**ERCOT Nodal Protocols**

**Section 6: Adjustment Period and Real-Time Operations**

**August 1, 2023**

[6 Adjustment Period and Real-Time Operations 6-1](#_Toc135992205)

[6.1 Introduction 6-1](#_Toc135992206)

[6.2 Market Timeline Summary 6-2](#_Toc135992207)

[6.3 Adjustment Period and Real-Time Operations Timeline 6-3](#_Toc135992208)

[6.3.1 Activities for the Adjustment Period 6-11](#_Toc135992210)

[6.3.2 Activities for Real-Time Operations 6-13](#_Toc135992211)

[6.3.3 Real-Time Timeline Deviations 6-21](#_Toc135992212)

[6.3.4 ERCOT Notification of Validation Rules for Real-Time 6-21](#_Toc135992213)

[6.4 Adjustment Period 6-22](#_Toc135992214)

[6.4.1 Capacity Trade, Energy Trade, Self-Schedule, and Ancillary Service Trades 6-22](#_Toc135992215)

[6.4.2 Output Schedules 6-22](#_Toc135992216)

[6.4.2.1 Output Schedules for Resources Other than Dynamically Scheduled Resources 6-23](#_Toc135992218)

[6.4.2.2 Output Schedules for Dynamically Scheduled Resources 6-24](#_Toc135992220)

[6.4.2.3 Output Schedule Criteria 6-25](#_Toc135992221)

[6.4.2.4 Output Schedule Validation 6-26](#_Toc135992222)

[6.4.2.5 DSR Load 6-27](#_Toc135992223)

[6.4.3 Real-Time Market (RTM) Energy Bids and Offers 6-28](#_Toc135992224)

[6.4.3.1 RTM Energy Bids 6-28](#_Toc135992225)

[6.4.3.1.1 RTM Energy Bid Criteria 6-30](#_Toc135992226)

[6.4.3.1.2 RTM Energy Bid Validation 6-30](#_Toc135992227)

[6.4.4 Energy Offer Curve 6-31](#_Toc135992228)

[6.4.4.1 Energy Offer Curve for On-Line Non-Spinning Reserve Capacity 6-32](#_Toc135992230)

[6.4.4.2 Energy Offer Curve for RUC-Committed Switchable Generation Resources 6-34](#_Toc135992232)

[6.4.5 Incremental and Decremental Energy Offer Curves 6-35](#_Toc135992233)

[6.4.6 Resource Status 6-35](#_Toc135992234)

[6.4.7 QSE-Requested Decommitment of Resources and Changes to Ancillary Service Resource Responsibility of Resources 6-36](#_Toc135992235)

[6.4.7.1 QSE Request to Decommit Resources in the Operating Period 6-38](#_Toc135992237)

[6.4.7.2 QSE Request to Decommit Resources in the Adjustment Period 6-38](#_Toc135992238)

[6.4.8 Notification of Forced Outage of a Resource 6-39](#_Toc135992239)

[6.4.9 Ancillary Services Capacity During the Adjustment Period and in Real-Time 6-40](#_Toc135992240)

[6.4.9.1 Evaluation and Maintenance of Ancillary Service Capacity Sufficiency 6-40](#_Toc135992242)

[6.4.9.1.1 ERCOT Increases to the Ancillary Services Plan 6-41](#_Toc135992244)

[6.4.9.1.2 Replacement of Infeasible Ancillary Service Due to Transmission Constraints 6-42](#_Toc135992245)

[6.4.9.1.3 Failure to Provide Ancillary Service 6-44](#_Toc135992247)

[6.4.9.2 Supplemental Ancillary Services Market 6-45](#_Toc135992249)

[6.4.9.2.1 Resubmitting Offers for Ancillary Services in the Adjustment Period 6-47](#_Toc135992250)

[6.4.9.2.2 SASM Clearing Process 6-47](#_Toc135992251)

[6.4.9.2.3 Communication of SASM Results 6-48](#_Toc135992252)

[6.5 Real-Time Energy Operations 6-49](#_Toc135992253)

[6.5.1 ERCOT Activities 6-49](#_Toc135992254)

[6.5.1.1 ERCOT Control Area Authority 6-49](#_Toc135992255)

[6.5.1.2 Centralized Dispatch 6-54](#_Toc135992256)

[6.5.2 Operating Standards 6-55](#_Toc135992257)

[6.5.3 Equipment Operating Ratings and Limits 6-56](#_Toc135992258)

[6.5.4 Inadvertent Energy Account 6-57](#_Toc135992259)

[6.5.5 QSE Activities 6-58](#_Toc135992260)

[6.5.5.1 Changes in Resource Status 6-58](#_Toc135992261)

[6.5.5.2 Operational Data Requirements 6-59](#_Toc135992262)

[6.5.6 TSP and DSP Responsibilities 6-71](#_Toc135992263)

[6.5.7 Energy Dispatch Methodology 6-72](#_Toc135992265)

[6.5.7.1 Real-Time Sequence 6-73](#_Toc135992267)

[6.5.7.1.1 SCADA Telemetry 6-73](#_Toc135992268)

[6.5.7.1.2 Network Topology Builder 6-74](#_Toc135992269)

[6.5.7.1.3 Bus Load Forecast 6-74](#_Toc135992270)

[6.5.7.1.4 State Estimator 6-74](#_Toc135992271)

[6.5.7.1.5 Topology Consistency Analyzer 6-74](#_Toc135992272)

[6.5.7.1.6 Breakers/Switch Status Alarm Processor and Forced Outage Detection Processor 6-75](#_Toc135992273)

[6.5.7.1.7 Real-Time Weather and Dynamic Rating Processor 6-75](#_Toc135992274)

[6.5.7.1.8 Overload Alarm Processor 6-76](#_Toc135992275)

[6.5.7.1.9 Contingency List and Contingency Screening 6-76](#_Toc135992276)

[6.5.7.1.10 Network Security Analysis Processor and Security Violation Alarm 6-76](#_Toc135992277)

[6.5.7.1.11 Transmission Network and Power Balance Constraint Management 6-78](#_Toc135992278)

[6.5.7.1.12 Resource Limits 6-79](#_Toc135992279)

[6.5.7.1.13 Data Inputs and Outputs for the Real-Time Sequence and SCED 6-82](#_Toc135992281)

[6.5.7.2 Resource Limit Calculator 6-85](#_Toc135992282)

[6.5.7.3 Security Constrained Economic Dispatch 6-93](#_Toc135992284)

[6.5.7.3.1 Determination of Real-Time On-Line Reliability Deployment Price Adder 6-112](#_Toc135992286)

[6.5.7.4 Base Points 6-120](#_Toc135992288)

[6.5.7.4.1 Updated Desired Set Points 6-122](#_Toc135992289)

[6.5.7.5 Ancillary Services Capacity Monitor 6-122](#_Toc135992290)

[6.5.7.6 Load Frequency Control 6-134](#_Toc135992292)

[6.5.7.6.1 LFC Process Description 6-134](#_Toc135992293)

[6.5.7.6.2 LFC Deployment 6-138](#_Toc135992295)

[6.5.7.7 Voltage Support Service 6-152](#_Toc135992296)

[6.5.7.8 Dispatch Procedures 6-154](#_Toc135992297)

[6.5.7.9 Compliance with Dispatch Instructions 6-155](#_Toc135992298)

[6.5.7.10 IRR Ramp Rate Limitations 6-158](#_Toc135992299)

[6.5.7.11 DC-Coupled Resource Ramp Rate Limitations 6-159](#_Toc135992300)

[6.5.8 Verbal Dispatch Instruction Confirmation 6-159](#_Toc135992301)

[6.5.9 Emergency Operations 6-160](#_Toc135992302)

[6.5.9.1 Emergency and Short Supply Operation 6-160](#_Toc135992303)

[6.5.9.2 Failure of the SCED Process 6-161](#_Toc135992304)

[6.5.9.3 Communication Prior to and During Emergency Conditions 6-163](#_Toc135992305)

[6.5.9.3.1 Operating Condition Notice 6-164](#_Toc135992306)

[6.5.9.3.1.1 Advance Action Notice 6-166](#_Toc135992307)

[6.5.9.3.2 Advisory 6-166](#_Toc135992308)

[6.5.9.3.3 Watch 6-169](#_Toc135992309)

[6.5.9.3.4 Emergency Notice 6-171](#_Toc135992310)

[6.5.9.4 Energy Emergency Alert 6-172](#_Toc135992311)

[6.5.9.4.1 General Procedures Prior to EEA Operations 6-175](#_Toc135992312)

[6.5.9.4.2 EEA Levels 6-176](#_Toc135992313)

[6.5.9.4.3 Restoration of Market Operations 6-181](#_Toc135992314)

[6.5.9.5 Block Load Transfers between ERCOT and Non-ERCOT Control Areas 6-181](#_Toc135992315)

[6.5.9.5.1 Registration and Posting of BLT Points 6-183](#_Toc135992316)

[6.5.9.5.2 Scheduling and Operation of BLTs 6-184](#_Toc135992317)

[6.5.9.6 Black Start 6-184](#_Toc135992318)

[6.6 Settlement Calculations for the Real-Time Energy Operations 6-184](#_Toc135992319)

[6.6.1 Real-Time Settlement Point Prices 6-184](#_Toc135992320)

[6.6.1.1 Real-Time Settlement Point Price for a Resource Node 6-185](#_Toc135992321)

[6.6.1.2 Real-Time Settlement Point Price for a Load Zone 6-188](#_Toc135992322)

[6.6.1.3 Real-Time Settlement Point Price for a Hub 6-193](#_Toc135992323)

[6.6.1.4 Load Zone LMPs 6-193](#_Toc135992324)

[6.6.1.5 Hub LMPs 6-194](#_Toc135992325)

[6.6.1.6 Real-Time Market Clearing Prices for Ancillary Services 6-198](#_Toc135992327)

[6.6.1.7 Real-Time Reliability Deployment Prices for Ancillary Services 6-202](#_Toc135992328)

[6.6.2 Load Ratio Share 6-205](#_Toc135992329)

[6.6.2.1 ERCOT Total Adjusted Metered Load for a 15-Minute Settlement Interval 6-205](#_Toc135992330)

[6.6.2.2 QSE Load Ratio Share for a 15-Minute Settlement Interval 6-206](#_Toc135992331)

[6.6.2.3 ERCOT Total Adjusted Metered Load for an Operating Hour 6-208](#_Toc135992332)

[6.6.2.4 QSE Load Ratio Share for an Operating Hour 6-208](#_Toc135992333)

[6.6.2.5 ERCOT Total Adjusted Metered Load for a Month 6-209](#_Toc135992334)

[6.6.2.6 QSE DC Tie Export Load Ratio Share for a Month 6-209](#_Toc135992335)

[6.6.2.7 ERCOT Adjusted Metered Load by Congestion Management Zone for a Month 6-210](#_Toc135992336)

[6.6.2.8 QSE DC Tie Export Load Ratio Share by Congestion Management Zone for a Month 6-210](#_Toc135992337)

[6.6.3 Real-Time Energy Charges and Payments 6-211](#_Toc135992338)

[6.6.3.1 Real-Time Energy Imbalance Payment or Charge at a Resource Node 6-211](#_Toc135992339)

[6.6.3.2 Real-Time Energy Imbalance Payment or Charge at a Load Zone 6-225](#_Toc135992340)

[6.6.3.3 Real-Time Energy Imbalance Payment or Charge at a Hub 6-229](#_Toc135992341)

[6.6.3.4 Real-Time Energy Payment for DC Tie Import 6-231](#_Toc135992342)

[6.6.3.5 Real-Time Payment for a Block Load Transfer Point 6-232](#_Toc135992343)

[6.6.3.6 Real-Time High Dispatch Limit Override Energy Payment 6-236](#_Toc135992344)

[6.6.3.7 Real-Time High Dispatch Limit Override Energy Charge 6-242](#_Toc135992346)

[6.6.3.8 Real-Time Payment or Charge for Energy from a Settlement Only Distribution Generator (SODG) or a Settlement Only Transmission Generator (SOTG) 6-242](#_Toc135992347)

[6.6.4 Real-Time Congestion Payment or Charge for Self-Schedules 6-249](#_Toc135992349)

[6.6.5 Base Point Deviation Charge 6-250](#_Toc135992350)

[6.6.5.1 Resource Base Point Deviation Charge 6-250](#_Toc135992352)

[6.6.5.1.1 General Generation Resource and Controllable Load Resource Base Point Deviation Charge 6-253](#_Toc135992354)

[6.6.5.1.1.1 Base Point Deviation Charge for Over Generation 6-254](#_Toc135992355)

[6.6.5.1.1.2 Base Point Deviation Charge for Under Generation 6-257](#_Toc135992357)

[6.6.5.1.1.3 Controllable Load Resource Base Point Deviation Charge for Over Consumption 6-261](#_Toc135992359)

[6.6.5.1.1.4 Controllable Load Resource Base Point Deviation Charge for Under Consumption 6-264](#_Toc135992361)

[6.6.5.2 IRR Generation Resource Base Point Deviation Charge 6-266](#_Toc135992363)

[6.6.5.3 Resources Exempt from Deviation Charges 6-274](#_Toc135992367)

[6.6.5.4 Base Point Deviation Payment 6-276](#_Toc135992369)

[6.6.6 Reliability Must-Run Settlement 6-278](#_Toc135992371)

[6.6.6.1 RMR Standby Payment 6-278](#_Toc135992373)

[6.6.6.2 RMR Payment for Energy 6-281](#_Toc135992374)

[6.6.6.3 RMR Adjustment Charge 6-283](#_Toc135992375)

[6.6.6.4 RMR Charge for Unexcused Misconduct 6-285](#_Toc135992376)

[6.6.6.5 RMR Service Charge 6-286](#_Toc135992377)

[6.6.6.6 Method for Reconciling RMR Actual Eligible Costs, RMR and MRA Contributed Capital Expenditures, and Miscellaneous RMR Incurred Expenses 6-287](#_Toc135992378)

[6.6.6.7 MRA Standby Payment 6-291](#_Toc135992379)

[6.6.6.8 MRA Contributed Capital Expenditures Payment 6-294](#_Toc135992380)

[6.6.6.9 MRA Payment for Deployment Event 6-296](#_Toc135992381)

[6.6.6.10 MRA Variable Payment for Deployment 6-298](#_Toc135992382)

[6.6.6.11 MRA Charge for Unexcused Misconduct 6-301](#_Toc135992383)

[6.6.6.12 MRA Service Charge 6-303](#_Toc135992384)

[6.6.7 Voltage Support Settlement 6-303](#_Toc135992385)

[6.6.7.1 Voltage Support Service Payments 6-303](#_Toc135992386)

[6.6.7.2 Voltage Support Charge 6-311](#_Toc135992388)

[6.6.8 Black Start Capacity 6-312](#_Toc135992389)

[6.6.8.1 Black Start Hourly Standby Fee Payment 6-312](#_Toc135992390)

[6.6.8.2 Black Start Capacity Charge 6-314](#_Toc135992391)

[6.6.9 Emergency Operations Settlement 6-314](#_Toc135992392)

[6.6.9.1 Payment for Emergency Power Increase Directed by ERCOT 6-319](#_Toc135992394)

[6.6.9.2 Charge for Emergency Power Increases 6-334](#_Toc135992396)

[6.6.10 Real-Time Revenue Neutrality Allocation 6-336](#_Toc135992398)

[6.6.11 Emergency Response Service Capacity 6-342](#_Toc135992399)

[6.6.11.1 Emergency Response Service Capacity Payments 6-342](#_Toc135992400)

[6.6.11.2 Emergency Response Service Capacity Charge 6-347](#_Toc135992401)

[6.6.12 Make-Whole Payment for Switchable Generation Resources Committed for Energy Emergency Alert (EEA) 6-348](#_Toc135992402)

[6.6.12.1 Switchable Generation Make-Whole Payment 6-351](#_Toc135992403)

[6.6.12.2 Switchable Generation Make-Whole Charge 6-366](#_Toc135992404)

[6.6.12.3 Miscellaneous Invoice for Switchable Generation Make-Whole Payments and Charges 6-367](#_Toc135992405)

[6.6.13 Wholesale Storage Load Reconciliation for ESRs Operating in a Private Microgrid Island 6-367](#_Toc135992406)

[6.6.14 Firm Fuel Supply Service Capability 6-368](#_Toc135992407)

[6.6.14.1 Firm Fuel Supply Service Fuel Replacement Costs Recovery 6-368](#_Toc135992408)

[6.6.14.2 Firm Fuel Supply Service Hourly Standby Fee Payment and Fuel Replacement Cost Recovery 6-369](#_Toc135992409)

[6.6.14.3 Firm Fuel Supply Service Capacity Charge 6-377](#_Toc135992410)

[6.7 Real-Time Settlement Calculations for the Ancillary Services 6-377](#_Toc135992411)

[6.7.1 Payments for Ancillary Service Capacity Sold in a Supplemental Ancillary Services Market (SASM) or Reconfiguration Supplemental Ancillary Services Market (RSASM) 6-377](#_Toc135992412)

[6.7.2 Payments for Ancillary Service Capacity Assigned in Real-Time Operations 6-380](#_Toc135992413)

[6.7.2.1 Charges for Infeasible Ancillary Service Capacity Due to Transmission Constraints 6-385](#_Toc135992414)

[6.7.2.2 Real-Time Adjustments to Day-Ahead Make Whole Payments due to Ancillary Services Infeasibility Charges 6-387](#_Toc135992415)

[6.7.3 Charges for Ancillary Service Capacity Replaced Due to Failure to Provide 6-393](#_Toc135992416)

[6.7.4 Adjustments to Cost Allocations for Ancillary Services Procurement 6-409](#_Toc135992418)

[6.7.5 Real-Time Ancillary Service Imbalance Payment or Charge 6-437](#_Toc135992420)

[6.7.5.1 Real-Time Ancillary Service Imbalance Payment or Charge 6-456](#_Toc135992422)

[6.7.5.2 Regulation Up Service Payments and Charges 6-457](#_Toc135992423)

[6.7.5.3 Regulation Down Service Payments and Charges 6-459](#_Toc135992424)

[6.7.5.4 Responsive Reserve Payments and Charges 6-462](#_Toc135992425)

[6.7.5.5 Non-Spinning Reserve Service Payments and Charges 6-465](#_Toc135992426)

[6.7.5.6 ERCOT Contingency Reserve Service Payments and Charges 6-467](#_Toc135992427)

[6.7.5.7 Real-Time Derated Ancillary Service Capability Payment 6-470](#_Toc135992428)

[6.7.5.8 Real-Time Derated Ancillary Service Capability Charge 6-473](#_Toc135992429)

[6.7.6 Real-Time Ancillary Service Imbalance Revenue Neutrality Allocation 6-474](#_Toc135992430)

[6.7.7 Adjustments to Net Cost Allocations for Real-Time Ancillary Services 6-480](#_Toc135992432)

[6.8 Settlement for Operating Losses During an LCAP Effective Period 6-487](#_Toc135992433)

[6.8.1 Determination of Operating Losses During an LCAP Effective Period 6-487](#_Toc135992434)

[6.8.2 Recovery of Operating Losses During an LCAP Effective Period 6-488](#_Toc135992435)

[6.8.3 Charges for Operating Losses During an LCAP Effective Period 6-491](#_Toc135992436)

[6.8.3.1 Charges for Capacity Shortfalls During an LCAP Effective Period 6-491](#_Toc135992437)

[6.8.3.1.1 Capacity Shortfall Ratio Share for an LCAP Effective Period 6-492](#_Toc135992438)

[6.8.3.2 Uplift Charges for an LCAP Effective Period 6-494](#_Toc135992439)

[6.8.4 Miscellaneous Invoice for Payments and Charges for an LCAP Effective Period 6-495](#_Toc135992440)

# Adjustment Period and Real-Time Operations

6.1 Introduction

(1) This Section addresses the following components: the Adjustment Period and Real-Time Operations, including Emergency Operations.

(2) The Adjustment Period provides each Qualified Scheduling Entity (QSE) the opportunity to adjust its trades, Self-Schedules, and Resource commitments as more accurate information becomes available under Section 6.4, Adjustment Period. During the Adjustment Period, ERCOT continues to evaluate system sufficiency and security by use of Hour-Ahead Reliability Unit Commitment (RUC) processes, as described in Section 5, Transmission Security Analysis and Reliability Unit Commitment. Under certain conditions during the Adjustment Period, ERCOT may also open one or more Supplemental Ancillary Service Markets (SASMs), as described in Section 6.4.9.2, Supplemental Ancillary Services Market.

|  |
| --- |
| [NPRR1010: Replace paragraph (2) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (2) The Adjustment Period provides each Qualified Scheduling Entity (QSE) the opportunity to adjust its trades, Self-Schedules, and Resource commitments as more accurate information becomes available under Section 6.4, Adjustment Period. During the Adjustment Period, ERCOT continues to evaluate system sufficiency and security by use of Hour-Ahead Reliability Unit Commitment (RUC) processes, as described in Section 5, Transmission Security Analysis and Reliability Unit Commitment. |

(3) During Real-Time operations,ERCOT dispatches Resources under normal system conditions and behavior based on economics and reliability to match system Load with On-Line generation while observing Resource and transmission constraints. The Security-Constrained Economic Dispatch (SCED) process produces Base Points for Resources. ERCOT uses the Base Points from the SCED process and uses the deployment of Regulation Up Service (Reg-Up), Regulation Down Service (Reg-Down), ERCOT Contingency Reserve Service (ECRS), Responsive Reserve (RRS), and Non-Spinning Reserve (Non-Spin) to control frequency and solve potential reliability issues.

|  |
| --- |
| [NPRR1010: Replace paragraph (3) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (3) During Real-Time operations,ERCOT dispatches Resources under normal system conditions and behavior based on economics and reliability to match system Load with On-Line generation while observing Resource and transmission constraints. The Security-Constrained Economic Dispatch (SCED) process produces Base Points and Ancillary Service awards for Resources. ERCOT uses the Base Points from the SCED process and uses the deployment of Regulation Up Service (Reg-Up), Regulation Down Service (Reg-Down), ERCOT Contingency Reserve Service (ECRS), Responsive Reserve (RRS), and Non-Spinning Reserve (Non-Spin) to control frequency and solve potential reliability issues. |

(4) Real-Time energy settlements use Real-Time Settlement Point Prices that are calculated for Resource Nodes, Load Zones, and Hubs for a 15-minute Settlement Interval, using the Locational Marginal Prices (LMPs) from all of the executions of SCED in the Settlement Interval. In contrast, the Day-Ahead Market (DAM) energy settlements will use DAM Settlement Point Prices that are calculated for Resource Nodes, Load Zones, and Hubs for a one-hour Settlement Interval.

|  |
| --- |
| [NPRR1010: Replace paragraph (4) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (4) Real-Time energy settlements use Real-Time Settlement Point Prices that are calculated for Resource Nodes, Load Zones, and Hubs for a 15-minute Settlement Interval, using the Locational Marginal Prices (LMPs) from all of the executions of SCED in the Settlement Interval. Similarly, Real-Time Ancillary Service Settlements use Real-Time Market Clearing Prices for Capacity (MCPCs) for a 15-minute Settlement Interval, using the MCPCs from all of the executions of SCED in the Settlement Interval. In contrast, the Day-Ahead Market (DAM) energy settlements will use DAM Settlement Point Prices that are calculated for Resource Nodes, Load Zones, and Hubs for a one-hour Settlement Interval, and DAM Ancillary Service Settlements will use DAM MCPCs for a one-hour Settlement Interval. |

(5) To the extent that the ERCOT CEO or designee determines that Market Participant activities have produced an outcome inconsistent with the efficient operation of the ERCOT-administered markets as defined in subsection (c)(2) of P.U.C. Subst. R. 25.503, Oversight of Wholesale Market Participants, ERCOT may prohibit the activity by Notice for a period beginning on the date of the Notice and ending no later than 45 days after the date of the Notice. ERCOT may issue subsequent Notices on the same activity. The ERCOT CEO may deem any Nodal Protocol Revision Request (NPRR) designed to correct the activity or issues affecting the activity as Urgent pursuant to Section 21.5, Urgent and Board Priority Nodal Protocol Revision Requests and System Change Requests.

6.2 Market Timeline Summary

(1) The figure below is a high-level summary of the overall market timeline:



6.3 Adjustment Period and Real-Time Operations Timeline

(1) The figure below highlights the major activities that occur in the Adjustment Period and Real-Time operations:

**Preparation for**

**Real**

**-**

**Time Ops**

**Adj Period**

**18:00**

**(D**

**–**

**1)**

**60 Minutes**

**Prior to**

**Op Hour**

**QSE Deadline:**

**Update Energy Bids and Offers**

**Submit HRUC Offers**

**Update Output Schedules**

**Update Inc/Dec Offers for**

**DSRs**

**ERCOT Activity:**

**LFC Process every 4 secs**

**Execute SCED every 5**

**mins**

**Communicate Instructions**

**& Prices**

**ERCOT Activity:**

**Snapshot Inputs &**

**Execute HRUC**

**Operating Period**

**Operating Hour**

**Clock**

**Hour**

**T**

**Adjustment Period & Real**

**-**

**Time Operations**

**Real**

**-**

**Time**

**Operations**

**QSE Deadline:**

**Update Output Schedules for**

**DSRs**

**Provide SCADA Telemetry**

**ERCOT Activity:**

**Communicate**

**HRUC Commitments**

(2) Activities for the Adjustment Period begin at 1800 in the Day-Ahead and end one full hour before the start of the Operating Hour. The figure above is intended to be only a general guide and not controlling language, and any conflict between this figure and another section of the Protocols is controlled by the other section.

(3) ERCOT shall monitor Real-Time Locational Marginal Prices (LMPs), Supplemental Ancillary Services Market (SASM) Market Clearing Prices for Capacity (MCPCs), and Real-Time Settlement Point Prices, including Real-Time prices for energy metered, Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reliability Deployment Prices, Real-Time Off-Line Reserve Price Adders, Real-Time On-Line Reserve Price Adders, Real-Time Reserve Prices for On-Line Reserves and Real-Time Reserve Prices for Off-Line Reserves, for errors and if there are conditions that cause the price to be questionable, ERCOT shall notify all Market Participants that the Real-Time LMPs, SASM MCPCs, and Real-Time Settlement Point Prices are under investigation as soon as practicable.

(4) ERCOT shall correct prices for an Operating Day when accurate prices can be determined, the impact of the price correction is determined to be significant, and one of the following conditions has been met: a market solution is determined to be invalid, invalid prices are identified in an otherwise valid market solution, the Base Points received by Market Participants are inconsistent with the Base Points of a valid market solution, or the Security-Constrained Economic Dispatch (SCED) process experiences a failure as described in Section 6.5.9.2, Failure of the SCED Process. The following are some reasons that may cause these conditions:

(a) Data Input error: Missing, incomplete, stale, or incorrect versions of one or more data elements input to the market applications may result in an invalid market solution and/or prices.

(b) Data Output error: These include: incorrect or incomplete data transfer, price recalculation error in post-processing, and Base Points inconsistent with prices due to the Emergency Base Point flag remaining activated even when the SCED solution is valid.

(c) Hardware/Software error: These include unpredicted hardware or software failures, planned market system or database outages, planned application or database upgrades, software implementation errors, and failure of the market run to complete.

(d) Inconsistency with the Protocols or Public Utility Commission of Texas (PUCT) Substantive Rules: Pricing errors may occur when specific circumstances result in prices that are in conflict with such Protocol language or the PUCT Substantive Rules.

(5) For purposes of a price correction performed prior to 1600 on the second Business Day after the Operating Day, the impact of a price correction shall be considered significant, as that term is used in paragraph (4) above, for the Operating Day when:

(a) The absolute value change to any single Real-Time Settlement Point Price at a Resource Node is greater than $0.05/MWh;

(b) The price correction would require ERCOT to change more than 50 Real-Time Settlement Point Prices;

(c) The absolute value change to any Real-Time Settlement Point Price at a Load Zone or Hub is greater than $0.02/MWh;

(d) The estimated absolute total dollar impact for changes to Real-Time prices for energy metered is greater than $500; or

(e) The absolute total dollar impact for changes to SASM MCPCs is greater than $500.

(6) If it is determined that any Real-Time Settlement Point Prices, Settlement Point LMPs, Electrical Bus LMPs, Real-Time prices for energy metered, Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reliability Deployment Prices, Real-Time On-Line Reserve Price Adders, Real-Time Off-Line Reserve Price Adders, Real-Time Reserve Prices for On-Line Reserves, Real-Time Reserve Prices for Off-Line Reserves, and/or constraint Shadow Prices are erroneous, ERCOT shall correct the prices before the prices are considered final in paragraph (7) below. Specifically:

(a) If it is determined that correcting the Real-Time Settlement Point Prices will not affect the Base Points that were received by Qualified Scheduling Entities (QSEs), then ERCOT shall correct the prices before the prices are considered final in paragraph (7) below.

(b) If it is determined that correcting the Real-Time Settlement Point Prices will affect the Base Points that were received by QSEs, then ERCOT shall correct the prices before the prices are considered final and settle the SCED executions as failed in accordance with Section 6.5.9.2.

(c) If the Base Points received by QSEs are inconsistent with the Real-Time Settlement Point Prices reduced by the sum of the Real-Time On-Line Reliability Deployment Prices and the Real-Time Reserve Prices for On-Line Reserves averaged over the 15-minute Settlement Interval, then ERCOT shall consider those Base Points as due to manual override from the ERCOT Operator and settle the relevant Settlement Interval(s) in accordance with Section 6.6.9, Emergency Operations Settlement.

(7) All Real-Time LMPs, Real-Time Settlement Point Prices, Real-Time prices for energy metered, Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reliability Deployment Prices, Real-Time Reserve Prices for On-Line Reserves, Real-Time Reserve Prices for Off-Line Reserves, Real-Time On-Line Reserve Price Adders, Real-Time Off-Line Reserve Price Adders and SASM MCPCs are final at 1600 of the second Business Day after the Operating Day.

(a) However, after Real-Time LMPs, Real Time Settlement Point Prices, Real-Time prices for energy metered, Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reliability Deployment Prices, Real-Time Reserve Prices for On-Line Reserves, Real-Time Reserve Prices for Off-Line Reserves, Real-Time On-Line Reserve Price Adders, Real-Time Off-Line Reserve Price Adders and SASM MCPCs are final, if ERCOT determines that prices qualify for a price correction pursuant to paragraph (4) above and that ERCOT will seek ERCOT Board review of such prices, it shall notify Market Participants and describe the need for such correction as soon as practicable but no later than 30 days after the Operating Day. Failure to notify Market Participants within this timeline precludes the ERCOT Board from reviewing such prices. However, nothing in this section shall be understood to limit or otherwise inhibit any of the following:

(i) ERCOT’s duty to inform the PUCT of potential or actual violations of the ERCOT Protocols or PUCT Rules and its right to request that the PUCT authorize correction of any prices that may have been affected by such potential or actual violations;

(ii) The PUCT’s authority to order price corrections when permitted to do so under other law; or

(iii) ERCOT’s authority to grant relief to a Market Participant pursuant to the timelines specified in Section 20, Alternative Dispute Resolution Procedure.

(b) Before seeking ERCOT Board review of prices, ERCOT will determine if the impact of the price correction is significant, as that term is used in paragraph (4) above, by calculating the potential changes to the Real-Time Market (RTM) Settlement Statement(s) of any Counter-Party on a given Operating Day. ERCOT shall seek ERCOT Board review of prices if the change in RTM Settlement Statement(s) would result in the absolute value impact to any single Counter-Party, based on the sum of all original RTM Settlement Statement amounts of Market Participants assigned to the Counter-Party, to be greater than:

(i) 2% and also greater than $20,000; or

(ii) 20% and also greater than $2,000.

(c) The ERCOT Board may review and change Real-Time LMPs, Real-Time Settlement Point Prices, Real-Time prices for energy metered, Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reliability Deployment Prices, Real-Time Reserve Prices for On-Line Reserves, Real-Time Reserve Prices for Off-Line Reserves, Real-Time On-Line Reserve Price Adders, Real-Time Off-Line Reserve Price Adders and SASM MCPCs if ERCOT gave timely notice to Market Participants and the ERCOT Board finds that such prices should be corrected for an Operating Day.

(d) In review of Real-Time LMPs, Real Time Settlement Point Prices, Real-Time prices for energy metered, Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reliability Deployment Prices,Real-Time Reserve Prices for On-Line Reserves, Real-Time Reserve Prices for Off-Line Reserves, Real-Time On-Line Reserve Price Adders, Real-Time Off-Line Reserve Price Adders and SASM MCPCs, the ERCOT Board may rely on the same reasons identified in paragraph (4) above to find that the prices should be corrected for an Operating Day.

|  |
| --- |
| [NPRR1000, NPRR1010, and NPRR1014: Replace applicable portions of Section 6.3 above with the following upon system implementation for NPRR1000 or NPRR1014; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]  **6.3 Adjustment Period and Real-Time Operations Timeline**  (1) The figure below highlights the major activities that occur in the Adjustment Period and Real-Time operations:  **Preparation for**  **Real**  **-**  **Time Ops**  **Adj Period**  **18:00**  **(D**  **–**  **1)**  **60 Minutes**  **Prior to**  **Op Hour**  **QSE Deadline:**  **Update Energy Bids and Offers**  **Update Output Schedules**  **ERCOT Activity:**  **LFC Process every 4 secs**  **Execute SCED every 5**  **mins**  **Communicate Instructions,**  **Awards & Prices**  **ERCOT Activity:**  **Snapshot Inputs &**  **Execute HRUC**  **Operating Period**  **Operating Hour**  **Clock**  **Hour**  **T**  **Adjustment Period & Real**  **-**  **Time Operations**  **Real**  **-**  **Time**  **Operations**  **QSE Deadline:**  **Update AS Offers**  **Provide SCADA Telemetry**  **Update Energy Bid/Offer Curves**  **ERCOT Activity:**  **Communicate**  **HRUC Commitments**  (2) Activities for the Adjustment Period begin at 1800 in the Day-Ahead and end one full hour before the start of the Operating Hour. The figure above is intended to be only a general guide and not controlling language, and any conflict between this figure and another section of the Protocols is controlled by the other section.  (3) ERCOT shall monitor Real-Time Locational Marginal Prices (LMPs), Real-Time Market Clearing Prices for Capacity (MCPCs), and Real-Time Settlement Point Prices, including Real-Time prices for energy metered, Real-Time Reliability Deployment Price Adders for Energy, and Real-Time Reliability Deployment Price Adders for Ancillary Service, for errors and if there are conditions that cause the price to be questionable, as soon as practicable, ERCOT shall notify all Market Participants that the Real-Time LMPs, Real-Time MCPCs, and Real-Time Settlement Point Prices are under investigation.  (4) ERCOT shall correct prices for an Operating Day when accurate prices can be determined, the impact of the price correction is determined to be significant, and one of the following conditions has been met: a market solution is determined to be invalid, invalid prices are identified in an otherwise valid market solution, the Base Points or Ancillary Service awards received by Market Participants are inconsistent with the Base Points or Ancillary Service awards of a valid market solution, or the Security-Constrained Economic Dispatch (SCED) process experiences a failure as described in Section 6.5.9.2, Failure of the SCED Process. The following are some reasons that may cause these conditions.  (a) Data Input error: Missing, incomplete, stale, or incorrect versions of one or more data elements input to the market applications may result in an invalid market solution and/or prices.  (b) Data Output error: These include: incorrect or incomplete data transfer, price recalculation error in post-processing, and Base Points inconsistent with prices due to the Emergency Base Point flag remaining activated even when the SCED solution is valid.  (c) Hardware/Software error: These include unpredicted hardware or software failures, planned market system or database outages, planned application or database upgrades, software implementation errors, and failure of the market run to complete.  (d) Inconsistency with the Protocols or Public Utility Commission of Texas (PUCT) Substantive Rules: Pricing errors may occur when specific circumstances result in prices that are in conflict with such Protocol language or the PUCT Substantive Rules.  (5) For purposes of a price correction performed prior to 1600 on the second Business Day after the Operating Day, the impact of a price correction shall be considered significant, as that term is used in paragraph (4) above, for the Operating Day when:  (a) The absolute value change to any single Real-Time Settlement Point Price at a Resource Node is greater than $0.05/MWh;  (b) The price correction would require ERCOT to change more than 50 Real-Time Settlement Point Prices;  (c) The absolute value change to any Real-Time Settlement Point Price at a Load Zone or Hub is greater than $0.02/MWh;  (d) The estimated absolute total dollar impact for changes to Real-Time prices for energy metered is greater than $500; or  (e) The absolute total dollar impact for changes to SASM MCPCs is greater than $500.  (6) If it is determined that any Real-Time Settlement Point Prices, Settlement Point LMPs, Electrical Bus LMPs, Real-Time prices for energy metered, Real-Time Reliability Deployment Price Adders for Energy, Real-Time MCPCs, Real-Time Reliability Deployment Price Adders for Ancillary Service, and/or constraint Shadow Prices are erroneous, ERCOT shall correct the prices before the prices are considered final in paragraph (7) below. Specifically:  (a) If it is determined that correcting the Real-Time Settlement Point Prices will not affect the Base Points, and correcting Real-Time MCPCs will not affect Ancillary Service awards, then ERCOT shall correct the prices before the prices are considered final in paragraph (7) below.  (b) If it is determined that correcting the Real-Time Settlement Point Prices will affect the Base Points, or correcting Real-Time MCPCs will affect Ancillary Service awards, then ERCOT shall correct the prices before the prices are considered final and settle the SCED executions as failed in accordance with Section 6.5.9.2.  (c) For Settlement purposes, if the Base Points are inconsistent with the Real-Time Settlement Point Prices, reduced by the Real-Time Reliability Deployment Price Adder for Energy, or Ancillary Service awards are inconsistent with the Real-Time MCPCs, reduced by the Real-Time Reliability Deployment Price Adder for Ancillary Service, averaged over the 15-minute Settlement Interval, then ERCOT shall consider the relevant Settlement Interval(s) in accordance with Section 6.6.9, Emergency Operations Settlement.  (7) All Real-Time LMPs, Real-Time Settlement Point Prices, Real-Time prices for energy metered, Real-Time Reliability Deployment Price Adders for Energy, Real-Time MCPCs, and Real-Time Reliability Deployment Price Adders for Ancillary Service are final at 1600 of the second Business Day after the Operating Day.  (a) However, after Real-Time LMPs, Real-Time Settlement Point Prices, Real-Time prices for energy metered, Real-Time Reliability Deployment Price Adders for Energy, Real-Time MCPCs, and Real-Time Reliability Deployment Price Adders for Ancillary Service are final, if ERCOT determines that prices qualify for a price correction pursuant to paragraph (4) above and that ERCOT will seek ERCOT Board review of such prices, it shall notify Market Participants and describe the need for such correction as soon as practicable but no later than 30 days after the Operating Day. Failure to notify Market Participants within this timeline precludes the ERCOT Board from reviewing such prices. However, nothing in this section shall be understood to limit or otherwise inhibit any of the following:  (i) ERCOT’s duty to inform the PUCT of potential or actual violations of the ERCOT Protocols or PUCT Rules and its right to request that the PUCT authorize correction of any prices that may have been affected by such potential or actual violations;  (ii) The PUCT’s authority to order price corrections when permitted to do so under other law; or  (iii) ERCOT’s authority to grant relief to a Market Participant pursuant to the timelines specified in Section 20, Alternative Dispute Resolution Procedure.  (b) Before seeking ERCOT Board review of prices, ERCOT will determine if the impact of the price correction is significant, as that term is used in paragraph (4) above, by calculating the potential changes to the RTM Settlement Statement(s) of any Counter-Party on a given Operating Day. ERCOT shall seek ERCOT Board review of prices if the change in RTM Settlement Statement(s) would result in the absolute value impact to any single Counter-Party, based on the sum of all original RTM Settlement Statement amounts of Market Participants assigned to the Counter-Party, to be greater than:  (i) 2% and also greater than $20,000; or  (ii) 20% and also greater than $2,000.  (c) The ERCOT Board may review and change Real-Time LMPs, Real-Time Settlement Point Prices, Real-Time prices for energy metered, Real-Time Reliability Deployment Price Adders for Energy, Real-Time MCPCs, and Real-Time Reliability Deployment Price Adders for Ancillary Service if ERCOT gave timely notice to Market Participants and the ERCOT Board finds that such prices should be corrected for an Operating Day.  (d) In review of Real-Time LMPs, Real-Time Settlement Point Prices, Real-Time prices for energy metered, Real-Time Reliability Deployment Price Adders for Energy, Real-Time MCPCs, and Real-Time Reliability Deployment Price Adders for Ancillary Service, the ERCOT Board may rely on the same reasons identified in paragraph (4) above to find that the prices should be corrected for an Operating Day. |

6.3.1 Activities for the Adjustment Period

(1) The following table summarizes the timeline for the Adjustment Period and the activities of QSEs and ERCOT. The table is intended to be only a general guide and not controlling language, and any conflict between this table and another section of the Protocols is controlled by the other section:

| Adjustment Period | QSE Activities | ERCOT Activities |
| --- | --- | --- |
| Time = From 1800 in the Day-Ahead up to one hour before the start of the Operating Hour | Submit and update Energy Trades, Capacity Trades, Self-Schedules, and Ancillary Service Trades  Submit and update Output Schedules  Submit and update Incremental and Decremental Energy Offer Curves for Dynamically Scheduled Resources (DSRs)   |  | | --- | | [NPRR1000: Delete the item above upon system implementation.] |   Submit and update Energy Offer Curves and/or RTM Energy Bids   |  | | --- | | [NPRR1014: Insert the item below upon system implementation:]  Submit Energy Bid/Offer Curves for Energy Storage Resources (ESRs) |   Update Current Operating Plan (COP)  Request Resource decommitments  Submit Three-Part Supply Offers for Off-Line Generation Resources  Submit offers for any Supplemental Ancillary Service Markets   |  | | --- | | [NPRR1010 and NPRR1014: Replace applicable portions of the item above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation for NPRR1014:]  Submit and update Ancillary Service Offers |   Communicate Resource Forced Outages | Post shift schedules on the Market Information System (MIS) Secure Area  Validate Energy Trades, Capacity Trades, Self-Schedules, and Ancillary Service Trades and identify invalid or mismatched trades  Validate Output Schedules  Validate Incremental and Decremental Energy Offer Curves  Validate Energy Offer Curves and/or RTM Energy Bids   |  | | --- | | [NPRR1014: Insert the item below upon system implementation:]  Validate Energy Bid/Offer Curves |   Validate COP including validation of the deliverability of Ancillary Services from Resources for the next Operating Period  Review and approve or reject Resource decommitments  Validate Three-Part Supply Offers  Publish Notice of Need to Procure Additional Ancillary Service capacity if required   |  | | --- | | [NPRR1010 and NPRR1014: Replace applicable portions of the item above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation for NPRR1014:]  Publish Notice of need to update the Ancillary Service Plan if required and update the Ancillary Service Demand Curves (ASDCs) for the affected hours and Ancillary Services |   Validate Ancillary Service Offers  At the end of the Adjustment Period snap-shot the net capacity credits for Hourly Reliability Unit Commitment (HRUC) Settlement  Update Short-Term Wind Power Forecast (STWPF)  Update Short-Term PhotoVoltaic Power Forecast (STPPF)  Execute the Hour-Ahead Sequence  Notify the QSE via the MIS Certified Area that an Energy Offer Curve, RTM Energy Bid or Output Schedule has not yet been submitted for a Resource as a reminder that one of the three must be submitted by the end of the Adjustment Period   |  | | --- | | [NPRR1010 and NPRR1014: Insert applicable portions of the items below upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation for NPRR1014:]  Notify the QSE via the MIS Certified Area that an Ancillary Service Offer has not yet been submitted for a Resource by the end of the Adjustment Period  Notify the QSE via the MIS Certified Area that an Energy Bid/Offer Curve has not yet been submitted for an ESR by the end of the Adjustment Period | |

6.3.2 Activities for Real-Time Operations

(1) Activities for Real-Time operations begin at the end of the Adjustment Period and conclude at the close of the Operating Hour.

(2) The following table summarizes the timeline for the Operating Period and the activities of QSEs and ERCOT during Real-Time operations where “T” represents any instant within the Operating Hour. The table is intended to be only a general guide and not controlling language, and any conflict between this table and another section of the Protocols is controlled by the other section:

| **Operating Period** | **QSE Activities** | **ERCOT Activities** |
| --- | --- | --- |
| During the first hour of the Operating Period |  | Execute the Hour-Ahead Sequence, including HRUC, beginning with the second hour of the Operating Period  Review the list of Off-Line Available Resources with a start-up time of one hour or less  Review and communicate HRUC commitments and Direct Current Tie (DC Tie) Schedule curtailments  Snapshot the Scheduled Power Consumption for Controllable Load Resources |
| Before the start of each SCED run | Update Output Schedules for DSRs | Validate Output Schedules for DSRs  Execute Real-Time Sequence |
| SCED run |  | Execute SCED and pricing run to determine impact of reliability deployments on energy prices |
| During the Operating Hour | Telemeter the Ancillary Service Resource Responsibility for each Resource  Acknowledge receipt of Dispatch Instructions  Comply with Dispatch Instruction    Review Resource Status to assure current state of the Resources is properly telemetered  Update COP with actual Resource Status and limits and Ancillary Service Schedules  Communicate Resource Forced Outages to ERCOT  Communicate to ERCOT Resource changes to Ancillary Service Resource Responsibility via telemetry in the time window beginning 30 seconds prior to the five-minute clock interval and ending ten seconds prior to that five-minute clock interval | Communicate all binding Base Points, Dispatch Instructions, and the sum of each type of available reserves, including total Real-Time reserve amount for On-Line reserves, total Real-Time reserve amount for Off-Line reserves, Real-Time Reserve Price Adders for On-Line Reserves, and Real-Time Reserve Price Adders for Off-Line Reserves and LMPs for energy and Ancillary Services, and for the pricing run as described in Section 6.5.7.3.1, Determination of Real-Time On-Line Reliability Deployment Price Adder, the total Reliability Unit Commitment (RUC)/Reliability Must-Run (RMR) MW relaxed, total Load Resource MW deployed that is added to the Demand, total Emergency Response Service (ERS) MW deployed that is added to the Demand, total emergency DC Tie MW that is added to or subtracted from the Demand, total Block Load Transfer (BLT) MW that is added to or subtracted from the Demand, total Low Ancillary Service Limit (LASL), total High Ancillary Service Limit (HASL), Real-Time On-Line Reliability Deployment Price Adder using Inter-Control Center Communications Protocol (ICCP) or Verbal Dispatch Instructions (VDIs)  Monitor Resource Status and identify discrepancies between COP and telemetered Resource Status  Restart Real-Time Sequence on major change of Resource or Transmission Element Status  Monitor ERCOT total system capacity providing Ancillary Services  Validate COP information  Monitor ERCOT control performance  Distribute by ICCP, and post on the ERCOT website, System Lambda and the LMPs for each Resource Node, Load Zone and Hub, and the sum of each type of available reserves, including total Real-Time reserve amount for On-Line reserves, total Real-Time reserve amount for Off-Line reserves, Real-Time Reserve Price Adders for On-Line Reserves and Real-Time Reserve Price Adders for Off-Line Reserves, and for the pricing run as described in Section 6.5.7.3.1 the total RUC/RMR MW relaxed, total Load Resource MW deployed that is added to the Demand, total ERS MW deployed that is added to the Demand, total emergency DC Tie MW that is added to or subtracted from the Demand, total BLT MW that is added to or subtracted from the Demand, total On-Line LASL, total On-Line HASL, Real-Time On-Line Reliability Deployment Price Adder created for each SCED process. These prices shall be posted immediately subsequent to deployment of Base Points from SCED with the time stamp the prices are effective  Post on the ERCOT website the nodal prices for Settlement Only Distribution Generators (SODGs) and Settlement Only Transmission Generator (SOTGs). These prices shall include all Real-Time Reserve Price Adders for On-Line Reserves and Real-Time On-Line Reliability Deployment Price Adders created for each SCED process. These prices shall be posted immediately subsequent to deployment of Base Points from SCED with the time stamp the prices are effective  Post LMPs for each Electrical Bus on the ERCOT website. These prices shall be posted immediately subsequent to deployment of Base Points from each binding SCED with the time stamp the prices are effective  Post on the ERCOT website the projected non-binding LMPs created by each SCED process for each Resource Node, the projected total Real-Time reserve amount for On-Line reserves and Off-Line reserves, the projected Real-Time On-Line Reserve Price Adders and Real-Time Off-Line Reserve Price Adders, and for the projected non-binding pricing runs as described in Section 6.5.7.3.1 the total RUC/RMR MW relaxed, total Load Resource MW deployed that is added to Demand, total emergency DC Tie MW that is added to or subtracted from the Demand, total BLT MW that is added to or subtracted from the Demand, total ERS MW deployed that are deployed that is added to the Demand, total LASL, total HASL, Real-Time On-Line Reliability Deployment Price Adder and the projected Hub LMPs and Load Zone LMPs. These projected prices shall be posted at a frequency of every five minutes from SCED for at least 15 minutes in the future with the time stamp of the SCED process that produced the projections  Post on the MIS Certified Area the projected non-binding Base Points for each Resource created by each SCED process. These projected non-binding Base Points shall be posted at a frequency of every five minutes from SCED for at least 15 minutes in the future with the time stamp of the SCED process that produced the projections  Post each hour on the ERCOT website binding SCED Shadow Prices and active binding transmission constraints by Transmission Element name (contingency /overloaded element pairs)  Post on the ERCOT website the Settlement Point Prices for each Settlement Point and the Real-Time price for each SODG and SOTG immediately following the end of each Settlement Interval  Post the Real-Time On-Line Reliability Deployment Price, Real-Time Reserve Price for On-Line Reserves and the Real-Time Reserve Price for Off-Line Reserves immediately following the end of each Settlement Interval  Post parameters as required by Section 6.4.9, Ancillary Services Capacity During the Adjustment Period and in Real-Time, on the ERCOT website |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR829, NPRR904, NPRR995, NPRR1000, NPRR1006, NPRR1010, NPRR1058, NPRR1077, and NPRR1149: Replace applicable portions of paragraph (2) above with the following upon system implementation for NPRR829, NPRR904, NPRR995, NPRR1000, NPRR1006, NPRR1058, NPRR1077, or NPRR1149; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]  (2) The following table summarizes the timeline for the Operating Period and the activities of QSEs and ERCOT during Real-Time operations where “T” represents any instant within the Operating Hour. The table is intended to be only a general guide and not controlling language, and any conflict between this table and another section of the Protocols is controlled by the other section:   | **Operating Period** | **QSE Activities** | **ERCOT Activities** | | --- | --- | --- | | During the first hour of the Operating Period |  | Execute the Hour-Ahead Sequence, including HRUC, beginning with the second hour of the Operating Period  Review the list of Off-Line Available Resources with a start-up time of one hour or less  Review and communicate HRUC commitments and Direct Current Tie (DC Tie) Schedule curtailments  Snapshot the Scheduled Power Consumption for Controllable Load Resources | | SCED run |  | Execute SCED and pricing run to determine impact of reliability deployments on energy and Ancillary Service prices | | During the Operating Hour | Acknowledge receipt of Dispatch Instructions  Comply with Dispatch Instruction    Review Resource Status to assure current state of the Resources is properly telemetered  Update COP and telemetry with actual Resource Status and limits and Ancillary Service capabilities  Submit and update Ancillary Service Offers  Communicate Resource Forced Outages to ERCOT  Submit and update Energy Offer Curves and/or RTM Energy Bids | Communicate all binding Base Points, Updated Desired Set Points (UDSPs), Ancillary Service awards, Dispatch Instructions, LMPs for energy, Real-Time MCPCs for Ancillary Services, and for the pricing run as described in Section 6.5.7.3.1, Determination of Real-Time Reliability Deployment Price Adders, the total Reliability Unit Commitment (RUC)/Reliability Must-Run (RMR) MW relaxed, total Load Resource MW deployed that is added to the Demand, total Transmission and/or Distribution Service Provider (TDSP) standard offer Load management MW deployed that is added to the Demand, total Emergency Response Service (ERS) MW deployed that is added to the Demand, total ERCOT-directed DC Tie MW that is added to or subtracted from the Demand, total Block Load Transfer (BLT) MW that is added to or subtracted from the Demand Real-Time Reliability Deployment Price Adder for Energy, and Real-Time Reliability Deployment Price Adders for Ancillary Service using Inter-Control Center Communications Protocol (ICCP) or Verbal Dispatch Instructions (VDIs). In communicating Ancillary Service awards, the awards shall be broken out by Ancillary Service sub-type, where applicable  Monitor Resource Status and identify discrepancies between COP and telemetered Resource Status  Restart Real-Time Sequence on major change of Resource or Transmission Element Status  Monitor ERCOT total system capacity providing Ancillary Services  Validate COP information  Validate Ancillary Service Trades  Monitor ERCOT control performance  Distribute by ICCP, and post on the ERCOT website, System Lambda and the LMPs for each Resource Node, Load Zone and Hub, and Real-Time MCPCs for each Ancillary Service, and for the pricing run as described in Section 6.5.7.3.1 the total RUC/RMR MW relaxed, total Load Resource MW deployed that is added to the Demand, total ERS MW deployed that is added to the Demand, total TDSP standard offer Load management MW deployed that is added to the Demand, total ERCOT-directed DC Tie MW that is added to or subtracted from the Demand, total BLT MW that is added to or subtracted from the Demand, Real-Time Reliability Deployment Price Adder for Energy, and Real-Time Reliability Deployment Price Adders for Ancillary Service created for each SCED process. These prices shall be posted immediately subsequent to deployment of Base Points and Ancillary Service awards from SCED with the time stamp the prices are effective  Post on the ERCOT website the nodal prices for Settlement Only Distribution Generators (SODGs), Settlement Only Distribution Energy Storage Systems (SODESSs), Settlement Only Transmission Generators (SOTGs), and Settlement Only Transmission Energy Storage Systems (SOTESSs). These prices shall include Real-Time Reliability Deployment Price Adders for Energy created for each SCED process. These prices shall be posted immediately subsequent to deployment of Base Points from SCED with the time stamp the prices are effective  Post LMPs for each Electrical Bus on the ERCOT website. These prices shall be posted immediately subsequent to deployment of Base Points from each binding SCED with the time stamp the prices are effective  Post every 15 minutes on the ERCOT website the aggregate net injection from Settlement Only Generators (SOGs) and Settlement Only Energy Storage Systems (SOESSs)  Post on the ERCOT website the projected non-binding LMPs for each Resource Node and Real-Time MCPCs for each Ancillary Service created by each SCED process and for the projected non-binding pricing runs as described in Section 6.5.7.3.1 the total RUC/RMR MW relaxed, total Load Resource MW deployed that is added to Demand, total TDSP standard offer Load management MW deployed that is added to the Demand, total ERCOT-directed DC Tie MW that is added to or subtracted from the Demand, total BLT MW that is added to or subtracted from the Demand, total ERS MW deployed that are deployed that is added to the Demand, Real-Time Reliability Deployment Price Adder for Energy, Real-Time On-Line Reliability Deployment Price Adders for Ancillary Service, and the projected Hub LMPs and Load Zone LMPs. These projected prices shall be posted at a frequency of every five minutes from SCED for at least 15 minutes in the future with the time stamp of the SCED process that produced the projections  Post on the MIS Certified Area the projected non-binding Base Points and Ancillary Service awards for each Resource created by each SCED process. These projected non-binding Base Points shall be posted at a frequency of every five minutes from SCED for at least 15 minutes in the future with the time stamp of the SCED process that produced the projections. In posting Ancillary Service awards, the awards shall be broken out by Ancillary Service sub-type, where applicable  Post each hour on the ERCOT website binding SCED Shadow Prices and active binding transmission constraints by Transmission Element name (contingency /overloaded element pairs)  Post on the ERCOT website, the Settlement Point Prices for each Settlement Point and the Real-Time price for each SODG, SODESS, SOTG, and SOTESS immediately following the end of each Settlement Interval  By Settlement Interval, post the 15-minute Real-Time Reliability Deployment Price for Energy, and the 15-minute Real-Time Reliability Deployment Price for Ancillary Service for each of the Ancillary Services | |

(3) At the beginning of each hour, ERCOT shall post on the ERCOT website the following information:

(a) Changes in ERCOT System conditions that could affect the security and dynamic transmission limits of the ERCOT System, including:

(i) Changes or expected changes, in the status of Transmission Facilities as recorded in the Outage Scheduler for the remaining hours of the current Operating Day and all hours of the next Operating Day; and

(ii) Any conditions such as adverse weather conditions as determined from the ERCOT-designated weather service;

(b) Updated system-wide Mid-Term Load Forecasts (MTLFs) for all forecast models available to ERCOT Operations, as well as an indicator for which forecast was in use by ERCOT at the time of publication;

(c) The quantities of RMR Services deployed by ERCOT for each previous hour of the current Operating Day; and

(d) Total ERCOT System Demand, from Real-Time operations, integrated over each Settlement Interval.

(4) No later than 0600, ERCOT shall post on the ERCOT website the actual system Load by Weather Zone, the actual system Load by Forecast Zone, and the actual system Load by Study Area for each hour of the previous Operating Day.

(5) ERCOT shall provide notification to the market and post on the ERCOT website Electrical Bus Load distribution factors and other information necessary to forecast Electrical Bus Loads. This report will be published when updates to the Load distribution factors are made. Private Use Network net Load will be redacted from this posting.

|  |
| --- |
| [NPRR1010: Insert paragraphs (6) and (7) below upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (6) After every SCED run, ERCOT shall post to the ERCOT website the total capability of Resources available to provide the following Ancillary Service combinations, based on the Resource telemetry from the QSE and capped by the limits of the Resource, for the most recent SCED execution:  (a) Capacity to provide Reg-Up, irrespective of whether it is capable of providing any other Ancillary Service;  (b) Capacity to provide RRS, irrespective of whether it is capable of providing any other Ancillary Service;  (c) Capacity to provide ECRS, irrespective of whether it is capable of providing any other Ancillary Service;  (d) Capacity to provide Non-Spin, irrespective of whether it is capable of providing any other Ancillary Service;  (e) Capacity to provide Reg-Up, RRS, or both, irrespective of whether it is capable of providing ECRS or Non-Spin;  (f) Capacity to provide Reg-Up, RRS, ECRS, or any combination, irrespective of whether it is capable of providing Non-Spin;  (g) Capacity to provide Reg-Up, RRS, ECRS, Non-Spin, or any combination; and  (h) Capacity to provide Reg-Down.  (7) Each week, ERCOT shall post on the ERCOT website the historical SCED-interval data described in paragraph (6) above. |

6.3.3 Real-Time Timeline Deviations

(1) ERCOT may temporarily deviate from the Real-Time deadlines but only to the extent necessary to ensure the secure operation of the ERCOT System. Temporary measures may include varying the timing requirements as specified below or omitting one or more procedures in the Real-Time Sequence. In such an event, ERCOT shall immediately issue a Watch and notify all QSEs of the following:

(a) Details of the affected timing requirements and procedures;

(b) Details of any interim requirements;

(c) An estimate of the period for which the interim requirements apply; and

(d) Reasons for the temporary variation.

6.3.4 ERCOT Notification of Validation Rules for Real-Time

(1) ERCOT shall provide each QSE with the information necessary to pre-validate its data for Real-Time operations, including publishing validation rules for offers, bids, and trades.

