$$\mathbf{VSSEAMT}_{q,r} = \mathbf{(-1) * Max\ (0,\ (RTSPP}_{p} \mathbf{- RTEOCOST}_{q,r,i}\mathbf{) * Max\ (0,\ (HSL}_{q,r} \mathbf{* \tfrac{1}{4} - NETVSSA}_{q,r}\mathbf{)))}$$

Where:

$$NETVSSA_{q,r} = RTCL_{q,r} + RTMG_{q,r}$$

For an ESR that is not a ~~Wholesale Storage Load (~~WSL~~)~~:

$$RTCL_{q,r} = \sum_{b} MEBR_{q,r,b}$$

And for an ESR that is a WSL:

$$RTCL_{q,r} = \sum_{b} MEBL_{q,r,b}$$

The above variables are defined as follows:

Variable	Unit	Definition
$VSSEAMT_{q,r}$	$	*Voltage Support Service Energy Amount per QSE per Resource*—The lost opportunity payment to QSE *q* for ERCOT-directed VSS from Resource *r* for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train.
$RTMG_{q,r}$	MWh	*Real-Time Metered Generation per QSE per Resource*—The Real-Time metered generation of Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train.
$RTSPP_{p}$	$/MWh	*Real-Time Settlement Point Price*—The Real-Time Settlement Point Price at the Resource Node for the 15-minute Settlement Interval.
$RTEOCOST_{q,r,i}$	$/MWh	Real-Time Energy Offer Curve Cost - The Energy Offer Curve Cost for Resource *r* represented by QSE *q*, for the Resource's generation above the LSL for the Settlement Interval *i*. See Section 4.4.9.3.3, Energy Offer Curve Costs. Where for an ESR, RTEOCOST shall be set to zero. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train.
$NETVSSA_{q,r}$	MWh	*Net VSS Activity*—The sum of the total energy metered by the Settlement Meter which measures ESR load and the RTMG, for Resource *r* represented by the QSE *q* for the 15-minute Settlement Interval.
$RTCL_{q,r}$	MWh	*Real-Time Charging Load per QSE per Resource* —The charging load for Resource *r* represented by the QSE *q*, represented as a negative value, for the 15-minute 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*.
$MEBR_{q,r,b}$	MWh	*Metered Energy for Energy Storage Resource load at Bus* - The energy metered by the Settlement Meter which measures ESR load that is not WSL for the 15-minute Settlement Interval represented as a negative value, for the QSE *q*, Resource *r*, at bus *b*.

$HSL_{q, r}$	MW	*High Sustained Limit per QSE per Settlement Point per Resource*—The HSL of Resource *r* represented by QSE *q* at Resource Node *p* for the hour that includes the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Generation Resource.
$LSL_{q, r}$	MW	*Low Sustained Limit per QSE per Settlement Point per Resource*—The LSL of Resource *r* represented by QSE *q* at Resource Node *p* for the hour that includes the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Generation Resource.
q	none	A QSE.
r	none	A Generation Resource or ESR.
p	none	A Resource Node Settlement Point.
b	none	An Electrical Bus.

(5) The total of the payments to each QSE for ERCOT-directed power reduction to provide VSS for a given 15-minute Settlement Interval is calculated as follows:

$$\mathbf{VSSEAMTQSETOT}_{q} = \sum_{r} \mathbf{VSSEAMT}_{q, r}$$

The above variables are defined as follows:

Variable	Unit	Definition
$VSSEAMTQSETOT_{q}$	$	*Voltage Support Service Lost Opportunity Amount QSE Total per QSE*—The total of the lost opportunity payments to QSE *q* for providing VSS for providing ERCOT-directed VSS for the 15-minute Settlement Interval.
$VSSEAMT_{q, r}$	$	*Voltage Support Service Energy Amount per QSE per Settlement Point per Resource*—The lost opportunity payment to QSE *q* for ERCOT-directed VSS from Resource *r* for the 15-minute Settlement Interval for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train.
q	none	A QSE.
r	none	A Generation Resource or ESR.

6.6.10 Real-Time Revenue Neutrality Allocation

(1) ERCOT must be revenue-neutral in each Settlement Interval. Each QSE receives an allocated share, on a LRS basis, of the net amount of:

(a) Real-Time Energy Imbalance payments or charges under Section 6.6.3.1, Real-Time Energy Imbalance Payment or Charge at a Resource Node;

(b) Real-Time Energy Imbalance payments or charges under Section 6.6.3.2, Real-Time Energy Imbalance Payment or Charge at a Load Zone;

(c) Real-Time Energy Imbalance payments or charges under Section 6.6.3.3, Real-Time Energy Imbalance Payment or Charge at a Hub;

(d) Real-Time energy payments under Section 6.6.3.4, Real-Time Energy Payment for DC Tie Import;

(e) Real-Time energy payments under Section 6.6.3.5, Real-Time Payment for a Block Load Transfer Point;

(f) Real-Time energy charge under Section 6.6.3.6, Real-Time Energy Charge for DC Tie Export Represented by the QSE Under the Oklaunion Exemption;

[NPRR1054: Delete paragraph (f) above upon system implementation and renumber accordingly.]

[NPRR917: Insert item (g) below upon system implementation and renumber accordingly:]

(g) Real-Time Energy payments or charges under Section 6.6.3.9, Real-Time Payment or Charge for Energy from a Settlement Only Distribution Generator (SODG) or a Settlement Only Transmission Generator (SOTG);

(g) Real-Time congestion payments or charges under Section 6.6.4, Real-Time Congestion Payment or Charge for Self-Schedules; and

(h) Real-Time payments or charges to the Congestion Revenue Right (CRR) Owners under Section 7.9.2, Real-Time CRR Payments and Charges.

(2) The Real-Time Revenue Neutrality Allocation for each QSE for a given 15-minute Settlement Interval is calculated as follows:

$$LARTRNAMT_q = (-1) * (RTEIAMTTOT + BLTRAMTTOT + RTDCIMPAMTTOT + RTDCEXPAMTTOT + RTCCAMTTOT + RTOBLAMTTOT / 4 + RTOBLLOAMTTOT / 4) * LRS_q$$

[NPRR917 and NPRR1054: Replace applicable portions of the formula "LARTRNAMT $_q$" above with the following upon system implementation:]

$$LARTRNAMT_q = (-1) * (RTEIAMTTOT + BLTRAMTTOT + RTDCIMPAMTTOT + ~~RTDCEXPAMTTOT +~~ RTESOGAMTTOT + RTCCAMTTOT + RTOBLAMTTOT / 4 + RTOBLLOAMTTOT / 4) * LRS_q$$

Where:

Total Real-Time Energy Imbalance Payment (or Charge) at Settlement Point (or Hub)

$$RTEIAMTTOT = \sum_{q} RTEIAMTQSETOT_{q}$$

Total Real-Time Payment for BLT Resources

$$BLTRAMTTOT = \sum_{q} BLTRAMTQSETOT_{q}$$

Total Real-Time Payment for DC Tie Imports

$$RTDCIMPAMTTOT = \sum_{q} RTDCIMPAMTQSETOT_{q}$$

Total Real-Time Charge for DC Tie Exports (under "Oklaunion Exemption")

$$RTDCEXPAMTTOT = \sum_{q} RTDCEXPAMTQSETOT_{q}$$

[NPRR1054: Delete the formula "RTDCEXPAMTTOT" above upon system implementation.]

Total Real-Time Congestion Payment or Charge for Self-Schedules

$$RTCCAMTTOT = \sum_{q} RTCCAMTQSETOT_{q}$$

Total Real-Time Payment or Charge for Point-to-Point (PTP) Obligations

$$RTOBLAMTTOT = \sum_{q} RTOBLAMTQSETOT_{q}$$

Total Real-Time Payment for PTP Obligations with Links to Options

$$RTOBLLOAMTTOT = \sum_{q} RTOBLLOAMTQSETOT_{q}$$

[NPRR917: Insert the language below upon system implementation:]

Total Real-Time Payment or Charge for energy from SODGs and SOTGs

$$RTESOGAMTTOT = \sum_{q} RTESOGAMTQSETOT_{q}$$

The above variables are defined as follows:

Variable	Unit	Description
$LARTRNAMT_{q}$	$	*Load-Allocated Real-Time Revenue Neutrality Amount per QSE*—The QSE *q*'s share of the total Real-Time revenue neutrality amount, for the 15-minute Settlement Interval.
$RTEIAMTTOT_{q}$	$	*Real-Time Energy Imbalance Amount Total*—The total net payments and charges for Real-Time Energy Imbalance Service at all Settlement Points (Resource, Load Zone or Hub) for the 15-minute Interval.

Variable	Unit	Description
BLTRAMTTOT	$	*Block Load Transfer Resource Amount Total*—The total of payments for energy delivered into the ERCOT Region through BLT points for the 15-minute Settlement Interval.
RTDCIMPAMTTOT	$	*Real-Time DC Import Amount Total*—The summation of payments for DC Tie imports for the 15-minute Settlement Interval.
RTDCEXPAMTTOT	$	*Real-Time DC Export Amount Total*—The summation of charges to all QSEs under the "Oklaunion Exemption" for DC Tie exports for the 15-minute Settlement Interval.
[NPRR1054: Delete the variable "RTDCEXPAMTTOT" above upon system implementation.]		
RTCCAMTTOT	$	*Real-Time Energy Congestion Cost Amount Total*—The total net congestion payments and charges for all Self-Schedules for the 15-minute Settlement Interval.
RTOBLAMTTOT	$	*Real-Time Obligation Amount Total*—The sum of all payments and charges for PTP Obligations settled in Real-Time for the hour that includes the 15-minute Settlement Interval.
RTOBLLOAMTTOT	$	*Real-Time Obligation with Links to an Option Amount Total*—The sum of all payments for PTP Obligations with Links to an Option settled in Real-Time for the hour that includes the 15-minute Settlement Interval.
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 Resource Node Settlement Points for the 15-minute Settlement Interval.
RTCCAMTQSETOT $_q$	$	*Real-Time Congestion Cost Amount QSE Total per QSE*—The total net congestion payments and charges to QSE *q* for its Self-Schedules for the 15-minute Settlement Interval.
BLTRAMTQSETOT $_q$	$	*Block Load Transfer Resource Amount QSE Total per QSE*—The total of the payments to QSE *q* for energy delivered into the ERCOT Region through BLT points for the 15-minute Settlement Interval.
RTDCIMPAMTQSETOT $_q$	$	*Real-Time DC Import Amount QSE Total per QSE*—The total of the payments to QSE *q* for energy imported into the ERCOT Region through DC Ties for the 15-minute Settlement Interval.
RTDCEXPAMTQSETOT $_q$	$	*Real-Time DC Export Amount QSE Total per QSE*—The total of the charges to QSE *q* for energy exported from the ERCOT Region through DC Ties for the 15-minute Settlement Interval.
[NPRR1054: Delete the variable "RTDCEXPAMTQSETOT" above upon system implementation.]		
RTOBLAMTQSETOT $_q$	$	*Real-Time Obligation Amount QSE Total per QSE*—The net total payment or charge to QSE *q* of all its PTP Obligations settled in Real-Time for the hour that includes the 15-minute Settlement Interval. See paragraph (2) of Section 7.9.2.1, Payments and Charges for PTP Obligations Settled in Real-Time.
RTOBLLOAMTQSETOT $_q$	$	*Real-Time Obligation with Links to an Option Amount QSE Total per QSE*—The total payment to QSE *q* for all of its PTP Obligations with Links to an Option settled in Real-Time for the hour that includes the 15-minute Settlement Interval. See paragraph (2) of Section 7.9.2.1.

Variable	Unit	Description
[NPRR917: Insert the variables "RTESOGAMTQSETOT $_q$" and "RTESOGAMTTOT" below upon system implementation:]		
RTESOGAMTQSETOT $_q$	$	*Real-Time Energy Payment or Charge per QSE for Energy from SODGs and SOTGs* —The payment or charge to QSE *q* for Real-Time energy from SODGs and SOTGs, for the 15-minute Settlement Interval.
RTESOGAMTTOT	$	*Real-Time Energy Amount Total for Energy from all SODGs and SOTGs* —The total net payments and charges to all QSEs for Real-Time energy from SODGs and SOTGs, for the 15-minute Settlement Interval.
LRS $_q$	none	The LRS calculated for QSE *q* for the 15-minute Settlement Interval. See Section 6.6.2.2, QSE Load Ratio Share for a 15-Minute Settlement Interval.
q	none	A QSE.
o	none	A CRR owner.

(3) In the event that ERCOT is unable to execute the DAM, the Real-Time Revenue Neutrality Allocation for each QSE for a given 15-minute Settlement Interval is calculated as follows:

$$\mathbf{LARTRNAMT}_q = \mathbf{(-1) * (RTEIAMTTOT + BLTRAMTTOT + RTDCIMPAMTTOT + RTDCEXPAMTTOT + RTCCAMTTOT + NDRTOBLAMTTOT / 4 + NDRTOPTAMTTOT / 4 + NDRTOPTRAMTTOT / 4 + NDRTOBLRAMTTOT / 4) * LRS}_q$$

[NPRR917 and NPRR1054: Replace applicable portions of the formula "LARTRNAMT $_q$" above with the following upon system implementation:]

$$\mathbf{LARTRNAMT}_q = \mathbf{(-1) * (RTEIAMTTOT + BLTRAMTTOT + RTDCIMPAMTTOT + \sout{RTDCEXPAMTTOT +} RTESOGAMTTOT + RTCCAMTTOT + NDRTOBLAMTTOT / 4 + NDRTOPTAMTTOT / 4 + NDRTOPTRAMTTOT / 4 + NDRTOBLRAMTTOT / 4) * LRS}_q$$

Where:

Total Real-Time Energy Imbalance Payment (or Charge) at Settlement Point (or Hub)

$$\text{RTEIAMTTOT} = \sum_q \text{RTEIAMTQSETOT}_q$$

Total Real-Time Payment for BLT Resources

$$\text{BLTRAMTTOT} = \sum_q \text{BLTRAMTQSETOT}_q$$

Total Real-Time Payment for DC Tie Imports

$$RTDCIMPAMTTOT = \sum_{q} RTDCIMPAMTQSETOT_{q}$$

Total Real-Time Charge for DC Tie Exports (under "Oklaunion Exemption")

$$RTDCEXPAMTTOT = \sum_{q} RTDCEXPAMTQSETOT_{q}$$

[NPRR1054: Delete the formula "RTDCEXPAMTTOT" above upon system implementation.]

Total Real-Time Congestion Payment or Charge for Self Schedules

$$RTCCAMTTOT = \sum_{q} RTCCAMTQSETOT_{q}$$

Total Real-Time Payment or Charge for PTP Obligations when ERCOT is unable to execute the DAM

$$NDRTOBLAMTTOT = \sum_{o} NDRTOBLAMTOTOT_{o}$$

Total Real-Time Payment for PTP Options when ERCOT is unable to execute the DAM

$$NDRTOPTAMTTOT = \sum_{o} NDRTOPTAMTOTOT_{o}$$

Total Real-Time Payment for PTP Options with Refund when ERCOT is unable to execute the DAM

$$NDRTOPTRAMTTOT = \sum_{o} NDRTOPTRAMTOTOT_{o}$$

Total Real-Time Payment or Charge for PTP Obligations with Refund when ERCOT is unable to execute the DAM

$$NDRTOBLRAMTTOT = \sum_{o} NDRTOBLRAMTOTOT_{o}$$

[NPRR917: Insert the language below upon system implementation:]

Total Real-Time Payment or Charge for energy from SODGs and SOTGs

$$RTESOGAMTTOT = \sum_{q} RTESOGAMTQSETOT_{q}$$

The above variables are defined as follows:

Variable	Unit	Description
$LARTRNAMT_{q}$	$	*Load-Allocated Real-Time Revenue Neutrality Amount per QSE*—The QSE *q*'s share of the total Real-Time revenue neutrality amount for the 15-minute Settlement Interval.
RTEIAMTTOT	$	*Real-Time Energy Imbalance Amount Total*—The total net payments and charges for Real-Time Energy Imbalance at all Settlement Points (Resource, Load Zone, or Hub) for the 15-minute Interval.

Variable	Unit	Description
BLTRAMTTOT	$	*Block Load Transfer Resource Amount Total*—The total of the payments for energy delivered into the ERCOT Region through BLT points for the 15-minute Settlement Interval.
RTDCIMPAMTTOT	$	*Real-Time DC Import Amount Total*—The summation of payments for DC Tie imports for the 15-minute Settlement Interval.
RTDCEXPAMTTOT	$	*Real-Time DC Export Amount Total*—The summation of charges to all QSEs that are under the "Oklaunion Exemption" for DC Tie exports for the 15-minute Settlement Interval.
[NPRR1054: Delete the variable "RTDCEXPAMTTOT" above upon system implementation.]		
RTCCAMTTOT	$	*Real-Time Energy Congestion Cost Amount Total*—The total net congestion payments and charges for all Self-Schedules for the 15-minute Settlement Interval.
NDRTOBLAMTTOT	$	*No DAM Real-Time Obligation Amount Total*—The sum of all payments and charges for PTP Obligations settled in Real-Time, when ERCOT is unable to execute the DAM, for the hour that includes the 15-minute Settlement Interval.
NDRTOPTAMTTOT	$	*No DAM Real-Time Option Amount Total*—The sum of all payments for PTP Options settled in Real-Time, when ERCOT is unable to execute the DAM, for the hour that includes the 15-minute Settlement Interval.
NDRTOPTRAMTTOT	$	*No DAM Real-Time Option with Refund Amount Total*—The sum of all payments for PTP Options with Refund settled in Real-Time, when ERCOT is unable to execute the DAM, for the hour that includes the 15-minute Settlement Interval.
NDRTOBLRAMTTOT	$	*No DAM Real-Time Obligation with Refund Amount Total*—The sum of all payments for PTP Obligations with Refund settled in Real-Time, when ERCOT is unable to execute the DAM, for the hour that includes the 15-minute Settlement Interval.
$RTEIAMTQSETOT_q$	$	*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.
$RTCCAMTQSETOT_q$	$	*Real-Time Congestion Cost Amount QSE Total per QSE*—The total net congestion payments and charges to QSE *q* for its Self-Schedules for the 15-minute Settlement Interval.
$BLTRAMTQSETOT_q$	$	*Block Load Transfer Resource Amount QSE Total per QSE*—The total of the payments to QSE *q* for energy delivered into the ERCOT Region through BLT points for the 15-minute Settlement Interval.
$RTDCIMPAMTQSETOT_q$	$	*Real-Time DC Import Amount QSE Total per QSE*—The total of the payments to QSE *q* for energy imported into the ERCOT Region through DC Ties for the 15-minute Settlement Interval.
$RTDCEXPAMTQSETOT_q$	$	*Real-Time DC Export Amount QSE Total per QSE*—The total of the charges to QSE *q* for energy exported from the ERCOT Region through DC Ties for the 15-minute Settlement Interval.
[NPRR1054: Delete the variable "RTDCEXPAMTQSETOT $_q$" above upon system implementation.]		

Variable	Unit	Description
NDRTOBLAMTOTOT $_o$	$	*No DAM Real-Time Obligation Amount Owner Total per CRR Owner*—The net total payment or charge to CRR owner *o* of all its PTP Obligations settled in Real-Time when ERCOT is unable to execute the DAM, for the hour.
NDRTOPTAMTOTOT $_o$	$	*No DAM Real-Time Option Amount Owner Total per CRR Owner*—The total payment to CRR owner *o* for all its PTP Options settled in Real-Time when ERCOT is unable to execute the DAM, for the hour.
NDRTOPTRAMTOTOT $_o$	$	*No DAM Real-Time Option with Refund Amount Owner Total per CRR Owner*—The total payment to Non-Opt-In Entity (NOIE) CRR owner *o* for all its PTP Options with Refund settled in Real-Time when ERCOT is unable to execute the DAM, for the hour.
NDRTOBLRAMTOTOT $_o$	$	*No DAM Real-Time Obligation with Refund Amount Owner Total per CRR Owner*—The net total payment or charge to CRR owner *o* for all its PTP Obligations with Refund settled in Real-Time, when ERCOT is unable to execute the DAM, for the hour.
[NPRR917: Insert the variables "RTESOGAMTQSETOT $_q$" and "RTESOGAMTTOT" below upon system implementation:]		
RTESOGAMTQSETOT $_q$	$	*Real-Time Energy Payment or Charge per QSE for Energy from SODGs and SOTGs* —The payment or charge to QSE *q* for Real-Time energy from SODGs and SOTGs, for the 15-minute Settlement Interval.
RTESOGAMTTOT	$	*Real-Time Energy Amount Total for Energy from all SODGs and SOTGs* —The total net payments and charges to all QSEs for Real-Time energy from SODGs and SOTGs, for the 15-minute Settlement Interval.
LRS $_q$	none	The LRS calculated for QSE *q* for the 15-minute Settlement Interval. See Section 6.6.2.2~~, QSE Load Ratio Share for a 15-Minute Settlement Interval~~.
q	none	A QSE.
o	none	A CRR Owner.

6.7 Real-Time Settlement Calculations for the Ancillary Services

6.7.5 Real-Time Ancillary Service Imbalance Payment or Charge

[NPRR1010: Insert Section 6.7.5.7 below upon system implementation of the Real-Time Co-Optimization (RTC) project:]

6.7.5.7 Real-Time Derated Ancillary Service Capability Payment

(1) If ERCOT manually reduces the amount of an Ancillary Service that may be awarded to a Resource in Real-Time under paragraph (6) of Section 6.4.9.1.1, Ancillary Service Awards, and the reduction reduces the payment the QSE would have received under

Section 6.7.5.1, Real-Time Ancillary Service Imbalance Payment or Charge, the QSE may be eligible for a Real-Time derated Ancillary Service capability payment under this Section.

(2) In order to be eligible for a Real-Time derated Ancillary Service capability payment, the QSE must:

(a) File a timely Settlement and billing dispute, identifying the following items, by Settlement Interval:

(i) Dollar amount and calculation of the estimated Real-Time derated Ancillary Service capability payment;

(ii) The quantity of Ancillary Service awards, by Ancillary Service product, that were not awarded due to ERCOT's manual reduction of the Resource's Ancillary Service capability;

(iii) Any additional revenues earned by the QSE under Section 6.6.3.1, Real-Time Energy Imbalance Payment or Charge at a Resource Node; and

(iv) Any additional revenues earned by the QSE under Section 6.7.5.1, Real-Time Ancillary Service Imbalance Payment or Charge.

