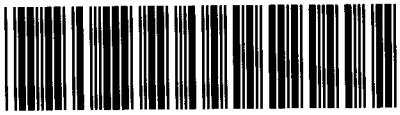

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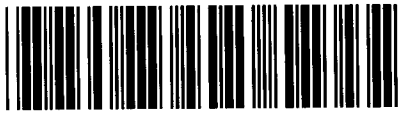

Item Number: 341

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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 (APRIL 12, 2016)

COMES NOW, Electric Reliability Council of Texas, Inc. (ERCOT) and respectfully informs the Public Utility Commission of Texas (PUCT, 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) 419 and 728 (unboxed language). These NPRRs were developed in the ERCOT committee process, and approved by the ERCOT Board of Directors (ERCOT Board) on April 17, 2012 (NPRR419) and December 8, 2015 (NPRR728). These NPRRs are described below.

NPRR	Description	ERCOT Nodal Protocol Sections Modified
419 **(unboxed due to system implementation)**	**Revise Real-Time Energy Imbalance and RMR Adjustment Charge.** This NPRR revises the Real-Time Energy Imbalance equations to determine intermediate data elements for the Resource's share of the generation site total revenues; revises the Resource Node, Load Zone, and Hub Real-Time Energy Imbalance equations to determine volumetric imbalance for each QSE and Settlement Point; and revises the Reliability Must-Run (RMR) Adjustment Charge to charge the QSE for the revenues paid in accordance with the energy imbalance calculation.	Section 6, Subsections 6.6.3.1, 6.6.3.2, 6.6.3.3, and 6.6.6.3 (Attachment A)

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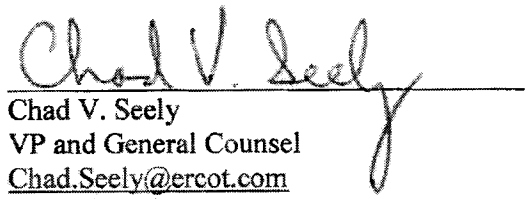
728 **(unboxed due to system implementation)**	**Removal of Language Related to NPRR484, Revisions to Congestion Revenue Rights Credit Calculations and Payments, and NPRR554, Clarification of Future Credit Exposure Calculation.** This NPRR removes portions of Protocol language, including definitions, introduced by NPRR484 related to Congestion Revenue Rights (CRR) Auction processes, payments and credit calculations, portions of NPRR554 related to the calculation of Future Credit Exposure (FCE), and the report posting requirement for Counter-Party FCE for Point-to-Point (PTP) Options and PTP Obligations.	Section 16, Subsection 16.11.4.7 (Attachment B)
	Administrative Changes. Non-substantive administrative changes were made such as spelling corrections, formatting, and correcting Section numbering and references.	Section 12, Subsections 12.2 and 12.4 (Attachment C) Section 14, Subsection 14.12 (Attachment D) Section 16, Subsection 16.11.4.1 (Attachment B)

The changes to the Nodal Protocol language as revised by the above NPRRs are shown in Attachments A through D 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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COUNCIL OF TEXAS, INC.

LIST OF ATTACHMENTS

ATTACHMENT A – Section 06-041216 Redline

ATTACHMENT B – Section 16-041216 Redline

ATTACHMENT C – Section 12-041216 Redline

ATTACHMENT D – Section 14-041216 Redline

ERCOT Nodal Protocols

Section 6: Adjustment Period and Real-Time Operations

April~~February~~ 12~~0~~, 2016

6 ADJUSTMENT PERIOD AND REAL-TIME OPERATIONS

6.6 Settlement Calculations for the Real-Time Energy Operations

6.6.3 Real-Time Energy Charges and Payments

6.6.3.1 Real-Time Energy Imbalance Payment or Charge at a Resource Node

(1) The payment or charge to each QSE for Energy Imbalance Service is calculated based on the Real-Time Settlement Point Price for the following amounts at a particular Resource Node Settlement Point:

(a) The energy produced by all its Generation Resources or consumed as WSL at the Settlement Point; plus

(b) The amount of its Self-Schedules with sink specified at the Settlement Point; plus

(c) The amount of its Day-Ahead Market (DAM) Energy Bids cleared in the DAM at the Settlement Point; plus

(d) The amount of its Energy Trades at the Settlement Point where the QSE is the buyer; minus

(e) The amount of its Self-Schedules with source specified at the Settlement Point; minus

(f) The amount of its energy offers cleared in the DAM at the Settlement Point; minus

(g) The amount of its Energy Trades at the Settlement Point where the QSE is the seller.

(2) The payment or charge to each QSE for Energy Imbalance Service at a Resource Node Settlement Point for a given 15-minute Settlement Interval is calculated as follows:

$$\mathbf{RTEIAMT}_{q,p} = (-1) * \{ \sum_{gsc} (\sum_{r} (\mathbf{RESREV}_{q,r,gsc,p})) + (\sum_{r} \mathbf{WSLAMTTOT}_{q,r,p}) + \mathbf{RTSPP}_{p} * [(\mathbf{SSSK}_{q,p} * 1/4) + (\mathbf{DAEP}_{q,p} * 1/4) + (\mathbf{RTQQEP}_{q,p} * 1/4) - (\mathbf{SSSR}_{q,p} * 1/4) - (\mathbf{DAES}_{q,p} * 1/4) - (\mathbf{RTQQES}_{q,p} * 1/4)] \}$$

Where:

$$\mathbf{RESREV}_{q,r,gsc,p} = \mathbf{GSPLITPER}_{q,r,gsc,p} * \mathbf{NMSAMTTOT}_{gsc}$$

$$\mathbf{RESMEB}_{q,r,gsc,p} = \mathbf{GSPLITPER}_{q,r,gsc,p} * \mathbf{NMRTETOT}_{gsc}$$

$$\mathbf{WSLTOT}_{q,p} = \sum_{r} \left(\sum_{b} \mathbf{MEBL}_{q,r,b} \right)$$

$$\mathbf{RNIMBAL}_{q,p} = \sum_{gsc} \left(\sum_{r} \mathbf{RESMEB}_{q,r,gsc,p} \right) + \mathbf{WSLTOT}_{q,p} + (\mathbf{SSSK}_{q,p} * 1/4) + (\mathbf{DAEP}_{q,p} * 1/4) + (\mathbf{RTQQEP}_{q,p} * 1/4) - (\mathbf{SSSR}_{q,p} * 1/4) - (\mathbf{DAES}_{q,p} * 1/4) - (\mathbf{RTQQES}_{q,p} * 1/4)$$

The above variables are defined as follows:

Variable	Unit	Description
$RTEIAMT_{q,p}$	$	*Real-Time Energy Imbalance Amount per QSE per Settlement Point*—The payment or charge to QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval.
$RNIMBAL_{q,p}$	MWh	*Resource Node Energy Imbalance per QSE per Settlement Point*—The Resource Node volumetric imbalance for QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval.
$RTSPP_{p}$	$/MWh	*Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval.
$SSSK_{q,p}$	MW	*Self-Schedule with Sink at Settlement Point per QSE per Settlement Point*—The QSE *q*'s Self-Schedule with sink at Settlement Point *p*, for the 15-minute Settlement Interval.
$DAEP_{q,p}$	MW	*Day-Ahead Energy Purchase per QSE per Settlement Point*—The QSE *q*'s DAM Energy Bids at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval.
$RTQQEP_{q,p}$	MW	*Real-Time QSE-to-QSE Energy Purchase per QSE per Settlement Point*—The amount of MW bought by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval.
$SSSR_{q,p}$	MW	*Self-Schedule with Source at Settlement Point per QSE per Settlement Point*—The QSE *q*'s Self-Schedule with source at Settlement Point *p*, for the 15-minute Settlement Interval.
$DAES_{q,p}$	MW	*Day-Ahead Energy Sale per QSE per Settlement Point*—The QSE *q*'s energy offers at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval.
$RTQQES_{q,p}$	MW	*Real-Time QSE-to-QSE Energy Sale per QSE per Settlement Point*—The amount of MW sold by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval.
$RESREV_{q,r,gsc,p}$	$	*Resource Share Revenue Settlement Payment*—The Resource share of the total payment to the entire Facility with a net metering arrangement attributed to Resource *r* that is part of a generation site code *gsc* for the QSE *q* at Settlement Point *p*.
$RESMEB_{q,r,gsc,p}$	MWh	*Resource Share Net Meter Real-Time Energy Total*—The Resource share of the net sum for all Settlement Meters attributed to Resource *r* that is part of a generation site code *gsc* for the QSE *q* at Settlement Point *p*.
$WSLTOT_{q,p}$	MWh	*WSL Total*—The total WSL energy metered by the Settlement Meters which measure WSL for the QSE *q* at Settlement Point *p*.
$MEBL_{q,r,b}$	MWh	*Metered Energy for Wholesale Storage Load at bus*—The WSL energy metered by the Settlement Meter which measures WSL for the 15-minute Settlement Interval represented as a negative value, for the QSE *q*, Resource *r*, at bus *b*.

Variable	Unit	Description
$NMSAMTTOT_{gsc}$	$	*Net Metering Settlement*—The total payment or charge to a generation site with a net metering arrangement.
$WSLAMTTOT_{q, r, p}$	$	*Wholesale Storage Load Settlement*—The total payment or charge to QSE *q*, Resource *r*, at Settlement Point *p*, for WSL for each 15-minute Settlement Interval.
$NMRETOT_{gsc}$	MWh	*Net Meter Real-Time Energy Total*—The net sum for all Settlement Meters included in generation site code *gsc*. A positive value indicates an injection of power to the ERCOT System.
$GSPLITPER_{q, r, gsc, p}$	none	*Generation Resource SCADA Splitting Percentage*—The generation allocation percentage for Resource *r* that is part of a net metering arrangement. GSPLITPER is calculated by taking the Supervisory Control and Data Acquisition (SCADA) values (GSSPLITSCA) for a particular Generation Resource *r* that is part of a net metering configuration and dividing by the sum of all SCADA values for all Resources that are included in the net metering configuration for each interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train.
q	none	A QSE.
p	none	A Resource Node Settlement Point.
r	none	A Generation Resource or an energy storage Load Resource that is located at the Facility with net metering.
gsc	none	A generation site code.
b	none	An Electrical Bus.

~~(2) The payment or charge to each QSE for Energy Imbalance Service at a Resource Node Settlement Point for a given 15-minute Settlement Interval is calculated as follows:~~

~~$$RTEIAMT_{q,p} = (-1) * \{\sum_{gsc}(\sum_{r}(GSPLITPER_{q,r,gsc,p} * NMSAMTTOT_{gsc}) + (\sum_{r} WSLAMTTOT_{q,r,p}) + RTSPP_{p} * [(SSSK_{q,p} * 1/4) + (DAEP_{q,p} * 1/4) + (RTQQEP_{q,p} * 1/4) - (SSSR_{q,p} * 1/4) - (DAES_{q,p} * 1/4) - (RTQQES_{q,p} * 1/4)]\}$$~~

~~The above variables are defined as follows:~~

~~Variable~~	~~Unit~~	~~Description~~
~~$RTEIAMT_{q,p}$~~	~~$~~	~~*Real-Time Energy Imbalance Amount per QSE per Settlement Point* – The payment or charge to QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval.~~
~~$RTSPP_{p}$~~	~~$/MWh~~	~~*Real-Time Settlement Point Price per Settlement Point* – The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval.~~
~~$SSSK_{q,p}$~~	~~MW~~	~~*Self-Schedule with Sink at Settlement Point per QSE per Settlement Point* – The QSE *q*'s Self-Schedule with sink at Settlement Point *p*, for the 15-minute Settlement Interval.~~
~~$DAEP_{q,p}$~~	~~MW~~	~~*Day-Ahead Energy Purchase per QSE per Settlement Point* – The QSE *q*'s DAM Energy Bids at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval.~~

Variable	Unit	Description
$RTQQEP_{q,p}$	MW	*Real-Time QSE-to-QSE Energy Purchase per QSE per Settlement Point* – The amount of MW bought by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval.
$SSSR_{q,p}$	MW	*Self-Schedule with Source at Settlement Point per QSE per Settlement Point* – The QSE *q*'s Self-Schedule with source at Settlement Point *p*, for the 15-minute Settlement Interval.
$DAES_{q,p}$	MW	*Day-Ahead Energy Sale per QSE per Settlement Point* – The QSE *q*'s energy offers at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval.
$RTQQES_{q,p}$	MW	*Real-Time QSE-to-QSE Energy Sale per QSE per Settlement Point* – The amount of MW sold by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval.
$NMSAMTTOT_{gse}$	$	*Net Metering Settlement* – The total payment or charge to a generation site with a net metering arrangement.
$WSLAMTTOT_{q,r,p}$	$	*Wholesale Storage Load Settlement* – The total payment or charge to QSE *q*, Resource *r*, at Settlement Point *p*, for WSL for each 15-minute Settlement Interval.
$GSPLITPER_{q,r,gse,p}$	none	*Generation Resource SCADA Splitting Percentage* – The generation allocation percentage for Resource *r* that is part of a net metering arrangement. GSPLITPER is calculated by taking the Supervisory Control and Data Acquisition (SCADA) values (GSSPLITSCA) for a particular Generation Resource *r* that is part of a net metering configuration and dividing by the sum of all SCADA values for all Resources that are included in the net metering configuration for each interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train.
q	none	A QSE.
p	none	A Resource Node Settlement Point.
r	none	A Generation Resource or an energy storage Load Resource that is located at the Facility with net metering.
gse	none	A generation site code.

