6.8.2.2 Capacity and Minimum Energy Payments

(1) OOMC Service may be used by ERCOT as a procured Replacement Reserve Resource in the Adjustment Period where necessary to meet next-day reliability needs. All Generation Resources that are available and plan to be off-line during the interval for which Ancillary Services are being procured are eligible to be selected to provide OOMC Service. ERCOT shall not issue an OOME Up Dispatch Instruction for the energy associated with the Low Sustainable Limit as set forth in the Resource Plan (as required by Section 4.4.15, QSE Resource Plans) for which it has issued an OOMC Dispatch Instruction. Zonal OOME Service will only be provided from Resources that are already On-line at the time of the Zonal OOME Dispatch Instruction and will not receive a capacity payment.

(2) The QSE for a Generation Resource selected to provide OOMC Service that actually reconnects to the ERCOT Transmission Grid and starts the unit in order to provide the OOMC Service will be paid both the Resource Category Generic Startup Cost for starting the unit as well as the Resource Category Generic Minimum Energy Cost less the MCPE for operating at the Low Sustainable Limit as set forth in the Resource Plan for that unit during the instructed interval(s).

(3) If the Generation Resource remains On-line beyond the time period specified by the OOMC Dispatch Instruction, there shall be a charge against the Resource Category Generic Startup Cost. This charge will only be applied if the MCPE is greater than the Resource Category Generic Fuel Cost for an upward instruction. If the difference is positive and the Resource Category Generic Startup Cost due is greater than zero, it will be subtracted from the payment for Resource Category Generic Startup Cost for starting the unit. This charge shall continue to be calculated for all intervals, except for the first three hours after the end of the OOMC Dispatch Instruction, until:

(a) the unit is disconnected from the ERCOT Transmission Grid;

(b) the end of the Operating Day; or

(c) the next Resource-specific deployment for the unit within the Operating Day, whichever comes first.

(4) Generation Resources that are connected to the ERCOT Transmission Grid when their QSE is instructed to provide OOMC Service will be paid the Resource Category Generic Minimum Energy Cost less the MCPE for operating at the Low Sustainable Limit of the Resource during the instructed interval(s).

When the Resource-specific OOMC instruction is issued, the QSE may maintain a Balanced Schedule, such as scheduling the ramping and minimum energy or being

Deleted: 6.8.1.10 Zonal or System Wide Replacement Reserve Service Capacity Payment to QSE¶
A QSE whose unit bid to provide RPRS to ERCOT is accepted in ERCOT's Ancillary Service procurement process shall be paid for services in the amount (in MW) of RPRS capacity accepted by ERCOT, multiplied by the maximum of the bid price or the highest MCPC of that interval per zone of all the RPRS procurement processes for a single Operating Hour, excluding any RPRS procured to resolve Local Congestion and is paid as follows:¶
PC_{RPqi} = SUM (PC_{RPqiuz})$_{uz}$¶
Given:¶
PC_{RPqiuz} = -1 * Max($PABC_{RPiu}$, $MCPC_{RPiz}$)* ZC_{RPquz}¶
$PABC_{RPiu}$ = CBP_{RPiu}/N + $HOBP_{RPiu}$¶
Where:¶
i interval being calculated¶
z zone¶
u single Resource¶
N Number of hours that this Resource is continuously procured¶
CBP_{RPiu} Capacity bid price submitted by the QSE for the single Resource¶
$HOBP_{RPiu}$ Hourly operational bid price submitted by the QSE for the single Resource¶
$MCPC_{RPiz}$ Highest Replacement Reserve Service Market Clearing Price of all procurement processes of Capacity ($/MW) per interval per zone, excluding any RPRS procured to resolve Local Congestion¶
$PABC_{RPiu}$ Bid Price of the single Resource awarded Replacement Reserve in that interval¶
PC_{RPqiuz} Replacement Reserve Service Payments ($) by Resource per in... [10]

Deleted: 6.8.1.11 Local Congestion Replacement Reserve Payment to QSE¶
(1) The QSE for a Resource selected to provide RPRS to resolve Local Congestion that actually reconnects to the ERCOT Transmission Grid and starts the unit in order to provide RPRS will be paid both the Resource Category Generic Startup Cost for starting the unit and the Resource Category Generic Minimum Energy Cost less the MCPE for operating at the Low Sustainable Limit (LSL) as set forth in the Resource Plan for that unit during the instructed interval(s). If the MCPE during the intervals of an hour in which ERCOT deploys a Resource for RPRS provides revenue in excess of the hourly cost to start and operate the unit at LSL, the QSE representing the Resource may retain any such excess revenue.¶
(2) Resources that are connected to the ERCOT Transmission Grid whe... [11]

Deleted: support emergency operations and provide voltage support, stability, or to manage localized transmission limitations

selected by ERCOT to provide Balancing Energy Service. When a QSE receives an OOMC Dispatch Instruction less than thirty minutes before the end of the Adjustment Period or during the Operating Period, the deviation resulting from ramping or minimum energy of a Resource selected to provide OOMC Service will not be subject to Uninstructed Resource Charge during the instructed interval(s), including the ramp interval(s) of such Resource.

(5) If ERCOT sends a QSE a Resource-specific Dispatch Instruction for OOMC Service ("OOMC Instruction") and the payment for OOMC Service does not cover all costs of providing the OOMC Service plus a ten percent (10%) premium, then that QSE may submit verifiable, additional costs directly attributable to the OOMC Dispatch Instruction, which exceed the payment for OOMC Service calculated pursuant to Section 6.8.2.2 (6). The QSE will be paid only for additional costs directly attributable to the OOMC Service, plus the premium. Verifiable costs are subject to the approved documentation requirements in Section 6.8.2.2(5)(b). The premium to be provided shall be the product of the costs of providing the service times ten percent (10%). Verification of these costs must be submitted to ERCOT by the QSE or the Resource to allow resolution by the end of the dispute process for Settlement True-Up as defined in Section 9.2.6, True-Up Statement. QSEs requesting cost based recovery shall perform the following:

(a) After receiving the Initial Statement for the subject Operating Day, submit a settlement dispute in accordance with the dispute process outlined in Section 9.5, Settlement and Billing Dispute Process. In addition to the standard information required on the dispute form on the ERCOT Portal, the dispute should clearly indicate:

(i) The Dispatch Instruction received from ERCOT to provide the OOMC Services;

(ii) The payment received for providing the OOMC Service;

(iii) The actual cost of providing the OOMC Service; and

(iv) A reference to the documentation to be provided in writing as indicated in Section 6.8.2.2(5)(b).

(b) Provide documentation to allow ERCOT to verify the claimed amounts. All documentation submitted to ERCOT for verification pursuant to this Section 6.8.2.2(5)(b) shall be considered Protected Information in accordance with Section 1.3.1.1, Items Considered Protected Information. ERCOT shall not make payments for verifiable costs outside the defined documentation requirements until after the QSE has followed the steps outlined in Section 6.8.2.2(5)(c) and the ERCOT Board has approved the documentation requirements. Fuel costs, including transportation and storage costs directly related to this OOMC event for use in calculating the costs in Section 6.8.2.2(5)(b) (i), (iii) and (v), will require supporting documentation of sufficient detail to allow for the verification of the

cost of fuel consumed by the Resource receiving the OOMC Instruction. Documentation may include contracts, invoices or other documents. For gas fired Resources, such documentation will not be required if the requested incremental fuel cost is less than one hundred ten percent (110%) of the Fuel Index Price.