(b) Have submitted an Ancillary Service Offer for the disputed Settlement Interval(s). The Ancillary Service Offer used to calculate the Real-Time derated Ancillary Service capability payment shall be the most recent offer received by ERCOT effective for the disputed Settlement Interval(s) before ERCOT manually reduced the amount of Ancillary Service to be awarded.

(3) ERCOT shall attempt to validate the calculations provided by the QSE, and may request additional supporting documentation or explanation with respect to the submitted materials within 15 Business Days of receipt. Additional information requested by ERCOT must be provided by the QSE within 15 Business Days of ERCOT's request. Upon determination by ERCOT that no additional supporting documentation or explanation is needed from the disputing QSE, ERCOT shall notify the QSE of its acceptance or rejection of the claim for the Real-Time derated Ancillary Service capability payment within 15 Business Days.

(4) The price used to determine the derated MWs that were not awarded due to the manual reduction shall be the Real-Time MCPC for the Ancillary Service that was reduced.

(5) The amount recoverable under this section shall be capped by the Real-Time MCPC for the Ancillary Service that was reduced, multiplied by the reduced quantity.

(6) The amount recoverable under this Section shall be reduced by any additional revenue received by the QSE, as determined in paragraphs (2)(a)(iii) and (2)(a)(iv) above.

(7) The Real-Time derated Ancillary Service capability payment for a given 15-minute Settlement Interval is calculated as follows:

$$\mathbf{RTDASAMT}_q = \mathbf{(-1)} * \mathbf{Min}[(\mathbf{RTRUILD}_q + \mathbf{RTRDILD}_q + \mathbf{RTRRILD}_q + \mathbf{RTNSILD}_q + \mathbf{RTECRILD}_q - \mathbf{RTEIRD}_q - \mathbf{RTASIRD}_q), \sum_r \mathbf{RTDASCAP}_{q,r}]$$

Where:

$$RTDASCAP_{q,r} = (1/4) * (RTMCPCRU * RTRUDQ_{q,r} + RTMCPCRD * RTRDDQ_{q,r} + RTMCPCRR * RTRRDQ_{q,r} + RTMCPCNS * RTNSDQ_{q,r} + RTMCPCECR * RTECRDQ_{q,r})$$

The above variables are defined as follows:

Variable	Unit	Description
$RTDASAMT_q$	$	*Real-Time Derated Ancillary Service Amount*—The payment to QSE *q* for amounts recoverable resulting from a manual reduction of Ancillary Services by ERCOT for the 15-minute Settlement Interval.
$RTRUILD_q$	$	*Real-Time Derated Regulation Up Imbalance Losses for Deration*—The payments not made to QSE *q* under paragraph (1) of Section 6.7.5.2, Regulation Up Service Payments and Charges, for the 15-minute Settlement Interval.
$RTRDILD_q$	$	*Real-Time Derated Regulation Down Imbalance Losses for Deration*—The payments not made to QSE *q* under paragraph (1) of Section 6.7.5.3, Regulation Down Service Payments and Charges, for the 15-minute Settlement Interval.
$RTRRILD_q$	$	*Real-Time Derated Responsive Reserve Imbalance Losses for Deration*—The payments not made to QSE *q* under paragraph (1) of Section 6.7.5.4, Responsive Reserve Payments and Charges, for the 15-minute Settlement Interval.
$RTNSILD_q$	$	*Real-Time Derated Non-Spin Imbalance Losses for Deration*—The payments not made to QSE *q* under paragraph (1) of Section 6.7.5.5, Non-Spinning Reserve Service Payments and Charges, for the 15-minute Settlement Interval.
$RTECRILD_q$	$	*Real-Time Derated ERCOT Contingency Reserve Service Imbalance Losses for Deration*—The payments not made to QSE *q* under paragraph (1) of Section 6.7.5.6, ERCOT Contingency Reserve Service Payments and Charges, for the 15-minute Settlement Interval.
$RTEIRD_q$	$	*Real-Time Energy Imbalance Revenues for Deration*—The additional payments to QSE *q* under Section 6.6.3.1~~, Real-Time Energy Imbalance Payment or Charge at a Resource Node, for the 15-minute Settlement Interval~~.
$RTASIRD_q$	$	*Real-Time Ancillary Service Imbalance Revenues for Deration*—The additional Ancillary Service imbalance payments to QSE *q* for all Ancillary Service products for the 15-minute Settlement Interval.

RTDASCAP $_{q, r}$	$	*Real-Time Derated Ancillary Service Payment Cap*—The amount recoverable for Resource *r* represented by QSE *q*, capped by the Real-Time MCPC for the Ancillary Service product that was derated, multiplied by the quantity by which the Resource's capability to provide the Ancillary Service was reduced for the 15-minute Settlement Interval.
RTMCPCRU	$/MW	*Real-Time Market Clearing Price for Capacity for Regulation Up* - The Real-Time MCPC for Reg-Up for the 15-minute Settlement Interval.
RTMCPCRD	$/MW	*Real-Time Market Clearing Price for Capacity for Regulation Down* - The Real-Time MCPC for Reg-Down for the 15-minute Settlement Interval.
RTMCPCRR	$/MW	*Real-Time Market Clearing Price for Capacity for Responsive Reserve* - The Real-Time MCPC for RRS for the 15-minute Settlement Interval.
RTMCPCNS	$/MW	*Real-Time Market Clearing Price for Capacity for Non-Spin* - The Real-Time MCPC for Non-Spin for the 15-minute Settlement Interval.
RTMCPCECR	$/MW	*Real-Time Market Clearing Price for Capacity for ERCOT Contingency Reserve Service* — The Real-Time MCPC for ECRS for the 15-minute Settlement Interval.
RTRUDQ $_{q, r}$	MW	*Real-Time Regulation Up Derated Quantity* - The Reg-Up quantity manually reduced by ERCOT for the Resource *r* represented by QSE *q* for the 15-minute Settlement Interval.
RTRDDQ $_{q, r}$	MW	*Real-Time Regulation Down Derated Quantity* - The Reg-Down quantity manually reduced by ERCOT for the Resource *r* represented by QSE *q* for the 15-minute Settlement Interval.
RTRRDQ $_{q, r}$	MW	*Real-Time Responsive Reserve Derated Quantity* - The RRS quantity manually reduced by ERCOT for the Resource *r* represented by QSE *q* for the 15-minute Settlement Interval.
RTECRDQ $_{q, r}$	MW	*Real-Time ERCOT Contingency Reserve Service Derated Quantity* - The ECRS quantity manually reduced by ERCOT for the Resource *r* represented by QSE *q* for the 15-minute Settlement Interval.
RTNSDQ $_{q, r}$	MW	*Real-Time Non-Spin Derated Quantity* - The Non-Spin quantity manually reduced by ERCOT for the Resource *r* represented by QSE *q* for the 15-minute Settlement Interval.
q	none	A QSE.
r	none	A Resource.

6.7.6 *Real-Time Ancillary Service Imbalance Revenue Neutrality Allocation*

(1) The total cost for Ancillary Service Imbalance payments and charges associated with ORDC and reliability deployments is allocated to the QSEs representing Load based on Load Ratio Share (LRS). The Real-Time Ancillary Service imbalance revenue neutrality allocations to each QSE for a given 15-minute Settlement Interval are calculated as follows:

LAASIRNAMT $_q$= (-1) * [(RTASIAMTTOT + RTRUCRSVAMTTOT) * LRS $_q$]

LARDASIRNAMT $_q$= (-1) * [(RTRDASIAMTTOT + RTRDRUCRSVAMTTOT) * LRS $_q$]

Where:

$$RTASIAMTTOT = \sum_{q} RTASIAMT_{q}$$

$$RTRUCRSVAMTTOT = \sum_{q} RTRUCRSVAMT_{q}$$

$$RTRDASIAMTTOT = \sum_{q} RTRDASIAMT_{q}$$

$$RTRDRUCRSVAMTTOT = \sum_{q} RTRDRUCRSVAMT_{q}$$

The above variables are defined as follows:

Variable	Unit	Definition
$LAASIRNAMT_{q}$	$	*Load-Allocated Ancillary Service Imbalance Revenue Neutrality Amount per QSE*—The QSE *q*'s share of the total Real-Time Ancillary Service imbalance revenue neutrality amount associated with ORDC for the 15-minute Settlement Interval.
$LARDASIRNAMT_{q}$	$	*Load-Allocated Reliability Deployment Ancillary Service Imbalance Revenue Neutrality Amount per QSE*—The QSE *q*'s share of the total Real-Time Ancillary Service imbalance revenue neutrality amount associated with Reliability Deployments for the 15-minute Settlement Interval.
RTASIAMTTOT	$	*Real-Time Ancillary Service Imbalance Market Total Amount*—The total payment or charge to all QSEs for the Real-Time Ancillary Service imbalance associated with ORDC for each 15-minute Settlement Interval.
$RTASIAMT_{q}$	$	*Real-Time Ancillary Service Imbalance Amount*—The total payment or charge to QSE *q* for the Real-Time Ancillary Service imbalance associated with ORDC for each 15-minute Settlement Interval.
RTRDASIAMTTOT	$	*Real-Time Reliability Deployment Ancillary Service Imbalance Market Total Amount*—The total payment or charge to all QSEs for the Real-Time Ancillary Service imbalance associated with Reliability Deployments for each 15-minute Settlement Interval.
$RTRDASIAMT_{q}$	$	*Real-Time Reliability Deployment Ancillary Service Imbalance Amount*—The total payment or charge to QSE *q* for the Real-Time Ancillary Service imbalance associated with Reliability Deployments for each 15-minute Settlement Interval.
RTRUCRSVAMTTOT	$	*Real-Time RUC Ancillary Service Reserve Market Total Amount*—The total payment to all QSEs for the Real-Time RUC Ancillary Service reserve payments associated with ORDC for each 15-minute Settlement Interval.
$RTRUCRSVAMT_{q}$	$	*Real-Time RUC Ancillary Service Reserve Amount*—The total payment to QSE *q* for the Real-Time RUC Ancillary Service reserve payment associated with ORDC for each 15-minute Settlement Interval.
RTRDRUCRSVAMTTOT	$	*Real-Time Reliability Deployment RUC Ancillary Service Reserve Market Total Amount*—The total payment |to all QSEs for the Real-Time RUC Ancillary Service Reserve payment as a result of Reliability Deployments for each 15-minute Settlement Interval.
$RTRDRUCRSVAMT_{q}$	$	*Real-Time Reliability Deployment RUC Ancillary Service Reserve Amount*—The total payment |to QSE *q* for the Real-Time RUC Ancillary Service Reserve payment as a result of Reliability Deployments for each 15-minute Settlement Interval.

Variable	Unit	Definition
LRS_q	none	The LRS calculated for QSE *q* for the 15-minute Settlement Interval. See Section 6.6.2.2, QSE Load Ratio Share for a 15-Minute Settlement Interval.
q	none	A QSE.

[NPRR1010: Replace Section 6.7.6 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]

6.7.6 Real-Time Ancillary Service Revenue Neutrality Allocation

(1) The total cost for Real-Time Ancillary Service payments and charges is allocated to the QSEs representing Load based on Load Ratio Share (LRS). The Real-Time Ancillary Service allocations to each QSE for a given 15-minute Settlement Interval are calculated as follows:

(a) For Reg-Up:

$$LARTRUAMT_q = (-1) * (RTRUIMBAMTTOT + RTRUOAMTTOT + RTRUTOAMTTOT) * LRS_q$$

Where:

$$RTRUIMBAMTTOT = \sum_q (RTRUIMBAMT_q)$$

$$RTRUOAMTTOT = \sum_q (RTRUOAMT_q)$$

$$RTRUTOAMTTOT = \sum_q (RTRUTOAMT_q)$$

The above variables are defined as follows:

Variable	Unit	Description
$LARTRUAMT_q$	$	*Load-Allocated Real-Time Reg-Up Amount for the QSE*— The QSE *q*'s share of the total Real-Time Reg-Up amount for the 15-minute Settlement Interval.
$RTRUIMBAMT_q$	$	*Real-Time Reg-Up Imbalance Amount for the QSE* - The total payment or charge to QSE *q* for the Real-Time Reg-Up imbalance for each 15-minute Settlement Interval.
$RTRUOAMT_q$	$	*Real-Time Reg-Up Only Amount for the QSE*— The total charge to QSE *q* in Real-Time for Reg-Up only awards for each 15-minute Settlement Interval.
RTRUIMBAMTTOT	$	*Real-Time Reg-Up Imbalance Market Total Amount* - The total payment or charge to all QSEs for the Real-Time Reg-Up imbalance for each 15-minute Settlement Interval.

RTRUOAMTTOT	$	*Real-Time Reg-Up Only Market Total Amount* - The total charge to all QSEs in Real-Time for Reg-Up only awards for each 15-minute Settlement Interval.
RTRUTOAMT $_q$	$	*Real-Time Reg-Up Trade Overage Amount for the QSE*— The total charge to QSE q in Real-Time for Reg-Up trade overages for each 15-minute Settlement Interval.
RTRUTOAMTTOT	$	*Real-Time Reg-Up Trade Overage Total Amount* — The total charge to all QSEs for Real-Time Reg-Up trade overages for each 15-minute Settlement Interval.
LRS $_q$	none	*Load Ratio Share per QSE*—The LRS as defined in Section 6.6.2.2, QSE Load Ratio Share for a 15-Minute Settlement Interval, for QSE q for the 15-minute Settlement Interval.
q	none	A QSE.

(b) For Reg-Down:

$$LARTRDAMT_q = (-1) * (RTRDIMBAMTTOT + RTRDOAMTTOT + RTRDTOAMTTOT) * LRS_q$$

Where:

$$RTRDIMBAMTTOT = \sum_q (RTRDIMBAMT_q)$$

$$RTRDOAMTTOT = \sum_q (RTRDOAMT_q)$$

$$RTRDTOAMTTOT = \sum_q (RTRDTOAMT_q)$$

The above variables are defined as follows:

Variable	**Unit**	**Description**
LARTRDAMT $_q$	$	*Load-Allocated Real-Time Reg-Down Amount for the QSE* — The QSE q's share of the total Real-Time Reg-Down amount for the 15-minute Settlement Interval.
RTRDIMBAMT $_q$	$	*Real-Time Reg-Down Imbalance Amount for the QSE* - The total payment or charge to QSE q for the Real-Time Reg-Down imbalance for each 15-minute Settlement Interval.
RTRDOAMT $_q$	$	*Real-Time Reg-Down Only Amount for the QSE*— The total charge to QSE q in Real-Time for Reg-Down only awards for each 15-minute Settlement Interval.
RTRDIMBAMTTOT	$	*Real-Time Reg-Down Imbalance Market Total Amount* - The total payment or charge to all QSEs for the Real-Time Reg-Down imbalance for each 15-minute Settlement Interval.
RTRDOAMTTOT	$	*Real-Time Reg-Down Only Market Total Amount* - The total charge to all QSEs in Real-Time for Reg-Down only awards for each 15-minute Settlement Interval.
RTRDTOAMT $_q$	$	*Real-Time Reg-Down Trade Overage Amount for the QSE*— The total charge to QSE q in Real-Time for Reg-Down trade overages for each 15-minute Settlement Interval.

RTRDOAMTTOT	$	*Real-Time Reg-Down Trade Overage Total Amount* — The total charge to all QSEs for Real-Time Reg-Down trade overages for each 15-minute Settlement Interval.
LRS_q	none	*Load Ratio Share per QSE*—The LRS as defined in Section 6.6.2.2~~, QSE Load Ratio Share for a 15-Minute Settlement Interval,~~ for QSE *q* for the 15-minute Settlement Interval.
q	none	A QSE.

(c) For Responsive Reserve (RRS):

$$LARTRRAMT_q = (-1) * (RTRRIMBAMTTOT + RTRROAMTTOT + RTRRTOAMTTOT) * LRS_q$$

Where:

$$RTRRIMBAMTTOT = \sum_q (RTRRIMBAMT_q)$$

$$RTRROAMTTOT = \sum_q (RTRROAMT_q)$$

$$RTRRTOAMTTOT = \sum_q (RTRRTOAMT_q)$$

The above variables are defined as follows:

Variable	**Unit**	**Description**
$LARTRRAMT_q$	$	*Load-Allocated Real-Time Responsive Reserve Amount for the QSE* — The QSE's share of the total Real-Time RRS amount for the 15-minute Settlement Interval.
$RTRRIMBAMT_q$	$	*Real-Time Responsive Reserve Imbalance Amount for the QSE* - The total payment or charge to QSE *q* for the Real-Time RRS imbalance for each 15-minute Settlement Interval.
$RTRROAMT_q$	$	*Real-Time Responsive Reserve Only Amount for the QSE*— The total charge to QSE *q* in Real-Time for RRS only awards for each 15-minute Settlement Interval.
RTRRIMBAMTTOT	$	*Real-Time Responsive Reserve Imbalance Market Total Amount* - The total payment or charge to all QSEs for the Real-Time RRS imbalance for each 15-minute Settlement Interval.
RTRROAMTTOT	$	*Real-Time Responsive Reserve Only Market Total Amount* - The total charge to all QSEs in Real-Time for RRS only awards for each 15-minute Settlement Interval.
$RTRRTOAMT_q$	$	*Real-Time Responsive Reserve Trade Overage Amount for the QSE*— The total charge to QSE *q* in Real-Time for RRS trade overages for each 15-minute Settlement Interval.
RTRROAMTTOT	$	*Real-Time Responsive Reserve Trade Overage Total Amount* — The total charge to all QSEs for Real-Time RRS trade overages for each 15-minute Settlement Interval.
LRS_q	none	*Load Ratio Share per QSE*—The LRS as defined in Section 6.6.2.2~~, QSE Load Ratio Share for a 15-Minute Settlement Interval,~~ for QSE *q* for the 15-minute Settlement Interval.

q	none	A QSE.

(d) For Non-Spin:

$$LARTNSAMT_q = (-1) * (RTNSIMBAMTTOT + RTNSOAMTTOT + RTNSTOAMTTOT) * LRS_q$$

Where:

$$RTNSIMBAMTTOT = \sum_q (RTNSIMBAMT_q)$$

$$RTNSOAMTTOT = \sum_q (RTNSOAMT_q)$$

$$RTNSTOAMTTOT = \sum_q (RTNSTOAMT_q)$$

The above variables are defined as follows:

Variable	Unit	Description
$LARTNSAMT_q$	$	*Load-Allocated Real-Time Non-Spin Amount for the QSE* — The QSE's share of the total Real-Time Non-Spin amount for the 15-minute Settlement Interval.
$RTNSIMBAMT_q$	$	*Real-Time Non-Spin Imbalance Amount for the QSE* - The total payment or charge to QSE q for the Real-Time Non-Spin imbalance for each 15-minute Settlement Interval.
$RTNSOAMT_q$	$	*Real-Time Non-Spin Only Amount for the QSE*— The total charge to QSE q in Real-Time for Non-Spin only awards for each 15-minute Settlement Interval.
RTNSIMBAMTTOT	$	*Real-Time Non-Spin Imbalance Market Total Amount* - The total payment or charge to all QSEs for the Real-Time Non-Spin imbalance for each 15-minute Settlement Interval.
RTNSOAMTTOT	$	*Real-Time Non-Spin Only Market Total Amount* - The total charge to all QSEs in Real-Time for Non-Spin only awards for each 15-minute Settlement Interval.
$RTNSTOAMT_q$	$	*Real-Time Non-Spin Trade Overage Amount for the QSE*— The total charge to QSE q in Real-Time for Non-Spin trade overages for each 15-minute Settlement Interval.
RTNSOAMTTOT	$	*Real-Time Non-Spin Trade Overage Total Amount* — The total charge to all QSEs for Real-Time Non-Spin trade overages for each 15-minute Settlement Interval.
LRS_q	none	*Load Ratio Share per QSE*—The LRS as defined in Section 6.6.2.2~~, QSE Load Ratio Share for a 15-Minute Settlement Interval,~~ for QSE q for the 15-minute Settlement Interval.
q	none	A QSE.

(e) For ERCOT Contingency Reserve Service (ECRS):

$$LARTECRAMT_q = (-1) * (RTECRIMBAMTTOT + RTECROAMTTOT +$$

RTECRTOAMTTOT) * LRS $_q$

Where:

$$RTECRIMBAMTTOT = \sum_q (RTECRIMBAMT_q)$$

$$RTECROAMTTOT = \sum_q (RTECROAMT_q)$$

$$RTECRTOAMTTOT = \sum_q (RTECRTOAMT_q)$$

The above variables are defined as follows:

Variable	Unit	Description
LARTECRAMT $_q$	$	*Load-Allocated Real-Time ERCOT Contingency Reserve Service Amount for the QSE* - The QSE *q*'s share of the total Real-Time ECRS amount for the 15-minute Settlement Interval.
RTECRIMBAMT $_q$	$	*Real-Time ERCOT Contingency Reserve Service Imbalance Amount for the QSE* - The total payment or charge to QSE *q* for the Real-Time ECRS imbalance for each 15-minute Settlement Interval.
RTECROAMT $_q$	$	*Real-Time ERCOT Contingency Reserve Service Only Amount for the QSE*— The total charge to QSE *q* in Real-Time for ECRS only awards for each 15-minute Settlement Interval.
RTECRIMBAMTTOT	$	*Real-Time ERCOT Contingency Reserve Service Imbalance Market Total Amount* - The total payment or charge to all QSEs for the Real-Time ECRS imbalance for each 15-minute Settlement Interval.
RTECROAMTTOT	$	*Real-Time ERCOT Contingency Reserve Service Only Market Total Amount* - The total charge to all QSEs in Real-Time for ECRS only awards for each 15-minute Settlement Interval.
RTECRTOAMT $_q$	$	*Real-Time ERCOT Contingency Reserve Service Trade Overage Amount for the QSE*— The total charge to QSE *q* in Real-Time for ECRS trade overages for each 15-minute Settlement Interval.
RTECROAMTTOT	$	*Real-Time ERCOT Contingency Reserve Service Trade Overage Total Amount* — The total charge to all QSEs for Real-Time ECRS trade overages for each 15-minute Settlement Interval.
LRS $_q$	none	*Load Ratio Share per QSE*—The LRS as defined in Section 6.6.2.2, ~~QSE Load Ratio Share for a 15-Minute Settlement Interval,~~ for QSE *q* for the 15-minute Settlement Interval.
q	none	A QSE.