[NPRR419: Replace paragraph (2) above with the following upon system implementation:]

(2) The payment or charge to each QSE for Energy Imbalance Service at a Resource Node Settlement Point for a given 15-minute Settlement Interval is calculated as follows:

$$RTEIAMT_{q,p} = (-1) * \{\sum_{gse}(\sum_{r}(RESREV_{q,r,gse,p})) + (\sum_{r} WSLAMTTOT_{q,r,p}) + RTSPP_{p} * [(SSSK_{q,p} * 1/4) + (DAEP_{q,p} * 1/4) + (RTQQEP_{q,p} * 1/4) - (SSSR_{q,p} * 1/4) - (DAES_{q,p} * 1/4) - (RTQQES_{q,p} * 1/4)]\}$$

Where:

$$RESREV_{q,r,gse,p} = GSPLITPER_{q,r,gse,p} * NMSAMTTOT_{gse}$$

$$RESMEB_{q,r,gse,p} = GSPLITPER_{q,r,gse,p} * NMRTETOT_{gse}$$

$$WSLTOT_{q,p} = \sum_{r} \left(\sum_{b} MEBL_{q,r,b} \right)$$

$$RNIMBAL_{q,p} = \sum_{gsc} \left(\sum_{r} RESMEB_{q,r,gsc,p} \right) + WSLTOT_{q,p} + (SSSK_{q,p} * 1/4) + (DAEP_{q,p} * 1/4) + (RTQQEP_{q,p} * 1/4) - (SSSR_{q,p} * 1/4) - (DAES_{q,p} * 1/4) - (RTQQES_{q,p} * 1/4)$$

The above variables are defined as follows:

Variable	Unit	Description
$RTEIAMT_{q,p}$	$	*Real-Time Energy Imbalance Amount per QSE per Settlement Point* – The payment or charge to QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval.
$RNIMBAL_{q,p}$	MWh	*Resource Node Energy Imbalance per QSE per Settlement Point* – The Resource Node volumetric imbalance for QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval.
$RTSPP_{p}$	$/MWh	*Real-Time Settlement Point Price per Settlement Point* – The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval.
$SSSK_{q,p}$	MW	*Self-Schedule with Sink at Settlement Point per QSE per Settlement Point* – The QSE *q*'s Self-Schedule with sink at Settlement Point *p*, for the 15-minute Settlement Interval.
$DAEP_{q,p}$	MW	*Day-Ahead Energy Purchase per QSE per Settlement Point* – The QSE *q*'s DAM Energy Bids at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval.
$RTQQEP_{q,p}$	MW	*Real-Time QSE-to-QSE Energy Purchase per QSE per Settlement Point* – The amount of MW bought by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval.
$SSSR_{q,p}$	MW	*Self-Schedule with Source at Settlement Point per QSE per Settlement Point* – The QSE *q*'s Self-Schedule with source at Settlement Point *p*, for the 15-minute Settlement Interval.
$DAES_{q,p}$	MW	*Day-Ahead Energy Sale per QSE per Settlement Point* – The QSE *q*'s energy offers at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval.
$RTQQES_{q,p}$	MW	*Real-Time QSE-to-QSE Energy Sale per QSE per Settlement Point* – The amount of MW sold by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval.
$RESREV_{q,r,gsc,p}$	$	*Resource Share Revenue Settlement Payment* – The Resource share of the total payment to the entire Facility with a net metering arrangement attributed to Resource *r* that is part of a generation site code *gsc* for the QSE *q* at Settlement Point *p*.
$RESMEB_{q,r,gsc,p}$	MWh	*Resource Share Net Meter Real-Time Energy Total* – The Resource share of the net sum for all Settlement Meters attributed to Resource *r* that is part of a generation site code *gsc* for the QSE *q* at Settlement Point *p*.
$WSLTOT_{q,p}$	MWh	*WSL Total* – The total WSL energy metered by the Settlement Meters which measure WSL for the QSE *q* at Settlement Point *p*.
$MEBL_{q,r,b}$	MWh	*Metered Energy for Wholesale Storage Load at bus* – The WSL energy metered by the Settlement Meter which measures WSL for the 15-minute Settlement Interval represented as a negative value, for the QSE *q*, Resource *r*, at bus *b*.

~~$NMSAMTTOT_{gse}$~~	~~$~~	~~*Net Metering Settlement* – The total payment or charge to a generation site with a net metering arrangement.~~
~~$WSLAMTTOT_{q,r,p}$~~	~~$~~	~~*Wholesale Storage Load Settlement* – The total payment or charge to QSE *q*, Resource *r*, at Settlement Point *p*, for WSL for each 15-minute Settlement Interval.~~
~~$NMRTETOT_{gse}$~~	~~MWh~~	~~*Net Meter Real-Time Energy Total* – The net sum for all Settlement Meters included in generation site code *gse*. A positive value indicates an injection of power to the ERCOT System.~~
~~$GSPLITPER_{q,r,gse,p}$~~	~~none~~	~~*Generation Resource SCADA Splitting Percentage* – The generation allocation percentage for Resource *r* that is part of a net metering arrangement. GSPLITPER is calculated by taking the Supervisory Control and Data Acquisition (SCADA) values (GSSPLITSCA) for a particular Generation Resource *r* that is part of a net metering configuration and dividing by the sum of all SCADA values for all Resources that are included in the net metering configuration for each interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train.~~
~~*q*~~	~~none~~	~~A QSE.~~
~~*p*~~	~~none~~	~~A Resource Node Settlement Point.~~
~~*r*~~	~~none~~	~~A Generation Resource or an energy storage Load Resource that is located at the Facility with net metering.~~
~~*gse*~~	~~none~~	~~A generation site code.~~
~~*b*~~	~~none~~	~~An Electrical Bus.~~

(3) For a facility with Settlement Meters that measure WSL, the total payment or charge for WSL is calculated for a QSE, energy storage Load Resource, and Settlement Point for each 15-minute Settlement Interval.

The WSL is settled as follows:

$$\mathbf{WSLAMTTOT}_{q,r,p} = \sum_{b} (\mathbf{RTRMPRWSL}_{b} * \mathbf{MEBL}_{q,r,b})$$

Where the price for Settlement Meter is determined as follows:

$$\mathbf{RTRMPRWSL}_{b} = \mathbf{Max}\ [-\$251, (\sum_{y} (\mathbf{RNWFL}_{b,y} * \mathbf{RTLMP}_{b,y}) + \mathbf{RTRSVPOR} + \mathbf{RTRDP})]$$

Where the weighting factor for the Electrical Bus associated with the meter is:

$$\mathbf{RNWFL}_{b,y} = [\mathbf{Max}\ (0.001, \sum_{r} \mathbf{TL}_{r,y})) * \mathbf{TLMP}_{y}] / [\sum_{y} \mathbf{Max}\ (0.001, \sum_{r} \mathbf{TL}_{r,y})) * \mathbf{TLMP}_{y}]$$

Where:

$$\text{RTRSVPOR} = \sum_{y} (\text{RNWF}_{y} * \text{RTORPA}_{y})$$

$$RTRDP = \sum_{y} (RNWF_{y} * RTORDPA_{y})$$

$$RNWF_{y} = TLMP_{y} / \sum_{y} TLMP_{y}$$

The summation is over all WSL *r* associated to the individual meter. The determination of which Resources are associated to an individual meter is static and based on the normal system configuration of the generation site code, *gsc*.

The above variables are defined as follows:

Variable	Unit	Description
$RTLMP_{b,y}$	$/MWh	*Real-Time Locational Marginal Price at bus per interval*—The Real-Time LMP for the meter at Electrical Bus *b*, for the SCED interval *y*.
$TLMP_{y}$	second	*Duration of SCED interval per interval*—The duration of the SCED interval *y*.
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.
$RTORPA_{y}$	$/MWh	*Real-Time On-Line Reserve Price Adder per interval*—The Real-Time On-Line Reserve Price Adder for 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 Settlement Interval.
$MEBL_{q,r,b}$	MWh	*Metered Energy for Wholesale Storage Load at bus*—The WSL energy metered by the Settlement Meter which measures WSL for the 15-minute Settlement Interval represented as a negative value, for the QSE *q*, Resource *r*, at bus *b*.
$WSLAMTTOT_{q,r,p}$	$	*Wholesale Storage Load Settlement*—The total payment or charge to QSE *q*, Resource *r*, at Settlement Point *p*, for WSL for each 15-minute Settlement Interval.
$RNWFL_{b,y}$	none	*Net meter Weighting Factor per interval for the Energy Metered as Wholesale Storage Load*—The weight factor used in net meter price calculation for meters in Electrical Bus *b*, for the SCED interval *y*, for the WSL associated with an energy storage Load Resource. The weighting factor used in the net meter price calculation shall not be recalculated after the fact due to revisions in the association of Resources to Settlement Meters.
$RTRMPRWSL_{b}$	$/MWh	*Real-Time Price for the Energy Metered as Wholesale Storage Load at bus*—The Real-Time price for the Settlement Meter which measures WSL at Electrical Bus *b*, for the 15-minute Settlement Interval.

Variable	Unit	Description
$TL_{r,y}$	MW	*Telemetered WSL charging per interval*—The telemetered Load associated with the energy storage Load Resource *r* for the SCED interval *y*.
gsc	none	A generation site code.
r	none	An energy storage 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.
b	none	An Electrical Bus.

(4) The total payment or charge to a Facility with a net metering arrangement for each 15-minute Settlement Interval shall be calculated as follows:

$$\mathbf{NMRTETOT}_{gsc} = \mathbf{Max}\left(0, \left(\sum_{b} \left(\mathbf{MEB}_{gsc,b} + \mathbf{MEBC}_{gsc,b}\right)\right)\right)$$

If $NMRTETOT_{gsc} = 0$ for a 15-minute Settlement Interval, then

The Load that is not WSL is included in the Real-Time AML per QSE and is included in the Real-Time energy imbalance payment or charge at a Load Zone.

Otherwise, when $NMRTETOT_{gsc} > 0$ for a 15-minute Settlement Interval, then

$$\mathbf{NMSAMTTOT}_{gsc} = \sum_{b} \left[\left(\mathbf{RTRMPR}_{b} * \mathbf{MEB}_{gsc,b}\right) + \left(\mathbf{RTRMPR}_{b} * \mathbf{MEBC}_{gsc,b}\right)\right]$$

Where the price for Settlement Meter is determined as follows:

$$\mathbf{RTRMPR}_{b} = \mathbf{Max}\left[\$251, \left(\sum_{y} \left(\mathbf{RNWF}_{b,y} * \mathbf{RTLMP}_{b,y}\right) + \mathbf{RTRSVPOR} + \mathbf{RTRDP}\right)\right]$$

Where the weighting factor for the Electrical Bus associated with the meter is:

$$\mathbf{RNWF}_{b,y} = \left[\mathbf{Max}\left(0.001, \sum_{r} \mathbf{BP}_{r,y}\right) * \mathbf{TLMP}_{y}\right] / \left[\sum_{y} \mathbf{Max}\left(0.001, \sum_{r} \mathbf{BP}_{r,y}\right) * \mathbf{TLMP}_{y}\right]$$

Where:

$$RTRSVPOR = \sum_{y} \left(RNWF_{y} * RTORPA_{y}\right)$$

$$RTRDP = \sum_{y} \left(RNWF_{y} * RTORDPA_{y}\right)$$

$$RNWF_{y} = TLMP_{y} / \sum_{y} TLMP_{y}$$

The summation is over all Resources *r* associated to the individual meter. The determination of which Resources are associated to an individual meter is static and based on the normal system configuration of the generation site code, *gsc*.

The above variables are defined as follows:

Variable	Unit	Description
NMRTETOT $_{gsc}$	MWh	*Net Meter Real-Time Energy Total*—The net sum for all Settlement Meters included in generation site code *gsc*. A positive value indicates an injection of power to the ERCOT System.
NMSAMTTOT $_{gsc}$	$	*Net Metering Settlement*—The total payment or charge to a generation site with a net metering arrangement.
RTRMPR $_{b}$	$/MWh	*Real-Time Price for the Energy Metered for each Resource meter at bus*—The Real-Time price for the Settlement Meter at Electrical Bus *b*, for the 15-minute Settlement Interval.
MEB $_{gsc, b}$	MWh	*Metered Energy at bus*—The metered energy by the Settlement Meter which is not upstream from another Settlement Meter which measures WSL for the 15-minute Settlement Interval. A positive value represents energy produced, and a negative value represents energy consumed.
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.
RTORPA $_{y}$	$/MWh	*Real-Time On-Line Reserve Price Adder per interval*—The Real-Time On-Line Reserve Price Adder for 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 Settlement Interval.
RTLMP $_{b, y}$	$/MWh	*Real-Time Locational Marginal Price at bus per interval*—The Real-Time LMP for the meter at Electrical Bus *b*, for the SCED interval *y*.
TLMP $_{y}$	second	*Duration of SCED interval per interval*—The duration of the SCED interval *y*.
RNWF $_{b, y}$	none	*Net meter Weighting Factor per interval*—The weight factor used in net meter price calculation for meters in Electrical Bus *b*, for the SCED interval *y*. The weighting factor used in the net meter price calculation shall not be recalculated after the fact due to revisions in the association of Resources to Settlement Meters.
BP $_{r, y}$	MW	*Base Point per Resource per interval*—The Base Point of Resource *r*, for the SCED interval *y*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.