Defined Documentation Requirements

(i) Startup Fuel Cost which is the fuel cost for bringing the unit online and up to its LSL and ready to go to full load or the beginning of the OOMC period, whichever occurs first, to provide the OOMC Service shall be determined by multiplying the fuel consumption (MMBtu) to start up the Resource by the associated fuel cost ($/MMBtu).

(ii) Startup Non-Fuel Cost which shall be based on either A or B below:

(A) Documented historical non-fuel startup costs expressed on a per unit start basis for the deployed Resource. If the historical Non-Fuel Startup costs are more than one hundred percent (100%) of the Resource Category Non-Fuel Startup Costs (RCNFSC), the QSE shall provide documentation for such costs. Non-fuel start-up costs are limited to the costs associated with water, chemicals, labor, emission allowances and start-up power used in the start-up of the Resource. Supporting documentation shall include an itemized list in sufficient detail to allow for the verification of each cost incurred due to the OOMC Service.

(B) Generic Resource Category Non-Fuel Startup Costs (RCNFSC) as defined in Section 6.8.2.2(5)(b)(ii)(B). If the QSE chooses to use RCNFSC, all subsequent requests for non-fuel startup cost-based recovery requested by the QSE for the remainder of the calendar year for the specific deployed Resource shall be based on the RCNFSC.

Resource Category Non-Fuel Startup Costs (RCNFSC)

For the purpose of documentation, the RCNFSC represents the startup cost (excluding fuel) of capacity used for Replacement Reserve Service. The RCNFSC for each type of Resource shall be:

Combined Cycle greater than 90 MW** = $6,810
Combined Cycle less than or equal to 90 MW** = $5,310
Gas-Steam Supercritical Boiler = $4,800
Gas-Steam Reheat Boiler = $3,000
Gas-Steam Non-reheat or boiler without air-preheater = $2,310
Simple Cycle greater than 90 MW = $5,000
Simple Cycle less than or equal to 90 MW = $2,300

Renewable = $0

** Determined by capacity of largest simple-cycle combustion turbine in the train

(iii) Operational Fuel Cost, which shall be determined by multiplying the fuel consumption (MMBtu) at the Low Sustainable Limit of the Resource by its associated fuel cost ($/MMBtu) for the intervals covered by the OOMC Instruction. Fuel consumption at the Low Sustainable Limit shall be based upon a heat rate curve for the Resource from the most recently conducted heat rate tests filed with ERCOT. Test data shall be provided in sufficient detail to allow ERCOT to validate the heat rate curve provided.

(iv) Variable non-fuel maintenance cost (in dollars per MWh) for a specific deployed Resource, which shall be calculated based on: actual itemized variable maintenance costs contained in contracts with a third party or the manufacturer's recommended maintenance schedule and associated costs. Supporting documentation will be the corresponding excerpt of the appropriate contract from the third party or the maintenance schedule.

(v) Fuel cost for bringing the unit offline from LSL as soon as possible (not to exceed three (3) hours) after the end of the OOMC period, in a manner consistent with Good Utility Practices, shall be determined by multiplying the fuel consumption (MMBtu) to bring the Resource offline by the associated fuel cost ($/MMBtu) minus the MCPE multiplied by the actual generation for shut down. Fuel quantity will be based on the Real-Time metering of the fuel consumption for the Resource.

(vi) Unavoidable costs directly resulting from a delay in an accepted Outage for a Generating Resource due to an OOMC instruction. Supporting documentation shall include an itemized list in sufficient detail to allow for the verification of each cost incurred due to the Outage delay. Further documentation supporting each line item must be provided upon ERCOT's request and may include copies of contracts, vendor invoices or other documents.

(c) Compensation for types of cost, whose documentation requirements are not covered in Sections 6.8.2.2(5)(b)(i) through 6.8.2.2(5)(b)(vi) for the deployed Resource, will be denied pending possible review by the ERCOT Board of Directors. The requesting QSE may request approval of the documentation requirements by the Board, and if requested will be considered by the Board at its next regularly scheduled meeting for which proper notice may be posted following ERCOT's receipt of the request. The requesting party may request that this review be conducted at an Executive Session of the ERCOT Board of Directors. Requests must be presented in person by a representative of the company submitting the request and must also include language suitable to be included in the Protocols to define the documentation requirements for future

requests of a similar nature. Subsequent to the approval of such costs, the requesting company shall submit a Protocol Revision Request, in accordance with Section 21, Process for Protocol Revision, incorporating the necessary documentation standards provided to the ERCOT Board. Once approved by the ERCOT Board, ERCOT will process the request for payments as described in Section 9.2.5, Resettlement Statement.

(d) Submit a signature sheet signed by the authorized representative of the Resource Entity certifying the costs submitted are directly attributable to the OOMC deployment and which satisfies the documentation standards in Section 6.8.2.2(5)(b).

(6) The calculation for capacity payments and minimum energy of Out of Merit Service is as follows:

$$\mathbf{PC_{OOMRPqi}} = \mathbf{SUM\ (PC_{OOMRPqui})_u}$$

If BP_{RPqui} exists,

Then:

$$PC_{OOMRPqui} = -1 * MIN\ [(BP_{RPqui} * C_{OOMRPui}),\ (PS_{ui} + PO_{ui})]$$

Else:

$$PC_{OOMRPqui} = -1 * (PS_{ui} + PO_{ui})$$

If the unit is deemed to be On-line as described in 6.8.2.2(4),

Then:

$$PS_{ui} = 0$$

$$PO_{ui} = SUM\ [(RCGMEC_c - MCPE_{jz}) * MIN\ (MINCAP_u/4,\ MR_{uj})]_j$$

If the unit is deemed to be Off-line as described in 6.8.2.2(2),

Then:

$$PS_{ui} = [RCGSC_c - (SUM_s(MCPE_{wz} * MR_{uw}))] / (\#\ of\ instructed\ hours)$$

$$PO_{ui} = SUM\ [(RCGMEC_c - MCPE_{jz}) * MIN\ (MINCAP_u/4,\ MR_{uj})]_j$$

If the unit is not a Nuclear, Hydro, Coal or Lignite unit and continues to remain On-line after the instructed intervals as described in 6.8.2.2(3),

Then:

CRCGSC = $SUM_a [(MCPE_{az} - RCGFC_c) * MR_{ua}]$

If CRCGSC > 0 and $[RCGSC_c - SUM_s(MCPE_{wz} * MR_{uw})] > 0$

Then:

PS_{ui} = $Max(0, \{RCGSC_c - SUM_s(MCPE_{wz} * MR_{uw})\text{-}CRCGSC\} / (\#$ of instructed hours))

PO_{ui} = $SUM [(RCGMEC_c - MCPE_{jz}) * MIN (MINCAP_u/4, MR_{uj})]_j$

If CRCGSC = 0

Then:

PS_{ui} = $\{[RCGSC_c - (SUM_s(MCPE_{wz} * MR_{uw}))] / (\#$ of instructed hours)$\}$

PO_{ui} = $SUM [(RCGMEC_c - MCPE_{jz}) * MIN (MINCAP_u/4, MR_{uj})]_j$

The equation below will be used to determine the Total OOM Capacity Payments to be allocated to each QSE as described in Section 6.9.7.1, OOM Capacity Charge.