ERCOT Nodal Protocols

Section 8: Performance Monitoring

March~~January~~ 1, 2021

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8 PERFORMANCE MONITORING

8.1 QSE and Resource Performance Monitoring

8.1.1 QSE Ancillary Service Performance Standards

8.1.1.3 Ancillary Service Capacity Compliance Criteria

(1) ERCOT shall provide each QSE representing Resources a capacity summary containing as a minimum the same general information required in Section 6.5.7.5, Ancillary Services Capacity Monitor, except specific to only the QSE. The summary shall be updated with calculations every ten seconds by ERCOT and then provided to the QSE every five minutes using the MIS Certified Area.

(2) ERCOT shall continuously measure the overall performance of each QSE in providing each Ancillary Service by comparing the sum of each of the QSE's Resources' telemetered Ancillary Services Resource Responsibility with the QSE's total Ancillary Service responsibility. If the comparison indicates the QSE is not providing sufficient capacity to meet its Ancillary Services responsibility, ERCOT shall notify the QSE via the MIS Certified Area.

(3) The QSE, within ten minutes of receiving the insufficient capacity notification from ERCOT, the QSE must:

(a) If due to a telemetry issue, correct the telemetered Ancillary Services Resource Responsibility to provide sufficient capacity; or

(b) Must provide both appropriate justification for not satisfying their Ancillary Service Obligation and a plan to correct the shortfall that is acceptable with the ERCOT operator. ERCOT shall report non-compliance of Ancillary Service capacity requirements to the Reliability Monitor for review.

(4) A QSE for an Energy Storage Resource (ESR) that is, was, or will be unable to meet its Ancillary Service Resource Responsibility due to a charging restriction during an EEA Level 3 event shall inform ERCOT of this inability no later than one hour after the end of the EEA Level 3 event. Upon providing such notification, the QSE shall be deemed to have complied with its Ancillary Service Supply Responsibility for a time period following the EEA Level 3 event that is equal to the duration of the suspended charging period during the EEA Level 3 event. However, nothing in this paragraph exempts the QSE from any charge under Section 6.7.3, Charges for Ancillary Service Capacity Replaced Due to Failure to Provide, or any other Settlement consequence due to the Ancillary Service insufficiency.

[NPRR1011, NPRR1040, and NPRR1053: Replace applicable portions of Section 8.1.1.3 ~~Delete paragraphs (2) and (3)~~ above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1011 or NPRR1053; or upon system implementation for NPRR1040:~~:~~]

8.1.1.3 Ancillary Service Capacity Compliance Criteria

(1) ERCOT shall provide each QSE representing Resources a capacity summary containing as a minimum the same general information required in Section 6.5.7.5, Ancillary Services Capacity Monitor, except specific to only the QSE. The summary shall be updated with calculations every ten seconds by ERCOT and then provided to the QSE every five minutes using the MIS Certified Area.

(2) ERCOT shall report non-compliance with Ancillary Service capacity requirements to the Reliability Monitor for review. Non-compliance occurs only if a QSE is deficient in its Ancillary Service capacity requirement for more than S% of the five-minute clock intervals that the QSE is carrying an Ancillary Service Supply Responsibility, as calculated for the calendar month in accordance with paragraphs (3) and (4) of this section, or if the QSE is deficient in its Ancillary Service Supply Responsibility, by service type, by more than greater of T% of its Ancillary Service Supply Responsibility or U MW for more than 25 minutes (i.e. five consecutive five-minute clock intervals) in five or more instances within the month. For purposes of this section, a single instance is considered a deficiency of the greater of T% or U MW for more than 25 consecutive minutes, regardless of how long the deficiency persists.

(3) ERCOT shall calculate the Ancillary Service capacity performance metrics under normal operating conditions. ERCOT shall not consider five-minute clock intervals during which any of the following events has occurred:

(a) For a Resource providing Ancillary Service that experiences a Forced Outage, all five-minute clock intervals from the time of the Forced Outage until the next Operating Hour for which the QSE can update its schedule (i.e., within ten minutes before the close of an Adjustment Period). This exemption shall only apply to the first three Outages experienced by any single Resource in the evaluation period. ERCOT shall validate the cause of the Forced Outage through telemetry, however should it not be readily discernable, upon request of ERCOT, the QSE shall provide the following documentation regarding each Forced Derate or Startup Loading Failure:

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

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

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

(b) For intervals where both the primary and backup Wide Area Network (WAN) connections are inoperative;

(c) For intervals where an Ancillary Service Obligation was traded during the Operating Hour between two QSEs such that one QSE assumed the Ancillary Service Obligation of the other QSE, and the ERCOT Operator was notified of the Ancillary Service Trade as soon as practicable; and

(d) For certain other periods of abnormal operations as determined by ERCOT in its sole discretion.

(4) For each QSE with Resources providing Ancillary Service, ERCOT shall calculate Ancillary Service capacity performance metrics for each month.

(a) Ancillary Service capacity performance is based on the following criteria:

(i) In each five-minute clock interval during which the QSE has an Ancillary Service Supply Responsibility, a QSE may be deficient in its Ancillary Service responsibility, by service type, by no more than the greater of:

(A) T% of its Ancillary Service Supply Responsibility; or

(B) U MW.

(ii) If at the end of the month for which the Ancillary Service capacity performance metric was calculated, the QSE failed to meet its applicable responsibilities as defined in item (i) above during more than S% of the five-minute clock intervals that the QSE was carrying an Ancillary Service Supply Responsibility, ERCOT will report such non-compliance to the Reliability Monitor.

(b) Ancillary Service capacity performance is measured for each service type in five-minute clock intervals based on the difference between Ancillary Service Supply Responsibility and the telemetered responsibility. ERCOT shall measure Ancillary Service capacity performance one time per five-minute clock interval. ERCOT shall not measure Ancillary Service capacity performance during the final 20 seconds of any given five-minute clock interval.

(5) The Ancillary Service capacity performance criteria in paragraphs (2) through (4) above shall be subject to review and approval by the ERCOT Board. The Ancillary

Service capacity performance criteria variables S, T, and U shall be posted to the ERCOT website no later than three Business Days after ERCOT Board approval.

8.1.1.4 Ancillary Service and Energy Deployment Compliance Criteria

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

(1) ERCOT shall limit the deployment of Regulation Service of each QSE for each LFC cycle equal to 125% of the total amount of Regulation Service in the ERCOT System divided by the number of control cycles in five minutes.

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

GREDP (%) = ABS[((ATG – AEPFR)/(ABP + ARI)) – 1.0] * 100

GREDP (MW) = ABS(ATG – AEPFR – ABP - ARI)

Where:

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

ARI = Average Regulation Instruction = the amount of regulation that the Generation Resource or IRR Group should have produced based on the LFC deployment signals, calculated by LFC, during each five-minute clock interval

Δfrequency is actual frequency minus 60 Hz

EPFR = Estimated Primary Frequency Response (MW) = if $|\Delta\text{frequency}| \leq$ Governor Dead-Band then EPFR = zero, if not then if Δfrequency > zero, EPFR = (Δfrequency - Governor Dead-Band)/((droop value * 60) – Governor Dead-Band) * HSL * -1, if not then if Δfrequency < zero, EPFR = (Δfrequency + Governor Dead-Band)/((droop value * 60) – Governor Dead-Band) * HSL * -1

AEPFR = Average Estimated Primary Frequency Response = the Estimated Primary Frequency Response (MW) will be calculated every four seconds using a Resource specific droop value where 5% droop = 0.05 the Governor Dead-Band (Hz) and Resource HSL (MW) provided by the Resource Entity, and the

frequency deviation (Hz) from 60 Hz and averaged for the five-minute clock interval. For Combined Cycle Generation Resources, or Generation Resources that have been approved to telemeter Non-Frequency Responsive Capacity (NFRC), the HSL will be reduced by the telemetered NFRC MW to calculate the EPFR. For Combined Cycle Generation Resources, 5.78% Governor droop shall be used. The Resource-specific calculations will be aggregated for IRR Groups.

ABP = Average Base Point = the time-weighted average of a linearly ramped Base Point or sum of Base Points for IRR Groups, for the five-minute clock interval. The linearly ramped Base Point is calculated every four seconds such that it ramps from its initial value to the SCED Base Point over a five-minute period. The initial value of the linearly ramped Base Point will be the four-second value of the previous linearly ramped Base Point at the time the new SCED Base Point is received into the ERCOT Energy Management System (EMS). In the event that the SCED Base Point is received after the five-minute ramp period, the linearly ramped Base Point will continue at a constant value equal to the ending four-second value of the five-minute ramp.

(3) For all of a QSE's Resources that have a Resource Status of ONDSR or ONDSRREG ("Dynamically Scheduled Resource (DSR) Portfolio"), ERCOT shall calculate an aggregate GREDP as a percentage and in MWs for those Resources as follows:

GREDP (%) = ABS[($\sum_{DSR}$ ATG – $\sum_{DSR}$ DBPOS + Intra-QSE Purchase – Intra-QSE Sale – ARRDDSRLR – ANSDDSRLR – $\sum_{DSR}$ AEPFR) / (ATDSRL + $\sum_{DSR}$ ARI) – 1.0] * 100

GREDP (MW) = ABS($\sum_{DSR}$ ATG – $\sum_{DSR}$ DBPOS – ATDSRL– ARRDDSRLR – ANSDDSRLR + Intra-QSE Purchase - Intra-QSE Sale – $\sum_{DSR}$ AEPFR – $\sum_{DSR}$ ARI)

Where:

$\sum_{DSR}$ ATG = Sum of Average Telemetered Generation for all Resources with a Resource Status of ONDSR or ONDSRREG of the QSE for the five-minute clock interval

$\sum_{DSR}$ ARI = Sum of Average Regulation Instruction for all Resources with a Resource Status of ONDSR or ONDSRREG of the QSE for the five-minute clock interval

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

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

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

$\sum_{DSR}$ AEPFR = Sum of Average Estimated Primary Frequency Response for all Resources with a Resource Status of ONDSR or ONDSRREG of the QSE for the five-minute clock interval

$\sum_{DSR}$ DBPOS = Sum of the difference between a linearly ramped Base Point minus Output Schedule for all Resources with a Resource Status of ONDSR or ONDSRREG of the QSE for the five-minute clock interval. The linearly ramped Base Point is calculated every four seconds such that it ramps from its initial value to the SCED Base Point over a five minute period

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

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

(4) For Controllable Load Resources that have a Resource Status of ONRGL or ONCLR, ERCOT shall compute the CLREDP. The CLREDP will be calculated both as a percentage and in MWs as follows:

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

CLREDP (MW) = ABS(ATPC – (ABP – AEPFR – ARI))

Where:

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

ARI = Average Regulation Instruction = the amount of regulation that the Controllable Load Resource should have produced based on the LFC deployment signals, calculated by LFC, during each five-minute clock interval. Reg-Up is considered a positive value for this calculation

AEPFR = Average Estimated Primary Frequency Response = the Estimated Primary Frequency Response (MW) will be calculated every four seconds using a Resource specific droop value where 5% droop = 0.05, the Governor Dead-Band (Hz) and Resource HSL (MW) provided by the Resource Entity, and the

frequency deviation (Hz) from 60 Hz and averaged for the five-minute clock interval

ABP = Average Base Point = the time-weighted average of a linearly ramped Base Point for the five-minute clock interval. The linearly ramped Base Point is calculated every four seconds such that it ramps from its initial value to the SCED Base Point over a five-minute period. The initial value of the linearly ramped Base Point will be the four second value of the previous linearly ramped Base Point at the time the new SCED Base Point is received into the ERCOT EMS. In the event that the SCED Base Point is received after the five minute ramp period, the linearly ramped Base Point will continue at a constant value equal to the ending four second value of the five-minute ramp.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Controllable Load Resource was providing Regulation Service that the CLREDP was equal to or greater than 2.5 MW and equal to or less than 5.0 MW;

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

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

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

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

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

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

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

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

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

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

(e) The five-minute clock intervals where the telemetered Resource Status is set to ONTEST such as intervals during Ancillary Service Qualification and Testing as outlined in Section 8.1.1.1, Ancillary Service Qualification and Testing, or the

five-minute clock intervals during general capacity testing requirements as outlined in Section 8.1.1.2, General Capacity Testing Requirements;

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

EEA was declared. ERCOT will report non-compliance of the following Performance criteria to the Reliability Monitor:

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

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

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

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

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

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

(10) The GREDP/CLREDP performance criteria in paragraphs (7) through (9) above shall be subject to review and approval by TAC. The GREDP/CLREDP performance criteria variables X, Y, and Z shall be posted to the ERCOT website no later than three Business Days after TAC approval.

(11) If at the end of the month during which GREDP was calculated, a non-DSR Resource or a QSE with DSR Resources, has a GREDP less than X% or Y MW for 85% of the five-minute clock intervals, the Reliability Monitor shall, at the request of the QSE, recalculate GREDP excluding the five-minute clock intervals when a Resource is deployed above the unit's ramp rate due to ramp rate sharing between energy and Regulation Service, as described in Section 6.5.7.2, Resource Limit Calculator. The requesting QSE shall provide to the Reliability Monitor information validating the ramp rate violation for the intervals in dispute.

[NPRR863, NPRR879, NPRR963, NPRR965, NPRR1000, NPRR1011, NPRR1014, ~~and~~ NPRR1029, and NPRR1040: Replace applicable portions of Section 8.1.1.4.1 above with the following upon system implementation for NPRR863, NPRR879, NPRR963, NPRR965, NPRR1000, NPRR1014, ~~or~~ NPRR1029, or NPRR1040; upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1011; or upon system implementation of NPRR1000 for NPRR1046:]

8.1.1.4.1 Regulation Service and Generation Resource/Controllable Load Resource/Energy Storage Resource Energy Deployment Performance, and Ancillary Service Capacity Performance Metrics

(1) ERCOT shall compute the GREDP for each Generation Resource that is On-Line and released to SCED for Base Point Dispatch Instructions. The GREDP is calculated for each five-minute clock interval as a percentage and in MWs as follows:

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

GREDP (MW) = ABS(ATG – AEPFR –ASP)

Where:

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

Δfrequency is actual frequency minus 60 Hz

EPFR = Estimated Primary Frequency Response (MW) = if $|\Delta\text{frequency}| \leq$ Governor Dead-Band then EPFR = zero, if not then if Δfrequency > zero, EPFR = (Δfrequency - Governor Dead-Band)/((droop value * 60) – Governor Dead-Band) * HSL * -1, if not then if Δfrequency < zero, EPFR = (Δfrequency + Governor Dead-Band)/((droop value * 60) – Governor Dead-Band) * HSL * -1

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

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

(2) For Controllable Load Resources that have a Resource Status of ONL and are acting as a Controllable Load Resource and are not part of an ESR, ERCOT shall compute the CLREDP. The CLREDP will be calculated both as a percentage and in MWs as follows:

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

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

Where:

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

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

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

(3) ERCOT shall compute the ESREDP for ESRs. The ESREDP is calculated for each five-minute clock interval as a percentage and in MWs as follows:

ESREDP (%) = ABS[((ATPF – AEPFR)/(ASP)) – 1.0] * 100

ESREDP (MW) = ABS(ATPF – AEPFR – ASP)

Where:

ATPF = Average Telemetered Power Flow = the average telemetered power flow of the Energy Storage Resource for the five-minute clock interval.

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

Δfrequency is actual frequency minus 60 Hz.

EPFR = Estimated Primary Frequency Response (MW) = If $|\Delta\text{frequency}| \leq$ Governor Dead-Band then EPFR = zero, if not then if Δfrequency > zero, EPFR = (Δfrequency - Governor Dead-Band)/((droop value * 60) – Governor Dead-Band) * ABS(HSL-LSL) * -1, if not then if Δfrequency < zero, EPFR = (Δfrequency + Governor Dead-Band)/((droop value * 60) – Governor Dead-Band) * ABS(HSL-LSL) * -1.

AEPFR = Average Estimated Primary Frequency Response = the Estimated Primary Frequency Response (MW) will be calculated every four seconds using a Resource-specific droop value where 5% droop = 0.05, the Governor Dead-

Band (Hz), Resource LSL (MW), and Resource HSL (MW) provided by the Resource Entity, and the frequency deviation (Hz) from 60 Hz and averaged for the five-minute clock interval.

(4) ERCOT shall post to the MIS Certified Area for each QSE and for all Generation Resources or Wind-powered Generation Resource (WGR) Groups, and for all Controllable Load Resources:

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

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

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

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

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

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

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

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

intervals during which the Generation Resource or the IRR Group was released to SCED that the GREDP was greater than 5.0 MW;

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(i) For intervals where both the primary and backup Wide Area Network (WAN) connections are inoperative; and

(ji) For QSGRs, the five-minute clock intervals in which the QSGR has a telemetered status of SHUTDOWN or telemeters an LSL of zero pursuant to Section 3.8.3.1, Quick Start Generation Resource Decommitment Decision Process.

(6) All Generation Resources that are not part of an ESR, excluding IRRs, shall meet the following GREDP criteria for each month. ERCOT will report non-compliance of the following performance criteria to the Reliability Monitor:

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

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

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

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

(a) An IRR or IRR Group must have a GREDP less than Z% or the ATG must be less than the expected MW output for 95% of the five-minute clock intervals in the month when the Resource or a member IRR of an IRR Group was not awarded Ancillary Service and received a Base Point Dispatch Instruction in which the Base Point was two MW or more below the IRR's HSL used by SCED. The expected MW output includes the Resource's Base Point, Regulation Service instructions, and any expected Primary Frequency Response.

(b) An IRR or IRR Group must have a GREDP less than the greater of X% or Y MW for 85% of the five-minute clock intervals in the month during which the Resource or a member IRR of an IRR Group was awarded Ancillary Service.

(c) Additionally, all IRRs and IRR Groups will also be measured for performance specifically during intervals in which ERCOT has declared EEA Level 1 or greater. These Resources and IRR Groups must meet the following GREDP

criteria for the time window that includes all five-minute clock intervals during which EEA was declared. ERCOT will report non-compliance of the following performance criteria to the Reliability Monitor:

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

(ii) An IRR or IRR Group must have a GREDP less than the greater of X% or Y MW when the Resource or a member IRR of an IRR Group was awarded Ancillary Service. An IRR or IRR Group cannot fail this criteria more than three five-minute clock intervals during which EEA was declared. The performance will be measured separately for each instance in which ERCOT has declared EEA.

(8) All Controllable Load Resources that are not part of an ESR shall meet the following CLREDP criteria each month. ERCOT will report non-compliance of the following performance criteria to the Reliability Monitor:

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

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

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

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

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

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

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

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

(9) All ESRs shall meet the following ESREDP criteria each month. ERCOT will report non-compliance of the following performance criteria to the Reliability Monitor:

(a) An ESR must have an ESREDP less than the greater of V% or W MW for 85% of the five-minute clock intervals in the month during which ESREDP was calculated.

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

(i) An ESR must have an ESREDP less than the greater of V% or W MW. An ESR cannot fail this criteria more than three five-minute clock intervals during which EEA was declared and ESREDP was calculated. The performance will be measured separately for each instance in which ERCOT has declared EEA.

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

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

(b) For each five-minute clock interval in which a DC-Coupled Resource meets the conditions in paragraph (2) of Section 3.8.7, the DC-Coupled Resource must have an ESREDP less than Z% or the ATG must be less than the expected MW output for 95% of the five-minute clock intervals in the month when the DC-Coupled Resource received a Base Point Dispatch Instruction in which the Base

Point was two MW or more below the DC-Coupled Resource's HSL used by SCED. The expected MW output includes the Resource's Base Point and any expected Primary Frequency Response.

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

(i) For each five-minute clock interval in which a DC-Coupled Resource meets the conditions in paragraph (1) of Section 3.8.7, the DC-Coupled Resource must have an ESREDP less than the greater of V% or W MW. A DC-Coupled Resource cannot fail this criteria more than three five-minute clock intervals during which EEA was declared and ESREDP was calculated. The performance will be measured separately for each instance in which ERCOT has declared EEA.

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

(11) The GREDP/CLREDP/ESREDP performance criteria in paragraphs (6) through (10) above shall be subject to review and approval by TAC. The GREDP/CLREDP/ESREDP performance criteria variables V, W, X, Y, and Z shall be posted to the ERCOT website no later than three Business Days after TAC approval.