Variable	Unit	Description
$MEBC_{gsc, b}$	MWh	*Metered Energy at bus (Calculated)*—The calculated energy for the 15-minute Settlement Interval for a Settlement Meter which is upstream from another Settlement Meter which measures WSL. A positive value represents energy produced, and a negative value represents energy consumed.
gsc	none	A generation site code.
r	none	A Generation Resource that is located at the Facility with net metering.
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.
b	none	An Electrical Bus.

(5) The Generation Resource SCADA Splitting Percentage for each Resource within a net metering arrangement for the 15-minute Settlement Interval is calculated as follows:

$$\mathbf{GSPLITPER}_{q,\ r,\ gsc,\ p} = \mathbf{GSSPLITSCA}_{r} / \sum_{r} \mathbf{GSSPLITSCA}_{r}$$

The above variables are defined as follows:

Variable	Unit	Definition
$GSPLITPER_{q, r, gsc, p}$	none	*Generation Resource SCADA Splitting Percentage*—The generation allocation percentage for Resource *r* that is part of a generation site code *gsc* for the QSE *q* at Settlement Point *p*. GSPLITPER is calculated by taking the SCADA values (GSSPLITSCA) for a particular Generation Resource *r* that is part of a net metering configuration and dividing by the sum of all SCADA values for all Resources that are included in the net metering configuration for each interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train.
$GSSPLITSCA_{r}$	MWh	*Generation Resource SCADA Net Real Power provided via Telemetry*—The net real power provided via telemetry per Resource within the net metering arrangement, integrated for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train.
gsc	none	A generation site code.
r	none	A Generation Resource that is located at the Facility with net metering.
q	none	A QSE.
p	none	A Resource Node Settlement Point.

(6) The total net payments and charges to each QSE for Energy Imbalance Service at all Resource Node Settlement Points for the 15-minute Settlement Interval is calculated as follows:

$$\mathbf{RTEIAMTQSETOT}_{q} = \sum_{p} \mathbf{RTEIAMT}_{q,p}$$

The above variables are defined as follows:

Variable	Unit	Definition

Variable	Unit	Definition
RTEIAMTQSETOT $_q$	$	*Real-Time Energy Imbalance Amount QSE Total per QSE*—The total net payments and charges to QSE *q* for Real-Time Energy Imbalance Service at all Resource Node Settlement Points for the 15-minute Settlement Interval.
RTEIAMT $_{q,p}$	$	*Real-Time Energy Imbalance Amount per QSE per Settlement Point*—The payment or charge to QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval.
q	none	A QSE.
p	none	A Resource Node Settlement Point.

6.6.3.2 Real-Time Energy Imbalance Payment or Charge at a Load Zone

(1) The payment or charge to each QSE for Energy Imbalance Service is calculated based on the Real-Time Settlement Point Price for the following amounts at a particular Load Zone Settlement Point:

(a) The amount of its Self-Schedules with sink specified at the Settlement Point; plus

(b) The amount of its DAM Energy Bids cleared in the DAM at the Settlement Point; plus

(c) The amount of its Energy Trades at the Settlement Point where the QSE is the buyer; minus

(d) The amount of its Self-Schedules with source specified at the Settlement Point; minus

(e) The amount of its energy offers cleared in the DAM at the Settlement Point; minus

(f) The amount of its Energy Trades at the Settlement Point where the QSE is the seller; minus

(g) Its AML at the Settlement Point; plus

(h) The aggregated generation of its Non-Modeled Generators in the Load Zone.

(2) The payment or charge to each QSE for Energy Imbalance Service at a Load Zone for a given 15-minute Settlement Interval is calculated as follows:

$$\mathbf{RTEIAMT}_{q,p} = (-1) * \{[\mathbf{RTSPP}_p * [(\mathbf{SSSK}_{q,p} * 1/4) + (\mathbf{DAEP}_{q,p} * 1/4) + (\mathbf{RTQQEP}_{q,p} * 1/4) - (\mathbf{SSSR}_{q,p} * 1/4) - (\mathbf{DAES}_{q,p} * 1/4) - (\mathbf{RTQQES}_{q,p} * 1/4)]] + [\mathbf{RTSPPEW}_p * (\mathbf{RTMGNM}_{q,p} - \mathbf{RTAML}_{q,p})]\}$$

And

$$LZIMBAL_{q,p} = (SSSK_{q,p} * 1/4) + (DAEP_{q,p} * 1/4) + (RTQQEP_{q,p} * 1/4) - (SSSR_{q,p} * 1/4) - (DAES_{q,p} * 1/4) - (RTQQES_{q,p} * 1/4) - RTAML_{q,p} + RTMGNM_{q,p}$$

The above variables are defined as follows:

Variable	Unit	Description
$RTEIAMT_{q,p}$	$	*Real-Time Energy Imbalance Amount per QSE per Settlement Point*—The payment or charge to QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval.
$RTSPP_{p}$	$/MWh	*Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval.
$LZIMBAL_{q,p}$	MWh	*Load Zone Energy Imbalance per QSE per Settlement Point*—The Load Zone volumetric imbalance for QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval.
$RTSPPEW_{p}$	$/MWh	*Real-Time Settlement Point Price Energy-Weighted*—The Real-Time Settlement Point Price at the Settlement Point *p*, for the 15-minute Settlement Interval that is weighted by the State Estimated Load for the Load Zone of each SCED interval within the 15-minute Settlement Interval.
$RTAML_{q,p}$	MWh	*Real-Time Adjusted Metered Load per QSE per Settlement Point*—The sum of the AML at the Electrical Buses that are included in Settlement Point *p* represented by QSE *q* for the 15-minute Settlement Interval.
$SSSK_{q,p}$	MW	*Self-Schedule with Sink at Settlement Point per QSE per Settlement Point*—The QSE *q*'s Self-Schedule with sink at Settlement Point *p*, for the 15-minute Settlement Interval.
$DAEP_{q,p}$	MW	*Day-Ahead Energy Purchase per QSE per Settlement Point*—The QSE *q*'s DAM Energy Bids at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval.
$RTQQEP_{q,p}$	MW	*Real-Time QSE-to-QSE Energy Purchase per QSE per Settlement Point*—The amount of MW bought by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval.
$SSSR_{q,p}$	MW	*Self-Schedule with Source at Settlement Point per QSE per Settlement Point*—The QSE *q*'s Self-Schedule with source at Settlement Point *p*, for the 15-minute Settlement Interval.
$DAES_{q,p}$	MW	*Day-Ahead Energy Sale per QSE per Settlement Point*—The QSE *q*'s energy offers at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval.
$RTQQES_{q,p}$	MW	*Real-Time QSE-to-QSE Energy Sale per QSE per Settlement Point*—The amount of MW sold by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval.
$RTMGNM_{q,p}$	MWh	*Real-Time Metered Generation from Non-Modeled generators per QSE per Settlement Point*—The total Real-Time energy produced by Non-Modeled Generators represented by QSE *q* in Load Zone Settlement Point *p*, for the 15-minute Settlement Interval.
q	none	A QSE.
p	none	A Load Zone Settlement Point.

~~(2) The payment or charge to each QSE for Energy Imbalance Service at a Load Zone for a given 15-minute Settlement Interval is calculated as follows:~~

$$RTEIAMT_{q,p} = (-1) * \{[RTSPP_p * [(SSSK_{q,p} * 1/4) + (DAEP_{q,p} * 1/4) + (RTQQEP_{q,p} * 1/4) - (SSSR_{q,p} * 1/4) - (DAES_{q,p} * 1/4) - (RTQQES_{q,p} * 1/4)]] + [RTSPPEW_p * (RTMGNM_{q,p} - RTAML_{q,p})]\}$$

The above variables are defined as follows:

Variable	Unit	Description
$RTEIAMT_{q,p}$	$	*Real-Time Energy Imbalance Amount per QSE per Settlement Point* – The payment or charge to QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval.
$RTSPP_p$	$/MWh	*Real-Time Settlement Point Price per Settlement Point* – The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval.
$RTSPPEW_p$	$/MWh	*Real-Time Settlement Point Price Energy Weighted* – The Real-Time Settlement Point Price at the Settlement Point *p*, for the 15-minute Settlement Interval that is weighted by the State Estimated Load for the Load Zone of each SCED interval within the 15-minute Settlement Interval.
$RTAML_{q,p}$	MWh	*Real-Time Adjusted Metered Load per QSE per Settlement Point* – The sum of the AML at the Electrical Buses that are included in Settlement Point *p* represented by QSE *q* for the 15-minute Settlement Interval.
$SSSK_{q,p}$	MW	*Self-Schedule with Sink at Settlement Point per QSE per Settlement Point* – The QSE *q*'s Self-Schedule with sink at Settlement Point *p*, for the 15-minute Settlement Interval.
$DAEP_{q,p}$	MW	*Day-Ahead Energy Purchase per QSE per Settlement Point* – The QSE *q*'s DAM Energy Bids at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval.
$RTQQEP_{q,p}$	MW	*Real-Time QSE-to-QSE Energy Purchase per QSE per Settlement Point* – The amount of MW bought by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval.
$SSSR_{q,p}$	MW	*Self-Schedule with Source at Settlement Point per QSE per Settlement Point* – The QSE *q*'s Self-Schedule with source at Settlement Point *p*, for the 15-minute Settlement Interval.
$DAES_{q,p}$	MW	*Day-Ahead Energy Sale per QSE per Settlement Point* – The QSE *q*'s energy offers at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval.
$RTQQES_{q,p}$	MW	*Real-Time QSE-to-QSE Energy Sale per QSE per Settlement Point* – The amount of MW sold by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval.
$RTMGNM_{q,p}$	MWh	*Real-Time Metered Generation from Non-Modeled generators per QSE per Settlement Point* – The total Real-Time energy produced by Non-Modeled Generators represented by QSE *q* in Load Zone Settlement Point *p*, for the 15-minute Settlement Interval.
q	none	A QSE.
p	none	A Load Zone Settlement Point.

[NPRR419: Replace paragraph (2) above with the following upon system implementation:]

(2) The payment or charge to each QSE for Energy Imbalance Service at a Load Zone for a given 15-minute Settlement Interval is calculated as follows:

$$RTEIAMT_{q,p} = (-1) * \{[RTSPP_p * [(SSSK_{q,p} * ¼) + (DAEP_{q,p} * ¼) + (RTQQEP_{q,p} * ¼) - (SSSR_{q,p} * ¼) - (DAES_{q,p} * ¼) - (RTQQES_{q,p} * ¼)]] + [RTSPPEW_p * (RTMGNM_{q,p} - RTAML_{q,p})]\}$$

And

$$LZIMBAL_{q,p} = (SSSK_{q,p} * ¼) + (DAEP_{q,p} * ¼) + (RTQQEP_{q,p} * ¼) - (SSSR_{q,p} * ¼) - (DAES_{q,p} * ¼) - (RTQQES_{q,p} * ¼) - RTAML_{q,p} + RTMGNM_{q,p}$$

The above variables are defined as follows:

Variable	Unit	Description
$RTEIAMT_{q,p}$	$	*Real-Time Energy Imbalance Amount per QSE per Settlement Point* – The payment or charge to QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval.
$RTSPP_p$	$/MWh	*Real-Time Settlement Point Price per Settlement Point* – The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval.
$LZIMBAL_{q,p}$	MWh	*Load Zone Energy Imbalance per QSE per Settlement Point* – The Load Zone volumetric imbalance for QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval.
$RTSPPEW_p$	$/MWh	*Real-Time Settlement Point Price Energy-Weighted* – The Real-Time Settlement Point Price at the Settlement Point *p*, for the 15-minute Settlement Interval that is weighted by the State Estimated Load for the Load Zone of each SCED interval within the 15-minute Settlement Interval.
$RTAML_{q,p}$	MWh	*Real-Time Adjusted Metered Load per QSE per Settlement Point* – The sum of the AML at the Electrical Buses that are included in Settlement Point *p* represented by QSE *q* for the 15-minute Settlement Interval.
$SSSK_{q,p}$	MW	*Self-Schedule with Sink at Settlement Point per QSE per Settlement Point* – The QSE *q*'s Self-Schedule with sink at Settlement Point *p*, for the 15-minute Settlement Interval.
$DAEP_{q,p}$	MW	*Day-Ahead Energy Purchase per QSE per Settlement Point* – The QSE *q*'s DAM Energy Bids at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval.
$RTQQEP_{q,p}$	MW	*Real-Time QSE-to-QSE Energy Purchase per QSE per Settlement Point* – The amount of MW bought by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval.
$SSSR_{q,p}$	MW	*Self-Schedule with Source at Settlement Point per QSE per Settlement Point* – The QSE *q*'s Self-Schedule with source at Settlement Point *p*, for the 15-minute Settlement Interval.
$DAES_{q,p}$	MW	*Day-Ahead Energy Sale per QSE per Settlement Point* – The QSE *q*'s energy offers at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval.
$RTQQES_{q,p}$	MW	*Real-Time QSE-to-QSE Energy Sale per QSE per Settlement Point* – The amount of MW sold by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval.
$RTMGNM_{q,p}$	MWh	*Real-Time Metered Generation from Non-Modeled generators per QSE per Settlement Point* – The total Real-Time energy produced by Non-Modeled Generators represented by QSE *q* in Load Zone Settlement Point *p*, for the 15-minute Settlement Interval.
q	none	A QSE.