6.4 Adjustment Period

6.4.1 Capacity Trade, Energy Trade, Self-Schedule, and Ancillary Service Trades

(1) A detailed explanation of Capacity Trade criteria and validations performed by ERCOT is provided in Section 4.4.1, Capacity Trades. A Qualified Scheduling Entity (QSE) may submit and update Capacity Trades during the Adjustment Period.

(2) A detailed explanation of Energy Trade criteria and validations performed by ERCOT is provided in Section 4.4.2, Energy Trades. A QSE may submit and update Energy Trades during the Adjustment Period and through 1430 on the day following the Operating Day for Settlement.

(3) A detailed explanation of Self-Schedule criteria and validations performed by ERCOT is provided in Section 4.4.3, Self-Schedules. A QSE may submit and update Self-Schedules during the Adjustment Period.

(4) A detailed explanation of Ancillary Service Trade criteria and validations performed by ERCOT is provided in Section 4.4.7.3, Ancillary Service Trades. A QSE may submit and update Ancillary Service Trades during the Adjustment Period.

|  |
| --- |
| [NPRR1149: Replace paragraph (4) above with the following upon system implementation:]  (4) A detailed explanation of Ancillary Service Trade criteria and validations performed by ERCOT is provided in Section 4.4.7.3, Ancillary Service Trades. A QSE may submit and update Ancillary Service Trades during the Adjustment Period and through the Operating Period for Settlement. |

6.4.2 Output Schedules

(1) A QSE that represents a Resource, other than an RMR Unit, must submit and maintain either an Energy Offer Curve or an Output Schedule for the Resource for all times when the Resource is On-Line.

(2) The entry of an Energy Offer Curve for a Resource automatically nullifies the Output Schedule for that Resource and prohibits entry of future Output Schedules for that Resource for the time during which the Energy Offer Curve is in effect.

(3) For a Resource for which an Energy Offer Curve has not been submitted, the Security-Constrained Economic Dispatch (SCED) process uses the Output Schedule submitted for that Resource as desired Dispatch levels for the Resource.

|  |
| --- |
| [NPRR1014: Replace Section 6.4.2 above with the following upon system implementation:]  ***6.4.2 Output Schedules***  (1) A QSE that represents a Resource, other than an RMR Unit, must submit and maintain an Energy Offer Curve, an Energy Bid/Offer Curve, or an Output Schedule for the Resource for all times when the Resource is On-Line.  (2) The entry of an Energy Offer Curve or Energy Bid/Offer Curve for a Resource automatically nullifies the Output Schedule for that Resource and prohibits entry of future Output Schedules for that Resource for the time during which the Energy Offer Curve or Energy Bid/Offer Curve is in effect.  (3) For a Resource for which an Energy Offer Curve or Energy Bid/Offer Curve has not been submitted, the Security-Constrained Economic Dispatch (SCED) process uses the Output Schedule submitted for that Resource as desired Dispatch levels for the Resource. |

6.4.2.1 Output Schedules for Resources Other than Dynamically Scheduled Resources

(1) An Output Schedule for a non-DSR Resource may be submitted and updated only during the Adjustment Period. An Output Schedule for a non-DSR Resource may be submitted and updated for each five-minute interval for each Operating Hour.

(2) For a Resource that is not a DSR and that is On-Line, the following provisions apply:

(a) The Output Schedule for a Qualifying Facility (QF) not submitting an Energy Offer Curve is considered to be equal to the telemetered output of the QF at the time that the SCED runs;

(b) The Output Schedule for Intermittent Renewable Resources (IRR) not submitting Energy Offer Curves is considered to be equal to the telemetered output of the Resource at the time that the SCED runs; and

(c) ERCOT shall create proxy Energy Offer Curves for the Resource under paragraph (4)(a) of Section 6.5.7.3, Security Constrained Economic Dispatch.

|  |
| --- |
| [NPRR1000 and NPRR1014: Replace applicable portions of Section 6.4.2.1 above with the following upon system implementation:]  **6.4.2.1 Output Schedules for Resources**  (1) An Output Schedule for a Resource may be submitted and updated only during the Adjustment Period. An Output Schedule for a Resource may be submitted and updated for each five-minute interval for each Operating Hour.  (2) For a Resource that is On-Line, the following provisions apply:  (a) The Output Schedule for a Qualifying Facility (QF) not submitting an Energy Offer Curve is considered to be equal to the telemetered output of the QF at the time that the SCED runs;  (b) The Output Schedule for Intermittent Renewable Resources (IRR) not submitting Energy Offer Curves is considered to be equal to the telemetered output of the Resource at the time that the SCED runs; and  (c) ERCOT shall create proxy Energy Offer Curves or proxy Energy Bid/Offer Curves for the Resource under paragraph (4)(a) of Section 6.5.7.3, Security Constrained Economic Dispatch. |

6.4.2.2 Output Schedules for Dynamically Scheduled Resources

(1) A QSE representing a DSR may update the Output Schedule for a dispatch interval at any time before the SCED process for that interval.

(2) For a DSR that is On-Line, the following provisions apply:

(a) For an On-Line DSR for which its QSE has not submitted an Incremental and Decremental Energy Offer Curve, ERCOT shall use the Output Schedule available at the SCED snapshot for the execution of the SCED and shall assume that the scheduled MW amount in the Output Schedule is the Base Point for the DSR for that SCED interval. ERCOT shall create proxy Energy Offer Curves for the DSR under paragraph (4)(a) of Section 6.5.7.3, Security Constrained Economic Dispatch.

(b) If the QSE representing a DSR submits an Incremental and Decremental Energy Offer Curve under Section 6.4.5, Incremental and Decremental Energy Offer Curves, then ERCOT shall use the Incremental and Decremental Energy Offer Curve to create proxy Energy Offer Curves for the DSR under paragraph (4)(b) of Section 6.5.7.3.

(c) For a DSR that is dispatched to a Base Point other than its Output Schedule for that SCED interval, the Base-Point Deviation Charge under Section 6.6.5.1, Resource Base Point Deviation Charge, applies:

(i) Beginning after four consecutive, complete 15-minute Settlement Intervals have occurred after the DSR is dispatched to a Base Point other than its Output Schedule; and

(ii) Ending when the DSR is no longer dispatched to a Base Point other than its Output Schedule.

(d) After the DSR is no longer dispatched to a Base Point other than its Output Schedule, the 15 MW or 15% limit, whichever is greater, under paragraph (3) of Section 6.4.2.3, Output Schedule Criteria, does not apply to the DSR until four consecutive, complete 15-minute Settlement Intervals have occurred after the DSR is no longer dispatched to a Base Point other than its Output Schedule.

|  |
| --- |
| [NPRR1000: Delete Section 6.4.2.2 above upon system implementation and renumber accordingly.] |

6.4.2.3 Output Schedule Criteria

(1) An Output Schedule submitted by a QSE for a Resource must include the following:

(a) The name of the Entity submitting the Output Schedule for the Resource;

(b) The name of the Resource;

(c) The desired MW output level for each five-minute interval for the Resource for all of the remaining five-minute intervals in the Operating Day for which an Energy Offer Curve has not been submitted.

|  |
| --- |
| [NPRR1014: Replace paragraph (c) above with the following upon system implementation:]  (c) The desired MW output level for each five-minute interval for the Resource for all of the remaining five-minute intervals in the Operating Day for which an Energy Offer Curve or Energy Bid/Offer Curve has not been submitted. |

(2) ERCOT must reject an Output Schedule for a Resource if an Energy Offer Curve corresponding to any period in the Output Schedule exists;

|  |
| --- |
| [NPRR1014: Replace paragraph (2) above with the following upon system implementation:]  (2) ERCOT must reject an Output Schedule for a Resource if an Energy Offer Curve or Energy Bid/Offer Curve corresponding to any period in the Output Schedule exists; |

(3) For a QSE representing one or more DSRs, the sum of all Output Schedules (excluding Ancillary Services energy deployments, energy deployed through Dispatch Instructions, and Energy Trades) for the QSE must be within 15% or 15 MW (whichever is greater) of the aggregate telemetered DSR Load;

|  |
| --- |
| [NPRR1000: Delete paragraph (3) above upon system implementation and renumber accordingly.] |

(4) The MW difference between Output Schedules for any two consecutive five-minute intervals must be less than ten times the SCED Up Ramp Rate (SURAMP) for schedules showing an increase from the prior period and the SCED Down Ramp Rate (SDRAMP) for schedules showing a decrease from the prior period.

|  |
| --- |
| [NPRR1010 and NPRR1014: Replace applicable portions of paragraph (4) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation for NPRR1014:]  (4) The MW difference between Output Schedules for any two consecutive five-minute intervals must be less than ten times the Normal Ramp Rate up for schedules showing an increase from the prior period and the Normal Ramp Rate down for schedules showing a decrease from the prior period. |

(5) The Output Schedule for each interval in the Operating Period must be less than or equal to the Resource’s High Sustained Limit (HSL) and must be greater than or equal to the Resource’s Low Sustained Limit (LSL) for the corresponding hour.

6.4.2.4 Output Schedule Validation

(1) A validated Output Schedule is a schedule that ERCOT has determined meets the criteria listed in Section 6.4.2.3, Output Schedule Criteria.

(2) ERCOT shall notify the QSE submitting an Output Schedule by the Messaging System if the schedule was rejected or was considered invalid for any reason. The QSE may then resubmit the schedule within the appropriate market timeline.

(3) ERCOT shall continuously validate Output Schedules and continuously display on the Market Information System (MIS) Certified Area information that allows any QSE to view its valid Output Schedule.

(4) If a valid Output Schedule does not exist for a Resource that has a status of On-Line DSR at the time of SCED execution, then ERCOT shall notify the QSE and set the Output Schedule equal to the telemetered output of the Resource until a revised Output Schedule is validated.

|  |
| --- |
| [NPRR1000: Delete paragraph (4) above upon system implementation and renumber accordingly.] |

(5) For Generation Resources with a Resource Status other than ONTEST, STARTUP, or SHUTDOWN, if a valid Energy Offer Curve or an Output Schedule does not exist for a non-DSR that has a status of On-Line at the end of the Adjustment Period, then ERCOT shall notify the QSE and set the Output Schedule equal to the then current telemetered output of the Resource until an Output Schedule or Energy Offer Curve is submitted in a subsequent Adjustment Period.

|  |
| --- |
| [NPRR1046: Replace paragraph (5) above with the following upon system implementation of NPRR1000:]  (5) For Generation Resources with a Resource Status other than ONTEST, STARTUP, or SHUTDOWN, if a valid Energy Offer Curve or an Output Schedule does not exist for a Resource that has a status of On-Line at the end of the Adjustment Period, then ERCOT shall notify the QSE and set the Output Schedule equal to the then current telemetered output of the Resource until an Output Schedule or Energy Offer Curve is submitted in a subsequent Adjustment Period. |

6.4.2.5 DSR Load

(1) A QSE may designate a Resource in the Current Operating Plan (COP) and through the telemetered Resource Status as a participant in the QSE’s control of DSR Load under the requirements in Section 16.2.3.1, Process to Gain Approval to Follow DSR Load.

(2) Each QSE may not have more than one DSR Load.

(3) The following principles for DSR Load apply:

(a) All power signals for DSR Load must be sent to ERCOT in Real-Time by telemetry; and

(b) If a DSR Load signal is lost for any reason for a period greater than one 15-minute Settlement Interval, then ERCOT shall notify the QSE and suspend validation of DSR Output Schedules. If the DSR Load signal fails for more than ten consecutive hours, ERCOT shall suspend the QSE’s ability to use DSRs until the signal is reliably restored (as determined by ERCOT). If the signal failure is identified to be an ERCOT communication problem, ERCOT may not suspend the QSE’s ability to use DSRs.

|  |
| --- |
| [NPRR1000: Delete Section 6.4.2.5 above upon system implementation.] |

6.4.3 Real-Time Market (RTM) Energy Bids and Offers

6.4.3.1 RTM Energy Bids

(1) A QSE may submit Controllable Load Resource-specific Real-Time Market (RTM) Energy Bids by the end of the Adjustment Period on behalf of a Load Serving Entity (LSE) representing a Controllable Load Resource.

|  |
| --- |
| [NPRR1058: Delete paragraph (1) above upon system implementation and renumber accordingly.] |

(2) An RTM Energy Bid represents the willingness to buy energy at or below a certain price, not to exceed the System-Wide Offer Cap (SWCAP), for the Demand response capability of a Controllable Load Resource in the RTM.

|  |
| --- |
| [NPRR1010: Replace paragraph (2) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (2) An RTM Energy Bid represents the willingness to buy energy at or below a certain price, not to exceed the effective Value of Lost Load (VOLL), for the Demand response capability of a Controllable Load Resource in the RTM. |

(3) RTM Energy Bids remain active for the offered period until either:

(a) Selected by ERCOT; or

(b) Automatically inactivated at the offer expiration time specified in the RTM Energy Bid.

|  |
| --- |
| [NPRR1058: Replace paragraph (3) above with the following upon system implementation:]  (3) RTM Energy Bids remain active for the offered period until automatically inactivated at the offer expiration time specified in the RTM Energy Bid. |

(4) For any Operating Hour, the QSE may submit or change an RTM Energy Bid in the Adjustment Period. If, by the end of the Adjustment Period, the QSE has not submitted a valid RTM Energy Bid, ERCOT shall create a proxy RTM Energy Bid for the entire Demand response capability of that Load Resource with a not-to-exceed price at the SWCAP.

|  |
| --- |
| [NPRR1058: Replace paragraph (4) above with the following upon system implementation:]  (4) For any Operating Hour, the QSE may submit or change an RTM Energy Bid at any time prior to SCED execution, and SCED will use the latest updated RTM Energy Bid available in the system. If a new RTM Energy Bid is not deemed to be valid, then the most recent valid RTM Energy Bid available in the system at the time of SCED execution will be used and ERCOT will notify the QSE that the invalid RTM Energy Bid was rejected. Once an Operating Hour ends, an RTM Energy Bid for that hour cannot be submitted, updated, or canceled.  (5) If the QSE has not submitted a valid RTM Energy Bid for an Operating Hour, ERCOT shall create a proxy RTM Energy Bid for the entire Demand response capability of that Load Resource with a not-to-exceed price at the SWCAP. |

|  |
| --- |
| [NPRR1010: Replace paragraph (4) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (4) For any Operating Hour, the QSE may submit or change an RTM Energy Bid in the Adjustment Period. If, by the end of the Adjustment Period, the QSE has not submitted a valid RTM Energy Bid, ERCOT shall create a proxy RTM Energy Bid for the entire Demand response capability of that Load Resource with a not-to-exceed price at the effective VOLL. |

(5) The QSE may remove the Controllable Load Resource from SCED Dispatch by changing the Load Resource’s telemetered Resource Status or ramp rates appropriately. The QSE will update the COP Resource Status accordingly as soon as practicable.

(6) Notwithstanding any other provisions in this subsection, a QSE representing an Energy Storage Resource (ESR) may submit or update its RTM Energy Bid for that ESR at any time prior to SCED execution, and SCED will use the latest updated RTM Energy Bid available in the system. If a new RTM Energy Bid is not deemed to be valid, then the most recent valid RTM Energy Bid available in the system at the time of SCED execution will be used and ERCOT will notify the QSE that the invalid RTM Energy Bid was rejected. Once an Operating Hour ends, an RTM Energy Bid for that hour cannot be submitted, updated, or canceled.

|  |
| --- |
| [NPRR1058: Delete paragraph (6) above upon system implementation.] |

6.4.3.1.1 RTM Energy Bid Criteria

(1) Each RTM Energy Bid submitted by a QSE must include the following information:

(a) The QSE;

(b) The relevant Load Resource;

(c) A bid curve with no more than ten price/quantity pairs with monotonically non-increasing not-to-exceed prices (in $/MWh) and with increasing quantities ranging from zero to the Load Resource’s maximum demand response capability (in MW) represented by the difference between the Load Resource’s telemetered Maximum Power Consumption (MPC) and Low Power Consumption (LPC);

(d) The first and last hour of the bid; and

(e) The expiration time and date of the bid.

(2) The software systems must be able to provide ERCOT with the ability to enter Resource-specific RTM Energy Bid floors and caps.

(3) The minimum amount per Load Resource for each RTM Energy Bid that may be submitted is one-tenth (0.1) MW.

(4) If a Controllable Load Resource is carrying Ancillary Service Resource Responsibility, its RTM Energy Bid must be priced no higher than the SWCAP.

|  |
| --- |
| [NPRR1010: Replace paragraph (4) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (4) If a Controllable Load Resource is offering to provide an Ancillary Service, its RTM Energy Bid must be priced no higher than the effective VOLL. |

6.4.3.1.2 RTM Energy Bid Validation

(1) A valid RTM Energy Bid is a bid that ERCOT has determined meets the criteria listed in Section 6.4.3.1.1, RTM Energy Bid Criteria.

(2) ERCOT shall notify the QSE submitting an RTM Energy Bid by the Messaging System if the bid was rejected or was considered invalid for any reason. The QSE may then resubmit the bid within the appropriate market timeline.

(3) ERCOT shall continuously validate RTM Energy Bids and continuously display on the MIS Certified Area information that allows any QSE to view its valid RTM Energy Bids.

6.4.4 Energy Offer Curve

(1) A detailed description of Energy Offer Curve and validations performed by ERCOT is in Section 4.4.9, Energy Offers and Bids.

(2) For an On-Line RMR Unit, ERCOT shall submit an Energy Offer Curve considering contractual constraints on the Resource and any other adverse effects on, or implications arising from, the RMR Agreement, that may occur as the result of the Dispatch of the RMR Unit. The RMR Unit’s Energy Offer Curve must price all energy at the SWCAP in $/MWh.

(3) For Generation Resources with a Resource Status other than ONTEST, STARTUP, or SHUTDOWN, if a valid Energy Offer Curve or an Output Schedule does not exist for a Resource that has a status of On-Line at the end of the Adjustment Period, then ERCOT shall notify the QSE. Except for IRRs, QF Resources, and DSRs, ERCOT shall create an Output Schedule equal to the then-current telemetered output of the Resource until an Output Schedule or Energy Offer Curve is submitted in a subsequent Adjustment Period.

|  |
| --- |
| [NPRR1000, NPRR1010, NPRR1014, and NPRR1058: Replace applicable portions of Section 6.4.4 above with the following upon system implementation for NPRR1000, NPRR1014, or NPRR1058; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]  ***6.4.4 Energy Offer Curve and Energy Bid/Offer Curve***  (1) A detailed description of Energy Offer Curve, Energy Bid/Offer Curve, and validations performed by ERCOT is in Section 4.4.9, Energy Offers and Bids.  (2) For an On-Line RMR Unit, ERCOT shall submit an Energy Offer Curve considering contractual constraints on the Resource and any other adverse effects on, or implications arising from, the RMR Agreement, that may occur as the result of the Dispatch of the RMR Unit. The RMR Unit’s administratively-set Energy Offer Curve must price all energy at the effective VOLL in $/MWh.  (3) For Generation Resources with a Resource Status other than ONTEST, STARTUP, or SHUTDOWN, if a valid Energy Offer Curve or an Output Schedule does not exist for a Resource that has a status of On-Line at the end of the Adjustment Period, then ERCOT shall notify the QSE. Except for IRRs and QF Resources, ERCOT shall create an Output Schedule equal to the then-current telemetered output of the Resource until an Output Schedule or Energy Offer Curve is submitted.  (4) For ESRs with a Resource Status other than ONTEST or ONHOLD, if a valid Energy Bid/Offer Curve or an Output Schedule does not exist, then ERCOT shall notify the QSE and create a proxy Energy Bid/Offer Curve priced at -$250/MWh for the MW portion of the curve less than zero MW, and priced at the RTSWCAP for the MW portion of the curve greater than zero MW. |

**6.4.4.1 Energy Offer Curve for On-Line Non-Spinning Reserve Capacity**

(1) The following applies to Generation Resources that a QSE assigns Non-Spinning Reserve (Non-Spin) Ancillary Service Resource Responsibility in its COP to meet the QSE’s Ancillary Service Supply Responsibility for Non-Spin and applies to On-Line Non-Spin assignments arising as the result of Day-Ahead Market (DAM) or Supplemental Ancillary Services Market (SASM) Ancillary Service awards, or Self-Arranged Ancillary Service Quantity.

(a) Prior to the end of the Adjustment Period for an Operating Hour during which a Generation Resource is assigned On-Line Non-Spin Ancillary Service Resource Responsibility, the QSE shall ensure that a valid Output Schedule or Energy Offer Curve for the Operating Hour has been submitted and accepted by ERCOT. The Energy Offer Curves submitted by the QSE for the capacity assigned to Non-Spin may not be offered at less than $75 per MWh.

|  |
| --- |
| [NPRR1058: Replace paragraph (a) above with the following upon system implementation:]  (a) For an Operating Hour during which a Generation Resource is assigned On-Line Non-Spin Ancillary Service Resource Responsibility, the QSE shall ensure that a valid Output Schedule or Energy Offer Curve for the Operating Hour has been submitted and accepted by ERCOT. The Energy Offer Curves submitted by the QSE for the capacity assigned to Non-Spin may not be offered at less than $75 per MWh. |

(b) If the QSE also assigns Responsive Reserve (RRS), ERCOT Contingency Reserve Service (ECRS), and/or Regulation Up Service (Reg-Up) to a Generation Resource that has been assigned Non-Spin, the QSE shall ensure that a valid Output Schedule or Energy Offer Curve for the Operating Hour has been submitted and accepted by ERCOT. The Energy Offer Curves submitted by the QSE for the capacity assigned to the sum of the RRS, ECRS, Reg-Up, and Non-Spin Ancillary Service Resource Responsibilities, as well as any Non-Frequency Responsive Capacity (NFRC) that is above the Resource’s High Ancillary Service Limit (HASL) and will not be utilized prior to deployment of a Resource’s On-Line Non-Spin, may not be offered at less than $75 per MWh.

|  |
| --- |
| [NPRR1131: Replace Section 6.4.4.1 above with the following upon system implementation:]  **6.4.4.1 Energy Offer Curve or Energy Bid Curve for On-Line Non-Spinning Reserve Capacity**  (1) The following applies to Generation Resources and Controllable Load Resources that a QSE assigns Non-Spinning Reserve (Non-Spin) Ancillary Service Resource Responsibility in its COP to meet the QSE’s Ancillary Service Supply Responsibility for Non-Spin and applies to On-Line Non-Spin assignments arising as the result of Day-Ahead Market (DAM) or Supplemental Ancillary Services Market (SASM) Ancillary Service awards, or Self-Arranged Ancillary Service Quantity.  (a) Prior to the end of the Adjustment Period for an Operating Hour during which a Generation Resource is assigned On-Line Non-Spin Ancillary Service Resource Responsibility, the QSE shall ensure that a valid Output Schedule or Energy Offer Curve for the Operating Hour has been submitted and accepted by ERCOT. The Energy Offer Curves submitted by the QSE for the capacity assigned to Non-Spin may not be offered at less than $75 per MWh.  (b) Prior to the end of the Adjustment Period for an Operating Hour during which a Controllable Load Resource is assigned On-Line Non-Spin Ancillary Service Resource Responsibility, the QSE shall ensure that an Energy Bid Curve for the Operating Hour has been submitted and accepted by ERCOT. The Energy Bid Curve submitted by the QSE for the capacity assigned to Non-Spin may not be less than $75 per MWh.  (c) If the QSE also assigns Responsive Reserve (RRS), ERCOT Contingency Reserve Service (ECRS), and/or Regulation Up Service (Reg-Up) to a Generation Resource that has been assigned Non-Spin, the QSE shall ensure that a valid Output Schedule or Energy Offer Curve for the Operating Hour has been submitted and accepted by ERCOT. The Energy Offer Curves submitted by the QSE for the capacity assigned to the sum of the RRS, ECRS, Reg-Up, and Non-Spin Ancillary Service Resource Responsibilities, as well as any Non-Frequency Responsive Capacity (NFRC) that is above the Resource’s High Ancillary Service Limit (HASL) and will not be utilized prior to deployment of a Resource’s On-Line Non-Spin, may not be offered at less than $75 per MWh.  (d) If the QSE also assigns RRS, ECRS, and/or Reg-Up to a Controllable Load Resource that has been assigned Non-Spin, the QSE shall ensure that a valid Energy Bid Curve for the Operating Hour has been submitted and accepted by ERCOT. The Energy Bid Curves submitted by the QSE for the capacity assigned to the sum of the RRS, ECRS, Reg-Up, and Non-Spin Ancillary Service Resource Responsibilities may not be less than $75 per MWh. |

|  |
| --- |
| [NPRR1010: Delete Section 6.4.4.1 above upon system implementation of the Real-Time Co-Optimization (RTC) project.] |

**6.4.4.2 Energy Offer Curve for RUC-Committed Switchable Generation Resources**

(1) Prior to the end of the Adjustment Period for an Operating Hour during which a Switchable Generation Resource (SWGR) has been committed by ERCOT as part of the Reliability Unit Commitment (RUC) process to address an actual or anticipated Energy Emergency Alert (EEA) event, the QSE shall ensure that an Energy Offer Curve that prices all energy from LSL to HSL at or above $4,500 per MWh or at the SWCAP, whichever is lower, for the Operating Hours in the RUC commitment period, has been submitted and accepted by ERCOT.

|  |
| --- |
| [NPRR1058: Replace paragraph (1) above with the following upon system implementation:]  (1) For an Operating Hour during which a Switchable Generation Resource (SWGR) has been committed by ERCOT as part of the Reliability Unit Commitment (RUC) process to address an actual or anticipated Energy Emergency Alert (EEA) event, the QSE shall ensure that an Energy Offer Curve that prices all energy from LSL to HSL at or above $4,500 per MWh or at the SWCAP, whichever is lower, for the Operating Hours in the RUC commitment period, has been submitted and accepted by ERCOT. |

|  |
| --- |
| [NPRR1010: Replace paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (1) Prior to the end of the Adjustment Period for an Operating Hour during which a Switchable Generation Resource (SWGR) has been committed by ERCOT as part of the Reliability Unit Commitment (RUC) process to address an actual or anticipated Energy Emergency Alert (EEA) event, ERCOT shall administratively set an Energy Offer Curve that prices all energy from LSL to HSL at or above $4,500 per MWh, or at the effective VOLL, whichever is lower, for the Operating Hours in the RUC commitment period. |

|  |
| --- |
| [NPRR1019: Delete Section 6.4.4.2 above upon system implementation.] |

6.4.5 Incremental and Decremental Energy Offer Curves

(1) A QSE for a DSR may submit an Incremental Energy Offer Curve and a Decremental Energy Offer Curve in addition to the Output Schedule for the DSR. The Incremental and Decremental Energy Offer Curves prices must be within the range of -$250.00 per MWh and the SWCAP in dollars per MWh with the quantity within the range of the High Reasonability Limit (HRL) and Low Reasonability Limit (LRL), which are described in the Resource Registration Glossary and provided in Resource Registration data. The first price/quantity pair for both the Incremental and Decremental Energy Offer Curves must provide an energy price at LRL and the last price/quantity pair must provide a price at HRL. At every MW value of the curves, the price of the Incremental Energy Offer Curve must be greater than the Decremental Energy Offer Curve. Incremental and Decremental Energy Offer Curves are subject to the same requirements for the same criteria and validations performed by ERCOT as provided in Section 4.4.9, Energy Offers and Bids.

|  |
| --- |
| [NPRR1010: Replace paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (1) A QSE for a DSR may submit an Incremental Energy Offer Curve and a Decremental Energy Offer Curve in addition to the Output Schedule for the DSR. The Incremental and Decremental Energy Offer Curves prices must be within the range of -$250.00 per MWh and the RTSWCAP in dollars per MWh with the quantity within the range of the High Reasonability Limit (HRL) and Low Reasonability Limit (LRL), which are described in the Resource Registration Glossary and provided in Resource Registration data. The first price/quantity pair for both the Incremental and Decremental Energy Offer Curves must provide an energy price at LRL and the last price/quantity pair must provide a price at HRL. At every MW value of the curves, the price of the Incremental Energy Offer Curve must be greater than the Decremental Energy Offer Curve. Incremental and Decremental Energy Offer Curves are subject to the same requirements for the same criteria and validations performed by ERCOT as provided in Section 4.4.9, Energy Offers and Bids. |

|  |
| --- |
| [NPRR1000: Replace Section 6.4.5 above with the following upon system implementation:]  ***6.4.5 [RESERVED]*** |

6.4.6 Resource Status

(1) ERCOT shall use the telemetered Resource Status for all applications requiring status of Resources during the Operating Hour, including SCED and Load Frequency Control (LFC). QSEs shall provide ERCOT with accurate telemetry of the current capability of each Resource including the Resource Status, Ramp Rates, HSL, and LSL.

|  |
| --- |
| [NPRR1010: Replace paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (1) ERCOT shall use the telemetered Resource Status for all applications requiring status of Resources during the Operating Hour, including SCED and Load Frequency Control (LFC). QSEs shall provide ERCOT with accurate telemetry of the current capability of each Resource including the Resource Status, Ancillary Service capability for each Ancillary Service, Ramp Rates, HSL, and LSL. |

(2) ERCOT shall perform the following validations during the Operating Period:

(a) Each QSE shall provide the Real-Time operating status of each Resource to ERCOT by telemetry using the status codes in the COP for Real-Time as described in Section 3.9, Current Operating Plan (COP); and

(b) Five minutes before the end of each hour, ERCOT shall identify inconsistencies between the telemetered Resource Status and the Resource Status stated in the COP for that Resource in the next hour. On detecting an inconsistency, ERCOT shall provide a notice of inconsistent Resource Status to the QSE using the Messaging System.

6.4.7 QSE-Requested Decommitment of Resources and Changes to Ancillary Service Resource Responsibility of Resources

(1) A Resource must remain committed during any RUC-Committed Interval or RUC Buy-Back Hour unless the Resource has a Forced Outage.

(2) In the Operating Period, a QSE may request to decommit a Resource other than a Quick Start Generation Resource (QSGR) for any interval that is not a RUC-Committed Interval or RUC Buy-Back Hour by verbally requesting ERCOT to consider its request.

(3) In the Operating Period, a QSE may decommit a QSGR without any request for any interval that is neither a RUC-Committed Interval, a RUC Buy-Back Hour, nor an interval in which a manual override by the ERCOT Operator has been given.

(4) In the Adjustment Period, a QSE may request to decommit a Resource for any interval that is not a RUC-Committed Interval or RUC Buy-Back Hour by indicating a change in unit status in the QSE’s COP, unless the Resource received a Weekly Reliability Unit Commitment (WRUC) instruction for the hour. A QSE may request to decommit a Resource for any interval that is a WRUC-instructed Interval and that is not a RUC-Committed Interval or RUC Buy-Back Hour by verbally requesting ERCOT to consider its request.

(5) In the Adjustment Period, a QSE may request ERCOT approval for moving an Ancillary Service Resource Responsibility from one Resource to another Resource by changing its COP, provided that the QSE complies with its total Ancillary Service Supply Responsibility. Any Ancillary Services transfer must be in alignment with the allowable Ancillary Service Trades, as described in Section 4.4.7.3, Ancillary Service Trades. A QSE may transfer Ancillary Service Resource Responsibility for any Ancillary Service to an eligible Resource that has been opted out of RUC Settlement. ERCOT shall use the Hourly Reliability Unit Commitment (HRUC) and other processes to study the move and if Ancillary Services become infeasible as a result of the proposed move, ERCOT shall follow the provisions of Section 6.4.9.1.2, Replacement of Infeasible Ancillary Service Due to Transmission Constraints.

|  |
| --- |
| [NPRR1092: Replace paragraph (5) above with the following upon system implementation:]  (5) In the Adjustment Period, a QSE may request ERCOT approval for moving an Ancillary Service Resource Responsibility from one Resource to another Resource by changing its COP, provided that the QSE complies with its total Ancillary Service Supply Responsibility. Any Ancillary Services transfer must be in alignment with the allowable Ancillary Service Trades, as described in Section 4.4.7.3, Ancillary Service Trades. A QSE may transfer Ancillary Service Resource Responsibility for any Ancillary Service to an eligible Resource that has been opted out of RUC Settlement. ERCOT shall use the Hourly Reliability Unit Commitment (HRUC) and other processes to study the move and if Ancillary Services become infeasible as a result of the proposed move, ERCOT shall follow the provisions of Section 6.4.9.1.2, Replacement of Infeasible Ancillary Service Due to Transmission Constraints. |

(6) In the Operating Period, a QSE shall only provide an Ancillary Service from a Resource which was reported to ERCOT in the COP to be providing that Ancillary Service for the effective Operating Hour unless modified pursuant to paragraph (7) below.

(7) A QSE may vary the quantity of the Ancillary Service Resource Responsibility on Resources, through telemetry, during the time window beginning 30 seconds prior to a five-minute clock interval and ending ten seconds prior to that five-minute clock interval, provided that the QSE complies with its total Ancillary Service Supply Responsibility. Any Ancillary Services transfer must be in alignment with the allowable Ancillary Service Trades, as described in Section 4.4.7.3.

|  |
| --- |
| [NPRR1010: Replace Section 6.4.7 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  ***6.4.7 QSE-Requested Decommitment of Resources***  (1) A Resource must remain committed during any RUC-Committed Interval or RUC Buy-Back Hour unless the Resource has a Forced Outage.  (2) In the Operating Period, a QSE may request to decommit a Resource other than a Quick Start Generation Resource (QSGR) for any interval that is not a RUC-Committed Interval or RUC Buy-Back Hour by verbally requesting ERCOT to consider its request.  (3) In the Operating Period, a QSE may decommit a QSGR without any request for any interval that is neither a RUC-Committed Interval, a RUC Buy-Back Hour, nor an interval in which a manual override by the ERCOT Operator has been given.  (4) In the Adjustment Period, a QSE may request to decommit a Resource for any interval that is not a RUC-Committed Interval or RUC Buy-Back Hour by indicating a change in unit status in the QSE’s COP, unless the Resource received a Weekly Reliability Unit Commitment (WRUC) instruction for the hour. A QSE may request to decommit a Resource for any interval that is a WRUC-instructed Interval and that is not a RUC-Committed Interval or RUC Buy-Back Hour by verbally requesting ERCOT to consider its request. |

6.4.7.1 QSE Request to Decommit Resources in the Operating Period

(1) For a request made during the Operating Period to decommit a Resource, ERCOT may perform a study using Real-Time conditions to determine if ERCOT will remain n-1 secure with that Resource Off-Line. ERCOT may grant the request provided the Resource is not providing any Ancillary Service Resource Responsibility and if analysis indicates the Resource Outage contingency results in no additional active constraints for SCED. ERCOT may only approve requests that do not have a reliability impact.

|  |
| --- |
| [NPRR1010: Replace paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (1) For a request made during the Operating Period to decommit a Resource, ERCOT may perform a study using Real-Time conditions to determine if ERCOT will remain n-1 secure with that Resource Off-Line. ERCOT may grant the request provided the analysis indicates the Resource Outage contingency results in no additional active constraints for SCED. ERCOT may only approve requests that do not have a reliability impact. |

(2) If more units are requesting decommitment than can be accommodated, ERCOT shall review the requests in order of receipt.

6.4.7.2 QSE Request to Decommit Resources in the Adjustment Period

(1) To decommit an otherwise available Resource for hours other than the Operating Period, the QSE must update the COP indicating the change in Resource Status for each hour in the COP for the remaining hours in the Adjustment Period. On detection of a change from On-Line to Off-Line Available state in future hours for a Resource, ERCOT shall review all requests for decommitment using the next scheduled HRUC. The Resource must be shown as available for HRUC commitment. ERCOT shall also review the list of Off-Line Available Resources with a start-up time of one hour or less. The next HRUC commitment must consider the Resource’s Minimum-Energy Offer excluding the Resource’s Startup Offer from the Three-Part Supply Offer.

(2) If HRUC continues to require the Resource to be committed, ERCOT shall notify the QSE, using the process described in Section 5.5.3, Communication of RUC Commitments and Decommitments, that the decommitment has been denied, and the affected intervals become RUC-Committed Intervals instead of QSE-Committed Intervals for RUC Settlement purposes. The QSE must update its COP to denote the RUC-Committed Intervals.

6.4.8 Notification of Forced Outage of a Resource

(1) In the event of a Forced Outage of a Resource, the telemetered status of the Resource automatically notifies ERCOT of the event. In the event of a Forced Outage, the telemetered Resource Status shall be changed to the appropriate Off-Line status as soon as practicable but no longer than 15 minutes after the Forced Outage occurs.

(2) In the event of a Forced Outage or an impending Forced Outage, the Resource Entity or its designee shall inform ERCOT of the following in the Outage Scheduler:

(a) Time of expected change in Resource Status or rating;

(b) Text message describing the nature of the Forced Outage or de-rating updated as new information becomes available; and

(c) The expected minimum and maximum duration of the Forced Outage or de-rating.

(3) In the event of a Forced Outage, the QSE must update the Resource’s COP as soon as practicable but no longer than 60 minutes after the Forced Outage occurs.

(4) Each QSE shall timely update the telemetered Resource Status and COP unless in the reasonable judgment of the QSE, such compliance would create an undue threat to safety, undue risk of bodily harm, or undue damage to equipment. The QSE is excused from updating the telemetered Resource Status and/or COP only for so long as the undue threat to safety, undue risk of bodily harm, or undue damage to equipment exists. The time for updating the telemetered Resource Status and/or COP begins once the undue threat to safety, undue risk of bodily harm, or undue damage to equipment no longer exists.

6.4.9 Ancillary Services Capacity During the Adjustment Period and in Real-Time

|  |
| --- |
| [NPRR1010: Replace Section 6.4.9 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  ***6.4.9 Real-Time Ancillary Service Offers and Awards*** |

6.4.9.1 Evaluation and Maintenance of Ancillary Service Capacity Sufficiency

(1) ERCOT shall evaluate Ancillary Service requirements and capacity sufficiency using evaluation tools including the Ancillary Services Capacity Monitor, described in Section 6.5.7.5, Ancillary Services Capacity Monitor, throughout the Adjustment Period and Operating Period.

(2) ERCOT may procure Ancillary Services in the Adjustment Period for the following reasons:

(a) Increased need of Ancillary Services capacity above that specified in the Day-Ahead;

(b) Replacement of Ancillary Services capacity that is infeasible due to transmission constraints; or

(c) Replacement of Ancillary Services capacity due to failure to provide.

(3) A QSE may change the specific Resources supplying Ancillary Services under Section 3.9, Current Operating Plan (COP), using the QSE’s Ancillary Service Resource Responsibility in the COP only if, in ERCOT’s determination, that change does not adversely affect the feasibility of the service(s) being allocated to an alternate Resource and if that change does not adversely affect the feasibility of other services previously procured by ERCOT. A QSE may not change the quantity provided of each type of Ancillary Services awarded through the ERCOT procurement process or the aggregate Self-Arranged Ancillary Service Quantity (by Ancillary Service type) from the DAM. On detection of a change in COP for Resources providing Ancillary Services, ERCOT shall review the impact on feasibility and communicate to the QSE if the change is not approved. The QSE must update its COP to reflect the ERCOT decision. If ERCOT does not act on the request by the beginning of the Operating Hour in which the change will take effect, the request is deemed approved.

|  |
| --- |
| [NPRR1010: Replace Section 6.4.9.1 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  **6.4.9.1 Ancillary Service Offers**  (1) A detailed description of the Ancillary Service Offers and validations performed by ERCOT is in Section 4.4.7.2, Ancillary Service Offers.  (2) QSEs may update their Ancillary Service Offers in Real-Time. SCED shall use the latest updated Ancillary Service Offers available to it at the time of the SCED execution. |

6.4.9.1.1 ERCOT Increases to the Ancillary Services Plan

(1) If ERCOT determines in the Adjustment Period, in its sole discretion, that more Ancillary Services are needed for one or more Operating Hours than were provided in the Day-Ahead Ancillary Services Plan, it shall notify each QSE of its increased Ancillary Service Supply Obligation.

(2) ERCOT may procure more Ancillary Services through a SASM, as described below in Section 6.4.9.2, Supplemental Ancillary Services Market, if the Self-Arranged Ancillary Service Quantities are insufficient to meet the total Ancillary Service Supply Obligation.

(3) When a SASM has been executed in response to ERCOT increasing the Ancillary Services Plan, each QSE that purchases Ancillary Service capacity shall be charged its share of the net cost incurred for that service, in accordance with Section 6.7.4, Adjustments to Cost Allocations for Ancillary Services Procurement.

|  |
| --- |
| [NPRR1010: Replace Section 6.4.9.1.1 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  ***6.4.9.1.1 Ancillary Service Awards***  (1) Ancillary Service awards will based on Resource capability (qualification, operating limits, Ancillary Service limits, ramp rates, etc.) and Ancillary Service Demand Curves (ASDCs) regardless of the quantity of Ancillary Service under deployment.  (2) QSEs representing Resources that are qualified to provide an Ancillary Service must submit valid Ancillary Service Offers for use in Real-Time clearing. QSEs shall submit Resource-specific telemetry indicating the Resource’s ability to provide Ancillary Service in Real-Time.  (3) QSEs representing Load Resources providing Ancillary Service via high-set under-frequency relays may self-provide high-set under-frequency relay-controlled RRS and ECRS; the amount of self-provision shall be limited based on the QSE’s Day-Ahead Market (DAM) Ancillary Service awards and trades.  (4) A previously Off-Line Generation Resource in startup mode due to a manual deployment of Non-Spin by ERCOT will continue to be eligible for Non-Spin. The eligible capacity shall be based on the telemetered HSL of the Resource minus its Base Point Dispatch Instruction by SCED interval.  (5) A Quick Start Generation Resource (QSGR) in startup mode due to an ERCOT Dispatch Instruction will continue to be eligible for ECRS and Non-Spin.  The eligible capacity shall be based on the telemetered HSL of the Resource minus its Base Point Dispatch Instruction by Security-Constrained Economic Dispatch (SCED) interval.  (6) ERCOT may manually reduce the amount of Ancillary Service eligible to be awarded to a Resource that, if deployed, could violate a transmission constraint. ERCOT shall notify the Resource’s QSE in Real-Time of any Ancillary Service capability that has been derated by ERCOT, including the Resource’s new Ancillary Service limit in MWs. Should the deration impact payments the QSE would have received under Section 6.7.5.1, Real-Time Ancillary Service Imbalance, the QSE will be eligible for consideration of a payment under Section 6.7.5.7, Real-Time Derated Ancillary Service Capability Payment.  (7)      Sixty days after the applicable Operating Day, ERCOT shall post to the ERCOT website the instances of ERCOT Operator reduction of Ancillary Services capability, including the name of the Resource, the type and reduced MW by Ancillary Service, and the reason for the reduction.  (8) Ancillary Service awards and Real-Time Market Clearing Prices for Capacity (MCPCs) are immediately binding upon the completion of a SCED run. |

6.4.9.1.2 Replacement of Infeasible Ancillary Service Due to Transmission Constraints

(1) The HRUC process must honor the HASL and Low Ancillary Service Limit (LASL) for each Resource for each hour of the RUC Study Period unless by doing so a transmission constraint exists where the capacity reserved to provide Ancillary Services from the Resource is needed to resolve the constraint that cannot be resolved by any other means. In such cases, the Ancillary Services may be determined to be infeasible. The Ancillary Services from a Resource may also be determined to be infeasible if the deployment of those Ancillary Services would have a consistent, negative impact on a transmission constraint. Infeasibility may be identified in either the Adjustment Period or the Operating Period. If the ERCOT Operator decides that the Ancillary Service capacity allocated to that Resource is infeasible based on ERCOT System conditions, then ERCOT shall provide the following information to each affected QSE:

(a) The amount by which the QSE must reduce the Ancillary Services currently allocated to each affected Resource; and

(b) The start and stop times of the reduction.

(2) Upon notification, each affected QSE may do one or more of the following:

(a) Substitute capacity from other Resources represented by that QSE to meet its Ancillary Services Supply Responsibility;

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

(c) Inform ERCOT that all or part of the Ancillary Services capacity needs to be replaced.

(3) If a QSE elects to substitute capacity, ERCOT shall determine the feasibility of the substitution. If the substitution is deemed infeasible by ERCOT or the QSE informs ERCOT that the Ancillary Services capacity needs to be replaced, then ERCOT shall procure, if in its sole discretion it finds that the service is still needed, the Ancillary Services capacity required under Section 6.4.9.2, Supplemental Ancillary Services Market.

(4) Settlement of infeasible Ancillary Services shall be performed in accordance with Section 6.7.2.1, Charges for Infeasible Ancillary Service Capacity Due to Transmission Constraints, and Section 6.7.4, Adjustments to Cost Allocations for Ancillary Services Procurement. These calculations occur for all hours for which the Ancillary Service has been determined to be infeasible, regardless of whether or not a SASM is executed for that specific hour.

|  |
| --- |
| [NPRR1010: Delete Section 6.4.9.1.2 above upon system implementation of the Real-Time Co-Optimization (RTC) project.] |

6.4.9.1.3 Replacement of Ancillary Service Due to Failure to Provide

(1) ERCOT may procure Ancillary Services to replace those of a QSE that has failed on its Ancillary Services Supply Responsibility through a SASM, as described below in Section 6.4.9.2, Supplemental Ancillary Services Market. A QSE is considered to have failed on its Ancillary Services Supply Responsibility when ERCOT determines, in its sole discretion, that some or all of the QSE’s Resource-specific Ancillary Service capacity will not be available in Real-Time. This Section does not apply to a failure to provide caused by events described in Section 6.4.9.1.2, Replacement of Infeasible Ancillary Service Due to Transmission Constraints.

(2) Within a time frame acceptable to ERCOT, each affected QSE may either substitute capacity to meet its Ancillary Services Supply Responsibility or inform ERCOT that the Ancillary Services capacity needs to be replaced. If a QSE elects to substitute capacity, ERCOT shall determine the feasibility of the substitution. If the substitution is deemed infeasible by ERCOT or the QSE informs ERCOT that the Ancillary Services capacity needs to be replaced, then ERCOT shall procure, if in its sole discretion it finds that the service is still needed, the Ancillary Services capacity required under Section 6.4.9.2.

(3) ERCOT shall charge each QSE that has failed according to paragraph (1) on its Ancillary Service Supply Responsibility for a particular Ancillary Service for a specific hour.

(4) A Load Resource that is not a Controllable Load Resource shall not simultaneously provide RRS and Non-Spin on the same Load Resource in Real-Time. ERCOT may, in its sole discretion, evaluate whether the simultaneous provision of RRS and Non-Spin results in the QSE failing on its RRS or Non-Spin Ancillary Service Supply Responsibility.

|  |
| --- |
| [NPRR1149: Replace Section 6.4.9.1.3 above with the following upon system implementation:]  ***6.4.9.1.3 Failure to Provide Ancillary Service***  (1) ERCOT may procure Ancillary Services to replace those of a QSE that has failed to provide its Ancillary Services Supply Responsibility through a SASM, as described below in Section 6.4.9.2, Supplemental Ancillary Services Market.  (2) A QSE is considered to have failed to provide its Ancillary Services Supply Responsibility when ERCOT determines, in its sole discretion, that some or all of the QSE’s Ancillary Service capacity will not be available in Real-Time, was not available during any interval for which the QSE had an Ancillary Service Supply Responsibility, or that the QSE assigned all or part of an Ancillary Service Supply Responsibility to a Resource that was not qualified to provide that Ancillary Service. This Section does not apply to a failure to provide caused by events described in Section 6.4.9.1.2, Replacement of Infeasible Ancillary Service Due to Transmission Constraints.  (3) Within a time frame acceptable to ERCOT, each affected QSE may either substitute capacity to meet its Ancillary Services Supply Responsibility or inform ERCOT that the Ancillary Services capacity needs to be replaced. If a QSE elects to substitute capacity, ERCOT shall determine the feasibility of the substitution. If the substitution is deemed infeasible by ERCOT or the QSE informs ERCOT that the Ancillary Services capacity needs to be replaced, then ERCOT shall procure, if in its sole discretion it finds that the service is still needed, the Ancillary Services capacity required under Section 6.4.9.2.  (4) ERCOT shall charge each QSE that has failed to provide its Ancillary Service Supply Responsibility, according to paragraph (2) above for a particular Ancillary Service for a specific hour, in the manner described in Section 6.7.3, Charges for a Failure to Provide Ancillary Service. |

|  |
| --- |
| [NPRR1010: Delete Section 6.4.9.1.3 above upon system implementation of the Real-Time Co-Optimization (RTC) project.] |

|  |
| --- |
| [NPRR1010: Insert Section 6.4.9.1.2 above upon system implementation of the Real-Time Co-Optimization (RTC) project:]  6.4.9.1.2 Changes to Operating Day Ancillary Service Plan  (1) Any time during the Adjustment Period or Operating Period, if ERCOT determines that the Ancillary Service Plan needs to be modified, ERCOT will notify Market Participants of ERCOT’s need to modify the Ancillary Service Plan and post the reliability reason for the modification in service requirements. ERCOT will also update the Ancillary Service Plan, as described in Section 4.2.1, Ancillary Service Plan and Ancillary Service Obligation, and update and post ASDCs for each impacted Ancillary Service product, as described in Section 4.2.1.1, Ancillary Service Plan. |

6.4.9.2 Supplemental Ancillary Services Market

(1) During the Adjustment Period, ERCOT may procure additional Reg-Up, Reg-Down, ECRS, Responsive Reserve (RRS), and Non-Spin services for the reasons, and in the amounts, specified in Section 6.4.9.1, Evaluation and Maintenance of Ancillary Service Capacity Sufficiency, using a SASM.

(2) ERCOT shall allow QSEs to request to modify their Ancillary Service positions through a Reconfiguration Supplemental Ancillary Services Market (RSASM). The RSASM is executed at 0900 daily. This RSASM allows QSEs to potentially change their Ancillary Service Supply Responsibility from hour ending 1300 through hour ending 2400 of the current Operating Day. QSEs attempt to reduce their Ancillary Service Supply Responsibility through the RSASM by submitting less Ancillary Service capacity in their Resource’s COPs than their Ancillary Service Supply Responsibility. The difference between the Ancillary Service Supply Responsibility and the COP Ancillary Service capacity is the reconfiguration amount that is procured by the RSASM. The QSE must also have valid Ancillary Service Offers of an amount equal to or greater than their requested reconfiguration amount. The RSASM shall not be executed if there are not enough offers to procure the Ancillary Service reconfiguration amount.

(3) The SASM process for acquiring more Ancillary Service capacity or an Ancillary Service reconfiguration must use the following timelines:

(a) For Ancillary Service capacity related to ERCOT desired increases, for replacement of Ancillary Service capacity related to infeasibility or for failure of a QSE to provide one or more Ancillary Services, ERCOT shall send a notice, by ERCOT Hotline and electronic communication, at time X to all QSEs of the SASM. Time X may be any time not less than two hours before the start of the Operating Hour for which the additional Ancillary Services capacity are being procured. For cases of Ancillary Service capacity being infeasible or for failure of a QSE to provide one or more Ancillary Services, the Operating Hours covered by the SASM may be a subset of the Operating Hours for which the Ancillary Service capacity is declared infeasible or failed.

|  |  |  |
| --- | --- | --- |
| SASM Process | QSE Activities: | ERCOT Activities: |
| Time = X |  | Notify all QSEs of intent to procure Ancillary Services by ERCOT Hotline and electronic communication.  Notify QSEs of any additional Ancillary Service Obligation, allocated to each LSE and aggregated to the QSE level. |
| Time = X plus 30 minutes | May submit additional Self-Arranged Ancillary Service Quantities pursuant to Section 4.4.7.1, Self-Arranged Ancillary Service Quantities | Determine the amount of Ancillary Services to be procured. |
| Time = X plus 35 minutes |  | Execute SASM. |
| Time = X plus 45 minutes |  | Notify QSEs with awards of results.  Post the quantities and Market Clearing Prices for Capacity (MCPCs) of Ancillary Services bought in the SASM. |
| Time = X plus 60 minutes | Submit updated COP with updated Ancillary Service Resource Responsibility. | Validate COPs for Ancillary Service Resource Responsibility. |

(b) For an Ancillary Services reconfiguration, ERCOT shall execute an RSASM at 0900 (time E), for hour ending 1300 through hour ending 2400 of the current Operating Day.

|  |  |  |
| --- | --- | --- |
| SASM Process | QSE Activities: | ERCOT Activities: |
| Time = E – 15 minutes | QSEs nominate quantities of Ancillary Services that shall be included in the RSASM by submitting COPs with less Ancillary Service capacity than their Ancillary Service Supply Responsibility and submitting Ancillary Service Offers to cover the difference between the Ancillary Service Supply Responsibility and COP Ancillary Service capacity. | ERCOT sets the quantities of Ancillary Services to be procured in the RSASM equal to the difference between total Ancillary Service Supply Responsibility and total COP Ancillary Service capacity. |
| Time = E |  | Execute RSASM for hour ending 1300 through hour ending 2400 of the current Operating Day. |
| Time = E plus 15 minutes |  | Notify QSEs with awards of results.  Post the quantities and MCPCs of Ancillary Services bought in the RSASM. |
| Time = E plus 30 minutes | Submit updated COP with updated Ancillary Service Resource Responsibility. | Validate COPs for Ancillary Service Resource Responsibility. |

(4) Each QSE that is awarded capacity in a SASM is paid the SASM MCPC for the quantity it is awarded.

(5) For purpose of Settlement, the reduction to the Ancillary Service Supply Responsibility is considered a failure quantity and each QSE that has their Ancillary Service Supply Responsibility reduced by an RSASM is charged in accordance with Sections 6.7.3, Charges for Ancillary Service Capacity Replaced Due to Failure to Provide, and 6.7.4, Adjustments to Cost Allocations for Ancillary Services Procurement. QSEs participating in RSASMs are not subject to performance metrics for “failure to provide” amounts until the end of the Adjustment Period for each hour cleared in the RSASM.

(6) ERCOT shall allocate additional Ancillary Service Obligations to QSEs using the same percentages as the original Day-Ahead allocation of Ancillary Service Obligations.

|  |
| --- |
| [NPRR1010: Delete Section 6.4.9.2 above upon system implementation of the Real-Time Co-Optimization (RTC) project.] |

6.4.9.2.1 Resubmitting Offers for Ancillary Services in the Adjustment Period

(1) During the Adjustment Period, a QSE may resubmit an offer for an Ancillary Service that it submitted for a Resource but was not struck in a previous market. The resubmitted offer for that Resource may be submitted at any price subject to applicable offer caps and offer floors to be considered a valid offer in any subsequent market.

|  |
| --- |
| [NPRR1010: Delete Section 6.4.9.2.1 above upon system implementation of the Real-Time Co-Optimization (RTC) project.] |

6.4.9.2.2 SASM Clearing Process

(1) SASM procurement requirements are:

(a) ERCOT shall procure the additional quantity required of each Ancillary Service, less the quantity self-arranged, if applicable. ERCOT may not buy more of one Ancillary Service in place of the quantity of a different service.

(b) ERCOT shall select Ancillary Service Offers submitted by QSEs, such that:

(i) For each Ancillary Service being procured, other than Reg-Down, ERCOT shall select offers that minimize the overall offer-based cost of these Ancillary Services. For each of these Ancillary Services, if selection of the Resource offer exceeds ERCOT’s required Ancillary Service quantity, then ERCOT shall select a portion of the Resource offer to meet the Ancillary Service quantity required. For Load Resources offering a block of capacity, ERCOT shall ignore the offer unless the entire block can be accepted.

(ii) For Reg-Down, ERCOT shall procure required quantities by selecting capacity in ascending order starting from the lowest-priced offer. ERCOT shall continue this selection process until the required quantity of Reg-Down is obtained. If selection of the Resource offer exceeds ERCOT’s required Ancillary Service quantity, then ERCOT shall select a portion of the Resource offer to meet the Ancillary Service quantity required. For Load Resources offering a block of capacity, ERCOT shall ignore the offer unless the entire block can be accepted.

(iii) For each Ancillary Service Offer from an Off-Line Resource considered in a SASM, the offer will be awarded only if it can meet the start-up time of the Resource based on the current and the historical operational state of the Resource. If the start-up time cannot be met for the first hour of a block offer, then the whole block offer shall not be considered.

(c) If a QSE has submitted offers of the same Resource capacity for more than one Ancillary Service (sometimes called linked offers), ERCOT may not select any one part of that Resource capacity to provide more than one Ancillary Service in the same Operating Hour. ERCOT may, however, select part of that Resource capacity to provide one Ancillary Service and another part of that capacity to provide a different Ancillary Service in the same Operating Hour.

(d) The SASM MCPC for each hour for each service is the Shadow Price for the corresponding Ancillary Service constraint for the hour as determined by the SASM algorithm.

(e) SASM MCPCs for any Ancillary Service shall not exceed the SWCAP. Ancillary Service Offers higher than corresponding Ancillary Service penalty factors, as defined in Appendix 2, Day-Ahead Market Optimization Control Parameters, of the Other Binding Document titled “Methodology for Setting Maximum Shadow Prices for Network and Power Balance Constraints,” will not be awarded.

|  |
| --- |
| [NPRR1010: Delete Section 6.4.9.2.2 above upon system implementation of the Real-Time Co-Optimization (RTC) project.] |

6.4.9.2.3 Communication of SASM Results

(1) As soon as practicable, but no later than the time specified in Section 6.4.9.2, Supplemental Ancillary Services Market, ERCOT shall notify each QSE of its awarded Ancillary Service Offer quantities in each SASM, specifying Resource, Ancillary Service type, SASM MCPC, and first and last hours of the awarded offer.

(2) For each QSE for which ERCOT has procured replacement Ancillary Services capacity in a SASM pursuant to Section 6.4.9.1.2, Replacement of Infeasible Ancillary Service Due to Transmission Constraints, or Section 6.4.9.1.3, Replacement of Ancillary Service Due to Failure to Provide, ERCOT shall, as soon as practicable but no later than the time specified in Section 6.4.9.2, notify each affected QSE of the procured Ancillary Service quantities, the Ancillary Service types, and the SASM MCPCs by hour.

(3) As soon as practicable, but no later than the time specified in Section 6.4.9.2, ERCOT shall post on the ERCOT website the hourly:

(a) SASM MCPC for each type of Ancillary Service for each hour;

(b) Total Ancillary Service procured in MW by Ancillary Service type for each hour; and

(c) Aggregated Ancillary Service Offer Curve for each Ancillary Service for each hour.

|  |
| --- |
| [NPRR1010: Delete Section 6.4.9.2.3 above upon system implementation of the Real-Time Co-Optimization (RTC) project.] |

6.5 Real-Time Energy Operations

6.5.1 ERCOT Activities

(1) ERCOT activities during Real-Time operations are summarized in the table located in Section 6.3.2, Activities for Real-Time Operations. That table is intended to be only a general guide and not controlling language, and any conflict between the table and another section of the Protocols is controlled by the other section.