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

ERCOT Nodal Protocols

Section 9: Settlement and Billing

March~~January~~ 1, 2021

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9 SETTLEMENT AND BILLING

9.5 Settlement Statements for Real-Time Market

9.5.3 Real-Time Market Settlement Charge Types

(1) ERCOT shall provide, on each RTM Settlement Statement, the dollar amount for each RTM Settlement charge and payment. The RTM Settlement "Charge Types" are:

(a) Section 5.7.1, RUC Make-Whole Payment;

(b) Section 5.7.2, RUC Clawback Charge;

(c) Section 5.7.3, Payment When ERCOT Decommits a QSE-Committed Resource;

(d) Section 5.7.4.1, RUC Capacity-Short Charge;

(e) Section 5.7.4.2, RUC Make-Whole Uplift Charge;

(f) Section 5.7.5, RUC Clawback Payment;

(g) Section 5.7.6, RUC Decommitment Charge;

(h) Section 6.6.3.1, Real-Time Energy Imbalance Payment or Charge at a Resource Node;

(i) Section 6.6.3.2, Real-Time Energy Imbalance Payment or Charge at a Load Zone;

(j) Section 6.6.3.3, Real-Time Energy Imbalance Payment or Charge at a Hub;

(k) Section 6.6.3.4, Real-Time Energy Payment for DC Tie Import;

(l) Section 6.6.3.5, Real-Time Payment for a Block Load Transfer Point;

(m) Section 6.6.3.6, Real-Time Energy Charge for DC Tie Export Represented by the QSE Under the Oklaunion Exemption;

(n) Section 6.6.3.7, Real-Time High Dispatch Limit Override Energy Payment;

(o) Section 6.6.3.8, Real-Time High Dispatch Limit Override Energy Charge;

(p) Section 6.6.4, Real-Time Congestion Payment or Charge for Self-Schedules;

(q) Section 6.6.5.1.1.1, Base Point Deviation Charge for Over Generation;

(r) Section 6.6.5.1.1.2, Base Point Deviation Charge for Under Generation;

(s) Section 6.6.5.2, IRR Generation Resource Base Point Deviation Charge;

(t) Section 6.6.5.4, Base Point Deviation Payment;

(u) Section 6.6.6.1, RMR Standby Payment;

(v) Section 6.6.6.2, RMR Payment for Energy;

(w) Section 6.6.6.3, RMR Adjustment Charge;

(x) Section 6.6.6.4, RMR Charge for Unexcused Misconduct;

(y) Section 6.6.6.5, RMR Service Charge;

(z) Section 6.6.6.6, Method for Reconciling RMR Actual Eligible Costs, RMR and MRA Contributed Capital Expenditures, and Miscellaneous RMR Incurred Expenses;

(aa) Paragraph (2) of Section 6.6.7.1, Voltage Support Service Payments;

(bb) Paragraph (4) of Section 6.6.7.1;

(cc) Section 6.6.7.2, Voltage Support Charge;

(dd) Section 6.6.8.1, Black Start Hourly Standby Fee Payment;

(ee) Section 6.6.8.2, Black Start Capacity Charge;

(ff) Section 6.6.9.1, Payment for Emergency Power Increase Directed by ERCOT;

(gg) Section 6.6.9.2, Charge for Emergency Power Increases;

(hh) Section 6.6.10, Real-Time Revenue Neutrality Allocation;

(ii) Paragraph (1)(a) of Section 6.7.1, Payments for Ancillary Service Capacity Sold in a Supplemental Ancillary Services Market (SASM) or Reconfiguration Supplemental Ancillary Services Market (RSASM);

(jj) Paragraph (1)(b) of Section 6.7.1;

(kk) Paragraph (1)(c) of Section 6.7.1;

(ll) Paragraph (1)(d) of Section 6.7.1;

(mm) Paragraph (1)(a) of Section 6.7.2, Payments for Ancillary Service Capacity Assigned in Real-Time Operations;

(nn) Paragraph (1)(b) of Section 6.7.2;

(oo) Paragraph (1)(a) of Section 6.7.2.1, Charges for Infeasible Ancillary Service Capacity Due to Transmission Constraints;

(pp) Paragraph (1)(b) of Section 6.7.2.1;

(qq) Paragraph (1)(c) of Section 6.7.2.1;

(rr) Paragraph (1)(d) of Section 6.7.2.1;

(ss) Paragraph (1)(a) of Section 6.7.3, Charges for Ancillary Service Capacity Replaced Due to Failure to Provide;

(tt) Paragraph (1)(b) of Section 6.7.3;

(uu) Paragraph (1)(c) of Section 6.7.3;

(vv) Paragraph (1)(d) of Section 6.7.3;

(ww) Paragraph (2) of Section 6.7.4, Adjustments to Cost Allocations for Ancillary Services Procurement;

(xx) Paragraph (3) of Section 6.7.4;

(yy) Paragraph (4) of Section 6.7.4;

(zz) Paragraph (5) of Section 6.7.4;

(aaa) Paragraph (7) of Section 6.7.5, Real-Time Ancillary Service Imbalance Payment or Charge (Real-Time Ancillary Service Imbalance Amount);

(bbb) Paragraph (7) of Section 6.7.5, (Real-Time Reliability Deployment Ancillary Service Imbalance Amount);

(ccc) Paragraph (8) of Section 6.7.5, (Real-Time RUC Ancillary Service Reserve Amount);

(ddd) Paragraph (8) of Section 6.7.5, (Real-Time Reliability Deployment RUC Ancillary Service Reserve Amount);

(eee) Section 6.7.6, Real-Time Ancillary Service Imbalance Revenue Neutrality Allocation (Load-Allocated Ancillary Service Imbalance Revenue Neutrality Amount);

(fff) Section 6.7.6, (Load-Allocated Reliability Deployment Ancillary Service Imbalance Revenue Neutrality Amount);

(ggg) Section 7.9.2.1, Payments and Charges for PTP Obligations Settled in Real-Time; and

(hhh) Section 9.16.1, ERCOT System Administration Fee.

[NPRR841, NPRR863, NPRR885, NPRR917, NPRR963, NPRR1012, ~~and~~ NPRR1014, and NPRR1054: Replace applicable portions of paragraph (1) above with the following upon system implementation for NPRR841, NPRR863, NPRR885, NPRR963, ~~or~~ NPRR1014, or NPRR1054; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1012:]

(1) ERCOT shall provide, on each RTM Settlement Statement, the dollar amount for each RTM Settlement charge and payment. The RTM Settlement "Charge Types" are:

(a) Section 5.7.1, RUC Make-Whole Payment;

(b) Section 5.7.2, RUC Clawback Charge;

(c) Section 5.7.3, Payment When ERCOT Decommits a QSE-Committed Resource;

(d) Section 5.7.4.1, RUC Capacity-Short Charge;

(e) Section 5.7.4.2, RUC Make-Whole Uplift Charge;

(f) Section 5.7.5, RUC Clawback Payment;

(g) Section 5.7.6, RUC Decommitment Charge;

(h) Section 6.6.3.1, Real-Time Energy Imbalance Payment or Charge at a Resource Node;

(i) Section 6.6.3.2, Real-Time Energy Imbalance Payment or Charge at a Load Zone;

(j) Section 6.6.3.3, Real-Time Energy Imbalance Payment or Charge at a Hub;

(k) Section 6.6.3.4, Real-Time Energy Payment for DC Tie Import;

(l) Section 6.6.3.5, Real-Time Payment for a Block Load Transfer Point;

~~(m) Section 6.6.3.6, Real-Time Energy Charge for DC Tie Export Represented by the QSE Under the Oklaunion Exemption;~~

(m~~n~~) Section 6.6.3.6~~7~~, Real-Time High Dispatch Limit Override Energy Payment;

(n~~o~~) Section 6.6.3.7~~8~~, Real-Time High Dispatch Limit Override Energy Charge;

(o~~p~~) Section 6.6.3.8~~9~~, Real-Time Payment or Charge for Energy from a Settlement Only Distribution Generator (SODG) or a Settlement Only Transmission Generator (SOTG);

(p~~q~~) Section 6.6.4, Real-Time Congestion Payment or Charge for Self-Schedules;

(q~~r~~) Section 6.6.5.2~~1.1.1~~, Set Point Deviation Charge for Over Generation;

(rs) Section 6.6.5.2.1.1.2, Set Point Deviation Charge for Under Generation;

(st) Section 6.6.5.31.1.3, Controllable Load Resource Set Point Deviation Charge for Over Consumption;

(tu) Section 6.6.5.3.1.1.4, Controllable Load Resource Set Point Deviation Charge for Under Consumption;

(uv) Section 6.6.5.42, IRR Generation Resource Set Point Deviation Charge;

~~(w) Section 6.6.5.3, Controllable Load Resource Set Point Deviation Charge for Over Consumption;~~

~~(x) Section 6.6.5.3.1, Controllable Load Resource Set Point Deviation Charge for Under Consumption;~~

(vy) Section 6.6.5.4, Set Point Deviation Payment;

(wz) Section 6.6.5.5, Energy Storage Resource Set Point Deviation Charge for Over Performance;

(xaa) Section 6.6.5.5.1, Energy Storage Resource Set Point Deviation Charge for Under Performance;

(ybb) Section 6.6.6.1, RMR Standby Payment;

(zcc) Section 6.6.6.2, RMR Payment for Energy;

(aadd) Section 6.6.6.3, RMR Adjustment Charge;

(bbee) Section 6.6.6.4, RMR Charge for Unexcused Misconduct;

(ccff) Section 6.6.6.5, RMR Service Charge;

(ddgg) Section 6.6.6.6, Method for Reconciling RMR Actual Eligible Costs, RMR and MRA Contributed Capital Expenditures, and Miscellaneous RMR Incurred Expenses;

(eehh) Section 6.6.6.7, MRA Standby Payment;

(ffii) Section 6.6.6.8, MRA Contributed Capital Expenditures Payment;

(ggjj) Section 6.6.6.9, MRA Payment for Deployment Event;

(hhkk) Section 6.6.6.10, MRA Variable Payment for Deployment;

(iill) Section 6.6.6.11, MRA Charge for Unexcused Misconduct;

(jj~~mm~~) Section 6.6.6.12, MRA Service Charge;

(kk~~nn~~) Paragraph (3) of Section 6.6.7.1, Voltage Support Service Payments;

(ll~~oo~~) Paragraph (5) of Section 6.6.7.1;

(mm~~pp~~) Section 6.6.7.2, Voltage Support Charge;

(nn~~qq~~) Section 6.6.8.1, Black Start Hourly Standby Fee Payment;

(oo~~rr~~) Section 6.6.8.2, Black Start Capacity Charge;

(pp~~ss~~) Section 6.6.9.1, Payment for Emergency Operations Settlement;

(qq~~tt~~) Section 6.6.9.2, Charge for Emergency Operations Settlement;

(rr~~uu~~) Section 6.6.10, Real-Time Revenue Neutrality Allocation;

(ss~~vv~~) Section 6.6.11.1, Emergency Response Service Capacity Payments;

(tt~~ww~~) Section 6.6.11.2, Emergency Response Service Capacity Charge;

(uu~~xx~~) Section 6.7.4, Real-Time Settlement for Updated Day-Ahead Market Ancillary Service Obligations;

(vv~~yy~~) Section 6.7.5.2, Regulation Up Service Payments and Charges;

(ww~~zz~~)Section 6.7.5.3, Regulation Down Service Payments and Charges;

(xx~~aaa~~)Section 6.7.5.4, Responsive Reserve Payments and Charges;

(yy~~bbb~~) Section 6.7.5.5, Non-Spinning Reserve Service Payments and Charges;

(zz~~ccc~~) Section 6.7.5.6, ERCOT Contingency Reserve Service Payments and Charges;

(aaa~~ddd~~) Section 6.7.5.7, Real-Time Derated Ancillary Service Capability Payment;

(bbb~~eee~~) Section 6.7.5.8, Real-Time Derated Ancillary Service Capability Charge;

(ccc~~fff~~)Section 6.7.6, Real-Time Ancillary Service Revenue Neutrality Allocation;

(ddd~~ggg~~) Section 7.9.2.1, Payments and Charges for PTP Obligations Settled in Real-Time; and

(eee~~hhh~~) Section 9.16.1, ERCOT System Administration Fee.

(2) In the event that ERCOT is unable to execute the Day-Ahead Market (DAM), ERCOT shall provide, on each RTM Settlement Statement, the dollar amount for the following RTM Congestion Revenue Right (CRR) Settlement charges and payments:

(a) Section 7.9.2.4, Payments for FGRs in Real-Time; and

(b) Section 7.9.2.5, Payments and Charges for PTP Obligations with Refund in Real-Time.

9.19 Partial Payments by Invoice Recipients

9.19.1 Default Uplift Invoices

(1) ERCOT shall collect the total short-pay amount for all Settlement Invoices for a month, less the total payments expected from a payment plan, from Qualified Scheduling Entities (QSEs) and CRR Account Holders. ERCOT must pay the funds it collects from payments on Default Uplift Invoices to the Entities previously short-paid. ERCOT shall notify those Entities of the details of the payment.

(2) Each Counter-Party's share of the uplift is calculated using the best available Settlement data for each Operating Day in the month prior to the month in which the default occurred, and is calculated as follows:

$$\mathbf{DURSCP}_{cp} = \mathbf{TSPA} * \mathbf{MMARS}_{cp}$$

Where:

$$MMARS_{cp} = MMA_{cp} / MMATOT$$

$$MMA_{cp} = \text{Max} \{ \sum_{mp} (URTMG_{mp} + URTDCIMP_{mp}),$$

$$\sum_{mp} (URTAML_{mp} + UWSLTOT_{mp}),$$

$$\sum_{mp} URTQQES_{mp},$$

$$\sum_{mp} URTQQEP_{mp},$$

$$\sum_{mp} UDAES_{mp},$$

$$\sum_{mp} UDAEP_{mp},$$

$$\sum_{mp} (URTOBL_{mp} + URTOBLLO_{mp}),$$

$$\sum_{mp} (UDAOPT_{mp} + UDAOBL_{mp} + UOPTS_{mp} + UOBLS_{mp}),$$

$$\sum_{mp} (UOPTP_{mp} + UOBLP_{mp})\}$$

[NPRR917 and NPRR1012: Replace applicable portions of the formula "MMA $_{cp}$" above with the following upon system implementation for NPRR917; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1012:]

$$MMA_{cp} = \text{Max} \{ \sum_{mp} (URTMG_{mp} + URTDCIMP_{mp}),$$

$$\sum_{mp} (URTAML_{mp} + UWSLTOT_{mp}),$$

$$\sum_{mp} URTQQES_{mp},$$

$$\sum_{mp} URTQQEP_{mp},$$

$$\sum_{mp} UDAES_{mp},$$

$$\sum_{mp} UDAEP_{mp},$$

$$\sum_{mp} (URTOBL_{mp} + URTOBLLO_{mp}),$$

$$\sum_{mp} (UDAOPT_{mp} + UDAOBL_{mp} + UOPTS_{mp} + UOBLS_{mp}),$$

$$\sum_{mp} (UOPTP_{mp} + UOBLP_{mp}),$$

$$\sum_{mp} UDAASOAWD_{mp},$$

$$\sum_{mp} (USOGTOT_{mp})\}$$

$$MMATOT = \sum_{cp} (MMA_{cp})$$

Where:

$URTMG_{mp} = \sum_{p, r, t} (RTMG_{mp, p, r, t})$, excluding RTMG for RMR Resources and RTMG in Reliability Unit Commitment (RUC)-Committed Intervals for RUC-committed Resources

$URTDCIMP_{mp} = \sum_{p, t} (RTDCIMP_{mp, p, t}) / 4$

$URTAML_{mp} = \max(0, \sum_{p, t} (RTAML_{mp, p, t}))$

$URTQQES_{mp} = \sum_{p, t} (RTQQES_{mp, p, t}) / 4$

$URTQQEP_{mp} = \sum_{p, t} (RTQQEP_{mp, p, t}) / 4$

$UDAES_{mp} = \sum_{p, h} (DAES_{mp, p, h})$

$UDAEP_{mp} = \sum_{p, h} (DAEP_{mp, p, h})$

$URTOBL_{mp} = \sum_{(j, k), h} (RTOBL_{mp, (j, k), h})$

$$URTOBLLO_{mp} = \sum_{(j,\,k),\,h} (RTOBLLO_{mp,\,(j,\,k),\,h})$$

$$UDAOPT_{mp} = \sum_{(j,\,k),\,h} (DAOPT_{mp,\,(j,\,k),\,h})$$

$$UDAOBL_{mp} = \sum_{(j,\,k),\,h} (DAOBL_{mp,\,(j,\,k),\,h})$$

$$UOPTS_{mp} = \sum_{(j,\,k),\,h} (OPTS_{mp,\,(j,\,k),\,h})$$

$$UOBLS_{mp} = \sum_{(j,\,k),\,h} (OBLS_{mp,\,(j,\,k),\,h})$$

$$UOPTP_{mp} = \sum_{(j,\,k),\,h} (OPTP_{mp,\,j,\,h})$$

$$UOBLP_{mp} = \sum_{(j,\,k),\,h} (OBLP_{mp,\,(j,\,k),\,h})$$

$$UWSLTOT_{mp} = (-1) * \sum_{r,\,b} (MEBL_{mp,\,r,\,b})$$

[NPRR1012: Insert the formula "$UDAASOAWD_{mp}$" below upon system implementation of the Real-Time Co-Optimization (RTC) project:]

$$UDAASOAWD_{mp} = \sum_{h} (DARUOAWD_{mp,\,h} + DARDOAWD_{mp,\,h} + DARROAWD_{mp,\,h} + DANSOAWD_{mp,\,h} + DAECROAWD_{mp,\,h})$$

[NPRR917: Insert the formula "$USOGTOT_{mp}$" below upon system implementation:]

$$USOGTOT_{mp} = \sum_{gsc,\,b} (OFSOG_{mp,\,gsc,\,b}) + \sum_{p,\,i} (RTMGSOGZ_{mp,\,p,\,i})$$

The above variables are defined as follows:

Variable	Unit	Definition
$DURSCP_{cp}$	$	*Default Uplift Ratio Share per Counter-Party*—The Counter-Party's pro rata portion of the total short-pay amount for all Day-Ahead Market (DAM) and Real-Time Market (RTM) Invoices for a month.
TSPA	$	*Total Short Pay Amount*—The total short-pay amount calculated by ERCOT to be collected through the Default Uplift Invoice process.
$MMARS_{cp}$	None	*Maximum MWh Activity Ratio Share*—The Counter-Party's pro rata share of Maximum MWh Activity.
MMA_{cp}	MWh	*Maximum MWh Activity*—The maximum MWh activity of all Market Participants represented by the Counter-Party in the DAM, RTM and CRR Auction for a month.
MMATOT	MWh	*Maximum MWh Activity Total*—The sum of all Counter-Party's Maximum MWh Activity.
$RTMG_{mp,\,p,\,r,\,i}$	MWh	*Real-Time Metered Generation per Market Participant per Settlement Point per Resource*—The Real-Time energy produced by the Generation Resource *r* represented by Market Participant *mp*, at Resource Node *p*, for the 15-minute Settlement Interval *i*, where the Market Participant is a QSE.

Variable	Unit	Definition
URTMG $_{mp}$	MWh	*Uplift Real-Time Metered Generation per Market Participant*—The monthly sum of Real-Time energy produced by Generation Resources represented by Market Participant *mp*, excluding generation for RMR Resources and generation in RUC-Committed Intervals, where the Market Participant is a QSE assigned to the registered Counter-Party.
RTDCIMP $_{mp, p, i}$	MW	*Real-Time DC Import per QSE per Settlement Point*—The aggregated Direct Current Tie (DC Tie) Schedule submitted by Market Participant *mp*, as an importer into the ERCOT System through DC Tie *p*, for the 15-minute Settlement Interval *i*, where the Market Participant is a QSE.
URTDCIMP $_{mp}$	MW	*Uplift Real-Time DC Import per Market Participant*—The monthly sum of the aggregated DC Tie Schedule submitted by Market Participant *mp*, as an importer into the ERCOT System where the Market Participant is a QSE assigned to a registered Counter-Party.
RTAML $_{mp, p, i}$	MWh	*Real-Time Adjusted Metered Load per Market Participant per Settlement Point*—The sum of the Adjusted Metered Load (AML) at the Electrical Buses that are included in Settlement Point *p* represented by Market Participant *mp* for the 15-minute Settlement Interval *i*, where the Market Participant is a QSE.
URTAML $_{mp}$	MWh	*Uplift Real-Time Adjusted Metered Load per Market Participant*—The monthly sum of the AML represented by Market Participant *mp*, where the Market Participant is a QSE assigned to the registered Counter-Party.
RTQQES $_{mp, p, i}$	MW	*QSE-to-QSE Energy Sale per Market Participant per Settlement Point*—The amount of MW sold by Market Participant *mp* through Energy Trades at Settlement Point *p* for the 15-minute Settlement Interval *i*, where the Market Participant is a QSE.
URTQQES $_{mp}$	MWh	*Uplift QSE-to-QSE Energy Sale per Market Participant*—The monthly sum of MW sold by Market Participant *mp* through Energy Trades, where the Market Participant is a QSE assigned to the registered Counter-Party.
RTQQEP $_{mp, p, i}$	MW	*QSE-to-QSE Energy Purchase per Market Participant per Settlement Point*—The amount of MW bought by Market Participant *mp* through Energy Trades at Settlement Point *p* for the 15-minute Settlement Interval *i*, where the Market Participant is a QSE.
URTQQEP $_{mp}$	MWh	*Uplift QSE-to-QSE Energy Purchase per Market Participant*—The monthly sum of MW bought by Market Participant *mp* through Energy Trades, where the Market Participant is a QSE assigned to the registered Counter-Party.
DAES $_{mp, p, h}$	MW	*Day-Ahead Energy Sale per Market Participant per Settlement Point per hour*—The total amount of energy represented by Market Participant *mp*'s cleared Three-Part Supply Offers in the DAM and cleared DAM Energy-Only Offers at Settlement Point *p*, for the hour *h*, where the Market Participant is a QSE.
UDAES $_{mp}$	MWh	*Uplift Day-Ahead Energy Sale per Market Participant*—The monthly total of energy represented by Market Participant *mp*'s cleared Three-Part Supply Offers in the DAM and cleared DAM Energy-Only Offer Curves, where the Market Participant is a QSE assigned to the registered Counter-Party.
DAEP $_{mp, p, h}$	MW	*Day-Ahead Energy Purchase per Market Participant per Settlement Point per hour*—The total amount of energy represented by Market Participant *mp*'s cleared DAM Energy Bids at Settlement Point *p* for the hour *h*, where the Market Participant is a QSE.
UDAEP $_{mp}$	MWh	*Uplift Day-Ahead Energy Purchase per Market Participant*—The monthly total of energy represented by Market Participant *mp*'s cleared DAM Energy Bids, where the Market Participant is a QSE assigned to the registered Counter-Party.

Variable	Unit	Definition
RTOBL $_{mp, (j, k), h}$	MW	*Real-Time Obligation per Market Participant per source and sink pair per hour*—The number of Market Participant *mp*'s Point-to-Point (PTP) Obligations with the source *j* and the sink *k* settled in Real-Time for the hour *h*, and where the Market Participant is a QSE.
URTOBL $_{mp}$	MWh	*Uplift Real-Time Obligation per Market Participant*—The monthly total of Market Participant *mp*'s PTP Obligations settled in Real-Time, counting the quantity only once per source and sink pair, and where the Market Participant is a QSE assigned to the registered Counter-Party.
RTOBLLO $_{q, (j, k)}$	MW	*Real-Time Obligation with Links to an Option per QSE per pair of source and sink*—The total MW of the QSE's PTP Obligation with Links to an Option Bids cleared in the DAM and settled in Real-Time for the source *j* and the sink *k* for the hour.
URTOBLLO $_{q, (j, k)}$	MW	*Uplift Real-Time Obligation with Links to an Option per QSE per pair of source and sink*—The monthly total of Market Participant *mp*'s MW of PTP Obligation with Links to Options Bids cleared in the DAM and settled in Real-Time for the source *j* and the sink *k* for the hour, where the Market Participant is a QSE assigned to the registered Counter-Party.
DAOPT $_{mp, (j, k), h}$	MW	*Day-Ahead Option per Market Participant per source and sink pair per hour*—The number of Market Participant *mp*'s PTP Options with the source *j* and the sink *k* owned in the DAM for the hour *h*, and where the Market Participant is a CRR Account Holder.
UDAOPT $_{mp}$	MWh	*Uplift Day-Ahead Option per Market Participant*—The monthly total of Market Participant *mp*'s PTP Options owned in the DAM, counting the ownership quantity only once per source and sink pair, and where the Market Participant is a CRR Account Holder assigned to the registered Counter-Party.
DAOBL $_{mp, (j, k), h}$	MW	*Day-Ahead Obligation per Market Participant per source and sink pair per hour*—The number of Market Participant *mp*'s PTP Obligations with the source *j* and the sink *k* owned in the DAM for the hour *h*, and where the Market Participant is a CRR Account Holder.
UDAOBL $_{mp}$	MWh	*Uplift Day-Ahead Obligation per Market Participant*—The monthly total of Market Participant *mp*'s PTP Obligations owned in the DAM, counting the ownership quantity only once per source and sink pair, where the Market Participant is a CRR Account Holder assigned to the registered Counter-Party.
OPTS $_{mp, (j, k), a, h}$	MW	*PTP Option Sale per Market Participant per source and sink pair per CRR Auction per hour*—The MW quantity that represents the total of Market Participant *mp*'s PTP Option offers with the source *j* and the sink *k* awarded in CRR Auction *a*, for the hour *h*, where the Market Participant is a CRR Account Holder.
UOPTS $_{mp}$	MWh	*Uplift PTP Option Sale per Market Participant*—The MW quantity that represents the monthly total of Market Participant *mp*'s PTP Option offers awarded in CRR Auctions, counting the awarded quantity only once per source and sink pair, where the Market Participant is a CRR Account Holder assigned to the registered Counter-Party.
OBLS $_{mp, (j, k), a, h}$	MW	*PTP Obligation Sale per Market Participant per source and sink pair per CRR Auction per hour*—The MW quantity that represents the total of Market Participant *mp*'s PTP Obligation offers with the source *j* and the sink *k* awarded in CRR Auction *a*, for the hour *h*, where the Market Participant is a CRR Account Holder.