~~*p*~~	~~none~~	~~A Load Zone Settlement Point.~~

(3) The total net payments and charges to each QSE for Energy Imbalance Service at all Load Zones for the 15-minute Settlement Interval is calculated as follows:

$$\mathbf{RTEIAMTQSETOT}_{q} = \sum_{p} \mathbf{RTEIAMT}_{q,p}$$

The above variables are defined as follows:

Variable	Unit	Definition
RTEIAMTQSETOT $_q$	$	*Real-Time Energy Imbalance Amount QSE Total per QSE*—The total net payments and charges to QSE *q* for Real-Time Energy Imbalance Service at all Load Zone Settlement Points for the 15-minute Settlement Interval.
RTEIAMT $_{q,p}$	$	*Real-Time Energy Imbalance Amount per QSE per Settlement Point*—The charge to QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval.
q	none	A QSE.
p	none	A Load Zone Settlement Point.

6.6.3.3 Real-Time Energy Imbalance Payment or Charge at a Hub

(1) The payment or charge to each QSE for Energy Imbalance Service is calculated based on the Real-Time Settlement Point Price for the following amounts at a particular Hub Settlement Point:

(a) The amount of its Self-Schedules with sink specified at the Settlement Point; plus

(b) The amount of its DAM Energy Bids cleared in the DAM at the Settlement Point; plus

(c) The amount of its Energy Trades at the Settlement Point where the QSE is the buyer; minus

(d) The amount of its Self-Schedules with source specified at the Settlement Point; minus

(e) The amount of its energy offers cleared in the DAM at the Settlement Point; minus

(f) The amount of its Energy Trades at the Settlement Point where the QSE is the seller.

(2) The payment or charge to each QSE for Energy Imbalance Service at a Hub for a given 15-minute Settlement Interval is calculated as follows:

$$\mathbf{RTEIAMT}_{q,p} = (-1) * \mathbf{RTSPP}_{p} * \{(\mathbf{SSSK}_{q,p} * 1/4) + (\mathbf{DAEP}_{q,p} * 1/4) + (\mathbf{RTQQEP}_{q,p} * 1/4) - (\mathbf{SSSR}_{q,p} * 1/4) - (\mathbf{DAES}_{q,p} * 1/4) - (\mathbf{RTQQES}_{q,p} * 1/4)\}$$

And

$$\mathbf{HBIMBAL}_{q,p} = (\mathbf{SSSK}_{q,p} * 1/4) + (\mathbf{DAEP}_{q,p} * 1/4) + (\mathbf{RTQQEP}_{q,p} * 1/4) - (\mathbf{SSSR}_{q,p} * 1/4) - (\mathbf{DAES}_{q,p} * 1/4) - (\mathbf{RTQQES}_{q,p} * 1/4)$$

The above variables are defined as follows:

Variable	Unit	Description
$RTEIAMT_{q,p}$	$	*Real-Time Energy Imbalance Amount per QSE per Settlement Point*—The payment or charge to QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval.
$HBIMBAL_{q,p}$	MWh	*Hub Energy Imbalance per QSE per Settlement Point*—The Hub volumetric imbalance for QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval.
$RTSPP_{p}$	$/MWh	*Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval.
$SSSK_{q,p}$	MW	*Self-Schedule with Sink at Settlement Point per QSE per Settlement Point*—The QSE *q*'s Self-Schedule with sink at Settlement Point *p*, for the 15-minute Settlement Interval.
$DAEP_{q,p}$	MW	*Day-Ahead Energy Purchase per QSE per Settlement Point*—The QSE *q*'s DAM Energy Bids at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval.
$RTQQEP_{q,p}$	MW	*Real-Time QSE-to-QSE Energy Purchase per QSE per Settlement Point*—The amount of MW bought by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval.
$SSSR_{q,p}$	MW	*Self-Schedule with Source at Settlement Point per QSE per Settlement Point*—The QSE *q*'s Self-Schedule with source at Settlement Point *p*, for the 15-minute Settlement Interval.
$DAES_{q,p}$	MW	*Day-Ahead Energy Sale per QSE per Settlement Point*—The QSE *q*'s Energy Offers at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval.
$RTQQES_{q,p}$	MW	*Real-Time QSE-to-QSE Energy Sale per QSE per Settlement Point*—The amount of MW sold by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval.
q	none	A QSE.
p	none	A Hub Settlement Point.

~~(2) The payment or charge to each QSE for Energy Imbalance Service at a Hub for a given 15-minute Settlement Interval is calculated as follows:~~

~~$$\mathbf{RTEIAMT}_{q,p} = (-1) * \mathbf{RTSPP}_{p} * \{(\mathbf{SSSK}_{q,p} * 1/4) + (\mathbf{DAEP}_{q,p} * 1/4) + (\mathbf{RTQQEP}_{q,p} * 1/4) - (\mathbf{SSSR}_{q,p} * 1/4) - (\mathbf{DAES}_{q,p} * 1/4) - (\mathbf{RTQQES}_{q,p} * 1/4)\}$$~~

~~The above variables are defined as follows:~~

~~Variable~~	~~Unit~~	~~Description~~

Variable	Unit	Description
$RTEIAMT_{q,p}$	$	*Real-Time Energy Imbalance Amount per QSE per Settlement Point* – The payment or charge to QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval.
$RTSPP_p$	$/MWh	*Real-Time Settlement Point Price per Settlement Point* – The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval.
$SSSK_{q,p}$	MW	*Self-Schedule with Sink at Settlement Point per QSE per Settlement Point* – The QSE *q*'s Self-Schedule with sink at Settlement Point *p*, for the 15-minute Settlement Interval.
$DAEP_{q,p}$	MW	*Day-Ahead Energy Purchase per QSE per Settlement Point* – The QSE *q*'s DAM Energy Bids at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval.
$RTQQEP_{q,p}$	MW	*Real-Time QSE-to-QSE Energy Purchase per QSE per Settlement Point* – The amount of MW bought by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval.
$SSSR_{q,p}$	MW	*Self-Schedule with Source at Settlement Point per QSE per Settlement Point* – The QSE *q*'s Self-Schedule with source at Settlement Point *p*, for the 15-minute Settlement Interval.
$DAES_{q,p}$	MW	*Day-Ahead Energy Sale per QSE per Settlement Point* – The QSE *q*'s Energy Offers at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval.
$RTQQES_{q,p}$	MW	*Real-Time QSE-to-QSE Energy Sale per QSE per Settlement Point* – The amount of MW sold by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval.
q	none	A QSE.
p	none	A Hub Settlement Point.

[NPRR419: Replace paragraph (2) above with the following upon system implementation:]

(2) The payment or charge to each QSE for Energy Imbalance Service at a Hub for a given 15-minute Settlement Interval is calculated as follows:

$$RTEIAMT_{q,p} = (-1) * RTSPP_p * \{(SSSK_{q,p} * ¼) + (DAEP_{q,p} * ¼) + (RTQQEP_{q,p} * ¼) - (SSSR_{q,p} * ¼) - (DAES_{q,p} * ¼) - (RTQQES_{q,p} * ¼)\}$$

And

$$HBIMBAL_{q,p} = (SSSK_{q,p} * ¼) + (DAEP_{q,p} * ¼) + (RTQQEP_{q,p} * ¼) - (SSSR_{q,p} * ¼) - (DAES_{q,p} * ¼) - (RTQQES_{q,p} * ¼)$$

The above variables are defined as follows:

Variable	Unit	Description
$RTEIAMT_{q,p}$	$	*Real-Time Energy Imbalance Amount per QSE per Settlement Point* – The payment or charge to QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval.
$HBIMBAL_{q,p}$	MWh	*Hub Energy Imbalance per QSE per Settlement Point* – The Hub volumetric imbalance for QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval.

~~$RTSPP_p$~~	~~$/MWh~~	~~*Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval.~~
~~$SSSK_{q,p}$~~	~~MW~~	~~*Self-Schedule with Sink at Settlement Point per QSE per Settlement Point*—The QSE *q*'s Self-Schedule with sink at Settlement Point *p*, for the 15-minute Settlement Interval.~~
~~$DAEP_{q,p}$~~	~~MW~~	~~*Day-Ahead Energy Purchase per QSE per Settlement Point*—The QSE *q*'s DAM Energy Bids at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval.~~
~~$RTQQEP_{q,p}$~~	~~MW~~	~~*Real-Time QSE-to-QSE Energy Purchase per QSE per Settlement Point*—The amount of MW bought by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval.~~
~~$SSSR_{q,p}$~~	~~MW~~	~~*Self-Schedule with Source at Settlement Point per QSE per Settlement Point*—The QSE *q*'s Self-Schedule with source at Settlement Point *p*, for the 15-minute Settlement Interval.~~
~~$DAES_{q,p}$~~	~~MW~~	~~*Day-Ahead Energy Sale per QSE per Settlement Point*—The QSE *q*'s Energy Offers at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval.~~
~~$RTQQES_{q,p}$~~	~~MW~~	~~*Real-Time QSE-to-QSE Energy Sale per QSE per Settlement Point*—The amount of MW sold by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval.~~
~~*q*~~	~~none~~	~~A QSE.~~
~~*p*~~	~~none~~	~~A Hub Settlement Point.~~

(3) The total net payments and charges to each QSE for Energy Imbalance Service at all Hubs for the 15-minute Settlement Interval is calculated as follows:

$$\mathbf{RTEIAMTQSETOT}_q = \sum_p \mathbf{RTEIAMT}_{q,p}$$

The above variables are defined as follows:

Variable	Unit	Definition
$RTEIAMTQSETOT_q$	$	*Real-Time Energy Imbalance Amount QSE Total per QSE*—The total net payments and charges to QSE *q* for Real-Time Energy Imbalance at all Hub Settlement Points for the 15-minute Settlement Interval.
$RTEIAMT_{q,p}$	$	*Real-Time Energy Imbalance Amount per QSE per Settlement Point*—The charge to QSE *q* for the Real-Time Energy Imbalance at Settlement Point *p*, for the 15-minute Settlement Interval.
q	none	A QSE.
p	none	A Hub Settlement Point.

6.6.6 Reliability Must-Run Settlement

6.6.6.3 RMR Adjustment Charge

(1) Each QSE that represents an RMR Unit shall pay a charge designed to recover the net total revenues from RUC settlements, and from Real-Time settlements received by that QSE for all RMR Units that it represents, except that the charge does not include net revenues received by the QSE for the RMR Standby Payments calculated under Section

6.6.6.1, RMR Standby Payment, and the RMR energy payments calculated under Section 6.6.6.2, RMR Payment for Energy.

(2) The charge for each QSE representing an RMR Unit for a given Operating Hour is calculated as follows:

$$\mathbf{RMRAAMT}_{q} = \mathbf{(-1) * [\sum_{p}\sum_{r}((-1) * RESREV_{q,r,gsc,p} + \sum_{i=1}^{4} EMREAMT_{q,r,p,i} + RUCMWAMT_{q,r,p} + RUCCBAMT_{q,r,p} + RUCDCAMT_{q,r,p} + \sum_{i=1}^{4} VSSEAMT_{q,r,p,i} + \sum_{i=1}^{4} VSSVARAMT_{q,r,i})]}$$

The above variables are defined as follows:

Variable	Unit	Definition
$RMRAAMT_q$	$	*RMR Adjustment Charge per QSE*—The adjustment from QSE *q* Standby Payments and energy payments for all RMR Units represented by this QSE, for the revenues received for the same RMR Units from RUC and Real-Time operations, for the hour.
$EMREAMT_{q,r,p,i}$	$	*Emergency Energy Amount per QSE per Settlement Point per unit per interval*—The payment to QSE *q* for the additional energy produced by RMR Unit *r* at Resource Node *p* in Real-Time during the Emergency Condition, for the 15-minute Settlement Interval *i*. Payment for emergency energy is made to the Combined Cycle Train.
$RESREV_{q,r,gsc,p}$	$	*Resource Share Revenue Settlement Payment*—The RMR Resource share of the total payment to the entire Facility with a net metering arrangement attributed to Resource *r* that is part of a generation site code *gsc* for the QSE *q* at Settlement Point *p*.
$RUCMWAMT_{q,r,p}$	$	*RUC Make-Whole Amount per QSE per Settlement Point per unit*—The amount calculated for RMR Unit *r* committed in RUC at Resource Node *p* to make whole the Startup Cost and minimum-energy cost of this unit, for the hour. See Section 5.7.1, RUC Make-Whole Payment. When one or more Combined Cycle Generation Resources are committed by RUC, payment is made to the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources.
$RUCCBAMT_{q,r}$	$	*RUC Clawback Charge per QSE per unit*—The RUC Clawback Charge to QSE *q* for RMR Unit *r*, for the hour. See Section 5.7.2, RUC Clawback Charge. When one or more Combined Cycle Generation Resources are committed by RUC, a charge is made to the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources.
$RUCDCAMT_{q,r,p}$	$	*RUC Decommitment Amount per QSE per Settlement Point per unit*—The amount calculated for RMR Unit *r* at Resource Node *p* represented by QSE *q* due to ERCOT de-commitment, for the hour. When one or more Combined Cycle Generation Resources are decommitted by RUC, payment is made to the Combined Cycle Train for all RUC-decommitted Combined Cycle Generation Resources.
$VSSEAMT_{q,r,p,i}$	$	*Voltage Support Service Energy Amount per QSE per Settlement Point per unit per interval* —The compensation to QSE *q* for ERCOT-directed power reduction from RMR Unit *r* at Resource Node *p* to provide Voltage Support Service (VSS), for the 15-minute Settlement Interval *i*. Payment for VSS is made to the Combined Cycle Train.