PC_{OOMRPi} = $SUM (PC_{OOMRPqi})_q$

Where:

a	Settlement Intervals beginning three (3) hours after the end of an OOMC Dispatch Instruction and continuing until the unit goes Off-line, the end of the Operating Day, or the next Resource-specific deployment, whichever occurs first
c	Resource Category
i	hourly interval
j	Settlement Intervals within the hourly interval, i
q	QSE
s	The twelve (12) Settlement Intervals prior to the Dispatch Instruction
u	single Resource
w	Settlement Interval prior to the Dispatch Instruction
z	zone
BP_{RPqui}	Bid Price for Replacement Reserve ($/MW) of the unit per interval
$C_{OOMRPui}$	Out of Merit Replacement Reserve Capacity awarded capacity (MW) per single Resource per interval
CRCGSC	Charge against the Resource Category Generic Startup Cost due if the generation unit continues to run past a Dispatch Instruction.
$MCPE_{az}$	Market Clearing Price for Energy during a Settlement Interval between the end of a Dispatch Instruction and the unit going Off-line, the end of the Operating Day, or the next OOMC deployment, whichever occurs first
$MCPE_{jz}$	Market Clearing Price for Energy during a Settlement Interval within the hourly interval, i

$MCPE_{wz}$	Market Clearing Price for Energy for a Settlement Interval prior to the Dispatch Instruction
$MINCAP_u$	Generating unit Low Sustainable Limit as reported in the Resource Plan
MR_{ua}	Actual metered output of the Resource during a Settlement Interval between the end of a Dispatch Instruction and the unit going Off-line, the end of the Operating Day, or the next OOMC deployment, whichever occurs first
MR_{uj}	Actual metered output of the Resource during a Settlement Interval within the hourly interval, i
MR_{uw}	Actual metered output of the Resource for a Settlement Interval prior to the Dispatch Instruction
PC_{OOMRPi}	Summation of OOM Replacement Capacity Payment ($) per interval for all QSEs in the market
$PC_{OOMRPqi}$	Total OOM Replacement Reserve Capacity Payment ($) by interval for that QSE (All OOM single Resources added together for that QSE)
$PC_{OOMRPqui}$	OOM Replacement Reserve Capacity Payments by single Resource by interval for that QSE
PO_{ui}	Price for operating a unit that is selected Out of Merit Order to provide Balancing Energy.
PS_{ui}	Price for starting a unit that is selected Out of Merit Order to provide Balancing Energy.
$RCGFC_c$	Resource Category Generic Fuel Cost for a specific category for upward instructions.
$RCGMEC_C$	Resource Category Generic Minimum Energy Cost for a specific category of generation unit
$RCGSC_c$	Resource Category Generic Startup Cost for a specific category of generation unit

6.9.2.1 Settlement for Under Scheduled Capacity

The Settlement for Under Scheduled Capacity for each QSE is as follows:

6.9.2.1.1 Under Scheduled Capacity Charge

(1) The dollar amount charged to each QSE due to Under Scheduled Capacity for each Settlement Interval is the QSE's shortfall ratio share at 1600 in the Day Ahead multiplied by the total OOMC and RPRS payments for the Settlement Interval, subject to a cap. The cap on the charge to each QSE is two multiplied by the total RPRS and OOMC payments for all QSEs multiplied by that QSE's Under Schedule Capacity as measured at 1600 the day prior to the Operating Day, divided by the total capacity of RPRS and OOMC Resources procured during each Settlement Interval. For the Operating Hour, a QSE's maximum capacity insufficiency, is the sum of (a) and (b) where (a) and (b) are as follows:

Deleted: Procured for System-wide Capacity

Deleted: RPRS

Deleted: procured for system-wide capacity insufficiency,

Deleted: ,

Deleted: *Replacement Reserve*

Deleted: The product of the maximum MCPC of Replacement Reserve procured for the hour (where the MCPC evaluated across all RPRS markets executed for the hour), multiplied by the QSE's maximum capacity insufficiency evaluated across all zones for each hour. A QSE's capacity insufficiency amount includes the maximum mismatch amount, evaluated across all zones for the hour.

(a) The greater of zero (0) or the sum of the difference between a QSE's Adjusted Meter Load and the QSE's minimum scheduled Load in each Settlement Interval for the Operating Hour as measured at 1600 in the Day Ahead

(b) The maximum mismatch amount that results from either (i) a mismatch in the QSE's Schedule as defined in Section 4.7.2, Schedule Validation Process, or (ii) a QSE selecting ERCOT as a Resource, evaluated at 1600 in the Day Ahead.

- *[The intent is that this charge type will apply before and after the implementation of PRR 666 if the PRR 666 changes take longer to implement than the changes in this PRR. The following outlines the structure that would be applied to determine the settlement equations for the preceding paragraph; however, redlines to both the current Protocols and to PRR 666 are not provided at this time for the remaining portions of this subsection because Protocol language is not currently available with the current Protocol language and the gray-boxed PRR 666 language for this section]: Determine the short position of each QSE per the equations in the current Protocols and under PRR 666 at 1600 in the DA for each Settlement Interval*
- *Determine the short ratio share of each QSE of each QSE at 1600 in the DA for each Settlement Interval*
- *Determine the total payments to all QSEs for RPRS and OOMC for each Settlement Interval*
- *Determine the total capacity procured for RPRS and OOMC for each Settlement Interval*
- *Determine the RPRS and OOMC Charge Rate for each Settlement Interval by dividing the total payments to all QSEs for RPRS and OOMC by the total capacity procured for RPRS and OOMC for each Settlement Interval*
- *Determine the Under-Scheduled Capacity charge for each QSE for each Settlement Interval by multiplying each QSEs short ratio share by the total RPRS and OOMC Payments to all QSEs for each Settlement Interval, with a cap for each QSE that is equal to two times the RPRS and OOMC Charge rate multiplied by the short position for each QSE for each Settlement Interval*

6.9.2.1.2 Replacement Reserve Uplift Charge

The calculation for Replacement Reserve Uplift Charge will be as follows:

UC_{RPiq} = $-1 * (S\ (PC_{RPiq} + LPC_{RPiq})_q + S\ (US_{RPiq})$ + Where:

i: Interval being calculated
q: QSE
UC_{RPi}: Replacement Reserve Service and OOMC Uplift Charge ($)

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Deleted: over all applicable RPRS market snapshots for the hour
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Deleted: (1) Prior to direct assignment of Zonal Congestion costs, the QSE's Obligation for Replacement Reserve procured for CSC Congestion will be recovered as part of the System Congestion Fund described in Section 7.3.3.1, System Congestion Fund.¶
Deleted: (2)
Deleted: $TCRPAY_{RPi} + S\ (CSC_{RPiq})_{q,CSC} * LRS_{q¶}$ $TCRPAY_{RPi} = -1 * (S(TCRcsc_i) * SP_{CSCi})_{CSC¶}$
Deleted: z: CSC zone being settled¶

PC_{RPiQSE}	Service Cost ($) per interval for all QSEs of Procured Capacity of Replacement Reserve procured by OOMC
LPC_{RPiQSE}	Service Cost ($) per interval for all QSEs of Procured Capacity of Replacement Reserve per single Resource
US_{RPiQSE}	Replacement Reserve Service Under Scheduled Charge ($) per interval for all QSEs
LRS_{qi}	Load Ratio Share (Factor) (Adjusted Metered Load / Total System Load) per hourly interval of that QSE

Deleted: to resolve Zonal Congestion and Capacity Insufficiency per single Resource

Deleted: procured to resolve Local Congestion

Deleted: CSC_{RPiQSE} Replacement Reserve Service CSC Impact Capacity Charge ($) per interval for all QSEs¶

Deleted: $TCRPAY_{RPi}$ Payment to TCR Account Holders for RPRS market per hourly interval¶
$TCRcsc_i$ Total number of TCRs per CSC per hourly interval¶
SP_{CSCi} Shadow Price of RPRS per CSC per hourly interval¶

6.9.7 *Settlement Obligations for Premiums for Individual Resource Dispatch Payments*

Premiums paid for managing Local Congestion will be shared by the QSE's Load Ratio Share for the hours during which the premiums were paid.