6.5.1.1 ERCOT Control Area Authority

(1) ERCOT, as Control Area Operator (CAO), is authorized to perform the following actions for the limited purpose of securely operating the ERCOT Transmission Grid under the standards specified in North American Electric Reliability Corporation (NERC) Standards, the Operating Guides and these Protocols,including:

(a) Direct the physical operation of the ERCOT Transmission Grid, including circuit breakers, switches, voltage control equipment, and Load-shedding equipment;

(b) Dispatch Resources that have committed to provide Ancillary Services;

|  |
| --- |
| [NPRR1010: Replace paragraph (b) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (b) Dispatch Resources that have been awarded Ancillary Services; |

(c) Direct changes in the operation of voltage control equipment;

(d) Direct the implementation of Reliability Must-Run (RMR) Service, Remedial Action Plans (RAPs), Automatic Mitigation Plans (AMPs), Remedial Action Schemes (RASs), and transmission switching to prevent the violation of ERCOT Transmission Grid security limits; and

(e) Perform additional actions required to prevent an imminent Emergency Condition or to restore the ERCOT Transmission Grid to a secure state in the event of an ERCOT Transmission Grid Emergency Condition.

(2) Unless the ERCOT Protocols or Other Binding Documents explicitly provide otherwise, ERCOT shall not model, monitor, direct operation of, or otherwise exercise any operational authority over any facility that operates on the low voltage side of the distribution transformer except as may be necessary for the following purposes:

(a) To ensure the reliable interconnection, dispatch, operation, and Settlement of any Generation Resource, Energy Storage Resource (ESR), Load Resource, or Emergency Response Service (ERS) Resource that is, or is proposed to be, interconnected at distribution voltage, and to ensure the reliable operation and Settlement of any other ERCOT-registered generator or Energy Storage System (ESS);

(b) To provide ERCOT information about all generators and ESS interconnected at distribution voltage as requested by ERCOT pursuant to these Protocols or Other Binding Documents for the purposes of ensuring accurate Settlement and operating and planning the Transmission Grid; and

(c) To effectuate automatic or manual Load-shedding as prescribed by these Protocols or Other Binding Documents.

(3) Nothing in paragraph (2) above limits ERCOT’s authority to require that a Transmission Service Provider (TSP) or Transmission Operator (TO) disconnect any Facility operated at distribution voltage from the ERCOT System if ERCOT determines such action is necessary to address a reliability concern on the ERCOT Transmission Grid. Additionally, nothing in paragraph (2) above limits ERCOT’s authority to require appropriate modeling and telemetry of transmission Loads that may represent multiple distribution-level Loads, as provided in Section 3.10.7.2, Modeling of Resources and Transmission Loads.

(4) Consistent with paragraph (1)(e) above, if ERCOT seeks to exercise its authority to prevent an anticipated Emergency Condition relating to serving Load in the current or next Season by procuring existing capacity that may be used to maintain ERCOT System reliability in a manner not otherwise delineated in these Protocols and the Operating Guides, ERCOT shall take the following actions:

(a) Upon determination by ERCOT that additional capacity is needed to prevent an Emergency Condition and prior to any procurement activity associated with such additional capacity, ERCOT shall issue a Notice as soon as practicable with the following information:

(i) A detailed description of the reliability condition and need for additional capacity as determined by ERCOT and the timing of the proposed procurement;

(ii) Justification for the quantity of additional capacity to be requested;

(iii) Identification of potential Generation Resources or Load providing capacity considered by ERCOT to be acceptable for providing the additional capacity. Load capacity may be provided by Entities who, at ERCOT’s direction, would interrupt consumption of electric power and remain interrupted until released by ERCOT; and

(iv) A schedule of activities associated with the proposed procurement.

(b) If ERCOT identifies a specific Entity with which it will negotiate the terms for procurement of additional capacity, then ERCOT shall issue a Notice as soon as practicable that includes the Entity name and, as applicable, the Resource mnemonic, the Resource MW rating by Season, the name of the Resource Entity, and the potential duration of any contract, including anticipated start and end dates.

(c) ERCOT shall, to the fullest extent practicable, ensure that any actions taken to procure additional capacity meet the following criteria:

(i) Any capacity procured pursuant to this paragraph will be procured using an open process, and the terms of the procurement between ERCOT and the Entity will be memorialized in contracts that will be publicly available for inspection on the ERCOT website.

(ii) Each contract will include specified financial terms and termination dates. For purposes of Settlement, any contract associated with a Generation Resource will include substantially the same terms and conditions as an RMR Unit under a RMR Agreement, including the Eligible Cost budgeting process.

(iii) ERCOT shall provide notice to the ERCOT Board, at the next ERCOT Board meeting after ERCOT has signed the contract, that the actions required prior to execution of the contract, pursuant to paragraphs (4)(a) through (c) above, were completed by ERCOT before the contract was executed.

(iv) Any information submitted by the Entity to ERCOT through the procurement process may be designated as Protected Information and treated in accordance with the provisions of Section 1.3, Confidentiality, provided that final contract terms must be made available for public inspection.

(d) A Generation Resource that has received capital contributions from ERCOT pursuant to a contract executed under this paragraph (4) may not participate in the energy or Ancillary Services markets until such capital contributions have been refunded to ERCOT. For the purposes of this Section, capital contributions are defined as improvements with an asset life greater than one year under the applicable federal tax rules. The Resource Entity’s refund of capital contributions shall be a lump sum payment calculated as follows:

(i) If the Generation Resource chooses to participate in the energy or Ancillary Service markets after the termination date of the contract executed under this paragraph (4), the Qualified Scheduling Entity (QSE) representing the Resource Entity shall repay, in a lump sum payment, 100% of the book value of the capitalized equipment and all installation charges leading to turn key, one-time startup based on a linear depreciation over the estimated life of the capitalized component(s) in accordance with Generally Accepted Accounting Principles (GAAP) standards for electric utility equipment. The estimated life shall be based on documentation provided by the manufacturer; if installing used equipment, the estimated life may be based on an approximation agreed to by the Resource Entity and ERCOT.

(ii) If the Generation Resource chooses to participate in the energy or Ancillary Services markets as contemplated in item (4)(d)(i) above, and its participation requires a lump sum payment of capital contributions, ERCOT will issue a notice to all registered Market Participants announcing the Generation Resource’s decision to participate in the market(s) and identifying the amount of the lump sum payment due pursuant to item (4)(d)(i) above. ERCOT will also issue a notice to all registered Market Participants after completion of the collection and disbursement of the capital contributions, as described in item (4)(d)(iii) below, and after resolution of any disputes related to these capital contributions.

(iii) After ERCOT receives a Notification of Change of Generation Resource Designation (Section 22, Attachment H, Notification of Change of Generation Resource Designation) changing the Resource designation to “operational” at a future date, ERCOT shall charge the QSE representing the Resource Entity for capital expenditures incurred and previously paid to the Resource Entity as a result of the Resource’s return to service pursuant to this Section.

(A) For months in the contract term where notice is received more than five Business Days prior to True-Up Settlement of the first Operating Day of that month, ERCOT shall claw back any payments made for the capital expenditure associated with that month and subsequent months of the term, on the next practical Settlement but no later than the True-Up Settlement.

(B) For months in the contract term where notice is received five Business Days or less prior to True-Up Settlement of the first Operating Day of that month, ERCOT shall claw back any payments made for the capital expenditures within 45 days of receipt of the notice.

(C) ERCOT shall distribute the repayment to QSEs representing Load on the same basis used to collect the monthly capital expenditures, using a monthly Load Ratio Share (LRS). A QSE’s monthly LRS shall be the QSE’s total Real-Time Adjusted Metered Load (AML) for the month divided by the total ERCOT Real-Time AML for the same month.

(e) ERCOT shall endeavor to minimize the deployment of capacity procured pursuant to this paragraph with the goal of reducing the potential distortion of markets. Resources and Loads deployed to alleviate imminent Emergency Conditions will not be offered into the Day-Ahead Market (DAM). Rather, ERCOT will determine whether to use the capacity as part of the Hourly Reliability Unit Commitment (HRUC) process based on system conditions and the ability to meet Demand. In the event Generation Resources are committed and On-Line, ERCOT systems will generate a proxy offer for the Generation Resource at the System-Wide Offer Cap (SWCAP). The default offer will place the Generation Resources among the last for economic Dispatch, so as not to displace Generation Resources that are On-Line and offering into the market. To the extent practicable, the capacity deployed to alleviate imminent Emergency Conditions will not be used solely for the purpose of reducing local congestion.

|  |
| --- |
| [NPRR1010: Replace paragraph (e) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (e) ERCOT shall endeavor to minimize the deployment of capacity procured pursuant to this paragraph with the goal of reducing the potential distortion of markets. Resources and Loads deployed to alleviate imminent Emergency Conditions will not be offered into the Day-Ahead Market (DAM). Rather, ERCOT will determine whether to use the capacity as part of the Hourly Reliability Unit Commitment (HRUC) process based on system conditions and the ability to meet Demand. In the event Generation Resources are committed and On-Line, ERCOT systems will generate a proxy offer for the Generation Resource at the Real-Time System-Wide Offer Cap (RTSWCAP). The default offer will place the Generation Resources among the last for economic Dispatch, so as not to displace Generation Resources that are On-Line and offering into the market. To the extent practicable, the capacity deployed to alleviate imminent Emergency Conditions will not be used solely for the purpose of reducing local congestion. |

(f) An Entity cannot be compelled to enter into a contract under this paragraph.

6.5.1.2 Centralized Dispatch

(1) ERCOT shall centrally Dispatch Resources and Transmission Facilities under these Protocols, including deploying energy by establishing Base Points, and Emergency Base Points, and by deploying Regulation Service, ERCOT Contingency Reserve Service (ECRS), and Non-Spinning Reserve (Non-Spin) to ensure operational security. Responsive Reserve (RRS) shall be self-deployed in response to frequency deviations or as specified in Nodal Operating Guide Section 4.8, Responsive Reserve Service During Scarcity Conditions.

(2) ERCOT shall verify that either an Energy Offer Curve providing prices for the Resource between its High Sustained Limit (HSL) and Low Sustained Limit (LSL) or an Output Schedule has been submitted for each On-Line Resource an hour before the end of the Adjustment Period for the upcoming Operating Hour. ERCOT shall notify QSEs that have not submitted an Output Schedule or Energy Offer Curve through the Market Information System (MIS) Certified Area.

|  |
| --- |
| [NPRR1014: Replace paragraph (2) above with the following upon system implementation:]  (2) ERCOT shall verify that either an Energy Offer Curve or Energy Bid/Offer Curve providing prices for the Resource between its High Sustained Limit (HSL) and Low Sustained Limit (LSL) or an Output Schedule has been submitted for each On-Line Resource an hour before the end of the Adjustment Period for the upcoming Operating Hour. ERCOT shall notify QSEs that have not submitted an Output Schedule or Energy Offer Curve or Energy Bid/Offer Curve through the Market Information System (MIS) Certified Area. |

|  |
| --- |
| [NPRR1010 and NPRR1014: Insert applicable portions of paragraph (3) below upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation for NPRR1014; and renumber accordingly:]  (3) If a Resource is scheduled to be On-Line and available to provide an Ancillary Service, but does not have any Ancillary Service Offers for which the Resource is qualified to provide, then at the end of the Adjustment Period, ERCOT shall notify the Resource’s QSE through the MIS Certified Area. |

(3) ERCOT may only issue Dispatch Instructions for the Real-Time operation of Transmission Facilities to a TSP, for the Real-Time operation of distribution facilities to a Distribution Service Provider (DSP), or for a Resource to the QSE that represents it.

|  |
| --- |
| [NPRR857: Replace paragraph (3) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  (3) In Real-Time operations, ERCOT may only issue Dispatch Instructions for Direct Current Ties (DC Ties) to the appropriate Direct Current Tie Operator (DCTO), for Transmission Facilities to a Transmission Service Provider (TSP), for distribution facilities to a Distribution Service Provider (DSP), or for a Resource to the QSE that represents it. |

(4) ERCOT shall post shift schedules on the MIS Secure Area.

6.5.2 Operating Standards

(1) ERCOT and each TSP shall operate the ERCOT Transmission Grid pursuant to NERC Reliability Standards, these Protocols, and Good Utility Practice. The requirements of the NERC Reliability Standards shall prevail to the extent there are any inconsistencies with these Protocols or Good Utility Practice. These Protocols control to the extent of any inconsistency between the Protocols and any of the following documents:

|  |
| --- |
| [NPRR857: Replace paragraph (1) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  (1) ERCOT and each TSP and DCTO shall operate the ERCOT Transmission Grid pursuant to NERC Reliability Standards, these Protocols, and Good Utility Practice. The requirements of the NERC Reliability Standards shall prevail to the extent there are any inconsistencies with these Protocols or Good Utility Practice. These Protocols control to the extent of any inconsistency between the Protocols and any of the following documents: |

(a) The Operating Guides;

(b) ERCOT procedures manual for ERCOT Operators to use during normal and emergency operations of the ERCOT Transmission Grid;

(c) Specific operating procedures and RAPs submitted to ERCOT by individual Transmission Facilities owners or operators to address operating problems on their respective grids that could affect operation of the ERCOT Transmission Grid; and

(d) Guidelines established by the ERCOT Board, which may be more stringent than those established by NERC for the secure operation of the ERCOT Transmission Grid.

6.5.3 Equipment Operating Ratings and Limits

(1) ERCOT shall consider all equipment operating limits when issuing Dispatch Instructions. Except as stated in Section 6.5.9, Emergency Operations, if a Dispatch Instruction conflicts with a restriction that may be placed on equipment from time to time by a TSP, a DSP, or a Generation Resource’s QSE to protect the integrity of equipment, ERCOT shall honor the restriction.

|  |
| --- |
| [NPRR857: Replace paragraph (1) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  (1) ERCOT shall consider all equipment operating limits when issuing Dispatch Instructions. Except as stated in Section 6.5.9, Emergency Operations, if a Dispatch Instruction conflicts with a restriction that may be placed on equipment from time to time by a TSP, a DSP, a DCTO, or a Generation Resource’s QSE to protect the integrity of equipment, ERCOT shall honor the restriction. |

(2) Each TSP shall notify ERCOT of any limitations on the TSP’s system that may affect ERCOT Dispatch Instructions. ERCOT shall continuously maintain a posting on the MIS Secure Area of any TSP limitations that may affect Dispatch Instructions. Examples of such limitations may include: temporary changes to transmission or transformer ratings, temporary changes to range of automatic tap position capabilities on auto-transformers, fixing or blocking tap changer, changes to no-load tap positions or other limitations affecting the delivery of energy across the ERCOT Transmission Grid. Any conflicts that cannot be satisfactorily resolved may be brought to ERCOT by any of the affected Entities for investigation and resolution.

|  |
| --- |
| [NPRR857: Replace paragraph (2) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  (2) Each TSP or DCTO shall notify ERCOT of any limitations on the TSP’s or DCTO’s system that may affect ERCOT Dispatch Instructions. ERCOT shall continuously maintain a posting on the MIS Secure Area of any TSP or DCTO limitations that may affect Dispatch Instructions. Examples of such limitations may include: temporary changes to transmission or transformer ratings, temporary changes to range of automatic tap position capabilities on auto-transformers, fixing or blocking tap changer, changes to no-load tap positions or other limitations affecting the delivery of energy across the ERCOT Transmission Grid. Any conflicts that cannot be satisfactorily resolved may be brought to ERCOT by any of the affected Entities for investigation and resolution. |

6.5.4 Inadvertent Energy Account

(1) ERCOT shall track any differences between the scheduled energy and the actual metered value at each Direct Current Tie (DC Tie) in an “Inadvertent Energy Account” between ERCOT and each interconnected non-ERCOT Control Area. ERCOT shall coordinate operation of each DC Tie with the DC Tie operator such that the Inadvertent Energy Account is maintained as close to zero as possible. Corrections of inadvertent energy between ERCOT and the other NERC-interconnected non-ERCOT Control Areas must comply with the NERC scheduling protocols and the ERCOT Operating Guides. ERCOT shall establish procedures to correct Inadvertent Energy Accounts with non-ERCOT Control Areas that are not subject to NERC scheduling protocols.

6.5.5 QSE Activities

(1) QSE activities during Real-Time operations are summarized in the table located in Section 6.3.2, Activities for Real-Time Operations. That table is intended to be only a general guide and not controlling language, and any conflict between the table and another section of the Protocols is controlled by the other section.

6.5.5.1 Changes in Resource Status

(1) Each QSE shall notify ERCOT via telemetry of a change in Resource Status that is not related to a Forced Outage as soon as practicable but no longer than 15 minutes after the change in status occurs and through changes in the Current Operating Plan (COP) as soon as practicable but no longer than 60 minutes after the change in status of the Resource occurs.

(2) When an On-Line Resource is experiencing an event that may affect its availability and/or capability and that requires further actions to stabilize the Resource and/or determine the impact of the event, the QSE may change the Resource Status to ONHOLD within 15 minutes of experiencing an event. Following this Resource Status change, the telemetered HSL and any other applicable telemetry of the Resource as specified in paragraph (2) of Section 6.5.5.2, Operational Data Requirements, shall be updated as soon as practicable but no longer than 15 minutes after the change in Resource Status to ONHOLD. After the QSE has determined the impact of the event, the QSE shall change the Resource Status to its updated status as soon as practicable but no longer than 60 consecutive minutes of being in the ONHOLD status.

(3) Each QSE shall promptly inform ERCOT when the operating mode of its Generation Resource’s Automatic Voltage Regulator (AVR) or Power System Stabilizer (PSS) is changed while the Resource is On-Line. The QSE shall also provide the Resource’s AVR or PSS status logs to ERCOT upon request. For each Generation Resource that is On-Line but not producing real power and is not capable of providing Reactive Power, each QSE must still telemeter its AVR status to ERCOT but is not required to provide verbal notifications of its AVR status changes to ERCOT during these operating conditions.

(4) Each QSE shall immediately report to ERCOT and the TSP any inability of the QSE’s Generation Resource required to meet its reactive capability requirements in these Protocols.

(5) Each QSE shall timely update the telemetered Resource Status unless in the reasonable judgment of the QSE, such compliance would create an undue threat to safety, undue risk of bodily harm, or undue damage to equipment. The QSE is excused from updating the telemetered Resource Status only for so long as the undue threat to safety, undue risk of bodily harm, or undue damage to equipment exists. The time for updating the telemetered Resource Status begins once the undue threat to safety, undue risk of bodily harm, or undue damage to equipment no longer exists.

(6) A QSE or Resource Entity may use a Generation Resource or ESR to serve Customer Load as part of a Private Microgrid Island (PMI) in any circumstance in which the Customer Load and the Resource are both disconnected from the ERCOT System due to an Outage of the transmission and/or distribution system, provided that the configuration complies with the requirements of paragraph (7) of Section 10.3.2.3, Generation Netting for ERCOT-Polled Settlement Meters, and provided that the QSE or Resource Entity has notified the Transmission and/or Distribution Service Provider (TDSP) of the establishment of a PMI configuration. The QSE shall ensure that the Load served by the Resource in the PMI configuration is de-energized at the time it is reconnected to the ERCOT System following the PMI configuration. All operations in a PMI configuration and any reconnection of Load following a PMI configuration shall be coordinated with the TDSP.

(7) A TDSP shall not intentionally disconnect, or direct another TDSP to disconnect, a Generation Resource or ESR included in a PMI configuration from the ERCOT System except in the following circumstances:

(a) An approved or accepted Planned or Maintenance Outage of a Transmission Facility reasonably requires, or would otherwise result in, the disconnection of the Resource from the ERCOT System;

(b) The Resource is a Distribution Generation Resource or Distribution Energy Storage Resource (DESR), and disconnection of the Resource is required for Distribution System maintenance;

(c) The TDSP’s disconnection of the Resource is necessary to maintain the security of the TDSP’s system or the ERCOT System;

(d) The TDSP’s disconnection of the Resource is necessary to protect the public from a safety risk attributable to the operation of the Resource; or

(e) ERCOT directs the disconnection of the Resource.

(8) For each Intermittent Renewable Resource (IRR) synchronized to the ERCOT System and not capable of providing real power due to a lack of fuel, the Resource Entity and QSE shall send ERCOT, via telemetry, a Real-Time On-Line status and HSL and LSL of 0.

6.5.5.2 Operational Data Requirements

(1) ERCOT shall use Operating Period data to monitor and control the reliability of the ERCOT Transmission Grid and shall use it in network analysis software to predict the short-term reliability of the ERCOT Transmission Grid. Each TSP, at its own expense, may obtain that Operating Period data from ERCOT or directly from QSEs.

(2) A QSE representing a Generation Resource connected to Transmission Facilities or distribution facilities shall provide the following Real-Time telemetry data to ERCOT for each Generation Resource. ERCOT shall make that data available, in accordance with ERCOT Protocols, NERC Reliability Standards, and Governmental Authority requirements, to requesting TSPs and DSPs operating within ERCOT. Such data must be provided to the requesting TSP or DSP at the requesting TSP’s or DSP’s expense, including:

(a) Net real power (in MW) as measured by installed power metering or as calculated in accordance with the Operating Guides based on metered gross real power and conversion constants determined by the Resource Entity and provided to ERCOT through the Resource Registration process. Net real power represents the actual generation of a Resource for all real power dispatch purposes, including use in Security-Constrained Economic Dispatch (SCED), determination of the High Ancillary Service Limit (HASL), High Dispatch Limit (HDL), Low Dispatch Limit (LDL) and Low Ancillary Service Limit (LASL), and is consistent with telemetered HSL, LSL and Non-Frequency Responsive Capacity (NFRC);

(b) Gross real power (in MW) as measured by installed power metering or as calculated in accordance with the Operating Guides based on metered real power, which may include Supervisory Control and Data Acquisition (SCADA) metering, and conversions constants determined by the Resource Entity and provided to ERCOT through the Resource Registration process;

(c) Gross Reactive Power (in Megavolt-Amperes reactive (MVAr));

(d) Net Reactive Power (in MVAr);

(e) Power to standby transformers serving plant auxiliary Load;

(f) Status of switching devices in the plant switchyard not monitored by the TSP or DSP affecting flows on the ERCOT Transmission Grid;

(g) Any data mutually agreed to by ERCOT and the QSE to adequately manage system reliability;

(h) Generation Resource breaker and switch status;

(i) HSL (Combined Cycle Generation Resources) shall:

(i) Submit the HSL of the current operating configuration; and

(ii) When providing ECRS, update the HSL as needed, to be consistent with Resource performance limitations of ECRS provision;

(j) NFRC currently available (unloaded) and included in the HSL of the Combined Cycle Generation Resource’s current configuration;

(k) High Emergency Limit (HEL), under Section 6.5.9.2, Failure of the SCED Process;

(l) Low Emergency Limit (LEL), under Section 6.5.9.2;

(m) LSL;

(n) Configuration identification for Combined Cycle Generation Resources;

(o) Ancillary Service Schedule for each quantity of ECRS and Non-Spin which is equal to the Ancillary Service Resource Responsibility minus the amount of Ancillary Service deployment;

(i) For On-line Non-Spin, Ancillary Service Schedule shall be set to zero;

(ii) For Off-Line Non-Spin and for On-Line Non-Spin using Off-Line power augmentation technology the Ancillary Service Schedule shall equal the Non-Spin obligation and then shall be set to zero within 20 minutes following Non-Spin deployment;

(p) Ancillary Service Resource Responsibility for each quantity of Regulation Up Service (Reg-Up), Regulation Down Service (Reg-Down), RRS, ECRS, and Non-Spin. The sum of Ancillary Service Resource Responsibility for all Resources in a QSE is equal to the Ancillary Service Supply Responsibility for that QSE;

(q) Reg-Up and Reg-Down participation factors represent how a QSE is planning to deploy the Ancillary Service energy on a percentage basis to specific qualified Resource(s). The Reg-Up and Reg-Down participation factors for a Resource providing Fast Responding Regulation Up Service (FRRS-Up) or Fast Responding Regulation Down Service (FRRS-Down) shall be zero; and

(r) The designated Master QSE of a Generation Resource that has been split to function as two or more Split Generation Resources shall provide Real-Time telemetry for items (a), (b), (c), (d), (e), (g), and (h) above, PSS and AVR status for the total Generation Resource in addition to the Split Generation Resource the Master QSE represents.

|  |
| --- |
| [NPRR1010, NPRR1014, and NPRR1029: Replace applicable portions of paragraph (2) above with the following upon system implementation for NPRR1014 or NPRR1029; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]  (2) A QSE representing a Generation Resource connected to Transmission Facilities or distribution facilities shall provide the following Real-Time telemetry data to ERCOT for each Generation Resource. ERCOT shall make that data available, in accordance with ERCOT Protocols, NERC Reliability Standards, and Governmental Authority requirements, to requesting TSPs and DSPs operating within ERCOT. Such data must be provided to the requesting TSP or DSP at the requesting TSP’s or DSP’s expense, including:  (a) Net real power (in MW) as measured by installed power metering or as calculated in accordance with the Operating Guides based on metered gross real power and conversion constants determined by the Resource Entity and provided to ERCOT through the Resource Registration process. Net real power represents the actual generation of a Resource for all real power dispatch purposes, including use in Security-Constrained Economic Dispatch (SCED), High Dispatch Limit (HDL), and Low Dispatch Limit (LDL), and is consistent with telemetered HSL, LSL, and Frequency Responsive Capacity (FRC);  (b) Gross real power (in MW) as measured by installed power metering or as calculated in accordance with the Operating Guides based on metered real power, which may include Supervisory Control and Data Acquisition (SCADA) metering, and conversions constants determined by the Resource Entity and provided to ERCOT through the Resource Registration process;  (c) Gross Reactive Power (in Megavolt-Amperes reactive (MVAr));  (d) Net Reactive Power (in MVAr);  (e) Power to standby transformers serving plant auxiliary Load;  (f) Status of switching devices in the plant switchyard not monitored by the TSP or DSP affecting flows on the ERCOT Transmission Grid;  (g) Any data mutually agreed to by ERCOT and the QSE to adequately manage system reliability;  (h) Generation Resource breaker and switch status;  (i) HSL (Combined Cycle Generation Resources) shall:  (i) Submit the HSL of the current operating configuration; and  (ii) When providing ECRS, update the HSL as needed, to be consistent with Resource performance limitations of ECRS provision;  (j) For Resources with capacity that is not capable of providing Primary Frequency Response (PFR), the current FRC of the Resource;  (k) High Emergency Limit (HEL), under Section 6.5.9.2, Failure of the SCED Process;  (l) Low Emergency Limit (LEL), under Section 6.5.9.2;  (m) LSL;  (n) Configuration identification for Combined Cycle Generation Resources;  (o) For Resources with capacity that is not capable of providing PFR, the high and low limits in MW of the Resource’s capacity that is frequency responsive;  (p) For RRS, including any sub-categories of RRS, the physical capability (in MW) of the Resource to provide RRS;  (q) For Ancillary Services other than RRS, a blended Normal Ramp Rate (in MW/min) that reflects the physical capability of the Resource to provide that specific type of Ancillary Service;  (r) Five-minute blended Normal Ramp Rates (up and down);  (s) The designated Master QSE of a Generation Resource that has been split to function as two or more Split Generation Resources shall provide Real-Time telemetry for items (a), (b), (c), (d), (e), (g), and (h) above, PSS and AVR status for the total Generation Resource in addition to the Split Generation Resource the Master QSE represents; and  (t) The telemetered MW of power augmentation capacity that is not On-Line for Resources that have power augmentation capacity included in HSL. |

(3) For each Intermittent Renewable Resource (IRR), the QSE shall set the HSL equal to the current net output capability of the facility. The net output capability should consider the net real power of the IRR generation equipment, IRR generation equipment availability, weather conditions, and whether the IRR net output is being affected by compliance with a SCED Dispatch Instruction.

(4) For each Aggregate Generation Resource (AGR), the QSE shall telemeter the number of its generators online.

(5) A QSE representing a Load Resource connected to Transmission Facilities or distribution facilities shall provide the following Real-Time data to ERCOT for each Load Resource and ERCOT shall make the data available, in accordance with ERCOT Protocols, NERC standards and policies, and Governmental Authority requirements, to the Load Resource’s host TSP or DSP at the TSP’s or DSP’s expense. The Load Resource’s net real power consumption, Low Power Consumption (LPC) and Maximum Power Consumption (MPC) shall be telemetered to ERCOT using a positive (+) sign convention:

(a) Load Resource net real power consumption (in MW);

(b) Any data mutually agreed to by ERCOT and the QSE to adequately manage system reliability;

(c) Load Resource breaker status, if applicable;

(d) LPC (in MW);

(e) MPC (in MW);

(f) Ancillary Service Schedule (in MW) for each quantity of RRS, ECRS, and Non-Spin, which is equal to the Ancillary Service Resource Responsibility minus the amount of Ancillary Service deployment;

(g) Ancillary Service Resource Responsibility (in MW) for each quantity of Reg-Up and Reg-Down for Controllable Load Resources, and RRS, ECRS, and Non-Spin for all Load Resources;

(h) The status of the high-set under-frequency relay, if required for qualification. The under-frequency relay for a Load Resource providing Non-Spin shall be disabled and the status of that relay shall indicate it as disabled or unarmed;

(i) For a Controllable Load Resource providing Non-Spin, the Scheduled Power Consumption that represents zero Ancillary Service deployments;

(j) For a single-site Controllable Load Resource with registered maximum Demand response capacity of ten MW or greater, net Reactive Power (in MVAr);

(k) Resource Status (Resource Status shall be ONRL if high-set under-frequency relay is active);

(l) Reg-Up and Reg-Down participation factor, which represents how a QSE is planning to deploy the Ancillary Service energy on a percentage basis to specific qualified Resource(s). The Reg-Up and Reg-Down participation factors for a Resource providing FRRS-Up or FRRS-Down shall be zero; and

(m) For a Controllable Load Resource providing Non-Spin, the “Scheduled Power Consumption Plus Two Hours,” representing the QSE’s forecast of the Controllable Load Resource’s instantaneous power consumption for a point two hours in the future.

|  |
| --- |
| [NPRR1010, NPRR1029, and NPRR1131: Replace applicable portions of paragraph (5) above with the following upon system implementation for NPRR1029 or NPRR1131; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]  (5) A QSE representing a Load Resource connected to Transmission Facilities or distribution facilities shall provide the following Real-Time data to ERCOT for each Load Resource and ERCOT shall make the data available, in accordance with ERCOT Protocols, NERC standards and policies, and Governmental Authority requirements, to the Load Resource’s host TSP or DSP at the TSP’s or DSP’s expense. The Load Resource’s net real power consumption, Low Power Consumption (LPC) and Maximum Power Consumption (MPC) shall be telemetered to ERCOT using a positive (+) sign convention:  (a) Load Resource net real power consumption (in MW);  (b) Any data mutually agreed to by ERCOT and the QSE to adequately manage system reliability;  (c) Load Resource breaker status, if applicable;  (d) LPC (in MW);  (e) MPC (in MW);  (f) The Load Resource’s Ancillary Service self-provision (in MW) for RRS and/or ECRS provided via under-frequency relay;  (g) The status of the high-set under-frequency relay, if required for qualification. The under-frequency relay for a Load Resource providing Non-Spin shall be disabled and the status of that relay shall indicate it as disabled or unarmed;  (h) For a Controllable Load Resource providing Non-Spin, the Scheduled Power Consumption that represents zero Ancillary Service deployments;  (i) For a single-site Controllable Load Resource with registered maximum Demand response capacity of ten MW or greater, net Reactive Power (in MVAr);  (j) Resource Status;  (k) For an Aggregate Load Resource (ALR) providing Non-Spin, the “Scheduled Power Consumption Plus Two Hours,” representing the QSE’s forecast of the Controllable Load Resource’s instantaneous power consumption for a point two hours in the future;  (l) For RRS, including any sub-categories of RRS, the current physical capability (in MW) of the Resource to provide RRS;  (m) For Ancillary Service products other than RRS, a blended Normal Ramp Rate (in MW/min) that reflects the current physical capability of the Resource’s ability to provide a particular Ancillary Service product; and  (n) For a Controllable Load Resource, 5-minute blended Normal Ramp Rates (up and down). |

|  |
| --- |
| [NPRR1014 and NPRR1029: Insert applicable portions of paragraph (6) below upon system implementation and renumber accordingly:]  (6) A QSE representing an ESR connected to Transmission Facilities or distribution facilities shall provide the following Real-Time telemetry data to ERCOT for each ESR. ERCOT shall make that data available, in accordance with ERCOT Protocols, NERC Reliability Standards, and Governmental Authority requirements, to requesting TSPs and DSPs operating within ERCOT. Such data must be provided to the requesting TSP or DSP at the requesting TSP’s or DSP’s expense, including:  (a) Net real power consumption or output (in MW) as measured by installed power metering or as calculated in accordance with the Operating Guides based on metered gross real power and conversion constants determined by the Resource Entity and provided to ERCOT through the Resource Registration process. Net real power represents the actual generation or consumption of an ESR for all real power dispatch purposes, including use in Security-Constrained Economic Dispatch (SCED), in determination of High Dispatch Limit (HDL), and Low Dispatch Limit (LDL) and is consistent with telemetered HSL, LSL and Frequency Responsive Capacity (FRC);  (b) Gross real power consumption or output (in MW) as measured by installed power metering or as calculated in accordance with the Operating Guides based on metered real power, which may include Supervisory Control and Data Acquisition (SCADA) metering, and conversion constants determined by the Resource Entity and provided to ERCOT through the Resource Registration process;  (c) Gross Reactive Power (in Megavolt-Amperes reactive (MVAr));  (d) Net Reactive Power (in MVAr);  (e) Power to standby transformers serving plant auxiliary Load;  (f) Status of switching devices in the plant switchyard not monitored by the TSP or DSP affecting flows on the ERCOT Transmission Grid;  (g) Any data mutually agreed to by ERCOT and the QSE to adequately manage system reliability;  (h) ESR breaker and switch status;  (i) HSL;  (j) High Emergency Limit (HEL), under Section 6.5.9.2, Failure of the SCED Process;  (k) Low Emergency Limit (LEL), under Section 6.5.9.2;  (l) LSL;  (m) For RRS, including any sub-category of RRS, the current physical capability (in MW) of the Resource to provide RRS;  (n) For Ancillary Services other than RRS, a blended ramp rate (in MW/min) that reflects the current physical capability of the Resource to provide that specific type of Ancillary Service; and  (o) Five-minute blended normal up and down ramp rates; |

(6) A QSE with Resources used in SCED shall provide communications equipment to receive ERCOT-telemetered control deployments.

(7) A QSE providing any Regulation Service shall provide telemetry indicating the appropriate status of Resources providing Reg-Up or Reg-Down, including status indicating whether the Resource is temporarily blocked from receiving Reg-Up and/or Reg-Down deployments from the QSE. This temporary blocking will be indicated by the enabling of the Raise Block Status and/or Lower Block Status telemetry points.

(a) Raise Block Status and Lower Block Status are telemetry points used in transient unit conditions to communicate to ERCOT that a Resource’s ability to adjust its output has been unexpectedly impaired.

(b) When one or both of the telemetry points are enabled for a Resource, ERCOT will cease using the regulation capacity assigned to that Resource for Ancillary Service deployment.

(c) This hiatus of deployment will not excuse the Resource’s obligation to provide the Ancillary Services for which it has been committed.

|  |
| --- |
| [NPRR1010, NPRR1014, and NPRR1029: Replace applicable portions of paragraph (c) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation for NPRR1014 or NPRR1029:]  (c) This hiatus of deployment will not excuse the Resource’s obligation to provide the Ancillary Services for which it has been awarded. |

(d) These telemetry points shall only be utilized during unforeseen transient unit conditions such as plant equipment failures. Raise Block Status and Lower Block Status shall only be enabled until the Resource operator has time to update the Resource limits and Ancillary Service telemetry to reflect the problem.

(e) The Resource limits and Ancillary Service telemetry shall be updated as soon as practicable.  Raise Block Status and Lower Block Status will then be disabled.

(8) Real-Time data for reliability purposes must be accurate to within three percent. This telemetry may be provided from relaying accuracy instrumentation transformers.

(9) Each QSE shall report the current configuration of combined-cycle Resources that it represents to ERCOT. The telemetered Resource Status for a Combined Cycle Generation Resource may only be assigned a Resource Status of OFFNS if no generation units within that Combined Cycle Generation Resource are On-Line.

|  |
| --- |
| [NPRR1010, NPRR1014, and NPRR1029: Replace applicable portions of paragraph (9) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation for NPRR1014 or NPRR1029:]  (9) Each QSE shall report the current configuration of combined-cycle Resources that it represents to ERCOT. The telemetered Resource Status for a Combined Cycle Generation Resource may only be assigned a Resource Status of OFF if no generation units within that Combined Cycle Generation Resource are On-Line. |

(10) A QSE representing Combined Cycle Generation Resources shall provide ERCOT with the possible operating configurations for each power block with accompanying limits. Combined Cycle Train power augmentation methods may be included as part of one or more of the registered Combined Cycle Generation Resource configurations. Power augmentation methods may include:

(a) Combustion turbine inlet air cooling methods;

(b) Duct firing;

(c) Other ways of temporarily increasing the output of Combined Cycle Generation Resources; and

(d) For Qualifying Facilities (QFs), an LSL that represents the minimum energy available for Dispatch by SCED, in MW, from the Combined Cycle Generation Resource based on the minimum stable steam delivery to the thermal host plus a justifiable reliability margin that accounts for changes in ambient conditions.

(11) A QSE representing Generation Resources other than Combined Cycle Generation Resources may telemeter an NFRC value for their Generation Resource only if the QSE or Resource Entity associated with that Generation Resource has first requested and obtained ERCOT’s approval of the Generation Resource’s NFRC quantity.

|  |
| --- |
| [NPRR1010, NPRR1014, and NPRR1029: Replace applicable portions of paragraph (11) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation for NPRR1014 or NPRR1029:]  (11) A QSE representing a Generation Resource other than a Combined Cycle Generation Resource may provide FRC telemetry for the Generation Resource only if the QSE or Resource Entity associated with that Generation Resource has first requested and obtained ERCOT’s approval. |

(12) A QSE representing an ESR shall provide the following Real-Time telemetry data to ERCOT for each ESR:

(a) Maximum Operating State of Charge, in MWh;

(b) Minimum Operating State of Charge, in MWh;

(c) State of Charge, in MWh;

(d) Maximum Operating Discharge Power Limit, in MW; and

(e) Maximum Operating Charge Power Limit, in MW.

(13) In accordance with ERCOT Protocols, NERC Reliability Standards, and Governmental Authority requirements, ERCOT shall make the data specified in paragraph (12) available to any requesting TSP or DSP at the requesting TSP’s or DSP’s expense.

|  |
| --- |
| [NPRR1077: Insert paragraphs (14)-(16) below upon system implementation:]  (14) Except as provided in paragraph (15) below, a QSE representing a Settlement Only Generator (SOG) shall provide ERCOT the following Real-Time telemetry:  (a) Net real power injection at the Point of Interconnection (POI) or Point of Common Coupling (POCC) for each site with one or more SOGs;  (b) For any site with one or more ESSs that are registered as an SOG, net real power withdrawal at the POI or POCC;  (c) For each inverter at the site, gross real power output measured at the generator terminals for all SOGs that are located behind that inverter, separately aggregated by fuel type;  (d) For SOGs at the same site that are not located behind an inverter, gross real power output measured at the generator terminals for all SOGs, separately aggregated by fuel type;  (e) For any site with one or more ESSs registered as an SOG, for each inverter, gross real power withdrawal by all such ESSs that are located behind that inverter, as measured at the generator terminals; and  (f) Generator breaker status.  (15) A QSE is not required to provide telemetry for a Settlement Only Distribution Generator (SODG) if:  (a) The site that includes the SODG has not exported more than 10 MWh in any calendar year, exclusive of any energy exported during any Settlement Interval in which an ERCOT-declared Energy Emergency Alert (EEA) is in effect;  (b) The QSE or Resource Entity for the SODG has submitted a written request to ERCOT seeking an exemption from the telemetry requirements under this paragraph; and  (c) ERCOT has provided the QSE or Resource Entity written confirmation that the SODG is exempt from providing telemetry under this paragraph.  (16) If ERCOT determines that a site that includes an SODG has exported more than 10 MWh in a given calendar year, it shall notify the SODG’s QSE that the SODG is no longer eligible for the telemetry exemption. Within 90 days of receiving this notification, the QSE for the SODG shall comply with the telemetry requirements of paragraph (14) above. |

|  |
| --- |
| [NPRR885: Insert paragraph (17) below upon system implementation:]  (17) A QSE representing a Must-Run Alternative (MRA) shall telemeter the MRA MW currently available (unloaded) and not included in the HSL. |

|  |
| --- |
| [NPRR1029: Insert paragraph (18) below upon system implementation:]  (18) A QSE representing a DC-Coupled Resource shall provide the following Real-Time telemetry data in addition to that required for other ESRs:  (a) Gross AC MW production of the intermittent renewable generation component of the DC-Coupled Resource, which includes the portion of the intermittent renewable generation used to charge the ESS and/or serve auxiliary Load on the DC side of the inverter; and  (b) Gross AC MW capability of the intermittent renewable generation component of the DC-Coupled Resource, based on Real-Time conditions. |

|  |
| --- |
| [NPRR995: Insert paragraph (19) below upon system implementation:]  (19) A QSE representing a Settlement Only Energy Storage System (SOESS) that elects to include the net generation and/or net withdrawals of the SOESS in the estimate of Real-Time Liability (RTL) shall provide ERCOT Real-Time telemetry of the net generation and/or net withdrawals of the SOESS. |

6.5.6 TSP and DSP Responsibilities

(1) Each TSP shall notify ERCOT of any changes in status of Transmission Elements as provided in these Protocols and clarified in the ERCOT procedures.

(2) Each TSP shall as soon as practicable report to ERCOT any short-term inability to meet minimum TSP reactive requirements.

(3) Each DSP shall as soon as practicable report to ERCOT any short-term inability to meet minimum DSP reactive requirements.

|  |
| --- |
| [NPRR1098: Replace Section 6.5.6 above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross Transmission LLC (Southern Cross) provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a Transmission Service Provider (TSP) and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  6.5.6 TSP, TO, DCTO, and DSP Responsibilities  (1) Each TSP shall notify ERCOT of any changes in status of Transmission Elements as provided in these Protocols and clarified in the ERCOT procedures.  (2) Each TSP shall as soon as practicable report to ERCOT any short-term inability to meet minimum TSP reactive requirements.  (3) Each DSP shall as soon as practicable report to ERCOT any short-term inability to meet minimum DSP reactive requirements.  (4) Each DCTO shall immediately notify its designated TO of any change that affects the reactive capability of any DC Tie Facility it operates, including any change to the operation mode of the DC Tie Facility’s voltage control system or any temporary transmission voltage limit changes. Each TO designated by a DCTO shall immediately notify ERCOT when a DC Tie Facility experiences a change that affects its reactive capability, including any change to the operation mode of the DC Tie Facility’s voltage control system or any temporary transmission voltage limit changes.  (5) Each TO designated by a DCTO operating a DC Tie meeting the applicability requirements of paragraph (1) of Section 3.15.4, Direct Current Tie Owner and Direct Current Tie Operator (DCTO) Responsibilities Related to Voltage Support, shall for each such DC Tie provide to ERCOT, via ICCP, the status of the DC Tie Facility’s voltage control system. An “On” status will indicate that the control system is on and set to regulate the voltage at the DC Tie’s POIB in automatic voltage control mode, and an “Off” status will indicate that the control system is off or in manual mode.  (6) Each TO designated by a DCTO operating a DC Tie meeting the applicability requirements of paragraph (1) of Section 3.15.4 shall telemeter to ERCOT, via ICCP, the Real-Time target voltage at each DC Tie’s POIB. Each TO shall modify the telemetered target voltage to match any verbal target voltage instruction issued as soon as practicable. |

6.5.7 Energy Dispatch Methodology

(1) This Section outlines the programmatic and manual processes employed by ERCOT to simultaneously achieve power balance (minimizing the use of Regulation Service) and manage congestion while operating within the constraints of the system at economically optimized cost. The Real-Time Sequence describes the key system components and inputs that are required to support the SCED process, which produces the Locational Marginal Prices (LMPs) and Base Points while meeting transmission system constraints. Section 6.5.7.3, Security Constrained Economic Dispatch, provides further details regarding additional components and inputs and ex-ante mitigation.

|  |
| --- |
| [NPRR1010: Replace Section 6.5.7 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  ***6.5.7 Real-Time Sequence Methodology***  (1) This Section outlines the programmatic and manual processes employed by ERCOT to simultaneously achieve power balance (minimizing the use of Regulation Service), determine Ancillary Service awards, and manage congestion while operating within the constraints of the system at economically optimized cost. The Real-Time Sequence describes the key system components and inputs that are required to support the SCED process, which produces the Locational Marginal Prices (LMPs), Base Points, Real-Time MCPCs, and Ancillary Service awards while meeting transmission system constraints. Section 6.5.7.3, Security Constrained Economic Dispatch, provides further details regarding additional components and inputs and ex-ante mitigation. |

6.5.7.1 Real-Time Sequence

(1) The Real-Time Sequence consists of multiple interdependent processes that are driven by telemetry data and the network topology. This Section describes the core aspects of the Real-Time Sequence.

(2) The figure below highlights the key computational modules and processes that are used during the Real-Time Sequence:



6.5.7.1.1 SCADA Telemetry

(1) SCADA telemetry provides the actual Real-Time status and output of Resources and the status of observable Transmission Elements of the Network Operations Model.

6.5.7.1.2 Network Topology Builder

(1) The Network Topology Builder creates the Updated Network Model based on the observed topology of the ERCOT Transmission Grid. The Updated Network Model is then used as the basis for the State Estimator solution.

6.5.7.1.3 Bus Load Forecast

(1) Once the Updated Network Model is created, the transmission Electrical Buses in the model will have a Bus Load Forecast applied. The forecasted Load must be denoted with a low State Estimator measurement confidence factor. The State Estimator must use the forecasted Load coupled with the remaining telemetry of line flows and voltages to estimate the actual Load on each Electrical Bus.

6.5.7.1.4 State Estimator

(1) The State Estimator must use the Bus Load Forecast and the remaining telemetry information of line flows and voltages to estimate all the transmission parameters needed to provide, on convergence, a mathematically consistent data set of constrained inputs to the Network Security Analysis (NSA) and the Topology Consistency Analyzer.

6.5.7.1.5 Topology Consistency Analyzer

(1) The Topology Consistency Analyzer identifies possibly erroneous breaker and switch status. The Topology Consistency Analyzer must notify ERCOT of inconsistencies detected and must indicate the correct breaker and switch status(es) when the preponderance of redundant information from the telemetered database indicates true errors in status. For example, such processing would detect flow on lines, flow on devices or network load, shown as disconnected from the transmission system and would indicate to ERCOT that there was a continuity error associated with the flow measurement or status indication. ERCOT may override SCADA telemetry as required to correct erroneous breaker and switch status before that information is processed by the NSA for the next SCED interval. ERCOT shall notify the TSP or QSE, who shall correct the status indications as soon as practicable. The Topology Consistency Analyzer maintains a summary of all incorrect status indicators and provides that information to all TSPs and other Market Participants through the MIS Secure Area.

|  |
| --- |
| [NPRR857: Replace paragraph (1) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  (1) The Topology Consistency Analyzer identifies possibly erroneous breaker and switch status. The Topology Consistency Analyzer must notify ERCOT of inconsistencies detected and must indicate the correct breaker and switch status(es) when the preponderance of redundant information from the telemetered database indicates true errors in status. For example, such processing would detect flow on lines, flow on devices or network load, shown as disconnected from the transmission system and would indicate to ERCOT that there was a continuity error associated with the flow measurement or status indication. ERCOT may override SCADA telemetry as required to correct erroneous breaker and switch status before that information is processed by the NSA for the next SCED interval. ERCOT shall notify the TSP, DCTO, or QSE, who shall correct the status indications as soon as practicable. The Topology Consistency Analyzer maintains a summary of all incorrect status indicators and provides that information to all TSPs, DCTOs, and other Market Participants through the MIS Secure Area. |

6.5.7.1.6 Breakers/Switch Status Alarm Processor and Forced Outage Detection Processor

(1) The Real-Time Sequence includes processes that detect and provide alarms to the ERCOT Operator when the status of breakers and switches, Resources, transmission lines and transformers, and Load disconnected from the Updated Network Model changes. Also, the ERCOT Operator must be able to determine if an Outage of Transmission Facilities had been scheduled in the Outage Scheduler or is a Forced Outage.

6.5.7.1.7 Real-Time Weather and Dynamic Rating Processor

(1) The Dynamic Rating Processor provides Dynamic Ratings using the processes described in Section 3.10.8, Dynamic Ratings, for all transmission lines and transformer elements with Dynamic Ratings designated by the TSPs. ERCOT shall obtain Real-Time weather data, where available, from multiple locations and provide it to the Dynamic Rating Processor. Weather conditions must include ambient temperature and may include wind speed when available. ERCOT shall post summaries of dynamically adjusted Transmission Element limits on the MIS Secure Area in a form that allows Market Participants to directly upload Real-Time data into the Common Information Model (CIM).

(2) On a monthly basis, ERCOT shall provide a summary report for each dynamically rated Transmission Element specifying the average change in Normal Rating in MVA that is gained on the element through use of a Dynamic Rating rather than the Normal Rating. ERCOT shall post this report to the MIS Secure Area.

6.5.7.1.8 Overload Alarm Processor

(1) Once transmission line and transformer Dynamic Ratings are retrieved, ERCOT shall compare the actual flow and state estimated flow calculation of MVA to the effective Transmission Element limit and, if an out-of-limit condition exists, ERCOT shall produce an overload notification.

6.5.7.1.9 Contingency List and Contingency Screening

(1) For the Real-Time Sequence, ERCOT may select relevant contingencies from a standard contingency list previously developed by ERCOT under Section 5.5.1, Security Sequence, that are likely to be active in Real-Time. ERCOT may use the information provided by the hour-ahead or Day-Ahead NSA to assist in determining which contingencies are candidates for activation.

6.5.7.1.10 Network Security Analysis Processor and Security Violation Alarm

(1) Using the input provided by the State Estimator, ERCOT shall use the NSA processor to perform analysis of all contingencies in the active list. For each contingency, ERCOT shall use the NSA processor to monitor the elements for limit violations. ERCOT shall use the NSA processor to verify Electrical Bus voltage limits to be within a percentage tolerance as outlined in the Operating Guides. Contingency security violations for transmission lines and transformers occur if:

(a) The predicted post-contingency MVA exceeds 100% of the Emergency Rating after consideration of Dynamic Ratings; and

(b) A RAP, AMP or RAS is not defined allowing relief within the time allowed by the security criteria as defined in Operating Guide Section 2.2.2, Security Criteria.

(2) When the NSA processor notifies ERCOT of a security violation, ERCOT shall immediately:

(a) Initiate the process described in Section 6.5.7.1.11, Transmission Network and Power Balance Constraint Management;

(b) Seek to determine what unforeseen change in system condition has arisen that has resulted in the security violation, especially those that were 125% or greater of the Emergency Rating for a single SCED interval or greater than 100% of the Emergency Rating for a duration of 30 minutes or more; and

(c) Where possible, seek to reverse the action (e.g. initiating a transmission clearance that the system was not properly pre-dispatched for) that has led to a security violation until further preventative action(s) can be taken.

(3) If SCED does not resolve a transmission security violation, ERCOT shall attempt to relieve the security violation by:

(a) Confirming that pre-determined RAPs are properly modeled in the system;

(b) Instructing Resources to follow Base Points from SCED if those Resources are not already doing so;

(c) Instructing Resources to update the Resources Status in the COP from ONTEST to ON in order to provide more capacity to SCED;

(d) Deploying Resource-Specific Non-Spin;

(e) Committing additional Generation Resources through the Reliability Unit Commitment (RUC) process;

(f) Removing conflicting non-cascading constraints from the SCED process;

(g) Re-Dispatching generation by over-riding HDLs and LDLs;

|  |
| --- |
| [NPRR1014: Replace paragraph (g) above with the following upon system implementation:]  (g) Re-Dispatching generation or, in the case of an ESR, its output or consumption, by over-riding HDLs and LDLs; |

(h) Instructing TSPs to utilize Reactive Power devices to manage voltage; and

(i) If all other mechanisms have failed, ERCOT may authorize the expedited use of a Temporary Outage Action Plan (TOAP) or Mitigation Plan.

(4) NSA must be capable of analyzing contingencies, including the effects of RASs, AMPs and RAPs modeled in the Network Operations Model. The NSA must fully integrate the evaluation and deployment of RASs, AMPs and RAPs and notify the ERCOT Operator of the application of these RASs, AMPs and RAPs to the solution.

(5) The Real-Time NSA may employ the use of appropriate ranking and other screening techniques to further reduce computation time by executing one or two iterations of the contingency study to gauge its impact and discard further study if the estimated result is inconsequential.

(6) HDL or LDL overrides required to pre-posture for an expected Outage shall only be utilized until SCED is capable of managing the related constraint by economic dispatch.

(7) ERCOT shall report monthly:

(a) All security violations that were 125% or greater of the Emergency Rating for a single SCED interval or greater than 100% of the Emergency Rating for a duration of 30 minutes or more during the prior reporting month and the number of occurrences and congestion cost associated with each of the constraints causing the security violations on a rolling 12 month basis.

(b) Operating conditions on the ERCOT System that contributed to each transmission security violation reported in paragraph (7)(a) above. Analysis should be made to understand the root cause and what steps could be taken to avoid a recurrence in the future.

6.5.7.1.11 Transmission Network and Power Balance Constraint Management

(1) ERCOT may not allow any constraint (contingency and limiting Transmission Element pair) identified by NSA to be activated in SCED until it has verified that the contingency definition in NSA associated with the constraint is accurate and appropriate given the current operating state of the ERCOT Transmission Grid. ERCOT shall continuously post to the MIS Secure Area all constraint contingencies in the NSA. ERCOT shall provide relevant constraint information, including, but not limited to, the contingency name as provided in the standard contingency list, whether or not the constraint is active in SCED, the overloaded Transmission Element name, the Rating of the overloaded Transmission Element including Generic Transmission Limits (GTLs) expressed in MW and MVA, and pre-contingency or post-contingency flows expressed in MW and MVA. For each Operating Day, ERCOT shall post to the MIS Secure Area within five days, a report listing all constraints with pre-contingency or post-contingency flows which exceeded the Rating of the overloaded Transmission Element for at least 15 minutes consecutively that were not activated in SCED and an explanation of why each constraint was not activated.

(2) ERCOT shall establish a maximum Shadow Price for each network constraint as part of the definition of contingencies. The cost calculated by SCED to resolve an additional MW of congestion on the network constraint is limited to the maximum Shadow Price for the network constraint.

(3) ERCOT shall establish a maximum Shadow Price for the power balance constraint. The cost calculated by SCED to resolve either the addition or reduction of one MW of dispatched generation on the power balance constraint is limited to the maximum Shadow Price for the power balance constraint.

(4) ERCOT shall determine the methodology for setting maximum Shadow Prices for network constraints and for the power balance constraint. Following review and recommendation by the Technical Advisory Committee (TAC), the ERCOT Board shall review the recommendation and approve a final methodology.

(5) The process for setting the maximum Shadow Prices as described above shall require ERCOT to obtain ERCOT Board approval of the values assigned to these caps along with the effective date for application of the cap. Within two Business Days following approval by the ERCOT Board, ERCOT shall post the Shadow Price caps and effective dates on the ERCOT website.

(6) If ERCOT determines that rating(s) in the Network Operations Model or configuration of the Transmission Facilities are not correct, then the TSP will provide the appropriate data submittals to ERCOT to correct the problem upon notification by ERCOT.

|  |
| --- |
| [NPRR857: Replace paragraph (6) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  (6) If ERCOT determines that rating(s) in the Network Operations Model or configuration of the Transmission Facilities are not correct, then the TSP or DCTO will provide the appropriate data submittals to ERCOT to correct the problem upon notification by ERCOT. |

6.5.7.1.12 Resource Limits

(1) The following Generation Resource limits are calculated by ERCOT and used as inputs by the SCED process:

(a) HASL;

(b) LASL;

(c) Normal Ramp Rate based on the values telemetered by the QSE to ERCOT;

(d) Emergency Ramp Rate based on the values telemetered by the QSE to ERCOT;

(e) SCED Up Ramp Rate (SURAMP), which represents the ability of a Generation Resource to increase generation output in SCED;

(f) SCED Down Ramp Rate (SDRAMP), which represents the ability of a Generation Resource to decrease generation output in SCED;

(g) HDL, which represents a dynamically calculated MW upper limit on a Resource that describes the maximum capability of the Resource SCED dispatch for the next five minutes (the Resource’s Real-Time generation plus the product of the Normal Ramp Rate, as telemetered by the QSE, multiplied by five), restricted by HASL; and

(h) LDL, which represents a dynamically calculated MW lower limit on a Resource that describes the minimum capability of the Resource SCED dispatch for the next five minutes (the Resource’s Real-Time generation minus the product of the Normal Ramp Rate, as telemetered by the QSE, multiplied by five), restricted by LASL.

(2) The following Load Resource limits are calculated by ERCOT and used in other calculations and as information for ERCOT Operators:

(a) For all Load Resources:

(i) HASL; and

(ii) LASL; and

(b) For Controllable Load Resources qualified to be Dispatched by SCED:

(i) Normal Ramp Rate based on the values telemetered by the QSE to ERCOT;

(ii) Emergency Ramp Rate based on the values telemetered by the QSE to ERCOT;

(iii) SURAMP, which represents the ability of a Load Resource to decrease consumption in SCED;

(iv) SDRAMP, which represents the ability of a Load Resource to increase consumption in SCED;

(v) HDL, which represents a dynamically calculated MW upper limit on a Resource that describes the maximum capability of the Resource SCED dispatch for the next five minutes (the Resource’s Real-Time consumption plus the product of the Normal Ramp Rate, as telemetered by the QSE, multiplied by five), restricted by HASL; and

(vi) LDL, which represents a dynamically calculated MW lower limit on a Resource that describes the minimum capability of the Resource SCED dispatch for the next five minutes (the Resource’s Real-Time consumption minus the product of the Normal Ramp Rate, as telemetered by the QSE, multiplied by five), restricted by LASL.