Variable	Unit	Definition
UOBLS $_{mp}$	MWh	*Uplift PTP Obligation Sale per Market Participant*—The MW quantity that represents the monthly total of Market Participant *mp*'s PTP Obligation offers awarded in CRR Auctions, counting the quantity only once per source and sink pair, where the Market Participant is a CRR Account Holder assigned to the registered Counter-Party.
OPTP $_{mp, (j, k), a, h}$	MW	*PTP Option Purchase per Market Participant per source and sink pair per CRR Auction per hour*—The MW quantity that represents the total of Market Participant *mp*'s PTP Option bids with the source *j* and the sink *k* awarded in CRR Auction *a*, for the hour *h*, where the Market Participant is a CRR Account Holder.
UOPTP $_{mp}$	MWh	*Uplift PTP Option Purchase per Market Participant*—The MW quantity that represents the monthly total of Market Participant *mp*'s PTP Option bids awarded in CRR Auctions, counting the quantity only once per source and sink pair, where the Market Participant is a CRR Account Holder assigned to the registered Counter-Party.
OBLP $_{mp, (j, k), a, h}$	MW	*PTP Obligation Purchase per Market Participant per source and sink pair per CRR Auction per hour*—The MW quantity that represents the total of Market Participant *mp*'s PTP Obligation bids with the source *j* and the sink *k* awarded in CRR Auction *a*, for the hour *h*, where the Market Participant is a CRR Account Holder.
UOBLP $_{mp}$	MWh	*Uplift PTP Obligation Purchase per Market Participant*—The MW quantity that represents the monthly total of Market Participant *mp*'s PTP Obligation bids awarded in CRR Auctions, counting the quantity only once per source and sink pair, where the Market Participant is a CRR Account Holder assigned to the registered Counter-Party.
UWSLTOT $_{mp}$	MWh	*Uplift Metered Energy for Wholesale Storage Load at bus per Market Participant*—The monthly sum of Market Participant *mp*'s Wholesale Storage Load (WSL) energy metered by the Settlement Meter which measures WSL.
MEBL $_{mp, r, b}$	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 Market Participant *mp*, Resource *r*, at bus *b*.

Variable	Unit	Definition
[NPRR1012: Insert the variables below upon system implementation of the Real-Time Co-Optimization (RTC) project:]		
UDAASOAWD $_{mp}$	MWh	*Uplift Day-Ahead Ancillary Service Only Award per Market Participant*—The monthly total of Market Participant *mp's* Ancillary Service Only Offers awarded in DAM, where the Market Participant is a QSE assigned to the registered Counter-Party.
DARUOAWD $_{mp, h}$	MW	*Day-Ahead Reg-Up Only Award per Market Participant*—The Reg-Up Only capacity quantity awarded in the DAM to the Market Participant *mp* for the hour *h*.
DARDOAWD $_{mp, h}$	MW	*Day-Ahead Reg-Down Only Award per Market Participant*—The Reg-Down Only capacity quantity awarded in the DAM to the Market Participant *mp* for the hour *h*.
DARROAWD $_{mp, h}$	MW	*Day-Ahead Responsive Reserve Only Award per Market Participant*—The Responsive Reserve (RRS) Only capacity quantity awarded in the DAM to the Market Participant *mp* for the hour *h*.
DANSOAWD $_{mp, h}$	MW	*Day-Ahead Non-Spin Only Award per Market Participant*—The Non-Spin Only capacity quantity awarded in the DAM to the Market Participant *mp* for the hour *h*.
DAECROAWD $_{mp, h}$	MW	*Day-Ahead ERCOT Contingency Reserve Service Only Award per Market Participant*—The ERCOT Contingency Reserve Service (ECRS) Only capacity quantity awarded in the DAM to the Market Participant *mp* for the hour *h*.
[NPRR917 and NPRR1052: Insert the variables " USOGTOT $_{mp}$", " RTMGSOGZ $_{mp, p, i}$", and "OFSOG $_{mp, gsc, b}$" below upon system implementation of NPRR917:]		
USOGTOT $_{mp}$	MWh	*Uplift Real-Time Settlement Only Generator Site per Market Participant*—The monthly sum of Real-Time energy produced by Settlement Only Generators (SOGs) represented by Market Participant *mp*, where the Market Participant is a QSE assigned to the registered Counter-Party.
RTMGSOGZ $_{mp\ p, i}$	MWh	*Real-Time Metered Generation from Settlement Only Generators Zonal per QSE per Settlement Point*—The total Real-Time energy produced by Settlement Only Transmission Self-Generators (SOTSGs) for the Market Participant *mp* in Load Zone Settlement Point *p*, for the 15-minute Settlement Interval. MWh quantities for Energy Storage System (ESS), Settlement Only Distribution Generators (SODGs), and Settlement Only Transmission Generators (SOTGs) at sites where the ESS capacity constitutes more than 50% of the total SOG nameplate capacity will be included in this value. MWh quantities for ~~Settlement Only Distribution Generators (~~SODGs~~)~~ and ~~Settlement Only Transmission Generators (~~SOTGs~~)~~ that opted out of nodal pricing pursuant to Section 6.6.3.9, Real-Time Payment or Charge for Energy from a Settlement Only Distribution Generator (SODG) or a Settlement Only Transmission Generator (SOTG), will also be included in this value.
OFSOG $_{mp, gsc, b}$	MWh	*Outflow as measured for an SODG or SOTG Site*—The outflow as measured by the Settlement Meter(s) at Electrical Bus *b* for SODG or SOTG site *gsc* represented by the Market Participant *mp*.

Variable	Unit	Definition
cp	none	A registered Counter-Party.
mp	none	A Market Participant that is a non-defaulting QSE or CRR Account Holder.
j	none	A source Settlement Point.
k	none	A sink Settlement Point.
a	none	A CRR Auction.
p	none	A Settlement Point.
i	none	A 15-minute Settlement Interval.
h	none	The hour that includes the Settlement Interval i.
r	none	A Resource.

[NPRR917: Insert the variables "gsc" and "b" below upon system implementation:]

gsc	none	A generation site code.
b	none	An Electrical Bus.

(3) The uplifted short-paid amount will be allocated to the Market Participants (QSEs or CRR Account Holders) assigned to a registered Counter-Party based on the pro-rata share of MWhs that the QSE or CRR Account Holder contributed to its Counter-Party's maximum MWh activity ratio share.

(4) Any uplifted short-paid amount greater than $2,500,000 must be scheduled so that no amount greater than $2,500,000 is charged on each set of Default Uplift Invoices until ERCOT uplifts the total short-paid amount. ERCOT must issue Default Uplift Invoices at least 30 days apart from each other.

(5) ERCOT shall issue Default Uplift Invoices no earlier than 90 days following a short-pay of a Settlement Invoice on the date specified in the Settlement Calendar. The Invoice Recipient is responsible for accessing the Invoice on the MIS Certified Area once posted by ERCOT.

(6) Each Default Uplift Invoice must contain:

(a) The Invoice Recipient's name;

(b) The ERCOT identifier (Settlement identification number issued by ERCOT);

(c) Net Amount Due or Payable – the aggregate summary of all charges owed by a Default Uplift Invoice Recipient;

(d) Run Date – the date on which ERCOT created and published the Default Uplift Invoice;

(e) Invoice Reference Number – a unique number generated by the ERCOT applications for payment tracking purposes;

(f) Default Uplift Invoice Reference – an identification code used to reference the amount uplifted;

(g) Payment Date and Time – the date and time that Default Uplift Invoice amounts must be paid;

(h) Remittance Information Details – details including the account number, bank name, and electronic transfer instructions of the ERCOT account to which any amounts owed by the Invoice Recipient are to be paid or of the Invoice Recipient's account from which ERCOT may draw payments due; and

(i) Overdue Terms – the terms that would apply if the Market Participant makes a late payment.

(7) Each Invoice Recipient shall pay any net debit shown on the Default Uplift Invoice on the payment due date whether or not there is any Settlement and billing dispute regarding the amount of the debit.

ERCOT Nodal Protocols

Section 16: Registration and Qualification of Market Participants

March~~January~~ 1, 2021

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16 REGISTRATION AND QUALIFICATION OF MARKET PARTICIPANTS

16.5 Registration of a Resource Entity

(1) A Resource Entity owns or controls a Generation Resource, Settlement Only Generator (SOG), or Load Resource connected to the ERCOT System. Each Resource Entity operating in the ERCOT Region must register with ERCOT. To become registered as a Resource Entity, an Entity must execute a Standard Form Market Participant Agreement (using the form in Section 22, Attachment A, Standard Form Market Participant Agreement), designate Resource Entity Authorized Representatives, contacts, and a User Security Administrator (USA) (per the Application for Registration as a Resource Entity), and demonstrate to ERCOT's reasonable satisfaction that it is capable of performing the functions of a Resource Entity under these Protocols. The Resource Entity shall provide Resource Registration data pursuant to Planning Guide Section 6.8.2, Resource Registration Process, for each Generation Resource, SOG, or Load Resource through ERCOT registration, except for Distributed Generation (DG) with an installed capacity equal to or lower than the DG registration threshold that has chosen not to register with ERCOT. A Resource Entity may submit a proposal to register the aggregation of generators, with the exception of Intermittent Renewable Resources (IRRs) pursuant to paragraph (12) of Section 3.10.7.2, Modeling of Resources and Transmission Loads, as an Aggregate Generation Resource (AGR) which ERCOT may grant at its sole discretion.

[NPRR1002 and NPRR1052: Replace applicable portions of paragraph (1) above with the following upon system implementation for NPRR1002; or upon system implementation of NPRR917 for NPRR1052:]

(1) A Resource Entity owns or controls a Generation Resource, Energy Storage Resource (ESR), Settlement Only Generator (SOG), or Load Resource connected to the ERCOT System. Each Resource Entity operating in the ERCOT Region must register with ERCOT. To become registered as a Resource Entity, an Entity must execute a Standard Form Market Participant Agreement (using the form in Section 22, Attachment A, Standard Form Market Participant Agreement), designate Resource Entity Authorized Representatives, contacts, and a User Security Administrator (USA) (per the Application for Registration as a Resource Entity), and demonstrate to ERCOT's reasonable satisfaction that it is capable of performing the functions of a Resource Entity under these Protocols. The Resource Entity shall provide Resource Registration data pursuant to Planning Guide Section 6.8.2, Resource Registration Process, for each Resource or SOG through ERCOT registration, except for Distributed Generation (DG) with an installed capacity equal to or lower than the DG registration threshold that has chosen not to register with ERCOT. A Resource Entity may submit a proposal to register the aggregation of generators, with the exception of Intermittent Renewable Resources (IRRs) pursuant to paragraph (12) of Section 3.10.7.2, Modeling of Resources and Transmission Loads, as an Aggregate Generation Resource (AGR) which ERCOT may grant at its sole discretion. If a Resource Entity intends to register one or more Energy Storage Systems (ESSs) and one or more non-

ESS generators as SOGs at the same site, the Resource Entity must provide an affidavit attesting to the amount of ESS and non-ESS capacity at the site as a condition for registration.

(2) Prior to commissioning, Resources Entities will regularly update the data necessary for modeling. These updates will reflect the best available information at the time submitted.

(3) Once ERCOT has received a new or amended Standard Generation Interconnection Agreement (SGIA) or a letter from a duly authorized official from the Municipally Owned Utility (MOU) or Electric Cooperative (EC) and has determined that the proposed Generation Resource or SOG meets the requirements of Planning Guide Section 6.9, Addition of Proposed Generation to the Planning Models, ERCOT shall review the description of the proposed Generation Resource or SOG in Exhibit "C" (or similar exhibit) to the SGIA and the data submitted pursuant to Planning Guide Section 6.8.2 to assess whether the Generation Resource or SOG, as proposed, would violate any operational standards established in the Protocols, Planning Guide, Nodal Operating Guides, and Other Binding Documents. ERCOT must provide its determination to the Transmission Service Provider (TSP) and the owner of the proposed Generation Resource or SOG within 90 days of the date the Generation Resource or SOG meets the conditions for review. Notwithstanding the foregoing, this determination shall not preclude ERCOT from subsequently determining that the Generation Resource or SOG violates any operational standards established in the Protocols, Planning Guide, Nodal Operating Guides, and Other Binding Documents or from taking any appropriate action based on that determination.

[NPRR1002: Replace paragraph (3) above with the following upon system implementation:]

(3) Once ERCOT has received a new or amended Standard Generation Interconnection Agreement (SGIA) or a letter from a duly authorized official from the Municipally Owned Utility (MOU) or Electric Cooperative (EC) and has determined that the proposed Generation Resource, ESR, or SOG meets the requirements of Planning Guide Section 6.9, Addition of Proposed Generation to the Planning Models, ERCOT shall review the description of the proposed Generation Resource, ESR, or SOG in Exhibit "C" (or similar exhibit) to the SGIA and the data submitted pursuant to Planning Guide Section 6.8.2, to assess whether the Generation Resource, ESR, or SOG, as proposed, would violate any operational standards established in the Protocols, Planning Guide, Nodal Operating Guides, and Other Binding Documents. ERCOT must provide its determination to the Transmission Service Provider (TSP) and the owner of the proposed Generation Resource, ESR, or SOG within 90 days of the date the Generation Resource, ESR, or SOG meets the conditions for review. Notwithstanding the foregoing, this determination shall not preclude ERCOT from subsequently determining that the Generation Resource, ESR, or SOG violates any operational standards established in the Protocols, Planning Guide, Nodal Operating

Guides, and Other Binding Documents or from taking any appropriate action based on that determination.

(4) An Interconnecting Entity (IE) shall not proceed to Initial Synchronization of a Generation Resource, Settlement Only Transmission Generator (SOTG), or Settlement Only Transmission Self-Generator (SOTSG) in the event of any of the following conditions:

(a) Pursuant to paragraph (3) above, ERCOT has reasonably determined that the Generation Resource, SOTG, or SOTSG may violate operational standards established in the Protocols, Planning Guide, Nodal Operating Guides, and Other Binding Documents, and the Resource Entity has not yet demonstrated to ERCOT's satisfaction that the Generation Resource, SOTG, or SOTSG can comply with these standards;

(b) The requirements of Planning Guide Section 5.9, Quarterly Stability Assessment, have not been completed for the Generation Resource, SOTG, or SOTSG; or

(c) Any required Subsynchronous Resonance (SSR) studies, SSR Mitigation Plan, SSR Protection, and SSR monitoring if required, have not been completed and approved by ERCOT.

[NPRR1002 and NPRR1016: Replace applicable portions of paragraph (4) above with the following upon system implementation:]

(4) An Interconnecting Entity (IE) shall not proceed to Initial Synchronization of a Generation Resource, ESR, Settlement Only Transmission Generator (SOTG), or Settlement Only Transmission Self-Generator (SOTSG) in the event of any of the following conditions:

(a) Pursuant to paragraph (3) above, ERCOT has reasonably determined that the Generation Resource, ESR, SOTG, or SOTSG may violate operational standards established in the Protocols, Planning Guide, Nodal Operating Guides, and Other Binding Documents, and the Resource Entity has not yet demonstrated to ERCOT's satisfaction that the Generation Resource, ESR, SOTG, or SOTSG can comply with these standards;

(b) The requirements of Planning Guide Section 5.9, Quarterly Stability Assessment, if applicable, have not been completed for the Generation Resource, ESR, SOTG, or SOTSG; or

(c) Any required Subsynchronous Resonance (SSR) studies, SSR Mitigation Plan, SSR Protection, and SSR monitoring if required, have not been completed and approved by ERCOT.

(5) DG with an installed capacity greater than one MW, the DG registration threshold, which exports energy into a Distribution System, must register with ERCOT.

(6) A Resource Entity representing an Energy Storage Resource (ESR) shall register the ESR as both a Generation Resource and a Controllable Load Resource.

[NPRR1002: Replace paragraph (6) above with the following upon system implementation:]

(6) A Resource Entity representing an ESR shall register the ESR as an ESR. ERCOT systems, including the Energy and Market Management System (EMMS) and Settlement system, shall continue to treat the ESR as both a Generation Resource and a Controllable Load Resource until such time as all ERCOT systems are capable of treating an ESR as a single Resource.

16.11 Financial Security for Counter-Parties

16.11.4 Determination and Monitoring of Counter-Party Credit Exposure

16.11.4.3 Determination of Counter-Party Estimated Aggregate Liability

16.11.4.3.2 Real-Time Liability Estimate

(1) ERCOT shall estimate RTL for an Operating Day as the sum of estimates for the following RTM Settlement charges and payments:

(a) Section 6.6.3.1, Real-Time Energy Imbalance Payment or Charge at a Resource Node, using Real-Time Metered Generation (RTMG) as generation estimate;

(b) Section 6.6.3.2, Real-Time Energy Imbalance Payment or Charge at a Load Zone, using 14-day or seven-day-old LRS for Load estimate;

[NPRR829: Replace item (b) above with the following upon system implementation:]

(b) Section 6.6.3.2, Real-Time Energy Imbalance Payment or Charge at a Load Zone, using 14-day or seven-day-old LRS for Load estimate and Real-Time telemetry of net generation as the generation estimate;

(c) Section 6.6.3.3, Real-Time Energy Imbalance Payment or Charge at a Hub;

(d) Section 6.6.3.4, Real-Time Energy Payment for DC Tie Import;

(e) Section 6.6.3.6, Real-Time Energy Charge for DC Tie Export Represented by the QSE Under the Oklaunion Exemption;

[NPRR1054: Delete item (e) above upon system implementation and renumber accordingly.]

[NPRR917: Insert item (f) below upon system implementation and renumber accordingly:]

(f) Section 6.6.3.9, Real-Time Payment or Charge for Energy from a Settlement Only Distribution Generator (SODG) or a Settlement Only Transmission Generator (SOTG), using the Real-Time telemetry, if provided, of net generation as the outflow estimate and the Real-Time Price for each SODG or SOTG site;

(f) Section 6.6.4, Real-Time Congestion Payment or Charge for Self-Schedules; and

[NPRR1013: Insert items (g)-(k) below upon system implementation of the Real-Time Co-Optimization (RTC) project and renumber accordingly:]

(g) Section 6.7.5.1, Regulation Up Payments and Charges;

(h) Section 6.7.5.2, Regulation Down Payments and Charges;

(i) Section 6.7.5.3, Responsive Reserve Payments and Charges;

(j) Section 6.7.5.4, Non-Spinning Reserve Payments and Charges; and

(k) Section 6.7.5.5, ERCOT Contingency Reserve Service Payments and Charges.

(g) Section 7.9.2.1, Payments and Charges for PTP Obligations Settled in Real-Time.

ERCOT Nodal Protocols

Section 2: Definitions and Acronyms

March~~January~~ 1, 2021

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2 DEFINITIONS AND ACRONYMS

2.1 DEFINITIONS

A

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Adjusted Metered Load (AML)

Retail Load usage data that has been adjusted for Unaccounted for Energy (UFE), Transmission Losses, Distribution Losses, and Direct Current Tie (DC Tie) exports (except for the Oklaunion Exemption).

[NPRR1054: Replace the above definition "Adjusted Metered Load (AML)" with the following upon system implementation:]

Adjusted Metered Load (AML)

Retail Load usage data that has been adjusted for Unaccounted for Energy (UFE), Transmission Losses, Distribution Losses, and Direct Current Tie (DC Tie) exports.

O

Oklaunion Exemption

The export schedules from the Public Service Company of Oklahoma, the Oklahoma Municipal Power Authority, and the AEP Texas North Company for their share of the Oklaunion Resource over the North DC Tie that are not treated as Load connected at transmission voltage, are not subject to any of the fees described in Section 4.4.4, DC Tie Schedules, and are limited to the actual net output of the Oklaunion Resource.

[NPRR1054: Delete the above definition "Oklaunion Exemption" upon system implementation.]

ERCOT Nodal Protocols

Section 5: Transmission Security Analysis and Reliability Unit Commitment

March~~January~~ 1, 2021

5 TRANSMISSION SECURITY ANALYSIS AND RELIABILITY UNIT COMMITMENT

5.7 Settlement for RUC Process

5.7.4 RUC Make-Whole Charges

5.7.4.1 RUC Capacity-Short Charge

5.7.4.1.1 Capacity Shortfall Ratio Share

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

(2) In calculating the amount short for each QSE, the QSE must be given a capacity credit for non-Intermittent Renewable Resources (IRRs) that were given notice of decommitment within the two hours before the Operating Hour as a result of the RUC process by setting the HASLSNAP and HASLADJ variables used below equal to the HASLSNAP value for the Resource immediately before the decommitment instruction was given.

(3) In calculating the short amount for each QSE, if the High Ancillary Service Limit (HASL) for a Resource was credited to the QSE during the RUC snapshot but the Resource experiences a Forced Outage within two hours before the start of the Settlement Interval, then the HASL for that Resource is also credited to the QSE in the HASLADJ.

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

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

apply in the determination of the On-Line Combined Cycle Generation Resource for that Settlement hour.