Variable	Unit	Definition
VSSVARAMT $_{q, r, i}$	$	*Voltage Support Service VAr Amount per QSE per Unit*—The payment to QSE *q* for the VSS provided by RMR Unit *r*, for the 15-minute Settlement Interval *i*. Payment for VSS is made to the Combined Cycle Train.
q	none	A QSE.
gsc	none	A generation site code.
p	none	A Resource Node Settlement Point.
r	none	An RMR Unit.
i	none	A 15-minute Settlement Interval in the hour.

~~(2) The charge for each QSE representing an RMR Unit for a given Operating Hour is calculated as follows:~~

$$\text{RMRAAMT}_q = (-1) * [\sum_p \sum_r (((-1) * \sum_{i=1}^{4} (\text{RTMG}_{q,r,p,i} * \text{RTSPP}_{p,i})) + \sum_{i=1}^{4} \text{EMREAMT}_{q,r,p,i} + \text{RUCMWAMT}_{q,r,p} + \text{RUCCBAMT}_{q,r,p} + \text{RUCDCAMT}_{q,r,p} + \sum_{i=1}^{4} \text{VSSEAMT}_{q,r,p,i} + \sum_{i=1}^{4} \text{VSSVARAMT}_{q,r,i})]$$

~~The above variables are defined as follows:~~

~~Variable~~	~~Unit~~	~~Definition~~
~~RMRAAMT $_q$~~	~~$~~	~~*RMR Adjustment Charge per QSE* – The adjustment from QSE *q* Standby Payments and energy payments for all RMR Units represented by this QSE, for the revenues received for the same RMR Units from RUC and Real-Time operations, for the hour.~~
~~EMREAMT $_{q, r, p, i}$~~	~~$~~	~~*Emergency Energy Amount per QSE per Settlement Point per unit per interval* – The payment to QSE *q* for the additional energy produced by RMR Unit *r* at Resource Node *p* in Real-Time during the Emergency Condition, for the 15-minute Settlement Interval *i*. Payment for emergency energy is made to the Combined Cycle Train.~~
~~RUCMWAMT $_{q, r, p}$~~	~~$~~	~~*RUC Make-Whole Amount per QSE per Settlement Point per unit* – The amount calculated for RMR Unit *r* committed in RUC at Resource Node *p* to make whole the Startup Cost and minimum energy cost of this unit, for the hour. See Section 5.7.1, RUC Make-Whole Payment. When one or more Combined Cycle Generation Resources are committed by RUC, payment is made to the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources.~~
~~RUCCBAMT $_{q, r}$~~	~~$~~	~~*RUC Clawback Charge per QSE per unit* – The RUC Clawback Charge to QSE *q* for RMR Unit *r*, for the hour. See Section 5.7.2, RUC Clawback Charge. When one or more Combined Cycle Generation Resources are committed by RUC, a charge is made to the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources.~~

Variable	Unit	Definition
$RUCDCAMT_{q,r,p}$	$	*RUC Decommitment Amount per QSE per Settlement Point per unit* – The amount calculated for RMR Unit *r* at Resource Node *p* represented by QSE *q* due to ERCOT de-commitment, for the hour. When one or more Combined Cycle Generation Resources are decommitted by RUC, payment is made to the Combined Cycle Train for all RUC-decommitted Combined Cycle Generation Resources.
$VSSEAMT_{q,r,p,i}$	$	*Voltage Support Service Energy Amount per QSE per Settlement Point per unit per interval* – The compensation to QSE *q* for ERCOT-directed power reduction from RMR Unit *r* at Resource Node *p* to provide Voltage Support Service (VSS), for the 15-minute Settlement Interval *i*. Payment for VSS is made to the Combined Cycle Train.
$VSSVARAMT_{q,r,i}$	$	*Voltage Support Service VAr Amount per QSE per Unit* – The payment to QSE *q* for the VSS provided by RMR Unit *r*, for the 15-minute Settlement Interval *i*. Payment for VSS is made to the Combined Cycle Train.
$RTSPP_{p,i}$	$/MWh	*Real-Time Settlement Point Price per Settlement Point* – The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*.
$RTMG_{q,r,p,i}$	MWh	*Real-Time Metered Generation per QSE per Settlement Point per Resource* – The Real-Time energy produced by the Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train.
q	none	A QSE.
p	none	A Resource Node Settlement Point.
r	none	An RMR Unit.
i	none	A 15-minute Settlement Interval in the hour.

[NPRR419: Replace paragraph (2) above with the following upon system implementation:]

(2) The charge for each QSE representing an RMR Unit for a given Operating Hour is calculated as follows:

$$RMRAAMT_q = (-1) * [\sum_p \sum_r ((-1) * RESREV_{q,r,gse,p} + \sum_{i=1}^{4} EMREAMT_{q,r,p,i} + RUCMWAMT_{q,r,p} + RUCCBAMT_{q,r,p} + RUCDCAMT_{q,r,p} + \sum_{i=1}^{4} VSSEAMT_{q,r,p,i} + \sum_{i=1}^{4} VSSVARAMT_{q,r,i})]$$

The above variables are defined as follows:

Variable	Unit	Definition
$RMRAAMT_q$	$	*RMR Adjustment Charge per QSE* – The adjustment from QSE *q* Standby Payments and energy payments for all RMR Units represented by this QSE, for the revenues received for the same RMR Units from RUC and Real-Time operations, for the hour.

EMREAMT$_{q,r,p,i}$	$	*Emergency Energy Amount per QSE per Settlement Point per unit per interval* – The payment to QSE *q* for the additional energy produced by RMR Unit *r* at Resource Node *p* in Real-Time during the Emergency Condition, for the 15-minute Settlement Interval *i*. Payment for emergency energy is made to the Combined Cycle Train.
RESREV$_{q,r,gse,p}$	$	*Resource Share Revenue Settlement Payment* – The RMR Resource share of the total payment to the entire Facility with a net metering arrangement attributed to Resource *r* that is part of a generation site code *gse* for the QSE *q* at Settlement Point *p*.
RUCMWAMT$_{q,r,p}$	$	*RUC Make-Whole Amount per QSE per Settlement Point per unit* – The amount calculated for RMR Unit *r* committed in RUC at Resource Node *p* to make whole the Startup Cost and minimum-energy cost of this unit, for the hour. See Section 5.7.1, RUC Make-Whole Payment. When one or more Combined Cycle Generation Resources are committed by RUC, payment is made to the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources.
RUCCBAMT$_{q,r}$	$	*RUC Clawback Charge per QSE per unit* – The RUC Clawback Charge to QSE *q* for RMR Unit *r*, for the hour. See Section 5.7.2, RUC Clawback Charge. When one or more Combined Cycle Generation Resources are committed by RUC, a charge is made to the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources.
RUCDCAMT$_{q,r,p}$	$	*RUC Decommitment Amount per QSE per Settlement Point per unit* – The amount calculated for RMR Unit *r* at Resource Node *p* represented by QSE *q* due to ERCOT de-commitment, for the hour. When one or more Combined Cycle Generation Resources are decommitted by RUC, payment is made to the Combined Cycle Train for all RUC-decommitted Combined Cycle Generation Resources.
VSSEAMT$_{q,r,p,i}$	$	*Voltage Support Service Energy Amount per QSE per Settlement Point per unit per interval* – The compensation to QSE *q* for ERCOT-directed power reduction from RMR Unit *r* at Resource Node *p* to provide Voltage Support Service (VSS), for the 15-minute Settlement Interval *i*. Payment for VSS is made to the Combined Cycle Train.
VSSVARAMT$_{q,r,i}$	$	*Voltage Support Service VAr Amount per QSE per Unit* – The payment to QSE *q* for the VSS provided by RMR Unit *r*, for the 15-minute Settlement Interval *i*. Payment for VSS is made to the Combined Cycle Train.
q	none	A QSE.
gse	none	A generation site code.
p	none	A Resource Node Settlement Point.
r	none	An RMR Unit.
i	none	A 15-minute Settlement Interval in the hour.

ERCOT Nodal Protocols

Section 16: Registration and Qualification of Market Participants

April~~March~~ 12, 2016

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16 REGISTRATION AND QUALIFICATION OF MARKET PARTICIPANTS

16.11 Financial Security for Counter-Parties

16.11.4 Determination and Monitoring of Counter-Party Credit Exposure

16.11.4.1 Determination of Total Potential Exposure for a Counter-Party

(1) A Counter-Party's TPE is the sum of its "Total Potential Exposure Any" (TPEA) and TPES:

(a) TPEA is the positive net exposure of the Counter-Party that may be satisfied by any forms of Financial Security defined under paragraphs (a) through (d) of Section 16.11.3, Alternative Means of Satisfying ERCOT Creditworthiness Requirements. TPEA will include all exposure not included in TPES.

(b) TPES is the positive net exposure of the Counter-Party that may be satisfied only by forms of Financial Security defined under paragraphs (b) through (d) of Section 16.11.3. The Future Credit Exposure (FCE) that reflects the future mark-to-market value for CRRs registered in the name of the Counter-Party is included in TPES.

(2) For all Counter-Parties:

$$TPEA = \text{Max}\left[0, MCE, \text{Max}\left[0, \left(\sum_{q} EAL_{q} + CRRA * \sum_{a} EAL_{a}\right)\right]\right]$$

$$TPES = \text{Max}\left[0, (1 - CRRA) * \sum_{a} EAL_{a}\right] + \text{Max}\left[0, \sum_{a} FCE_{a}\right] + IA$$

The above variables are defined as follows:

Variable	Unit	Description
EAL_q	$	*Estimated Aggregate Liability for the QSE*—EAL for the QSE *q* represented by Counter-Party.
EAL_a	$	*Estimated Aggregate Liability for the CRR Account Holder*—EAL for the CRR Account Holder *a* represented by Counter-Party.
FCE_a	$	*Future Credit Exposure for the CRR Account Holder*—FCE for the CRR Account Holder *a* represented by Counter-Party.
MCE	$	*Minimum Current Exposure*—For each Counter-Party, ERCOT shall determine a Minimum Current Exposure (MCE) as follows: $MCE = \text{Max}[0, \{\sum_{e} \sum_{i=1}^{96} \sum_{k} [[[L_{o,i,d,k} * T2 - G_{o,i,d,k} * (1 - NUCADJ_o) * T3] * RTSPP_{i,d,k} * SAF] + [RTQQNET_{o,i,d,k} * T5]]/n\}, \{\sum_{e} \sum_{i=1}^{96} \sum_{k} [G_{o,i,d,k} * NUCADJ_o * T1 * RTSPP_{i,d,k} * SAF]/n\}, \{\sum_{e} \sum_{i=1}^{96} \sum_{k} DARTNET_{o,i,d,k} * T4/n\}]$

Variable	Unit	Description
		~~*[NPRR743: Replace equation "MCE" above with the following upon system implementation:]*~~ ~~$MCE = Max[\{\sum_{\varepsilon} \sum_{i=1}^{96} \sum_{k} [L_{o,i,d,k} * RTSPP_{i,d,k} * SAF]/n\}, \{\sum_{\varepsilon} \sum_{i=1}^{96} \sum_{k} [[[L_{o,i,d,k} * T2 - G_{o,i,d,k} * (1 - NUCADJ_{o}) * T3] * RTSPP_{i,d,k} * SAF] + [RTQQNET_{o,i,d,k} * T5]]/n\}, \{\sum_{\varepsilon} \sum_{i=1}^{96} \sum_{k} [G_{o,i,d,k} * NUCADJ_{o} * T1 * RTSPP_{i,d,k} * SAF]/n\}, \{\sum_{\varepsilon} \sum_{i=1}^{96} \sum_{k} DARTNET_{o,i,d,k} * T4/n\}]$~~ $RTQQNET_{o,i,d,k} = \sum_{c} [Max[(RTQQES_{o,i,d,k,c} - RTQQEP_{o,i,d,k,c}), BTCF * (RTQQES_{o,i,d,k,c} - RTQQEP_{o,i,d,k,c})] * RTSPP_{i,d,k} * SAF]$ $DARTNET_{o,i,d,k}$ = Absolute value of [DAM EOO Cleared $_{o,i,d,k}$ * DART $_{i,d,k}$ + DAM TPO Cleared $_{o,i,d,k}$ * DART $_{i,d,k}$ + DAM PTP Cleared $_{o,i,d,k}$ * DARTPTP $_{i,d,k}$ – DAM EOB Cleared $_{o,i,d,k}$ * DART $_{i,d,k}$] Where: $G_{o,i,d,k}$ = *Total Metered Generation at all Resource Nodes* for Counter-Party *o* for interval *i* for Operating Day *d* at Settlement Point *k* $L_{o,i,d,k}$ = *Total Adjusted Metered Load (AML) at all Load Zones* for Counter-Party *o* for interval *i* for Operating Day *d* at Settlement Point *k* SAF = *Seasonal Adjustment Factor*—Used to provide for the potential for Seasonal price increases based on historical trends. ERCOT shall initially set this factor equal to 100%. This factor will not go below 100%. ERCOT will provide Notice to Market Participants of any change at least 14 days prior to effective date along with the analysis supporting the change. $NUCADJ_{o}$ = *Net Unit Contingent Adjustment*—To allow for situations where a generator may unintentionally or intentionally meet its requirement from the Real-Time Market (RTM). $RTQQNET_{o,i,d,k}$ = *Net QSE-to-QSE Energy Trades* for Counter-Party *o* for interval *i* for Operating Day *d* $RTQQES_{o,i,d,k,c}$ = *QSE Energy Trades* for which the Counter-Party *o* is the seller for interval *i* for Operating Day *d* at Settlement Point *k* with Counter-Party *c* $RTQQEP_{o,i,d,k,c}$ = *QSE Energy Trades* for which the Counter-Party *o* is the buyer for interval *i* for Operating Day *d* at Settlement Point *k* with Counter-Party *c* *BTCF* = *Bilateral Trades Credit Factor* $RTSPP_{i,d,k}$ = *Real-Time Settlement Point Price* for interval *i* for