(3) For a more detailed explanation of all the Resource limits calculated by ERCOT, please reference Section 6.5.7.2, Resource Limit Calculator.

|  |
| --- |
| [NPRR1010 and NPRR1014: Replace applicable portions of Section 6.5.7.1.12 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation for NPRR1014:]  ***6.5.7.1.12 Resource Limits***  (1) The following Generation Resource or ESR limits are calculated by ERCOT and used as inputs by the SCED process:  (a) Normal Ramp Rate based on the values telemetered by the QSE to ERCOT, which represents the current ability of the Resource to follow a Base Point instruction;  (b) Emergency Ramp Rate based on the values telemetered by the QSE to ERCOT;  (c) HDL, which represents a dynamically calculated MW upper limit on a Resource that describes the maximum capability of the Resource’s SCED dispatch and limits the amount of Reg-Up that can be awarded to the Resource for the next five minutes (the Resource’s Real-Time generation or, in the case of an ESR, its Real-Time output or consumption, plus the product of the Normal Ramp Rate, as telemetered by the QSE, multiplied by five), restricted by HSL; and  (d) LDL, which represents a dynamically calculated MW lower limit on a Resource that describes the minimum capability of the Resource’s SCED dispatch and limits the amount of Reg-Down that can be awarded to the Resource for the next five minutes (the Resource’s Real-Time generation or, in the case of an ESR, its Real-Time output or consumption, minus the product of the Normal Ramp Rate, as telemetered by the QSE, multiplied by five), restricted by LSL.  (2) The following Load Resource limits are calculated by ERCOT for Controllable Load Resources qualified to be dispatched by SCED and used in other calculations and as information for ERCOT Operators:  (a) Normal Ramp Rate based on the values telemetered by the QSE to ERCOT, which represents the current ability of the Resource to follow a SCED Base Point instruction;  (b) Emergency Ramp Rate based on the values telemetered by the QSE to ERCOT;  (c) HDL, which represents a dynamically calculated MW upper limit on a Resource that describes the maximum capability of the Resource SCED dispatch and limits the amount of Reg-Down that can be awarded to the Resource for the next five minutes (the Resource’s Real-Time consumption plus the product of the Normal Ramp Rate, as telemetered by the QSE, multiplied by five), restricted by HSL; and  (d) LDL, which represents a dynamically calculated MW lower limit on a Resource that describes the minimum capability of the Resource SCED dispatch and limits the amount of Reg-Up that can be awarded to the Resource for the next five minutes (the Resource’s Real-Time consumption minus the product of the Normal Ramp Rate, as telemetered by the QSE, multiplied by five), restricted by LSL.  (3) For a more detailed explanation of all the Resource limits calculated by ERCOT, please reference Section 6.5.7.2, Resource Limit Calculator. |

6.5.7.1.13 Data Inputs and Outputs for the Real-Time Sequence and SCED

(1) Inputs: The following information must be provided as inputs to the Real-Time Sequence and SCED. ERCOT may require additional information as required, including:

(a) Real-Time data from TSPs including status indication for each point if that data element is stale for more than 20 seconds;

|  |
| --- |
| [NPRR857: Replace paragraph (a) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  (a) Real-Time data from TSPs and DCTOs including status indication for each point if that data element is stale for more than 20 seconds; |

(i) Transmission Electrical Bus voltages;

(ii) MW and MVAr pairs for all transmission lines, transformers, and reactors;

(iii) Actual breaker and switch status for all modeled devices; and

(iv) Tap position for auto-transformers;

(b) State Estimator results (MW and MVAr pairs and calculated MVA) for all modeled Transmission Elements;

(c) Transmission Element ratings from TSPs;

|  |
| --- |
| [NPRR857: Replace paragraph (c) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  (c) Transmission Element ratings from TSPs and DCTOs; |

(i) Data from the Network Operations Model:

(A) Transmission lines – Normal, Emergency, and 15-Minute Ratings (MVA); and

(B) Transformers and Auto-transformers – Normal, Emergency, and 15-Minute Ratings (MVA) and tap position limits;

(ii) Data from QSEs:

(A) Generator Step-Up (GSU) transformers tap position;

(B) Resource HSL (from telemetry); and

(C) Resource LSL (from telemetry); and

(d) Real-Time weather, from Wind-powered Generation Resources (WGRs), and where available from TSPs or other sources. ERCOT may elect to obtain other sources of weather data and may utilize such information to calculate the dynamic limit of any Transmission Element.

|  |
| --- |
| [NPRR857: Replace paragraph (d) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  (d) Real-Time weather, from Wind-powered Generation Resources (WGRs), and where available from TSPs, DCTOs, or other sources. ERCOT may elect to obtain other sources of weather data and may utilize such information to calculate the dynamic limit of any Transmission Element. |

(2) ERCOT shall validate the inputs of the Resource Limit Calculator as follows:

(a) The calculated SURAMP and SDRAMP are each greater than or equal to zero; and

(b) Other provision specified under Section 3.18, Resource Limits in Providing Ancillary Service.

|  |
| --- |
| [NPRR1010: Delete paragraph (2) above upon system implementation of the Real-Time Co-Optimization (RTC) project and renumber accordingly.] |

(3) Outputs for ERCOT Operator information and possible action include:

(a) Operator notification of any change in status of any breaker or switch;

(b) Lists of all breakers and switches not in their normal position;

(c) Operator notification of all Transmission Element overloads detected from telemetered or State-Estimated data;

(d) Operator notification of all Transmission Element security violations; and

(e) Operator summary displays:

(i) Transmission system status changes;

(ii) Overloads;

(iii) System security violations; and

(iv) Base Points.

(4) Every hour, ERCOT shall post on the MIS Secure Area the following information:

(a) Status of all breakers and switches used in the NSA except breakers and switches connecting Resources to the ERCOT Transmission Grid;

(b) All binding transmission constraints and the contingency or overloaded element pairs that caused such constraint; and

(c) Shift Factors, including Private Use Network Settlement Points, by Resource Node, Hub, Load Zone, and DC Tie.

(5) Sixty days after the applicable Operating Day, ERCOT shall post on the MIS Secure Area, the following information:

(a) Hourly transmission line flows and voltages from the State Estimator, excluding transmission line flows and voltages for Private Use Networks; and

(b) Hourly transformer flows, voltages and tap positions from the State Estimator, excluding transformer flows, voltages, and tap positions for Private Use Networks.

(6) Notwithstanding paragraph (5) above, ERCOT, in its sole discretion, shall release relevant State Estimator data less than 60 days after the Operating Day if it determines the release is necessary to provide complete and timely explanation and analysis of unexpected market operations and results or system events including, but not limited to, pricing anomalies, recurring transmission congestion, and system disturbances. ERCOT’s release of data under this paragraph shall be limited to intervals associated with the unexpected market or system event as determined by ERCOT. The data release shall be made available simultaneously to all Market Participants.

(7) Every hour, ERCOT shall post on the ERCOT website, the sum of ERCOT generation, and flow on the DC Ties, all from the State Estimator.

(8) After every SCED run, ERCOT shall post to the ERCOT website the sum of the HDL and the sum of the LDL for all Generation Resources On-Line and Dispatched by SCED.

(9) Sixty days after the applicable Operating Day, ERCOT shall post to the ERCOT website the summary LDL and HDL report from paragraph (8) above and include instances of manual overrides of HDL or LDL, including the name of the Generation Resource and the type of override.

(10) No sooner than sixty days after the applicable Operating Day, ERCOT shall provide to the appropriate TAC subcommittee instances of manual overrides of HDL or LDL, including the name of the Generation Resource, the reason for the override, and, as applicable, the cost as calculated in Section 6.6.3.6, Real-Time High Dispatch Limit Override Energy Payment.

(11) After every SCED run, ERCOT shall post to the MIS Certified Area, for any QSE, instances of a manual override of the HDL or LDL for a Generation Resource, including the original and overridden HDL or LDL.

6.5.7.2 Resource Limit Calculator

(1) ERCOT shall calculate the HASL, LASL, SURAMP, SDRAMP, HDL and LDL within four seconds after a change of the Resource-specific attributes provided as part of the QSE’s SCADA telemetry under Section 6.5.5.2, Operational Data Requirements. The formulas described below define which Resource-specific attributes must be used to calculate each Resource limit. The Resource limits are used as inputs into both the SCED process and the Ancillary Service Capacity Monitor as described in Section 6.5.7.6, Load Frequency Control. These Resource limits help ensure that the deployments produced by the SCED and Load Frequency Control (LFC) processes will respect the commitment of a Resource to provide Ancillary Services as well as individual Resource physical limitations.

(2) The figures below illustrate how the Resource Limit Calculator determines the Resource limits for Generation and Load Resources:

Generation Resources:

LSL

HSL

Time

LSL

-

LASL

-

HASL

-

Generation

Increase

Services

Provided: Reg

Down

Provided: Reg Up,

RRS, ECRS, Non-Spin

Current

Telemetry

HDL

LDL

Ramp

Rate

5 Minutes

**Generation**

Quantity

Offer Curve Generation

LSL

HSL

-

-

-

Generation

Increase

Ramp

Rate

5 Minutes

-

0

-

-

Increase

Generation

Decrease

Ramp

Rate

5 Minutes

Ancillary

Load Resources:

Time

LSL = LPC -

LASL -

HASL -

Ancillary Services Provided: Reg-Down

Current Load

Telemetry

HDL

LDL

5-30 Minutes

**Load**

Quantity

Bid Curve Load

LSL/LPC

HSL/MPC

0

Increasing

Consumption

Decreasing

Consumption

Ramp

Rate

Ancillary Services Provided: Reg-Up, ECRS, Non-Spin

HSL = MPC -

Normal Load   
Fluctuation

(3) For Generation Resources, HASL is calculated as follows:

HASL = Max (LASL, (HSLTELEM – (ECRSTELEM + RRSTELEM + RUSTELEM + NSRSTELEM + NFRCTELEM)))

|  |  |
| --- | --- |
| Variable | Description |
| HASL | High Ancillary Service Limit. |
| HSLTELEM | High Sustained Limit provided via telemetry – per Section 6.5.5.2. |
| LASL | Low Ancillary Service Limit. |
| RRSTELEM | RRS Ancillary Service Schedule provided via telemetry. |
| RUSTELEM | Reg-Up Ancillary Service Resource Responsibility designation provided by telemetry. |
| NSRSTELEM | Non-Spin Ancillary Service Schedule provided via telemetry. |
| ECRSTELEM | ECRS Ancillary Service Schedule provided by telemetry. |
| NFRCTELEM | NFRC currently available (unloaded) and included in the HSL of the Generation Resource with non-zero ECRS Ancillary Service Schedule telemetry. |

(4) For Generation Resources, LASL is calculated as follows:

LASL = LSLTELEM + RDSTELEM

|  |  |
| --- | --- |
| Variable | Description |
| LASL | Low Ancillary Service Limit. |
| LSLTELEM | Low Sustained Limit provided via telemetry. |
| RDSTELEM | Reg-Down Ancillary Service Resource Responsibility designation provided by telemetry. |

(5) For each Generation Resource, the SURAMP is calculated as follows:

SURAMP = RAMPRATE – (1 – RDSDEPLP) \* (RUSTELEM / 7)

|  |  |
| --- | --- |
| Variable | Description |
| SURAMP | SCED Up Ramp Rate. |
| RAMPRATE | Normal Ramp Rate up, as telemetered by the QSE, when ECRS is not deployed or when the subject Resource is not providing ECRS.  Emergency Ramp Rate up, as telemetered by the QSE, for Resources deploying ECRS. |
| RUSTELEM | Reg-Up Ancillary Service Resource Responsibility designation provided by telemetry. |
| RDSDEPLP | Percentage of system-wide Reg-Down Ancillary Resource Responsibility deployed by LFC. This value shall not exceed 100% and controls the amount of ramp rate reserved for Regulation Service in Real-Time. |

(6) For each Generation Resource, the SDRAMP is calculated as follows:

SDRAMP = NORMRAMP – (1 – RUSDEPLP) \* (RDSTELEM / 7)

| Variable | Description |
| --- | --- |
| SDRAMP | SCED Down Ramp Rate. |
| NORMRAMP | Normal Ramp Rate down, as telemetered by the QSE. |
| RDSTELEM | Reg-Down Ancillary Service Resource Responsibility designation by Resource provided via telemetry. |
| RUSDEPLP | Percentage of system-wide Reg-Up Ancillary Resource Responsibility deployed by LFC. This value shall not exceed 100% and controls the amount of ramp rate reserved for Regulation Service in Real-Time. |

(7) For Generation Resources, HDL is calculated as follows:

(a) If the telemetered Resource Status is SHUTDOWN, then

**HDL = POWERTELEM – (SDRAMP \* 5)**

(b) If the telemetered Resource Status is any status code specified in item (5)(b)(i) of Section 3.9.1, Current Operating Plan (COP) Criteria, other than SHUTDOWN, then

**HDL = Min (POWERTELEM + (SURAMP \* 5), HASL)**

|  |  |
| --- | --- |
| Variable | Description |
| HDL | High Dispatch Limit. |
| POWERTELEM | Gross or net real power provided via telemetry. |
| SURAMP | SCED Up Ramp Rate. |
| SDRAMP | SCED Down Ramp Rate. |
| HASL | High Ancillary Service Limit – definition provided in Section 2, Definitions and Acronyms. |

(8) For Generation Resources, LDL is calculated as follows:

(a) If the telemetered Resource Status is STARTUP, then

**LDL = POWERTELEM + (SURAMP \* 5)**

(b) If the telemetered Resource Status is any status code specified in item (5)(b)(i) of Section 3.9.1 other than STARTUP, then

**LDL = Max (POWERTELEM - (SDRAMP \* 5), LASL)**

|  |  |
| --- | --- |
| Variable | Description |
| LDL | Low Dispatch Limit. |
| POWERTELEM | Gross or net real power provided via telemetry. |
| SDRAMP | SCED Down Ramp Rate. |
| LASL | Low Ancillary Service Limit – definition provided in Section 2. |

(9) For Load Resources, HASL is calculated as follows:

HASL = Max (LPCTELEM, (MPCTELEM – RDSTELEM))

|  |  |
| --- | --- |
| Variable | Description |
| HASL | High Ancillary Service Limit. |
| LPCTELEM | Low Power Consumption provided via telemetry. |
| MPCTELEM | Maximum Power Consumption provided via telemetry. |
| RDSTELEM | Reg-Down Ancillary Service Resource Responsibility designation provided by telemetry. |

(10) For Load Resources, LASL is calculated as follows:

LASL = Min (HASL, (LPCTELEM + (ECRSTELEM + RRSTELEM + RUSTELEM + NSRSTELEM)))

|  |  |
| --- | --- |
| Variable | Description |
| LASL | Low Ancillary Service Limit. |
| HASL | High Ancillary Service Limit. |
| LPCTELEM | Low Power Consumption provided via telemetry. |
| ECRSTELEM | ECRS Ancillary Service Schedule provided by telemetry. |
| RRSTELEM | RRS Ancillary Service Schedule provided by telemetry. |
| RUSTELEM | Reg-Up Ancillary Service Resource Responsibility designation provided by telemetry. |
| NSRSTELEM | Non-Spin Ancillary Service Schedule provided via telemetry. |

(11) For each Controllable Load Resource, the SURAMP is calculated as follows:

**SURAMP = RAMPRATE – (1 – RDSDEPLP) \* (RUSTELEM / 7)**

|  |  |
| --- | --- |
| **Variable** | **Description** |
| SURAMP | SCED Up Ramp Rate. |
| RAMPRATE | Normal Ramp Rate up, as telemetered by the QSE, when ECRS is not deployed or when the subject Load Resource is not providing ECRS.  Emergency Ramp Rate up, as telemetered by the QSE, for Load Resources deploying ECRS. |
| RUSTELEM | Reg-Up Ancillary Service Resource Responsibility designation provided by telemetry. |
| RDSDEPLP | Percentage of system-wide Reg-Down Ancillary Resource Responsibility deployed by LFC. This value shall not exceed 100% and controls the amount of ramp rate reserved for Regulation Service in Real-Time. |

(12) For each Controllable Load Resource, the SDRAMP is calculated as follows:

**SDRAMP = NORMRAMP – (1 – RUSDEPLP) \* (RDSTELEM / 7)**

| Variable | Description |
| --- | --- |
| SDRAMP | SCED Down Ramp Rate. |
| NORMRAMP | Normal Ramp Rate down, as telemetered by the QSE. |
| RDSTELEM | Reg-Down Ancillary Service Resource Responsibility designation by Resource provided via telemetry. |
| RUSDEPLP | Percentage of system-wide Reg-Up Ancillary Resource Responsibility deployed by LFC. This value shall not exceed 100% and controls the amount of ramp rate reserved for Regulation Service in Real-Time. |

(13) For Load Resources, HDL is calculated as follows:

**HDL = Min (POWERTELEM + (SDRAMP \* 5), HASL)**

|  |  |
| --- | --- |
| Variable | Description |
| HDL | High Dispatch Limit. |
| POWERTELEM | Net real power flow provided via telemetry. |
| SDRAMP | SCED Down Ramp Rate. |
| HASL | High Ancillary Service Limit – definition provided in Section 2. |

(14) For Load Resources, LDL is calculated as follows:

**LDL = Max (POWERTELEM - (SURAMP \* 5), LASL)**

|  |  |
| --- | --- |
| Variable | Description |
| LDL | Low Dispatch Limit. |
| POWERTELEM | Net real power flow provided via telemetry. |
| SURAMP | SCED Up Ramp Rate. |
| LASL | Low Ancillary Service Limit – definition provided in Section 2. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR879, NPRR1010, and NPRR1014: Replace applicable portions of Section 6.5.7.2 above with the following upon system implementation for NPRR879 or NPRR1014; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]  **6.5.7.2 Resource Limit Calculator**  (1) ERCOT shall calculate the HDL and LDL within four seconds after a change of the Resource-specific attributes provided as part of the QSE’s SCADA telemetry under Section 6.5.5.2, Operational Data Requirements. The formulas described below define which Resource-specific attributes must be used to calculate each Resource limit. The Resource limits are used as inputs into both the SCED process and the Ancillary Service Capacity Monitor as described in Section 6.5.7.6, Load Frequency Control. These Resource limits help ensure that the deployments produced by the SCED and Load Frequency Control (LFC) processes will respect individual Resource physical limitations.  (2) For SCED-dispatchable Generation Resources, HDL is calculated as follows:  (a) If the telemetered Resource Status is SHUTDOWN, then  **HDL = POWERTELEM – (NORMRAMPDN \* 5)**  (b) If the telemetered Resource Status is any status code specified in item (5)(b)(i) of Section 3.9.1, Current Operating Plan (COP) Criteria, other than SHUTDOWN, then  **HDL = Min (POWERTELEM + (NORMRAMPUP \* 5), HSLTELEM)**   |  |  | | --- | --- | | **Variable** | **Description** | | HDL | High Dispatch Limit. | | POWERTELEM | Gross or net real power provided via telemetry. | | NORMRAMPDN | 5-minute blended Normal Ramp Rate down, as telemetered by the QSE. | | NORMRAMPUP | 5-minute blended Normal Ramp Rate up, as telemetered by the QSE. | | HSLTELEM | For IRRs qualified to provide an Ancillary Service and telemetering a non-zero capability to provide that Ancillary Service, and all IRRs within an IRR Group where any IRR within the IRR Group is qualified to provide an Ancillary Service and telemetering a non-zero capability to provide that Ancillary Service, HSLTELEM shall be the five-minute intra-hour forecast for the Resource. For all other Resources, HSLTELEM shall be the Resource’s HSL provided to ERCOT via telemetry, in accordance with Section 6.5.5.2. |   (3) For SCED-dispatchable Generation Resources, LDL is calculated as follows:  (a) If the telemetered Resource Status is STARTUP, then  **LDL = POWERTELEM + (NORMRAMPUP \* 5)**  (b) If the telemetered Resource Status is any status code specified in item (5)(b)(i) of Section 3.9.1 other than STARTUP, then  **LDL = Max (POWERTELEM - (NORMRAMPDN \* 5), LSLTELEM)**   |  |  | | --- | --- | | **Variable** | **Description** | | LDL | Low Dispatch Limit. | | POWERTELEM | Gross or net real power provided via telemetry. | | LSLTELEM | Low Sustained Limit (LSL) provided via telemetry. | | NORMRAMPDN | 5-minute blended Normal Ramp Rate down, as telemetered by the QSE. | | NORMRAMPUP | 5-minute blended Normal Ramp Rate up, as telemetered by the QSE. |   (4) For ESRs, HDL is calculated as follows:  (a) If the telemetered Resource Status is ONHOLD, then  **HDL = 0**  (b) If the telemetered Resource Status is ONTEST, then  **HDL** = **Max (Min (POWERTELEM, HSLTELEM), LSLTELEM)**  (c) If the telemetered Resource Status is any status code specified in item (5)(b)(iv) of Section 3.9.1, Current Operating Plan (COP) Criteria, other than OUT, EMR, EMRSWGR, ONHOLD, or ONTEST, then  **HDL = Min (POWERTELEM + (NORMRAMPUP\* 5), HSLTELEM)**   |  |  | | --- | --- | | **Variable** | **Description** | | HDL | High Dispatch Limit. | | POWERTELEM | Net real power provided via telemetry. | | NORMRAMPUP | 5-minute blended Normal Ramp Rate up, as telemetered by the QSE. | | HSLTELEM | High Sustained Limit (HSL) provided via telemetry – per Section 6.5.5.2. |   (5) For ESRs, LDL is calculated as follows:  (a) If the telemetered Resource Status is ONHOLD, then  **LDL = 0**  (b) If the telemetered Resource Status is ONTEST, then  **LDL** = **Max (Min (POWERTELEM, HSLTELEM), LSLTELEM)**  (c) If the telemetered Resource Status is any status code specified in item (5)(b)(iv) of Section 3.9.1, Current Operating Plan (COP) Criteria, other than OUT, or EMR, or EMRSWGR, or ONHOLD, or ONTEST, then  **LDL = Max (POWERTELEM - (NORMRAMPDN \* 5), LSLTELEM)**   |  |  | | --- | --- | | **Variable** | **Description** | | LDL | Low Dispatch Limit. | | POWERTELEM | Net real power provided via telemetry. | | LSLTELEM | Low Sustained Limit provided via telemetry. | | NORMRAMPDN | 5-minute blended Normal Ramp Rate down, as telemetered by the QSE. |   (6) For SCED-dispatchable Load Resources, HDL is calculated as follows:  **HDL = Min (POWERTELEM + (NORMRAMPDN \* 5), HSLTELEM)**   |  |  | | --- | --- | | **Variable** | **Description** | | HDL | High Dispatch Limit. | | POWERTELEM | Net real power flow provided via telemetry. | | NORMRAMPDN | Normal Ramp Rate down, as telemetered by the QSE. | | HSLTELEM | HSL provided via telemetry. |   (7) For SCED-dispatchable Load Resources, LDL is calculated as follows:  **LDL = Max (POWERTELEM - (NORMRAMPUP \* 5), LSLTELEM)**   |  |  | | --- | --- | | **Variable** | **Description** | | LDL | Low Dispatch Limit. | | POWERTELEM | Net real power flow provided via telemetry. | | NORMRAMPUP | Normal Ramp Rate up, as telemetered by the QSE. | | LSLTELEM | LSL provided via telemetry. | |

6.5.7.3 Security Constrained Economic Dispatch

(1) The SCED process is designed to simultaneously manage energy, the system power balance and network congestion through Resource Base Points and calculation of LMPs every five minutes. The SCED process uses a two-step methodology that applies mitigation prospectively to resolve Non-Competitive Constraints for the current Operating Hour. The SCED process evaluates Energy Offer Curves, Output Schedules and Real-Time Market (RTM) Energy Bids to determine Resource Dispatch Instructions by maximizing bid-based revenues minus offer-based costs, subject to power balance and network constraints. The SCED process uses the Resource Status provided by SCADA telemetry under Section 6.5.5.2, Operational Data Requirements, and validated by the Real-Time Sequence, instead of the Resource Status provided by the COP.

(2) The SCED solution must monitor cumulative deployment of Regulation Services and ensure that Regulation Services deployment is minimized over time.

(3) In the Generation To Be Dispatched (GTBD) determined by LFC, ERCOT shall subtract the sum of the telemetered net real power consumption from all Controllable Load Resources available to SCED.

(4) For use as SCED inputs, ERCOT shall use the available capacity of all committed Generation Resources by creating proxy Energy Offer Curves for certain Resources as follows:

(a) Non-IRRs and Dynamically Scheduled Resources (DSRs) without Energy Offer Curves

(i) ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below for:

(A) Each non-IRR for which its QSE has submitted an Output Schedule instead of an Energy Offer Curve; and

(B) Each DSR that has not submitted incremental and decremental Energy Offer Curves.

|  |  |
| --- | --- |
| MW | Price (per MWh) |
| HSL | SWCAP |
| Output Schedule MW plus 1 MW | SWCAP minus $0.01 |
| Output Schedule MW | -$249.99 |
| LSL | -$250.00 |

(b) DSRs with Energy Offer Curves

(i) For each DSR that has submitted incremental and decremental Energy Offer Curves, ERCOT shall create a monotonically increasing proxy Energy Offer Curve. That curve must consist of the incremental Energy Offer Curve that reflects the available capacity above the Resource’s Output Schedule to its HSL and the decremental Energy Offer Curve that reflects the available capacity below the Resource’s Output Schedule to the LSL. The curve must be created as described below:

|  |  |
| --- | --- |
| MW | Price (per MWh) |
| Output Schedule MW plus 1 MW to HSL | Incremental Energy Offer Curve |
| LSL to Output Schedule MW | Decremental Energy Offer Curve |

(c) Non-IRRs without full-range Energy Offer Curves

(i) For each non-IRR for which its QSE has submitted an Energy Offer Curve that does not cover the full range of the Resource’s available capacity, ERCOT shall create a proxy Energy Offer Curve that extends the submitted Energy Offer Curve to use the entire available capacity of the Resource above the highest point on the Energy Offer Curve to the Resource’s HSL and the offer floor from the lowest point on the Energy Offer Curve to its LSL, using these points:

|  |  |
| --- | --- |
| MW | Price (per MWh) |
| HSL (if more than highest MW in submitted Energy Offer Curve) | Price associated with highest MW in submitted Energy Offer Curve |
| Energy Offer Curve | Energy Offer Curve |
| 1 MW below lowest MW in Energy Offer Curve (if more than LSL) | -$249.99 |
| LSL (if less than lowest MW in Energy Offer Curve) | -$250.00 |

(d) IRRs

(i) For each IRR that has not submitted an Energy Offer Curve, ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below:

|  |  |
| --- | --- |
| MW | Price (per MWh) |
| HSL | $1,500 |
| HSL minus 1 MW | -$249.99 |
| LSL | -$250.00 |

(ii) For each IRR for which its QSE has submitted an Energy Offer Curve that does not cover the full range of the IRR’s available capacity, ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below:

|  |  |
| --- | --- |
| MW | Price (per MWh) |
| HSL (if more than highest MW in submitted Energy Offer Curve) | Price associated with the highest MW in submitted Energy Offer Curve |
| Energy Offer Curve | Energy Offer Curve |
| 1 MW below lowest MW in Energy Offer Curve (if more than LSL) | -$249.99 |
| LSL (if less than lowest MW in Energy Offer Curve) | -$250.00 |

(e) RUC-committed Resources

(i) For each RUC-committed Resource that has not submitted an Energy Offer Curve, ERCOT shall create a proxy Energy Offer Curve as described below:

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL | $250 |
| Zero | $250 |

(ii) For each RUC-committed Resource that has submitted an Energy Offer Curve, ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below:

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL (if more than highest MW in Energy Offer Curve) | Greater of $250 or price associated with the highest MW in QSE submitted Energy Offer Curve |
| Energy Offer Curve | Greater of $250 or the QSE submitted Energy Offer Curve |
| Zero | Greater of $250 or the first price point of the QSE submitted Energy Offer Curve |

(iii) For each Combined Cycle Generation Resource that was RUC-committed from one On-Line configuration in order to transition to a different configuration with additional capacity, as instructed by ERCOT, that has not submitted an Energy Offer Curve for the RUC-committed configuration, ERCOT shall create a proxy Energy Offer Curve as described below:

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL of RUC-committed configuration | $250 |
| Zero | $250 |

(iv) For each Combined Cycle Generation Resource that was RUC-committed from one On-Line configuration in order to transition to a different configuration with additional capacity, as instructed by ERCOT, that has submitted an Energy Offer Curve for the RUC-committed configuration, ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below:

|  |  |
| --- | --- |
| **MW** | **Price (per MWh)** |
| HSL of RUC-committed configuration (if more than highest MW in Energy Offer Curve) | Greater of $250 or price associated with the highest MW in QSE submitted Energy Offer Curve |
| Energy Offer Curve for MW at and above HSL of QSE-committed configuration | Greater of $250 or the QSE submitted Energy Offer Curve |
| HSL of QSE-committed configuration (if more than highest MW in Energy Offer Curve and price associated with highest MW in Energy Offer Curve is less than $250) | $250 |
| HSL of QSE-committed configuration (if more than highest MW in Energy Offer Curve) | Price associated with the highest MW in QSE submitted Energy Offer Curve |
| Energy Offer Curve for MW at and below HSL of QSE-committed configuration | The QSE submitted Energy Offer Curve |
| 1 MW below lowest MW in Energy Offer Curve (if more than LSL) | -$249.99 |
| LSL (if less than lowest MW in Energy Offer Curve) | -$250.00 |

(5) The Entity with decision making authority, as more fully described in Section 3.19.1, Constraint Competitiveness Test Definitions, over how a Resource or Split Generation Resource is offered or scheduled, shall be responsible for all offers associated with each Resource, including offers represented by a proxy Energy Offer Curve.

(6) For a Controllable Load Resource whose QSE has submitted an RTM Energy Bid that does not cover the full range of the Resource’s available Demand response capability, consistent with the Controllable Load Resource’s telemetered quantities, ERCOT shall create a proxy energy bid as described below:

|  |  |
| --- | --- |
| MW | Price (per MWh) |
| LPC to MPC minus maximum MW of RTM Energy Bid | Price associated with the lowest MW in submitted RTM Energy Bid curve |
| MPC minus maximum MW of RTM Energy Bid to MPC | RTM Energy Bid curve |
| MPC | Right-most point (lowest price) on RTM Energy Bid curve |

(7) ERCOT shall ensure that any RTM Energy Bid is monotonically non-increasing. The QSE representing the Controllable Load Resource shall be responsible for all RTM Energy Bids, including bids updated by ERCOT as described above.

(8) If a Controllable Load Resource telemeters a status of OUTL, it is not considered as dispatchable capacity by SCED. A QSE may use this function to inform ERCOT of instances when the Controllable Load Resource is unable to follow SCED Dispatch Instructions. Under all telemetered statuses including OUTL, the remaining telemetry quantities submitted by the QSE shall represent the operating conditions of the Controllable Load Resource that can be verified by ERCOT. A QSE representing a Controllable Load Resource with a telemetered status of OUTL is still obligated to provide any applicable Ancillary Service Resource Responsibilities previously awarded to that Controllable Load Resource. This paragraph does not apply to ESRs.

(9) Energy Offer Curves that were constructed in whole or in part with proxy Energy Offer Curves shall be so marked in all ERCOT postings or references to the energy offer.

(10) The two-step SCED methodology referenced in paragraph (1) above is:

(a) The first step is to execute the SCED process to determine Reference LMPs. In this step, ERCOT executes SCED using the full Network Operations Model while only observing limits of Competitive Constraints. Energy Offer Curves for all On-Line Generation Resources and RTM Energy Bids from available Controllable Load Resources, whether submitted by QSEs or created by ERCOT under this Section, are used in the SCED to determine “Reference LMPs.”

(b) The second step is to execute the SCED process to produce Base Points, Shadow Prices, and LMPs, subject to security constraints (including Competitive and Non-Competitive Constraints) and other Resource constraints. The second step must:

(i) Use Energy Offer Curves for all On-Line Generation Resources, whether submitted by QSEs or created by ERCOT. Each Energy Offer Curve must be bounded at the lesser of the Reference LMP (from Step 1) or the appropriate Mitigated Offer Floor. In addition, each Energy Offer Curve subject to mitigation under the criteria described in Section 3.19.4, Security-Constrained Economic Dispatch Constraint Competitiveness Test, must be capped at the greater of the Reference LMP (from Step 1) at the Resource Node plus a variable not to exceed 0.01 multiplied by the value of the Resource’s Mitigated Offer Cap (MOC) curve at the LSL or the appropriate MOC;

(ii) Use RTM Energy Bid curves for all available Controllable Load Resources, whether submitted by QSEs or created by ERCOT. There is no mitigation of RTM Energy Bids. An RTM Energy Bid from a Controllable Load Resource represents the bid for energy distributed across all nodes in the Load Zone in which the Controllable Load Resource is located. For an ESR, an RTM Energy Bid represents a bid for energy at the ESR’s Resource Node; and

(iii) Observe all Competitive and Non-Competitive Constraints.

(c) ERCOT shall archive information and provide monthly summaries of security violations and any binding transmission constraints identified in Step 2 of the SCED process. The summary must describe the limiting element (or identified operator-entered constraint with operator’s comments describing the reason and the Resource-specific impacts for any manual overrides). ERCOT shall provide the summary to Market Participants on the MIS Secure Area and to the Independent Market Monitor (IMM).

(11) For each SCED process, in addition to the binding Base Points and LMPs, ERCOT shall calculate a non-binding projection of the Base Points and Resource Node LMPs, Real-Time Reliability Deployment Price Adders, Real-Time On-Line Reserve Price Adders, Real-Time Off-Line Reserve Price Adders, Hub LMPs and Load Zone LMPs at a frequency of every five minutes for at least 15 minutes into the future based on the same inputs to the SCED process as described in this Section, except that the Resource’s HDL and LDL and the total generation requirement will be as estimated at future intervals. The Resource’s HDL and LDL will be calculated for each interval of the projection based on the ramp rate capability over the study period. ERCOT shall estimate the projected total generation requirement by calculating a Load forecast for the study period. In lieu of the steps described in Section 6.5.7.3.1, Determination of Real-Time On-Line Reliability Deployment Price Adder, the non-binding projection of Real-Time Reliability Deployment Price Adders shall be estimated based on GTBD, reliability deployments MWs, and aggregated offers. The Energy Offer Curve from SCED Step 2, the virtual offers for Load Resources deployed and the power balance penalty curve will be compared against the updated GTBD to get an estimate of the System Lambda from paragraph (2)(m) of Section 6.5.7.3.1. ERCOT shall post the projected non-binding Base Points for each Resource for each interval study period on the MIS Certified Area and the projected non-binding LMPs for Resource Nodes, Real-Time Reliability Deployment Price Adders, Real-Time On-Line Reserve Price Adders, Real-Time Off-Line Reserve Price Adders, Hub LMPs and Load Zone LMPs on the ERCOT website pursuant to Section 6.3.2, Activities for Real-Time Operations.

(12) For each SCED process, ERCOT shall calculate a Real-Time On-Line Reserve Price Adder and a Real-Time Off-Line Reserve Price Adder based on the On-Line and Off-Line available reserves in the ERCOT System and the Operating Reserve Demand Curve (ORDC). The Real-Time Off-Line available reserves shall be administratively set to zero when the SCED snapshot of the Physical Responsive Capability (PRC) is equal to or below the PRC MW at which Energy Emergency Alert (EEA) Level 1 is initiated. In addition, for each SCED process, ERCOT shall calculate a Real-Time On-Line Reliability Deployment Price Adder. The sum of the Real-Time Reliability Deployment Price Adder and the Real-Time On-Line Reserve Price Adder shall be averaged over the 15-minute Settlement Interval and added to the Real-Time LMPs to determine the Real-Time Settlement Point Prices. The price after the addition of the sum of the Real-Time On-Line Reliability Deployment Price Adder and the Real-Time On-Line Reserve Price Adder to LMPs approximates the pricing outcome of the impact to energy prices from reliability deployments and the Real-Time energy and Ancillary Service co-optimization since the Real-Time On-Line Reserve Price Adder captures the value of the opportunity cost of reserves based on the defined ORDC. An Ancillary Service imbalance Settlement shall be performed pursuant to Section 6.7.5, Real-Time Ancillary Service Imbalance Payment or Charge, to make Resources indifferent to the utilization of their capacity for energy or Ancillary Service reserves.

(13) ERCOT shall determine the methodology for implementing the ORDC to calculate the Real-Time On-Line Reserve Price Adder and Real-Time Off-Line Reserve Price Adder. Following review by TAC, the ERCOT Board shall review the recommendation and approve a final methodology. Within two Business Days following approval by the ERCOT Board, ERCOT shall post the methodology on the ERCOT website.

(14) At the end of each season, ERCOT shall determine the ORDC for the same season in the upcoming year, based on historic data using the ERCOT Board-approved methodology for implementing the ORDC. Annually, ERCOT shall verify that the ORDC is adequately representative of the loss of Load probability for varying levels of reserves. Twenty days after the end of the Season, ERCOT shall post the ORDC for the same season of the upcoming year on the ERCOT website.

(15) ERCOT may override one or more of a Controllable Load Resource’s parameters in SCED if ERCOT determines that the Controllable Load Resource’s participation is having an adverse impact on the reliability of the ERCOT System.

(16) The QSE representing an ESR, in order to charge the ESR, must submit RTM Energy Bids, and the ESR may withdraw energy from the ERCOT System only when dispatched by SCED to do so. An ESR may telemeter a status of OUTL only if the ESR is in Outage status.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR930, NPRR1000, NPRR1010, NPRR1014, and NPRR1019: Replace applicable portions of Section 6.5.7.3 above with the following upon system implementation for NPRR930, NPRR1000, NPRR1014, or NPRR1019; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]  **6.5.7.3 Security Constrained Economic Dispatch**  (1) The SCED process is designed to simultaneously manage energy, Ancillary Services, the system power balance and network congestion through Resource Base Points, Ancillary Service awards, and the calculation of LMPs and Real-Time MCPCs approximately every five minutes, or more frequently if necessary. The SCED process uses a two-step methodology that applies mitigation to offers for energy prospectively to resolve Non-Competitive Constraints for the current Operating Hour. The SCED process evaluates Energy Offer Curves, Energy Bid/Offer Curves, Ancillary Service Offers, Output Schedules and Real-Time Market (RTM) Energy Bids to determine Resource Dispatch Instructions and Ancillary Service awards by maximizing bid-based revenues minus offer-based costs, subject to power balance, Ancillary Service Demand Curves (ASDCs), and network constraints. The SCED process uses the Resource Status provided by SCADA telemetry under Section 6.5.5.2, Operational Data Requirements, and validated by the Real-Time Sequence, instead of the Resource Status provided by the COP.  (2) The SCED solution must monitor cumulative deployment of Regulation Services and ensure that Regulation Services deployment is minimized over time.  (3) In the Generation To Be Dispatched (GTBD) determined by LFC, ERCOT shall subtract the sum of the telemetered net real power consumption from all Controllable Load Resources available to SCED.  (4) For use as SCED inputs for determining energy dispatch and Ancillary Service awards, ERCOT shall use the available capacity of all committed Generation Resources by creating proxy Energy Offer Curves for certain Resources as follows:  (a) Non-IRRs without Energy Offer Curves  (i) ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below for:  (A) Each non-IRR for which its QSE has submitted an Output Schedule instead of an Energy Offer Curve.   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL | RTSWCAP | | Output Schedule MW plus 1 MW | RTSWCAP minus $0.01 | | Output Schedule MW | -$249.99 | | LSL | -$250.00 |   (b) Non-IRRs without full-range Energy Offer Curves  (i) For each non-IRR for which its QSE has submitted an Energy Offer Curve that does not cover the full range of the Resource’s available capacity, ERCOT shall create a proxy Energy Offer Curve that extends the submitted Energy Offer Curve to use the entire available capacity of the Resource above the highest point on the Energy Offer Curve to the Resource’s HSL and the offer floor from the lowest point on the Energy Offer Curve to its LSL, using these points:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL (if more than highest MW in submitted Energy Offer Curve) | Price associated with highest MW in submitted Energy Offer Curve | | Energy Offer Curve | Energy Offer Curve | | 1 MW below lowest MW in Energy Offer Curve (if more than LSL) | -$249.99 | | LSL (if less than lowest MW in Energy Offer Curve) | -$250.00 |   (c) IRRs  (i) For each IRR that has not submitted an Energy Offer Curve, ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL | $1,500 | | HSL minus 1 MW | -$249.99 | | LSL | -$250.00 |   (ii) For each IRR for which its QSE has submitted an Energy Offer Curve that does not cover the full range of the IRR’s available capacity, ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL (if more than highest MW in submitted Energy Offer Curve) | Price associated with the highest MW in submitted Energy Offer Curve | | Energy Offer Curve | Energy Offer Curve | | 1 MW below lowest MW in Energy Offer Curve (if more than LSL) | -$249.99 | | LSL (if less than lowest MW in Energy Offer Curve) | -$250.00 |   (d) RUC-committed Resources  (i) For each RUC-committed Resource that has not submitted an Energy Offer Curve, ERCOT shall create a proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL | $250 | | Zero | $250 |   (ii) For each RUC-committed Resource that has submitted an Energy Offer Curve, ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL (if more than highest MW in Energy Offer Curve) | Greater of $250 or price associated with the highest MW in QSE submitted Energy Offer Curve | | Energy Offer Curve | Greater of $250 or the QSE submitted Energy Offer Curve | | Zero | Greater of $250 or the first price point of the QSE submitted Energy Offer Curve |   (iii) For each RUC-committed Resource during the time period stated in the Advance Action Notice (AAN) if any Resource received an Outage Schedule Adjustment, ERCOT shall create a proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL | $4,500 or the effective Value of Lost Load (VOLL), whichever is less. | | Zero | $4,500 or the effective VOLL, whichever is less. |   (iv) For each Combined Cycle Generation Resource that was RUC-committed from one On-Line configuration in order to transition to a different configuration with additional capacity, as instructed by ERCOT, that has not submitted an Energy Offer Curve for the RUC-committed configuration, ERCOT shall create a proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL of RUC-committed configuration | $250 | | Zero | $250 |   (v) For each Combined Cycle Generation Resource that was RUC-committed from one On-Line configuration in order to transition to a different configuration with additional capacity, as instructed by ERCOT, that has submitted an Energy Offer Curve for the RUC-committed configuration, ERCOT shall create a monotonically increasing proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL of RUC-committed configuration (if more than highest MW in Energy Offer Curve) | Greater of $250 or price associated with the highest MW in QSE submitted Energy Offer Curve | | Energy Offer Curve for MW at and above HSL of QSE-committed configuration | Greater of $250 or the QSE submitted Energy Offer Curve | | HSL of QSE-committed configuration (if more than highest MW in Energy Offer Curve and price associated with highest MW in Energy Offer Curve is less than $250) | $250 | | HSL of QSE-committed configuration (if more than highest MW in Energy Offer Curve) | Price associated with the highest MW in QSE submitted Energy Offer Curve | | Energy Offer Curve for MW at and below HSL of QSE-committed configuration | The QSE submitted Energy Offer Curve | | 1 MW below lowest MW in Energy Offer Curve (if more than LSL) | -$249.99 | | LSL (if less than lowest MW in Energy Offer Curve) | -$250.00 |   (vi) For each RUC-committed Switchable Generation Resource (SWGR) that is not part of a Combined Cycle Train already operating in ERCOT, that has not submitted an Energy Offer Curve, and that has a COP Resource Status of EMRSWGR for the instructed Operating Hour at the time of the RUC instruction, ERCOT shall create a proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL | $4,500 or the effective Value of Lost Load (VOLL), whichever is less | | Zero | $4,500 or the effective VOLL, whichever is less |   (vii) For each RUC-committed SWGR that is not part of a Combined Cycle Train already operating in ERCOT, that has submitted an Energy Offer Curve, and that has a COP Resource Status of EMRSWGR for the instructed Operating Hour at the time of the RUC instruction, ERCOT shall create a proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL (if more than highest MW in Energy Offer Curve) | Greater of: $4,500 or the effective VOLL, whichever is less; and the price associated with the highest MW in QSE-submitted Energy Offer Curve | | Energy Offer Curve | Greater of: $4,500 or the effective VOLL, whichever is less; and the QSE-submitted Energy Offer Curve | | Zero | Greater of: $4,500 or the effective VOLL, whichever is less; and the first price point of the QSE-submitted Energy Offer Curve |   (viii) For each Combined Cycle Train configuration that includes at least one SWGR that is operating in a non-ERCOT Control Area as part of a configuration with a COP Resource Status of EMRSWGR for the instructed Operating Hour at the time of a RUC instruction requiring the switching of the SWGR into the ERCOT Control Area, if the QSE for the Combined Cycle Train has not submitted an Energy Offer Curve for the RUC-committed configuration, ERCOT shall create a proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL of RUC-committed configuration | $4,500 or the effective VOLL, whichever is less | | Zero | $4,500 or the effective VOLL, whichever is less |   (ix) For each Combined Cycle Train configuration that includes at least one SWGR that is operating in a non-ERCOT Control Area as part of a configuration with a COP Resource Status of EMRSWGR for the instructed Operating Hour at the time of a RUC instruction requiring the switching of the SWGR into the ERCOT Control Area, if the QSE for the Combined Cycle Train has submitted an Energy Offer Curve for the RUC-committed configuration, ERCOT shall create a proxy Energy Offer Curve as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | HSL of RUC-committed configuration (if more than highest MW in Energy Offer Curve) | Greater of: $4,500 or the effective VOLL, whichever is less; and the price associated with the highest MW in QSE-submitted Energy Offer Curve | | Energy Offer Curve for MW at and above HSL of QSE-committed configuration | Greater of: $4,500 or the effective VOLL, whichever is less; and the QSE-submitted Energy Offer Curve | | HSL of QSE-committed configuration (if more than highest MW in Energy Offer Curve and price associated with highest MW in Energy Offer Curve is less than $4,500) | $4,500 or the effective VOLL, whichever is less | | HSL of QSE-committed configuration (if more than highest MW in Energy Offer Curve) | Price associated with the highest MW in QSE-submitted Energy Offer Curve | | Energy Offer Curve for MW at and below HSL of QSE-committed configuration | The QSE-submitted Energy Offer Curve | | 1 MW below lowest MW in Energy Offer Curve (if more than LSL) | -$249.99 | | LSL (if less than lowest MW in Energy Offer Curve) | -$250.00 |   (5) For use as SCED inputs for determining energy dispatch and Ancillary Service awards, ERCOT shall use the available Ancillary Service MW capacity of all Resources by creating a proxy Ancillary Service Offer for qualified Resources as follows:  (a) The proxy Ancillary Service Offer shall be a linked Ancillary Service Offer across all Ancillary Service products for which a Resource is qualified to provide. For Generation Resources, the proxy Ancillary Service Offer MW shall be equal to the Resource’s telemetered HSL. For ESRs, the proxy Ancillary Service Offer MW shall be equal to the difference between the Resource’s telemetered HSL and LSL. For Load Resources, the proxy Ancillary Service Offer MW shall be equal to the Resource’s telemetered Maximum Power Consumption (MPC).  (b) For Resources that are not RUC-committed, the price in the proxy Ancillary Service Offer shall be set to:  (i) For Reg-Up and RRS, the maximum of:  (A) The proxy Ancillary Service Offer price floor for Reg-Up or RRS, respectively;  (B) The Resource’s highest submitted Ancillary Service Offer price for Reg-Up or RRS, respectively;  (C) The Resource’s highest Ancillary Service Offer price for ECRS (submitted or proxy); or  (D) The Resource’s highest Ancillary Service Offer price for Non-Spin (submitted or proxy).  (ii) For ECRS, the maximum of:  (A) The proxy Ancillary Service Offer price floor for ECRS;  (B) The Resource’s highest submitted Ancillary Service Offer price for ECRS; or  (C) The Resource’s highest Ancillary Service Offer price for Non-Spin (submitted or proxy).  (iii) For Non-Spin, the maximum of:  (A) The proxy Ancillary Service Offer price floor for Non-Spin; or  (B) The Resource’s highest submitted Ancillary Service Offer price for Non-Spin.  (iv) For Reg-Down, the maximum of:  (A) The proxy Ancillary Service Offer price floor for Reg-Down; or  (B) The Resource’s highest submitted Ancillary Service Offer price for Reg-Down.  (c) ERCOT systems shall be designed to allow for proxy Ancillary Service Offer price floors to differ when the same Ancillary Service product can be provided by either On-Line or Off-Line Resources, and/or an Ancillary Service product has sub-types.  (d) Proxy Ancillary Service Offer price floors shall be approved by TAC and posted on the ERCOT website.  (e) For RUC-committed Resources:  (i) If a RUC-committed Resource does not have an Ancillary Service Offer for an Ancillary Service product that the Resource is qualified to provide, ERCOT shall create an Ancillary Service Offer for that Ancillary Service product at a value of $250/MWh for the full operating range of the Resource up to its telemetered HSL.  (ii) For each Ancillary Service product for which a RUC-committed Resource has an Ancillary Service Offer, the Ancillary Service Offer used by SCED for that Ancillary Service product across the full operating range of the Resource up to its telemetered HSL shall be the maximum of:  (A) The Resource’s highest submitted Ancillary Service Offer price; or  (B) $250/MWh.  (6) For use as SCED inputs for determining energy Dispatch and Ancillary Service awards, ERCOT shall use the available capacity of all On-Line ESRs by creating proxy Energy Bid/Offer Curves for certain Resources as follows:  (a) For each ESR for which its QSE has submitted an Energy Bid/Offer Curve that does not cover the full offer range (LSL to HSL) of the Resource’s available capacity, ERCOT shall create a proxy Energy Bid/Offer Curve that extends the submitted Energy Bid/Offer Curve to use the entire available capacity of the Resource above the highest MW point on the Energy Bid/Offer Curve to the Resource’s HSL and from the lowest MW point on the Energy Bid/Offer Curve to LSL, using these prices for the corresponding MW segments:   |  |  |  | | --- | --- | --- | | **Scenario** | **MW Segment** | **Price (per MWh)** | | HSL MW and the highest MW point on the Energy Bid/Offer are both greater than or equal to zero,  and,  HSL is greater than the highest MW in submitted Energy Bid/Offer Curve | From highest MW point on submitted Energy Bid/Offer Curve to HSL MW | RTSWCAP | | HSL MW is greater than or equal to zero,  and,  the highest MW point on the Energy Bid/Offer is less than zero | From highest MW point on submitted Energy Bid/Offer Curve to 0 MW  From 0 MW to HSL | Price associated with the highest MW in submitted Energy Bid/Offer Curve  RTSWCAP | | HSL is less than zero and is also greater than the highest MW in submitted Energy Bid/Offer Curve | From highest MW point on submitted Energy Bid/Offer Curve to HSL MW | Price associated with the highest MW in submitted Energy Bid/Offer Curve | | Energy Bid/Offer Curve |  | Energy Bid/Offer Curve | | LSL MW and the lowest MW point on the Energy Bid/Offer Curve are both greater than or equal to zero,  and,  LSL is less than the lowest MW in submitted Energy Bid/Offer Curve | From LSL to lowest MW point on submitted Energy Bid/Offer Curve | Price associated with the lowest MW in submitted Energy Bid/Offer Curve | | LSL MW is less than zero,  and,  the lowest MW point on the Energy Bid/Offer Curve is greater than zero | From LSL to 0 MW  From 0 MW to lowest MW point on submitted Energy Bid/Offer Curve | -$250.00  Price associated with the lowest MW in submitted Energy Bid/Offer Curve | | LSL and the lowest MW point on the Energy Bid/Offer Curve are both less than or equal to zero,  and,  LSL is less than the lowest MW point on the Energy Bid/Offer Curve | From LSL to lowest MW point on submitted Energy Bid/Offer Curve | -$250.00 |   (b) At the time of SCED execution, if a valid Energy Bid/Offer Curve or Output Schedule does not exist for an ESR that has a status of On-Line, then ERCOT shall notify the QSE and create a proxy Energy Bid/Offer Curve priced at -$250/MWh for the MW portion of the curve less than zero MW, and priced at the RTSWCAP for the MW portion of the curve greater than zero MW.  (c) At the time of SCED execution, if a QSE representing an ESR has submitted an Output Schedule instead of an Energy Bid/Offer Curve, ERCOT shall create a proxy Energy Bid/Offer Curve priced at -$250/MWh for the MW portion of the curve from its LSL to the MW amount on the Output Schedule, and priced at the RTSWCAP for the MW portion of the curve from the MW amount on the Output Schedule to its HSL.  (7) The Entity with decision-making authority, as more fully described in Section 3.19.1, Constraint Competitiveness Test Definitions, over how a Resource or Split Generation Resource is offered or scheduled, shall be responsible for all offers associated with each Resource, including offers represented by a proxy Energy Offer Curve, proxy Energy Bid/Offer Curve, or proxy Ancillary Service Offer.  (8) For a Controllable Load Resource whose QSE has submitted an RTM Energy Bid that does not cover the full range of the Resource’s available Demand response capability, consistent with the Controllable Load Resource’s telemetered quantities, ERCOT shall create a proxy energy bid as described below:   |  |  | | --- | --- | | **MW** | **Price (per MWh)** | | LPC to MPC minus maximum MW of RTM Energy Bid | Price associated with the lowest MW in submitted RTM Energy Bid curve | | MPC minus maximum MW of RTM Energy Bid to MPC | RTM Energy Bid curve | | MPC | Right-most point (lowest price) on RTM Energy Bid curve |   (9) ERCOT shall ensure that any RTM Energy Bid is monotonically non-increasing. The QSE representing the Controllable Load Resource shall be responsible for all RTM Energy Bids, including bids updated by ERCOT as described above.  (10) If a Controllable Load Resource telemeters a status of OUTL, it is not considered as dispatchable capacity by SCED. A QSE may use this function to inform ERCOT of instances when the Controllable Load Resource is unable to follow SCED Dispatch Instructions. Under all telemetered statuses including OUTL, the remaining telemetry quantities submitted by the QSE shall represent the operating conditions of the Controllable Load Resource that can be verified by ERCOT. A QSE representing a Controllable Load Resource with a telemetered status of OUTL is still obligated to provide any applicable Ancillary Services awarded to the Resource. This paragraph does not apply to ESRs.  (11) Energy Offer Curves that were constructed in whole or in part with proxy Energy Offer Curves shall be so marked in all ERCOT postings or references to the energy offer.  (12) SCED will enforce Resource-specific Ancillary Service constraints to ensure that Ancillary Service awards are aligned with a Resource’s qualifications and telemetered Ancillary Service capabilities.  (13) Energy Bid/Offer Curves that were constructed in whole or in part with proxy Energy Bid/Offer Curves shall be so marked in all ERCOT postings or references to the energy bid/offer.  (14) The two-step SCED methodology referenced in paragraph (1) above is:  (a) The first step is to execute the SCED process to determine Reference LMPs. In this step, ERCOT executes SCED using the full Network Operations Model while only observing limits of Competitive Constraints in addition to power balance and Ancillary Service constraints. Energy Offer Curves for all On-Line Generation Resources, Energy Bid/Offer Curves for all On-Line ESRs, and RTM Energy Bids from available Controllable Load Resources, whether submitted by QSEs or created by ERCOT under this Section, are used in the SCED to determine “Reference LMPs.”  (b) The second step is to execute the SCED process to produce Base Points, Ancillary Service awards, Shadow Prices, Real-Time MCPCs, and LMPs, subject to security constraints (including Competitive and Non-Competitive Constraints) and other Resource constraints. The second step must:  (i) Use Energy Offer Curves for all On-Line Generation Resources, whether submitted by QSEs or created by ERCOT. Each Energy Offer Curve must be bounded at the lesser of the Reference LMP (from Step 1) or the appropriate Mitigated Offer Floor. In addition, each Energy Offer Curve subject to mitigation under the criteria described in Section 3.19.4, Security-Constrained Economic Dispatch Constraint Competitiveness Test, must be capped at the greater of the Reference LMP (from Step 1) at the Resource Node plus a variable not to exceed 0.01 multiplied by the value of the Resource’s Mitigated Offer Cap (MOC) curve at the LSL or the appropriate MOC;  (ii) Use Energy Bid/Offer Curves for all On-Line ESRs, whether submitted by QSEs or created by ERCOT. Each Energy Bid/Offer Curve must be bounded at the lesser of the Reference LMP (from Step 1) or the appropriate Mitigated Offer Floor. The offer portion of each Energy Bid/Offer Curve subject to mitigation under the criteria described in Section 3.19.4, Security-Constrained Economic Dispatch Constraint Competitiveness Test, must be capped at the greater of the Reference LMP (from Step 1) at the Resource Node plus a variable not to exceed 0.01 multiplied by the value of the Resource’s MOC curve at the LSL or the appropriate MOC;  (iii) Use RTM Energy Bid curves for all available Controllable Load Resources, whether submitted by QSEs or created by ERCOT. There is no mitigation of RTM Energy Bids. An RTM Energy Bid from a Controllable Load Resource represents the bid for energy distributed across all nodes in the Load Zone in which the Controllable Load Resource is located. For an ESR, an RTM Energy Bid represents a bid for energy at the ESR’s Resource Node;  (iv) Observe all Competitive and Non-Competitive Constraints; and  (v) Use Ancillary Service Offers to determine Ancillary Service awards.  (c) ERCOT shall archive information and provide monthly summaries of security violations and any binding transmission constraints identified in Step 2 of the SCED process. The summary must describe the limiting element (or identified operator-entered constraint with operator’s comments describing the reason and the Resource-specific impacts for any manual overrides). ERCOT shall provide the summary to Market Participants on the MIS Secure Area and to the Independent Market Monitor (IMM).  (d) The System Lambda used to determine LMPs from SCED Step 2 shall be capped at the effective VOLL.  (15) For each SCED process, in addition to the binding Base Points, Ancillary Service awards, Real-Time MCPCs, and LMPs, ERCOT shall calculate a non-binding projection of the Base Points, Ancillary Service awards, MCPCs, Resource Node LMPs, Real-Time Reliability Deployment Price Adders, Hub LMPs, and Load Zone LMPs at a frequency of every five minutes for at least 15 minutes into the future based on the same inputs to the SCED process as described in this Section, except that the Resource’s HDL and LDL and the total generation requirement will be as estimated at future intervals. The Resource’s HDL and LDL will be calculated for each interval of the projection based on the ramp rate capability over the study period. ERCOT shall estimate the projected total generation requirement by calculating a Load forecast for the study period. In lieu of the steps described in Section 6.5.7.3.1, Determination of Real-Time Reliability Deployment Price Adders, the non-binding projection of Real-Time Reliability Deployment Price Adders shall be estimated based on GTBD, reliability deployments MWs, and aggregated offers. The Energy Offer Curve and Energy Bid/Offer Curves from SCED Step 2, the virtual offers for Load Resources deployed and the power balance penalty curve will be compared against the updated GTBD to get an estimate of the System Lambda from paragraph (2)(m) of Section 6.5.7.3.1. ERCOT shall post the projected non-binding Base Points and Ancillary Service awards for each Resource for each interval study period on the MIS Certified Area and the projected non-binding LMPs for Resource Nodes, Real-Time MCPCs, Real-Time Reliability Deployment Price Adders, Hub LMPs and Load Zone LMPs on the ERCOT website pursuant to Section 6.3.2, Activities for Real-Time Operations.  (16) ERCOT may override one or more of a Controllable Load Resource’s parameters in SCED if ERCOT determines that the Controllable Load Resource’s participation is having an adverse impact on the reliability of the ERCOT System.  (17) The QSE representing an ESR may withdraw energy from the ERCOT System only when dispatched by SCED to do so. An ESR may telemeter a status of OUT only if the ESR is in Outage status. |

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

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

(a) RUC-committed Resources, except for those whose QSEs have opted out of RUC Settlement in accordance with paragraph (14) of Section 5.5.2, Reliability Unit Commitment (RUC) Process;

(b) RMR Resources that are On-Line, including capacity secured to prevent an Emergency Condition pursuant to paragraph (4) of Section 6.5.1.1, ERCOT Control Area Authority;

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

(d) Deployed ERS;

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

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

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

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

(i) ERCOT-directed firm Load shed during EEA Level 3, as described in paragraph (3) of Section 6.5.9.4.2, EEA Levels.

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

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

(b) Notwithstanding item (a) above, for RUC-committed Combined Cycle Generation Resources with a telemetered Resource Status of ONRUC that were instructed by ERCOT to transition to a different configuration to provide additional capacity, set the LSL, LASL, and LDL equal to the minimum of their current value and the COP HSL of the QSE-committed configuration for the RUC hour at the snapshot time of the RUC instruction.