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

$$RUCSFRS_{ruc,\,i,\,q} = RUCSF_{ruc,\,i,\,q} / RUCSFTOT_{ruc,\,i}$$

Where:

$$RUCSFTOT_{ruc,\,i} = \sum_{q} RUCSF_{ruc,\,i,\,q}$$

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

$$RUCSF_{ruc,\,i,\,q} = \text{Max}\,(0, \text{Max}\,(RUCSFSNAP_{ruc,\,q,\,i}, RUCSFADJ_{ruc,\,q,\,i}) - \sum_{z\ is\ prior\ to\ ruc} RUCCAPCREDIT_{q,\,i,\,z})$$

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

$$RUCSFSNAP_{ruc,q,i} = \text{Max}\,(0, ((\sum_{p} RTAML_{q,\,p,\,i} * 4) + \sum_{p} RTDCEXP_{q,\,p,\,i} - RUCCAPSNAP_{ruc,\,q,\,i}))$$

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

$$RUCCAPSNAP_{ruc,\,q,\,i} = \sum_{r} HASLSNAP_{q,\,r,\,h} + (RUCCPSNAP_{q,\,h} - RUCCSSNAP_{q,\,h}) + (\sum_{p} DAEP_{q,\,p,\,h} - \sum_{p} DAES_{q,\,p,\,h}) + (\sum_{p} RTQQEPSNAP_{q,\,p,\,i} - \sum_{p} RTQQESSNAP_{q,\,p,\,i}) + \sum_{p} DCIMPSNAP_{q,\,p,\,i}$$

(10) The RUC Shortfall in MW for one QSE for one 15-minute Settlement Interval, as measured at Real-Time, but including capacity from IRRs as seen in the RUC snapshot, is:

$$RUCSFADJ_{ruc,\,q,\,i} = \text{Max}\,(0, ((\sum_{p} RTAML_{q,\,p,\,i}) * 4) + \sum_{p} RTDCEXP_{q,\,p,\,i} - (\sum_{r=IRRsOnly} HASLSNAP_{ruc,\,q,\,r,\,h} + RUCCAPADJ_{q,\,i}))$$

(11) The amount of capacity that a QSE had in Real-Time for a 15-minute Settlement Interval, excluding capacity from IRRs, is:

$$\text{RUCCAPADJ}_{q,i} = \sum_{r} \text{HASLADJ}_{q,r,h} + (\text{RUCCPADJ}_{q,h} - \text{RUCCSADJ}_{q,h}) + (\sum_{p} \text{DAEP}_{q,p,h} - \sum_{p} \text{DAES}_{q,p,h}) + (\sum_{p} \text{RTQQEPADJ}_{q,p,i} - \sum_{p} \text{RTQQESADJ}_{q,p,i}) + \sum_{p} \text{DCIMPADJ}_{q,p,i}$$

The above variables are defined as follows:

Variable	Unit	Definition
$\text{RUCSFRS}_{ruc,i,q}$	none	*RUC Shortfall Ratio Share*—The ratio of the QSE *q*'s capacity shortfall to the sum of all QSEs' capacity shortfalls, for the RUC process *ruc*, for the 15-minute Settlement Interval *i*.
$\text{RUCSF}_{ruc,i,q}$	MW	*RUC Shortfall*—The QSE *q*'s capacity shortfall for the RUC process *ruc* for the 15-minute Settlement Interval *i*.
$\text{RUCSFTOT}_{ruc,i}$	MW	*RUC Shortfall Total*—The sum of all QSEs' capacity shortfalls, for a RUC process *ruc*, for a 15-minute Settlement Interval *i*.
$\text{RUCSFSNAP}_{ruc,q,i}$	MW	*RUC Shortfall at Snapshot*—The QSE *q*'s capacity shortfall according to the snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*.
$\text{RUCSFADJ}_{ruc,q,i}$	MW	*RUC Shortfall at Adjustment Period*—The QSE *q*'s Adjustment Period capacity shortfall, including capacity from IRRs as seen in the snapshot for the RUC process *ruc*, for the 15-minute Settlement Interval *i*.
$\text{RUCCAPCREDIT}_{q,i,z}$	MW	*RUC Capacity Credit by QSE*—The QSE *q*'s capacity credit resulting from capacity paid through the RUC Capacity-Short Amount for RUC process *z* for the 15-minute Settlement Interval *i*.
$\text{RTAML}_{q,p,i}$	MWh	*Real-Time Adjusted Metered Load*—The QSE *q*'s Adjusted Metered Load (AML) at the Settlement Point *p* for the 15-minute Settlement Interval *i*.
$\text{RUCCAPSNAP}_{ruc,q,i}$	MW	*RUC Capacity Snapshot at time of RUC*—The amount of the QSE *q*'s calculated capacity in the COP and Trades Snapshot for the RUC process *ruc* for a 15-minute Settlement Interval *i*.
$\text{HASLSNAP}_{q,r,h}$	MW	*High Ancillary Services Limit at Snapshot*—The HASL of the Resource *r* represented by the QSE *q*, according to the COP and Trades Snapshot for the RUC process for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
$\text{RTDCEXP}_{q,p,i}$	MW	*Real-Time DC Export per QSE per Settlement Point*—The aggregated DC Tie Schedule through DC Tie *p* submitted by QSE *q* that is under the Oklaunion Exemption as an exporter from the ERCOT Region, for the 15-minute Settlement Interval *i*.
$\text{DCIMPADJ}_{q,p,i}$	MW	*DC Import per QSE per Settlement Point*—The approved aggregated DC Tie Schedule submitted by QSE *q* as an importer into the ERCOT System through DC Tie *p* according to the Adjustment Period snapshot, for the 15-minute Settlement Interval *i*.
$\text{DCIMPSNAP}_{q,p,i}$	MW	*DC Import per QSE per Settlement Point*—The approved aggregated DC Tie Schedule submitted by QSE *q* as an importer into the ERCOT System through DC Tie *p*, according to the snapshot for the RUC process for the hour that includes the 15-minute Settlement Interval *i*.
$\text{RUCCPSNAP}_{q,h}$	MW	*RUC Capacity Purchase at Snapshot*—The QSE *q*'s capacity purchase, according to the COP and Trades Snapshot for the RUC process for the hour *h* that includes the 15-minute Settlement Interval.

Variable	Unit	Definition
RUCCSSNAP $_{q, h}$	MW	*RUC Capacity Sale at Snapshot*—The QSE *q*'s capacity sale, according to the COP and Trades Snapshot for the RUC process for the hour *h* that includes the 15-minute Settlement Interval.
RUCCAPADJ $_{q, i}$	MW	*RUC Capacity Snapshot during Adjustment Period*—The amount of the QSE *q*'s calculated capacity in the RUC according to the COP and Trades Snapshot, excluding capacity for IRRs, at the end of the Adjustment Period for a 15-minute Settlement Interval *i*
HASLADJ $_{q, r, h}$	MW	*High Ancillary Services Limit at Adjustment Period*—The HASL of a non-IRR *r* represented by the QSE *q*, according to the Adjustment Period snapshot, for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
RUCCPADJ $_{q, h}$	MW	*RUC Capacity Purchase at Adjustment Period*—The QSE *q*'s capacity purchase, according to the Adjustment Period COP and Trades Snapshot for the hour *h* that includes the 15-minute Settlement Interval.
RUCCSADJ $_{q, h}$	MW	*RUC Capacity Sale at Adjustment Period*—The QSE *q*'s capacity sale, according to the Adjustment Period COP and Trades Snapshot for the hour *h* that includes the 15-minute Settlement Interval.
DAEP $_{q, p, h}$	MW	*Day-Ahead Energy Purchase*—The QSE *q*'s energy purchased in the DAM at the Settlement Point *p* for the hour *h* that includes the 15-minute Settlement Interval.
DAES $_{q, p, h}$	MW	*Day-Ahead Energy Sale*—The QSE *q*'s energy sold in the DAM at the Settlement Point *p* for the hour *h* that includes the 15-minute Settlement Interval.
RTQQEPSNAP $_{q, p, i}$	MW	*QSE-to-QSE Energy Purchase by QSE by point*—The QSE *q*'s Energy Trades in which the QSE is the buyer at the delivery Settlement Point *p* for the 15-minute Settlement Interval *i*, in the COP and Trades Snapshot.
RTQQESSNAP $_{q, p, i}$	MW	*QSE-to-QSE Energy Sale by QSE by point*—The QSE *q*'s Energy Trades in which the QSE is the seller at the delivery Settlement Point *p* for the 15-minute Settlement Interval *i*, in the COP and Trades Snapshot.
RTQQEPADJ $_{q, p, i}$	MW	*QSE-to-QSE Energy Purchase by QSE by point*—The QSE *q*'s Energy Trades in which the QSE is the buyer at the delivery Settlement Point *p* for the 15-minute Settlement Interval *i*, in the last COP and Trades Snapshot at the end of the Adjustment Period for that Settlement Interval.
RTQQESADJ $_{q, p, i}$	MW	*QSE-to-QSE Energy Sale by QSE by point*—The QSE *q*'s Energy Trades in which the QSE is the seller at the delivery Settlement Point *p* for the 15-minute Settlement Interval *i*, in the last COP and Trades Snapshot at the end of the Adjustment Period for that Settlement Interval.
q	none	A QSE.
p	none	A Settlement Point.
r	none	A Generation Resource that is QSE-committed or planning to operate as a Quick Start Generation Resource (QSGR) for the Settlement Interval as shown by the Resource Status of OFFQS in the COP and Trades Snapshot and/or Adjustment Period snapshot; or RUC-decommitted for the Settlement Interval (subject to paragraphs (1) and (2) above); or a Switchable Generation Resource (SWGR) released by a non-ERCOT Control Area Operator (CAO) to operate in the ERCOT Control Area due to an ERCOT RUC instruction for an actual or anticipated EEA condition. If the Settlement Interval is a RUCAC-Interval, *r* represents the Combined Cycle Generation Resource that was QSE-committed at the time the RUCAC was issued.

Variable	Unit	Definition
z	none	A previous RUC process for the Operating Day.
i	none	A 15-minute Settlement Interval.
h	none	The hour that includes the Settlement Interval *i*.
ruc	none	The RUC process for which this RUC Shortfall Ratio Share is calculated.

[NPRR1009, NPRR1014, NPRR1029, ~~and~~ NPRR1032, and NPRR1054: Replace applicable portions of Section 5.7.4.1.1 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1009; or upon system implementation for NPRR1014, NPRR1029, ~~or~~ NPRR1032, or NPRR1054:]

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

(a) QSE-committed;

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

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

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

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

The DCRCAPSNAP variable at the RUC Snapshot is calculated as:

$$\mathbf{DCRCAPSNAP}_{ruc, q, r, h} = \mathbf{RUCHSLESS}_{ruc, q, r, h} + (\mathbf{WGRPP}_{ruc, q, r, h} + \mathbf{PVGRPP}_{ruc, q, r, h})$$

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

$$\mathbf{DCRCAPADJ}_{ruc, q, r, h} = \mathbf{HSLESS}_{q, r, h} + (\mathbf{WGRPP}_{ruc, q, r, h} + \mathbf{PVGRPP}_{ruc, q, r, h})$$

The above variables are defined as follows:

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

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

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

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

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

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

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

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

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

$$\mathbf{RUCSFRS}_{ruc,\,i,\,q} = \mathbf{RUCSF}_{ruc,\,i,\,q} / \mathbf{RUCSFTOT}_{ruc,\,i}$$

Where:

$$\text{RUCSFTOT}_{ruc,\,i} = \sum_{q} \text{RUCSF}_{ruc,\,i,\,q}$$

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

$$\mathbf{RUCSF}_{ruc,\,i,\,q} = \mathbf{Max}\,(0,\ \mathbf{Max}\,(\mathbf{RUCSFSNAP}_{ruc,\,q,\,i},\ \mathbf{RUCSFADJ}_{ruc,\,q,\,i}) - \sum_{z \text{ is prior to } ruc} \mathbf{RUCCAPCREDIT}_{q,\,i,\,z})$$

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

$$\mathbf{RUCSFSNAP}_{ruc,q,i} = \mathbf{Max}\ (\mathbf{RUCOSFSNAP}_{ruc,q,i}, \mathbf{RUCASFSNAP}_{ruc,q,i})$$

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

$$\mathbf{RUCOSFSNAP}_{ruc,q,i} = \mathbf{Max}\ (0, ((\sum_{p} \mathbf{RTAML}_{q,p,i} * 4) + \sum_{p} \mathbf{RTDCEXP}_{q,p,i} + \mathbf{ASONPOSSNAP}_{ruc,q,i} - \mathbf{RUCCAPSNAP}_{ruc,q,i}))$$

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

$$\mathbf{ASONPOSSNAP}_{ruc,q,i} = \mathbf{RUPOSSNAP}_{ruc,q,h} + \mathbf{RRPOSSNAP}_{ruc,q,h} + \mathbf{Max}\ (0, (\mathbf{ECRPOSSNAP}_{ruc,q,h} + \mathbf{NSPOSSNAP}_{ruc,q,h} - \sum_{r} \mathbf{ASOFFOFRSNAP}_{ruc,q,r,h}))$$

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

$$\mathbf{RUCCAPSNAP}_{ruc,q,i} = \sum_{r} \mathbf{RCAPSNAP}_{ruc,q,r,h} + \sum_{r} \mathbf{DCRCAPSNAP}_{ruc,q,r,h} + (\mathbf{RUCCPSNAP}_{ruc,q,h} - \mathbf{RUCCSSNAP}_{ruc,q,h}) + (\sum_{p} \mathbf{DAEP}_{q,p,h} - \sum_{p} \mathbf{DAES}_{q,p,h}) + (\sum_{p} \mathbf{RTQQEPSNAP}_{ruc,q,p,i} - \sum_{p} \mathbf{RTQQESSNAP}_{ruc,q,p,i}) + \sum_{p} \mathbf{DCIMPSNAP}_{ruc,q,p,i} + \sum_{r} \mathbf{ASOFRLRSNAP}_{ruc,q,r,h}$$

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

$$\mathbf{RUCASFSNAP}_{ruc,q,i} = \mathbf{Max}\ (0, \mathbf{ASCAP1SNAP}_{ruc,q,i}, \mathbf{ASCAP2SNAP}_{ruc,q,i}, \mathbf{ASCAP3SNAP}_{ruc,q,i}, \mathbf{ASCAP4SNAP}_{ruc,q,i}, \mathbf{ASCAP5SNAP}_{ruc,q,i}) + \mathbf{Max}\ (0, \mathbf{ASCAP6SNAP}_{ruc,q,i})$$

Where:

$$ASCAP1SNAP_{ruc,q,i} = RUPOSSNAP_{ruc,q,h} - \sum_{r} ASOFR1SNAP_{ruc,q,r,h}$$

$$ASCAP2SNAP_{ruc,q,i} = RRPOSSNAP_{ruc,q,h} - \sum_{r} ASOFR2SNAP_{ruc,q,r,h}$$

$$ASCAP3SNAP_{ruc,q,i} = (RUPOSSNAP_{ruc,q,h} + RRPOSSNAP_{ruc,q,h}) - \sum_{r} ASOFR3SNAP_{ruc,q,r,h}$$

$$ASCAP4SNAP_{ruc,q,i} = (RUPOSSNAP_{ruc,q,h} + RRPOSSNAP_{ruc,q,h} + ECRPOSSNAP_{ruc,q,h}) - \sum_{r} ASOFR4SNAP_{ruc,q,r,h}$$

$$ASCAP5SNAP_{ruc,q,i} = (RUPOSSNAP_{ruc,q,h} + RRPOSSNAP_{ruc,q,h} + ECRPOSSNAP_{ruc,q,h} + NSPOSSNAP_{ruc,q,h}) - \sum_{r} ASOFR5SNAP_{ruc,q,r,h}$$

$$ASCAP6SNAP_{ruc,q,i} = RDPOSSNAP_{ruc,q,h} - \sum_{r} ASOFR6SNAP_{ruc,q,r,h}$$

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

$$\mathbf{RUCSFADJ}_{ruc,q,i} = \mathbf{Max}\ (\mathbf{RUCOSFADJ}_{ruc,q,i}, \mathbf{RUCASFADJ}_{q,i})$$

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

$$\mathbf{RUCOSFADJ}_{ruc,q,i} = \mathbf{Max}\ (0, ((\sum_{p} \mathbf{RTAML}_{q,p,i} * 4) + \sum_{p} \mathbf{RTDCEXP}_{q,p,i} + \mathbf{ASONPOSADJ}_{q,i} - (\sum_{r=IRRsOnly} \mathbf{RCAPSNAP}_{ruc,q,r,h} + \sum_{r} \mathbf{DCRCAPADJ}_{ruc,q,r,h} + \mathbf{RUCCAPADJ}_{q,i})))$$

Where:

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

$$ASONPOSADJ_{q,i} = RUPOSADJ_{q,h} + RRPOSADJ_{q,h} + \text{Max}\ (0, (ECRPOSADJ_{q,h} + NSPOSADJ_{q,h} - \sum_{r} ASOFFOFRADJ_{q,r,h}))$$

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

$$RUCCAPADJ_{q,i} = \sum_{r} RCAPADJ_{q,r,h} + (RUCCPADJ_{q,h} - RUCCSADJ_{q,h}) + (\sum_{p} DAEP_{q,p,h} - \sum_{p} DAES_{q,p,h}) + (\sum_{p} RTQQEPADJ_{q,p,i} - \sum_{p} RTQQESADJ_{q,p,i}) + \sum_{p} RTDCIMP_{q,p} + \sum_{r} ASOFRLRADJ_{q,r,h}$$

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

$$\mathbf{RUCASFADJ}_{q,i} = \mathbf{Max\ (0,\ ASCAP1ADJ}_{q,i}\mathbf{,\ ASCAP2ADJ}_{q,i}\mathbf{,\ ASCAP3ADJ}_{q,i}\mathbf{,\ ASCAP4ADJ}_{q,i}\mathbf{,\ ASCAP5ADJ}_{q,i}\mathbf{) + Max\ (0,\ ASCAP6ADJ}_{q,i}\mathbf{)}$$

Where:

$$ASCAP1ADJ_{q,i} = RUPOSADJ_{q,h} - \sum_{r} ASOFR1ADJ_{q,r,h}$$

$$ASCAP2ADJ_{q,i} = RRPOSADJ_{q,h} - \sum_{r} ASOFR2ADJ_{q,r,h}$$

$$ASCAP3ADJ_{q,i} = (RUPOSADJ_{q,h} + RRPOSADJ_{q,h}) - \sum_{r} ASOFR3ADJ_{q,r,h}$$

$$ASCAP4ADJ_{q,i} = (RUPOSADJ_{q,h} + RRPOSADJ_{q,h} + ECRPOSADJ_{q,h}) - \sum_{r} ASOFR4ADJ_{q,r,h}$$

$$ASCAP5ADJ_{q,i} = (RUPOSADJ_{q,h} + RRPOSADJ_{q,h} + ECRPOSADJ_{q,h} + NSPOSADJ_{q,h}) - \sum_{r} ASOFR5ADJ_{q,r,h}$$

$$ASCAP6ADJ_{q,i} = RDPOSADJ_{q,h} - \sum_{r} ASOFR6ADJ_{q,r,h}$$

The above variables are defined as follows:

Variable	Unit	Definition
$RUCSFRS_{ruc,i,q}$	none	*RUC Shortfall Ratio Share*—The ratio of the QSE *q*'s capacity shortfall to the sum of all QSEs' capacity shortfalls, for the RUC process *ruc*, for the 15-minute Settlement Interval *i*.
$RUCSF_{ruc,i,q}$	MW	*RUC Shortfall*—The QSE *q*'s capacity shortfall for the RUC process *ruc* for the 15-minute Settlement Interval *i*.
$RUCSFTOT_{ruc,i}$	MW	*RUC Shortfall Total*—The sum of all QSEs' capacity shortfalls, for a RUC process *ruc*, for a 15-minute Settlement Interval *i*.

RUCSFSNAP $_{ruc, q, i}$	MW	*RUC Shortfall at Snapshot*—The QSE *q*'s capacity shortfall will be the maximum of the QSE's overall shortfall or Ancillary Service shortfall, as calculated for the RUC process *ruc* for the 15-minute Settlement Interval *i*.
RUCSFADJ $_{ruc, q, i}$	MW	*RUC Shortfall at End of Adjustment Period*—The QSE *q*'s end of Adjustment Period capacity shortfall will be the maximum of the QSE's overall shortfall or Ancillary Service shortfall, as calculated for the RUC process *ruc*, for the 15-minute Settlement Interval *i*.
RUCCAPCREDIT $_{q, i, z}$	MW	*RUC Capacity Credit*—The QSE *q*'s capacity credit resulting from capacity paid through the RUC Capacity-Short Amount for RUC process *z* for the 15-minute Settlement Interval *i*.
RUCOSFSNAP $_{ruc, q, i}$	MW	*RUC Overall Shortfall at Snapshot* —The QSE *q*'s overall capacity shortfall according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*.
RUCASFSNAP $_{ruc, q, i}$	MW	*RUC Ancillary Service Shortfall at Snapshot* —The QSE *q*'s Ancillary Service capacity shortfall according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*.
ASONPOSSNAP $_{ruc, q, i}$	MW	*Ancillary Service On-Line Position at Snapshot* – The QSE *q's* total On-Line Ancillary Service position according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*.
RUPOSSNAP $_{ruc, q, h}$	MW	*Regulation Up Position at Snapshot* —The QSE *q's* Real-Time Reg-Up Ancillary Service Position according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval.
RRPOSSNAP $_{ruc, q, h}$	MW	*Responsive Reserve Service Position at Snapshot* —The QSE *q's* Real-Time RRS Ancillary Service Position according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval.
ECRPOSSNAP $_{ruc, q, h}$	MW	*ERCOT Contingency Reserve Service Position at Snapshot* —The QSE *q's* Real-Time ECRS Ancillary Service Position according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval.
NSPOSSNAP $_{ruc, q, h}$	MW	*Non-Spin Reserve Service Position at Snapshot* —The QSE *q's* Real-Time Non-Spin Ancillary Service Position according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval.
RDPOSSNAP $_{ruc, q, h}$	MW	*Regulation Down Position at Snapshot* —The QSE *q's* Real-Time Regulation Down Service (Reg-Down) Ancillary Service Position according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval.
ASOFFOFRSNAP $_{ruc, q, r, h}$	MW	*Ancillary Service Offline Offers at Snapshot* –The capacity represented by validated Ancillary Service Offers for ECRS and Non-Spin for Resource *r* represented by QSE *q* according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource's offered capacity is only included in the sum to the extent that the Resource's COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*.