Deleted: 6.9.7.1 OOM Capacity Charge¶
(1) The cost of Replacement Capacity that is not assigned in the mathematical optimization process will be shared by all QSEs in relation to their Load Ratio Share of the total ERCOT Load for the interval. The OOM Replacement Capacity Load Allocation will be calculated as follows:¶
$LA_{OOMRP_{qi}} = -1 * PC_{OOMRP_i} * LRS_{qi}$¶
Where:¶
i interval¶
u unit¶
z zone¶
$LA_{OOM_{qi}}$ OOM Replacement Capacity Load Allocation Charges ($) for that QSE in that interval¶
PC_{OOMRP_i} OOM Replacement Capacity Costs ($) for the total market for that interval¶
LRS_{qi} Load Ratio Share (0-1) = (Adjusted Metered Load for that QSE per interval/ Total System Load per interval)¶

7.1 Overview of ERCOT Congestion Management

ERCOT employs a Zonal Congestion management scheme that is flow-based, whereby the ERCOT Transmission Grid, including attached Generation Resources and Load, will be divided into a predetermined number of Congestion Zones. Each Congestion Zone is defined such that each Generation Resource or Load within the Congestion Zone boundaries has a similar effect on the loading (Shift Factor) of Transmission Facilities between Congestion Zones. For purposes of solving Zonal Congestion the Shift Factor will be assumed the same for: (i) all Generation Resources deemed likely to vary their output and (ii) Loads within a Congestion Zone. Therefore any imbalance between Loads and Generation Resources in a Congestion Zone will be deemed to have the same impact on a given loading between Congestion Zones.

This Congestion management scheme applies zonal Shift Factors, determined by ERCOT, to predict potential Congestion on CSCs under the known topology of the ERCOT System. The zonal Shift Factors determined by ERCOT should most closely represent the effect of Generation Resources deemed likely to vary their output and Loads in the Congestion Zone on the CSCs with the current topology of ERCOT System. This scheme is used in the Day Ahead and Adjustment Periods to evaluate potential Congestion and notify Market Participants accordingly. ERCOT also uses this scheme, along with other factors, to determine if it should procure Replacement Reserve Service in a Congestion Zone to provide additional Balancing Energy Service to solve expected Congestion. ERCOT will use monthly zonal Shift Factors to post and analyze the Schedule impact on CSCs until it implements calculations of interval Shift Factors in the system.

ERCOT will manage transmission Congestion and categorize the cost of Congestion management as either Zonal Congestion management costs or Local Congestion management Costs. Zonal Congestion management costs are those costs attributable to managing Congestion

on CSCs or predefined Closely Related Elements (CRE). The costs of managing Zonal Congestion will be directly assigned to QSEs based on the impact of each QSE's portfolio on CSCs. All other Congestion management costs are considered Local Congestion management costs.

ERCOT will use the Zonal Congestion management model with Shift Factors of Generation Resources and Loads on CSCs and zonal Balancing Energy Service MCPEs to determine the Shadow Prices of energy across corresponding CSCs.

The Local Congestion management scheme relies on a more detailed Operational Model to determine how each particular Resource or Load impacts the transmission system. This model does not use portfolios and uses the current known topology of the transmission system.

ERCOT will Uplift the cost incurred in real-time to solve Local Congestion pro rata to each QSE based on its Load Ratio Share.

ERCOT will manage Congestion by:

(1) Evaluating the levels of Zonal Congestion and any other Congestion during the Day Ahead, the Adjustment Period and the Operating Period using appropriate models of the ERCOT Transmission Grid;

(2) Examining the impacts of QSE energy schedules on CSCs;

(3) Posting on the MIS, the total megawatt quantity impacts on every CSC, and allowing QSEs to adjust schedules to mitigate potential Congestion on the CSCs;

(4) Procuring during the Adjustment Period, as needed, Replacement Reserve Service (RPRS) to use with other Resources for which QSEs have submitted Balancing Energy bids to provide sufficient capacity for Balancing Energy flows in the Operating Hour while respecting operational limits of the ERCOT Transmission Grid;

(5) Determining settlement for QSEs providing RPRS procured to manage Congestion; and

(6) Determining settlement for QSEs providing Balancing Energy associated with resolving Zonal Congestion.

ERCOT will carry out these steps in accordance with this Section and the Scheduling and Ancillary Service Scheduling and Selection requirements in Sections 4 and 6, respectively.

Deleted: In addition, ERCOT will directly assign to QSEs the costs of any Replacement Reserve Service procured on a zonal basis for Congestion management purposes. ERCOT will use these Shadow Prices in settlement to directly assign to QSEs the cost of managing Zonal Congestion to QSEs.

Deleted: 7.3.4.2 Replacement Reserve Service Zonal Congestion Charge¶
Replacement Reserve Zonal Congestion costs will be allocated directly to the QSE impacting the CSC. The Replacement Reserve Zonal Congestion costs per interval per QSE will be determined by multiplying the Shadow Price of CSC capacity by the QSE's CSC impact and in that interval.¶
The CSC impact is determined by taking for each Congestion Zone, the maximum difference, in any of the four intervals in an hour, between each QSE's Supply schedules and the QSE Obligation schedules at the time of each round of Replacement Reserve capacity procurement multiplied by the Zonal Shift Factor. The calculation of the Replacement Reserve Service Zonal Congestion Charge will be as follows:¶
$CSC_{RPRq} = SPC_{CSCi} * MAX(0, I_{CSCiq})$¶
$I_{CSCiq} = MAX[0, MAX[S((QSS_{TOPiqz} - QOS_{TOPiqz}) * SF_{zcsc})_z]_n]$¶
Where:¶
h hour being calculated¶
i interval within hour h¶
n The number of times that RPRS is procured.¶
q QSE¶
z Congestion Zone¶
CSC Commercially Significant Constraint¶
CSC_{RPRq} CSC Replacement Reserve related Congestion charge, per interval, per QSE¶
SPC_{CSCi} Capacity Shadow Price per CSC, per interval¶
I_{CSCiq} Scheduled MW Impact per CSC, per interval, at the time of purchase, per QSE¶
SF_{zcsc} Zonal Shift Factor per CSC, per zone¶
QSS_{TOPiqz} QSE Supply Schedule per interval, per zone, at the time of purchase, per QSE¶
QOS_{TOPiqz} QSE Obligation Schedule per interval, per zone, at the time of purchase, per QSE¶

7.4.2 Resolution of Local Congestion

ERCOT will procure RPRS if necessary to provide sufficient capacity to resolve forecasted Local Congestion. ERCOT will purchase RPRS from the Resource(s) having the lowest cost per megawatt based on each Resource's Resource Category Generic Cost and its ability to resolve the Congestion given its Shift Factor on the Local Congestion.

ERCOT will instruct and Dispatch Resources in Real Time in a manner that does not exceed the units' operational limits known to ERCOT. The Resources that have been instructed to operate within a range to resolve Local Congestion are paid or pay a price, in accordance with Sections 7.4.3.1 Balancing Energy Up from a Specific Resource, 7.4.3.2 Balancing Energy Down from a Specific Resource, and Section 6.8, Compensation for Services Provided.

The Local Congestion Costs are embedded in each service deployed to resolve Local Congestion such as OOMC, OOME, and unit specific premiums.