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

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

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

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

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

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

(e) Add the deployed MW from Load Resources that are not Controllable Load Resources and that are providing RRS or ECRS to GTBD linearly ramped over the ten-minute ramp period and add the deployed MW from Load Resources that are not Controllable Load Resources providing Non-Spin to GTBD linearly ramped over the 30-minute ramp period. The amount of deployed MW is calculated from the Resource telemetry and from applicable deployment instructions in Extensible Markup Language (XML) messages. ERCOT shall generate a linear bid curve defined by a price/quantity pair of $300/MWh for the first MW of Load Resources deployed and a price/quantity pair of $700/MWh for the last MW of Load Resources deployed in each SCED execution. After recall instruction, the restoration period length and amount of MW added to GTBD during the restoration period will be determined by validated telemetry and the type of Ancillary Service deployed from the Resource. The TAC shall review the validity of the prices for the bid curve at least annually.

(f) Add the deployed MW from ERS to GTBD. The amount of deployed MW is determined from the XML messages and ERS contracted capacities for the ERS Time Periods when ERS is deployed. After recall, an approximation of the amount of un-restored ERS shall be used. After ERCOT recalls each group, GTBD shall be adjusted to reflect restoration on a linear curve over the assumed restoration period (“RHours”).

The above parameter is defined as follows:

| Parameter | Unit | Current Value\* |
| --- | --- | --- |
| RHours | Hours | 4.5 |
| \* Changes to the current value of the parameter(s) referenced in this table above may be recommended by TAC and approved by the ERCOT Board. ERCOT shall update parameter values on the first day of the month following ERCOT Board approval unless otherwise directed by the ERCOT Board. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value. | | |

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

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

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

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

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

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

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

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

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

(p) The Real-Time On-Line Reliability Deployment Price Adder is the minimum of items (n) and (o) above except when ERCOT is directing firm Load shed during EEA Level 3. When ERCOT is directing firm Load shed during EEA Level 3 to either maintain sufficient PRC or stabilize grid frequency, as described in paragraph (3) of Section 6.5.9.4.2, the Real-Time On-Line Reliability Deployment Price Adder is the VOLL minus the sum of the System Lambda of the second step in the two-step SCED process described in paragraph (10)(b) of Section 6.5.7.3 and the Real-Time On-Line Reserve Price Adder. Once ERCOT is no longer directing firm Load shed, as described above, the Real-Time On-Line Reliability Deployment Price Adder will again be set as the minimum of items (n) and (o) above.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR904, NPRR1006, NPRR1010, NPRR1014, NPRR1091, and NPRR1105: Replace applicable portions of Section 6.5.7.3.1 above with the following upon system implementation for NPRR904, NPRR1006, NPRR1014, NPRR1091, or NPRR1105; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]  **6.5.7.3.1Determination of Real-Time Reliability Deployment Price Adder**  (1) The following categories of reliability deployments are considered in the determination of the Real-Time Reliability Deployment Price Adder for Energy, and the Real-Time Reliability Deployment Price Adders for Ancillary Services:  (a) RUC-committed Resources, except for those whose QSEs have opted out of RUC Settlement in accordance with paragraph (142) of Section 5.5.2, Reliability Unit Commitment (RUC) Process;  (b) RMR Resources that are On-Line, including capacity secured to prevent an Emergency Condition pursuant to paragraph (4) of Section 6.5.1.1, ERCOT Control Area Authority;  (c) Deployed Load Resources other than Controllable Load Resources;  (d) Deployed ERS;  (e) ERCOT-directed DC Tie imports during an EEA or transmission emergency where the total adjustment shall not exceed 1,250 MW in a single interval;  (f) ERCOT-directed curtailment of DC Tie imports below the higher of DC Tie advisory import limit as of 0600 in the Day-Ahead or subsequent advisory import limit to address local transmission system limitations where the total adjustment shall not exceed 1,250 MW in a single interval;  (g) ERCOT-directed curtailment of DC Tie imports below the higher of DC Tie advisory import limit as of 0600 in the Day-Ahead or subsequent advisory import limit due to an emergency action by a neighboring system operator during an emergency that is accommodated by ERCOT where the total adjustment shall not exceed 1,250 MW in a single interval;  (h) ERCOT-directed DC Tie exports to address emergency conditions in the receiving electric grid where the total adjustment shall not exceed 1,250 MW in a single interval;  (i) ERCOT-directed curtailment of DC Tie exports below the DC Tie advisory export limit as of 0600 in the Day-Ahead or subsequent advisory export limit during EEA, a transmission emergency, or to address local transmission system limitations where the total adjustment shall not exceed 1,250 MW in a single interval;  (j) Energy delivered to ERCOT through registered Block Load Transfers (BLTs) during an EEA;  (k) Energy delivered from ERCOT to another power pool through registered BLTs during emergency conditions in the receiving electric grid;  (l) ERCOT-directed deployment of TDSP standard offer Load management programs;  (m) ERCOT-directed deployment of distribution voltage reduction measures; and  (n) ERCOT-directed deployment of Off-Line Non-Spin.  (2) The Real-Time Reliability Deployment Price Adder for Energy, and Real-Time Reliability Deployment Price Adders for Ancillary Services are estimations of the impact to energy prices and Real-Time MCPCs due to the above categories of reliability deployments. For intervals where there are reliability deployments as described in paragraph (1) above, the Real-Time Reliability Deployment Price Adder for Energy and Real-Time Reliability Deployment Price Adders for Ancillary Services are determined as follows:  (a) For Off-Line Non-Spin Resources that are brought On-Line by ERCOT deployment instruction, RUC-committed Resources with a telemetered Resource Status of ONRUC and for RMR Resources that are On-Line:  (i) Set the LSL and LDL to zero;  (ii) Remove all Ancillary Service Offers; and  (iii) For the first step of SCED, administratively set the Energy Offer Curve for the Resource at a value equal to the power balance penalty price for all capacity between 0 MW and the HSL of the Resource.  (b) Notwithstanding item (a) above, for RUC-committed Combined Cycle Generation Resources with a telemetered Resource Status of ONRUC that were instructed by ERCOT to transition to a different configuration to provide additional capacity:  (i) Set the LSL and LDL equal to the minimum of their current value and the COP HSL of the QSE-committed configuration for the RUC hour at the snapshot time of the RUC instruction;  (ii) Set the maximum Ancillary Service capabilities of the Resource equal to the minimum of their current value and COP Ancillary Service capabilities of the QSE-committed configuration for the RUC hour at the snapshot time of the RUC instruction; and  (iii) For the first step of SCED, administratively set the Energy Offer Curve for the Resource at a value equal to the power balance penalty price for the additional capacity of the Resource, defined as the positive difference between the Resource’s current telemetered HSL and the COP HSL of the QSE-committed configuration for the RUC hour at the snapshot time of the RUC instruction.  (c) For all other Generation Resources excluding ones with a telemetered status of ONRUC, ONTEST, STARTUP, SHUTDOWN, and also excluding RMR Resources that are On-Line and excluding Generation Resources with a telemetered output less than 95% of LSL:  (i) If the Generation Resource SCED Base Point is not at LDL, set LDL to the greater of Aggregated Resource Output - (60 minutes \* Normal Ramp Rate down), or LSL; and  (ii) If the Generation Resource SCED Base Point is not at HDL, set HDL to the lesser of Aggregated Resource Output + (60 minutes \* Normal Ramp Rate up), or HSL.  (d) For all On-Line ESRs:  (i) If the ESR SCED Base Point is not at LDL, set LDL to the greater of Aggregated Resource Output - (60 minutes \* Normal Ramp Rate down), or LSL; and  (ii) If the ESR SCED Base Point is not at HDL, set HDL to the lesser of Aggregated Resource Output + (60 minutes \* Normal Ramp Rate up), or HSL.  (e) For all Controllable Load Resources excluding ones with a telemetered status of OUTL:  (i) If the Controllable Load Resource SCED Base Point is not at LDL, set LDL to the greater of Aggregated Resource Output - (60 minutes \* Normal Ramp Rate down), or LSL; and  (ii) If the Controllable Load Resource SCED Base Point is not at HDL, set HDL to the lesser of Aggregated Resource Output + (60 minutes \* Normal Ramp Rate up), or HSL.  (f) Add the deployed MW from Load Resources that are not Controllable Load Resources and that are providing RRS or ECRS to GTBD linearly ramped over the ten-minute ramp period and add the deployed MW from Load Resources that are not Controllable Load Resources providing Non-Spin to GTBD linearly ramped over the 30-minute ramp period. The amount of deployed MW is calculated from the Resource telemetry and from applicable deployment instructions in Extensible Markup Language (XML) messages. ERCOT shall generate a linear bid curve defined by a price/quantity pair of $300/MWh for the first MW of Load Resources deployed and a price/quantity pair of $700/MWh for the last MW of Load Resources deployed in each SCED execution. After recall instruction, the restoration period length and amount of MW added to GTBD during the restoration period will be determined by validated telemetry and the type of Ancillary Service deployed from the Resource. The TAC shall review the validity of the prices for the bid curve at least annually.  (g) Add the deployed MW from ERS to GTBD. The amount of deployed MW is determined from the XML messages and ERS contracted capacities for the ERS Time Periods when ERS is deployed. After recall, an approximation of the amount of un-restored ERS shall be used. After ERCOT recalls each group, GTBD shall be adjusted to reflect restoration on a linear curve over the assumed restoration period (“RHours”).  The above parameter is defined as follows:   | Parameter | Unit | Current Value\* | | --- | --- | --- | | RHours | Hours | 4.5 | | \* Changes to the current value of the parameter(s) referenced in this table above may be recommended by TAC and approved by the ERCOT Board. ERCOT shall update parameter values on the first day of the month following ERCOT Board approval unless otherwise directed by the ERCOT Board. ERCOT shall provide a Market Notice prior to implementation of a revised parameter value. | | |   (h) Add the MW from DC Tie imports during an EEA or transmission emergency, to address local transmission system limitations, or due to an emergency action by a neighboring system operator during an emergency that is accommodated by ERCOT to GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the ERCOT Operator.  (i) Add the MW from DC Tie export curtailments during an EEA or transmission emergency, to address local transmission system limitations, or due to an emergency action by a neighboring system operator during an emergency that is accommodated by ERCOT to GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the ERCOT Operator. The MW added to GTBD associated with any individual DC Tie shall not exceed the higher of DC Tie advisory limit for exports on that tie as of 0600 in the Day-Ahead or subsequent advisory export limit minus the aggregate export on the DC Tie that remained scheduled following the Dispatch Instruction from the ERCOT Operator.  (j) Subtract the MW from DC Tie exports to address emergency conditions in the receiving electric grid from GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the receiving grid operator.  (k) Subtract the MW from DC Tie import curtailments to address local transmission system limitations or emergency conditions in the receiving electric grid from GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the receiving grid operator. The MW subtracted from GTBD associated with any individual DC Tie shall not exceed the higher of DC Tie advisory limit for imports on that tie as of 0600 in the Day-Ahead or subsequent advisory import limit minus the aggregate import on the DC Tie that remained scheduled following the Dispatch Instruction from the ERCOT Operator.  (l) Add the MW from energy delivered to ERCOT through registered BLTs during an EEA to GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the ERCOT Operator.  (m) Subtract the MW from energy delivered from ERCOT to another power pool through registered BLTs during emergency conditions in the receiving electric grid from GTBD. The amount of MW is determined from the Dispatch Instruction and should continue over the duration of time specified by the receiving grid operator.  (n) Add the deployed MWs from TDSP standard offer Load management programs to GTBD, if ERCOT instructs TDSPs to deploy their standard offer Load management programs. The amount of deployed MW is the value ERCOT provided for all TDSP standard offer Load management programs in the most current May Report on Capacity, Demand and Reserves in the ERCOT Region, unless modified as specified in this paragraph. If ERCOT is informed that all or a portion of a TDSP’s standard offer Load management program has been fully exhausted, or has been expanded as the result of a Public Utility Commission of Texas (PUCT) proceeding, ERCOT will remove the associated MW value of any exhausted capacity from the amount of deployed MW or, in the case of an expansion, ERCOT will request an updated MW value from the relevant TDSPs to use in place of the May Report on Capacity, Demand and Reserves in the ERCOT Region value for that year. The initial value ERCOT will use for deployed MW under this paragraph for each calendar year, as well as any subsequent changes to this value, will be communicated to Market Participants in a Market Notice. After recall, an approximation of the amount of un-restored TDSP standard offer Load management programs shall be used. GTBD shall be adjusted to reflect restoration on a linear curve over the assumed restoration period (“RHours”) defined by item (g) above.  (o) Perform a SCED with changes to the inputs in items (a) through (m) above, considering only Competitive Constraints and the non-mitigated Energy Offer Curves.  (p) Perform mitigation on the submitted Energy Offer Curves using the LMPs from the previous step as the reference LMP.  (q) Perform a SCED with the changes to the inputs in items (a) through (m) above, considering both Competitive and Non-Competitive Constraints and the mitigated Energy Offer Curves.  (r) The Real-Time Reliability Deployment Price Adder for Energy is equal to the positive difference between the System Lambda from item (q) above and the System Lambda of the second step in the two-step SCED process described in paragraph (10)(b) of Section 6.5.7.3, Security Constrained Economic Dispatch.  (s) For each individual Ancillary Service, the Real-Time Reliability Deployment Price Adder for Ancillary Service is equal to the positive difference between the MCPC for that Ancillary Service from item (q) above and the MCPC for that Ancillary Service. |

6.5.7.4 Base Points

(1) ERCOT shall issue a Base Point for each On-Line Generation Resource and each On-Line Controllable Load Resource on completion of each SCED execution. The Base Point set by SCED must observe a Generation Resource’s and Controllable Load Resource’s HDL and LDL. Base Points are automatically superseded on receipt of a new Base Point from ERCOT regardless of the status of any current ramping activity of a Resource. ERCOT shall provide each Base Point using Dispatch Instructions issued over Inter-Control Center Communications Protocol (ICCP) data link to the QSE representing each Resource that include the following information:

(a) Resource identifier that is the subject of the Dispatch Instruction;

(b) MW output for Generation Resource and MW consumption for Controllable Load Resource;

(c) Time of the Dispatch Instruction;

(d) Flag indicating SCED has dispatched a Generation Resource or Controllable Load Resource below HDL used by SCED;

|  |
| --- |
| [NPRR1111: Replace paragraph (d) above with the following upon system implementation of SCR819:]  (d) Flag indicating SCED has dispatched a Generation Resource or Controllable Load Resource below HDL used by SCED or an IRR has been instructed not to exceed its Base Point; |

|  |
| --- |
| [NPRR285: Insert paragraph (e) below upon system implementation and renumber accordingly:]  (e) Flag indicating SCED has dispatched a Generation Resource away from the Output Schedule submitted for that Generation Resource; |

(e) Flag indicating that the Resource is identified for mitigation pursuant to paragraph (7) of Section 3.19.4, Security-Constrained Economic Dispatch Constraint Competitiveness Test, and paragraph (10) of Section 6.5.7.3, Security Constrained Economic Dispatch; and

(f) Other information relevant to that Dispatch Instruction.

|  |
| --- |
| [NPRR1010: Insert Section 6.5.7.4.1 below upon system implementation of the Real-Time Co-Optimization (RTC) project:]  6.5.7.4.1 Updated Desired Set Points  (1) Each Resource shall follow ERCOT-issued Updated Desired Set Points (UDSPs), unless otherwise instructed by ERCOT. ERCOT-issued UDSPs shall not include expected Primary Frequency Response.  (2) A UDSP is the sum of a calculated MW value representing the expected MW output of a Resource ramping to a SCED Base Point and the Resource-specific Regulation Service instruction from ERCOT.  (3) LFC shall send Resource-specific UDSP to QSEs every four seconds.  (4) Resources, excluding non-Controllable Load Resources, that have been awarded RRS as FFR-capable Resources or are telemetering a Resource Status of ONSC, will all have manual deployment instructions and expected deployments triggered automatically by frequency deviations included in the UDSP value provided to the QSE for the Resource. These deployment components of UDSP will reflect the latest Ancillary Service awards and are separate from the ramping component of UDSP.  (5) When ERCOT System frequency experiences a 0.05 Hz or greater deviation from scheduled frequency, and a Resource is ramping to a SCED Base Point in a manner directionally opposite to system frequency, the ramping component of the Resource’s UDSP will be temporarily held constant and flagged accordingly. |

6.5.7.5 Ancillary Services Capacity Monitor

(1) ERCOT shall calculate the following every ten seconds and provide Real-Time summaries to ERCOT Operators and all Market Participants using ICCP, giving updates of calculations every ten seconds, and posting on the ERCOT website, giving updates of calculations every five minutes, which show the Real-Time total system amount of:

(a) RRS capacity from:

(i) Generation Resources;

(ii) Load Resources excluding Controllable Load Resources;

(iii) Controllable Load Resources; and

(iv) Resources capable of Fast Frequency Response (FFR);

(b) Ancillary Service Resource Responsibility for RRS from:

(i) Generation Resources;

(ii) Load Resources excluding Controllable Load Resources;

(iii) Controllable Load Resources; and

(iv) Resources capable of FFR;

(c) ECRS capacity from:

(i) Generation Resources;

(ii) Load Resources excluding Controllable Load Resources;

(iii) Controllable Load Resources; and

(iv) Quick Start Generation Resources (QSGRs);

(d) Ancillary Service Resource Responsibility for ECRS from:

(i) Generation Resources;

(ii) Load Resources excluding Controllable Load Resources; and

(iii) Controllable Load Resources; and

(iv) QSGRs;

(e) ECRS deployed to Generation and Load Resources;

(f) Non-Spin available from:

(i) On-Line Generation Resources with Energy Offer Curves;

(ii) Undeployed Load Resources;

(iii) Off-Line Generation Resources; and

(iv) Resources with Output Schedules;

(g) Ancillary Service Resource Responsibility for Non-Spin from:

(i) On-Line Generation Resources with Energy Offer Curves;

(ii) On-Line Generation Resources with Output Schedules;

(iii) Load Resources;

(iv) Off-Line Generation Resources excluding QSGRs; and

(v) QSGRs;

(h) Undeployed Reg-Up and Reg-Down;

(i) Ancillary Service Resource Responsibility for Reg-Up and Reg-Down;

(j) Deployed Reg-Up and Reg-Down;

(k) Available capacity:

(i) With Energy Offer Curves in the ERCOT System that can be used to increase Generation Resource Base Points in SCED;

(ii) With Energy Offer Curves in the ERCOT System that can be used to decrease Generation Resource Base Points in SCED;

(iii) Without Energy Offer Curves in the ERCOT System that can be used to increase Generation Resource Base Points in SCED;

(iv) Without Energy Offer Curves in the ERCOT System that can be used to decrease Generation Resource Base Points in SCED;

(v) With RTM Energy Bid curves from available Controllable Load Resources in the ERCOT System that can be used to decrease Base Points (energy consumption) in SCED;

(vi) With RTM Energy Bid curves from available Controllable Load Resources in the ERCOT System that can be used to increase Base Points (energy consumption) in SCED;

(vii) From Resources participating in SCED plus the Reg-Up, ECRS, and RRS from Load Resources and the Net Power Consumption minus the Low Power Consumption from Load Resources with a validated Real-Time RRS and ECRS Schedule;

(viii) From Resources included in item (vii) above plus reserves from Resources that could be made available to SCED in 30 minutes;

(ix) In the ERCOT System that can be used to increase Generation Resource Base Points in the next five minutes in SCED; and

(x) In the ERCOT System that can be used to decrease Generation Resource Base Points in the next five minutes in SCED;

(l) Aggregate telemetered HSL capacity for Resources with a telemetered Resource Status of EMR;

(m) Aggregate telemetered HSL capacity for Resources with a telemetered Resource Status of OUT;

(n) Aggregate net telemetered consumption for Resources with a telemetered Resource Status of OUTL; and

(o) The ERCOT-wide PRC calculated as follows:

**PRC1 = Min(Max((RDF\*(HSL-NFRC) – Actual Net Telemetered Output)i , 0.0) , 0.2\*RDF\*(HSL-NFRC)i),**

where the included On-Line Generation Resources do not include WGRs, nuclear Generation

Resources, or Generation Resources with an output less than or equal to 95% of telemetered LSL or

with a telemetered status of ONTEST, ONHOLD, STARTUP, or SHUTDOWN.





***WGRs***

***online***

***All***

***WGR***

***online***

***i***

**PRC2 = Min(Max((RDFW\*HSL – Actual Net Telemetered Output)i , 0.0) , 0.2\*RDFW\*HSLi),**

where the included On-Line WGRs only include WGRs that are Primary Frequency Response-capable.

****

**PRC3 = ((Synchronous condenser output)i as qualified by item (8) of Operating Guide Section 2.3.1.2, Additional Operational Details for Responsive Reserve and ERCOT Contingency Reserve Service Providers))**

**PRC4 = (Min(Max((Actual Net Telemetered Consumption – LPC), 0.0), ECRS and RRS Ancillary Service Resource Responsibility \* 1.5) from all Load Resources controlled by high-set under frequency relays carrying an ECRS and/or RRS Ancillary Service Resource Responsibility)i**





***resources***

***load***

***online***

***All***

***resource***

***load***

***online***

***i***





***resources***

***load***

***online***

***All***

***resource***

***load***

***online***

***i***

**PRC5 = Min(Max((LRDF\_1\*Actual Net Telemetered Consumption – LPC)i, 0.0), (0.2 \* LRDF\_1 \* Actual Net Telemetered Consumption)) from all Controllable Load Resources active in SCED and carrying Ancillary Service Resource Responsibility**





***resources***

***load***

***online***

***All***

***resource***

***load***

***online***

***i***

**PRC6 = Min(Max((LRDF\_2 \* Actual Net Telemetered Consumption – LPC)i, 0.0), (0.2 \* LRDF\_2 \* Actual Net Telemetered Consumption)) from all Controllable Load Resources active in SCED and not carrying Ancillary Service Resource Responsibility**

**PRC7 = (Capacity from Resources capable of providing FFR)i**





***resources***

***FFR***

***online***

***All***

***resource***

***FFR***

***online***

***i***

**PRC8 = (If discharging or idle, Min(X% of HSL based on droop, HSL-ESR-Gen “injection”, the capacity that can be sustained for 15 minutes per the State of Charge), else Min(X% of (HSL – LSL(ESR “charging”) based on droop, the capacity that can be sustained for 15 minutes per the State of Charge – LSL(ESR “charging”)))**





***ESR***

***online***

***All***

***ESR***

***online***

***i***

**Excludes ESR capacity used to provide FFR**

**PRC = PRC1 + PRC2 + PRC3 + PRC4 + PRC5 + PRC6 + PRC7 + PRC8**

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| PRC1 | MW | Generation On-Line greater than 0 MW |
| PRC2 | MW | WGRs On-Line greater than 0 MW |
| PRC3 | MW | Synchronous condenser output |
| PRC4 | MW | Capacity from Load Resources carrying ECRS Ancillary Service Resource Responsibility |
| PRC5 | MW | Capacity from Controllable Load Resources active in SCED and carrying Ancillary Service Resource Responsibility |
| PRC6 | MW | Capacity from Controllable Load Resources active in SCED and not carrying Ancillary Service Resource Responsibility |
| PRC7 | MW | Capacity from Resources capable of providing FFR |
| PRC8 | MW | ESR capacity capable of providing Primary Frequency Response |
| PRC | MW | Physical Responsive Capability |
| X | Percentage | Percent threshold based on the Governor droop setting of ESRs |
| RDF |  | The currently approved Reserve Discount Factor |
| RDFW |  | The currently approved Reserve Discount Factor for WGRs |
| LRDF\_1 |  | The currently approved Load Resource Reserve Discount Factor for Controllable Load Resources carrying Ancillary Service Resource Responsibility |
| LRDF\_2 |  | The currently approved Load Resource Reserve Discount Factor for Controllable Load Resources not carrying Ancillary Service Resource Responsibility |
| NFRC | MW | Non-Frequency Responsive Capacity |

(2) Each QSE shall operate Resources providing Ancillary Service capacity to meet its obligations. If a QSE experiences temporary conditions where its total obligation for providing Ancillary Service cannot be met on the QSE’s Resources, then the QSE may add additional capability from other Resources that it represents. It adds that capability by changing the Resource Status and updating the Ancillary Service Schedules and Ancillary Services Resource Responsibility of the affected Resources and notifying ERCOT under Section 6.4.9.1, Evaluation and Maintenance of Ancillary Service Capacity Sufficiency. If the QSE is unable to meet its total obligations to provide committed Ancillary Services capacity, the QSE shall notify ERCOT immediately of the expected duration of the QSE’s inability to meet its obligations. ERCOT shall determine whether replacement Ancillary Services will be procured to account for the QSE’s shortfall according to Section 6.4.9.1.

(3) The Load Resource Reserve Discount Factors (RDFs) for Controllable Load Resources (LRDF\_1 and LRDF\_2) shall be subject to review and approval by TAC.

(4) The RDFs used in the PRC calculation shall be posted to the ERCOT website no later than three Business Days after approval.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1010, NPRR1014, and NPRR1029: Replace applicable portions of Section 6.5.7.5 above with the following upon system implementation for NPRR1014 or NPRR1029; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]  **6.5.7.5 Ancillary Services Capacity Monitor**  (1) Every ten seconds, ERCOT shall calculate the following and provide Real-Time summaries to ERCOT Operators and all Market Participants using ICCP and postings on the ERCOT website showing the Real-Time total system amount of:  (a) RRS capability from:  (i) Generation Resources and ESRs in the form of PFR;  (ii) Load Resources, excluding Controllable Load Resources, capable of responding via under-frequency relay;  (iii) Controllable Load Resources in the form of PFR; and  (iv) Resources capable of Fast Frequency Response (FFR);  (b) Ancillary Service Resource awards for RRS to:  (i) Generation Resources and ESRs in the form of PFR;  (ii) Load Resources, excluding Controllable Load Resources, capable of responding by under-frequency relay;  (iii) Controllable Load Resources in the form of PFR; and  (iv) Resources providing FFR;  (c) ECRS capability from:  (i) Generation Resources;  (ii) Load Resources excluding Controllable Load Resources;  (iii) Controllable Load Resources;  (iv) Quick Start Generation Resources (QSGRs); and  (v) ESRs.  (d) Ancillary Service Resource awards for ECRS to:  (i) Generation Resources;  (ii) Load Resources excluding Controllable Load Resources; and  (iii) Controllable Load Resources;  (iv) QSGRs; and  (v) ESRs.  (e) ECRS manually deployed by Resources with a Resource Status of ONSC;  (f) Non-Spin available from:  (i) On-Line Generation Resources with Energy Offer Curves;  (ii) Undeployed Load Resources;  (iii) Off-Line Generation Resources and On-Line Generation Resources with power augmentation;  (iv) Resources with Output Schedules; and  (v) ESRs.  (g) Ancillary Service Resource awards for Non-Spin to:  (i) On-Line Generation Resources with Energy Offer Curves;  (ii) On-Line Generation Resources with Output Schedules;  (iii) Load Resources;  (iv) Off-Line Generation Resources excluding Quick Start Generation Resources (QSGRs), including Non-Spin awards on power augmentation capacity that is not active on On-Line Generation Resources;  (v) QSGRs; and  (vi) ESRs.  (h) Reg-Up and Reg-Down capability;  (i) Undeployed Reg-Up and Reg-Down;  (j) Ancillary Service Resource awards for Reg-Up and Reg-Down;  (k) Deployed Reg-Up and Reg-Down;  (l) Available capacity:  (i) With Energy Offer Curves in the ERCOT System that can be used to increase Generation Resource Base Points in SCED;  (ii) With Energy Offer Curves in the ERCOT System that can be used to decrease Generation Resource Base Points in SCED;  (iii) Without Energy Offer Curves in the ERCOT System that can be used to increase Generation Resource Base Points in SCED;  (iv) Without Energy Offer Curves in the ERCOT System that can be used to decrease Generation Resource Base Points in SCED;  (v) With RTM Energy Bid curves from available Controllable Load Resources in the ERCOT System that can be used to decrease Base Points (energy consumption) in SCED;  (vi) With RTM Energy Bid curves from available Controllable Load Resources in the ERCOT System that can be used to increase Base Points (energy consumption) in SCED;  (vii) From Resources participating in SCED plus the Reg-Up, RRS, and ECRS from Load Resources and the Net Power Consumption minus the Low Power Consumption from Load Resources with a validated Real-Time RRS and ECRS awards;  (viii) With Energy Bid/Offer Curves for ESRs in the ERCOT System that can be used to increase ESR Base Points in SCED;  (ix) With Energy Bid/Offer Curves for ESRs in the ERCOT System that can be used to decrease ESR Base Points in SCED;  (x) Without Energy Bid/Offer Curves for ESRs in the ERCOT System that can be used to increase ESR Base Points in SCED;  (xi) Without Energy Bid/Offer Curves for ESRs in the ERCOT System that can be used to decrease ESR Base Points in SCED;  (xii) From Resources included in item (vii) above plus reserves from Resources that could be made available to SCED in 30 minutes;  (xiii) In the ERCOT System that can be used to increase Generation Resource Base Points in the next five minutes in SCED; and  (xiv) In the ERCOT System that can be used to decrease Generation Resource Base Points in the next five minutes in SCED;  (xv) The total capability of Resources available to provide the following combinations of Ancillary Services, based on the Resource telemetry from the QSE and capped by the limits of the Resource:  (A) Capacity to provide Reg-Up, RRS, or both, irrespective of whether it is capable of providing ECRS or Non-Spin;  (B) Capacity to provide Reg-Up, RRS, ECRS, or any combination, irrespective of whether it is capable of providing Non-Spin; and  (C) Capacity to provide Reg-Up, RRS, ECRS, or Non-Spin, in any combination;  (m) Aggregate telemetered HSL capacity for Resources with a telemetered Resource Status of EMR;  (n) Aggregate telemetered HSL capacity for Resources with a telemetered Resource Status of OUT;  (o) Aggregate net telemetered consumption for Resources with a telemetered Resource Status of OUTL; and  (p) The ERCOT-wide PRC calculated as follows:  **PRC1 = Min(Max((RDF\*FRCHL – FRCO)i , 0.0) , 0.2\*RDF\*FRCHLi),**  where the included On-Line Generation Resources do not include WGRs, nuclear Generation  Resources, or Generation Resources with an output less than or equal to 95% of telemetered LSL or  with a telemetered status of ONTEST, ONHOLD, STARTUP, or SHUTDOWN.      ***WGRs***  ***online***  ***All***  ***WGR***  ***online***  ***i***  **PRC2 = Min(Max((RDFW\*HSL – Actual Net Telemetered Output)i , 0.0) , 0.2\*RDFW\*HSLi),**  where the included On-Line WGRs only include WGRs that are Primary Frequency Response-capable.  **PRC3 = ((Synchronous condenser output)i as qualified by item (8) of Operating Guide Section 2.3.1.2, Additional Operational Details for Responsive Reserve and ERCOT Contingency Reserve Service Providers))**  **PRC4 = (Min(Max((Actual Net Telemetered Consumption – LPC), 0.0), ECRS and RRS Ancillary Service Resource award \* 1.5) from all Load Resources controlled by high-set under-frequency relays with an ECRS and/or RRS Ancillary Service Resource award)i**      ***resources***  ***load***  ***online***  ***All***  ***resource***  ***load***  ***online***  ***i***  **PRC5 = Min(Max((LRDF\_1\*Actual Net Telemetered Consumption – LPC)i, 0.0), (0.2 \* LRDF\_1 \* Actual Net Telemetered Consumption)) from all Controllable Load Resources active in SCED with an Ancillary Service Resource award**      ***resources***  ***load***  ***online***  ***All***  ***resource***  ***load***  ***online***  ***i***  **PRC6 = Min(Max((LRDF\_2 \* Actual Net Telemetered Consumption – LPC)i, 0.0), (0.2 \* LRDF\_2 \* Actual Net Telemetered Consumption)) from all Controllable Load Resources active in SCED without an Ancillary Service Resource award**      ***resources***  ***load***  ***online***  ***All***  ***resource***  ***load***  ***online***  ***i***  **PRC7 = (Capacity from Resources capable of providing FFR)i**      ***resources***  ***FFR***  ***online***  ***All***  ***resource***  ***FFR***  ***online***  ***i***  **PRC8 = (If discharging or idle, Min(X% of HSL based on droop, HSL-ESR-Gen “injection”, the capacity that can be sustained for 15 minutes per the State of Charge), else Min(X% of (HSL – LSL(ESR “charging”) based on droop, the capacity that can be sustained for 15 minutes per the State of Charge – LSL(ESR “charging”)))**      ***ESR***  ***online***  ***All***  ***ESR***  ***online***  ***i***  **Excludes ESR capacity used to provide FFR**  **PRC9 = (If discharging or idle, Min(X% of HSL based on droop, HSL-Gen “injection”, the sum of the MW headroom available from the intermittent renewable generation component and the MW capacity that can be sustained for 15 minutes per the ESS State of Charge), else Min(X% of Real-Time Total Capacity based on droop, the sum of the MW headroom available from the intermittent renewable generation component and the MW capacity that can be sustained for 15 minutes per the ESS State of Charge))**      ***DC-Coupled Resources***  ***online***  ***All***  ***ESR***  ***online***  ***i***  **Excludes DC-Coupled Resource capacity used to provide FFR**  **PRC = PRC1 + PRC2 + PRC3+ PRC4 + PRC5 + PRC6 + PRC7 + PRC8 + PRC9**  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | **Variable** | **Unit** | **Description** | | PRC1 | MW | Generation On-Line greater than 0 MW | | PRC2 | MW | WGRs On-Line greater than 0 MW | | PRC3 | MW | Synchronous condenser output | | PRC4 | MW | Capacity from Load Resources with an ECRS Ancillary Service Resource award | | PRC5 | MW | Capacity from Controllable Load Resources active in SCED with an Ancillary Service Resource award | | PRC6 | MW | Capacity from Controllable Load Resources active in SCED without an Ancillary Service Resource award | | PRC7 | MW | Capacity from Resources capable of providing FFR | | PRC8 | MW | ESR capacity capable of providing Primary Frequency Response | | PRC9 | MW | Capacity from DC-Coupled Resources capable of providing Primary Frequency Response | | PRC | MW | Physical Responsive Capability | | X | Percentage | Percent threshold based on the Governor droop setting of ESRs | | RDF |  | The currently approved Reserve Discount Factor | | RDFW |  | The currently approved Reserve Discount Factor for WGRs | | LRDF\_1 |  | The currently approved Load Resource Reserve Discount Factor for Controllable Load Resources awarded an Ancillary Service Resource award | | LRDF\_2 |  | The currently approved Load Resource Reserve Discount Factor for Controllable Load Resources not awarded an Ancillary Service Resource award | | FRCHL | MW | Telemetered High limit of the FRC for the Resource | | FRCO | MW | Telemetered output of FRC portion of the Resource |   (2) The Load Resource Reserve Discount Factors (RDFs) for Controllable Load Resources (LRDF\_1 and LRDF\_2) shall be subject to review and approval by TAC.  (3) The RDFs used in the PRC calculation shall be posted to the ERCOT website no later than three Business Days after approval.  (4) ERCOT shall display on the ERCOT website and update every ten seconds a rolling view of the ERCOT-wide PRC, as defined in paragraph (1)(p) above, for the current Operating Day. |

6.5.7.6 Load Frequency Control

(1) The function of LFC is to maintain system frequency without a cost optimization function. ERCOT shall execute LFC every four seconds to reduce system frequency deviations from scheduled frequency by providing a control signal to each QSE that represents Resources providing Regulation Service, RRS, and ECRS.

6.5.7.6.1 LFC Process Description

(1) The LFC system corrects system frequency based on the Area Control Error (ACE) algorithm and Good Utility Practice.

(2) The ACE algorithm subtracts the actual frequency in Hz from the scheduled system frequency (normally 60 Hz), and multiplies the result by the frequency bias constant of MW/0.1 Hz. The ACE algorithm then takes that product and subtracts a configurable portion of the sum of the difference between the Updated Desired Base Point and Real-Time net MW output as appropriate. LFC shall ensure that the total reduction will not exceed the system-wide regulation requirement. This calculation produces an ACE value, which is a MW-equivalent correction needed to control the actual system frequency to the scheduled system frequency value.

(3) The LFC module receives inputs from Real-Time telemetry that includes Resource output and actual system frequency. The LFC uses actual Resource information calculated from SCADA to determine available Resource capacity providing Regulation Service, RRS, and ECRS.

(4) Based on the ACE MW correction, the LFC issues a set of control signals every four seconds to each QSE providing Regulation and, if required, each QSE providing RRS and ECRS. Control must be proportional to the QSE’s share of each of the services that it is providing, respecting the QSE’s Resources’ capability to provide regulation control. Control signals are provided to the QSE using the ICCP data link. QSEs shall receive an Updated Desired Base Point updated every four seconds by LFC. ERCOT will provide an Operations Notice of any methodology change to the determination of the Updated Desired Base Point within 60 minutes of the change.

(5) Each QSE shall allocate its Regulation energy deployment among its Resources to meet a deployment signal, and shall provide ERCOT with the participation factor of each Resource via telemetry in accordance with Section 6.5.7.6.2.1, Deployment of Regulation Service, and Section 6.4.9.1, Evaluation and Maintenance of Ancillary Service Capacity Sufficiency. A QSE may allocate Regulation Service Ancillary Service Resource Responsibility to any Resource telemetering a Resource Status of ONOPTOUT. Each QSE’s allocation of Regulation Service to its Resources must be consistent with the telemetry provided under Section 6.5.5.2, Operational Data Requirements. Each QSE’s allocation of its Regulation energy deployment among its Resources to meet a deployment signal must ensure the participation factors of all its Generation Resources in comparison to all its Controllable Load Resources remains constant.

|  |
| --- |
| [NPRR1092: Replace paragraph (5) above with the following upon system implementation:]  (5) Each QSE shall allocate its Regulation energy deployment among its Resources to meet a deployment signal, and shall provide ERCOT with the participation factor of each Resource via telemetry in accordance with Section 6.5.7.6.2.1, Deployment of Regulation Service, and Section 6.4.9.1, Evaluation and Maintenance of Ancillary Service Capacity Sufficiency. A QSE may allocate Regulation Service Ancillary Service Resource Responsibility to any Resource that has successfully opted out of RUC Settlement. Each QSE’s allocation of Regulation Service to its Resources must be consistent with the telemetry provided under Section 6.5.5.2, Operational Data Requirements. Each QSE’s allocation of its Regulation energy deployment among its Resources to meet a deployment signal must ensure the participation factors of all its Generation Resources in comparison to all its Controllable Load Resources remains constant. |

(6) If all Reg-Up capacity has been deployed, ERCOT shall use the LFC system to deploy ECRS on Generation Resources and Controllable Load Resources. Such ECRS deployments by ERCOT must be deployed as specified in Section 6.5.7.6.2.4, Deployment and Recall of ERCOT Contingency Reserve Service.

(7) ERCOT shall settle energy that results from LFC deployment at the Settlement Point Price for the point of injection. When a QSE deploys RRS or ECRS, the QSE shall deploy units consistent with the performance criteria in Sections 8.1.1.3.2, Responsive Reserve Capacity Monitoring Criteria, 8.1.1.3.4, ERCOT Contingency Reserve Service Capacity Monitoring Criteria, 8.1.1.4.2, Responsive Reserve Energy Deployment Criteria, and 8.1.1.4.4, ERCOT Contingency Reserve Service Energy Deployment Criteria.

(8) The inputs for LFC include:

(a) Actual system frequency;

(b) Scheduled system frequency;

(c) Capacity available for Regulation by QSE;

(d) Telemetered high and low Regulation availability status indications for each Resource available for Regulation deployments for ERCOT information;

(e) Resource limits calculated by ERCOT as described Section 6.5.7.2, Resource Limit Calculator;

(f) Resource Regulation participation factor;

(g) Capacity available for RRS and ECRS by QSE;

(h) ERCOT System frequency bias; and

(i) Telemetered Resource output.

(9) If system frequency deviation is greater than an established threshold, ERCOT may issue Dispatch Instructions to those Resources not providing Reg-Up or Reg-Down that have Base Points directionally opposite ACE, to temporarily suspend ramping to their Base Point until frequency deviation returns to zero.

|  |
| --- |
| [NPRR1010: Replace Section 6.5.7.6.1 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  ***6.5.7.6.1 LFC Process Description***  (1) The LFC system corrects system frequency based on the Area Control Error (ACE) algorithm and Good Utility Practice.  (2) The ACE algorithm subtracts the actual frequency in Hz from the scheduled system frequency (normally 60 Hz), and multiplies the result by the frequency bias constant of MW/0.1 Hz. The ACE algorithm then takes that product and subtracts a configurable portion of the sum of the difference between the Updated Desired Set Point (UDSP) and Real-Time net MW output as appropriate. LFC shall ensure that the total reduction will not exceed the system-wide regulation requirement. This calculation produces an ACE value, which is a MW-equivalent correction needed to control the actual system frequency to the scheduled system frequency value.  (3) The LFC module receives inputs from Real-Time telemetry that includes Resource output and actual system frequency. The LFC uses actual Resource information calculated from SCADA to determine available Resource capacity providing Regulation Service, RRS, and ECRS.  (4) Based on the ACE MW correction, the LFC issues a set of control signals every four seconds for each Resource providing Regulation and, if required, each Resource providing RRS or ECRS. Control signals to each Resource are provided to the QSE using the ICCP data link. QSEs shall receive a UDSP updated every four seconds by LFC. ERCOT will provide an operations notice of any methodology change to the determination of the UDSP within 60 minutes of the change.  (5) If all Reg-Up capacity has been deployed, ERCOT shall run off-cycle SCED executions or use the LFC system to deploy ECRS on Resources providing FFR or with an ONSC Resource Status. Such ECRS deployments by ERCOT must be deployed as specified in Section 6.5.7.6.2.4, Deployment and Recall of ERCOT Contingency Reserve Service.  (6) ERCOT shall settle energy that results from LFC deployment at the Settlement Point Price for the point of injection. When a QSE deploys RRS or ECRS, the QSE shall deploy units consistent with the performance criteria in Sections 8.1.1.3.2, Responsive Reserve Capacity Monitoring Criteria, Section 8.1.1.3.4, ERCOT Contingency Reserve Service Capacity Monitoring Criteria, 8.1.1.4.2, Responsive Reserve Energy Deployment Criteria, and 8.1.1.4.4, ERCOT Contingency Reserve Service Energy Deployment Criteria.  (7) The inputs for LFC include:  (a) Actual system frequency;  (b) Scheduled system frequency;  (c) Capacity awarded for Regulation Service to Resources;  (d) For Resources awarded Regulation Service, telemetered HSL or MPC, and LSL or LPC;  (e) Resource limits calculated by ERCOT as described in Section 6.5.7.2, Resource Limit Calculator;  (f) Capacity awarded for RRS and ECRS to Resources;  (g) ERCOT System frequency bias; and  (h) Telemetered Resource output. |

6.5.7.6.2 LFC Deployment

(1) ERCOT may deploy Regulation Service, RRS, ECRS, and Non-Spin only as prescribed by their respective specific functions to maintain frequency and system security. ERCOT may not substitute one Ancillary Service for another.

|  |
| --- |
| [NPRR1010: Insert paragraph (2) below upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (2) LFC will send UDSP deployment signals for each Resource, as specified in Section 6.5.7.4.1, Updated Desired Set Points. |

6.5.7.6.2.1 Deployment of Regulation Service

(1) ERCOT shall deploy Reg-Up and Reg-Down necessary to maintain ERCOT System frequency to meet NERC Control Area and other Control Area performance criteria as specified in these Protocols and the Operating Guides.

(2) Reg-Up is a deployment or recall of a deployment referenced to the Resource’s Base Point in response to a change (up or down) in ERCOT System frequency to maintain the target ERCOT System frequency within predetermined limits according to the Operating Guides.

(3) Reg-Down is a deployment or recall of a deployment referenced to the Resource’s Base Point in response to a change (up or down) in ERCOT System frequency to maintain the target ERCOT System frequency within predetermined limits according to the Operating Guides.

(4) These requirements also apply to the deployment or recall of a deployment of Reg-Up and Reg-Down:

(a) Deployment or recall of a deployment must be accomplished through use of an automatic signal from ERCOT to each QSE provider of Reg-Up and Reg-Down.

(b) ERCOT shall minimize Reg-Up and Reg-Down energy as much as practicable in each SCED cycle.

(c) ERCOT shall settle energy provided by Reg-Up and Reg-Down at the Resource’s Settlement Point Price.

(d) ERCOT shall integrate the control signal sent to providers of Reg-Up and shall calculate the amount of energy deployed by Reg-Up in each Settlement Interval.

(e) ERCOT shall integrate the control signal sent to providers of Reg-Down and shall calculate the amount of energy deployed by Reg-Down in each Settlement Interval.

(f) ERCOT shall calculate for each LFC cycle the amount of regulation that each Resource is expected to provide at that instant in time. The expected amount must be averaged over each SCED interval. The actual generation from telemetry must also be averaged over each SCED interval.

(5) Every day, ERCOT shall post to the MIS Secure Area the total amount of deployed Reg-Up and Reg-Down energy in each Settlement Interval of the previous day.

(6) For each Resource providing Reg-Up or Reg-Down, the implied ramp rate in MW per minute is the total amount of Regulation Service awarded divided by five.

(7) Each QSE providing Reg-Up or Reg-Down and ERCOT shall meet the deployment performance requirements specified in Section 8, Performance Monitoring.

(8) ERCOT shall issue Reg-Up and Reg-Down deployment Dispatch Instructions over ICCP. Those Dispatch Instructions must contain the change in MW output requested of the QSE assuming all Resources are at their Updated Desired Base Point issued by LFC.

|  |
| --- |
| [NPRR1010: Replace paragraph (8) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (8) ERCOT shall issue Reg-Up and Reg-Down deployment Dispatch Instructions over ICCP. Those Dispatch Instructions must contain the change in MW output requested of the Resource.  (9) Reg-Up and Reg-Down Dispatch Instructions shall be included as a component of a Resource’s UDSP.  (10) Upon the receipt of new Base Points and Ancillary Service awards from SCED, LFC will reset Regulation Service instructions to zero. |

6.5.7.6.2.2 Deployment of Responsive Reserve (RRS)

(1) RRS is intended to:

(a) Help restore the frequency within the first few seconds of a significant frequency deviation of the interconnected transmission system; and

(b) Provide energy during the implementation of an EEA.

(2) ERCOT shall deploy RRS to meet NERC Control Performance Standards and other performance criteria as specified in these Protocols and the Operating Guides, by one or more of the following:

(a) RRS energy deployment by automatic Governor response as a result of frequency deviation;

(b) Through use of an automatic Dispatch Instruction signal to deploy RRS capacity from Generation Resources providing Primary Frequency Response or Controllable Load Resources providing Primary Frequency Response;

(c) By Dispatch Instructions for deployment of RRS energy from a Load Resource, excluding Controllable Load Resources, by an electronic Messaging System; and

(d) RRS energy deployment by automatic action of high-set under-frequency relays as a result of a significant frequency deviation.

(3) ERCOT shall deploy RRS to respond to a frequency deviation when the power requirement to restore frequency to normal ACE in ten minutes exceeds the Reg-Up ramping capability. Deployment of RRS on Load Resources, excluding Controllable Load Resources, must be as described in Section 6.5.9.4, Energy Emergency Alert.

(4) ERCOT may deploy RRS in response to system disturbance requirements as specified in the Operating Guides if no additional energy is available to be dispatched from SCED as determined by the Ancillary Service Capacity Monitor.

(5) Energy from RRS Resources may also be deployed by ERCOT under Section 6.5.9, Emergency Operations.

(6) ERCOT shall allocate the deployment of RRS proportionally among QSEs that provide RRS using Resources that are not on high-set under-frequency relays.

(7) ERCOT shall use the SCED, ECRS, and Non-Spin as soon as practicable to minimize the prolonged use of RRS energy.

(8) Once RRS is deployed, the QSE’s obligation to deliver RRS remains in effect until specifically instructed by ERCOT to stop providing RRS. However, except in an Emergency Condition, the QSE’s obligation to deliver RRS may not exceed the period for which the service was committed.

(9) Following the deployment or recall of a deployment by Dispatch Instruction of RRS, QSE shall adjust the telemetered RRS Ancillary Service Schedule of Resources providing the service and ERCOT shall adjust the HASL and LASL based on the QSE’s telemetered Ancillary Service Schedule for RRS as described in Section 6.5.7.2, Resource Limit Calculator, to account for such deployment.

(10) QSEs providing RRS and ERCOT shall meet the deployment performance requirements specified in Section 8, Performance Monitoring.

(11) For RRS deployment that is not automatic in response to frequency deviation, ERCOT shall issue RRS deployment Dispatch Instructions over ICCP for Generation Resources and Controllable Load Resources and XML for all other Load Resources. Those Dispatch Instructions must contain the MW output requested. For Generation Resources and Controllable Load Resources from which RRS capacity was deployed, ERCOT shall use SCED to dispatch RRS energy. The Base Points for those Resources includes RRS energy as well as any other energy dispatched by SCED.

(12) To the extent that ERCOT deploys a Load Resource that is not a Controllable Load Resource and that has chosen a block deployment option, ERCOT shall either deploy the entire responsibility or, if only partial deployment is possible, skip the Load Resource with the block deployment option and proceed to deploy the next available Resource.

(13) RRS provided from a Generation Resource shall be responsive to frequency deviations as defined in Section 8.5.1.1, Governor in Service. Generation Resources providing RRS must have a Governor droop setting that is not greater than 5.0%.

(14) RRS provided from a Resource capable of FFR shall self-deploy their obligated response within 15 cycles after frequency drops below 59.85 Hz and must continue to provide a response until the frequency increases above that level. Resources which require recharging may do so once the frequency increases above 59.990 Hz.

(15) RRS provided by interruptible Load shall have automatic under-frequency relay setting set at no lower than 59.70 Hz

(16) ERCOT shall deploy RRS to meet NERC Control Performance Standards and other performance criteria as specified in these Protocols and the Operating Guides by one or more of the following:

(a) RRS energy deployment during an EEA;

(b) By Dispatch Instructions for deployment of RRS energy from a Load Resource, excluding Controllable Load Resources, by an electronic Messaging System; and

(c) RRS energy deployment from Load Resources and Generation Resources operating in synchronous condenser fast-response mode by automatic action of high-set under-frequency relays as a result of a significant frequency deviation.

|  |
| --- |
| [NPRR1010: Replace Section 6.5.7.6.2.2 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  **6.5.7.6.2.2 Deployment of Responsive Reserve (RRS)**  (1) RRS is intended to:  (a) Help restore the frequency within the first few seconds of a significant frequency deviation of the interconnected transmission system; and  (b) Provide energy during the implementation of an EEA.  (2) ERCOT shall deploy RRS to meet NERC Control Performance Standards and other performance criteria as specified in these Protocols and the Operating Guides, by one or more of the following:  (a) RRS energy deployment by automatic Governor response as a result of frequency deviation;  (b) By Dispatch Instruction for deployment of RRS energy from a Load Resource, excluding Controllable Load Resources, by an electronic Messaging System;  (c) RRS energy deployment by automatic action of high-set under-frequency relays as a result of a significant frequency deviation; and  (d) By Dispatch Instruction for deployment of RRS from Resources with a Resource Status of ONSC or Resources providing FFR.  (3) ERCOT shall deploy RRS to respond to a frequency deviation when the power requirement to restore frequency to normal ACE in ten minutes exceeds the Reg-Up ramping capability. Deployment of RRS on Load Resources, excluding Controllable Load Resources, must be as described in Section 6.5.9.4, Energy Emergency Alert.  (4) Energy from RRS Resources may also be deployed by ERCOT under Section 6.5.9, Emergency Operations.  (5) For Resources providing RRS with a Resource Status of ONSC, ERCOT shall deploy RRS as described in Section 6.5.9.4.2, EEA Levels, and Nodal Operating Guide Section 2.3.1.2, Additional Operational Details for Responsive Reserve Providers.  (6) For Resources providing RRS with FFR, ERCOT may manually deploy the FFR RRS in an attempt to recover frequency to meet NERC Performance Control Standards after utilizing Reg-Up and the SCED process which includes off-cycle SCED executions.  (7) ERCOT shall use the SCED, ECRS, and Non-Spin as soon as practicable to minimize the prolonged use of RRS energy.  (8) Once RRS is manually deployed on Load Resources controlled by under-frequency relays or Resources telemetering a Resource Status of ONSC, the Resource’s obligation to deliver RRS remains in effect until recalled by ERCOT.  (9) Resources providing RRS and ERCOT shall meet the deployment performance requirements specified in Section 8, Performance Monitoring.  (10) ERCOT shall issue RRS deployment Dispatch Instructions over ICCP for Generation Resources awarded RRS with a Resource Status of ONSC, and SCED-dispatchable Resources providing FFR. Dispatch Instructions must contain the MW output requested. UDSPs for those Resources includes RRS energy deployments as well as any other energy dispatched by SCED.  (11) ERCOT shall issue RRS deployment Dispatch Instructions, specifying the required MW output, through Extensible Markup Language (XML) for non-Controllable Load Resources.  (12) To the extent that ERCOT deploys a Load Resource that is not a Controllable Load Resource and that has chosen a block deployment option, ERCOT shall either deploy the entire award or, if only partial deployment is needed, skip the Load Resource with the block deployment option and proceed to deploy the next available Resource.  (13) RRS provided from a Generation Resource shall be responsive to frequency deviations as defined in Section 8.5.1.1, Governor in Service. Generation Resources providing RRS must have a Governor droop setting that is not greater than 5.0%.  (14) RRS provided from a Resource capable of FFR shall self-deploy their obligated response within 15 cycles after frequency drops below 59.85 Hz and must continue to provide a response until the frequency increases above that level. Resources which require recharging may do so once the frequency increases above 59.990 Hz.  (15) RRS provided by interruptible Load shall have automatic under-frequency relay setting set at no lower than 59.70 Hz.  (16) ERCOT shall deploy RRS to meet NERC Control Performance Standards and other performance criteria as specified in these Protocols and the Operating Guides by one or more of the following:  (a) RRS energy deployment during an EEA;  (b) By Dispatch Instructions for deployment of RRS energy from a Load Resource, excluding Controllable Load Resources, by an electronic Messaging System; and  (c) RRS energy deployment from Load Resources and Generation Resources operating in synchronous condenser fast-response mode by automatic action of high-set under-frequency relays as a result of a significant frequency deviation. |

6.5.7.6.2.3 Non-Spinning Reserve Service Deployment

(1) ERCOT shall deploy Non-Spin Service by operator Dispatch Instruction for the portion of On-Line Generation Resources that is only available through power augmentation and participating as Off-Line Non-Spin, Off-Line Generation Resources and Load Resources. ERCOT shall develop a procedure approved by TAC to deploy Resources providing Non-Spin Service. ERCOT Operators shall implement the deployment procedure when a specified threshold(s) in MW of capability available to SCED to increase generation is reached. ERCOT Operators may implement the deployment procedure to recover deployed RRS, ECRS, or when other Emergency Conditions exist. The deployment of Non-Spin must always be 100% of that scheduled on an individual Resource.

(2) Once Non-Spin capacity from Off-Line Generation Resources providing Non-Spin is deployed and the Generation Resources are On-Line, ERCOT shall use SCED to determine the amount of energy to be dispatched from those Resources.

(3) Off-Line Generation Resources providing Non-Spin (OFFNS Resource Status) are required to provide an Energy Offer Curve for use by SCED.

(4) Non-Spin can be provided by Controllable Load Resources that are SCED qualified or by Load Resources that are not Controllable Load Resources but do not have an under-frequency relay or the under-frequency relay is not armed.

(a) A Controllable Load Resource providing Non-Spin shall have an RTM Energy Bid for SCED and shall be capable of being Dispatched to its Non-Spin Ancillary Service Resource Responsibility within 30 minutes of a deployment instruction for capacity, using the Resource’s Normal Ramp Rate curve. An Aggregate Load Resource must comply with all requirements in the document titled “Requirements for Aggregate Load Resource Participation in the ERCOT Markets.”

(b) A Load Resource that is not a Controllable Load Resources shall be capable of being Dispatched to its Non-Spin Ancillary Service Resource Responsibility within 30 minutes of a deployment instruction for capacity. Following a deployment instruction, the QSE shall reduce the Non-Spin Ancillary Service Schedule by the amount of the deployment.

(5) ERCOT shall post a list of Off-Line Generation Resources and Load Resources that are not Controllable Load Resources on the MIS Certified Area immediately following the Day-Ahead Reliability Unit Commitment (DRUC) for each QSE with a Load Resource Non-Spin award. The list will be broken into groups of approximately 500 MW increments. ERCOT shall develop a process for determining which individual Resource to place in each group based on a random sampling of individual Load Resources that are not Controllable Load Resources awarded Non-Spin and Generation Resources carrying Off-Line Non-Spin. At ERCOT’s discretion, ERCOT may deploy all groups as specified in the Other Binding Document titled “Non-Spinning Reserve Deployment and Recall Procedure.”

(a) On-Line Generation Resources participating in Off-Line Non-Spin using power augmentation will be randomly distributed in Real-Time among the groups created in the Day-Ahead for the purpose of manual deployment of Non-Spin by operator Dispatch Instruction.

(b) Any Generation Resource providing Off-Line Non-Spin that did not previously receive group assignment will be automatically considered in Group 1. Any Load Resource that is not a Controllable Load Resource providing Non-Spin in Real-Time that did not previously receive group assignment will be automatically considered in Group 1. ERCOT may assign a Generation Resource providing Off-Line Non-Spin or a Load Resource that is not a Controllable Load Resource to another group if that Resource did not previously receive group assignment and, in ERCOT’s reasonable judgment, Group 1 is too large.

(6) Subject to the exceptions described in paragraphs (a) and (b) below, On-Line Generation Resources that are assigned Non-Spin Ancillary Service Resource Responsibility during an Operating Hour shall always be deployed in that Operating Hour. This deployment shall be considered as a standing Protocol-directed Non-Spin deployment Dispatch Instruction. Within the 30-second window prior to the top-of-hour clock interval described in paragraph (2) of Section 6.3.2, Activities for Real-Time Operations, the QSE shall respond to the standing Non-Spin deployment Dispatch Instruction for those Generation Resources assigned Non-Spin Ancillary Service Resource Responsibility effective at the top-of-hour by adjusting the Non-Spin Ancillary Service Schedule telemetry. The QSE shall set the Non-Spin Ancillary Service Schedule telemetry equal to the portion of Non-Spin being provided from power augmentation if the portion being provided from power augmentation is participating as Off-Line Non-Spin, otherwise it shall be set to 0. As described in Section 6.5.7.2, Resource Limit Calculator, ERCOT shall adjust the HASL and LASL based on the QSE’s telemetered Non-Spin Ancillary Service Schedule to account for such deployment and to make the energy from the full amount of the Non-Spin Ancillary Service Resource Responsibility available to SCED. A Non-Spin deployment Dispatch Instruction from ERCOT is not required and these Generation Resources must be able to Dispatch their Non-Spin Ancillary Service Resource Responsibility in response to a SCED Base Point deployment instruction. The provisions of this paragraph (5) do not apply to:

(a) QSGRs assigned Off-Line Non-Spin Ancillary Service Resource Responsibility and provided to SCED for deployment, which must follow the provisions of Section 3.8.3, Quick Start Generation Resources; or

(b) The portion of On-Line Generation Resources that is only available through power augmentation if participating as Off-Line Non-Spin.