ASOFRLRSNAP $_{ruc, q, r, h}$	MW	*Ancillary Service Offer per Load Resource at Snapshot* – The capacity represented by validated Ancillary Service Offers for Reg-Up, Non-Spin, RRS, and ECRS for the Load Resource *r* represented by QSE *q* according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. A Resource's offered capacity is only included in the sum to the extent that the Resource's COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*.
ASCAP1SNAP $_{ruc, q, i}$	MW	*Ancillary Service Net Capacity Level 1 at Snapshot* —The net capacity for Reg-Up for QSE *q*, according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*.
ASCAP2SNAP $_{ruc, q, i}$	MW	*Ancillary Service Net Capacity Level 2 at Snapshot* —The net capacity for RRS for QSE *q*, according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*.
ASCAP3SNAP $_{ruc, q, i}$	MW	*Ancillary Service Net Capacity Level 3 at Snapshot* —The net capacity for Reg-Up and RRS for QSE *q*, according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*.
ASCAP4SNAP $_{ruc, q, i}$	MW	*Ancillary Service Net Capacity Level 4 at Snapshot* —The net capacity for Reg-Up, RRS, and ECRS for QSE *q*, according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*.
ASCAP5SNAP $_{ruc, q, i}$	MW	*Ancillary Service Net Capacity Level 5 at Snapshot* —The net capacity for Reg-Up, RRS, ECRS, and Non-Spinning Reserve (Non-Spin) for QSE *q*, according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*.
ASCAP6SNAP $_{ruc, q, i}$	MW	*Ancillary Service Net Capacity Level 6 at Snapshot* —The net capacity for ~~Regulation Down Service (~~Reg-Down~~)~~ for QSE *q*, according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*.
ASOFR1SNAP $_{ruc, q, r, h}$	MW	*Ancillary Service Offer Level 1 at Snapshot* – The capacity represented by validated Reg-Up Ancillary Service Offers for Resource *r* represented by QSE *q* according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource's offered capacity is only included in the sum to the extent that the Resource's COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*.
ASOFR2SNAP $_{ruc, q, r, h}$	MW	*Ancillary Service Offer Level 2 at Snapshot* – The capacity represented by validated RRS Ancillary Service Offers for Resource *r* represented by QSE *q* according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource's offered capacity is only included in the sum to the extent that the Resource's COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*.

ASOFR3SNAP $_{ruc, q, r, h}$	MW	*Ancillary Service Offer Level 3 at Snapshot* – The capacity represented by validated Reg-Up and RRS Ancillary Service Offers for Resource *r* represented by QSE *q* according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource's offered capacity is only included in the sum to the extent that the Resource's COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*.
ASOFR4SNAP $_{ruc, q, r, h}$	MW	*Ancillary Service Offer Level 4 at Snapshot* – The capacity represented by validated Reg-Up, RRS, and ECRS Ancillary Service Offers for Resource *r* represented by QSE *q* according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource's offered capacity is only included in the sum to the extent that the Resource's COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*.
ASOFR5SNAP $_{ruc, q, r, h}$	MW	*Ancillary Service Offer Level 5 at Snapshot* – The capacity represented by validated Reg-Up, RRS, ECRS, and Non-Spin Ancillary Service Offers for Resource *r* represented by QSE *q* according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource's offered capacity is only included in the sum to the extent that the Resource's COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*.
ASOFR6SNAP $_{ruc, q, r, h}$	MW	*Ancillary Service Offer Level 6 at Snapshot* – The capacity represented by validated Reg-Down Ancillary Service Offers for Resource *r* represented by QSE *q* according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource's offered capacity is only included in the sum to the extent that the Resource's COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*.
RUCOSFADJ $_{ruc, q, i}$	MW	*RUC Overall Shortfall at End of Adjustment Period* —The QSE *q's* overall capacity shortfall at the end of the Adjustment Period, including capacity from IRRs as seen in the RUC Snapshot for the RUC process *ruc* and capacity from DC-Coupled Resources, for the 15-minute Settlement Interval *i*.
RUCASFADJ $_{q, i}$	MW	*RUC Ancillary Service Shortfall at End of Adjustment Period* —The QSE *q's* Ancillary Service capacity shortfall at the end of the Adjustment Period for the 15-minute Settlement Interval *i*.
ASONPOSADJ $_{q, i}$	MW	*Ancillary Service On-Line Position at End of Adjustment Period* – The QSE *q's* total On-Line Ancillary Service position at the end of the Adjustment Period for the 15-minute Settlement Interval *i*.
RUPOSADJ $_{q, h}$	MW	*Regulation Up Position at End of Adjustment Period* —The QSE *q's* Reg-Up Ancillary Service Position at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval.

RRPOSADJ $_{q, h}$	MW	*Responsive Reserve Service Position at End of Adjustment Period*—The QSE *q's* RRS Ancillary Service Position at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval.
ECRPOSADJ $_{q, h}$	MW	*ERCOT Contingency Reserve Service Position at End of Adjustment Period*—The QSE *q's* ECRS Ancillary Service Position at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval.
NSPOSADJ $_{q, h}$	MW	*Non-Spin Reserve Service Position at End of Adjustment Period*—The QSE *q's* Non-Spin Ancillary Service Position at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval.
RDPOSADJ $_{q, h}$	MW	*Regulation Down Position at End of Adjustment Period*—The QSE *q's* Reg-Down Ancillary Service Position at the end of the Adjustment period for the hour *h* that includes the 15-minute Settlement Interval.
ASOFFOFRADJ $_{q, r, h}$	MW	*Ancillary Service Offline Offers at End of Adjustment Period* –The capacity represented by validated Ancillary Service Offers for ECRS and Non-Spin for Resource *r* represented by QSE *q* at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource's offered capacity is only included in the sum to the extent that the Resource's COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*.
ASOFRLRADJ $_{q, r, h}$	MW	*Ancillary Service Offer per Load Resource at End of Adjustment Period* – The capacity represented by validated Ancillary Service Offers for Reg-Up, Non-Spin, RRS, and ECRS for the Load Resource *r* represented by QSE *q* at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. A Resource's offered capacity is only included in the sum to the extent that the Resource's COP Status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*
ASCAP1ADJ $_{q, i}$	MW	*Ancillary Service Net Capacity Level 1 at End of Adjustment Period*—The net capacity at the end of the Adjustment Period for Reg-Up for QSE *q*, for the 15-minute Settlement Interval *i*.
ASCAP2ADJ $_{q, i}$	MW	*Ancillary Service Net Capacity Level 2 at End of Adjustment Period*—The net capacity at the end of the Adjustment Period for RRS for QSE *q*, for the 15-minute Settlement Interval *i*.
ASCAP3ADJ $_{q, i}$	MW	*Ancillary Service Net Capacity Level 3 at End of Adjustment Period* —The net capacity at the end of the Adjustment Period for Reg-Up and RRS for QSE *q*, for the 15-minute Settlement Interval *i*.
ASCAP4ADJ $_{q, i}$	MW	*Ancillary Service Net Capacity Level 4 at End of Adjustment Period*—The net capacity at the end of the Adjustment Period for Reg-Up, RRS, and ECRS for QSE *q*, for the 15-minute Settlement Interval *i*.
ASCAP5ADJ $_{q, i}$	MW	*Ancillary Service Net Capacity Level 5 at End of Adjustment Period*—The net capacity at the end of the Adjustment Period for Reg-Up, RRS, ECRS, and Non-Spin for QSE *q*, for the 15-minute Settlement Interval *i*.
ASCAP6ADJ $_{q, i}$	MW	*Ancillary Service Net Capacity Level 6 at End of Adjustment Period*— The net capacity at the end of the Adjustment Period for Reg-Down for QSE *q*, for the 15-minute Settlement Interval *i*.

$ASOFR1ADJ_{q, r, h}$	MW	*Ancillary Service Offer Level 1 at End of Adjustment Period* – The capacity represented by validated Reg-Up Ancillary Service Offers for Resource *r* represented by QSE *q* at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource's offered capacity is only included in the sum to the extent that the Resource's COP status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*.
$ASOFR2ADJ_{q, r, h}$	MW	*Ancillary Service Offer Level 2 at End of Adjustment Period* – The capacity represented by validated RRS Ancillary Service Offers for Resource *r* represented by QSE *q* at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource's offered capacity is only included in the sum to the extent that the Resource's COP status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*.
$ASOFR3ADJ_{q, r, h}$	MW	*Ancillary Service Offer Level 3 at End of Adjustment Period* – The capacity represented by validated Reg-Up and RRS Ancillary Service Offers for Resource *r* represented by QSE *q* at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource's offered capacity is only included in the sum to the extent that the Resource's COP status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*.
$ASOFR4ADJ_{q, r, h}$	MW	*Ancillary Service Offer Level 4 at End of Adjustment Period* – The capacity represented by validated Reg-Up, RRS, and ECRS Ancillary Service Offers for Resource *r* represented by QSE *q* at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource's offered capacity is only included in the sum to the extent that the Resource's COP status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*.
$ASOFR5ADJ_{q, r, h}$	MW	*Ancillary Service Offer Level 5 at End of Adjustment Period*– The capacity represented by validated Reg-Up, RRS, ECRS, and Non-Spin Ancillary Service Offers for Resource *r* represented by QSE *q* at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource's offered capacity is only included in the sum to the extent that the Resource's COP status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*.

ASOFR6ADJ $_{q, r, h}$	MW	*Ancillary Service Offer Level 6 at End of Adjustment Period* – The capacity represented by validated Reg-Down Ancillary Service Offers for Resource *r* represented by QSE *q* at the end of the Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. A Resource's offered capacity is only included in the sum to the extent that the Resource's COP status and Ancillary Service Capability indicate it would be capable of providing the Ancillary Service during the hour *h*.
RTAML $_{q, p, i}$	MWh	*Real-Time Adjusted Metered Load*—The QSE *q*'s Adjusted Metered Load (AML) at the Settlement Point *p* for the 15-minute Settlement Interval *i*.
RUCCAPSNAP $_{ruc, q, i}$	MW	*RUC Capacity Snapshot at time of RUC*—The amount of the QSE *q*'s calculated capacity in the RUC Snapshot for the RUC process *ruc* for a 15-minute Settlement Interval *i*.
RCAPSNAP $_{ruc, q, r, h}$	MW	*Resource Capacity at Snapshot*—The available capacity of Generation Resource or ESR *r*, that is not a DC-Coupled Resource, represented by the QSE *q*, according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval. For ESRs and Generation Resources that are not IRRs, the available capacity shall be equal to HSL. For WGRs and PVGRs, the available capacity shall be equal to the WGRPP and the PVGRPP, respectively. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
~~RTDCEXP $_{q, p, i}$~~	~~MW~~	~~*Real-Time DC Export*—The aggregated DC Tie Schedule through DC Tie *p* submitted by QSE *q* that is under the Oklaunion Exemption as an exporter from the ERCOT Region, for the 15-minute Settlement Interval *i*.~~
DCRCAPSNAP $_{ruc, q, r, h}$	MW	*DC-Coupled Resource Capacity at Snapshot*—The Resource Capacity of DC-Coupled Resource *r* represented by the QSE *q* for the hour *h*, according to the RUC Snapshot for the RUC process *ruc*.
DCRCAPADJ $_{ruc, q, r, h}$	MW	*DC-Coupled Resource Capacity at Adjustment Period*—The Resource Capacity of DC-Coupled Resource *r* represented by the QSE *q* for the hour *h*, at the end of the Adjustment Period.
DCIMPSNAP $_{ruc, q, p, i}$	MW	*DC Import at Snapshot*—The approved aggregated DC Tie Schedule submitted by QSE *q* as an importer into the ERCOT System through DC Tie *p*, according to the RUC Snapshot for the RUC process *ruc* for the 15-minute Settlement Interval *i*.
RTDCIMP $_{q, p}$	MW	*Real-Time DC Import per QSE per Settlement Point*—The aggregated final, approved DC Tie Schedule submitted by QSE *q* as an importer into the ERCOT System through DC Tie *p*, for the 15-minute Settlement Interval.
RUCCPSNAP $_{ruc, q, h}$	MW	*RUC Capacity Purchase at Snapshot*—The QSE *q*'s capacity purchase, according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval.
RUCCSSNAP $_{ruc, q, h}$	MW	*RUC Capacity Sale at Snapshot*—The QSE *q*'s capacity sale, according to the RUC Snapshot for the RUC process *ruc* for the hour *h* that includes the 15-minute Settlement Interval.
RUCCAPADJ $_{q, i}$	MW	*RUC Capacity at End of Adjustment Period*—The amount of the QSE *q*'s calculated capacity, excluding capacity for IRRs and DC-Coupled Resources, at the end of the Adjustment Period for a 15-minute Settlement Interval *i*.

RCAPADJ $_{q, r, h}$	MW	*Resource Capacity at End of Adjustment Period*—The HSL of a non-IRR Generation Resource or ESR *r*, that is not a DC-Coupled Resource, represented by the QSE *q* at the end of the Adjustment Period, for the hour *h* that includes the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
RUCCPADJ $_{q, h}$	MW	*RUC Capacity Purchase at End of Adjustment Period*—The QSE *q*'s capacity purchase, at the end of Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval.
RUCCSADJ $_{q, h}$	MW	*RUC Capacity Sale at End of Adjustment Period*—The QSE *q*'s capacity sale, at the end of Adjustment Period for the hour *h* that includes the 15-minute Settlement Interval.
DAEP $_{q, p, h}$	MW	*Day-Ahead Energy Purchase*—The QSE *q*'s energy purchased in the DAM at the Settlement Point *p* for the hour *h* that includes the 15-minute Settlement Interval.
DAES $_{q, p, h}$	MW	*Day-Ahead Energy Sale*—The QSE *q*'s energy sold in the DAM at the Settlement Point *p* for the hour *h* that includes the 15-minute Settlement Interval.
RTQQEPSNAP $_{ruc, q, p, i}$	MW	*Real-Time QSE-to-QSE Energy Purchase at Snapshot*—The QSE *q*'s Energy Trades in which the QSE is the buyer at the delivery Settlement Point *p* for the 15-minute Settlement Interval *i*, in the RUC Snapshot for the RUC process *ruc*.
RTQQESSNAP $_{ruc, q, p, i}$	MW	*Real-Time QSE-to-QSE Energy Sale at Snapshot*—The QSE *q*'s Energy Trades in which the QSE is the seller at the delivery Settlement Point *p* for the 15-minute Settlement Interval *i*, in the RUC Snapshot for the RUC process *ruc*.
RTQQEPADJ $_{q, p, i}$	MW	*Real-Time QSE-to-QSE Energy Purchase at End of Adjustment Period*—The QSE *q*'s Energy Trades in which the QSE is the buyer at the delivery Settlement Point *p* for the 15-minute Settlement Interval *i*, at the end of the Adjustment Period for that Settlement Interval.
RTQQESADJ $_{q, p, i}$	MW	*Real-Time QSE-to-QSE Energy Sale at End of Adjustment Period*—The QSE *q*'s Energy Trades in which the QSE is the seller at the delivery Settlement Point *p* for the 15-minute Settlement Interval *i*, at the end of the Adjustment Period for that Settlement Interval.
q	none	A QSE.
p	none	A Settlement Point.
r	none	A Generation Resource, an ESR, or a Load Resource.
z	none	A previous RUC process for the Operating Day.
i	none	A 15-minute Settlement Interval.
h	none	The hour that includes the Settlement Interval *i*.
ruc	none	The RUC process for which this RUC Shortfall Ratio Share is calculated.

ERCOT Nodal Protocols

Section 7: Congestion Revenue Rights

March~~January~~ 1, 2021

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7 CONGESTION REVENUE RIGHTS

7.5 CRR Auctions

7.5.7 Method for Distributing CRR Auction Revenues

(1) ERCOT shall determine, for each month, the CRR Monthly Revenues (CMRs). The CMR is the sum of:

(a) Monthly CRR revenue for that month; and

(b) PCRR revenues.

(2) ERCOT shall credit the net CRR Auction revenue (including PCRR revenue) produced from CRRs cleared in each CRR Auction that source from a Settlement Point located within a 2003 ERCOT CMZ and sink at a Settlement Point located within the same 2003 ERCOT CMZ to Qualified Scheduling Entities (QSEs) in the 2003 ERCOT CMZ on a zonal Load Ratio Share (LRS) basis. All other net CRR Auction revenues must be allocated to QSEs on an ERCOT-wide LRS basis. For these allocation purposes, any Non-Opt-In Entity (NOIE) Load Zone is considered to be located entirely within the 2003 ERCOT CMZ that represented the largest Load for that NOIE or group of NOIEs in 2003.

[NPRR1030: Replace paragraph (2) above with the following upon system implementation:]

(2) ERCOT shall credit the net CRR Auction revenue (including PCRR revenue) produced from CRRs cleared in each CRR Auction that source from a Settlement Point located within a 2003 ERCOT CMZ and sink at a Settlement Point located within the same 2003 ERCOT CMZ to Qualified Scheduling Entities (QSEs) in the 2003 ERCOT CMZ on a zonal ratio share basis. All other net CRR Auction revenues must be allocated to QSEs on an ERCOT-wide ratio share basis. For these allocation purposes, any Non-Opt-In Entity (NOIE) Load Zone is considered to be located entirely within the 2003 ERCOT CMZ that represented the largest Load for that NOIE or group of NOIEs in 2003.

(3) For initial distribution of CMRs, revenues shall be paid to each QSE based on that QSE's LRS in the interval coincident with the ERCOT-wide peak 15-minute Settlement Interval for the month.

[NPRR1030: Replace paragraph (3) above with the following upon system implementation:]

(3) For initial distribution of CMRs, revenues shall be paid to each QSE based on that QSE's DC Tie ratio share for the month. Remaining revenues shall be paid to each QSE based on that QSE's ratio share, excluding DC Tie exports, in the interval coincident with the

ERCOT-wide peak 15-minute Settlement Interval for the month.

(4) ERCOT shall true up the distribution of CMRs based on that QSE's LRS in the interval coincident with the ERCOT-wide peak 15-minute Settlement Interval for the month.

[NPRR905 and NPRR1030: Replace applicable portions of paragraph (4) above with the following upon system implementation:]

(4) ERCOT shall true up the distribution of CMRs, in accordance with paragraph (2) of Section 9.10, CRR Auction Revenue Distribution Invoices, based on that QSE's DC Tie ratio share for the month. Remaining revenues shall be paid to each QSE based on that QSE's ratio share, excluding DC Tie exports, in the interval coincident with the ERCOT-wide peak 15-minute Settlement Interval for the month.

(5) The net CRR Auction revenue produced from CRRs cleared and paid for in each CRR Auction that source from a Settlement Point within a 2003 ERCOT CMZ and sink at a Settlement Point located within the same 2003 ERCOT CMZ shall be distributed on a zonal LRS basis. The portion of the net monthly CRR Auction revenue to be distributed to each QSE with Load in that zone for a given month is calculated as follows:

$$\mathbf{LACMRZAMT}_{z,q} = \mathbf{(-1)} * \sum_{a} (\mathbf{CRRZREV}_{z,a} + \mathbf{PCRRZREV}_{z,a}) * \mathbf{MLRSZ}_{z,q}$$

The above variables are defined as follows:

Variable	Unit	Definition
$LACMRZAMT_{z,q}$	$	*Load-Allocated CRR Monthly Revenue Zonal Amount per zone per QSE*—The payment to QSE *q* of the revenues resulted from the CRRs that source and sink in CMZ *z*, for the month.
$CRRZREV_{z,a}$	$	*CRR Zonal Revenue per zone per CRR Auction*—The revenue resulted from the CRRs that source and sink in CMZ *z*, cleared through CRR Auction Offers and CRR Auction Bids in CRR Auction *a*, for the month.
$PCRRZREV_{z,a}$	$	*PCRR Zonal Revenue per zone per CRR Auction*—The revenue resulted from the PCRRs that source and sink in CMZ *z*, pertaining to CRR Auction *a*, for the month.
$MLRSZ_{q,z}$	none	*Monthly Load Ratio Share Zonal per QSE per zone*—The LRS of QSE *q* for its Load in CMZ *z*, for the peak-Load 15-minute Settlement Interval in the month.
q	none	A QSE.
z	none	A 2003 ERCOT CMZ.
a	none	A CRR Auction.

[NPRR1030 and NPRR1054: Replace applicable portions of paragraph (5) above with the following upon system implementation:]

(5) The net CRR Auction revenue produced from CRRs cleared and paid for in each CRR Auction that source from a Settlement Point within a 2003 ERCOT CMZ and sink at a Settlement Point located within the same 2003 ERCOT CMZ shall be distributed on a

zonal ratio share basis. The portion of the net monthly CRR Auction revenue to be distributed to each QSE with Load in that zone for a given month is calculated as follows:

$$\mathbf{LACMRZAMT}_{z,q} = \mathbf{(-1) * (CMRZDC}_{z,q} + \mathbf{CMRZNDC}_{z,q})$$

Where:

$$CMRZNDC_{z,q} = (\sum_{a} (CRRZREV_{z,a} + PCRRZREV_{z,a}) - \sum_{q} CMRZDC_{z,q}) * MLRSZ_{z,q}$$

$$CMRZDC_{z,q} = \sum_{a} (CRRZREV_{z,a} + PCRRZREV_{z,a}) * DCMLRSZ_{z,q}$$

The above variables are defined as follows:

Variable	Unit	Definition
$LACMRZAMT_{z,q}$	$	*Load-Allocated CRR Monthly Revenue Zonal Amount per zone per QSE*—The sum payment to QSE *q* representing Loads and DC Tie exports of the revenues resulted from the CRRs that source and sink in CMZ *z*, for the month.
$CMRZDC_{z,q}$	$	*CRR Monthly Revenue Zonal Amount for DC Tie Exports per zone per QSE*—The amount due to QSE *q* representing DC Tie ~~E~~exports ~~(excluding Oklaunion)~~ of the revenues resulted from the CRRs that source and sink in CMZ *z*, for the month.
$CMRZNDC_{z,q}$	$	*CRR Monthly Revenue Zonal Amount for Non-DC Tie Loads per zone per QSE*—The amount due to QSE *q* representing Loads (excluding DC Tie exports) of the revenues resulted from the CRRs that source and sink in CMZ *z*, for the month.
$CRRZREV_{z,a}$	$	*CRR Zonal Revenue per zone per CRR Auction*—The revenue resulted from the CRRs that source and sink in CMZ *z*, cleared through CRR Auction Offers and CRR Auction Bids in CRR Auction *a*, for the month.
$PCRRZREV_{z,a}$	$	*PCRR Zonal Revenue per zone per CRR Auction*—The revenue resulted from the PCRRs that source and sink in CMZ *z*, pertaining to CRR Auction *a*, for the month.
$DCMLRSZ_{q,z}$	none	*DC Tie Exports Monthly Load Ratio Share Zonal per QSE per zone*—The ratio share calculated for QSE *q* with DC Tie ~~E~~exports ~~(excluding Oklaunion)~~ in CMZ *z*, for the month. See Section 6.6.2.8, QSE DC Tie Export Load Ratio Share by Congestion Management Zone for a Month.
$MLRSZ_{q,z}$	none	*Monthly Load Ratio Share Zonal per QSE per zone*—The ratio share of QSE *q* for its Load excluding DC Tie ~~E~~exports in CMZ *z*, for the peak Load 15-minute Settlement Interval in the month.
q	none	A QSE.
z	none	A 2003 ERCOT CMZ.
a	none	A CRR Auction.