The formula to calculate Local Congestion Replacement Reserve payment can be found in Section 6.8.1.1, Local Congestion Replacement Reserve Payment to QSE, of these Protocols.

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7.5.1 Function of Transmission Congestion Rights

TCRs and PCRs function as financial hedges (similar to financial options with zero strike price) against the marginal costs to resolve Zonal Congestion. The total costs of Zonal Congestion is comprise the Balancing Energy Service costs associated with managing Zonal Congestion. The TCR and PCR holder will receive an amount equal to the directly assigned Congestion costs for an equivalent quantity of scheduled flow. TCRs are not deratable once they are sold in the auction(s), and allocated PCRs are not deratable.

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Deleted: those portions of RPRS costs and

Deleted: of

A TCR is a financial right on a specified directional CSC for a particular hour that entitles the holder of record to receive remuneration equal to the sum of non-negative BES Shadow Prices ($/MW/15-minute) over all 15-minute intervals within the hour for the corresponding CSC multiplied by 1 MW.

Deleted: and RPRS

7.5.5 TCR Settlement

To participate in ERCOT's TCR settlements, a TCR holder need not be a QSE nor be represented by a QSE, but must be registered as a TCR Account Holder with ERCOT and have the ability to make and accept electronic transfer of funds.

$$TCRUL_{nq} = -1 * \left(MAUCR_n + AAUCR * \frac{MEnergy_n}{\sum_{All\ Months} MEnergy_n} \right) * LSR_{nq}$$

Where:

n	Month
q	QSE
$TCRUL_{nq}$	TCR Auction Revenue Uplift per QSE per month
$MAUCR_n$	Monthly TCR Auction Revenue
$AAUCR_n$	Annual TCR Auction Revenue plus PCR revenues
$Menergy_n$	Monthly Energy Forecast
LSR_{nq}	QSE's Load Share Ratio in that month's peak interval

Congestion Credits, calculated as described below, will be determined based on the record of ownership in ERCOT's database, at the end of the day for which the TCRs are effective, for the relevant CSC, based on the published Shadow Price(s) for the same. The TCR holders will be paid Congestion Credits based on their TCR ownership the day after direct assigned Invoice payments are due in accordance with the Settlement Calendar in Section 9.

Deleted: + SPC_{CSCh}

$$TCRPAY_{hp} = -1 * S\ (TCR_{CSChp} + PCR_{CSChp}) * (S\ (SP_{CSCi}/4)_i))_{CSC}$$

h	Hour being calculated
i	Intervals within the hour
p	TCR owner of record
CSC	Commercially Significant Constraint
TCR_{CSChp}	Total number of TCRs owned per hour, per TCR owner of record
PCR_{CSChp}	Total number of PCRs owned per hour, per PCR owner of record
SP_{CSCi}	BES Shadow Price per CSC, per interval
$TCRPAY_{hp}$	TCR payment per hour, per TCR owner of record

Deleted: CSC_{RPRh} CSC Replacement Reserve related Congestion charge, per interval, per QSE¶

Deleted: SPC_{CSCh} RPRS Capacity Shadow Price per CSC, per hour¶

APPENDIX B

Board Action Report

PRR Number	674	PRR Title	Temporary Alteration of Settlement Equations Related to the RPRS Under-Scheduled Charge
Timeline (Normal or Urgent)	Urgent	Action	Approved
Protocol Section(s) Requiring Revision (include Section No. and Title)	6.9.2.1.1, Replacement Reserve Under Scheduled Capacity 6.9.2.1.2, Replacement Reserve Uplift Charge		
Effective Date	October 1, 2006, until the earlier of February 1, 2007 or the implementation of PRR676, RPRS Solution with Nodal RUC-Type Procurement and Cost Allocation.		
Revision Description	This PRR temporarily alters the settlement equations for the Replacement Reserve Service (RPRS) Under-Scheduled charge by uplifting the cost of RPRS on aLoad Ratio Share until issues relating to RPRS are corrected. No sunset date was offered in this PRR.		
Overall Market Benefit	This PRR allows additional time for the development of a permanent solution.		
Overall Market Impact	This PRR may incent Qualified Scheduling Entities (QSEs) to submit short schedules and thus impact RPRS procurement.		
Consumer Impact	None.		
Credit Impacts: Has the Credit Workgroup reviewed the PRR? If so, are there credit impacts? (indicate Yes or No, and if Yes, include a summary of impact)	TBD.		
Procedural History	➢ PRR674 was posted on 7/19/06, with a request for Urgent status. ➢ On 7/20/06, PRS rejected the request for Urgent status. ➢ On 7/24/06, City Public Service (CPS) Energy posted comments. ➢ On 8/2/06, PRS discussed this PRR. ➢ On 8/11/06, the RPRS Task Force (TF) discussed this PRR. ➢ On 8/17/06, PRS discussed and granted the request for Urgent status. ➢ On 8/17/06, Constellation NewEnergy (CNE) posted comments. ➢ On 8/25/06, the RPRS TF again discussed this PRR. ➢ On 8/31/06, PRS considered this PRR. ➢ On 8/31/06, CNE posted an appeal of the PRS decision. ➢ On 9/7/06, TAC considered the CNE appeal. ➢ On 9/7/06, CNE posted an appeal of the TAC decision. ➢ On 9/17/06, the ERCOT Board (Board) considered the CNE appeal and this PRR.		

Board Action Report

PRS Recommendation (indicate whether all segments were present for the vote, and the segment of parties that voted no or abstained)	On 8/31/06, PRS voted on the motion to reject PRR674. The motion passed by roll-call vote with 14 yeas from the Electric Cooperative (2), Municipally Owned Utility (4), Investor Owned Utility (IOU)(2), Independent Generator (IG)(2), Consumer (1), and Independent Power Marketer (IPM)(3) Market Segments; nine nays from the IG (3), the Consumer (4), and Independent REP (IREP)(2) Market Segments; and two abstentions from an Independent REP and an IPM. The tally was 4.525 for and 2.475 against the motion. All Market Segments were present for the vote.
Summary of PRS Discussion	On 8/31/06, PRS discussed making the PRR more acceptable by including competitive procurement and setting a sunset date. Participants also discussed that bigger contributors to the June 20 events have been addressed and noted that the RPRS procurement and costs are trending downward. Therefore, drastic measures are unwarranted and could do harm. Participants contended that PRR674 creates an incentive to be capacity short. Competitive procurement combined with uplift will discourage capacity from participating in the market, and this is potentially risky in an environment where capacity is increasingly tight. The sponsor of the PRR countered that the issue is not the amount of capacity being procured, but who pays for it and how much, and that these costs are not appropriately assigned. Therefore, the problem has not been resolved and PRR674 offers a short-term solution. The sponsor further noted that the current system causes forward prices to spike and depresses Real-Time prices. Participants responded that who pays is key to the functioning of the RPRS market – if the cost allocation is changed, market behavior will change and this will affect procurement. Participants stressed that resources are too constrained to allow for multiple changes to the RPRS system.
TAC Recommendation (indicate whether all segments were present for the vote, and the segment of parties that voted no or abstained)	On 9/7/06, TAC voted to waive notice for consideration of the CNE appeal. The motion passed unanimously with all Market Segments present. Then TAC voted on a motion to reject CNE's appeal of PRS' decision to reject PRR674. The motion passed with three nays from the IREP and Consumer (2) Market Segments and three abstentions the Consumer and IOU (2) Market Segments. All Market Segments were present for the vote.
Summary of TAC Discussion	On 9/7/06, CNE presented its appeal of the PRS decision to reject PRR674. There was no TAC discussion.
Board Action	The Board voted on a motion to grant CNE's appeal of the TAC decision and approve PRR674 as submitted, effective until the earlier of February 1, 2007 or the implementation of PRR676. The

Board Action Report

	Board also directed ERCOT Staff to report the impacts of PRR674 on the Balancing Energy market to the Board in November, 2006.