(7) Off-Line Generation Resources providing Non-Spin, while Off-Line and before the receipt of any deployment instruction, shall be capable of being dispatched to their Non-Spin Resource Responsibility within 30 minutes of a deployment instruction. Following a deployment instruction, the QSE shall reduce the Non-Spin Ancillary Service Schedule by the amount of the deployment. An Off-Line Generation Resource providing Non-Spin must also be brought On-Line with an Energy Offer Curve at an output level greater than or equal to P1 multiplied by LSL where P1 is defined in the “ERCOT and QSE Operations Business Practices During the Operating Hour.” These actions must be done within a time frame that would allow SCED to fully dispatch the Resource’s Non-Spin Resource Responsibility within the 30 minute period using the Resource’s Normal Ramp Rate curve. The Resource Status indicating that a Generation Resource has come On-Line with an Energy Offer Curve is ON as described in paragraph (5)(b)(i) of Section 3.9.1, Current Operating Plan (COP) Criteria.

(8) For DSRs providing Non-Spin, on deployment of Non-Spin, the DSR’s QSE shall adjust its Resource Output Schedule to reflect the amount of deployment. For non-DSRs with Output Schedules providing Non-Spin, on deployment of Non-Spin, ERCOT shall adjust the Resource Output Schedule for the remainder of the Operating Period to reflect the amount of deployment. ERCOT shall notify the QSEs representing the non-DSR of the adjustment through the MIS Certified Area.

(9) For On-Line Generation Resources providing Non-Spin, Base Points include Non-Spin energy as well as any other energy dispatched as a result of SCED. These Resources’ Non-Spin Ancillary Service Resource Responsibility and Normal Ramp Rate curve should allow SCED to fully Dispatch the Resource’s Non-Spin Resource Responsibility within the 30-minute time frame according to the Resources’ Normal Ramp Rate curve. For the portion of the Non-Spin Ancillary Service Resource Responsibility provided from power augmentation participating as Off-Line, SCED should be able to be dispatch it within 30 minutes of the Non-Spin deployment instruction.

(10) Each QSE providing Non-Spin from a Resource shall inform ERCOT of the Non-Spin Resource availability using the Resource Status and Non-Spin Ancillary Service Resource Responsibility indications for the Operating Hour using telemetry and shall use the COP to inform ERCOT of Non-Spin Resource Status and Non-Spin Ancillary Service Resource Responsibility for hours in the Adjustment Period through the end of the Operating Day.

(11) ERCOT may deploy Non-Spin at any time in a Settlement Interval.

(12) ERCOT’s Non-Spin deployment Dispatch Instructions must include:

(a) The Resource name;

(b) A MW level of capacity deployment for Generation Resources with Energy Offer Curve, a MW level of energy for Generation Resources with Output Schedules, and a Dispatch Instruction for Load Resources equal to their awarded Non-Spin Ancillary Service Resource Responsibility; and

(c) The anticipated duration of deployment.

(13) ERCOT shall provide a signal via ICCP to the QSE of a deployed Generation or Load Resource indicating that its Non-Spin capacity has been deployed.

(14) ERCOT shall, as part of its TAC-approved Non-Spin deployment procedure, provide for the recall of Non-Spin energy including descriptions of changes to Output Schedules and release of energy obligations from On-Line Resources with Output Schedules and from On-Line Resources that were previously Off-Line Resources providing Non-Spin capacity.

(15) ERCOT shall provide a notification to all QSEs via the ERCOT website when any Non-Spin capacity is deployed on the ERCOT System showing the time, MW quantity and the anticipated duration of the deployment.

|  |
| --- |
| [NPRR1000, NPRR1010, and NPRR1131: Replace applicable portions of Section 6.5.7.6.2.3 above with the following upon system implementation for NPRR1000 or NPRR1131; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]  **6.5.7.6.2.3 Non-Spinning Reserve Service Deployment**  (1) ERCOT shall deploy Non-Spin Service by operator Dispatch Instruction for the portion of On-Line Generation Resources that is only available through power augmentation and participating as Off-Line Non-Spin and Off-Line Generation Resources. ERCOT shall develop a procedure approved by TAC to deploy Resources providing Non-Spin Service. ERCOT Operators shall implement the deployment procedure when a specified threshold(s) in MW of capability available to SCED to increase generation is reached. ERCOT Operators may implement the deployment procedure to recover deployed RRS, ECRS, or when other Emergency Conditions exist. The deployment of Non-Spin must always be 100% of that awarded on an individual Resource.  (2) Once Non-Spin capacity from Off-Line Generation Resources awarded Non-Spin is deployed and the Generation Resources are On-Line, ERCOT shall use SCED to determine the amount of energy to be dispatched from those Resources.  (3) Off-Line Generation Resources offering to provide Non-Spin must provide an Energy Offer Curve for use by SCED.  (4) Non-Spin can be provided by Controllable Load Resources that are SCED qualified or by Load Resources that are not Controllable Load Resources but do not have an under-frequency relay or the under-frequency relay is unarmed.  (a) Controllable Load Resources awarded Non-Spin shall have an RTM Energy Bid for SCED and shall be capable of being Dispatched to its Non-Spin Ancillary Service award within 30 minutes, using the Resource’s Normal Ramp Rate curve. An Aggregate Load Resource must comply with all requirements in the document titled “Requirements for Aggregate Load Resource Participation in the ERCOT Markets.”  (b) A Load Resource that is not a Controllable Load Resource shall be capable of being Dispatched to its Non-Spin Ancillary Service Resource Responsibility within 30 minutes of a deployment instruction for capacity.  (5) Off-Line Generation Resources awarded Non-Spin, while Off-Line and before the receipt of any deployment instruction, shall be capable of being dispatched to their Non-Spin award within 30 minutes of a Dispatch Instruction. On-Line Generation Resources awarded Non-Spin on the power augmentation capacity shall be capable of being dispatched to their Non-Spin award within 30 minutes of a Dispatch Instruction.  (6) ERCOT may deploy Non-Spin at any time in a Settlement Interval.  (7) ERCOT shall develop a process to place Off-Line Generation Resources and Load Resources that are not Controllable Load Resources with Non-Spin award in a group based on a random sampling for the purpose of deploying these Resources manually. At ERCOT’s discretion, ERCOT may deploy all groups as specified in the Other Binding Document titled “Non-Spinning Reserve Deployment and Recall Procedure.”  (a) On-Line Generation Resources participating in Off-Line Non-Spin using power augmentation will be randomly distributed in Real-Time among the groups created in the Day-Ahead for the purpose of manual deployment of Non-Spin by operator Dispatch Instruction.  (b) Any Generation Resource providing Off-Line Non-Spin that did not previously receive group assignment will be automatically considered in Group 1. Any Load Resource that is not a Controllable Load Resource providing Non-Spin in Real-Time that did not previously receive group assignment will be automatically considered in Group 1. ERCOT may assign a Generation Resource providing Off-Line Non-Spin or a Load Resource that is not a Controllable Load Resource to another group if that Resource did not previously receive group assignment and, in ERCOT’s reasonable judgment, Group 1 is too large.  (8) ERCOT’s Non-Spin deployment Dispatch Instructions must include:  (a) The Resource name;  (b) A MW level of capacity deployment for Generation Resources with Energy Offer Curve and a MW level of energy for Generation Resources with Output Schedules and a Dispatch Instruction for Load Resources, excluding Controllable Load Resources, at a minimum equal to their awarded Non-Spin Ancillary Service amount; and  (c) The anticipated duration of deployment.  (9) ERCOT shall provide a signal via ICCP to the QSE of a deployed Generation or Load Resource indicating that its Non-Spin capacity has been deployed.  (10) ERCOT shall, as part of its TAC-approved Non-Spin deployment procedure, provide for the recall of Non-Spin from On-Line Resources that were previously Off-Line Resources providing Non-Spin capacity and from On-Line Resources providing Non-Spin through power augmentation.  (11) ERCOT shall provide a notification to all QSEs via the ERCOT website when any Non-Spin capacity is deployed on the ERCOT System showing the time, MW quantity and the anticipated duration of the deployment. |

6.5.7.6.2.4 Deployment and Recall of ERCOT Contingency Reserve Service

(1) ECRS is intended to:

(a) Help restore the frequency to 60 Hz within ten minutes of a significant frequency deviation;

(b) Provide energy to avoid, or during the implementation of, an EEA;

(c) Provide backup to Reg-Up; and

(d) Provide energy upon detection of insufficient available capacity for net load ramps.

(2) ERCOT shall deploy ECRS to meet NERC Standards and other performance criteria as specified in these Protocols and the Operating Guides by taking one or more of the following actions:

(a) Automatic Dispatch Instruction signal to release ECRS capacity from Generation Resources and Controllable Load Resources to SCED; and/or

(b) Dispatch Instruction for deployment of energy from Load Resources via electronic Messaging System.

(3) ERCOT shall release ECRS from Generation Resources and Controllable Load Resources to SCED when frequency drops below 59.91 Hz and available Reg-Up is not sufficient to restore frequency. Upon deployment of Off-Line ECRS from a QSGR providing ECRS, the Resource’s Ancillary Service Schedule for ECRS must be adjusted for the ERCOT instructed ECRS deployment and the Resource’s status must be set to OFFQS to be available for dispatch by SCED. Once recalled QSGRs providing ECRS must follow the decommitment process outlined in Section 3.8.3.1, Quick Start Generation Resource Decommitment Decision Process.

(4) Energy from Resources providing ECRS may also be manually deployed by ERCOT pursuant to Section 6.5.9, Emergency Operations.

(5) ERCOT shall use SCED and Non-Spin as soon as practicable to recover ECRS reserves.

(6) Following an ECRS deployment to SCED-dispatchable Resources, the QSE’s obligation to deliver ECRS remains in effect until ERCOT issues a recall instruction or its ECRS obligation expires, whichever occurs first. Following an ECRS deployment to Load Resources, excluding Controllable Load Resources, or Resources operating in synchronous condenser fast-response mode, the QSE’s obligation to deliver ECRS remains in effect until ERCOT issues a recall instruction.

(7) Following a deployment or recall Dispatch Instruction of ECRS, a QSE shall adjust the telemetered ECRS Ancillary Service Schedule for the Resource providing the service and ERCOT shall adjust the HASL based on the QSE’s telemetered Ancillary Service Schedule for ECRS, as described in Section 6.5.7.2, Resource Limit Calculator, to account for such deployment.

(8) For Generation Resources and Controllable Load Resources providing ECRS, Base Points include ECRS energy as well as any other energy dispatched by SCED. A Resource must be able to be fully dispatched by SCED to its ECRS Ancillary Service Resource Responsibility within the ten-minute time frame according to its telemetered Emergency Ramp Rate.

(9) Each QSE providing ECRS shall meet the deployment performance requirements specified in Section 8.1.1.4.2, Responsive Reserve Energy Deployment Criteria.

(10) ERCOT shall issue instructions to release ECRS capacity provided from Generation Resources and Controllable Load Resources to SCED over ICCP and shall issue deployment instructions for Load Resources providing ECRS via XML. Such instructions shall contain the MW requested.

(11) To the extent that ERCOT deploys a Load Resource that is not a Controllable Load Resource and that has chosen a block deployment option, ERCOT shall either deploy the entire Ancillary Service Resource Responsibility or, if only partial deployment is possible, skip the Load Resource with the block deployment option and proceed to deploy the next available Resource.

(12) ERCOT shall recall automatically deployed ECRS capacity once system frequency recovers above 59.97 Hz.

(13) ERCOT shall recall ECRS deployment provided from a Load Resource that is not a Controllable Load Resource once PRC is above a pre-defined threshold, as described in the Operating Guides.

|  |
| --- |
| [NPRR1010: Replace Section 6.5.7.6.2.4 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  **6.5.7.6.2.4Deployment and Recall of ERCOT Contingency Reserve Service**  (1) ECRS is intended to:  (a) Help restore the frequency to 60 Hz within ten minutes of a significant frequency deviation;  (b) Provide energy to avoid, or during the implementation of, an EEA;  (c) Provide backup to Reg-Up; and  (d) Provide energy upon detection of insufficient available capacity for net load ramps.  (2) ERCOT shall deploy ECRS to meet NERC Standards and other performance criteria as specified in these Protocols and the Operating Guides by taking one or more of the following actions:  (a) ERCOT shall issue ECRS deployment Dispatch Instructions, specifying the required MW output, over ICCP for Resources awarded ECRS with a Resource Status of ONSC.  (b) Dispatch Instruction for deployment of energy from Load Resources via electronic Messaging System.  (3) Energy from Resources providing ECRS may also be manually deployed by ERCOT pursuant to Section 6.5.9, Emergency Operations.  (4) ERCOT shall use SCED and Non-Spin as soon as practicable to recover ECRS reserves.  (5) Following a manual ECRS deployment to Load Resources, excluding Controllable Load Resources, or Resources telemetering a Resource Status of ONSC, the QSE’s obligation to deliver ECRS remains in effect until ERCOT issues a recall instruction.  (6) For Generation Resources and Controllable Load Resources providing ECRS, Base Points include ECRS energy as well as any other energy dispatched by SCED. A Resource must be able to be fully dispatched by SCED to its ECRS Ancillary Service award within the ten-minute time frame according to its telemetered ramp rate that reflects the Resource’s capability of providing ECRS.  (7) Each Resource providing ECRS shall meet the deployment performance requirements specified in Section 8.1.1.4.2, Responsive Reserve Energy Deployment Criteria.  (8) ERCOT shall issue deployment instructions for Load Resources providing ECRS via XML. Such instructions shall contain the MW requested.  (9) To the extent that ERCOT deploys a Load Resource that is not a Controllable Load Resource and that has chosen a block deployment option, ERCOT shall either deploy the entire Ancillary Service award or, if only partial deployment is possible, skip the Load Resource with the block deployment option and proceed to deploy the next available Resource.  (10) ERCOT shall recall deployed ECRS capacity provided from Resource telemetering Resource Status of ONSC once system frequency recovers above 59.98 Hz.  (11) ERCOT shall recall ECRS deployment provided from a Load Resource that is not a Controllable Load Resource once PRC is above a pre-defined threshold, as described in the Operating Guides. |

6.5.7.7 Voltage Support Service

(1) ERCOT shall coordinate with TSPs the creation and maintenance of Voltage Profiles as described in Section 3.15, Voltage Support.

(2) ERCOT shall instruct the interconnecting TSP, or the TSP’s agent, to make Voltage Set Point adjustments, as necessary, within the Generation Resource’s Unit Reactive Limit (URL) provided to ERCOT. The interconnecting TSP, or the TSP’s agent, shall instruct any QSE or Resource Entity representing a Generation Resource to make the Voltage Set Point adjustments instructed by ERCOT, or as the TSP determines to be necessary. If ERCOT determines that a Generation Resource should be instructed to provide additional MVAr beyond its URL or that a Generation Resource’s real power output should be decreased to allow the Generation Resource to provide additional Reactive Power beyond the URL, ERCOT shall issue a Resource-specific Dispatch Instruction requiring any change in Reactive Power and/or real power output, except that ERCOT may not require a Generation Resource to exceed its excitation limits.

|  |
| --- |
| [NPRR989: Replace paragraph (2) above with the following upon system implementation:]  (2) ERCOT shall instruct the interconnecting TSP, or the TSP’s agent, to make Voltage Set Point adjustments, as necessary, within the Generation Resource’s or ESR’s Corrected Unit Reactive Limit (CURL) provided to ERCOT. The interconnecting TSP, or the TSP’s agent, shall instruct any QSE or Resource Entity representing a Generation Resource or ESR to make the Voltage Set Point adjustments instructed by ERCOT, or as the TSP determines to be necessary. If ERCOT determines that a Generation Resource or ESR should be instructed to provide additional MVAr beyond its URL or that a Generation Resource’s or ESR’s real power output should be decreased to allow the Generation Resource or ESR to provide additional Reactive Power beyond the URL, ERCOT shall issue a Resource-specific Dispatch Instruction requiring any change in Reactive Power and/or real power output, except that ERCOT may not require a Generation Resource or ESR to exceed its operational limits. |

(3) ERCOT and TSPs shall develop procedures for the operation of transmission-controlled reactive Resources in order to minimize the dependence on generation-supplied reactive Resources. For Generation Resources required to provide Voltage Support Service (VSS), GSU transformer tap settings must be managed to maximize the use of the ERCOT System for all Market Participants while maintaining adequate reliability.

|  |
| --- |
| [NPRR989: Replace paragraph (3) above with the following upon system implementation:]  (3) ERCOT and TSPs shall develop procedures for the operation of transmission-controlled reactive equipment in order to minimize the dependence on Reactive Power supplied by Generation Resources and ESRs. For Generation Resources and ESRs required to provide Voltage Support Service (VSS), GSU transformer tap settings must be managed to maximize the use of the ERCOT System for all Market Participants while maintaining adequate reliability. |

(4) Each TSP, under ERCOT’s direction, is responsible for monitoring and ensuring that all Generation Resources required to provide VSS have their dynamic reactive capability deployed in approximate proportion to their respective capability requirements.

|  |
| --- |
| [NPRR989: Replace paragraph (4) above with the following upon system implementation:]  (4) Each TSP, under ERCOT’s direction, is responsible for monitoring and ensuring that all Generation Resources and ESRs required to provide VSS have their dynamic reactive capability deployed in approximate proportion to their respective capability requirements. |

(5) Each Generation Resource required to provide VSS shall follow its Voltage Set Point as directed by ERCOT, the interconnecting TSP, or the TSP’s agent, within the operating Reactive Power capability of the Generation Resource.

|  |
| --- |
| [NPRR989: Replace paragraph (5) above with the following upon system implementation:]  (5) Each Generation Resource and ESR required to provide VSS shall follow its Voltage Set Point as directed by ERCOT, the interconnecting TSP, or the TSP’s agent, within the operating Reactive Power capability of the Generation Resource or ESR. |

(6) Each interconnecting TSP, or the TSP’s agent, shall telemeter via ICCP the Real-Time Voltage Set Point to ERCOT at the Point of Interconnection Bus (POIB) for each Generation Resource interconnected to the TSP’s system required to provide VSS. Each interconnecting TSP, or the TSP’s agent shall modify the telemetered Voltage Set Point to match any verbal Voltage Set Point instructions as soon as practicable. ERCOT shall telemeter the Real-Time desired Voltage Set Point and the TSP-designated POIB kV measurement via ICCP to each QSE representing a Generation Resource. Each QSE representing a Generation Resource shall provide in Real-Time the desired Voltage Set Point and the associated POIB kV measurement provided by ERCOT to the Resource Entity for that Generation Resource.

|  |
| --- |
| [NPRR989: Replace paragraph (6) above with the following upon system implementation:]  (6) Each interconnecting TSP, or the TSP’s agent, shall telemeter via ICCP the Real-Time Voltage Set Point to ERCOT at the Point of Interconnection Bus (POIB) for each Generation Resource and ESRs interconnected to the TSP’s system required to provide VSS. Each interconnecting TSP, or the TSP’s agent shall modify the telemetered Voltage Set Point to match any verbal Voltage Set Point instructions as soon as practicable. ERCOT shall telemeter the Real-Time desired Voltage Set Point and the TSP-designated POIB kV measurement via ICCP to each QSE representing a Generation Resource or an ESR. Each QSE representing a Generation Resource or an ESR shall provide in Real-Time the desired Voltage Set Point and the associated POIB kV measurement provided by ERCOT to the Resource Entity for that Generation Resource or ESR. |

6.5.7.8 Dispatch Procedures

(1) ERCOT shall issue all Resource Dispatch Instructions to the QSE that represents the affected Resource. ERCOT and QSEs are responsible for complying with Dispatch Instructions as prescribed in the Nodal Operating Guides. A QSE may provide a Resource Status of ONTEST for a Generation Resource not providing Ancillary Services to indicate that the Resource is currently undergoing unit testing and is blocked from SCED Dispatch. A QSE may provide a Resource Status of STARTUP for a Generation Resource not providing Ancillary Services to indicate that the Resource is currently undergoing a start-up sequence which requires manual control below or above its telemetered LSL to stabilize the Resource prior to its availability for SCED Dispatch. Generation Resources with a Resource Status of ONTEST will be provided a Base Point equal to the net real power telemetry at the time of the SCED execution. ERCOT may not issue Dispatch Instructions to the QSE for Generation Resources with a Resource Status of ONTEST except:

(a) For Dispatch Instructions that are a part of testing; or

(b) During conditions when the Resource is the only alternative for solving a transmission constraint; or

(c) During Force Majeure Events that threaten the reliability of the ERCOT System.

(2) Each QSE shall immediately forward any valid Dispatch Instruction to the appropriate Resource or group of Resources or identify a reason for non-compliance with the Dispatch Instruction to ERCOT in accordance with Section 6.5.7.9, Compliance with Dispatch Instructions.

(3) If ERCOT believes that a Resource has inadequately responded to a Dispatch Instruction, ERCOT shall notify the QSE representing the Resource as soon as practicable.

(4) ERCOT shall record all voice conversations that occur in the communication of Verbal Dispatch Instructions (VDIs).

(5) By mutual agreement of the TSP and ERCOT, Dispatch Instructions to the TSP may be provided to the TSP’s TO. In that case, issuance of the Dispatch Instruction to the TO is considered issuance to the TSP, and the TSP must comply with the Dispatch Instruction exactly as if it had been issued directly to the TSP, whether or not the TO accurately conveys the Dispatch Instruction to the TSP.

|  |
| --- |
| [NPRR857: Replace paragraph (5) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  (5) By mutual agreement of the TSP, DCTO, and ERCOT, Dispatch Instructions to the TSP or DCTO may be provided to the TSP’s or DCTO’s Transmission Operator (TO). In that case, issuance of the Dispatch Instruction to the TO is considered issuance to the TSP or DCTO, and the TSP or DCTO must comply with the Dispatch Instruction exactly as if it had been issued directly to the TSP or DCTO, whether or not the TO accurately conveys the Dispatch Instruction to the TSP or DCTO. |

(6) ERCOT shall direct VDIs to the Master QSE of a Generation Resource that has been split to function as two or more Split Generation Resources as deemed necessary by ERCOT to effectuate actions for the total Generation Resource for instances in which electronic instructions are not feasible.

6.5.7.9 Compliance with Dispatch Instructions

(1) Except as otherwise specified in this Section, each TSP and each QSE shall comply fully and promptly with a Dispatch Instruction issued to it, unless in the sole and reasonable judgment of the TSP or QSE, such compliance would create an undue threat to safety, undue risk of bodily harm or undue damage to equipment, or the Dispatch Instruction is otherwise not in compliance with these Protocols.

|  |
| --- |
| [NPRR857: Replace paragraph (1) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  (1) Except as otherwise specified in this Section, each TSP, DCTO, and QSE shall comply fully and promptly with a Dispatch Instruction issued to it, unless in the sole and reasonable judgment of the TSP, DCTO, or QSE, such compliance would create an undue threat to safety, undue risk of bodily harm or undue damage to equipment, or the Dispatch Instruction is otherwise not in compliance with these Protocols. |

(2) If the recipient of a Dispatch Instruction does not comply because in the sole and reasonable judgment of the TSP or QSE, such compliance would create an undue threat to safety, undue risk of bodily harm, or undue damage to equipment, then the TSP or QSE must immediately notify ERCOT and provide the reason for non-compliance.

|  |
| --- |
| [NPRR857: Replace paragraph (2) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  (2) If the recipient of a Dispatch Instruction does not comply because in the sole and reasonable judgment of the TSP, DCTO, or QSE, such compliance would create an undue threat to safety, undue risk of bodily harm, or undue damage to equipment, then the TSP, DCTO, or QSE must immediately notify ERCOT and provide the reason for non-compliance. |

(3) If the recipient of a Dispatch Instruction recognizes that the Dispatch Instruction conflicts with other valid instructions or is invalid, the recipient shall immediately notify ERCOT of the conflict and request resolution. ERCOT shall resolve the conflict by issuing another Dispatch Instruction.

(4) ERCOT’s final Dispatch Instruction to a QSE in effect applies for all Protocol-related processes. If the QSE does not comply after receiving the final Dispatch Instruction, the QSE remains liable for failure to meet its obligations under the Protocols and remains liable for any charges resulting from such failure.

(5) ERCOT’s final Dispatch Instruction to a TSP in effect applies for all Protocol-related processes. If the TSP does not comply after receiving the final Dispatch Instruction, the TSP remains liable for such failure under these Protocols under the TSP’s Agreement with ERCOT.

|  |
| --- |
| [NPRR857: Replace paragraph (5) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  (5) ERCOT’s final Dispatch Instruction to a TSP or DCTO in effect applies for all Protocol-related processes. If the TSP or DCTO does not comply after receiving the final Dispatch Instruction, the TSP or DCTO remains liable for such failure under these Protocols under the TSP’s or DCTO’s Agreement with ERCOT. |

(6) In all cases in which compliance with a Dispatch Instruction is disputed, both ERCOT and the QSE or TSP shall document their communications, agreements, disagreements, and reasons for their actions, to enable resolution of the dispute through the Alternative Dispute Resolution (ADR) process in Section 20, Alternative Dispute Resolution Procedure.

|  |
| --- |
| [NPRR857: Replace paragraph (6) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  (6) In all cases in which compliance with a Dispatch Instruction is disputed, both ERCOT and the QSE, TSP, or DCTO shall document their communications, agreements, disagreements, and reasons for their actions, to enable resolution of the dispute through the Alternative Dispute Resolution (ADR) process in Section 20, Alternative Dispute Resolution Procedure. |

(7) An Intermittent Renewable Resource (IRR) must comply with Dispatch Instructions when receiving a flag signifying that the IRR has received a Base Point below the HDL used by SCED.

|  |
| --- |
| [NPRR1111: Replace paragraph (7) above with the following upon system implementation of SCR819:]  (7) An Intermittent Renewable Resource (IRR) must comply with Dispatch Instructions when receiving a flag signifying that the IRR has received a Base Point below the HDL used by SCED or the IRR has been instructed not to exceed its Base Point. |

6.5.7.10 IRR Ramp Rate Limitations

(1) Each IRR that is part of a Standard Generation Interconnection Agreement (SGIA) signed on or after January 1, 2009 shall limit its ramp rate to 20% per minute of its nameplate rating (MWs) as registered with ERCOT when responding to or released from an ERCOT deployment.

(2) The requirement of paragraph (1) above does not apply during a Force Majeure Event or during intervals in which a decremental deployment instruction coincides with a demonstrated decrease in the available IRR.

(3) Each IRR that is part of an SGIA signed on or before December 31, 2008 and that controls power output by means other than turbine stoppage shall limit its ramp rate to 20% per minute of its nameplate rating (MWs) as registered with ERCOT when responding to or released from an ERCOT deployment.

(4) The requirement of paragraph (3) above does not apply during a Force Majeure Event, during intervals in which a decremental deployment instruction coincides with a demonstrated decrease in the available IRR, or during unit start up and shut down mode.

(5) The ramp rate requirement of paragraph (3) above shall not apply to an IRR during a limited compliance transition period if the IRR:

(a) Meets the technical specifications of paragraph (3) above but does not comply with the ramp rate requirement; and

(b) Submitted a compliance plan to ERCOT on or before June 1, 2009 that details the technical limitations leading to non-compliance, a work plan to achieve compliance by a reasonable date, and a ramp rate mitigation plan describing the IRR’s best efforts to adhere to the IRR ramp rate limitation during the applicable compliance transition period.

(6) The ramp rate requirement of paragraph (3) above shall not apply to an IRR that:

(a) Does not meet the technical specifications of paragraph (3) above; and

(b) Submitted an operations plan to ERCOT on or before June 1, 2009 describing the IRR’s best efforts to adhere to the IRR ramp rate limitation.

(7) IRRs subject to the ramp rate limitations of paragraphs (1) and (3) above are exempt from the requirements of the applicable paragraph upon receipt of a valid Dispatch Instruction from ERCOT to exceed the applicable ramp rate limitation when necessary to protect ERCOT System reliability.

(8) IRRs that operate under a RAS are exempt from the ramp rate limitations of paragraphs (1) and (3) above when decreasing unit output to avoid RAS activation.

(9) IRRs that meet the requirements of paragraphs (1) and (3) above are compliant with the ramp rate limitation requirements when the number of eligible one-minute intervals with an average ramp rate of 25% or less of nameplate capacity is equal to or greater than 90% of the eligible one-minute intervals in any one of three consecutive months. Intervals where paragraphs (2), (4), (7) or (8) above apply shall be excluded as eligible intervals for this performance metric. ERCOT shall initiate a review process with the IRR where the IRR’s score is less than 90%.

|  |
| --- |
| [NPRR1029: Insert Section 6.5.7.11 below upon system implementation:]  **6.5.7.11 DC-Coupled Resource Ramp Rate Limitations**  (1) A DC-Coupled Resource that does not meet any of the conditions in paragraph (1) of Section 3.8.7, DC-Coupled Resources, shall adhere to the ramp rate restrictions established in Section 6.5.7.10, IRR Ramp Rate Limitations. |

6.5.8 Verbal Dispatch Instruction Confirmation

(1) Following the issuance of a VDI by ERCOT to a QSE for a Generation Resource, ERCOT will provide the QSE with an electronic confirmation of the VDI for Settlement purposes.

(2) A VDI confirmation shall contain the following information:

(a) Operating Day and time ERCOT issued the VDI;

(b) Identification of the QSE for the Resource(s) subject to the VDI, and instructing authority (including the names of the ERCOT Operator and individual that received the VDI);

(c) Identification of the specific Resource(s) subject to the VDI;

(d) Specific actions required of the Resource(s);

(e) Beginning operating level or state of the Resource(s);

(f) Instructed operating level or state of the Resource(s);

(g) Time at which the Resource(s) was required to initiate actions;

(h) Time by which the Resource(s) was required to complete actions; and

(i) Other information relevant to that Dispatch Instruction.

(3) Following receipt by the QSE of the VDI confirmation issued by ERCOT, the QSE shall provide ERCOT with electronic acknowledgement of the VDI confirmation.

6.5.9 Emergency Operations

(1) ERCOT, based on ERCOT System reliability needs, may issue a Dispatch Instruction requiring a Resource to move to a specific output level (“Emergency Base Point”).

(2) A QF may only be ordered Off-Line in the case of an ERCOT-declared Emergency Condition with imminent threat to the reliability of the ERCOT System. ERCOT may only Dispatch a QF below its LSL when ERCOT has declared an Emergency Condition and the QF is the only Resource that can provide the necessary relief.

(3) ERCOT shall honor all Resource operating parameters in Dispatch Instructions under normal conditions and Emergency Conditions. During Emergency Conditions, ERCOT may verbally request QSEs to operate its Resources outside normal operating parameters. If such request is received by a QSE, the QSE shall discuss the request with ERCOT in good faith and may choose to comply with the request.

(4) A QSE may not self-arrange for Ancillary Services procured in response to Emergency Conditions.

6.5.9.1 Emergency and Short Supply Operation

(1) ERCOT is responsible for maintaining reliability in normal and Emergency Conditions. The Operating Guides are intended to ensure that minimum standards for reliability are maintained. Minimum standards for reliability are defined by the Operating Guides and the NERC Reliability Standards and include, but are not limited to:

(a) Minimum operating reserve levels;

(b) Criteria for determining acceptable operation of the frequency control system;

(c) Criteria for determining and maintaining system voltages within acceptable limits;

(d) Criteria for maximum acceptable transmission equipment loading levels; and

(e) Criteria for determining when ERCOT is subject to unacceptable risk of widespread cascading Outages.

(2) ERCOT shall, to the fullest extent practicable, utilize the Day-Ahead process, the Adjustment Period process, and the Real-Time process before ordering Resources to specific output levels with Emergency Base Point instructions. It is anticipated that, with effective and timely communication, the market-based tools available to ERCOT will avert most threats to the reliability of the ERCOT System. However, these Protocols do not preclude ERCOT from taking any action to preserve the integrity of the ERCOT System.

6.5.9.2 Failure of the SCED Process

(1) When the SCED process is not able to reach a solution, ERCOT shall issue a Watch.

(2) For intervals that the SCED process fails to reach a solution, then the LMPs, Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reserve Price Adders and Real-Time Off-Line Reserve Price Adders for the interval for which no solution was reached are equal to the LMPs, Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reserve Price Adders and Real-Time Off-Line Reserve Price Adders in the most recently solved interval. For Settlement Intervals that the Real-Time Settlement Point Prices are identified as erroneous and ERCOT sets the SCED intervals as failed in accordance with Section 6.3, Adjustment Period and Real-Time Operations Timeline, then the LMPs, Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reserve Price Adders and Real-Time Off-Line Reserve Price Adders for the failed SCED intervals are equal to the LMPs, Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reserve Price Adders and Real-Time Off-Line Reserve Price Adders in the most recently solved SCED interval that is not set as failed. ERCOT shall notify the market of the failure by posting on the ERCOT website. For intervals covering the first 15 minutes of SCED process execution following a failure, ERCOT shall set the LMPs, Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reserve Price Adders and Real-Time Off-Line Reserve Price Adders equal to the LMPs, Real-Time On-Line Reserve Price Adders and Real-Time Off-Line Reserve Price Adders in the most recently solved SCED interval prior to the SCED process failure. ERCOT shall notify the market of this price correction by posting on the ERCOT website.

|  |
| --- |
| [NPRR1010: Replace paragraph (2) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (2) For intervals that the SCED process fails to reach a solution, then the LMPs, Real-Time MCPCs, Real-Time Reliability Deployment Price Adders for Energy, and Real-Time Reliability Deployment Price Adders for Ancillary Service for the interval for which no solution was reached are equal to the LMPs, Real-Time MCPCs, Real-Time Reliability Deployment Price Adders for Energy, and Real-Time Reliability Deployment Price Adders for Ancillary Service in the most recently solved interval. For Settlement Intervals that the Real-Time Settlement Point Prices are identified as erroneous, and ERCOT sets the SCED intervals as failed in accordance with Section 6.3, Adjustment Period and Real-Time Operations Timeline, then the LMPs, Real-Time MCPCs, Real-Time Reliability Deployment Price Adders for Energy, and Real-Time Reliability Deployment Price Adders for Ancillary Service, for the failed SCED intervals are equal to the LMPs, Real-Time MCPCs, Real-Time Reliability Deployment Price Adders for Energy, and Real-Time Reliability Deployment Price Adders for Ancillary Service, in the most recently solved SCED interval that is not set as failed. ERCOT shall notify the market of the failure by posting on the ERCOT website. For intervals covering the first 15 minutes of SCED process execution following a failure, ERCOT shall set the LMPs, Real-Time MCPCs, Real-Time Reliability Deployment Price Adders for Energy, and Real-Time Reliability Deployment Price Adders for Ancillary Service, equal to the LMPs, Real-Time MCPCs, Real-Time Reliability Deployment Price Adders for Energy, and Real-Time Reliability Deployment Price Adders for Ancillary Service, in the most recently solved SCED interval prior to the SCED process failure. ERCOT shall notify the market of this price correction by posting on the ERCOT website. |

(3) In the event that a Market Suspension is declared in accordance with Section 25, Market Suspension and Restart, upon the effective date and time of the Market Suspension, the Market Suspension Settlement methodology set forth in Section 25.5, Market Suspension and Market Restart Settlement, will supersede the provisions set forth in paragraph (2) above.

(4) Once ERCOT issues a Watch for a SCED process failure, ERCOT may use any of the following measures:

(a) ERCOT may direct the SCED process to relax the active transmission constraints and/or the HASLs and LASLs for specific Resources and resume calculation of LMPs, Real-Time On-Line Reliability Deployment Price Adders, Real-Time On-Line Reserve Price Adders and Real-Time Off-Line Reserve Price Adders by reducing the Ancillary Service Schedules for the affected Resource, if sufficient supply exists to manage total system needs;

|  |
| --- |
| [NPRR1010: Replace paragraph (a) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (a) ERCOT may direct the SCED process to relax the active transmission constraints; |

(b) ERCOT may issue Emergency Base Points for Resources;

(c) ERCOT may manually issue Emergency Base Points for a Resource and must communicate the Resource name, MW output requested, and start time and duration of the Dispatch Instruction to the QSE representing the Resource;

(d) ERCOT may issue an instruction to hold the previous interval; and

(e) A QF, a hydro Generation Resource, or a nuclear-powered Resource may be instructed by ERCOT to operate below its LSL only after all other Resource options have been exhausted.

(5) The Watch continues until the SCED process can reach a solution without using the measures in paragraph (4) above.

6.5.9.3 Communication Prior to and During Emergency Conditions

(1) Effective, accurate, and timely communication between ERCOT, TSPs, and QSEs is essential. Each QSE must be provided adequate information to make informed decisions and must receive the information with sufficient advance notice to facilitate Resource and Load responses.

|  |
| --- |
| [NPRR857: Replace paragraph (1) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  (1) Effective, accurate, and timely communication between ERCOT, TSPs, DCTOs, and QSEs is essential. Each QSE must be provided adequate information to make informed decisions and must receive the information with sufficient advance notice to facilitate Resource and Load responses. |

(2) The type of communication ERCOT issues is determined primarily on the basis of the time available for the market to respond before an Emergency Condition occurs. The timing of these communications could range from days in advance to immediate. If there is insufficient time to allow the market to react, ERCOT may bypass one or more of the communication steps.

(3) ERCOT shall consider the severity of the potential Emergency Condition as it determines which of the communications to use as set forth in the following subsections. The severity of the Emergency Condition could be limited to an isolated local area, or the condition might cover large areas affecting several entities, or the condition might be an ERCOT-wide condition potentially affecting the entire ERCOT System.

(4) The following Sections describe the types of communications that will be issued by ERCOT to inform all QSEs and TSPs of the operating situation. These communications may relate to transmission, distribution, or Generation or Load Resources. The communications must specify the severity of the situation, the area affected, the areas potentially affected, and the anticipated duration of the Emergency Condition.

|  |
| --- |
| [NPRR857: Replace paragraph (4) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  (4) The following Sections describe the types of communications that will be issued by ERCOT to inform all QSEs, TSPs, and DCTOs of the operating situation. These communications may relate to transmission, distribution, or Generation or Load Resources. The communications must specify the severity of the situation, the area affected, the areas potentially affected, and the anticipated duration of the Emergency Condition. |

6.5.9.3.1 Operating Condition Notice

(1) ERCOT will issue an Operating Condition Notice (OCN) to inform Market Participants of a possible future need for more Resources due to conditions that could affect ERCOT System reliability. OCNs are for informational purposes only, and ERCOT exercises no additional operational authority with the issuance of this type of notice, but may solicit additional information from QSEs in order to determine whether the issuance of an Advisory, Watch, or Emergency Notice is warranted. The OCN is the first of three levels of communication issued by ERCOT in anticipation of a possible Emergency Condition.

(2) When time permits, ERCOT will issue an OCN before issuing an Advisory, Watch, or Emergency Notice. However, issuance of an OCN may not require action on the part of any Market Participant, but rather serves as a notice to Market Participants that some attention to the changing conditions may be warranted. OCNs serve to communicate to QSEs the need to take extra precautions to be prepared to serve the Load during times when contingencies are most likely to arise.

|  |
| --- |
| [NPRR857: Replace paragraph (2) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  (2) When time permits, ERCOT will issue an OCN before issuing an Advisory, Watch, or Emergency Notice. However, issuance of an OCN may not require action on the part of any Market Participant, but rather serves as notice to Market Participants that some attention to the changing conditions may be warranted. OCNs serve to communicate to QSEs the need to take extra precautions to be prepared to serve the Load during times when contingencies are most likely to arise. |

(3) Reasons for OCNs include, but are not limited to, unplanned transmission Outages, insufficient Resources to meet forecasted conditions, and weather-related concerns such as anticipated freezing temperatures, hurricanes, wet weather, and ice storms.

(4) ERCOT will monitor actual and forecasted weather for the ERCOT Region and adjacent NERC regions. When adverse weather conditions are expected, ERCOT may confer with TSPs and QSEs regarding the potential for adverse reliability impacts and contingency preparedness. Based on its assessment of the potential for adverse conditions, ERCOT may require information from QSEs representing Resources regarding the Resources’ fuel capabilities. Requests for this type of information shall be for a time period of no more than seven days from the date of the request. The specific information that may be requested shall be defined in the Operating Guides. QSEs representing Resources shall provide the requested information in a timely manner, as defined by ERCOT at the time of the request.

|  |
| --- |
| [NPRR857: Replace paragraph (4) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  (4) ERCOT will monitor actual and forecasted weather for the ERCOT Region and adjacent NERC regions. When adverse weather conditions are expected, ERCOT may confer with TSPs, DCTOs, and QSEs regarding the potential for adverse reliability impacts and contingency preparedness. Based on its assessment of the potential for adverse conditions, ERCOT may require information from QSEs representing Resources regarding the Resources’ fuel capabilities. Requests for this type of information shall be for a time period of no more than seven days from the date of the request. The specific information that may be requested shall be defined in the Operating Guides. QSEs representing Resources shall provide the requested information in a timely manner, as defined by ERCOT at the time of the request. |

(5) QSEs and TSPs are expected to establish and maintain internal procedures for monitoring actual and forecasted weather and for implementing appropriate measures when the potential for adverse weather or other conditions (which could threaten ERCOT System reliability) arise.

|  |
| --- |
| [NPRR857: Replace paragraph (5) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  (5) QSEs, TSPs, and DCTOs are expected to establish and maintain internal procedures for monitoring actual and forecasted weather and for implementing appropriate measures when the potential for adverse weather or other conditions (which could threaten ERCOT System reliability) arise. |

6.5.9.3.1.1 Advance Action Notice

(1) ERCOT may issue an AAN in anticipation of a possible Emergency Condition. Any AAN will identify actions ERCOT expects to take to address the possible Emergency Condition unless the need for ERCOT action is alleviated by QSE and/or TSP actions taken, or by other system developments that occur, before a time stated in the AAN.

(2) An AAN may not require action on the part of any Market Participant but may include additional information so that Market Participants can modify their plans in such a way that mitigates the need for ERCOT to take additional actions.

(3) An AAN will be canceled if ERCOT determines that the possible Emergency Condition has been alleviated by QSE or TSP action, by ERCOT action, or by other system developments.

6.5.9.3.2 Advisory

(1) An Advisory is the second of three levels of communication issued by ERCOT in anticipation of a possible Emergency Condition.

(2) ERCOT shall issue an Advisory for reasons such as, but not limited to, the following:

(a) When it recognizes that conditions are developing or have changed and more Ancillary Services will be needed to maintain current or near-term operating reliability;

(b) When weather or ERCOT System conditions require more lead-time than the normal DAM allows;

(c) When communications or other controls are significantly limited; or

(d) When ERCOT Transmission Grid conditions are such that operations within security criteria as defined in the Operating Guides are not likely or possible because of Forced Outages or other conditions unless a Constraint Management Plan (CMP) exists.

(3) The Advisory must communicate existing constraints. ERCOT shall notify TSPs and QSEs of the Advisory, and QSEs shall notify appropriate Resources and Load Serving Entities (LSEs). ERCOT shall communicate with TSPs as needed to confirm their understanding of the condition and to determine the availability of Transmission Facilities. For the purposes of verifying submitted information, ERCOT may communicate with QSEs.

|  |
| --- |
| [NPRR857: Replace paragraph (3) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  (3) The Advisory must communicate existing constraints. ERCOT shall notify TSPs, DCTOs, and QSEs of the Advisory, and QSEs shall notify appropriate Resources and Load Serving Entities (LSEs). ERCOT shall communicate with TSPs and DCTOs as needed to confirm their understanding of the condition and to determine the availability of Transmission Facilities. For the purposes of verifying submitted information, ERCOT may communicate with QSEs. |

(4) Although an Advisory is for information purposes, ERCOT may exercise its authority, in such circumstances, to increase Ancillary Service requirements above the quantities originally specified in the Day-Ahead in accordance with procedures. ERCOT may require information from QSEs representing Resources regarding the Resources’ fuel capabilities. Requests for this type of information shall be for a time period of no more than seven days from the date of the request. The specific information that may be requested shall be defined in the Operating Guide. QSEs representing Resources shall provide the requested information in a timely manner, as defined by ERCOT at the time of the request.

(5) When an Advisory is issued for PRC below 3,000 MW and ERCOT expects system conditions to deteriorate to the extent that an EEA Level 2 or 3 may be experienced, ERCOT shall evaluate constraints active in SCED and determine which constraints have the potential to limit generation output.

(a) Upon identification of such constraints, ERCOT shall coordinate with the TSPs that own or operate the overloaded Transmission Facilities associated with those constraints, as well as the Resource Entities whose generation output may be limited, to determine whether:

|  |
| --- |
| [NPRR857: Replace paragraph (a) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  (a) Upon identification of such constraints, ERCOT shall coordinate with the TSPs and DCTOs that own or operate the overloaded Transmission Facilities associated with those constraints, as well as the Resource Entities whose generation output may be limited, to determine whether: |

(i) A 15-Minute Rating is available to allow for additional transmission capacity for use in congestion management, if an EEA Level 2 or 3 is declared, and post-contingency actions can be taken within 15 minutes to return the flow to within the Emergency Rating. Such actions may include, but are not limited to, reducing the generation that increased output as a result of enforcing the 15-Minute Rating rather than the Emergency Rating;

(ii) Post-contingency loading of the Transmission Facilities is expected to be at or below Normal Rating within two hours; or

(iii) Additional transmission capacity could allow for additional output from a limited Generation Resource by taking one of the following actions:

(A) Restoring Transmission Elements that are out of service;

(B) Reconfiguring the transmission system; or

(C) Making adjustments to phase angle regulator tap positions.

If ERCOT determines that one of the above-mentioned actions allows for additional output from a limited Generation Resource, ERCOT may instruct the TSPs to take the action(s) during the Advisory to allow for additional output from the limited Generation Resource.

(b) ERCOT shall also coordinate with TSPs who own and operate the Transmission Facilities associated with the double-circuit contingencies for the constraints identified above to determine whether the double-circuit failures are at a high risk of occurring due to system conditions, which may include: severe weather conditions forecasted by ERCOT in the vicinity of the double circuit, weather conditions that indicate a high risk of insulator flashover on the double circuit, repeated Forced Outages of the individual circuits that are part of the double circuit in the preceding 48 hours, or fire in progress in the right of way of the double circuit.

(c) The actions detailed in this Section shall be supplemental to the development and maintenance of CMPs as otherwise directed by the Protocols or Operating Guides.

6.5.9.3.3 Watch

(1) A Watch is the third of three levels of communication issued by ERCOT in anticipation of a possible Emergency Condition.

(2) ERCOT shall issue a Watch when ERCOT determines that:

(a) Conditions have developed such that additional Ancillary Services are needed in the current Operating Period;

(b) There are insufficient Ancillary Services or Energy Offers in the DAM;

|  |
| --- |
| [NPRR1010: Delete paragraphs (a) and (b) above upon system implementation of the Real-Time Co-Optimization (RTC) project and renumber accordingly.] |

(c) Market-based congestion management techniques embedded in SCED as specified in these Protocols will not be adequate to resolve transmission security violations;

(d) Forced Outages or other abnormal operating conditions have occurred, or may occur that require operations with active violations of security criteria as defined in the Operating Guides unless a CMP exists;

(e) ERCOT varies from timing requirements or omits one or more Day-Ahead or Adjustment Period and Real-Time procedures;

(f) ERCOT varies from timing requirements or omits one or more scheduling procedures in the Real-Time process; or

(g) The SCED process fails to reach a solution, whether or not ERCOT is using one of the measures specified in paragraph (4) of Section 6.5.9.2, Failure of the SCED Process.

(3) With the issuance of a Watch pursuant to paragraph (2)(a) above, ERCOT may exercise its authority to immediately procure the following services from existing offers:

(a) Regulation Services;

(b) RRS services;

(c) ECRS services; and

(d) Non-Spin services.

(4) If ERCOT issues a Watch because insufficient Ancillary Service Offers were received in the DAM or Supplemental Ancillary Service Market (SASM), and if the Watch does not result in sufficient offers and the DAM or SASM is executed with insufficient offers, then ERCOT may acquire the insufficient amount of Ancillary Services as follows:

(a) The SASM process shall be conducted in accordance with Section 6.4.9.2.2, SASM Clearing Process. If the SASM process is not sufficient, then;

(b) The HRUC process shall be conducted to commit planned Off-Line Resources qualified to provide the Ancillary Service(s) that are insufficient in accordance with Section 5.2.2.2, RUC Process Timeline After an Aborted Day-Ahead Market. If the HRUC process is not sufficient, then;

(c) If the insufficiency arose due to insufficient Ancillary Service Offers received in the DAM or ERCOT needs to increase the Ancillary Service requirements after DAM clearing, ERCOT may assign the insufficient amounts of Ancillary Service(s) to QSEs with planned On-Line Resources qualified to provide the insufficient Ancillary Service(s), even if there are no existing Ancillary Service Offers for those QSEs’ Resources. ERCOT shall prorate the required Ancillary Service capacity among QSEs representing On-Line capacity not already reserved for Ancillary Services in the COP in a way that maximizes the distribution of the assignment.

(d) A QSE may request cancellation of the assignment of Ancillary Services to its On-Line Resources if there are equipment or Resource control issues which limit the ability of the Resources to provide the Ancillary Services. If ERCOT accepts the cancellation, ERCOT may require QSEs to submit supporting information describing the Resource control issues.

|  |
| --- |
| [NPRR1010: Delete paragraphs (3) and (4) above upon system implementation of the Real-Time Co-Optimization (RTC) project and renumber accordingly.] |

(5) ERCOT shall post the Watch message electronically to the ERCOT website and shall provide verbal notice via the TO Hotline and the QSE Hotline. Corrective actions identified by ERCOT must be communicated through Dispatch Instructions to all TSPs, DSPs and QSEs required to implement the corrective action. Each QSE shall immediately notify the Market Participants that it represents of the Watch. To minimize the effects on the ERCOT System, each TSP or DSP shall identify and prepare to implement actions, including restoration of transmission lines as appropriate and preparing for Load shedding. ERCOT may instruct TSPs or DSPs to reconfigure ERCOT System elements as necessary to improve the reliability of the ERCOT System. On notice of a Watch, each QSE, TSP, and DSP shall prepare for an Emergency Condition in case conditions worsen. ERCOT may require information from QSEs representing Resources regarding the Resources’ fuel capabilities. Requests for this type of information shall be for a time period of no more than seven days from the date of the request. The specific information that may be requested shall be defined in the Operating Guides. QSEs representing Resources shall provide the requested information in a timely manner, as defined by ERCOT at the time of the request.

|  |
| --- |
| [NPRR857: Replace paragraph (5) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  (5) ERCOT shall post the Watch message electronically to the ERCOT website and shall provide verbal notice via the TO Hotline and the QSE Hotline. Corrective actions identified by ERCOT must be communicated through Dispatch Instructions to all TSPs, DCTOs, DSPs and QSEs required to implement the corrective action. Each QSE shall immediately notify the Market Participants that it represents of the Watch. To minimize the effects on the ERCOT System, each TSP or DSP shall identify and prepare to implement actions, including restoration of transmission lines as appropriate and preparing for Load shedding. ERCOT may instruct DCTOs, TSPs or DSPs to reconfigure ERCOT System elements as necessary to improve the reliability of the ERCOT System. On notice of a Watch, each QSE, DCTO, TSP, and DSP shall prepare for an Emergency Condition in case conditions worsen. ERCOT may require information from QSEs representing Resources regarding the Resources’ fuel capabilities. Requests for this type of information shall be for a time period of no more than seven days from the date of the request. The specific information that may be requested shall be defined in the Operating Guides. QSEs representing Resources shall provide the requested information in a timely manner, as defined by ERCOT at the time of the request. |

6.5.9.3.4 Emergency Notice

(1) Emergency Notice is the communication issued by ERCOT when operating in an Emergency Condition.

(2) ERCOT shall issue an Emergency Notice for one or both of the following reasons:

(a) ERCOT cannot maintain minimum reliability standards (for reasons including fuel shortages) during the Operating Period using every Resource practicably obtainable from the market; or

(b) Immediate action cannot be taken to avoid or relieve a Transmission Element operating above its Emergency Rating.

(3) The actions ERCOT takes during an Emergency Condition depend on the nature and severity of the situation.

(4) ERCOT is considered to be in an Emergency Condition whenever ERCOT Transmission Grid status is such that a violation of security criteria, as defined in the Operating Guides, presents the threat of uncontrolled separation or cascading Outages and/or large-scale service disruption to Load (other than Load being served from a radial transmission line) and/or overload of a Transmission Element, and no timely solution is obtainable through SCED or CMPs.

(5) If the Emergency Condition is the result of a transmission problem, ERCOT shall act immediately to return the ERCOT System to a reliable condition, including instructing any QSE representing a Resource to change the Resource’s output, curtailing any remaining DC Tie Load, and instructing TSPs or DSPs to drop Load. In addition, ERCOT may instruct any QSE representing an ESR to suspend ESR charging if ERCOT determines that a Load reduction by the ESR is capable of mitigating the transmission problem. An ESR co-located behind a Point of Interconnection (POI) with onsite generation that is incapable of exporting additional power to the ERCOT System may continue to charge as long as maximum output to the ERCOT System is maintained.

(6) In the event that Load is curtailed or Load Resource(s) or ERS Resource(s) are deployed due to a transmission problem as described in paragraph (5) above, ERCOT shall post within one day an operations message to the ERCOT website listing the event’s date, start and end time, MW quantity of Load curtailment or deployment instruction, and the substation(s) or geographic area in which the event occurred.

(7) If the Emergency Condition is the result of an Ancillary Service insufficiency, then ERCOT shall follow the EEA procedures.

|  |
| --- |
| [NPRR1010: Delete paragraph (7) above upon system implementation of the Real-Time Co-Optimization (RTC) project.] |

6.5.9.4 Energy Emergency Alert

(1) At times it may be necessary to reduce ERCOT System Demand because of a temporary decrease in available electricity supply. To provide orderly, predetermined procedures for curtailing Demand during such emergencies, ERCOT shall initiate and coordinate the implementation of the EEA following the steps set forth below in Section 6.5.9.4.2, EEA Levels.

(2) The goal of the EEA is to provide for maximum possible continuity of service while maintaining the integrity of the ERCOT System to reduce the chance of cascading Outages.

(3) ERCOT’s operating procedures must meet the following goals:

(a) Use of market processes to the fullest extent practicable without jeopardizing the reliability of the ERCOT System;

(b) Use of RRS, ECRS, other Ancillary Services, and ERS to the extent permitted by ERCOT System conditions;

(c) Maximum use of ERCOT System capability;

(d) Maintenance of station service for nuclear-powered Generation Resources;

(e) Securing startup power for Generation Resources;

(f) Operation of Generation Resources during loss of communication with ERCOT;

(g) Restoration of service to Loads in the manner defined in the Operating Guides; and

(h) Management of Interconnection Reliability Operating Limits (IROLs) shall not change.

(4) ERCOT is responsible for coordinating with QSEs, TSPs, and DSPs to monitor ERCOT System conditions, initiating the EEA levels, notifying Market Participants, and coordinating the implementation of the EEA levels while maintaining transmission security limits.

|  |
| --- |
| [NPRR857: Replace paragraph (4) above with the following upon system implementation and satisfying the following conditions: (1) Southern Cross provides ERCOT with funds to cover the entire estimated cost of the project; and (2) Southern Cross has signed an interconnection agreement with a TSP and the TSP gives ERCOT written notice that Southern Cross has provided it with: (a) Notice to proceed with the construction of the interconnection; and (b) The financial security required to fund the interconnection facilities:]  (4) ERCOT is responsible for coordinating with QSEs, DCTOs, TSPs, and DSPs to monitor ERCOT System conditions, initiating the EEA levels, notifying Market Participants, and coordinating the implementation of the EEA levels while maintaining transmission security limits. |

(5) ERCOT, at management’s discretion, may at any time issue an ERCOT-wide appeal through the public news media for voluntary energy conservation.

(6) During the EEA, ERCOT has the authority to obtain energy from non-ERCOT Control Areas using the DC Ties or by using BLTs to move load to non-ERCOT Control Areas. ERCOT maintains the authority to curtail energy schedules flowing into or out of the ERCOT System across the DC Ties in accordance with NERC scheduling guidelines.

(7) Some of the EEA steps are not applicable if transmission security violations exist. There may be insufficient time to implement all EEA levels in sequence, however, to the extent practicable, ERCOT shall use Ancillary Services that QSEs have made available in the market to maintain or restore reliability.

|  |
| --- |
| [NPRR1010: Replace paragraph (7) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (7) Some of the EEA steps are not applicable if transmission security violations exist. There may be insufficient time to implement all EEA levels in sequence, however, to the extent practicable, ERCOT shall use Ancillary Service capabilities of Resources in the market to maintain or restore reliability. |

(8) ERCOT may immediately implement EEA Level 3 any time the clock-minute average system frequency falls below 59.91 Hz for 20 consecutive minutes and shall immediately implement EEA Level 3 any time the steady-state frequency is below 59.5 Hz for any duration.

(9) Percentages for EEA Level 3 Load shedding will be based on the previous year’s TSP peak Loads, as reported to ERCOT, and must be reviewed by ERCOT and modified annually as required.

(10) During EEA Level 2 or 3, for those constraints that meet the criteria identified in paragraph (5)(a) of Section 6.5.9.3.2, Advisory, ERCOT may control the post-contingency flow to within the 15-Minute Rating in SCED. After PRC is restored to at least 3,000 MW or the Emergency Condition has ended, whichever is later, and ERCOT has determined that system conditions have improved such that the chance of re-entering into an EEA Level 2 or 3 is low, ERCOT shall restore control to the post-contingency flow to within the Emergency Rating for these constraints that utilized the 15-Minute Rating in SCED.

(11) During EEA Level 2 or 3, for those constraints that meet the criteria identified in paragraph (5)(b) of Section 6.5.9.3.2, ERCOT shall continue to enforce constraints associated with double-circuit contingencies throughout an EEA if the double-circuit failures are determined to be at high risk of occurring, due to system conditions. For all other double-circuit contingencies identified in paragraph (5)(b) of Section 6.5.9.3.2, ERCOT will enforce only the associated single-circuit contingencies during EEA Level 2 or 3. ERCOT shall resume enforcing such constraints as a double-circuit contingency after PRC is restored to at least 3,000 MW or the Emergency Condition has ended, whichever is later, and ERCOT has determined that system conditions have improved such that the chance of re-entering into an EEA Level 2 or 3 is low. For constraints related to stability limits that are not IROLs, ERCOT may elect not to enforce double-circuit contingencies during EEA Level 3 only.

6.5.9.4.1 General Procedures Prior to EEA Operations

(1) Prior to declaring EEA Level 1 detailed in Section 6.5.9.4.2, EEA Levels, ERCOT may perform the following operations consistent with Good Utility Practice:

(a) Provide Dispatch Instructions to QSEs for specific Resources to operate at an Emergency Base Point to maximize Resource deployment so as to increase PRC levels on other Resources;

(b) Commit specific available Resources as necessary that can respond in the timeframe of the emergency. Such commitments will be settled using the HRUC process;

(c) Start RMR Units available in the time frame of the emergency. RMR Units should be loaded to full capability;

(d) Utilize available Resources providing RRS, ECRS, and Non-Spin services as required;

(e) Instruct TSPs and DSPs or their agents to reduce Customer Load by using existing, in-service distribution voltage reduction measures if ERCOT determines that the implementation of these measures could help avoid entering into EEA and ERCOT does not expect to need to use these measures to reduce the amount of Load shedding that may be needed in EEA Level 3. A TSP, DSP, or their agent shall implement these instructions if distribution voltage reduction measures are available and already installed. If the TSP, DSP, or their agent determines in their sole discretion that the distribution voltage reduction would adversely affect reliability, the voltage reduction measure may be reduced, modified, or otherwise changed from maximum performance to a level of exercise that has no negative impact to reliability; and

(f) ERCOT shall use the PRC and system frequency to determine the appropriate Emergency Notice and EEA levels.