(6) The net CRR Auction revenue produced from CRRs cleared and paid for in each CRR Auction that do not source from a Settlement Point within a 2003 ERCOT CMZ and sink at a Settlement Point located within the same 2003 ERCOT CMZ shall be distributed on an ERCOT-wide LRS basis. The portion of the net monthly CRR Auction Revenue Amount (from CRRs with paths that cross the 2003 ERCOT CMZ boundaries) to be distributed for a given month is calculated as follows:

$$\mathbf{LACMRNZAMT}_{q} = \mathbf{(-1)} * \sum_{a} \mathbf{(CRRNZREV}_{a} + \mathbf{PCRRNZREV}_{a}) * \mathbf{MLRS}_{q}$$

The above variables are defined as follows:

Variable	Unit	Definition
LACMRNZAMT $_q$	$	*Load-Allocated CRR Monthly Revenue Non-Zonal Amount per QSE*—The payment to QSE *q* of the revenues resulted from the CRRs that source and sink in different CMZs, for the month.
CRRNZREV $_a$	$	*CRR Zonal Revenue per CRR Auction*—The revenue resulted from the CRRs that source and sink in different CMZs, cleared through CRR Auction Offers and CRR Auction Bids in CRR Auction *a*, for the month.
PCRRNZREV $_a$	$	*PCRR Zonal Revenue per CRR Auction*—The revenue resulted from the PCRRs that source and sink in different CMZs, pertaining to CRR Auction *a*, for the month.
MLRS $_q$	none	*Monthly Load Ratio Share per QSE*—The LRS calculated for QSE *q* for the peak-Load 15-minute Settlement Interval in the month. See Section 6.6.2.2, QSE Load Ratio Share for a 15-Minute Settlement Interval.
q	none	A QSE.
a	none	A CRR Auction.

[NPRR1030: Replace paragraph (6) above with the following upon system implementation:]

(6) The net CRR Auction revenue produced from CRRs cleared and paid for in each CRR Auction that do not source from a Settlement Point within a 2003 ERCOT CMZ and sink at a Settlement Point located within the same 2003 ERCOT CMZ shall be distributed on an ERCOT-wide ratio share basis. The portion of the net monthly CRR Auction Revenue Amount (from CRRs with paths that cross the 2003 ERCOT CMZ boundaries) to be distributed for a given month is calculated as follows:

$$\mathbf{LACMRNZAMT}_q = \mathbf{(-1) * (CMRNZDC}_q \mathbf{+ CMRNZNDC}_q\mathbf{)}$$

Where:

$$CMRNZNDC_q = (\sum_a (CRRNZREV_a + PCRRNZREV_a) - \sum_q CMRNZDC_q) * MLRS_q$$

$$CMRNZDC_q = \sum_a (CRRNZREV_a + PCRRNZREV_a) * DCMLRS_q$$

The above variables are defined as follows:

Variable	Unit	Definition
LACMRNZAMT $_q$	$	*Load-Allocated CRR Monthly Revenue Non-Zonal Amount per QSE*—The sum payment to QSE *q* representing Loads and DC Tie exports of the revenues resulted from the CRRs that source and sink in different CMZs, for the month.
CMRNZDC $_q$	$	*CRR Monthly Revenue Non-Zonal Amount for DC Tie Exports per QSE*—The amount due to QSE *q* representing DC Tie ~~E~~exports ~~(excluding Oklaunion)~~ of the revenues resulted from the CRRs that source and sink in different CMZs, for the month.
CMRNZNDC $_q$	$	*CRR Monthly Revenue Non-Zonal Amount for Non-DC Tie Loads per QSE*—The amount due to QSE *q* representing Loads (excluding DC Tie exports) of the revenues resulted from the CRRs that source and sink in different CMZs, for the month.

CRRNZREV $_a$	$	*CRR Zonal Revenue per CRR Auction*—The revenue resulted from the CRRs that source and sink in different CMZs, cleared through CRR Auction Offers and CRR Auction Bids in CRR Auction *a*, for the month.
PCRRNZREV $_a$	$	*PCRR Zonal Revenue per CRR Auction*—The revenue resulted from the PCRRs that source and sink in different CMZs, pertaining to CRR Auction *a*, for the month.
DCMLRS $_q$	none	*DC Tie Monthly Load Ratio Share per QSE*—The ratio share calculated for QSE *q* with DC Tie Eexports ~~(excluding Oklaunion)~~ for the calendar month. See Section 6.6.2.6, QSE DC Tie Export Load Ratio Share for a Month.
MLRS $_q$	none	*Monthly Load Ratio Share per QSE* —The ratio share of Loads excluding DC Tie exports for QSE *q* for the peak Load 15-minute Settlement Interval.
q	none	A QSE.
a	none	A CRR Auction.

7.9 CRR Settlements

7.9.3 CRR Balancing Account

7.9.3.5 CRR Balancing Account Closure

(1) After the calculation of refunds described in Section 7.9.3.4, Monthly Refunds to Short-Paid CRR Owners, any CRR Balancing Account and CRR Auction PTP Option Award Charge Total in excess of the refunds described in Section 7.9.3.4 will first be used to fund the CRR Balancing Account Fund if the prior month's CRR Balancing Account Fund Balance is less than the CRR Balancing Account Fund Cap. Any surplus that remains from the CRR Balancing Account and CRR Auction PTP Option Award Charge Total above the CRR Balancing Account Fund cap is paid to the QSEs representing Load Serving Entities (LSEs) based on a monthly Load Ratio Share (LRS). The monthly LRS is the 15-minute LRS calculated for the peak-Load Settlement Interval during the month. The CRR Balancing Account Fund Cap is $10 million.

[NPRR1030: Replace paragraph (1) above with the following upon system implementation:]

(1) After the calculation of refunds described in Section 7.9.3.4, Monthly Refunds to Short-Paid CRR Owners, any CRR Balancing Account and CRR Auction PTP Option Award Charge Total in excess of the refunds described in Section 7.9.3.4 will first be used to fund the CRR Balancing Account Fund if the prior month's CRR Balancing Account Fund Balance is less than the CRR Balancing Account Fund Cap. Any surplus that remains from the CRR Balancing Account and CRR Auction PTP Option Award Charge Total above the CRR Balancing Account Fund cap is paid to the QSEs representing Load Serving Entities (LSEs) based on the QSEs ratio shares. The CRR Balancing Account Fund Cap is $10 million.

(2) The credit to each QSE representing LSEs for a given month is calculated as follows:

$LACRRAMT_q$ = (-1) * Max ((CRRBACRTOT + CRRFEETOT + CRRRAMTTOT) - (FUNDCAP- CRRBAFBBAL),0) * $MLRS_q$

Where:

$CRRRAMTTOT = \sum_o CRRRAMT_o$

The above variables are defined as follows:

Variable	Unit	Definition
$LACRRAMT_q$	$	*Load-Allocated CRR Amount per QSE*—The allocated surplus from the CRR Balancing Account and CRR Auction PTP Option Award Charge Total at the end of the month to QSE *q*, based on LRS for the month.
CRRBAFBBAL	$	*CRR Balancing Account Fund Beginning Balance*—The amount in the CRR Balancing Account Fund at the end of the previous month.
FUNDCAP	$	*CRR Balancing Account Fund Cap*—The threshold amount in the CRR Balancing Account Fund above which funds are available to allocate to QSEs representing Load.
CRRBACRTOT	$	*CRR Balancing Account Credit Total*—The total credit accumulated in the CRR Balancing Account during the month. See its calculation in Section 7.9.3.4.
CRRFEETOT	$	*CRR Auction PTP Option Award Charge Total*—The sum of the PTP Option Award Charges to all CRR Account Holders in single-month or multi-month CRR Auctions for the month.
CRRRAMTTOT	$	*CRR Refund Amount Total*—The total refund to all the previously short-paid CRR Owners at the end of the month.
$CRRRAMT_o$	$	*CRR Refund Amount per owner*—The refund credited to the CRR Owner *o* at the end of the month.
$MLRS_q$	none	*Monthly Load Ratio Share per QSE*—The LRS calculated for QSE *q* for the 15-minute monthly peak-load Settlement Interval. See Section 6.6.2.2, QSE Load Ratio Share for a 15-Minute Settlement Interval, for the calculation of LRS for a 15-minute Settlement Interval.
m	none	A month.
q	none	A QSE.
o	none	A CRR Owner.

[NPRR1030 and NPRR1054: Replace applicable portions of paragraph (2) above with the following upon system implementation:]

(2) The credit to each QSE representing LSEs for a given month is calculated as follows:

$LACRRAMT_q$ = (-1) * ($CRRDC_q$ + $CRRNDC_q$)

Where:

$CRRNDC_q = (CRRALLOCTOT - \sum_q CRRDC_q) * MLRS_q$

$$CRRDC_q = CRRALLOCTOT * DCMLRS_q$$

$$CRRALLOCTOT = Max((CRRBACRTOT + CRRFEETOT + CRRRAMTTOT) - (FUNDCAP - CRRBAFBBAL), 0)$$

$$CRRRAMTTOT = \sum_o CRRRAMT_o$$

The above variables are defined as follows:

Variable	Unit	Definition
$LACRRAMT_q$	$	*Load-Allocated CRR Amount per QSE*—The allocated surplus from the CRR Balancing Account and CRR Auction PTP Option Award Charge Total at the end of the month to QSE *q* with Loads and Direct Current Tie (DC Tie) exports.
$CRRDC_q$	$	*CRR Amount for DC Tie Exports per QSE*—The allocated surplus from the CRR Balancing Account and CRR Auction PTP Option Award Charge Total at the end of the month to QSE *q* for DC Tie Exports ~~(excluding Oklaunion),~~ based on DC Tie ratio shares for the month.
$CRRNDC_q$	$	*CRR Amount for Non-DC Tie Loads per QSE*—The allocated surplus from the CRR Balancing Account and CRR Auction PTP Option Award Charge Total at the end of the month to QSE *q* for Load (excluding DC Tie exports), based on ratio share for the peak Load 15-minute Settlement Interval for the month.
CRRBAFBBAL	$	*CRR Balancing Account Fund Beginning Balance*—The amount in the CRR Balancing Account Fund at the end of the previous month.
FUNDCAP	$	*CRR Balancing Account Fund Cap*—The threshold amount in the CRR Balancing Account Fund above which funds are available to allocate to QSEs representing Load.
CRRBACRTOT	$	*CRR Balancing Account Credit Total*—The total credit accumulated in the CRR Balancing Account during the month. See its calculation in Section 7.9.3.4.
CRRFEETOT	$	*CRR Auction PTP Option Award Charge Total*—The sum of the PTP Option Award Charges to all CRR Account Holders in single-month or multi-month CRR Auctions for the month.
CRRALLOCTOT	$	*CRR Allocation Amount Total* – The surplus from the CRR Balancing Account and CRR Auction PTP Option Award Charge Total at the end of the month.
CRRRAMTTOT	$	*CRR Refund Amount Total*—The total refund to all the previously short-paid CRR Owners at the end of the month.
$CRRRAMT_o$	$	*CRR Refund Amount per owner*—The refund credited to the CRR Owner *o* at the end of the month.
$DCMLRS_q$	none	*DC Tie Monthly Load Ratio Share per QSE*—The ratio share calculated for QSE *q* with DC Tie exports ~~(excluding Oklaunion)~~ for the calendar month. See Section 6.6.2.6, QSE DC Tie Export Load Ratio Share for a Month.
$MLRS_q$	none	*Monthly Load Ratio Share per QSE* — The ratio share of Loads excluding DC Tie exports for QSE *q*, for the peak Load 15-minute Settlement Interval in the month.
q	none	A QSE.
o	none	A CRR Owner.

ERCOT Nodal Protocols

Section 11: Data Acquisition and Aggregation

March~~January~~ 1, 2021

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11 DATA ACQUISITION AND AGGREGATION

11.4 Load Data Aggregation

11.4.6 Unaccounted for Energy Calculation and Allocation

11.4.6.1 Calculation of ERCOT-Wide Unaccounted For Energy

(1) The DAS will calculate ERCOT-wide UFE as the difference between the total ERCOT generation and the total Load, adjusted for losses in ERCOT during each Settlement Interval. UFE may be positive or negative in any single Settlement Interval.

$$\mathbf{UFE}_{i}\ \mathbf{(MWh)} = \mathbf{ERCOT\ Generation}_{i\ Total} - \mathbf{ERCOT\ Net\ Loss\ Adjusted\ Load}_{i\ Total}$$

The above variables are defined as follows:

Variable	Unit	Description
UFE_i	MWh	Total ERCOT system UFE per interval.
$ERCOT\ Generation_{i\ Total}$	MWh	Total ERCOT internal generation plus sum of approved ERCOT DC Tie imports.
$ERCOT\ Net\ Loss\ Adjusted\ Load_{i\ Total}$	MWh	Total ERCOT load plus Block Load Transfer (BLT) exports plus sum of approved DC Tie exports, adjusted for distribution and transmission losses. Exports associated with Oklaunion exempt QSEs do not receive distribution or transmission losses. ***[NPRR1054: Replace the description above with the following upon system implementation:]*** Total ERCOT load plus Block Load Transfer (BLT) exports plus sum of approved DC Tie exports, adjusted for distribution and transmission losses.
i		Interval

ERCOT Nodal Protocols

Section 23

Form E: Notice of Change of Information

March 1~~June 10~~, 202~~1~~0

NOTICE OF CHANGE OF INFORMATION

A Market Participant must update, amend and/or correct the registration information previously submitted to ERCOT using this Notice of Change of Information (NCI). The Market Participant must notify ERCOT of any change to the information or additional information on any application or form that it has previously submitted to ERCOT according to the notification timeframe in the ERCOT Protocols or, if the Protocols do not contain a timeframe for the subject matters, at least 30 days before the change will take effect. Please fill out this form electronically, print and execute. Submit all changes and/or additional information by one of the following methods: 1) Market Information System (MIS); 2) email to MPRegistration@ercot.com; 3) facsimile to (512) 225-7079; or 4) regular mail to Market Participant Registration, 7620 Metro Center Drive, Austin, Texas 78744.

Except as otherwise required by the ERCOT Protocols, ERCOT will send a written acknowledgement of receipt of the changes within five Business Days of receipt and will notify Market Participant of any deficiencies or any additional documentation required within 10 days of receipt. The notice of receipt will be sent to the email address of the Authorized Representative on file with ERCOT or the address specified in the NCI received by ERCOT.

The following contacts/information can be changed via the submittal of this NCI:

- **Authorized Representative ("AR")** – Responsible for updating all registration information, and will be the contact person between the Market Participant and ERCOT for all business matters requiring authorization by ERCOT. *(All Market Participant Types)*

- **Backup AR** – May perform the functions of the AR in the event the AR is unavailable. *(All Market Participant Types)*

- **User Security Administrator (USA)** – Responsible for managing the Market Participant's access to ERCOT's computer systems through Digital Certificates. *(All Market Participant Types)*

- **Backup USA** – May perform the functions of the USA in the event the USA is unavailable. *(All Market Participant Types)*

- **Cybersecurity** – Responsible for communicating Cybersecurity Incidents.

- **24x7 Control or Operations Center (24x7)** – Responsible for operational communications. Shall have sufficient authority to commit and bind the entity. The Market Participant must provide a 24x7 phone number for the operations desk in a manner that reasonably assures continuous communication with ERCOT and is not affected by private branch exchange (PBX) features such as automatic transfer or roll to voice mail. *(Qualified Scheduling Entities (QSEs), sub-QSEs, Transmission Service Providers (TSPs))*

- **Compliance** – Responsible for compliance related issues. *(QSEs, Sub-QSEs, Resource Entities ("REs"), TSPs, Distribution Service Providers (DSPs))*

- ~~**Resource Outage Submittal ("ROSC")** – Responsible for coordinating and submitting Resource Outages to ERCOT. *(REs)*~~

- **Accounts Payable ("AP")** – Responsible for settlements and billing. *(Congestion Revenue Right (CRR) Account Holders (CRRAHs), QSEs, Sub-QSEs)*

- **Backup AP** – May perform the functions of the AP in the event the AP is unavailable. *(CRRAHs, QSEs, Sub-QSEs)*

- **Credit** – Responsible for all credit-related matters. *(Counter-Parties (CPs))*

- **Backup Credit** – May perform the functions of the Credit in the event the Credit is unavailable. *(CPs)*

- **Transition/Acquisition ("TA")** – Requirement for Competitive Retailers (CRs) and Transmission and/or Distribution Service Providers (TDSPs). Responsible for coordinating Mass TA events between ERCOT, TDSPs and CRs. The CR may be a Provider of Last Resort (POLR), Designated CR, Gaining CR or Losing CR. Includes TA Business ("TAB"), TA Regulatory ("TAR") and TA Technical ("TAT"). List one contact per TA. *(Load Serving Entities (LSEs), TSPs, DSPs)*

- **Legal Address Change** *(All Market Participant Types)*

Received:

*Market Participant Account Name(s):	
*Data Universal Numbering System (DUNS) Number(s):	
*Market Participant Type(s):	☐ CP ☐ CRRAH ☐ Independent Market Information System Registered Entity (IMRE) ☐ LSE ☐ QSE/Sub-QSE ☐ RE ☐ TSP and/or DSP

Comments (if necessary): _____

*AR, Backup AR or Officer:	
*Signature:	
*Email:	
*Phone Number:	

1. Contact type(s): ☐ AR ☐ Backup AR ☐ USA ☐ Backup USA ☐ Cybersecurity ☐ 24x7 ☐ Compliance ☐ ~~ROSC~~ ☐ AP ☐ Backup AP ☐ Credit ☐ Backup Credit ☐ TAB ☐ TAR ☐ TAT

Name:		Title:			
Address:					
City:		State:		Zip:	
Telephone:		Fax:			
Email Address:					

If former contact(s) is/are no longer with the Market Participant please list name(s) here: _____

Contact type(s): ☐ AR ☐ Backup AR ☐ USA ☐ Backup USA ☐ Cybersecurity ☐ 24x7 ☐ Compliance ☐ ~~ROSC~~ ☐ AP ☐ Backup AP ☐ Credit ☐ Backup Credit ☐ TAB ☐ TAR ☐ TAT

Name:		Title:			
Address:					
City:		State:		Zip:	
Telephone:		Fax:			
Email Address:					

If former contact(s) is/are no longer with the Market Participant please list name(s) here: _____

Contact type(s): ☐ AR ☐ Backup AR ☐ USA ☐ Backup USA ☐ Cybersecurity ☐ 24x7 ☐ Compliance ☐ ~~ROSC~~ ☐ AP ☐ Backup AP ☐ Credit ☐ Backup Credit ☐ TAB ☐ TAR ☐ TAT

Name:		Title:			
Address:					
City:		State:		Zip:	

Telephone:		Fax:	
Email Address:			

If former contact(s) is/are no longer with the Market Participant please list name(s) here: _____

Contact type(s): ☐ AR ☐ Backup AR ☐ USA ☐ Backup USA ☐ Cybersecurity ☐ 24x7 ☐ Compliance ☐ ~~ROSC~~ ☐ AP ☐ Backup AP ☐ Credit ☐ Backup Credit ☐ TAB ☐ TAR ☐ TAT

Name:		Title:	
Address:			
City:		State:	Zip:
Telephone:		Fax:	
Email Address:			

If former contact(s) is/are no longer with the Market Participant please list name(s) here: _____

Contact type(s): ☐ AR ☐ Backup AR ☐ USA ☐ Backup USA ☐ Cybersecurity ☐ 24x7 ☐ Compliance ☐ ~~ROSC~~ ☐ AP ☐ Backup AP ☐ Credit ☐ Backup Credit ☐ TAB ☐ TAR ☐ TAT

Name:		Title:	
Address:			
City:		State:	Zip:
Telephone:		Fax:	
Email Address:			

If former contact(s) is/are no longer with the Market Participant please list name(s) here: _____

Contact type(s): ☐ AR ☐ Backup AR ☐ USA ☐ Backup USA ☐ Cybersecurity ☐ 24x7 ☐ Compliance ☐ ~~ROSC~~ ☐ AP ☐ Backup AP ☐ Credit ☐ Backup Credit ☐ TAB ☐ TAR ☐ TAT

Name:		Title:	
Address:			
City:		State:	Zip:
Telephone:		Fax:	
Email Address:			

If former contact(s) is/are no longer with the Market Participant please list name(s) here: _____

Contact type(s): ☐ AR ☐ Backup AR ☐ USA ☐ Backup USA ☐ Cybersecurity ☐ 24x7 ☐ Compliance ☐ ~~ROSC~~ ☐ AP ☐ Backup AP ☐ Credit ☐ Backup Credit ☐ TAB ☐ TAR ☐ TAT

Name:		Title:	
Address:			
City:		State:	Zip:
Telephone:		Fax:	
Email Address:			

If former contact(s) is/are no longer with the Market Participant please list name(s) here: _____

2. Legal Address Change

Address:
City, State, Zip:

3. Cancelation of User Security Administrator (USA) and Digital Certificate Opt-Out

☐ By checking this box, Market Participant elects to: (i) cancel its USA and Digital Certificate Opt-Out; (ii) designate a USA and optionally a Backup USA, listed in Section 1, Contact type(s), of this NCI form; and (iii) receive Digital Certificates as required by Section 16.12, User Security Administrator and Digital Certificates. Market Participant understands that designation of a USA and Backup USA, and issuance of Digital Certificates, is subject to the requirements in Section 16.12.