ERCOT/Market Segment Impacts and Benefits			
Assumptions	1	*None*	
		Impact Area	**Monetary Impact**
Market Cost	1	*Minimal*	
		Impact Area	**Monetary Impact**
Market Benefit	1	*Allows additional time for new PRR*	
Additional Qualitative Information	1	*Unknown*	
Other	1	*none*	

Original Sponsor	
Name	Eric Goff/Vanus Priestley
Company	Constellation NewEnergy, Inc
Segment	Independent Power Marketer

Comments Received	
Comment Author	**Comment Description**
CPS Energy 072406	Opposed adoption of PRR674; however, to the extent it moves forward, CPS Energy suggested changes related to certain RPRS costs.
CNE 081706	Proposed changes to shorten the time-frame for implementation and using generic costs for calculating RPRS charges by eliminating Step 2 of RPRS procurement.

Proposed Protocol Language Revision

6.9.2.1.1 *Replacement Reserve Uplift Charge*

(1) Prior to direct assignment of Zonal Congestion costs, the QSE's Obligation for Replacement Reserve procured for CSC Congestion will be recovered as part of the System Congestion Fund described in Section 7.3.3.1, System Congestion Fund.

(2) The calculation for Replacement Reserve Uplift Charge will be as follows:

$$UC_{RPiq} = -1 * (S\ (PC_{RPiq} + LPC_{RPiq})_q +_z TCRPAY_{RPi} + S\ (CSC_{RPiq})_{q,CSC}) * LRS_{qi}$$

$$TCRPAY_{RPi} = -1 * (S\ (TCRcsc_i) * SP_{CSCi})_{CSC}$$

Where:

i:	Interval being calculated
q:	QSE
z:	CSC zone being settled
$UC_{RPi:}$	Replacement Reserve Service Uplift Charge ($)
PC_{RPiQSE}	Service Cost ($) per interval for all QSEs of Procured Capacity of Replacement Reserve procured to resolve Zonal Congestion and Capacity Insufficiency per single Resource
LPC_{RPiQSE}	Service Cost ($) per interval for all QSEs of Procured Capacity of Replacement Reserve procured to resolve Local Congestion per single Resource
CSC_{RPiQSE}	Replacement Reserve Service CSC Impact Capacity Charge ($) per interval for all QSEs
LRS_{qi}	Load Ratio Share (Factor) (Adjusted Metered Load / Total System Load) per hourly interval of that QSE
$TCRPAY_{RPi}$	Payment to TCR Account Holders for RPRS market per hourly interval
$TCRcsc_i$	Total number of TCRs per CSC per hourly interval
SP_{CSCi}	Shadow Price of RPRS per CSC per hourly interval

Deleted: *6.9.2.1.1 Replacement Reserve Under Scheduled Capacity*¶
(1) The product of the maximum MCPC of Replacement Reserve procured for the hour (where the MCPC evaluated across all RPRS markets executed for the hour), multiplied by the QSE's maximum capacity insufficiency evaluated across all zones for each hour. A QSE's capacity insufficiency amount includes the maximum mismatch amount, evaluated across all zones for the hour. For the Operating Hour, a QSE's maximum capacity insufficiency, isthe sum of (a) and (b) where (a) and (b) are as follows:¶
The greater of zero (0) or the sum of the difference between a QSE's Adjusted Meter Load and the QSE's minimum scheduled Load in each Settlement Interval for the Operating Hour the maximum mismatch amount that results from either (i) a mismatch in the QSE's Schedule as defined in Section 4.7.2, *Schedule Validation Process*, or (ii) a QSE selecting ERCOT as a Resource, evaluated over all applicable RPRS market snapshots for the hour.¶
(2) When ERCOT procures Replacement Reserve Service to resolve system-wide capacity insufficiency, the calculation for Replacement Reserve Service Obligation for underscheduled capacity is:¶

$$US_{RP_{hq}} = Max_{Mh}(MCPC_R$$

¶
Where¶

$$MMQ_{iq} = \sum_{Across\ q_a}\{(Max_{Mh}[(MM$$

¶

$$MMS_{Miq_aq_b} = Max(0,(QSSA_{Ti}$$

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Where:¶
¶ ... [1]

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Deleted: S (US_{RPhq}) +
Deleted: US_{RPiQSE} Replacement Reserve Service Under Scheduled Charge ($) per interval for all QSEs

6.9.2.1.1 Replacement Reserve Under Scheduled Capacity

(1) The product of the maximum MCPC of Replacement Reserve procured for the hour (where the MCPC evaluated across all RPRS markets executed for the hour), multiplied by the QSE's maximum capacity insufficiency evaluated across all zones for each hour. A QSE's capacity insufficiency amount includes the maximum mismatch amount, evaluated across all zones for the hour. For the Operating Hour, a QSE's maximum capacity insufficiency, isthe sum of (a) and (b) where (a) and (b) are as follows:

The greater of zero (0) or the sum of the difference between a QSE's Adjusted Meter Load and the QSE's minimum scheduled Load in each Settlement Interval for the Operating Hour the maximum mismatch amount that results from either (i) a mismatch in the QSE's Schedule as defined in Section 4.7.2, Schedule Validation Process, or (ii) a QSE selecting ERCOT as a Resource, evaluated over all applicable RPRS market snapshots for the hour.

(2) When ERCOT procures Replacement Reserve Service to resolve system-wide capacity insufficiency, the calculation for Replacement Reserve Service Obligation for underscheduled capacity is:

$$US_{RP_{hq}} = Max_{Mh}(MCPC_{RP_{Mh}}) * Max_i\left[0,\left(\left(\left(AML_{iq} - Min_M CL_{iq}\right)*4\right)+\sum MMQ_{hq}\right)\right]$$

Where

$$MMQ_{iq} = \sum_{Across\ q_a}\left\{\left(Max_{Mh}\left[\left(MMS_{Miq_aq_b}\right)\right]\right)\right\}$$

$$MMS_{Miq_aq_b} = Max\left(0,\left(QSSA_{TORP_{iz}} - QOSB_{TORP_{iz}}\right)\right) + Min\left(0,\left(QSSB_{TORP_{iz}} - QOSA_{TORP_{iz}}\right)\right)$$

Where:

Where:

h	hour in trade day for which ERCOT purchased RPRS for capacity insufficiency
i	hourly interval being evaluated, i=1, ...4 where

intervals 1, 2, 3, and 4 denote the set of 15-minute Settlement Intervals in a given hour

M	RPRS Markets, in the event of multiple RPRS markets for a particular Operating Hour. --this includes both the Day Ahead RPRS market all applicable RPRS markets executed during the Adjustment Period
q	QSE
q_a	Buying QSE
q_b	Selling QSE
AML_{iq}	Adjusted Metered Load (MWh) summed across all zones for a QSE, for Settlement Interval, i, of the settlement hour, h. This value includes estimated and/or actual meter values and the associated Transmission Losses & Distribution Losses and UFE.
.	
CL_{iq}	QSE's Scheduled Load (MWh) by Settlement Interval, i, summed across all zones. (This quantity is evaluated across all snapshots of QSE's schedule for all RPRS markets for the particular hour)
$MCPC_{RPMh}$	Replacement Reserve Service Market Clearing Price of Capacity ($/MW), for the hour h, procured for system-wide insufficiency, over applicable markets, M, for the hour.
MMQ_{iq}	Mismatched amount (MW), by interval, i, for the QSE. (This value is summed across all zones for all intervals in the hour and is evaluated across all applicable schedule snapshots.)
$MMS_{Miq_aq_b}$	Mismatched Schedule Quantity (MW) representing either Inter-QSE Trades, or ERCOT scheduled as a Resource by Settlement Interval, i, of the settlement hour, h, by QSE. (This value is summed over all zones.)
$QSSA_{TORP_i}$	QSE Supply Schedule for the buying QSE, A, by Settlement Interval, i, of the settlement hour, h, at the time of the Replacement Reserve Market.