(2) When PRC falls below 3,000 MW and is not projected to be recovered above 3,000 MW within 30 minutes following the deployment of Non-Spin, ERCOT may deploy available contracted ERS-10 and ERS-30 via an XML message followed by a VDI to the QSE Hotline. The ERS-10 and ERS-30 ramp periods shall begin at the completion of the VDI.

(a) ERS-10 and ERS-30 may be deployed at any time in a Settlement Interval. ERS-10 and ERS-30 may be deployed either simultaneously or separately, and in any order, at the discretion of ERCOT operators.

(b) Upon deployment, QSEs shall instruct their ERS Resources in ERS-10 and ERS-30 to perform at contracted levels consistent with the criteria described in Section 8.1.3.1.4, Event Performance Criteria for Emergency Response Service Resources, until either ERCOT releases the ERS-10 and ERS-30 deployment or the ERS-10 and ERS-30 Resources have reached their maximum deployment time.

(c) ERCOT shall notify QSEs of the release of ERS-10 and ERS-30 via an XML message followed by VDI to the QSE Hotline. The VDI shall represent the official notice of ERS-10 and ERS-30 release.

(d) Upon release, an ERS Resource shall return to a condition such that it is capable of meeting its ERS performance requirements as soon as practical, but no later than ten hours following the release.

6.5.9.4.2 EEA Levels

(1) ERCOT will declare an EEA Level 1 when PRC falls below 2,300 MW and is not projected to be recovered above 2,300 MW within 30 minutes without the use of the following actions that are prescribed for EEA Level 1:

(a) ERCOT shall take the following steps to maintain steady state system frequency near 60 Hz and maintain PRC above 1,750 MW:

(i) Request available Generation Resources that can perform within the expected timeframe of the emergency to come On-Line by initiating manual HRUC or through Dispatch Instructions;

(ii) Use available DC Tie import capacity that is not already being used;

(iii) Issue a Dispatch Instruction for Resources to remain On-Line which, before start of emergency, were scheduled to come Off-Line; and

(iv) Instruct QSEs to deploy undeployed ERS-10 and ERS-30.

|  |
| --- |
| [NPRR1010: Insert paragraph (v) below upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (v) At ERCOT’s discretion, manually deploy, through ICCP, available RRS and ECRS capacity from Generation Resources having a Resource Status of ONSC and awarded RRS or ECRS. |

(b) QSEs shall:

(i) Ensure COPs and telemetered HSLs are updated and reflect all Resource delays and limitations;

|  |
| --- |
| [NPRR1010: Replace paragraph (i) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (i) Ensure COPs and telemetered HSLs, Normal Ramp Rates, Emergency Ramp Rates, and Ancillary Service capabilities are updated and reflect all Resource delays and limitations; |

(ii) Suspend any ongoing ERCOT required Resource performance testing; and

(iii) Ensure that each of its ESRs suspends charging until the EEA is recalled, except under the following circumstances:

(A) The ESR has a current SCED Base Point Instruction, LFC Dispatch Instruction, or manual Dispatch Instruction to charge the ESR;

(B) The ESR is actively providing Primary Frequency Response; or

(C) The ESR is co-located behind a POI with onsite generation that is incapable of exporting additional power to the ERCOT System, in which case the ESR may continue to charge as long as maximum output to the ERCOT System is maintained.

|  |
| --- |
| [NPRR995: Replace paragraph (iii) above with the following upon system implementation:]  (iii) Ensure that each of its ESRs and SOESSs suspends charging until the EEA is recalled, except under the following circumstances:  (A) The ESR has a current SCED Base Point Instruction, LFC Dispatch Instruction, or manual Dispatch Instruction to charge the ESR;  (B) The ESR or SOESS is actively providing Primary Frequency Response; or  (C) The ESR or SOESS is co-located behind a POI with onsite generation that is incapable of exporting additional power to the ERCOT System, in which case the ESR may continue to charge as long as maximum output to the ERCOT System is maintained. |

(2) ERCOT may declare an EEA Level 2 when the clock-minute average system frequency falls below 59.91 Hz for 15 consecutive minutes. ERCOT will declare an EEA Level 2 when PRC falls below 1,750 MW and is not projected to be recovered above 1,750 MW within 30 minutes without the use of the following actions that are prescribed for EEA Level 2:

(a) In addition to the measures associated with EEA Level 1, ERCOT shall take the following steps to maintain steady state system frequency at a minimum of 59.91 Hz and maintain PRC above 1,430 MW:

(i) Instruct TSPs and DSPs or their agents to reduce Customer Load by using existing, in-service distribution voltage reduction measures that have not already been implemented. A TSP, DSP, or their agent shall implement these instructions if distribution voltage reduction measures are available and already installed. If the TSP, DSP, or their agent determines in their sole discretion that the distribution voltage reduction would adversely affect reliability, the voltage reduction measure may be reduced, modified, or otherwise changed from maximum performance to a level of exercise that has no negative impact to reliability.

(ii) Instruct TSPs and DSPs to implement any available Load management plans to reduce Customer Load.

(iii) Instruct QSEs to deploy ECRS or RRS (controlled by high-set under-frequency relays) supplied from Load Resources. ERCOT may deploy ECRS or RRS simultaneously or separately, and in any order. ERCOT shall issue such Dispatch Instructions in accordance with the deployment methodologies described in paragraph (iv) below.

(iv) Load Resources providing ECRS that are not controlled by high-set under-frequency relays shall be deployed prior to Group 1 deployment. ERCOT shall deploy ECRS and RRS capacity supplied by Load Resources (controlled by high-set under-frequency relays) in accordance with the following:

(A) Instruct QSEs to deploy RRS with a Group 1 designation and all of the ECRS that is supplied from Load Resources (controlled by high-set under-frequency relays) by instructing the QSE representing the specific Load Resources to interrupt Group 1 Load Resources providing ECRS and RRS. QSEs shall deploy Load Resources according to the group designation and will be given some discretion to deploy additional Load Resources from any of the groups not designated for deployment if Load Resource operational considerations require such. ERCOT shall issue notification of the deployment via XML message. ERCOT shall follow this XML notification with a QSE Hotline VDI, which shall initiate the ten-minute deployment period;

(B) At the discretion of the ERCOT Operator, instruct QSEs to deploy RRS that is supplied from Load Resources (controlled by high-set under-frequency relays) by instructing the QSE representing the specific Load Resource to interrupt additional Load Resources providing RRS based on their group designation. ERCOT shall issue notification of the deployment via XML message. ERCOT shall follow this XML notification with a QSE Hotline VDI, which shall initiate the ten-minute deployment period;

(C) The ERCOT Operator may deploy Load Resources providing only ECRS (not controlled by high-set under-frequency relays) and all groups of Load Resources providing RRS and ECRS at the same time. ERCOT shall issue notification of the deployment via XML message. ERCOT shall follow this XML notification with a QSE Hotline VDI, which shall initiate the ten-minute deployment period; and

(D) ERCOT shall post a list of Load Resources on the MIS Certified Area immediately following the DRUC for each QSE with a Load Resource obligation which may be deployed to interrupt under paragraph (A) and paragraph (B). ERCOT shall develop a process for determining which individual Load Resource to place in each group based on a random sampling of individual Load Resources. At ERCOT’s discretion, ERCOT may deploy all Load Resources at any given time during EEA Level 2.

|  |
| --- |
| [NPRR1010: Replace paragraph (D) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (D) ERCOT shall post a list of Load Resources on the MIS Certified Area immediately following the DRUC for each QSE with a Load Resource RRS or ECRS award, which may be deployed to interrupt under paragraph (A) and paragraph (B). ERCOT shall develop a process for determining which individual Load Resource to place in each group based on a random sampling of individual Load Resources. At ERCOT’s discretion, ERCOT may deploy all Load Resources at any given time during EEA Level 2. |

(v) Unless a media appeal is already in effect, ERCOT shall issue an appeal through the public news media for voluntary energy conservation; and

(vi) With the approval of the affected non-ERCOT Control Area, TSPs, DSPs, or their agents may implement transmission voltage level BLTs, which transfer Load from the ERCOT Control Area to non-ERCOT Control Areas in accordance with BLTs as defined in the Operating Guides.

(b) Confidentiality requirements regarding transmission operations and system capacity information will be lifted, as needed to restore reliability.

(3) ERCOT may declare an EEA Level 3 when the clock-minute average system frequency falls below 59.91 Hz for 20 consecutive minutes. ERCOT will declare an EEA Level 3 when PRC cannot be maintained above 1,430 MW or when the clock-minute average system frequency falls below 59.91 Hz for 25 consecutive minutes. Upon declaration of an EEA Level 3, ERCOT will implement any measures associated with EEA Levels 1 and 2 that have not already been implemented.

(a) ERCOT may instruct ESRs to suspend charging. For ESRs, ERCOT shall issue the suspension instruction via a SCED Base Point instruction, or, if otherwise necessary, via a manual Dispatch Instruction. An ESR shall suspend charging unless it is providing Primary Frequency Response, has received a charging instruction via SCED Base Point, or is carrying Reg-Down and has received a charging instruction from LFC. However, an ESR co-located behind a POI with onsite generation that is incapable of exporting additional power to the ERCOT System may continue to charge as long as maximum output to the ERCOT System is maintained.

|  |
| --- |
| [NPRR995: Replace paragraph (a) above with the following upon system implementation:]  (a) ERCOT may instruct ESRs to suspend charging. For ESRs, ERCOT shall issue the suspension instruction via a SCED Base Point, or, if otherwise necessary, via a manual Dispatch Instruction. An ESR shall suspend charging unless it is providing Primary Frequency Response, has received a charging instruction via SCED Base Point, or is carrying Reg-Down and has received a charging instruction from LFC. An SOESS shall suspend charging unless it is providing Primary Frequency Response. However, an ESR or SOESS co-located behind a POI with onsite generation that is incapable of exporting additional power to the ERCOT System may continue to charge as long as maximum output to the ERCOT System is maintained. |

(b) When PRC falls below 1,000 MW and is not projected to be recovered above 1,000 MW within 30 minutes, or when the clock-minute average frequency falls below 59.91 Hz for 25 consecutive minutes, ERCOT shall direct all TOs to shed firm Load, in 100 MW blocks, distributed as documented in the Operating Guides in order to maintain a steady state system frequency at a minimum of 59.91 Hz and to recover 1,000 MW of PRC within 30 minutes.

(c) TOs and TDSPs may shed Load connected to under-frequency relays pursuant to an ERCOT Load shed directive issued during EEA Level 3 so long as each affected TO continues to comply with its Under-Frequency Load Shed (UFLS) obligation as described in Nodal Operating Guide Section 2.6.1, Automatic Firm Load Shedding, and its Load shed obligation as described in Nodal Operating Guide Section 4.5.3.4, Load Shed Obligation.

6.5.9.4.3 Restoration of Market Operations

(1) ERCOT shall continue the EEA until sufficient offers are received and deployed by ERCOT to eliminate the conditions requiring the EEA and normal SCED operations are restored. After restoring RRS, ERCOT shall restore curtailed DC Tie Load. Intermittent solutions of SCED do not set new LMPs until ERCOT declares that the EEA is no longer needed.

6.5.9.5 Block Load Transfers between ERCOT and Non-ERCOT Control Areas

(1) BLTs are procedures that transfer Loads normally located in the ERCOT Control Area to a non-ERCOT Control Area. Similarly, when a non-ERCOT Control Area experiences certain transmission contingencies or short-supply conditions, ERCOT may agree to the implementation of BLT procedures that transfer Loads normally located in a non-ERCOT Control Area to the ERCOT Control Area. BLTs are restricted to the following conditions:

(a) All modeled BLTs shall be implemented only with approval from ERCOT, unless a governmental order is issued requiring the use of the BLT.

(i) BLTs shall be registered with ERCOT. Such registration shall be subject to ERCOT approval.

(ii) For all BLTs, the TSP in the ERCOT Control Area responsible for implementing the BLT shall coordinate with ERCOT in the implementation and execution of BLTs to ensure the reliability of the ERCOT System is not jeopardized and to ensure sufficient generation capacity is available prior to serving additional Load.

(b) BLTs that are comprised of looped systems may be tied to the non-ERCOT Control Area’s electrical system(s) through multiple interconnection points at the same time. Transfers of looped configurations are permitted only if all interconnection points are registered and netted under a single Electric Service Identifier (ESI ID) and represented by a singled TSP or DSP or netted behind the Non-Opt-In Entity (NOIE) metering points.

(c) BLTs of Load to the ERCOT Control Area are:

(i) Treated as non-competitive wholesale Load in the Load Zone containing the ERCOT breaker or switch that initiated the BLT;

(ii) Registered in accordance with Section 6.5.9.5.1, Registration and Posting of BLT Points, by the TSP in the ERCOT Control Area responsible for implementing the BLT;

(iii) Responsible for Unaccounted For Energy (UFE) allocations and Transmission Losses consistent with similarly situated NOIE metering points; and

(iv) Permitted only if the BLT will not jeopardize the reliability of the ERCOT System. Under an Emergency Notice, BLTs that have been implemented may be curtailed or terminated by ERCOT to maintain the reliability of the ERCOT System.

(d) BLTs of Load from the ERCOT Control Area are:

(i) Treated as generation and Load in the ERCOT Settlement system unless the Load is in a NOIE territory and the NOIE has opted for the Load transfer to be treated as a NOIE Load reduction by not submitting a Settlement Block Load Transfer Registration Form. BLTs may only be instructed with the permission of the affected non-ERCOT Control Area. Under an emergency condition in a non-ERCOT Control Area, BLTs that have been implemented may be curtailed or terminated by the non-ERCOT Control Area to maintain the reliability of the non-ERCOT system;

(ii) Registered in accordance with Section 6.5.9.5.1 by the TSP in the ERCOT Control Area responsible for implementing the BLT; and

(iii) Permitted only if the BLT will not jeopardize the reliability of the ERCOT System.

(e) BLTs specifically exclude transfers of Load between ERCOT and non-ERCOT Control Areas that occur behind a retail Settlement Meter.

(f) BLTs may be used in the restoration of service to Customers if the transfers will not jeopardize the reliability of the ERCOT System.

(g) For any BLT established in a TDSP area that is open to Customer Choice, the TDSP must register the BLT metering point for Settlement. For any BLT established in a NOIE territory, the NOIE may either register the BLT for Settlement or may forgo registration and have the Load transfer settled as a Load increase or reduction. As a condition for Settlement, a BLT must be registered using the Settlement Block Load Transfer Registration Form found on the ERCOT website, and each BLT metering point must use revenue quality, 15-minute Interval Data Recorder (IDR) Meters. ERCOT may impose additional metering requirements it considers necessary to ensure ERCOT System reliability and integrity.

(h) SCADA telemetry on switching devices at BLT points that are deemed necessary by ERCOT to be modeled in the Network Operations Model must be provided by the TSP registering the BLT.

6.5.9.5.1 Registration and Posting of BLT Points

(1) The necessary Market Participant registration, agreements, metering, and ERCOT Settlement systems, as applicable, must be in place before implementation of any BLT. At its sole discretion, ERCOT may exclude a BLT of ten MW or less from the Network Operations Model and associated telemetry requirements.

(2) ERCOT may require any size of BLT that has been deployed in accordance with Section 6.5.9.5.2, Scheduling and Operation of BLTs, to be in the Network Operations Model with required telemetry if ERCOT determines it is warranted due to the length of time deployed.

(3) BLTs that transfer Load from the ERCOT Control Area to a non-ERCOT Control Area are treated as generation and Load by ERCOT and assigned a Resource ID and, if in a NOIE territory, an ESI ID unless the Load is in a NOIE territory and the NOIE has not registered the BLT for Settlement pursuant to paragraph (1)(g) of Section 6.5.9.5, Block Load Transfers between ERCOT and Non-ERCOT Control Areas. The ERCOT Control Area TSP or DSP associated with the BLT Point has the responsibility for registering the BLT and the creation and maintenance of BLT Resource IDs for Settlement purposes. For any BLT that a NOIE has registered for Settlement, the NOIE shall designate NOIE metering point(s), a Resource Entity, and a QSE for Settlement purposes. For BLTs occurring on TSP or DSP systems open to Customer Choice, the non-ERCOT Control Area Entity receiving the transferred Load shall designate a registered Resource Entity and acknowledge a QSE for Settlement purposes in accordance with Section 16.5, Registration of a Resource Entity. The ERCOT Control Area TSP or DSP must complete the applicable BLT registration form. This BLT registration form along with the metering design and data documentation is the basis for establishing the ERCOT data model of the BLT and associated metering points for Settlement as applicable.

(4) BLTs that transfer Load from a non-ERCOT Control Area to the ERCOT Control Area are treated as a non-competitive wholesale Load by ERCOT and assigned an ESI ID unless the BLT is in a NOIE territory and the NOIE has not registered the BLT for Settlement. The ERCOT Control Area TSP or DSP associated with the BLT Point has the responsibility for registering the BLT and the creation and maintenance of BLT ESI IDs. Customers connected to the ERCOT System do not require an ESI ID separate from the assigned BLT ESI ID. The TSP or DSP that registers the BLT Point shall provide the ESI ID associated with the BLT to ERCOT. For BLTs occurring on NOIE TSP or DSP systems, the NOIE may designate NOIE metering point(s), an LSE, and a QSE for Settlement purposes. Load associated with NOIE BLTs that do not have an LSE or QSE for Settlement purposes will be reflected in the NOIE’s 4-Coincident Peak (4-CP) calculation. For BLTs occurring on TSP or DSP systems open to Customer Choice, the non-ERCOT Control Area Entity shall designate a registered ERCOT LSE and acknowledge a QSE for Settlement purposes in accordance with Section 16.3, Registration of Load Serving Entities.

(5) A “BLT Point” is the metering point for a BLT Resource ID or for a BLT ESI ID.

(6) ERCOT shall post the registration details of all registered BLTs to the MIS Secure Area.

6.5.9.5.2 Scheduling and Operation of BLTs

(1) For BLTs that are deployed in an emergency and are not modeled in the Network Operations Model, the responsible TSP shall notify ERCOT as soon as practicable after deployment.

(2) For BLTs that transfer Load to a non-ERCOT Control Area, ERCOT shall confirm the BLT’s availability with the non-ERCOT Control Area before implementation.

(3) Any energy associated with the non-ERCOT Control Area Load BLT Point is treated as a Load obligation of the QSE representing the LSE with the BLT ESI ID as registered for Settlement purposes in accordance with Section 6.5.9.5.1, Registration and Posting of BLT Points.

6.5.9.6 Black Start

(1) Black Start Service (BSS) is obtained by ERCOT through Black Start Agreements with QSEs for Generation Resources capable of self-starting or Generation Resources within close proximity of a non-ERCOT Control Area that are capable of starting from that non-ERCOT Control Area under a firm standby power supply contract, without support from the ERCOT System, or transmission equipment in the ERCOT System. Generation Resources that can be started with a minimum of pre-coordinated switching operations using ERCOT transmission equipment within the ERCOT System may be considered for BSS only where switching may be accomplished within one hour or less.

(2) ERCOT may Dispatch BSS pursuant to an emergency restoration plan to begin restoration of the ERCOT System to a secure operating state after a Blackout. General restoration actions for all Market Participants are described in the Operating Guides.

6.6 Settlement Calculations for the Real-Time Energy Operations

***6.6.1 Real-Time Settlement Point Prices***

(1) Real-Time energy Settlements use Real-Time Settlement Point Prices that are calculated for Resource Nodes, Load Zones, and Hubs. For each Security-Constrained Economic Dispatch (SCED) Locational Marginal Price (LMP) calculated at each Settlement Point in the SCED process, an administrative price floor of -$251/MWh will be applied to Real-Time Settlement Point Prices after adding the sum of the Real-Time On-Line Reliability Deployment Price Adders and the Real-Time On-Line Reserve Price Adder. ERCOT shall assign an LMP to de-energized Electrical Buses for use in the calculation of the Real-Time Settlement Point Prices by using heuristic rules applied in the following order:

|  |
| --- |
| [NPRR1010: Replace paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (1) Real-Time energy Settlements use Real-Time Settlement Point Prices that are calculated for Resource Nodes, Load Zones, and Hubs. For each Security-Constrained Economic Dispatch (SCED) Locational Marginal Price (LMP) calculated at each Settlement Point in the SCED process, an administrative price floor of -$251/MWh will be applied to Real-Time Settlement Point Prices after adding the Real-Time Reliability Deployment Price Adders for Energy. ERCOT shall assign an LMP to de-energized Electrical Buses for use in the calculation of the Real-Time Settlement Point Prices by using heuristic rules applied in the following order: |

(a) Use an appropriate LMP predetermined by ERCOT as applicable to a specific Electrical Bus; or if not so specified

(b) Use the following rules in order:

(i) Use average LMP for Electrical Buses within the same station having the same voltage level as the de-energized Electrical Bus, if any exist.

(ii) Use average LMP for all Electrical Buses within the same station, if any exist.

(iii) Use System Lambda.

6.6.1.1 Real-Time Settlement Point Price for a Resource Node

(1) The Real-Time Settlement Point Price for a Resource Node Settlement Point is the time-weighted average of the sum of the Real-Time LMPs, Real-Time On-Line Reliability Deployment Price Adders, and the Real-Time On-Line Reserve Price Adders. The Real-Time Settlement Point Price for a 15-minute Settlement Interval is calculated as follows:

RTSPP = Max (-$251, ((RNWF *y* \* (RTLMP *y* + RTORPA *y* + RTORDPA *y*))))

Where the Resource Node weighting factor is:

**RNWF *y*= TLMP *y* / TLMP *y***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| RTSPP | $/MWh | *Real-Time Settlement Point Price*⎯The Real-Time Settlement Point Price at the Settlement Point for the 15-minute Settlement Interval. |
| RTORPA *y* | $/MWh | *Real-Time On-Line Reserve Price Adder per interval*⎯The Real-Time On-Line Reserve Price Adder for the SCED interval *y*. |
| RTLMP *y* | $/MWh | *Real-Time Locational Marginal Price per interval*⎯The Real-Time LMP at the Settlement Point for the SCED interval *y*. |
| RTORDPA*y* | $/MWh | *Real-Time On-Line Reliability Deployment Price Adder*⎯The Real-Time Price Adder that captures the impact of reliability deployments on energy prices for the SCED interval *y*. |
| RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Resource Node Settlement Point Price calculation for the portion of the SCED interval *y* within the Settlement Interval. |
| TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the portion of the SCED interval *y* within the Settlement Interval. |
| *y* | none | A SCED interval in the 15-minute Settlement Interval. The summation is over the total number of SCED runs that cover the 15-minute Settlement Interval. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1010: Replace paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (1) The Real-Time Settlement Point Price for a Resource Node Settlement Point is the time-weighted average of the sum of the Real-Time LMPs and the Real-Time Reliability Deployment Price Adder for Energy. The Real-Time Settlement Point Price for a 15-minute Settlement Interval is calculated as follows:  **RTSPP = Max (-$251, ((RNWF *y* \* (RTLMP *y* + RTRDPA *y*))))**  Where the Resource Node weighting factor is:  **RNWF *y*= TLMP *y* / TLMP *y***  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | **Variable** | **Unit** | **Description** | | RTSPP | $/MWh | *Real-Time Settlement Point Price*⎯The Real-Time Settlement Point Price at the Settlement Point for the 15-minute Settlement Interval. | | RTLMP *y* | $/MWh | *Real-Time Locational Marginal Price per interval*⎯The Real-Time LMP at the Settlement Point for the SCED interval *y*. | | RTRDPA*y* | $/MWh | *Real-Time Reliability Deployment Price Adder for Energy*⎯The Real-Time price adder that captures the impact of reliability deployments on energy prices for the SCED interval *y*. | | RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Resource Node Settlement Point Price calculation for the portion of the SCED interval *y* within the Settlement Interval. | | TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the portion of the SCED interval *y* within the Settlement Interval. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. The summation is over the total number of SCED runs that cover the 15-minute Settlement Interval. | |

(2) The Real-Time Settlement Point Price at the logical Resource Node for a Combined Cycle Train shall be determined in accordance with paragraph (1) above using a Real-Time LMP calculated for the logical Resource Node in each SCED Interval as follows:

(a) The Real-Time LMP for the logical Resource Node of a Combined Cycle Train for each SCED interval is calculated as follows:

For a Combined Cycle Train that is On-Line in the SCED interval:

**RTLMP *y* =** **∑*CCGR\_PhyR* RTLMP *CCGR\_PhyR, y* \* RTONCCGRWF *CCGR\_PhyR***

For a Combined Cycle Train that is Off-Line in the SCED interval:

**RTLMP *y* =** **∑*CCT\_PhyR* RTLMP *CCT\_PhyR, y* \* RTOFFCCGRWF *CCT\_PhyR***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Definition** |
| RTLMP *y* | $/MWh | *Real-Time Locational Marginal Price at a logical Resource Node for a Combined Cycle Train*⎯The Real-Time LMP at the Combined Cycle Generation Resource logical Resource Node for a SCED interval *y*. |
| RTLMP *CCGR\_PhyR, y* | $/MWh | *Real-Time Locational Marginal Price at a generation unit Resource Node designated in a Combined Cycle Train registration for the On-Line Combined Cycle Generation Resource*⎯The Real-Time LMP at the Resource Node of a generation unit designated in a Combined Cycle Train registration for the On-Line Combined Cycle Generation Resource for the SCED interval *y*. |
| RTLMP *CCT\_PhyR, y* | $/MWh | *Real-Time Locational Marginal Price at a generation unit Resource Node registered to the Combined Cycle Train*⎯The Real-Time LMP at the Resource Node of a generation unit designated in a Combined Cycle Train registration for the SCED interval *y*. |
| RTONCCGRWF *CCGR\_PhyR, y* | none | *Real-Time On-Line Combined Cycle Generation Resource Weighting Factor*⎯The Real Time Combined Cycle Generation Resource weighting factor for a generation unit designated in a Combined Cycle Train registration for the On-Line Combined Cycle Generation Resource for the SCED interval *y*. |
| RTOFFCCGRWF *CCT\_PhyR, y* | none | *Real-Time Off-Line Combined Cycle Generation Resource Weighting Factor*⎯The Real-Time Combined Cycle Generation Resource weighting factor for a generation unit designated in a Combined Cycle Train registration when the whole Combined Cycle Train is Off-Line for the SCED interval *y*. |
| *CCGR\_PhyR* | none | A generation unit designated in a Combine Cycle Train registration for the On-Line Combined Cycle Generation Resource. |
| *CCT\_PhyR* | none | A generation unit designated in a Combine Cycle Train registration |
| *c* | none | A binding transmission constraint for the SCED interval *y*. |
| *y* | none | A SCED interval in the 15-minute Settlement Interval. |

(b) For an On-Line Combined Cycle Train, the weight factor for each generation unit registered in an On-Line Combined Cycle Generation Resource shall be the Real-Time power output telemetry in each SCED interval for each generation unit registered in the Combined Cycle Generation Resource divided by the total Real-Time power output telemetry for all of the generation units registered in the Combined Cycle Generation Resource. For an Off-Line Combined Cycle Train, the weight factor for each generation unit designated in a Combined Cycle Train registration shall be its High Reasonability Limit (HRL) divided by the total sum of the HRL for all generation units registered in the Combined Cycle Train.

Where:

**RTONCCGRWF *CCGR\_PhyR, y* = TG *CCGR\_PhyR* / ∑*CCGR\_PhyR* TG *CCGR\_PhyR***

**RTOFFCCGRWF *CCT\_PhyR, y* = HRL *CCT\_PhyR* / ∑*CCT\_PhyR* HRL *CCT\_PhyR***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Definition** |
| RTONCCGRWF *CCGR\_PhyR, y* | none | *Real-Time On-Line Combined Cycle Generation Resource Weighting Factor*⎯The Real Time Combined Cycle Generation Resource weighting factor for a generation unit designated in a Combined Cycle Train registration for the On-Line Combined Cycle Generation Resource for the SCED interval *y*. |
| TG *CCGR\_PhyR, y* | MW | *Telemetered Generation for a Combined Cycle Generation Resource generation unit*⎯The telemetered Real-Time power generation for a generation unit designated in a Combined Cycle Train registration for the On-Line Combined Cycle Generation Resource at the time of State Estimator execution for the SCED interval *y*. |
| RTOFFCCGRWF *CCT\_PhyR, y* | none | *Real-Time Off-Line Combined Cycle Generation Resource Weighting Factor*⎯The Real Time Combined Cycle Generation Resource weighting factor for a generation unit designated in a Combined Cycle Train registration when the whole Combined Cycle Train is Off-Line for the SCED interval *y*. |
| HRL *CCT\_PhyR* | MW | *High Reasonability Limit*—The HRL as specified in the ERCOT-approved Resource Registration data for a generation unit designated in a Combined Cycle Train registration. |
| *CCGR\_PhyR* | none | A generation unit designated in a Combine Cycle Train registration for the On-Line Combined Cycle Generation Resource. |
| *CCT\_PhyR* | none | A generation unit designated in a Combine Cycle Train registration. |
| *y* | none | A SCED interval in the 15-minute Settlement Interval. |

6.6.1.2 Real-Time Settlement Point Price for a Load Zone

(1) The Real-Time Settlement Point Price for a Load Zone Settlement Point is based on the state-estimated Load in MW and the time-weighted average Real-Time LMPs at Electrical Buses that are included in the Load Zone. The Real-Time Settlement Point Price for a Load Zone Settlement Point for a 15-minute Settlement Interval is calculated as follows:

RTSPP = Max (-$251, ((TLMP *y* \* LZLMP *y*) / TLMP*y*) + RTRSVPOR + RTRDP)

For all Load Zones except Direct Current Tie (DC Tie) Load Zones:

LZLMP *y* =  (RTLMP *b, y* \* SEL *b, y*) / SEL*b, y*

For a DC Tie Load Zone:

LZLMP *y* = RTLMP *b, y*

Where:

RTRSVPOR = image010(RNWF *y* \* RTORPA *y*)

RTRDP = (RNWF *y* \* RTORDPA *y*)

RNWF *y*= TLMP *y* / TLMP *y*

|  |
| --- |
| [NPRR1010: Replace paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (1) The Real-Time Settlement Point Price for a Load Zone Settlement Point is based on the state-estimated Load in MW and the time-weighted average Real-Time LMPs at Electrical Buses that are included in the Load Zone. The Real-Time Settlement Point Price for a Load Zone Settlement Point for a 15-minute Settlement Interval is calculated as follows:  **RTSPP = Max (-$251, ((TLMP *y* \* LZLMP *y*) / TLMP*y*) + RTRDP)**  For all Load Zones except Direct Current Tie (DC Tie) Load Zones:  LZLMP *y* =  (RTLMP *b, y* \* SEL *b, y*) / SEL*b, y*  For a DC Tie Load Zone:  LZLMP *y* = RTLMP *b, y*  Where:  RTRDP = (RNWF *y* \* RTRDPA *y*)  RNWF *y*= TLMP *y* / TLMP *y* |

(2) For all Settlement calculations in which a 15-minute Real-Time Settlement Point Price for a Load Zone is required in order to perform Settlement for a 15-minute quantity that is represented as one value (the integrated value for the 15-minute interval) but varies with each SCED interval within the 15-minute Settlement Interval, an energy-weighted Real-Time Settlement Point Price shall be used and is calculated as follows:

**RTSPPEW = Max [-$251, ((RTLMP*b, y* \* LZWF *b, y*) + RTRSVPOR + RTRDP)]**

For all Load Zones except DC Tie Load Zones:

LZWF *b, y* = (SEL*b, y* \* TLMP *y*) **/** [(SEL*b, y* \* TLMP*y*)]

For a DC Tie Load Zone:

LZWF *b, y* = (SEL*b, y* \* TLMP *y*) **/** [(SEL*b, y* \* TLMP*y*)]

SEL*b, y* = 1

Where:

RTRSVPOR = image010(RNWF *y* \* RTORPA *y*)

RTRDP = (RNWF *y* \* RTORDPA *y*)

RNWF *y* = TLMP *y* /TLMP *y*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| RTSPP | $/MWh | *Real-Time Settlement Point Price*⎯The Real-Time Settlement Point Price at the Settlement Point, for the 15-minute Settlement Interval. |
| RTSPPEW | $/MWh | *Real-Time Settlement Point Price Energy-Weighted*⎯The Real-Time Settlement Point Price at the Settlement Point *p*, for the 15-minute Settlement Interval that is weighted by the state-estimated Load of the Load Zone of each SCED interval within the 15-minute Settlement Interval. |
| RTLMP *b, y* | $/MWh | *Real-Time Locational Marginal Price at bus per interval*⎯The Real-Time LMP at Electrical Bus *b* in the Load Zone, for the SCED interval *y*. |
| RTRSVPOR | $/MWh | *Real-Time Reserve Price for On-Line Reserves*⎯The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval. |
| RTORPA*y* | $/MWh | *Real-Time On-Line Reserve Price Adder per interval*⎯The Real-Time Price Adder for On-Line Reserves for the SCED interval *y*. |
| RTRDP | $/MWh | *Real-Time On-Line Reliability Deployment Price*⎯The Real-Time price for the 15-minute Settlement Interval, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time On-Line Reliability Deployment Price Adder. |
| RTORDPA*y* | $/MWh | *Real-Time On-Line Reliability Deployment Price Adder*⎯The Real-Time Price Adder that captures the impact of reliability deployments on energy prices for the SCED interval *y*. |
| RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Resource Node Settlement Point Price calculation for the portion of the SCED interval *y* within the Settlement Interval. |
| LZWF *b, y* | none | *Load Zone Weighting Factor per bus per interval*⎯The weight used in the Load Zone Settlement Point Price calculation for Electrical Bus *b*, for the portion of the SCED interval *y* within the 15-minute Settlement Interval. |
| LZLMP *y* | $/MWh | *Load Zone Locational Marginal Price*⎯The Load Zone LMP for the Load Zone for the SCED interval *y*. |
| SEL *b, y* | MW | *State Estimator Load at bus per interval*⎯The Load value from State Estimator, including a calculated net Load value at each Private Use Network and adjustments to account for Distribution Generation Resource (DGR) and Distribution Energy Storage Resource (DESR) injections and withdrawals that are settled at a Resource Node, excluding Wholesale Storage Load (WSL) and Non-WSL Energy Storage Resource (ESR) Charging Load for Electrical Bus *b* in the Load Zone, for the SCED interval *y*. |
| TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the portion of the SCED interval *y* within the Settlement Interval. |
| *y* | none | A SCED interval in the 15-minute Settlement Interval. The summation is over the total number of SCED runs that cover the 15-minute Settlement Interval. |
| *b* | none | An Electrical Bus in the Load Zone. The summation is over all of the Electrical Buses in the Load Zone. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1010: Replace paragraph (2) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  (2) For all Settlement calculations in which a 15-minute Real-Time Settlement Point Price for a Load Zone is required in order to perform Settlement for a 15-minute quantity that is represented as one value (the integrated value for the 15-minute interval) but varies with each SCED interval within the 15-minute Settlement Interval, an energy-weighted Real-Time Settlement Point Price shall be used and is calculated as follows:  **RTSPPEW = Max [-$251, ((RTLMP*b, y* \* LZWF *b, y*) + RTRDP)]**  For all Load Zones except DC Tie Load Zones:  LZWF *b, y* = (SEL*b, y* \* TLMP *y*) **/** [(SEL*b, y* \* TLMP*y*)]  For a DC Tie Load Zone:  LZWF *b, y* = (SEL*b, y* \* TLMP *y*) **/** [(SEL*b, y* \* TLMP*y*)]  SEL*b, y* = 1  Where:  RTRDP = (RNWF *y* \* RTRDPA *y*)  RNWF *y* = TLMP *y* /TLMP *y*  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | **Variable** | **Unit** | **Description** | | RTSPP | $/MWh | *Real-Time Settlement Point Price*⎯The Real-Time Settlement Point Price at the Settlement Point, for the 15-minute Settlement Interval. | | RTSPPEW | $/MWh | *Real-Time Settlement Point Price Energy-Weighted*⎯The Real-Time Settlement Point Price at the Settlement Point *p*, for the 15-minute Settlement Interval that is weighted by the state-estimated Load of the Load Zone of each SCED interval within the 15-minute Settlement Interval. | | RTLMP *b, y* | $/MWh | *Real-Time Locational Marginal Price at bus per interval*⎯The Real-Time LMP at Electrical Bus *b* in the Load Zone, for the SCED interval *y*. | | RTRDP | $/MWh | *Real-Time Reliability Deployment Price for Energy*⎯The Real-Time price for the 15-minute Settlement Interval, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time Reliability Deployment Price Adder for Energy. | | RTRDPA*y* | $/MWh | *Real-Time Reliability Deployment Price Adder for Energy*⎯The Real-Time price adder that captures the impact of reliability deployments on energy prices for the SCED interval *y*. | | RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Resource Node Settlement Point Price calculation for the portion of the SCED interval *y* within the Settlement Interval. | | LZWF *b, y* | none | *Load Zone Weighting Factor per bus per interval*⎯The weight used in the Load Zone Settlement Point Price calculation for Electrical Bus *b*, for the portion of the SCED interval *y* within the 15-minute Settlement Interval. | | LZLMP *y* | $/MWh | *Load Zone Locational Marginal Price*⎯The Load Zone LMP for the Load Zone for the SCED interval *y*. | | SEL *b, y* | MW | *State Estimator Load at bus per interval*⎯The Load value from State Estimator, including a calculated net Load value at each Private Use Network and adjustments to account for Distribution Generation Resource (DGR) and Distribution Energy Storage Resource (DESR) injections and withdrawals that are settled at a Resource Node, excluding Wholesale Storage Load (WSL) and Non-WSL Energy Storage Resource (ESR) Charging Load, for Electrical Bus *b* in the Load Zone, for the SCED interval *y*. | | TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the portion of the SCED interval *y* within the Settlement Interval. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. The summation is over the total number of SCED runs that cover the 15-minute Settlement Interval. | | *b* | none | An Electrical Bus in the Load Zone. The summation is over all of the Electrical Buses in the Load Zone. | |

6.6.1.3 Real-Time Settlement Point Price for a Hub

(1) The Real-Time Settlement Point Price at a Hub is determined according to the methodology included in the definition of that Hub in Section 3.5.2, Hub Definitions.

6.6.1.4 Load Zone LMPs

(1) The Load Zone LMPs shall be posted on the ERCOT website. The Load Zone LMP is based on the state-estimated Loads in MW and the Real-Time LMPs at the Electrical Buses included in the Load Zone. The Load Zone LMP for a Load Zone for a SCED interval is calculated as follows:

LZLMP *y* =  (RTLMP*b, y* \* LZWF *b, y*)

For all Load Zones except DC Tie Load Zones:

LZWF *b, y* = SEL*b, y* / (SEL*b, y*)

For a DC Tie Load Zone:

LZWF *b, y* = [Max (0.001, SEL b, y)] / [Max (0.001, SEL b, y)]

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| LZLMP *y* | $/MWh | *Load Zone Locational Marginal Price*⎯The Load Zone LMP for the Load Zone for the SCED interval *y*. |
| RTLMP *b, y* | $/MWh | *Real-Time Locational Marginal Price at bus per SCED interval*⎯The Real-Time LMP at Electrical Bus *b* in the Load Zone, for the SCED interval *y*. |
| LZWF *b, y* | None | *Load Zone State Estimator Load Weighting Factor per bus per SCED interval*⎯The weight used in the Load Zone LMP calculation for Electrical Bus *b* for the SCED interval *y*. |
| SEL *b, y* | MW | *State Estimator Load at bus per SCED interval*⎯The Load from the State Estimator, including a calculated net Load value at each Private Use Network and adjustments to account for DGR and DESR injections and withdrawals that are settled at a Resource Node, excluding WSL and Non-WSL ESR Charging Load for Electrical Bus *b* in the Load Zone, for the SCED interval *y*. |
| *y* | None | A SCED interval. |
| *b* | None | An Electrical Bus in the Load Zone. The summation is over all of the Electrical Buses in the Load Zone. |

6.6.1.5 Hub LMPs

(1) The Hub LMPs shall be posted on the ERCOT website.

(2) For each defined Hub except for the ERCOT Hub Average 345 kV Hub, the Hub LMP is the arithmetic average of the Real-Time LMPs of the Hub Buses included in the Hub. The Hub LMP for a SCED Interval is calculated as follows:

HUBLMP *Hub, y* = (HUBDF *hb, Hub* \* RTHBP *hb, Hub, y*), if HB*Hub* ≠ 0

HUBLMP *Hub, y* = HUBLMP*ERCOT345Bus*, if HB*Hub* = 0

Where:

RTHBP *hb, Hub, y* = (HBDF *b, hb, Hub* \* RTLMP *b, hb, Hub, y*)

HUBDF *hb, Hub* = 1 **/** HB *Hub*, if HB*Hub* ≠ 0

HUBDF *hb, Hub*  = 0, if HB*Hub* = 0

HBDF *b, hb, Hub*  = 1 **/** B *hb, Hub*, if B *hb, Hub* ≠ 0

HBDF *b, hb, Hub*  = 0, if B *hb, Hub* = 0

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| HUBLMP*Hub, y* | $/MWh | *Hub Locational Marginal Price*⎯The Hub LMP for the Hub for the SCED Interval *y*. |
| RTHBP *hb, Hub, y* | $/MWh | *Real-Time Hub Bus Price at Hub Bus per SCED interval*⎯The Real-Time energy price at Hub Bus *hb* for the SCED interval *y*. |
| RTLMP *b, hb, Hub, y* | $/MWh | *Real-Time Locational Marginal Price at Electrical Bus of Hub Bus per interval*⎯The Real-Time LMP at Electrical Bus *b* that is a component of Hub Bus *hb*, for the SCED interval *y*. |
| HUBDF *hb, Hub* | none | *Hub Distribution Factor per Hub Bus*⎯The distribution factor of Hub Bus *hb*. |
| HBDF *b, hb, Hub* | none | *Hub Bus Distribution Factor per Electrical Bus of Hub Bus*⎯The distribution factor of Electrical Bus *b* that is a component of Hub Bus *hb*. |
| B *hb, Hub* | none | The total number of energized Electrical Buses in Hub Bus *hb*. |
| HB*Hub* | none | The total number of Hub Buses in the Hub with at least one energized component in each Hub Bus. |
| *Hub* | none | One of the following Hubs: ERCOT Bus Average 345 kV Hub, North 345 kV Hub, South 345 kV Hub, Houston 345 kV Hub, or the West 345 kV Hub |
| *hb* | none | A Hub Bus that is a component of the Hub. |
| *y* | none | A SCED interval. |
| *b* | none | An energized Electrical Bus that is a component of a Hub Bus. |

(3) The Hub LMP for the ERCOT Hub Average 345 kV Hub (ERCOT 345) for a SCED Interval is calculated as follows:

HUBLMP *ERCOT345, y* = (HUBLMP*NORTH345, y* + HUBLMP*SOUTH345, y +* HUBLMP*HOUSTON345, y +* HUBLMP*WEST345, y*) / 4

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| HUBLMP*ERCOT345, y* | $/MWh | *Hub Locational Marginal Price for the ERCOT345*⎯The Hub LMP for the ERCOT Hub Average 345 kV Hub (ERCOT 345), for the SCED Interval *y*. |
| HUBLMP*NORTH345, y* | $/MWh | *Hub Locational Marginal Price for the NORTH345*⎯The Hub LMP for the North 345 kV Hub (NORTH 345), for the SCED Interval *y*. |
| HUBLMP*SOUTH345, y* | $/MWh | *Hub Locational Marginal Price for the SOUTH345*⎯The Hub LMP for the South 345 kV Hub (SOUTH 345), for the SCED Interval *y*. |
| HUBLMP*HOUSTON345, y* | $/MWh | *Hub Locational Marginal Price for the HOUSTON345*⎯The Hub LMP for the Houston 345 kV Hub (HOUSTON 345), for the SCED Interval *y*. |
| HUBLMP*WEST345, y* | $/MWh | *Hub Locational Marginal Price for the WEST345*⎯The Hub LMP for the West 345 kV Hub (WEST 345), for the SCED Interval *y*. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1057: Replace applicable portions of Section 6.6.1.5 above with the following upon system implementation of NPRR941 or NPRR1057:]***  6.6.1.5 Hub LMPs  (1) The Hub LMPs shall be posted on the ERCOT website.  (2) For each defined Hub except for the ERCOT Hub Average 345 kV Hub and the ERCOT Bus Average 345 kV Hub, the Hub LMP is the arithmetic average of the Real-Time LMPs of the Hub Buses included in the Hub. The Hub LMP for a SCED Interval is calculated as follows:  HUBLMP *Hub, y* = (HUBDF *hb, Hub* \* RTHBP *hb, Hub, y*), if HB*Hub* ≠ 0  HUBLMP *Hub, y* = HUBLMP*ERCOT345Bus,y*, if HB*Hub* = 0  Where:  RTHBP *hb, Hub, y* = (HBDF *b, hb, Hub* \* RTLMP *b, hb, Hub, y*)  HUBDF *hb, Hub* = 1 **/** HB *Hub*, if HB*Hub* ≠ 0  HUBDF *hb, Hub*  = 0, if HB*Hub* = 0  HBDF *b, hb, Hub*  = 1 **/** B *hb, Hub*, if B *hb, Hub* ≠ 0  HBDF *b, hb, Hub*  = 0, if B *hb, Hub* = 0  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | Variable | Unit | Description | | HUBLMP*Hub, y* | $/MWh | *Hub Locational Marginal Price*⎯The Hub LMP for the Hub for the SCED Interval *y*. | | RTHBP *hb, Hub, y* | $/MWh | *Real-Time Hub Bus Price at Hub Bus per SCED interval*⎯The Real-Time energy price at Hub Bus *hb* for the SCED interval *y*. | | HUBLMP *ERCOT345Bus,y* | $/MWh | *Hub Locational Marginal Price for the ERCOT345Bus*⎯The Hub LMP for the ERCOT Bus Average 345 kV Hub (ERCOT 345 Bus), for the SCED Interval *y*. | | RTLMP *b, hb, Hub, y* | $/MWh | *Real-Time Locational Marginal Price at Electrical Bus of Hub Bus per interval*⎯The Real-Time LMP at Electrical Bus *b* that is a component of Hub Bus *hb*, for the SCED interval *y*. | | HUBDF *hb, Hub* | none | *Hub Distribution Factor per Hub Bus*⎯The distribution factor of Hub Bus *hb*. | | HBDF *b, hb, Hub* | none | *Hub Bus Distribution Factor per Electrical Bus of Hub Bus*⎯The distribution factor of Electrical Bus *b* that is a component of Hub Bus *hb*. | | B *hb, Hub* | none | The total number of energized Electrical Buses in Hub Bus *hb*. | | HB*Hub* | none | The total number of Hub Buses in the Hub with at least one energized component in each Hub Bus. | | *Hub* | none | One of the following Hubs: North 345 kV Hub, South 345 kV Hub, Houston 345 kV Hub, West 345 kV Hub, the Panhandle 345 kV Hub, or the Lower Rio Grande Valley 138/345 kV Hub. | | *hb* | none | A Hub Bus that is a component of the Hub with at least one energized component. | | *y* | none | A SCED interval. | | *b* | none | An energized Electrical Bus that is a component of a Hub Bus. |   (3) The Hub LMP for the ERCOT Hub Average 345 kV Hub (ERCOT 345) for a SCED Interval is calculated as follows:  HUBLMP *ERCOT345, y* = (HUBLMP*NORTH345, y* + HUBLMP*SOUTH345, y +* HUBLMP*HOUSTON345, y +* HUBLMP*WEST345, y*) / 4  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | Variable | Unit | Description | | HUBLMP*ERCOT345, y* | $/MWh | *Hub Locational Marginal Price for the ERCOT345*⎯The Hub LMP for the ERCOT Hub Average 345 kV Hub (ERCOT 345), for the SCED Interval *y*. | | HUBLMP*NORTH345, y* | $/MWh | *Hub Locational Marginal Price for the NORTH345*⎯The Hub LMP for the North 345 kV Hub (NORTH 345), for the SCED Interval *y*. | | HUBLMP*SOUTH345, y* | $/MWh | *Hub Locational Marginal Price for the SOUTH345*⎯The Hub LMP for the South 345 kV Hub (SOUTH 345), for the SCED Interval *y*. | | HUBLMP*HOUSTON345, y* | $/MWh | *Hub Locational Marginal Price for the HOUSTON345*⎯The Hub LMP for the Houston 345 kV Hub (HOUSTON 345), for the SCED Interval *y*. | | HUBLMP*WEST345, y* | $/MWh | *Hub Locational Marginal Price for the WEST345*⎯The Hub LMP for the West 345 kV Hub (WEST 345), for the SCED Interval *y*. |   (4) The Hub LMP for the ERCOT Bus Average 345 kV Hub (ERCOT 345 Bus) for a SCED Interval is calculated as follows:  HUBLMP *ERCOT345Bus, y* =(HUBDF *hb,ERCOT345Bus* \* RTHBP *hb, ERCOT345Bus, y*), if HB*ERCOT345Bus* ≠ 0  HUBLMP *ERCOT345Bus, y* = 0, if HB*ERCOT345Bus* = 0  Where:  RTHBP *hb, ERCOT345Bus, y* = (HBDF *b, hb, ERCOT345Bus* \* RTLMP *b, hb, ERCOT345Bus, y*)  HUBDF *hb, ERCOT345Busc =* IF(HB*ERCOT345Bus* =0, 0, 1 **/** HB *ERCOT345Bus*)  HBDF *b, hb, ERCOT345Bus =* IF(B*hb, ERCOT345Bus* =0, 0, 1 **/** B *hb, ERCOT345Bus*)   |  |  |  | | --- | --- | --- | | Variable | Unit | Description | | HUBLMP *ERCOT345Bus, y* | $/MWh | *Hub Locational Marginal Price for the ERCOT345Bus*⎯The Hub LMP for the ERCOT Bus Average 345 kV Hub (ERCOT 345 Bus), for the SCED Interval *y*. | | RTHBP *hb, ERCOT345Bus, y* | $/MWh | *Real-Time Hub Bus Price at Hub Bus per SCED interval*⎯The Real-Time energy price at Hub Bus *hb* in ERCOT 345 Bus, for the SCED interval *y*. | | RTLMP *b, hb, ERCOT345Bus, y* | $/MWh | *Real-Time Locational Marginal Price at Electrical Bus of Hub Bus per interval*⎯The Real-Time LMP at Electrical Bus *b* that is a component of Hub Bus *hb* in ERCOT 345 Bus, for the SCED interval *y*. | | HUBDF *hb, ERCOT345Bus* | none | *Hub Distribution Factor per Hub Bus*⎯The distribution factor of Hub Bus *hb*. | | HBDF *b, hb, ERCOT345Bus* | none | *Hub Bus Distribution Factor per Electrical Bus of Hub Bus*⎯The distribution factor of Electrical Bus *b* that is a component of Hub Bus *hb*. | | HB*ERCOT345Bus* | none | The total number of Hub Buses in the ERCOT Bus Average 345 kV Hub (ERCOT 345 Bus) with at least one energized component in each Hub Bus . The Hub “ERCOT 345 Bus” includes any Hub Bus defined in the Hub “North 345”, “South 345”, “Houston 345” and “West 345”. | | B *hb, ERCOT345Bus* | none | The total number of energized Electrical Buses in Hub Bus *hb* that is a component of “ERCOT 345 Bus”. | | *hb* | none | A Hub Bus that is a component of the ERCOT Bus Average 345 kV Hub (ERCOT 345 Bus) with at least one energized component. The Hub “ERCOT 345 Bus” includes any Hub Bus defined in the Hub “North 345”, “South 345”, “Houston 345” and “West 345”. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. The summation is over the total number of SCED runs that cover the 15-minute Settlement Interval. | | *b* | none | An energized Electrical Bus that is a component of a Hub Bus. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1010: Insert Section 6.6.1.6 below upon system implementation of the Real-Time Co-Optimization (RTC) project:]  **6.6.1.6 Real-Time Market Clearing Prices for Ancillary Services**  (1) The Real-Time Market Clearing Price for Capacity (MCPC) for Reg-Up is the time-weighted average of the sum of the Real-Time MCPCs for Reg-Up and Real-Time Reliability Deployment Price Adder for Ancillary Service for Reg-Up of each SCED interval in the 15-minute Settlement Interval. The Real-Time MCPC for Reg-Up for a 15-minute Settlement Interval is calculated as follows:  RTMCPCRU =  (RNWF *y* \* (RTMCPCRUS *y* + RTRDPARUS *y*))  Where:  RNWF *y* = TLMP *y* / TLMP *y*  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | RTMCPCRU | $/MW | *Real-Time Market Clearing Price for Capacity for Reg-Up -* The Real-Time MCPC for Reg-Up for the 15-minute Settlement Interval. | | RTMCPCRUS *y* | $/MW | *Real-Time Market Clearing Price for Capacity for Reg-Up per SCED interval -* The Real-Time MCPC for Reg-Up for the SCED interval *y.* | | RTRDPARUS *y* | $/MW | *Real-Time Reliability Deployment Price Adder for Ancillary Service for Reg-Up per SCED interval* - The Real-Time price adder for Reg-Up that captures the impact of reliability deployments on Reg-Up prices for the SCED interval y. | | RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Ancillary Service Price calculation for the portion of the SCED interval *y* within the Settlement Interval. | | TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the portion of the SCED interval *y* within the Settlement Interval. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. |   (2) The Real-Time MCPC for Reg-Down is the time-weighted average of the sum of the Real-Time MCPCs for Reg-Down and Real-Time Reliability Deployment Price Adder for Ancillary Service for Reg-Down of each SCED interval in the 15-minute Settlement Interval. The Real-Time MCPC for Reg-Down for a 15-minute Settlement Interval is calculated as follows:  RTMCPCRD =  (RNWF *y* \* (RTMCPCRDS *y*+ RTRDPARDS *y*))  Where:  RNWF *y* = TLMP *y* / TLMP *y*  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | RTMCPCRD | $/MW | *Real-Time Market Clearing Price for Capacity for Reg-Down -* The Real-Time MCPC for Reg-Down for the 15-minute Settlement Interval. | | RTMCPCRDS *y* | $/MW | *Real-Time Market Clearing Price for Capacity for Reg-Down per SCED interval -* The Real-Time MCPC for Reg-Down for the SCED interval *y.* | | RTRDPARDS *y* | $/MW | *Real-Time Reliability Deployment Price Adder for Ancillary Service for Reg-Down per SCED interval* - The Real-Time price adder for Reg-Down that captures the impact of reliability deployments on Reg-Down prices for the SCED interval *y*. | | RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Ancillary Service Price calculation for the portion of the SCED interval *y* within the Settlement Interval. | | TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the portion of the SCED interval *y* within the Settlement Interval. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. |   (3) The Real-Time MCPC for RRS is the time-weighted average of the sum of the Real-Time MCPCs for RRS and Real-Time Reliability Deployment Price Adder for Ancillary Service for RRS of each SCED interval in the 15-minute Settlement Interval. The Real-Time MCPC for RRS for a 15-minute Settlement Interval is calculated as follows:  RTMCPCRR =  (RNWF *y* \* (RTMCPCRRS *y* + RTRDPARRS *y*))  Where:  RNWF *y* = TLMP *y* / TLMP *y*  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | RTMCPCRR | $/MW | *Real-Time Market Clearing Price for Capacity for Responsive Reserve -* The Real-Time MCPC for RRS for the 15-minute Settlement Interval. | | RTMCPCRRS *y* | $/MW | *Real-Time Market Clearing Price for Capacity for Responsive Reserve per SCED interval -* The Real-Time MCPC for RRS for the SCED interval *y.* | | RTRDPARRS *y* | $/MW | *Real-Time Reliability Deployment Price Adder for Ancillary Service for Responsive Reserve per SCED interval* - The Real-Time price adder for RRS that captures the impact of reliability deployments on RRS prices for the SCED interval y. | | RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Ancillary Service Price calculation for the portion of the SCED interval *y* within the Settlement Interval. | | TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the portion of the SCED interval *y* within the Settlement Interval. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. |   (4) The Real-Time MCPC for ECRS is the time-weighted average of the sum of the Real-Time MCPC for ECRS and Real-Time Reliability Deployment Price Adder for Ancillary Service for ECRS of each SCED interval in the 15-minute Settlement Interval. The Real-Time MCPC for ECRS for a 15-minute Settlement Interval is calculated as follows:  RTMCPCECR =  (RNWF *y* \* (RTMCPCECRS *y*+ RTRDPAECRS *y*))  Where:  RNWF *y* = TLMP *y* / TLMP *y*  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | RTMCPCECR | $/MW | *Real-Time Market Clearing Price for Capacity for ERCOT Contingency Reserve* *-* The Real-Time MCPC for ECRS for the 15-minute Settlement Interval. | | RTMCPCECRS *y* | $/MW | *Real-Time Market Clearing Price for Capacity for ERCOT Contingency Reserve* *per SCED interval -* The Real-Time MCPC for ECRS for the SCED interval *y.* | | RTRDPAECRS *y* | $/MW | *Real-Time Reliability Deployment Price Adder for Ancillary Service for ECRS per SCED interval* - The Real-Time price adder for ECRS that captures the impact of reliability deployments on ECRS prices for the SCED interval y. | | RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Ancillary Service Price calculation for the portion of the SCED interval *y* within the Settlement Interval. | | TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the portion of the SCED interval *y* within the Settlement Interval. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. |   (5) The Real-Time MCPC for Non-Spin is the time-weighted average of the sum of the Real-Time MCPC for Non-Spin and Real-Time Reliability Deployment Price Adders for Ancillary Service for Non-Spin of each SCED interval in the 15-minute Settlement Interval. The Real-Time MCPC for Non-Spin for a 15-minute Settlement Interval is calculated as follows:  RTMCPCNS =  (RNWF *y* \* (RTMCPCNSS *y*+ RTRDPANSS *y*))  Where:  RNWF *y* = TLMP *y* / TLMP *y*  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | 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. | | RTMCPCNSS *y* | $/MW | *Real-Time Market Clearing Price for Capacity for Non-Spin* *per SCED interval -* The Real-Time MCPC for Non-Spin for the SCED interval *y.* | | RTRDPANSS *y* | $/MW | *Real-Time Reliability Deployment Price Adder for Ancillary Service for Non-Spin per SCED interval* - The Real-Time price adder for Non-Spin that captures the impact of reliability deployments on Non-Spin prices for the SCED interval y. | | RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Ancillary Service Price calculation for the portion of the SCED interval *y* within the Settlement Interval. | | TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the portion of the SCED interval *y* within the Settlement Interval. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1010: Insert Section 6.6.1.7 below upon system implementation of the Real-Time Co-Optimization (RTC) project:]  **6.6.1.7 Real-Time Reliability Deployment Prices for Ancillary Services**  (1) The Real-Time Reliability Deployment Price for Ancillary Service for Reg-Up (RTRDPRU) is the time-weighted average of the sum of the Real-Time Reliability Deployment Price Adders for Ancillary Service for Reg-Up per SCED interval. The Real-Time Reliability Deployment Price for Ancillary Service for Reg-Up for a 15-minute Settlement Interval is calculated as follows:  RTRDPRU =  (RNWF *y* \* RTRDPARUS *y*)  Where:  RNWF *y* = TLMP *y* / TLMP *y*  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | RTRDPRU | $/MW | *Real-Time Reliability Deployment Price for Ancillary Service for Reg-Up -* The Real-Time Reliability Deployment Price for Ancillary Service for Reg-Up for the 15-minute Settlement Interval. | | RTRDPARUS *y* | $/MW | *Real-Time Reliability Deployment Price Adder for Ancillary Service for Reg-Up per SCED interval* - The Real-Time price adder for Reg-Up that captures the impact of reliability deployments on Reg-Up prices for the SCED interval y. | | RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Ancillary Service Price calculation for the portion of the SCED interval *y* within the Settlement Interval. | | TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the portion of the SCED interval *y* within the Settlement Interval. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. |   (2) The Real-Time Reliability Deployment Price for Ancillary Service for Reg-Down (RTRDPRD) is the time-weighted average of the sum of the Real-Time Reliability Deployment Price Adders for Ancillary Service for Reg-Down per SCED interval. The Real-Time Reliability Deployment Price for Ancillary Service for Reg-Down for a 15-minute Settlement Interval is calculated as follows:  RTRDPRD =  (RNWF *y* \* RTRDPARDS *y*)  Where:  RNWF *y* = TLMP *y* / TLMP *y*  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | RTRDPRD | $/MW | *Real-Time Reliability Deployment Price for Ancillary Service for Reg-Down -* The Real-Time Reliability Deployment Price for Ancillary Service for Reg-Down for the 15-minute Settlement Interval. | | RTRDPARDS *y* | $/MW | *Real-Time Reliability Deployment Price Adder for Ancillary Service for Reg-Down per SCED interval* - The Real-Time price adder for Reg-Down that captures the impact of reliability deployments on Reg-Down prices for the SCED interval *y*. | | RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Ancillary Service Price calculation for the portion of the SCED interval *y* within the Settlement Interval. | | TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the portion of the SCED interval *y* within the Settlement Interval. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. |   (3) The Real-Time Reliability Deployment Price for Ancillary Service for Responsive Reserve (RTRDPRRS) is the time-weighted average of the sum of the Real-Time Reliability Deployment Price Adders for Ancillary Service for Responsive Reserve per SCED interval. The Real-Time Reliability Deployment Price for Ancillary Service for Responsive Reserve for a 15-minute Settlement Interval is calculated as follows:  RTRDPRRS =  (RNWF *y* \* RTRDPARRS *y*)  Where:  RNWF *y* = TLMP *y* / TLMP *y*  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | RTRDPRRS | $/MW | *Real-Time Reliability Deployment Price for Ancillary Service for Responsive Reserve -* The Real-Time Reliability Deployment Price for Ancillary Service for RRS for the 15-minute Settlement Interval. | | RTRDPARRS *y* | $/MW | *Real-Time Reliability Deployment Price Adder for Ancillary Service for Responsive Reserve per SCED interval* - The Real-Time price adder for RRS that captures the impact of reliability deployments on RRS prices for the SCED interval y. | | RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Ancillary Service Price calculation for the portion of the SCED interval *y* within the Settlement Interval. | | TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the portion of the SCED interval *y* within the Settlement Interval. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. |   (4) The Real-Time Reliability Deployment Price for Ancillary Service for ERCOT Contingency Reserve (RTRDPECR) is the time-weighted average of the sum of the Real-Time Reliability Deployment Price Adders for Ancillary Service for ERCOT Contingency Reserve per SCED interval. The Real-Time Reliability Deployment Price for Ancillary Service for ERCOT Contingency Reserve for a 15-minute Settlement Interval is calculated as follows:  RTRDPECR =  (RNWF *y* \* RTRDPAECRS *y*)  Where:  RNWF *y* = TLMP *y* / TLMP *y*  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | RTRDPECR | $/MW | *Real-Time Market Clearing Price for Capacity for ERCOT Contingency Reserve* *-* The Real-Time Reliability Deployment Price for Ancillary Service for ECRS for the 15-minute Settlement Interval. | | RTRDPAECRS *y* | $/MW | *Real-Time Reliability Deployment Price Adder for Ancillary Service for ECRS per SCED interval* - The Real-Time price adder for ECRS that captures the impact of reliability deployments on ECRS prices for the SCED interval y. | | RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Ancillary Service Price calculation for the portion of the SCED interval *y* within the Settlement Interval. | | TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the portion of the SCED interval *y* within the Settlement Interval. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. |   (5) The Real-Time Reliability Deployment Price for Ancillary Service for ERCOT Non-Spin (RTRDPNS) is the time-weighted average of the sum of the Real-Time Reliability Deployment Price Adders for Ancillary Service for Non-Spin per SCED interval. The Real-Time Reliability Deployment Price for Ancillary Service for Non-Spin for a 15-minute Settlement Interval is calculated as follows:  RTRDPNS =  (RNWF *y* \* RTRDPANSS *y*)  Where:  RNWF *y* = TLMP *y* / TLMP *y*  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | RTRDPNS | $/MW | *Real-Time Market Clearing Price for Capacity for Non-Spin* *-* The Real-Time Reliability Deployment Price for Ancillary Service for ECRS for the 15-minute Settlement Interval. | | RTRDPANSS *y* | $/MW | *Real-Time Reliability Deployment Price Adder for Ancillary Service for Non-Spin per SCED interval* - The Real-Time price adder for Non-Spin that captures the impact of reliability deployments on Non-Spin prices for the SCED interval y. | | RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Ancillary Service Price calculation for the portion of the SCED interval *y* within the Settlement Interval. | | TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the portion of the SCED interval *y* within the Settlement Interval. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. | |