Variable	Unit	Description
		Operating Day *d* at Settlement Point *k* DARTNET $_{o, i, d, k}$ = *Net DAM activities* for Counter-Party *o* for interval *i* for Operating Day *d* DART $_{i, d, k}$ = *Day Ahead - Real-Time Spread* for interval *i* for Operating Day *d* at Settlement Point *k* DAM EOB Cleared $_{o, i, d, k}$ = *DAM Energy Only Bids Cleared* for interval *i* for Operating Day *d* at Settlement Point *k* DAM EOO Cleared $_{o, i, d, k}$ = *DAM Energy Only Offers Cleared* for interval *i* for Operating Day *d* at Settlement Point *k* DAM TPO Cleared $_{o, i, d, k}$ = *DAM Three-Part Offers Cleared* for interval *i* for Operating Day *d* at Settlement Point *k* DAM PTP Cleared $_{o, i, d, k}$ = *DAM Point-to-Point (PTP) Obligations Cleared* for interval *i* for Operating Day *d* at Settlement Point *k* DARTPTP $_{o, i, d, k}$ = *Day Ahead - Real-Time Spread* for value of PTP Obligation for interval *i* for Operating Day *d* at Settlement Point *k* *c* = Bilateral Counter-Party *d* = Operating Day *e* = Most recent *n* Operating Days for which RTM Initial Settlement Statements are available *i* = Settlement Interval *n* = Days used for averaging *o* = Counter-Party *k* = A Settlement Point
CRRA	None.	*CRR Activity other than FCE*—CRR activity other than FCE – May have a value of "0" or "1." Flag to indicate whether CRR activity other than FCE will be included in TPES or TPEA. Initially set to "1" to include activity into TPEA. ERCOT, in its sole discretion, can reset to "0" if needed.
q	None.	QSE represented by Counter-Party.
a	None.	CRR Account Holder represented by Counter-Party.
IA	$	*Independent Amount*—The Independent Amount is the amount required to be posted as defined in Section 16.16.1, Counter-Party Criteria.

The above parameters are defined as follows.

Parameter	Unit	Current Value*
NUCADJ $_o$	Percentage	Minimum value of 20%.
T1	Days	2
T2	Days	5
T3	Days	5
T4	Days	1

Parameter	Unit	Current Value*
T5	Days	For a Counter-Party that represents Load this value is equal to 5, otherwise this value is equal to 2.
BTCF	Percentage	80%
n	Days	14
* The current value for the parameters referenced in this table above will be recommended by TAC and approved by the ERCOT Board. ERCOT shall update parameter values on the first day of the month following ERCOT Board approval unless otherwise directed by the ERCOT Board. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value.		

[NPRR620 and NPRR743: Replace applicable portions of paragraph (2) above with the following upon system implementation:]

(2) For all Counter-Parties:

$$TPEA = \text{Max}[0, MCE, \text{Max}[0, (\sum_q (1\text{-}TOA) * EAL_q + TOA * EAL_t + CRRA * \sum_a EAL_a)]]$$

$$TPES = \text{Max}[0, (1 - CRRA) * \sum_a EAL_a] + \text{Max}[0, \sum_a FCE_a] + IA$$

The above variables are defined as follows:

Variable	Unit	Description
EAL_q	$	*Estimated Aggregate Liability for a QSE that represents Load or generation*—EAL for the QSE *q* represented by Counter-Party.
EAL_t	$	*Estimated Aggregate Liability for a QSE that represents neither Load nor generation*—EAL for the QSE *t* represented by a Counter-Party.
EAL_a	$	*Estimated Aggregate Liability for the CRR Account Holder*—EAL for the CRR Account Holder *a* represented by Counter-Party.
FCE_a	$	*Future Credit Exposure for the CRR Account Holder*—FCE for the CRR Account Holder *a* represented by Counter-Party.
MCE	$	*Minimum Current Exposure*—For each Counter-Party, ERCOT shall determine a Minimum Current Exposure (MCE) as follows: $MCE = \text{Max}[\{\sum_e \sum_{i=1}^{96} \sum_k [L_{o,i,d,k} * RTSPP_{i,d,k} * SAF]/n\},$ $\{\sum_e \sum_{i=1}^{96} \sum_k [[[L_{o,i,d,k} * T2 - G_{o,i,d,k} * (1\text{-}NUCADJ_o) * T3] * RTSPP_{i,d,k} * SAF] + [RTQQNET_{o,i,d,k} * T5]]/n\},$ $\{\sum_e \sum_{i=1}^{96} \sum_k [G_{o,i,d,k} * NUCADJ_o * T1 * RTSPP_{i,d,k} * SAF]/n\},$ $\{\sum_e \sum_{i=1}^{96} \sum_k DARTNET_{o,i,d,k} * T4/n\},$ IMCE] $RTQQNET_{o,i,d,k} = \sum_c [\text{Max}[(RTQQES_{o,i,d,k,c} - RTQQEP_{o,i,d,k,c}), BTCF *$

$(RTQQES_{o,i,d,k,c} - RTQQEP_{o,i,d,k,c})] * RTSPP_{i,d,k} * SAF]$

$DARTNET_{o,i,d,k}$ = Absolute value of [DAM EOO Cleared $_{o,i,d,k}$ * $DART_{i,d,k}$ + DAM TPO Cleared $_{o,i,d,k}$ * $DART_{i,d,k}$ + DAM PTP Cleared $_{o,i,d,k}$ * $DARTPTP_{i,d,k}$ – DAM EOB Cleared $_{o,i,d,k}$ * $DART_{i,d,k}$]

Where:

$G_{o,i,d,k}$ = *Total Metered Generation at all Resource Nodes* for Counter-Party *o* for interval *i* for Operating Day *d* at Settlement Point *k*

$L_{o,i,d,k}$ = *Total Adjusted Metered Load (AML) at all Load Zones* for Counter-Party *o* for interval *i* for Operating Day *d* at Settlement Point *k*

SAF = *Seasonal Adjustment Factor*—Used to provide for the potential for Seasonal price increases based on historical trends. ERCOT shall initially set this factor equal to 100%. This factor will not go below 100%. ERCOT will provide Notice to Market Participants of any change at least 14 days prior to effective date along with the analysis supporting the change.

$NUCADJ_o$ = *Net Unit Contingent Adjustment*—To allow for situations where a generator may unintentionally or intentionally meet its requirement from the Real-Time Market (RTM).

$RTQQNET_{o,i,d,k}$ = *Net QSE-to-QSE Energy Trades* for Counter-Party *o* for interval *i* for Operating Day *d*

$RTQQES_{o,i,d,k,c}$ = *QSE Energy Trades* for which the Counter-Party *o* is the seller for interval *i* for Operating Day *d* at Settlement Point *k* with Counter-Party *c*

$RTQQEP_{o,i,d,k,c}$ = *QSE Energy Trades* for which the Counter-Party *o* is the buyer for interval *i* for Operating Day *d* at Settlement Point *k* with Counter-Party *c*

BTCF = *Bilateral Trades Credit Factor*

$RTSPP_{i,d,k}$ = *Real-Time Settlement Point Price* for interval *i* for Operating Day *d* at Settlement Point *k*

$DARTNET_{o,i,d,k}$ = *Net DAM activities* for Counter-Party *o* for interval *i* for Operating Day *d*

$DART_{i,d,k}$ = *Day Ahead - Real-Time Spread* for interval *i* for Operating Day *d* at Settlement Point *k*

DAM EOB Cleared $_{o,i,d,k}$ = *DAM Energy Only Bids Cleared* for interval *i* for Operating Day *d* at Settlement Point *k*

DAM EOO Cleared $_{o,i,d,k}$ = *DAM Energy Only Offers Cleared* for interval *i* for Operating Day *d* at Settlement Point *k*

DAM TPO Cleared $_{o,i,d,k}$ = *DAM Three-Part Offers Cleared* for interval *i* for Operating Day *d* at Settlement Point *k*

DAM PTP Cleared $_{o,i,d,k}$ = *DAM Point-to-Point (PTP) Obligations Cleared* for interval *i* for Operating Day *d* at Settlement Point *k*

$DARTPTP_{o,i,d,k}$ = *Day Ahead - Real-Time Spread* for value of PTP Obligation for interval *i* for Operating Day *d* at Settlement Point *k*

		c = Bilateral Counter-Party d = Operating Day e = Most recent n Operating Days for which Real-Time Market (RTM) Initial Settlement Statements are available i = Settlement Interval n = Days used for averaging o = Counter-Party k = A Settlement Point
IMCE	$	*Initial Minimum Current Exposure* $IMCE_i$ = TOA * (EFFCAP * nm * cif) * SAF EFFCAP = *Effective Cap.* The greater of Value of Lost Load (VOLL), as described in the Methodology for Implementing Operating Reserve Demand Curve (ORDC) to Calculate Real-Time Reserve Price Adder, or the System-Wide Offer Cap (SWCAP), as determined in accordance with Public Utility Commission of Texas (PUCT) Substantive Rules.
TOA	None	*Trade-Only Activity* — Counter-Party that does not represent either a Load or a generation QSE. May have a value of "0" or "1." Flag to indicate whether activity corresponds to a Counter-Party that does not represent either a Load or a generation QSE. Set to "0" if Counter-Party represents a QSE that has an association with a Load Serving Entity (LSE) or a Resource Entity, or if Counter-Party does not represent any QSE; otherwise set to 1.
CRRA	None.	*CRR Activity other than FCE*—CRR activity other than FCE – May have a value of "0" or "1." Flag to indicate whether CRR activity other than FCE will be included in TPES or TPEA. Initially set to "1" to include activity into TPEA. ERCOT, in its sole discretion, can reset to "0" if needed.
q	None.	QSE represented by Counter-Party.
a	None.	CRR Account Holder represented by Counter-Party.
IA	$	*Independent Amount*—The Independent Amount is the amount required to be posted as defined in Section 16.16.1, Counter-Party Criteria.

The above parameters are defined as follows.

Parameter	Unit	Current Value*
nm	None	50 — *Notional multiplier.*
cif	Percentage	9 — *Cap interval factor.* Represents the historic largest percentage of SWCAP intervals during a calendar day.
$NUCADJ_o$	Percentage	Minimum value of 20%.
T1	Days	2
T2	Days	5
T3	Days	5

T4	Days	1
T5	Days	For a Counter-Party that represents Load this value is equal to 5, otherwise this value is equal to 2.
BTCF	Percentage	80%
n	Days	14
* The current value for the parameters referenced in this table above will be recommended by TAC and approved by the ERCOT Board. ERCOT shall update parameter values on the first day of the month following ERCOT Board approval unless otherwise directed by the ERCOT Board. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value.		

(3) If ERCOT, in its sole discretion, determines that the TPEA or the TPES for a Counter-Party calculated under paragraphs (1) or (2) above does not adequately match the financial risk created by that Counter-Party's activities under these Protocols, then ERCOT may set a different TPEA or TPES for that Counter-Party. ERCOT shall, to the extent practical, give to the Counter-Party the information used to determine that different TPEA or TPES. ERCOT shall provide written or electronic Notice to the Counter-Party of the basis for ERCOT's assessment of the Counter-Party's financial risk and the resulting creditworthiness requirements.

(4) ERCOT shall monitor and calculate each Counter-Party's TPEA and TPES daily.

16.11.4.7 Credit Monitoring and Management Reports

(1) ERCOT shall post twice each Business Day on the MIS Certified Area each active Counter-Party's credit monitoring and management related reports as listed below. The first posting shall be made by 1200 and the second posting shall be made as close as reasonably possible to the close of the Business Day but no later than 2350. The reports listed in items (f) and (g) below are not required to be included in both first and second posting if the Counter-Party has no active CRR ownership. The reports listed in items (c), (d), (e), (f), and (g) below are not required to be included in the second post if there are no changes to the underlying data. ERCOT shall post one set of these reports on the MIS Certified Area on each non-Business Day for which an ACL is sent.

(a) Available Credit Limit (ACL) Summary Report;

(b) Total Potential Exposure (TPE) Summary Report;

(c) Minimum Current Exposure (MCE) Summary Report;

(d) Estimate Aggregate Liability (EAL) Summary Report;

(e) Estimated Aggregate Liability (EAL) Detail Report;

(f) Future Credit Exposure for CRR PTP Obligations (FCEOBL) Summary Report; and

(g) Future Credit Exposure for CRR PTP Options (FCEOPT) Summary Report.

~~(2) ERCOT shall post once each Business Day on the MIS Certified Area each active Counter-Party's credit monitoring and management related reports or extracts as listed below; however, these reports may not be posted if system limitations are prohibitive or if the Counter-Party has no active CRR ownership.~~

~~(a) Future Credit Exposure for CRR PTP Obligations (FCEOBL) Detail Report; and~~

~~(b) Future Credit Exposure for CRR PTP Options (FCEOPT) Detail Report.~~

~~*[NPRR728: Delete paragraph (2) above upon system implementation and renumber accordingly.]*~~

(2~~3~~) The reports listed in paragraph (1~~2~~) above will be posted to the MIS Certified Area in Portable Document File (PDF) format and Microsoft Excel (XLS) format. There shall be a provision to "open", "save" and "print" each report.