$QOSA_{TORP_i}$	QSE Obligation Schedule for the selling QSE, A, by Settlement Interval, i, of the settlement hour, h, at the time of the Replacement Reserve Market.
$QOSB_{TORP_i}$	QSE Obligation Schedule for the selling QSE, B, by Settlement Interval, i, of the settlement hour, h, at the time of the Replacement Reserve Market.
$QSSB_{TORP_i}$	QSE Supply Schedule for the buying QSE, B, by Settlement Interval, i, of the settlement hour, h, at the time of the Replacement Reserve Market.
US_{RPhq}	Replacement Reserve Service Under Scheduled Charge ($) for each zone by hour for the QSE

Protocols Revision Request

PRR Number	674	PRR Title	Temporary Alteration of Settlement Equations Related to the RPRS Under Scheduled Charge
Protocol Section(s) Requiring Revision (include Section No. and Title)		6.9.2.1.1, Replacement Reserve Under Scheduled Capacity 6.9.2.1.2, Replacement Reserve Uplift Charge	
Requested Resolution (Normal or Urgent)		Urgent	
Revision Description		This PRR temporarily alters the settlement equations for the RPRS Under Scheduled charge.	
Reason for Revision		Current settlement of the RPRS Under Scheduled Charge is improper. This PRR temporarily alters the settlement, uplifting the cost of RPRS on a load ratio share, until issues relating to RPRS are corrected. Once a new PRR to address all of the issues brought up the board meeting is approved, this revision will no longer be needed.	
Credit Implications (Yes or No, and summary of impact)		No	
Relevance to Nodal Market (Yes or No, and summary of impact)		No	
Nodal Protocol Section(s) Requiring Revision (include Section No. and Title)		None.	
Timeline			
Date Posted		7/19/06	
Please access the ERCOT website for current timeline information.			

Sponsor	
Name	Eric Goff/Vanus Priestley
E-mail Address	Eric.Goff2@constellation.com
Company	Constellation NewEnergy, Inc

Protocols Revision Request

Company Address	1221 Lamar St Houston, TX 77010
Phone Number	713-646-6718
Fax Number	

ERCOT/Market Segment Impacts and Benefits

Instructions: To allow for comprehensive PRR consideration, please fill out each block below **completely**, even if your response is "none," "not known," or "not applicable." Wherever possible, please include reasons, explanations, and cost/benefit analyses pertaining to the PRR.

Assumptions	1	*None*	
	2		
	3		
	4		
		Impact Area	**Monetary Impact**
Market Cost	1	*Minimal*	
		Impact Area	**Monetary Impact**
Market Benefit	1	*Allows additional time for new PRR*	
	2		
	3		
	4		
Additional Qualitative Information	1	*Unknown*	
	2		
	3		
	4		
Other	1	*none*	
Comments	2		
	3		
	4		

Proposed Protocol Language Revision

6.9.2.1.1 *Replacement Reserve Uplift Charge*

(1) Prior to direct assignment of Zonal Congestion costs, the QSE's Obligation for Replacement Reserve procured for CSC Congestion will be recovered as part of the System Congestion Fund described in Section 7.3.3.1, System Congestion Fund.

(2) The calculation for Replacement Reserve Uplift Charge will be as follows:

$$UC_{RPiq} = -1 * (S\ (PC_{RPiq} + LPC_{RPiq})_q +_{,} TCRPAY_{RPi} + S\ (CSC_{RPiq})_{q,CSC}) * LRS_{qi}$$

$$TCRPAY_{RPi} = -1 * (S(TCRcsc_i) * SP_{CSCi})_{CSC}$$

Where:

i:	Interval being calculated
q:	QSE
z:	CSC zone being settled
UC_{RPi}:	Replacement Reserve Service Uplift Charge ($)
PC_{RPiQSE}	Service Cost ($) per interval for all QSEs of Procured Capacity of Replacement Reserve procured to resolve Zonal Congestion and Capacity Insufficiency per single Resource
LPC_{RPiQSE}	Service Cost ($) per interval for all QSEs of Procured Capacity of Replacement Reserve procured to resolve Local Congestion per single Resource
CSC_{RPiQSE}	Replacement Reserve Service CSC Impact Capacity Charge ($) per interval for all QSEs
LRS_{qi}	Load Ratio Share (Factor) (Adjusted Metered Load / Total System Load) per hourly interval of that QSE
$TCRPAY_{RPi}$	Payment to TCR Account Holders for RPRS market per hourly interval
$TCRcsc_i$	Total number of TCRs per CSC per hourly interval
SP_{CSCi}	Shadow Price of RPRS per CSC per hourly interval

Deleted: *6.9.2.1.1 Replacement Reserve Under Scheduled Capacity*¶
(1) The product of the maximum MCPC of Replacement Reserve procured for the hour (where the MCPC evaluated across all RPRS markets executed for the hour), multiplied by the QSE's maximum capacity insufficiency evaluated across all zones for each hour. A QSE's capacity insufficiency amount includes the maximum mismatch amount, evaluated across all zones for the hour. For the Operating Hour, a QSE's maximum capacity insufficiency, isthe sum of (a) and (b) where (a) and (b) are as follows:¶
The greater of zero (0) or the sum of the difference between a QSE's Adjusted Meter Load and the QSE's minimum scheduled Load in each Settlement Interval for the Operating Hour the maximum mismatch amount that results from either (i) a mismatch in the QSE's Schedule as defined in Section 4.7.2, Schedule Validation Process, or (ii) a QSE selecting ERCOT as a Resource, evaluated over all applicable RPRS market snapshots for the hour.¶
(2) When ERCOT procures Replacement Reserve Service to resolve system-wide capacity insufficiency, the calculation for Replacement Reserve Service Obligation for underscheduled capacity is:¶
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$$US_{RP_{hq}} = Max_{Mh}(MCPC_R$$

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Where¶
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$$MMQ_{iq} = \sum_{Across\ q_e} \{Max_{Mh}[(MM$$

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$$MMS_{Mq_e q_a} = Max(0,(QSSAn$$

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Where:¶
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6.9.2.1.1 Replacement Reserve Under Scheduled Capacity

(1) The product of the maximum MCPC of Replacement Reserve procured for the hour (where the MCPC evaluated across all RPRS markets executed for the hour), multiplied by the QSE's maximum capacity insufficiency evaluated across all zones for each hour. A QSE's capacity insufficiency amount includes the maximum mismatch amount, evaluated across all zones for the hour. For the Operating Hour, a QSE's maximum capacity insufficiency, isthe sum of (a) and (b) where (a) and (b) are as follows:

The greater of zero (0) or the sum of the difference between a QSE's Adjusted Meter Load and the QSE's minimum scheduled Load in each Settlement Interval for the Operating Hour the maximum mismatch amount that results from either (i) a mismatch in the QSE's Schedule as defined in Section 4.7.2, Schedule Validation Process, or (ii) a QSE selecting ERCOT as a Resource, evaluated over all applicable RPRS market snapshots for the hour.

(2) When ERCOT procures Replacement Reserve Service to resolve system-wide capacity insufficiency, the calculation for Replacement Reserve Service Obligation for underscheduled capacity is:

$$US_{RP_{hq}} = Max_{Mh}(MCPC_{RP_{Mh}}) * Max_i\left[0,\left(\left(\left(AML_{iq} - Min_M CL_{iq}\right)*4\right)+\sum MMQ_{hq}\right)\right]$$

Where

$$MMQ_{iq} = \sum_{Across\ q_a}\left\{\left(Max_{Mh}\left[\left(MMS_{Miq_aq_b}\right)\right]\right)\right\}$$

$$MMS_{Miq_aq_b} = Max\left(0,\left(QSSA_{TORP_{iq}} - QOSB_{TORP_{iq}}\right)\right) + Min\left(0,\left(QSSB_{TORP_{iq}} - QOSA_{TORP_{iq}}\right)\right)$$

Where:

Where:

h	hour in trade day for which ERCOT purchased RPRS for capacity insufficiency
i	hourly interval being evaluated, i=1, ...4 where

intervals 1, 2, 3, and 4 denote the set of 15-minute Settlement Intervals in a given hour

M	RPRS Markets, in the event of multiple RPRS markets for a particular Operating Hour. --this includes both the Day Ahead RPRS market all applicable RPRS markets executed during the Adjustment Period
q	QSE
q_a	Buying QSE
q_b	Selling QSE
AML_{iq}	Adjusted Metered Load (MWh) summed across all zones for a QSE, for Settlement Interval, i, of the settlement hour, h. This value includes estimated and/or actual meter values and the associated Transmission Losses & Distribution Losses and UFE.
.	
CL_{iq}	QSE's Scheduled Load (MWh) by Settlement Interval, i, summed across all zones. (This quantity is evaluated across all snapshots of QSE's schedule for all RPRS markets for the particular hour)
$MCPC_{RPMh}$	Replacement Reserve Service Market Clearing Price of Capacity ($/MW), for the hour h, procured for system-wide insufficiency, over applicable markets, M, for the hour.
MMQ_{iq}	Mismatched amount (MW), by interval, i, for the QSE. (This value is summed across all zones for all intervals in the hour and is evaluated across all applicable schedule snapshots.)
$MMS_{Miq_aq_b}$	Mismatched Schedule Quantity (MW) representing either Inter-QSE Trades, or ERCOT scheduled as a Resource by Settlement

Interval, i, of the settlement hour, h, by QSE. (This value is summed over all zones.)

$QSSA_{TORP_i}$ QSE Supply Schedule for the buying QSE, A, by Settlement Interval, i, of the settlement hour, h, at the time of the Replacement Reserve Market.

$QOSA_{TORP_i}$ QSE Obligation Schedule for the selling QSE, A, by Settlement Interval, i, of the settlement hour, h, at the time of the Replacement Reserve Market.

$QOSB_{TORP_i}$ QSE Obligation Schedule for the selling QSE, B, by Settlement Interval, i, of the settlement hour, h, at the time of the Replacement Reserve Market.

$QSSB_{TORP_i}$ QSE Supply Schedule for the buying QSE, B, by Settlement Interval, i, of the settlement hour, h, at the time of the Replacement Reserve Market.

US_{RPhq} Replacement Reserve Service Under Scheduled Charge ($) for each zone by hour for the QSE

APPENDIX C

What is Replacement Reserve Service (RPRS)?

ERCOT uses RPRS to ensure that sufficient resources are online in the right locations to maintain overall resource adequacy and transmission security. At least once a day the RPRS evaluates system conditions which include supply, demand, and availability of generation and transmission resources. The result of this evaluation often requires the use of generation units which were scheduled to be offline. ERCOT has observed a significant improvement in the security of the transmission grid by the way of reduced occurrence of transmission congestion since RPRS began.

RPRS procurement is done in two steps. Step 1 is used to procure resources which help to relieve local transmission congestion. Step 2 is used to procure resources to meet the overall capacity and energy needs of the system.

Who pays, at what prices?

The RPRS model uses both Protocol determined generic costs and Qualified Scheduling Entity (QSE) entered offers to procure additional resources. If there is a competitive solution[1], typically when the choice of resource is not dependent on its location, QSE offers are used. Otherwise, as in the case of resolving local transmission congestion where only specific resources in specific locations are needed, generic costs are used[2]. The costs for the resources procured via competitive solution are directly assigned to QSEs who have not scheduled adequate energy (short scheduled) at the time of RPRS procurement to meet their real-time demand. All other costs are uplifted to Load Serving Entities (LSE).

RPRS Market Clearing Prices for Capacity (MCPC) are prices which represent the highest cost resource procured under a competitive solution which is aimed at producing the lowest cost resource procurement over the operating day. Resources procured under competitive methods (in Step 2) are paid based on this MCPC while resources procured non-competitively (in Step 1) are paid generic costs.

What is the issue with RPRS?

Considerable dollars have been collected from QSEs who short schedule. These dollars are significantly more than those paid to resource owners, leaving a significant credit to be uplifted back to the LSEs. Some Market Participants have expressed strong concern that too much has been collected from those QSEs with short schedules.

In Step 2, resources are often procured to effectively replace energy from scheduled resources that can not operate at full output due to transmission constraints but whose output would be needed to meet overall system requirements. In these cases, it has been argued that these resources are procured to maintain transmission security and thus should be procured and charged generically (uplifted) as in Step 1.

RPRS is typically procured day-ahead based on the next day's load forecast. To the extent that load forecast may be higher than actual, some RPRS in Step 2 may be procured that the next day proves not to be needed for resource adequacy. It is argued

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[1] Competitive solution in this paper is used generically to mean that unmitigated resources offers are used since there are multiple resources that can be called upon to provide the service; therefore, it is assumed there is a market-based competitive solution. This occurs in Step 2 of RPRS. It should not be confused with Market Solution for local congestion which was used in the Real-Time Market in 2001-03.

[2] Generic Costs are used in Step 1 of RPRS. Generic costs are from ERCOT Protocols 6.8.2.1

that the cost of RPRS attributed to forecast error should also be uplifted and not directly assigned to short scheduled QSEs.

ERCOT Staff believes the primary question is, "(a) Should all RPRS costs related to transmission security[3] and load forecast error be uplifted to all LSEs, or (b)should only those costs which are presumed not to have a competitive solution be uplifted; i.e. those procured in Step 1?" The current Protocol and system implementation is (b) and so RPRS only uplifts costs which are selected based on their location and directly assigns the remainder to the QSEs with short schedules.

Proposed Solutions

While ERCOT Staff does not have a position on either proposal below, ERCOT feels that the RPRS Market is an important tool for maintaining the resource adequacy and security of the power system.

- PRR 674 (Appeal to Board): This PRR would uplift all RPRS costs until a better solution allowing for a direct assignment of appropriate costs is approved. No significant systems or operational change is expected.
- PRR 676 (TAC Approved): This PRR would continue to directly assign costs similar to today, but would lower the amount of costs assignable to QSEs with short schedules. Settlement system changes will be required, but no operational changes are expected.

Both PRR 674 and 676 would reduce charges to QSEs with short schedules. PRR 674 proposes to eliminate all direct assignment for RPRS, while PRR 676 would keep the same direct assignment strategy currently used, but with limited costs.

[3] This includes both resources procured in Step 1which reduce congestion and those procured in Step 2 to replace energy from constrained resources