16.11.5 Monitoring of a Counter-Party's Creditworthiness and Credit Exposure by ERCOT

(1) ERCOT shall monitor the creditworthiness and credit exposure of each Counter-Party or its guarantor, if any. To enable ERCOT to monitor creditworthiness, each Counter-Party shall provide to ERCOT:

(a) Its own or its guarantor's quarterly (semi-annually, if the guarantor is foreign and rated by a rating agency acceptable to ERCOT) unaudited financial statements not later than 60 days (90 days if the guarantor is foreign and rated by a rating agency acceptable to ERCOT) after the close of each of the issuer's fiscal quarters; if an issuer's financial statements are publicly available electronically and the issuer provides to ERCOT sufficient information to access those financial statements, then the issuer is considered to have met this requirement.

(b) Its own or its guarantor's annual audited financial statements not later than 120 days after the close of each of the issuer's fiscal year; if an issuer's financial statements are publicly available electronically and the issuer provides to ERCOT sufficient information to access those financial statements, then the issuer is considered to have met this requirement. ERCOT may extend the period for providing interim unaudited or annual audited statements on a case-by-case basis. Annual audited financial statements must be prepared in accordance with U.S. Generally Accepted Accounting Principles (GAAP) or International Accounting Standards (IAS).

(c) For paragraphs (a) and (b) above, financial statements shall include the Counter-Party's or its guarantor's:

(i) Statement of Financial Position (balance sheet) as of the applicable quarterly or annual ending date;

(ii) Statement of Income (or Profit and Loss); and

(iii) Statement of Cash Flows.

(d) Notice of a material change. A Counter-Party that has been granted an Unsecured Credit Limit pursuant to Section 16.11.2, Requirements for Setting a Counter-Party's Unsecured Credit Limit, shall inform ERCOT within one Business Day if it has experienced a material change in its operations, financial condition or prospects that might adversely affect the Counter-Party and require a revision to its Unsecured Credit Limit. ERCOT may require the Counter-Party to meet one of the credit requirements of Section 16.11.3, Alternative Means of Satisfying ERCOT Creditworthiness Requirements.

(2) A Counter-Party is responsible at all times for maintaining:

(a) Secured Collateral in an amount equal to or greater than that Counter-Party's

(i) TPES; plus

(ii) Net Positive Exposure of approved CRR Bilateral Trades; plus

(iii) ACL locked for CRR Auction, if any; and

(b) Remainder Collateral plus Financial Security defined as guarantees in paragraph (a) of Section 16.11.3 in an amount equal to or greater than that Counter-Party's

(i) TPEA; minus

(ii) Unsecured Credit Limit.

(3) ERCOT shall promptly notify each Counter-Party of the need to increase its Financial Security, including whether Secured Collateral must be provided, and allow the Counter-Party time, as defined in paragraph (6)(a) below, to provide additional Financial Security to maintain compliance with this Section.

(4) When either the Counter-Party's TPEA or TPES as defined in Section 16.11.4, Determination and Monitoring of Counter-Party Credit Exposure, reaches 90% of its requirement, ERCOT shall use reasonable efforts to electronically issue a warning to the Counter-Party's Authorized Representative and credit contact advising the Counter-Party that it should consider increasing its Financial Security. However, failure to issue that warning does not prevent ERCOT from exercising any of its other rights under this Section.

(5) ERCOT may suspend a Counter-Party when:

(a) That Counter-Party's TPES as defined in Section 16.11.4, equals or exceeds 100% of its Secured Collateral; or

(b) That Counter-Party's TPEA as defined in Section 16.11.4 equals or exceeds 100% of the sum of its Unsecured Credit Limit and its Remainder Collateral.

The Counter-Party is responsible at all times for managing its activity within both its TPEA and its TPES or increasing its Financial Security to avoid reaching its limits. Any failure by ERCOT to send a Notice as set forth in this Section does not relieve the Counter-Party from the obligation to maintain appropriate Financial Security in amounts equal to or greater than that Counter-Party's TPES and TPEA as defined in Section 16.11.4.

(6) To the extent that a Counter-Party fails to maintain Secured Collateral in amounts equal to or greater than its TPES or Remainder Collateral in amounts equal to or greater than its TPEA, each as defined in Section 16.11.4:

(a) ERCOT shall promptly notify the Counter-Party of the amount by which its Financial Security must be increased, including whether Secured Collateral must be provided and allow it:

(i) Until 1500 on the second Bank Business Day from the date on which ERCOT delivered the Notice to increase its Financial Security if ERCOT delivered its Notice before 1500; or

(ii) Until 1700 on the second Bank Business Day from the date on which ERCOT delivered Notification to increase its Financial Security if ERCOT delivered its Notice after 1500 but prior to 1700.

ERCOT shall notify the QSE's Authorized Representative(s) and Credit Contact if it has not received the required security by 1530 on the Bank Business Day on which the security was due; however, failure to notify the Counter-Party's representatives or contact that the required security was not received does not prevent ERCOT from exercising any of its other rights under this Section.

(b) At the same time ERCOT notifies the Counter-Party that is the QSE, ERCOT may notify each LSE and Resource represented by the Counter-Party that the LSE or Resource may be required to designate a new QSE if its current QSE fails to increase its Financial Security.

(c) ERCOT is not required to make any payment to that Counter-Party unless and until the Counter-Party increases its Financial Security, including any Secured Collateral required. The payments that ERCOT will not make to a Counter-Party include Invoice receipts, CRR revenues, CRR credits, reimbursements for short payments, and any other reimbursements or credits under any other agreement between the Market Participant and ERCOT. ERCOT may retain all such amounts until the Counter-Party has fully discharged all payment obligations

owed to ERCOT under the Counter-Party Agreement, other agreements, and these Protocols.

(d) ERCOT may reject any bids or offers in a CRR Auction from the Counter-Party until it has increased its Financial Security, including any Secured Collateral required. ERCOT may reject any bids or offers from the Counter-Party in the DAM until it has increased its Financial Security.

(7) If a Counter-Party increases its Financial Security as required by ERCOT by the deadline in paragraph (6)(a) above, then ERCOT may notify each LSE and Resource represented by the Counter-Party.

(8) If a Counter-Party increases its Financial Security as required by ERCOT by the deadline in paragraph (6)(a) above, then ERCOT shall release any payments held.

16.11.6 Payment Breach and Late Payments by Market Participants

(1) It is the sole responsibility of each Market Participant to ensure that the full amounts due to ERCOT, or its designee, if applicable, by that Market Participant, is paid to ERCOT by close of the Bank Business Day on which it is due.

(2) If a Market Participant receives separate Invoices for Subordinate QSE or various CRR Account Holder activity, netting by the Market Participant of the amounts due to ERCOT with amounts due to the Market Participant among those Invoices for payment purposes is not permitted. The amounts due to ERCOT on the separate Invoices for each Market Participant must be paid by the close of the Bank Business Day on which it is due. If a Market Participant does not pay the full amount due to ERCOT for all such Invoices by the required time, ERCOT shall deduct any and all amounts due and unpaid from any amounts due to the same Market Participant before allocating short payments to other Market Participants.

(3) The failure of a Market Participant to pay when due any payment or Financial Security obligation owed to ERCOT or its designee, if applicable, under any agreement with ERCOT, is a Late Payment and constitutes an event of "Payment Breach." For purposes of designating a Late Payment, ERCOT shall consider multiple Invoices unpaid when due on a single Business Day by a single Market Participant as constituting one Late Payment. Any Payment Breach by a Market Participant under any agreement with ERCOT is a Default under all other agreements between ERCOT and the Market Participant unless cured within one Bank Business Day after ERCOT delivers to the Market Participant written notice of the Payment Breach.

(4) Upon a Payment Breach, ERCOT shall immediately attempt to contact the Market Participant's Authorized Representative and/or Credit Contact telephonically to inform the Market Participant of the Payment Breach, and demand payment of the past due amount. ERCOT shall also provide the Market Participant with written notice of the Payment Breach via email. Upon a Payment Breach, ERCOT may impose remedies for Payment Breach, as set forth in Section 16.11.6.1, ERCOT's Remedies, in addition to any

other rights or remedies ERCOT has under any agreement, these Protocols or at common law.

(5) If a Market Participant makes a payment or a partial payment as allowed by these Protocols or a collateral call to ERCOT after the due date and time, or if a short-paid Invoice is settled by a draw on available security greater than the amount of Market Participant's cash collateral held in excess of that required to cover its Total Potential Exposure (TPE) ("Excess Collateral"), then that payment is a "Late Payment." ERCOT may, in its sole discretion, and upon a Market Participant's showing that the failure to pay when due was not within the control of the Market Participant, waive the Payment Breach as a Late Payment. ERCOT shall track the number of Late Payments received from each Market Participant in each rolling 12-month period for purposes of imposing the Late Payment remedies set forth in Section 16.11.6.2, ERCOT's Remedies for Late Payments by a Market Participant.

[NPRR702: Replace paragraph (5) above with the following upon system implementation:]

(5) If a Market Participant makes a payment or a partial payment as allowed by these Protocols or a collateral call to ERCOT after the due date and time, or if a short-paid Invoice is settled by a draw on available security greater than the amount of Market Participant's Excess Cash Collateral, then that payment is a "Late Payment." ERCOT may, in its sole discretion, and upon a Market Participant's showing that the failure to pay when due was not within the control of the Market Participant, waive the Payment Breach as a Late Payment. ERCOT shall track the number of Late Payments received from each Market Participant in each rolling 12-month period for purposes of imposing the Late Payment remedies set forth in Section 16.11.6.2.

16.11.6.1 ERCOT's Remedies

In addition to all other remedies that ERCOT has under any agreement, common law or these Protocols, for Payment Breaches or other Defaults by a Market Participant, ERCOT has the following additional remedies.

16.11.6.1.1 No Payments by ERCOT to Market Participant

ERCOT is not required to make any payment to a Market Participant unless and until the Market Participant satisfies the Payment Breach by paying the past due amount in full, including amounts due under Section 16.11.6.1.3, Aggregate Amount Owed by Breaching Market Participant Immediately Due. The payments that ERCOT will not make include Invoice receipts, CRR Auction revenues, CRR credits, reimbursements for short payments and any other reimbursements or credits under any and all other agreements between ERCOT and the Market Participant. ERCOT shall retain all such amounts, and may apply all withheld funds toward the payment of the delinquent amount(s), until the Market Participant has fully paid all amounts owed to ERCOT under any agreements and these Protocols. If the Market Participant should fail

to pay the full amount due within the cure period, ERCOT may apply all funds it withheld toward the payment of the delinquent amount(s).

16.11.6.1.2 ERCOT May Draw On, Hold or Distribute Funds

Upon a Payment Breach, ERCOT, at its option, without notice to the Market Participant and in its sole discretion, may immediately, or at any time before the Market Participant pays the past due amount in full, including amounts due under Section 16.11.6.1.3, Aggregate Amount Owed by Breaching Market Participant Immediately Due, draw on, hold or distribute to other Market Participants any Financial Security or other funds of the Market Participant in ERCOT's possession. If the funds drawn exceed the amount applied to any Payment Breach, then ERCOT may hold those funds as Financial Security.

16.11.6.1.3 Aggregate Amount Owed by Breaching Market Participant Immediately Due

ERCOT shall aggregate all amounts due it by the Market Participant, including Deferred Invoice Exposure, under any agreement with ERCOT and these Protocols into a single amount to the fullest extent allowed by law. The entire unpaid net balance owed to ERCOT by the Market Participant, at ERCOT's option, and its sole discretion, is immediately due and payable without further notice and demand for payment. Any such notice and demand for payment are expressly waived by the Market Participant.

16.11.6.1.4 Repossession of CRRs by ERCOT

ERCOT, at its sole discretion, may repossess CRRs held by a Market Participant with a Payment Breach. ERCOT shall effect that repossession by sending a written notice to the Market Participant of the repossession and by removing the CRRs from the Market Participant's CRR account. ERCOT shall offer all of those repossessed CRRs, with each repossessed CRR in its existing configuration, in a one-time auction to Market Participants (other than the Market Participant(s) in Payment Breach) for sale to the highest bidder. ERCOT shall offset net revenues from that sale against amounts owed to ERCOT by the Market Participant. If ERCOT receives no bids for a CRR in that auction, ERCOT shall void the CRR and may not model it in all future DAMs and CCR Auctions.

16.11.6.1.5 Declaration of Forfeit of CRRs

(1) At ERCOT's sole discretion, if it does not receive full payment on the due date of a CRR Auction Invoice, may declare any of the CRR bids cleared and Pre-Assigned Congestion Revenue Rights (PCRRs) allocated to the Market Participant forfeited. ERCOT shall effect that forfeiture by sending a written notice to the Market Participant of the forfeiture and of not delivering the CRRs or PCRRs to the Market Participant's CRR account. ERCOT shall offer all forfeited CRRs, with each forfeited CRR in its existing configuration, in a one-time auction to Market Participants (other than the Market Participant(s) in Payment Breach) for sale to the highest bidder or ERCOT shall make the

related capacity available in subsequent CRR Auctions. Revenue from that sale shall be considered as CRR Auction revenue and distributed to QSEs based on Load Ratio Share as specified in Section 7.5.7, Method for Distributing CRR Auction Revenues.

(2) ERCOT may also, at its sole discretion, honor any of the offers from Market Participants that were cleared in the CRR Auction by removing the CRRs from the Market Participant's CRR account. ERCOT shall offset net revenues due to the Market Participant from CRRs offered and cleared against amounts owed to ERCOT by the Market Participant.

16.11.6.1.6 Revocation of a Market Participant's Rights and Termination of Agreements

(1) ERCOT may revoke a breaching Market Participant's rights to conduct activities under these Protocols. ERCOT may also terminate the breaching Market Participant's agreements with ERCOT.

(2) If ERCOT revokes a Market Participant's rights or terminates the Market Participant's agreements, then the provisions of Section 16.2.5, Suspended Qualified Scheduling Entity – Notification to LSEs and Resource Entities Represented, and Section 16.2.6.1, Designation as an Emergency Qualified Scheduling Entity or Virtual Qualified Scheduling Entity, apply.

(3) If a breaching Market Participant is also an LSE (whether or not the Default occurred pursuant to the Market Participant's activities as an LSE), then:

(a) Within 24 hours of receiving notice of the Payment Breach, the Market Participant shall provide to ERCOT all the information regarding its Electric Service Identifiers (ESI IDs) set forth in the ERCOT Retail Market Guide; and

(b) On revocation of some or all of the Market Participant's rights or termination of the Market Participant's agreements and on notice to the Market Participant and the Public Utility Commission of Texas (PUCT), ERCOT shall initiate a Mass Transition of the Market Participant's ESI IDs pursuant to Section 15.1.3.1, Mass Transition Process, without the necessity of obtaining any order from or other action by the PUCT.

(4) After revocation of its rights or termination of its Agreement with ERCOT, the Market Participant will remain liable for all charges or costs associated with any continued activity related to the Counter-Party's relationship with ERCOT and any expenses arising from the consequences of such termination or revocation.

16.11.6.2 ERCOT's Remedies for Late Payments by a Market Participant

If a Market Participant makes any Late Payments, and even if ERCOT does not immediately implement the above-referenced remedies for any Payment Breach by a Market Participant, the Market Participant is subject to the actions enumerated in this Section.

This Section does not waive ERCOT's right to impose remedies for Payment Breach, as set forth in Section 16.11.6.1, ERCOT's Remedies, in addition to any other rights or remedies ERCOT has under any agreement, these Protocols, or at common law, for any Payment Breach by the Market Participant in each rolling 12-month period for purposes of imposing the Late Payment remedies set forth in this Section.

16.11.6.2.1 First Late Payment in Any Rolling 12-Month Period

(1) For the first Late Payment resulting from a Payment Breach in any rolling 12-month period, ERCOT shall review the circumstances and reason for the Late Payment, and shall, at its sole discretion, determine whether it should take Level I Enforcement action, as described in Section 16.11.6.2.5, Level I Enforcement, against the Market Participant.

(2) If ERCOT determines that it will take Level I Enforcement action against the Market Participant, ERCOT shall send written notice to the Market Participant's Authorized Representative and/or Credit Contact via email, advising the Market Participant of the action required by the Market Participant under Level I Enforcement.

16.11.6.2.2 Second Late Payment in Any Rolling 12-Month Period

(1) For the second Late Payment resulting from a Payment Breach in any rolling 12-month period, ERCOT shall review the circumstances and reason for the Late Payment, and shall take action as follows:

(a) Level I Enforcement - If ERCOT did not take Level I Enforcement action in the case of the first Late Payment, ERCOT shall take Level I Enforcement action, as described in Section 16.11.6.2.5, Level I Enforcement.

(b) Level II Enforcement - If ERCOT did take Level I Enforcement action in the case of the first Late Payment, ERCOT shall take Level II Enforcement action, as described in Section 16.11.6.2.6, Level II Enforcement.

(2) ERCOT shall send written notice to the Market Participant's Authorized Representative and/or Credit Contact via email, advising the Market Participant of the action required under Level I Enforcement or Level II Enforcement.

16.11.6.2.3 Third Late Payment in Any Rolling 12-Month Period

(1) For the third Late Payment resulting from a Payment Breach in any rolling 12-month period, ERCOT shall review the circumstances and reason for the Late Payment, and shall take action as follows:

(a) Level II Enforcement - If ERCOT did not take Level II Enforcement action in the case of the second Late Payment, ERCOT shall take Level II Enforcement action, as described in Section 16.11.6.2.6, Level II Enforcement.

(b) Level III Enforcement - If ERCOT did take Level II Enforcement action in the case of the second Late Payment, ERCOT shall take Level III Enforcement action, as described in Section 16.11.6.2.7, Level III Enforcement.

(2) ERCOT shall send written notice to the Market Participant's Authorized Representative and/or Credit Contact via email, advising the Market Participant of the action required under Level II or Level III Enforcement, and informing the Market Participant that a fourth Late Payment in any 12-month rolling period shall result in ERCOT taking action under Section 16.11.6.1.6, Revocation of a Market Participant's Rights and Termination of Agreements.

16.11.6.2.4 Fourth Late Payment in Any Rolling 12-Month Period

For the fourth Late Payment resulting from a Payment Breach in any rolling 12-month period, ERCOT shall take action under Section 16.11.6.1.6, Revocation of a Market Participant's Rights and Termination of Agreements.

16.11.6.2.5 Level I Enforcement

(1) Under Level I Enforcement, ERCOT shall notify the Market Participant to comply with one of the following requirements:

(a) If the Market Participant has not provided Financial Security, the Market Participant shall now provide Financial Security, within two Bank Business Days, in an amount at or above 110% of the amount of the Market Participant's TPE less the Unsecured Credit Limit; or any other liability to ERCOT that the Market Participant has or is expected to have for activity in the ERCOT Region, whichever applies.

(b) If the Market Participant has already provided Financial Security, the Market Participant shall increase its Financial Security, within two Bank Business Days, to an amount at or above 110% of its TPE less the Unsecured Credit Limit or any other liability to ERCOT that the Market Participant has or is expected to have for activity in the ERCOT Region, whichever applies.

(2) Increased Financial Security requirements under this Section remain in effect for a minimum of 60 days and remain in effect thereafter until ERCOT, at its sole discretion, determines to reduce such Financial Security requirements to the normally applicable levels.

16.11.6.2.6 Level II Enforcement

(1) Under Level II Enforcement, ERCOT shall notify the Market Participant that the Market Participant shall provide Financial Security, within two Bank Business days, in the form of a cash deposit or letter of credit, as chosen by ERCOT at its sole discretion, at 110% of

the Market Participant's TPE less the Unsecured Credit Limit or for any other liability to ERCOT that the Market Participant has or is expected to have for activity in the ERCOT Region.

(2) Increased Financial Security requirements under this Section remain in effect for a minimum of 60 days and remain in effect thereafter until ERCOT, at its sole discretion, determines to reduce such Financial Security requirements to the normally applicable levels.

16.11.6.2.7 Level III Enforcement

(1) Under Level III Enforcement, ERCOT shall:

(a) Advise the Authorized Representative and/or Credit Contact that a fourth Late Payment in the rolling 12-month period shall result in ERCOT taking action under Section 16.11.6.1.6, Revocation of a Market Participant's Rights and Termination of Agreements; or

(b) Take action under Section 16.11.6.1.6.

16.11.7 Release of Market Participant's Financial Security Requirement

Following the termination of a Market Participant's Agreement, ERCOT shall, within 30 days after being satisfied, in its sole discretion, that no sums remain owing or will become due and payable by the Market Participant under these Protocols or any agreement between the Market Participant and ERCOT, return or release to the Market Participant, as appropriate, any Financial Security still held by ERCOT that the Market Participant provided to ERCOT under this Section.

16.11.8 Acceleration

Upon termination of a Market Participant's rights as a Market Participant and any other agreement(s) between ERCOT and the Market Participant, all sums owed to ERCOT are immediately accelerated and are immediately due and owing in full. At that time, ERCOT may immediately draw upon the Market Participant's Financial Security and shall use those funds to offset or recoup all amounts due to ERCOT.

16.12 User Security Administrator and Digital Certificates

Each Market Participant is allowed access to ERCOT's computer systems through the use of Digital Certificates upon execution of the Standard Form Market Participant Agreement (as provided for in Section 22, Attachment A, Standard Form Market Participant Agreement), completion of applicable registration and qualification requirements. Digital Certificates expire after one year. A User Security Administrator (USA) is responsible for managing the Market Participant's access to ERCOT's computer systems through Digital Certificates. Each Market

Participant must, as part of the application for registration with ERCOT, designate an individual employee or authorized agent as its USA, and optionally, a secondary USA. If a Market Participant has designated a secondary USA, the secondary USA functions in the same manner as the primary USA. The Market Participant is responsible for revising its USA list as the need arises. The Market Participant's USA is also responsible for registering all Market Participant's Digital Certificate holders ("Certificate Holders") and administering the use of Digital Certificates on behalf of the Market Participant. Each Market Participant with more than one ERCOT functional registration must designate a USA for each registration (which may be the same employee or authorized agent) and shall manage each registration separately for the purposes of this Section. Once the Market Participant completes registration requirements, ERCOT shall send the USA a copy of the Digital Certificate user guide.

16.12.1 USA Responsibilities and Qualifications for Digital Certificate Holders

The USA and the Market Participant are responsible for the following:

(a) Requesting Digital Certificates for authorized potential Certificate Holders (either persons or programmatic interfaces) that the USA has qualified through an appropriate screening process requiring confirmation that the Certificate Holder is an employee or authorized agent (including third parties) of the Market Participant. A Certificate Holder (including the USA) must be qualified as set forth below. The Market Participant shall be liable for ensuring that each of its Certificate Holder(s) meets the requirements of (i) – (v) below.

(i) For any employee or authorized agent receiving a Digital Certificate, the Market Participant shall confirm that the employee or authorized agent satisfies reasonable background review sufficient for employment or contract with the Market Participant so as to reasonably limit threat(s) to ERCOT's market or computer systems. The Market Participant may not request that Digital Certificates be issued to any employee or authorized agent it determines, after reasonable background review, that the employee or authorized agent poses a threat to ERCOT's market or computer systems.

(ii) The potential Certificate Holder is aware of the rules and restrictions relating to the use of Digital Certificates.

(iii) The potential Certificate Holder is eligible to review and receive technology and software under applicable export control laws and regulations. ERCOT shall post links to relevant laws and regulations on the Market Information System (MIS) Public Area.

(iv) The Market Participant has conducted a reasonable review of the potential Certificate Holder and is not aware that the potential Certificate Holder is one of the persons on any U.S. terrorist watch list, the link to which is located on the MIS Public Area.

(v) The Certificate Holder does not violate the conditions of use specified by the software vendor that provides the Digital Certificates for the Market Participant's use and provided to the Certificate Holder.

(b) Requesting revocation of Digital Certificates under any of the following conditions:

(i) As soon as possible but no later than three Business Days after:

(A) A Certificate Holder ceases employment with the Market Participant; or

(B) The Market Participant becomes aware that a Certificate Holder is changing job functions (pursuant to a reasonable process for identifying when job function changes occur) so that the Certificate Holder no longer needs the Digital Certificate,

The Market Participant or USA shall request the revocation by proceeding with the ERCOT certificate revocation process.

(ii) As soon as possible, but no later than five Business Days, after the Market Participant becomes aware (pursuant to a reasonable process for identifying violations) that the Certificate Holder has violated any of the following conditions of use of a Digital Certificate, the Market Participant or USA shall request the revocation by proceeding with the ERCOT certificate revocation process. Violations of conditions of use include:

(A) Violating the requirements of paragraph (a) above; or

(B) Using the Digital Certificate for any unauthorized purpose; or

(C) Allowing any person other than the Certificate Holder to use the Digital Certificate.

(c) Managing the level of access for each Certificate Holder by assigning and maintaining Digital Certificate roles for each authorized user in accordance with the process set forth in ERCOT's Digital Certificate user guide.

(d) Requesting annual renewal of Digital Certificates.

(e) If needed, issuing Digital Certificates for use by electronic systems not limited to servers.

(f) Maintaining the integrity of the administration of Digital Certificates through consistent, sound and reasonable business practices.

16.12.2 Requirements for Use of Digital Certificates

Use of Digital Certificates must comply with the following:

(a) A Digital Certificate shall be used by only one individual and may not be shared. If multiple employees or authorized agents share a computer and each requires a Digital Certificate, the USA shall request separate Digital Certificates for each. Multiple Digital Certificates may be installed and managed on a single computer. ERCOT shall include instructions on how to manage multiple Digital Certificates in the Digital Certificate user guide.

(b) A Digital Certificate may not be traded or sold.

(c) Electronic equipment on which the Digital Certificate resides must be physically and electronically secured in a reasonable manner to prevent improper use of the Digital Certificate.

(d) The Market Participant is wholly responsible for any use of Digital Certificates issued by its USA.

16.12.3 Market Participant Audits of User Security Administrators and Digital Certificates

(1) During September of each year, each Market Participant shall generate a list of its registered USA and Certificate Holders. The Market Participant, through its USA or another authorized third party, shall perform an audit by reviewing the list and noting any inconsistencies or instances of non-compliance (including, for example, any Certificate Holder that may have changed job functions and no longer requires the Digital Certificate). If the Market Participant or its USA or the authorized third party identifies discrepancies, the USA shall use the process for managing Digital Certificates as included in ERCOT's Digital Certificate user guide to rectify the discrepancy. The audit must, at a minimum confirm that:

(a) The Market Participant and each listed USA and Certificate Holder meet the applicable requirements of paragraphs (a) and (b) of Section 16.12.1, USA Responsibilities and Qualifications for Digital Certificate Holders;

(b) Each listed USA and Certificate Holder is currently employed by or is an authorized agent contracted with the Market Participant;

(c) The Market Participant has verified that the listed USA is authorized to be the USA;

(d) Each Certificate Holder is authorized to retain and use the Digital Certificate; and

(e) Each listed Certificate Holder needs the Digital Certificate to perform his or her job functions.