6.6.2 Load Ratio Share

6.6.2.1 ERCOT Total Adjusted Metered Load for a 15-Minute Settlement Interval

(1) ERCOT total Adjusted Metered Load (AML) for a 15-minute Settlement Interval is calculated as follows:

RTAMLTOT = (max(0,RTAML *q, p*))

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| RTAMLTOT | MWh | *Real-Time Adjusted Metered Load Total*—The total AML in ERCOT, for the 15-minute Settlement Interval. |
| RTAML *q, p* | MWh | *Real-Time Adjusted Metered Load per Qualified Scheduling Entity (QSE) per Settlement Point*—The sum of the AML at the Electrical Buses that are included in Settlement Point *p*, represented by Qualified Scheduling Entity (QSE) *q*, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. The summation is over all of the QSEs with metered readings in that interval. |
| *p* | none | A Settlement Point. The summation is over all of the Settlement Points. |

6.6.2.2 QSE Load Ratio Share for a 15-Minute Settlement Interval

(1) Each QSE’s Load Ratio Share (LRS) for a 15-minute Settlement Interval is calculated as follows:

LRS *q* = (max(0,RTAML *q, p*)) / RTAMLTOT

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| LRS *q* | none | *Load Ratio Share per QSE*—The LRS as defined in Section 2, Definitions and Acronyms, for QSE *q*, for the 15-minute Settlement Interval. |
| RTAML *q, p* | MWh | *Real-Time Adjusted Metered Load per Settlement Point per QSE*—The sum of the AML at the Electrical Buses that are included in Settlement Point *p*, represented by QSE *q*, for the 15-minute Settlement Interval. |
| RTAMLTOT | MWh | *Real-Time Adjusted Metered Load Total*—The total AML in ERCOT, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A Settlement Point. The summation is over all of the Settlement Points. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1030: Insert paragraphs (2)-(4) below upon system implementation:]  (2) Each QSE’s MLRS, excluding DC Tie exports included in RTAML, for ERCOT’s peak Load 15-minute Settlement Interval in the calendar month is calculated as follows:  MLRS *q* = max(0,(RTAML *q, p -* RTAMLDC *q, p*)) / (RTAMLTOT -  RTAMLDC *q, p*)  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | Variable | Unit | Description | | 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. | | RTAML *q, p* | MWh | *Real-Time Adjusted Metered Load per Settlement Point per QSE*—The sum of the AML at the Electrical Buses that are included in Settlement Point *p*, represented by QSE *q*, for the 15-minute Settlement Interval. | | RTAMLDC *q,p* | MWh | *Real-Time Adjusted Metered Load for DC Ties per Settlement Point per QSE*—The sum of the DC Tie AML at the Electrical Buses that are included in Settlement Point *p*, represented by QSE *q*, for the 15-minute Settlement Interval. | | RTAMLTOT | MWh | *Real-Time Adjusted Metered Load Total*—The total AML in ERCOT, for the 15-minute Settlement Interval. | | *q* | none | A QSE. | | *p* | none | A Settlement Point. The summation is over all of the Settlement Points. |   (3) ERCOT total AML per Congestion Management Zone (CMZ) excluding DC Tie exports included in RTAML for ERCOT’s peak Load 15-minute Settlement Interval in the calendar month is calculated as follows:  **RTAMLLZTOTz =  (max(0,** (**RTAML *q, p –* RTAMLDC** ***q, p* )))**  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | **Variable** | **Unit** | **Description** | | RTAMLLZTOTz | MWh | *Real-Time Adjusted Metered Load - Load Zone Total*—The total AML excluding DC Tie exports in CMZ z, for the peak Load 15-minute Settlement Interval in the calendar month. | | RTAML *q, p* | MWh | *Real-Time Adjusted Metered Load per QSE per Settlement Point*—The sum of the AML at the Electrical Buses that are included in Settlement Point *p*, represented by QSE *q*, for the 15-minute Settlement Interval*.* | | RTAMLDC *q, p* | MWh | *Real-Time Adjusted Metered Load for DC Ties per Settlement Point per QSE*—The sum of the DC Tie AML at the Electrical Buses that are included in Settlement Point *p*, represented by QSE *q*, for the 15-minute Settlement Interval. | | *q* | none | A QSE. | | *p* | none | A Settlement Point in the 2003 ERCOT CMZ. | | *z* | none | A 2003 ERCOT CMZ. |   (4) Each QSE’s MLRSZ, excluding DC Tie exports included in RTAML, by CMZ for ERCOT’s peak Load 15-minute Settlement Interval in the calendar month is calculated as follows:  MLRSZ *q,z* = max(0, (RTAML *q, p -* RTAMLDC *q, p*)) / RTAMLLZTOTz  The above variables are defined as follows:   |  |  |  |  | | --- | --- | --- | --- | | Variable | Unit | | Description | | 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 Exports in CMZ *z*, for the peak Load 15-minute Settlement Interval in the month. | | RTAML *q, p* | MWh | | *Real-Time Adjusted Metered Load per Settlement Point per QSE*—The sum of the AML at the Electrical Buses that are included in Settlement Point *p*, represented by QSE *q*, for the 15-minute Settlement Interval. | | RTAMLDC *q,p* | MWh | | *Real-Time Adjusted Metered Load for DC Ties per Settlement Point per QSE*—The sum of the DC Tie AML at the Electrical Buses that are included in Settlement Point *p*, represented by QSE *q*, for the 15-minute Settlement Interval. | | RTAMLLZTOTz | | MWh | *Real-Time Adjusted Metered Load - Load Zone Total*—The total AML excluding DC Tie exports in CMZ z, for the peak Load 15-minute Settlement Interval in the calendar month. | | *q* | none | | A QSE. | | *p* | none | | A Settlement Point in the 2003 ERCOT CMZ. | | *z* | | none | A 2003 ERCOT CMZ. | |

**6.6.2.3 ERCOT Total Adjusted Metered Load for an Operating Hour**

(1) ERCOT total AML for an Operating Hour is calculated as follows:

**HRTAMLTOT = (max(0, RTAML *q, p*)** **)**

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| HRTAMLTOT | MWh | *Real-Time Adjusted Metered Load Total*—The total AML in ERCOT, for the Operating Hour. |
| RTAML *q, p* | MWh | *Real-Time Adjusted Metered Load per QSE per Settlement Point*—The sum of the AML at the Electrical Buses that are included in Settlement Point *p*, represented by QSE *q*, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. The summation is over all of the QSEs with metered readings in that interval. |
| *p* | none | A Settlement Point. The summation is over all of the Settlement Points. |
| *i* | none | A 15-minute Settlement Interval in the Operating Hour. The summation is over all of the Settlement Intervals of the Operating Hour. |

6.6.2.4 QSE Load Ratio Share for an Operating Hour

(1) Each QSE’s LRS for an Operating Hour is calculated as follows:

HLRS *q* = (max(0,RTAML *q, p, i*)) / (HRTAMLTOT)

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| HLRS *q* | none | *Hourly Load Ratio Share per QSE*—The LRS as defined in Section 2, Definitions and Acronyms, for QSE *q*, for the hour. |
| RTAML *q, p, i* | MWh | *Real-Time Adjusted Metered Load per Settlement Point per QSE by interval*—The sum of the AML at the Electrical Buses that are included in the Settlement Point *p*, represented by QSE *q* for the 15-minute Settlement Interval *i*. |
| HRTAMLTOT | MWh | *Real-Time Adjusted Metered Load Total*—The total AML in ERCOT, for the Operating Hour. |
| *p* | none | A Settlement Point. The summation is over all of the Settlement Points. |
| *i* | none | A 15-minute Settlement Interval in the Operating Hour. The summation is over all of the Settlement Intervals of the Operating Hour. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1030: Insert Section 6.6.2.5 below upon system implementation:]  **6.6.2.5 ERCOT Total Adjusted Metered Load for a Month**  (1) ERCOT total AML for a calendar month is calculated as follows:  **MRTAMLTOT = (max(0,** **RTAML *q, p,i*))**  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | **Variable** | **Unit** | **Description** | | MRTAMLTOT | MWh | *Monthly Real-Time Adjusted Metered Load Total*—The total AML in ERCOT, for the calendar month. | | RTAML *q, p,i* | MWh | *Real-Time Adjusted Metered Load per QSE per Settlement Point*—The sum of the AML at the Electrical Buses that are included in Settlement Point *p*, represented by QSE *q*, for the 15-minute Settlement Interval *i*. | | *q* | none | A QSE. | | *p* | none | A Settlement Point. | | *i* | none | A 15-minute Settlement Interval. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1030 : Insert Section 6.6.2.6 below upon system implementation:]  6.6.2.6 QSE DC Tie Export Load Ratio Share for a Month  (1) Each QSE’s DC Tie Export DCMLRS for a calendar month is calculated as follows:  DCMLRS *q* = max(0, RTAMLDC *q, p, i* ) / MRTAMLTOT  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | Variable | Unit | Description | | DCMLRS *q* | none | *DC Tie Export Monthly Load Ratio Share per QSE*—The ratio share calculated for QSE *q* with DC Tie Exports for the calendar month. | | RTAMLDC *q, p, i* | MWh | *Real-Time Adjusted Metered Load for DC Ties per Settlement Point per QSE*—The sum of the DC Tie AML at the Electrical Buses that are included in Settlement  Point *p*, represented by QSE *q*, for the 15-minute Settlement Interval *i*. | | MRTAMLTOT | MWh | *Monthly Real-Time Adjusted Metered Load Total*—The total AML in ERCOT, for  the calendar month. | | *q* | none | A QSE. | | *p* | none | A Settlement Point. | | *i* | none | A 15-minute Settlement Interval. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1030: Insert Section 6.6.2.7 below upon system implementation:]  **6.6.2.7 ERCOT Adjusted Metered Load by Congestion Management Zone for a Month**  (1) ERCOT total AML per CMZ for a calendar month is calculated as follows:  **MRTAMLLZTOT z =  (max(0,** **RTAML *q, p,i*))**  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | **Variable** | **Unit** | **Description** | | MRTAMLLZTOTz | MWh | *Monthly Real-Time Adjusted Metered Load - Load Zone Total*—The total AML in CMZ z, for the calendar month. | | RTAML *q, p,i* | MWh | *Real-Time Adjusted Metered Load per QSE per Settlement Point*—The sum of the AML at the Electrical Buses that are included in Settlement Point *p*, represented by QSE *q*, for the 15-minute Settlement Interval *i.* | | *q* | none | A QSE. | | *p* | none | A Settlement Point in the 2003 ERCOT CMZ. | | *i* | none | A 15-minute Settlement Interval. | | *z* | none | A 2003 ERCOT CMZ. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1030: Insert Section 6.6.2.8 below upon system implementation:]  6.6.2.8 QSE DC Tie Export Load Ratio Share by Congestion Management Zone for a Month  (1) Each QSE’s DC Tie Export DCMLRSZ by CMZ for a calendar month is calculated as follows:  DCMLRSZ q, z = max(0, RTAMLDC *q, p, i* ) / MRTAMLLZTOT*z*  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | Variable | Unit | Description | | DCMLRSZ *q, z* | none | *DC Tie Exports Monthly Load Ratio Share Zonal per QSE*—The ratio share  calculated for QSE *q* with DC Tie exports by CMZ *z* for the calendar month. | | RTAMLDC *q, p, i* | MWh | *Real-Time Adjusted Metered Load for DC Ties per Settlement Point per QSE*—The sum of the DC Tie AML at the Electrical Buses that are included in Settlement  Point *p*, represented by QSE *q*, for the 15-minute Settlement Interval *i*. | | MRTAMLLZTOT*z* | MWh | *Monthly Real-Time Adjusted Metered Load - Load Zone Total*—The total AML in CMZ z, for the calendar month. | | *q* | none | A QSE. | | *p* | none | A Settlement Point in the 2003 ERCOT CMZ. | | *i* | none | A 15-minute Settlement Interval. | | *z* | none | A 2003 ERCOT CMZ. | |

6.6.3 Real-Time Energy Charges and Payments

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

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

(a) The energy produced by all its Generation Resources, consumed as WSL, or consumed as Non-WSL ESR Charging Load at the Settlement Point; plus

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

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

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

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

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

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

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

RTEIAMT *q, p* = (-1) \* {((RESREV *q, r, gsc, p*)) + (WSLAMTTOT *q, r, p*) + (ESRNWSLAMTTOT *q, r, p*) + RTSPP *p* \* [(SSSK *q, p* \* ¼) + (DAEP *q, p* \* ¼) + (RTQQEP *q, p* \* ¼) – (SSSR *q, p* \* ¼) – (DAES *q, p* \* ¼) – (RTQQES *q, p* \* ¼)]}

Where:

RESREV *q, r, gsc, p* = GSPLITPER *q, r, gsc, p* \* NMSAMTTOT *gsc*

RESMEB *q, r, gsc, p* = GSPLITPER *q, r, gsc, p* \* NMRTETOT *gsc*

WSLTOT *q, p* =  ( MEBL *q, r, b*)

ESRNWSLTOT *q, p* =  ( MEBR *q, r, b*)

RNIMBAL *q, p =* (RESMEB *q, r, gsc, p*) + WSLTOT *q, p* + ESRNWSLTOT *q, p* + (SSSK *q, p* \* ¼) + (DAEP *q, p* \* ¼) + (RTQQEP *q, p* \* ¼) – (SSSR *q, p* \* ¼) – (DAES *q, p* \* ¼) – (RTQQES *q, p* \* ¼)

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| RTEIAMT *q, p* | $ | *Real-Time Energy Imbalance Amount per QSE per Settlement Point*—The payment or charge to QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval. |
| RNIMBAL *q, p* | MWh | *Resource Node Energy Imbalance per QSE per Settlement Point*—The Resource Node volumetric imbalance for QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval. |
| RTSPP *p* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval. |
| SSSK *q, p* | MW | *Self-Schedule with Sink at Settlement Point per QSE per Settlement Point*—The QSE *q*’s Self-Schedule with sink at Settlement Point *p*, for the 15-minute Settlement Interval. |
| DAEP *q, p* | MW | *Day-Ahead Energy Purchase per QSE per Settlement Point*—The QSE *q*’s DAM Energy Bids at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval. |
| RTQQEP *q, p* | MW | *Real-Time QSE-to-QSE Energy Purchase per QSE per Settlement Point*⎯The amount of MW bought by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval. |
| SSSR *q, p* | MW | *Self-Schedule with Source at Settlement Point per QSE per Settlement Point*—The QSE *q*’s Self-Schedule with source at Settlement Point *p*, for the 15-minute Settlement Interval. |
| DAES *q, p* | MW | *Day-Ahead Energy Sale per QSE per Settlement Point*—The QSE *q*’s energy offers at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval. |
| RTQQES *q, p* | MW | *Real-Time QSE-to-QSE Energy Sale per QSE per Settlement Point*⎯The amount of MW sold by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval. |
| RESREV *q, r, gsc, p* | $ | *Resource Share Revenue Settlement Payment*—The Resource share of the total payment to the entire Facility with a net metering arrangement attributed to Resource *r* that is part of a generation site code *gsc* for the QSE *q* at Settlement Point *p*. |
| RESMEB *q, r, gsc, p* | MWh | *Resource Share Net Meter Real-Time Energy Total*—The Resource share of the net sum for all Settlement Meters attributed to Resource *r* that is part of a generation site code *gsc* for the QSE *q* at Settlement Point *p*. |
| WSLTOT *q, p* | MWh | *WSL Total*—The total WSL energy metered by the Settlement Meters which measure WSL for the QSE *q* at Settlement Point *p*. |
| ESRNWSLTOT *q, p* | MWh | *ESR Non-WSL Total*—The total energy metered by the Settlement Meters which measures Non-WSL ESR Charging Load for the QSE *q* at Settlement Point *p.* |
| MEBL *q,r,b* | MWh | *Metered Energy for Wholesale Storage Load at bus*⎯The WSL energy metered by the Settlement Meter which measures WSL for the 15-minute Settlement Interval represented as a negative value, for the QSE *q*, Resource *r*, at bus *b*. |
| MEBR *q, r, b* | MWh | *Metered Energy for Energy Storage Resource Load at Bus*—The energy metered by the Settlement Meter which measures Non-WSL ESR Charging Load for the 15-minute Settlement Interval represented as a negative value, for the QSE *q*, Resource *r*, at bus *b*. |
| NMSAMTTOT *gsc* | $ | *Net Metering Settlement*—The total payment or charge to a generation site with a net metering arrangement. |
| WSLAMTTOT*q, r, p* | $ | *Wholesale Storage Load Settlement*—The total payment or charge to QSE *q*, Resource *r*, at Settlement Point *p*, for WSL for each 15-minute Settlement Interval. |
| ESRNWSLAMTTOT*q, r, p* | $ | *Energy Storage Resource Non-WSL Settlement*—The total payment or charge to QSE *q*, Resource *r*, at Settlement Point *p*, for Non-WSL ESR Charging Load for each 15-minute Settlement Interval. |
| NMRTETOT *gsc* | MWh | *Net Meter Real-Time Energy Total*—The net sum for all Settlement Meters included in generation site code *gsc*. A positive value indicates an injection of power to the ERCOT System. |
| GSPLITPER *q, r, gsc, p* | none | *Generation Resource SCADA Splitting Percentage*—The generation allocation percentage for Resource *r* that is part of a net metering arrangement. GSPLITPER is calculated by taking the Supervisory Control and Data Acquisition (SCADA) values (GSSPLITSCA) for a particular Generation Resource *r* that is part of a net metering configuration and dividing by the sum of all SCADA values for all Resources that are included in the net metering configuration for each interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *p* | none | A Resource Node Settlement Point. |
| *r* | none | A Generation Resource or a Controllable Load Resource that is part of an ESR that is located at the Facility with net metering. |
| *gsc* | none | A generation site code. |
| *b* | none | An Electrical Bus. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1014: Replace paragraph (2) above with the following upon system implementation:]  (2) The payment or charge to each QSE for Energy Imbalance Service at a Resource Node Settlement Point for a given 15-minute Settlement Interval is calculated as follows:  **RTEIAMT *q, p* = (-1) \* {((RESREV *q, r, gsc, p*)) + (WSLAMTTOT *q, r, p*) + (ESRNWSLAMTTOT *q, r, p*) + RTSPP *p* \* [(SSSK *q, p* \* ¼) + (DAEP *q, p* \* ¼) + (RTQQEP *q, p* \* ¼) – (SSSR *q, p* \* ¼) – (DAES *q, p* \* ¼) – (RTQQES *q, p* \* ¼)]}**  Where:  RESREV *q, r, gsc, p* = GSPLITPER *q, r, gsc, p* \* NMSAMTTOT *gsc*  RESMEB *q, r, gsc, p* = GSPLITPER *q, r, gsc, p* \* NMRTETOT *gsc*  WSLTOT *q, p* =  ( MEBL *q,r,b*)  ESRNWSLTOT *q, p* =  ( MEBR *q, r, b*)  RNIMBAL *q, p =* (RESMEB *q, r, gsc, p*) + WSLTOT *q, p* + ESRNWSLTOT *q, p* + (SSSK *q, p* \* ¼) + (DAEP *q, p* \* ¼) + (RTQQEP *q, p* \* ¼) – (SSSR *q, p* \* ¼) – (DAES *q, p* \* ¼) – (RTQQES *q, p* \* ¼)  The above variables are defined as follows:   | **Variable** | **Unit** | **Description** | | --- | --- | --- | | RTEIAMT *q, p* | $ | *Real-Time Energy Imbalance Amount per QSE per Settlement Point*—The payment or charge to QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval. | | RNIMBAL *q, p* | MWh | *Resource Node Energy Imbalance per QSE per Settlement Point*—The Resource Node volumetric imbalance for QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval. | | RTSPP *p* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval. | | SSSK *q, p* | MW | *Self-Schedule with Sink at Settlement Point per QSE per Settlement Point*—The QSE *q*’s Self-Schedule with sink at Settlement Point *p*, for the 15-minute Settlement Interval. | | DAEP *q, p* | MW | *Day-Ahead Energy Purchase per QSE per Settlement Point*—The QSE *q*’s DAM Energy Bids at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval. | | RTQQEP *q, p* | MW | *Real-Time QSE-to-QSE Energy Purchase per QSE per Settlement Point*⎯The amount of MW bought by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval. | | SSSR *q, p* | MW | *Self-Schedule with Source at Settlement Point per QSE per Settlement Point*—The QSE *q*’s Self-Schedule with source at Settlement Point *p*, for the 15-minute Settlement Interval. | | DAES *q, p* | MW | *Day-Ahead Energy Sale per QSE per Settlement Point*—The QSE *q*’s energy offers at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval. | | RTQQES *q, p* | MW | *Real-Time QSE-to-QSE Energy Sale per QSE per Settlement Point*⎯The amount of MW sold by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval. | | RESREV *q, r, gsc, p* | $ | *Resource Share Revenue Settlement Payment*—The Resource share of the total payment to the entire Facility with a net metering arrangement attributed to Resource *r* that is part of a generation site code *gsc* for the QSE *q* at Settlement Point *p*. | | RESMEB *q, r, gsc, p* | MWh | *Resource Share Net Meter Real-Time Energy Total*—The Resource share of the net sum for all Settlement Meters attributed to Resource *r* that is part of a generation site code *gsc* for the QSE *q* at Settlement Point *p*. | | WSLTOT *q, p* | MWh | *WSL Total*—The total WSL energy metered by the Settlement Meters which measure WSL for the QSE *q* at Settlement Point *p*. | |  | | | | ESRNWSLTOT *q, p* | MWh | *ESR Non-WSL Total*—The total energy metered by the Settlement Meters which measures Non-WSL ESR Charging Load for the QSE *q* at Settlement Point *p.* | | MEBL *q,r,b* | MWh | *Metered Energy for Wholesale Storage Load at bus*⎯The WSL energy metered by the Settlement Meter which measures WSL for the 15-minute Settlement Interval represented as a negative value, for the QSE *q*, Resource *r*, at bus *b*. | |  | | | | MEBR *q, r, b* | MWh | *Metered Energy for Energy Storage Resource Load at Bus -* The energy metered by the Settlement Meter which measures Non-WSL ESR Charging Load for the 15-minute Settlement Interval represented as a negative value, for the QSE *q*, Resource *r*, at bus *b*. | | NMSAMTTOT *gsc* | $ | *Net Metering Settlement*—The total payment or charge to a generation site with a net metering arrangement. | | WSLAMTTOT*q, r, p* | $ | *Wholesale Storage Load Settlement*—The total payment or charge to QSE *q*, Resource *r*, at Settlement Point *p*, for WSL for each 15-minute Settlement Interval. | |  | | | | ESRNWSLAMTTOT*q, r, p* | $ | *Energy Storage Resource Non-WSL Settlement*—The total payment or charge to QSE *q*, Resource *r*, at Settlement Point *p*, for Non-WSL ESR Charging Load for each 15-minute Settlement Interval. | | NMRTETOT *gsc* | MWh | *Net Meter Real-Time Energy Total*—The net sum for all Settlement Meters included in generation site code *gsc*. A positive value indicates an injection of power to the ERCOT System. | | GSPLITPER *q, r, gsc, p* | none | *Generation Resource SCADA Splitting Percentage*—The generation allocation percentage for Resource *r* that is part of a net metering arrangement. GSPLITPER is calculated by taking the Supervisory Control and Data Acquisition (SCADA) values (GSSPLITSCA) for a particular Generation Resource or ESR *r* that is part of a net metering configuration and dividing by the sum of all SCADA values for all Resources that are included in the net metering configuration for each interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | *q* | none | A QSE. | | *p* | none | A Resource Node Settlement Point. | | *r* | none | A Generation Resource or ESR that is located at the Facility with net metering. | | *gsc* | none | A generation site code. | | *b* | none | An Electrical Bus. | |

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

The WSL is settled as follows:

**WSLAMTTOT *q, r, p* =**  **(RTRMPRESR *b* \* MEBL** ***q, r, b*)**

The Non-WSL ESR Charging Load is settled as follows:

**ESRNWSLAMTTOT *q, r, p* =**  **(RTRMPRESR *b* \* MEBR** ***q, r, b*)**

Where the price for Settlement Meter is determined as follows:

**RTRMPRESR *b* = Max [-$251, (image010(RNWFL *b, y* \* RTLMP *b, y*) + RTRSVPOR + RTRDP)]**

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

**RNWFL *b, y* = [Max (0.001,** image001**BP *r, y*) \* TLMP *y*] /**

**[image010Max (0.001,** image001 **BP *r, y*) \* TLMP *y*]**

Where:

RTRSVPOR = image010(RNWF  *y* \* RTORPA *y*)

RTRDP = (RNWF  *y* \* RTORDPA *y*)

RNWF *y* = TLMP *y* / TLMP *y*

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

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| RTLMP *b, y* | $/MWh | *Real-Time Locational Marginal Price at bus per interval*⎯The Real-Time LMP for the meter at Electrical Bus *b*, for the SCED interval *y*. |
| TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the SCED interval *y*. |
| RTRSVPOR | $/MWh | *Real-Time Reserve Price for On-Line Reserves*⎯The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval. |
| RTORPA*y* | $/MWh | *Real-Time On-Line Reserve Price Adder per interval*⎯The Real-Time On-Line Reserve Price Adder for the SCED interval *y*. |
| RTRDP | $/MWh | *Real-Time On-Line Reliability Deployment Price* ⎯The Real-Time price for the 15-minute Settlement Interval, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time On-Line Reliability Deployment Price Adder. |
| RTORDPA*y* | $/MWh | *Real-Time On-Line Reliability Deployment Price Adder* ⎯The Real-Time Price Adder that captures the impact of reliability deployments on energy prices for the SCED interval *y*. |
| RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Resource Node Settlement Point Price calculation for the portion of the SCED interval *y* within the Settlement Interval. |
| MEBL*q,r,b* | MWh | *Metered Energy for Wholesale Storage Load at bus*⎯The WSL energy metered by the Settlement Meter which measures WSL for the 15-minute Settlement Interval represented as a negative value, for the QSE *q*, Resource *r*, at bus *b*. |
| MEBR *q, r, b* | MWh | *Metered Energy for Energy Storage Resource Load at Bus* - The energy metered by the Settlement Meter which measures Non-WSL ESR Charging Load for the 15-minute Settlement Interval represented as a negative value, for the QSE *q*, Resource *r*, at bus *b*. |
| WSLAMTTOT*q, r, p* | $ | *Wholesale Storage Load Settlement*—The total payment or charge to QSE *q*, Resource *r*, at Settlement Point *p*, for WSL for each 15-minute Settlement Interval. |
| ESRNWSLAMTTOT*q, r, p* | $ | *Energy Storage Resource Non-WSL Settlement*—The total payment or charge to QSE *q*, Resource *r*, at Settlement Point *p*, for Non-WSL ESR Charging Load for each 15-minute Settlement Interval. |
| RNWFL*b, y* | none | *Net meter Weighting Factor per interval for the Energy Metered as Energy Storage Resource Load*The weight factor used in net meter price calculation for meters in Electrical Bus *b*, for the SCED interval *y*, for the ESR Load associated with an ESR. The weighting factor used in the net meter price calculation shall not be recalculated after the fact due to revisions in the association of Resources to Settlement Meters. |
| RTRMPRESR*b* | $/MWh | *Real-Time Price for the Energy Metered as Energy Storage Resource Load at bus*⎯The Real-Time price for the Settlement Meter which measures ESR Load at Electrical Bus *b*, for the 15-minute Settlement Interval. |
| BP *r, y* | MW | *Base Point per Resource per interval* - The Base Point of Resource *r*, for the SCED interval *y*. |
| *q* | none | A QSE. |
| *gsc* | none | A generation site code. |
| *r* | none | The Controllable Load Resource that is part of an ESR. |
| *p* | none | A Resource Node Settlement Point. |
| *y* | none | A SCED interval in the 15-minute Settlement Interval. The summation is over the total number of SCED runs that cover the 15-minute Settlement Interval. |
| *b* | none | An Electrical Bus. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1010 and NPRR1014: Replace applicable portions of paragraph (3) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation for NPRR1014:]  (3) For a facility with Settlement Meters that measure ESR Load, the total payment or charge for ESR Load is calculated for a QSE, ESR, and Settlement Point for each 15-minute Settlement Interval.  The WSL is settled as follows:  **WSLAMTTOT *q, r, p* =**  **(RTRMPRESR *b* \* MEBL** ***q, r, b*)**  The Non-WSL ESR Charging Load is settled as follows:  **ESRNWSLAMTTOT *q, r, p* =**  **(RTRMPRESR *b* \* MEBR** ***q, r, b*)**  Where the price for Settlement Meter is determined as follows:  **RTRMPRESR *b* = Max [-$251, (image010(RNWFL *b, y* \* RTLMP *b, y*) + RTRDP)]**  Where the weighting factor for the Electrical Bus associated with the meter is:  **RNWFL *b, y* = [Max (0.001, ABS(** image001**Min(0, BP *r, y*))) \* TLMP *y*] /**  **[image010Max (0.001, ABS(** image001 **Min(0, BP *r, y*))) \* TLMP *y*]**  Where:  RTRDP = (RNWF  *y* \* RTRDPA *y*)  RNWF *y* = TLMP *y* / TLMP *y*  The summation is over all ESR Load *r* associated to the individual meter. The determination of which Resources are associated to an individual meter is static and based on the normal system configuration of the generation site code, *gsc*.  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | RTLMP *b, y* | $/MWh | *Real-Time Locational Marginal Price at bus per interval*⎯The Real-Time LMP for the meter at Electrical Bus *b*, for the SCED interval *y*. | | TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the SCED interval *y*. | | RTRDP | $/MWh | *Real-Time Reliability Deployment Price for Energy* ⎯The Real-Time price for the 15-minute Settlement Interval, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time Reliability Deployment Price Adder for Energy. | | RTRDPA*y* | $/MWh | *Real-Time Reliability Deployment Price Adder for Energy* ⎯The Real-Time price adder that captures the impact of reliability deployments on energy prices for the SCED interval *y*. | | RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Real-Time Reliability Deployment price calculation for the portion of the SCED interval *y* within the Settlement Interval. | | MEBL*q,r,b* | MWh | *Metered Energy for Wholesale Storage Load at bus*⎯The WSL energy metered by the Settlement Meter which measures WSL for the 15-minute Settlement Interval represented as a negative value, for the QSE *q*, Resource *r*, at bus *b*. | | MEBR *q, r, b* | MWh | *Metered Energy for Energy Storage Resource Load at Bus* - The energy metered by the Settlement Meter which measures Non-WSL ESR Charging Load for the 15-minute Settlement Interval represented as a negative value, for the QSE *q*, Resource *r*, at bus *b*. | | WSLAMTTOT*q, r, p* | $ | *Wholesale Storage Load Settlement*—The total payment or charge to QSE *q*, Resource *r*, at Settlement Point *p*, for WSL for each 15-minute Settlement Interval. | | ESRNWSLAMTTOT*q, r, p* | $ | *Energy Storage Resource Non-WSL Settlement*—The total payment or charge to QSE *q*, Resource *r*, at Settlement Point *p*, for Non-WSL ESR Charging Load for each 15-minute Settlement Interval. | | RNWFL*b, y* | none | *Net meter Weighting Factor per interval for the Energy Metered as Energy Storage Resource Load*The weight factor used in net meter price calculation for meters in Electrical Bus *b*, for the SCED interval *y*, for the ESR Load associated with an ESR. The weighting factor used in the net meter price calculation shall not be recalculated after the fact due to revisions in the association of Resources to Settlement Meters. | | RTRMPRESR*b* | $/MWh | *Real-Time Price for the Energy Metered as Energy Storage Resource Load at bus*⎯The Real-Time price for the Settlement Meter which measures ESR Load at Electrical Bus *b*, for the 15-minute Settlement Interval. | | BP *r, y* | MW | *Base Point per Resource per interval* - The Base Point of Resource *r*, for the SCED interval *y*. | | *q* | none | A QSE. | | *gsc* | none | A generation site code. | | *r* | none | An ESR. | | *p* | none | A Resource Node Settlement Point. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. The summation is over the total number of SCED runs that cover the 15-minute Settlement Interval. | | *b* | none | An Electrical Bus. | |

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

**NMRTETOT *gsc* = Max (0, ( (MEB *gsc, b +* MEBC *gsc, b*)))**

If NMRTETOT *gsc* = 0 for a 15-minute Settlement Interval, then

The Load that is not WSL is included in the Real-Time AML per QSE.

Otherwise, when NMRTETOT *gsc* **>** 0 for a 15-minute Settlement Interval, then

NMSAMTTOT *gsc* =  [(RTRMPR *b* \* MEB *gsc, b*) + (RTRMPR *b* \* MEBC *gsc, b*)]

Where the price for Settlement Meter is determined as follows:

RTRMPR *b* = Max [-$251, (image010(RNWF *b, y* \* RTLMP *b, y*) + RTRSVPOR + RTRDP)]

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

**RNWF *b, y* = [Max (0.001,** **BP *r, y*) \* TLMP *y*] /**

**[image010Max (0.001,** **BP *r, y*) \* TLMP *y*]**

Where:

RTRSVPOR = image010(RNWF  *y* \* RTORPA *y*)

RTRDP = (RNWF  *y* \* RTORDPA *y*)

RNWF *y* = TLMP *y* / TLMP *y*

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

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| NMRTETOT *gsc* | MWh | *Net Meter Real-Time Energy Total*—The net sum for all Settlement Meters included in generation site code *gsc*. A positive value indicates an injection of power to the ERCOT System. |
| NMSAMTTOT*gsc* | $ | *Net Metering Settlement*—The total payment or charge to a generation site with a net metering arrangement. |
| RTRMPR *b* | $/MWh | *Real-Time Price for the Energy Metered for each Resource meter at bus*⎯The Real-Time price for the Settlement Meter at Electrical Bus *b*, for the 15-minute Settlement Interval. |
| MEB *gsc, b* | MWh | *Metered Energy at bus*⎯ The metered energy by the Settlement Meter which is not upstream from another Settlement Meter which measures ESR Load for the 15-minute Settlement Interval. A positive value represents energy produced, and a negative value represents energy withdrawn. |
| RTRSVPOR | $/MWh | *Real-Time Reserve Price for On-Line Reserves*⎯The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval. |
| RTORPA*y* | $/MWh | *Real-Time On-Line Reserve Price Adder per interval*⎯The Real-Time On-Line Reserve Price Adder for the SCED interval *y*. |
| RTRDP | $/MWh | *Real-Time On-Line Reliability Deployment Price* ⎯The Real-Time price for the 15-minute Settlement Interval, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time On-Line Reliability Deployment Price Adder. |
| RTORDPA*y* | $/MWh | *Real-Time On-Line Reliability Deployment Price Adder* ⎯The Real-Time Price Adder that captures the impact of reliability deployments on energy prices for the SCED interval *y*. |
| RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Resource Node Settlement Point Price calculation for the portion of the SCED interval *y* within the Settlement Interval. |
| RTLMP *b, y* | $/MWh | *Real-Time Locational Marginal Price at bus per interval*⎯The Real-Time LMP for the meter at Electrical Bus *b*, for the SCED interval *y*. |
| TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the SCED interval *y*. |
| RNWF *b, y* | none | *Net meter Weighting Factor per interval*The weight factor used in net meter price calculation for meters in Electrical Bus *b*, for the SCED interval *y*. The weighting factor used in the net meter price calculation shall not be recalculated after the fact due to revisions in the association of Resources to Settlement Meters. |
| BP *r, y* | MW | *Base Point per Resource per interval*The Base Point of Resource *r,* for the SCED interval *y*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| MEBC*gsc, b* | MWh | *Metered Energy at bus (Calculated)*⎯ The calculated energy for the 15-minute Settlement Interval for a Settlement Meter which is upstream from another Settlement Meter which measures ESR Load. A positive value represents energy produced, and a negative value represents energy withdrawn. |
| *gsc* | none | A generation site code. |
| *r* | none | A Generation Resource that is located at the Facility with net metering. |
| *y* | none | A SCED interval in the 15-minute Settlement Interval. The summation is over the total number of SCED runs that cover the 15-minute Settlement Interval. |
| *b* | none | An Electrical Bus. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1010 and NPRR1014: Replace applicable portions of paragraph (4) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation for NPRR1014:]  (4) The total payment or charge to a Facility with a net metering arrangement for each 15-minute Settlement Interval shall be calculated as follows:  **NMRTETOT *gsc* = Max (0, ( (MEB *gsc, b +* MEBC *gsc, b*)))**  If NMRTETOT *gsc* = 0 for a 15-minute Settlement Interval, then  The Load that is not WSL is included in the Real-Time AML per QSE.  Otherwise, when NMRTETOT *gsc* **>** 0 for a 15-minute Settlement Interval, then  **NMSAMTTOT** *gsc* **=  [(RTRMPR *b* \* MEB *gsc, b*) + (RTRMPR *b* \* MEBC *gsc, b*)]**  Where the price for Settlement Meter is determined as follows**:**  **RTRMPR *b*** = **Max [-$251, (image010(RNWF *b, y* \* RTLMP *b, y*) + RTRDP)]**  Where the weighting factor for the Electrical Bus associated with the meter is:  **RNWF *b, y* = [Max (0.001,** **Max (0,** **BP *r, y*)) \* TLMP *y*] /**  **[image010Max (0.001,** **Max (0,** **BP *r, y*)) \* TLMP *y*]**  Where:  RTRDP = (RNWF  *y* \* RTRDPA *y*)  RNWF *y* = TLMP *y* / TLMP *y*  The summation is over all Resources *r* associated to the individual meter. The determination of which Resources are associated to an individual meter is static and based on the normal system configuration of the generation site code, *gsc*.  The above variables are defined as follows:   | **Variable** | **Unit** | **Description** | | --- | --- | --- | | NMRTETOT *gsc* | MWh | *Net Meter Real-Time Energy Total*—The net sum for all Settlement Meters included in generation site code *gsc*. A positive value indicates an injection of power to the ERCOT System. | | NMSAMTTOT*gsc* | $ | *Net Metering Settlement*—The total payment or charge to a generation site with a net metering arrangement. | | RTRMPR *b* | $/MWh | *Real-Time Price for the Energy Metered for each Resource meter at bus*⎯The Real-Time price for the Settlement Meter at Electrical Bus *b*, for the 15-minute Settlement Interval. | | MEB *gsc, b* | MWh | *Metered Energy at bus*⎯The metered energy by the Settlement Meter which is not upstream from another Settlement Meter which measures ESR Load for the 15-minute Settlement Interval. A positive value represents energy produced, and a negative value represents energy withdrawn. | | RTRDP | $/MWh | *Real-Time Reliability Deployment Price for Energy*⎯The Real-Time price for the 15-minute Settlement Interval, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time Reliability Deployment Price Adder for Energy. | | RTRDPA*y* | $/MWh | *Real-Time Reliability Deployment Price Adder for Energy* ⎯The Real-Time price adder that captures the impact of reliability deployments on energy prices for the SCED interval *y*. | | RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Resource Node Settlement Point Price calculation for the portion of the SCED interval *y* within the Settlement Interval. | | RTLMP *b, y* | $/MWh | *Real-Time Locational Marginal Price at bus per interval*⎯The Real-Time LMP for the meter at Electrical Bus *b*, for the SCED interval *y*. | | TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the SCED interval *y*. | | RNWF *b, y* | none | *Net meter Weighting Factor per interval*The weight factor used in net meter price calculation for meters in Electrical Bus *b*, for the SCED interval *y*. The weighting factor used in the net meter price calculation shall not be recalculated after the fact due to revisions in the association of Resources to Settlement Meters. | | BP *r, y* | MW | *Base Point per Resource per interval*The Base Point of Resource *r,* for the SCED interval *y*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | MEBC*gsc, b* | MWh | *Metered Energy at bus (Calculated)* ⎯ The calculated energy for the 15-minute Settlement Interval for a Settlement Meter which is upstream from another Settlement Meter which measures ESR Load. A positive value represents energy produced, and a negative value represents energy withdrawn. | | *gsc* | none | A generation site code. | | *r* | none | A Generation Resource or ESR that is located at the Facility with net metering. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. The summation is over the total number of SCED runs that cover the 15-minute Settlement Interval. | | *b* | none | An Electrical Bus. | |

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

**GSPLITPER *q, r, gsc, p* = GSSPLITSCA *r* /** **GSSPLITSCA *r***

The above variables are defined as follows:

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1014: Replace paragraph (5) above with the following upon system implementation:]  (5) The Generation Resource or ESR SCADA Splitting Percentage for each Resource within a net metering arrangement for the 15-minute Settlement Interval is calculated as follows:  **GSPLITPER *q, r, gsc, p* = GSSPLITSCA *r* /** **GSSPLITSCA *r***  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | GSPLITPER *q, r, gsc, p* | none | *Generation Resource SCADA Splitting Percentage*—The generation allocation percentage for Resource *r* that is part of a generation site code *gsc* for the QSE *q* at Settlement Point *p*. GSPLITPER is calculated by taking the SCADA values (GSSPLITSCA) for a particular Generation Resource or ESR *r* that is part of a net metering configuration and dividing by the sum of all SCADA values for all Resources that are included in the net metering configuration for each interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | GSSPLITSCA *r* | MWh | *Generation Resource SCADA Net Real Power provided via Telemetry*—The net real power provided via telemetry per Resource within the net metering arrangement, integrated for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | *gsc* | none | A generation site code. | | *r* | none | A Generation Resource or ESR that is located at the Facility with net metering. | | *q* | none | A QSE. | | *p* | none | A Resource Node Settlement Point. | |

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

RTEIAMTQSETOT *q* =  RTEIAMT *q, p*

The above variables are defined as follows:

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

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

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

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

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

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

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

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

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

(g) Its AML at the Settlement Point excluding Non-WSL ESR Charging Load; plus

(h) The aggregated generation of its Settlement Only Transmission Self-Generators (SOTSGs) at the Settlement Point. SOTSG sites will be represented as a single unit in the ERCOT Settlement system.

(i) The aggregated generation of its Settlement Only Distribution Generators (SODGs) and Settlement Only Transmission Generators (SOTGs) that have elected to retain Load Zone pricing in accordance with Section 6.6.3.8, Real-Time Payment or Charge for Energy from a Settlement Only Distribution Generator (SODG) or a Settlement Only Transmission Generator (SOTG). SODG and SOTG sites will be represented as a single unit in the ERCOT Settlement system.

|  |
| --- |
| [NPRR995: Replace paragraph (i) above with the following upon system implementation:]  (i) The aggregated generation of its Settlement Only Distribution Generators (SODGs) and Settlement Only Transmission Generators (SOTGs) that have elected to retain Load Zone pricing in accordance with Section 6.6.3.8, Real-Time Payment or Charge for Energy from a Settlement Only Distribution Generator (SODG), Settlement Only Transmission Generator (SOTG), Settlement Only Distribution Energy Storage System (SODESS), or Settlement Only Transmission Energy Storage System (SOTESS). SODG, SOTG, Settlement Only Distribution Energy Storage System (SODESS), and Settlement Only Transmission Energy Storage System (SOTESS) sites will be represented as a single unit in the ERCOT Settlement system. |

(j) The aggregated generation of its Energy Storage System (ESS) SODGs and SOTGs at sites where the ESS capacity constitutes more than 50% of the total SODG or SOTG nameplate capacity, as confirmed by an affidavit submitted by the Resource Entity for the site. SODG and SOTG sites will be represented as a single unit in the ERCOT Settlement system.

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

RTEIAMT *q, p* = (-1) \* {[RTSPP *p* \* [(SSSK *q, p* \* ¼) + (DAEP *q, p* \* ¼) + (RTQQEP *q, p* \* ¼) – (SSSR *q, p* \* ¼) – (DAES *q, p* \* ¼) – (RTQQES *q, p* \* ¼)]] + [RTSPPEW *p* \* (RTMGSOGZ *q, p* – (RTAML *q, p* – RTAMLESRNW *q, p*))]}

|  |
| --- |
| [NPRR995: Replace the formula “RTEIAMT q, p” above with the following upon system implementation:]  **RTEIAMT *q, p* = (-1) \* {[RTSPP *p* \* [(SSSK *q, p* \* ¼) + (DAEP *q, p* \* ¼) + (RTQQEP *q, p* \* ¼) – (SSSR *q, p* \* ¼) – (DAES *q, p* \* ¼) – (RTQQES *q, p* \* ¼)]] + [RTSPPEW *p* \* (RTMGSOGZ *q, p* – (RTAML *q, p* – RTAMLESRNW *q, p* – RTAMLNWSOL *q, p*))]}** |

And

LZIMBAL *q, p =* (SSSK *q, p* \* ¼) + (DAEP *q, p* \* ¼) + (RTQQEP *q, p* \* ¼) – (SSSR *q, p* \* ¼) – (DAES *q, p* \* ¼) – (RTQQES *q, p* \* ¼) – (RTAML *q, p* – RTAMLESRNW *q, p*) + RTMGSOGZ *q, p*

|  |
| --- |
| [NPRR995: Replace the formula “LZIMBAL q, p” above with the following upon system implementation:]  **LZIMBAL *q, p =* (SSSK *q, p* \* ¼) + (DAEP *q, p* \* ¼) + (RTQQEP *q, p* \* ¼) – (SSSR *q, p* \* ¼) – (DAES *q, p* \* ¼) – (RTQQES *q, p* \* ¼) – (RTAML *q, p* –RTAMLESRNW *q, p* – RTAMLNWSOL *q, p*) + RTMGSOGZ *q, p*** |

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| RTEIAMT *q, p* | $ | *Real-Time Energy Imbalance Amount per QSE per Settlement Point*—The payment or charge to QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval. |
| RTSPP *p* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval. |
| LZIMBAL *q, p* | MWh | *Load Zone Energy Imbalance per QSE per Settlement Point*—The Load Zone volumetric imbalance for QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval. |
| RTSPPEW *p* | $/MWh | *Real-Time Settlement Point Price Energy-Weighted*⎯The Real-Time Settlement Point Price at the Settlement Point *p*, for the 15-minute Settlement Interval that is weighted by the State Estimated Load for the Load Zone of each SCED interval within the 15-minute Settlement Interval. |
| RTAML *q, p* | MWh | *Real-Time Adjusted Metered Load per QSE per Settlement Point*—The sum of the AML at the Electrical Buses that are included in Settlement Point *p* represented by QSE *q* for the 15-minute Settlement Interval. |
| RTAMLESRNW *q, p* | MWh | *Real-Time Adjusted Metered Load for ESR Non-WSL per QSE per Settlement Point*—The sum of the AML for the Non-WSL ESR Charging Load at the Electrical Buses that are included in Settlement Point *p* represented by QSE *q* for the 15-minute Settlement Interval, represented as a positive value. |
| |  |  |  |  | | --- | --- | --- | --- | | [NPRR995: Insert the variable “RTAMLNWSOL q, p” below upon system implementation:]   |  |  |  | | --- | --- | --- | | RTAMLNWSOL *q, p* | MWh | *Real-Time Adjusted Metered Load for Non-WSL Settlement Only* *Charging Load per QSE per Settlement Point*—The sum of the AML for the Non-WSL Settlement Only Charging Load for the SODESS or SOTESS site that are included in Settlement Point *p* represented by QSE *q* for the 15-minute Settlement Interval, represented as a positive value. | | | | |
| SSSK *q, p* | MW | *Self-Schedule with Sink at Settlement Point per QSE per Settlement Point*—The QSE *q*’s Self-Schedule with sink at Settlement Point *p*, for the 15-minute Settlement Interval. |
| DAEP *q, p* | MW | *Day-Ahead Energy Purchase per QSE per Settlement Point*—The QSE *q*’s DAM Energy Bids at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval. |
| RTQQEP *q, p* | MW | *Real-Time QSE-to-QSE Energy Purchase per QSE per Settlement Point*⎯The amount of MW bought by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval. |
| SSSR *q, p* | MW | *Self-Schedule with Source at Settlement Point per QSE per Settlement Point*—The QSE *q*’s Self-Schedule with source at Settlement Point *p*, for the 15-minute Settlement Interval. |
| DAES *q, p* | MW | *Day-Ahead Energy Sale per QSE per Settlement Point*—The QSE *q*’s energy offers at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval. |
| RTQQES *q, p* | MW | *Real-Time QSE-to-QSE Energy Sale per QSE per Settlement Point*⎯The amount of MW sold by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval. |
| RTMGSOGZ *q, p* | MWh | *Real-Time Metered Generation from Settlement Only Generators Zonal per QSE per Settlement Point*—The total Real-Time energy produced by SOTSGs represented by QSE *q* in Load Zone Settlement Point *p*, for the 15-minute Settlement Interval. MWh quantities for ESS SODGs and 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 SODGs and SOTGs that have opted out of nodal pricing pursuant to Section 6.6.3.8 will also be included in this value. |
|  | | |
| *q* | none | A QSE. |
| *p* | none | A Load Zone Settlement Point. |

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

RTEIAMTQSETOT *q* = RTEIAMT *q, p*

The above variables are defined as follows:

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

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

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

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

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

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

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

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

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

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

RTEIAMT *q, p* = (-1) \* RTSPP *p* \* {(SSSK *q, p* \* ¼) + (DAEP *q, p* \* ¼) + (RTQQEP *q, p* \* ¼) – (SSSR *q, p* \* ¼) – (DAES *q, p* \* ¼) – (RTQQES *q, p* \* ¼)}

And

HBIMBAL *q, p =* (SSSK *q, p* \* ¼) + (DAEP *q, p* \* ¼) + (RTQQEP *q, p* \* ¼) – (SSSR *q, p* \* ¼) – (DAES *q, p* \* ¼) – (RTQQES *q, p* \* ¼)

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| RTEIAMT *q, p* | $ | *Real-Time Energy Imbalance Amount per QSE per Settlement Point*—The payment or charge to QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval. |
| HBIMBAL *q, p* | MWh | *Hub Energy Imbalance per QSE per Settlement Point*—The Hub volumetric imbalance for QSE *q* for Real-Time Energy Imbalance Service at Settlement Point *p*, for the 15-minute Settlement Interval. |
| RTSPP *p* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval. |
| SSSK *q, p* | MW | *Self-Schedule with Sink at Settlement Point per QSE per Settlement Point*—The QSE *q*’s Self-Schedule with sink at Settlement Point *p*, for the 15-minute Settlement Interval. |
| DAEP *q, p* | MW | *Day-Ahead Energy Purchase per QSE per Settlement Point*—The QSE *q*’s DAM Energy Bids at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval. |
| RTQQEP *q, p* | MW | *Real-Time QSE-to-QSE Energy Purchase per QSE per Settlement Point*⎯The amount of MW bought by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval. |
| SSSR *q, p* | MW | *Self-Schedule with Source at Settlement Point per QSE per Settlement Point*—The QSE *q*’s Self-Schedule with source at Settlement Point *p*, for the 15-minute Settlement Interval. |
| DAES *q, p* | MW | *Day-Ahead Energy Sale per QSE per Settlement Point*—The QSE *q*’s Energy Offers at Settlement Point *p* cleared in the DAM, for the hour that includes the 15-minute Settlement Interval. |
| RTQQES *q, p* | MW | *Real-Time QSE-to-QSE Energy Sale per QSE per Settlement Point*⎯The amount of MW sold by QSE *q* through Energy Trades at Settlement Point *p*, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A Hub Settlement Point. |

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

**RTEIAMTQSETOT *q* = RTEIAMT *q, p***

The above variables are defined as follows:

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

6.6.3.4 Real-Time Energy Payment for DC Tie Import

(1) The payment to each QSE for energy imported into the ERCOT System through each DC Tie is calculated based on the Real-Time Settlement Point Price at the DC Tie Settlement Point. The payment for a given 15-minute Settlement Interval is calculated as follows:

RTDCIMPAMT *q, p* = (-1) \* RTSPP *p* \* (RTDCIMP *q, p* \* ¼)

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| RTDCIMPAMT *q, p* | $ | *Real-Time DC Import Amount per QSE per Settlement Point*—The payment to QSE *q* for DC Tie import through DC Tie *p*, for the 15-minute Settlement Interval. |
| RTSPP *p* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval. |
| RTDCIMP *q, p* | MW | *Real-Time DC Import per QSE per Settlement Point*—The aggregated DC Tie Schedule submitted by QSE *q* as an importer into the ERCOT System through DC Tie *p*, for the 15-minute Settlement Interval.   |  | | --- | | [NPRR1032: Replace the description above with the following upon system implementation:]  *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. | |
| *q* | none | A QSE. |
| *p* | none | A DC Tie Settlement Point. |

(2) ERCOT shall pay each QSE for energy imported into the ERCOT System during a declared Emergency Condition through each DC Tie in response to an ERCOT Dispatch Instruction. The payment for a given 15-minute Settlement Interval is calculated as follows:

RTEDCIMPAMT *q, p* = (-1) \* Max {RTSPP *p*, (VEEPDCTP *q, p*\* CAEDCT)}\* (RTEDCIMP *q, p* \* ¼)

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| RTEDCIMPAMT *q, p* | $ | *Real-Time Emergency DC Import Amount per QSE per Settlement Point*—The payment to QSE *q* for emergency DC Tie import through DC Tie *p*, for the 15-minute Settlement Interval. |
| RTSPP *p* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval. |
| FIP | $/MMBtu | *Fuel Index Price*—As defined in Section 2, Definitions and Acronyms. |
| RTEDCIMP *q, p* | MW | *Real-Time Emergency DC Import per QSE per Settlement Point*—The aggregated DC Tie Schedule for emergency energy imported by QSE *q* into the ERCOT System during Emergency Conditions through DC Tie *p*, for the 15-minute Settlement Interval. |
| VEEPDCTP *q, p* | $/MWh | *Verified Emergency Energy Price at DC Tie Point*—The ERCOT verified cost for the energy imported by QSE *q* into the ERCOT System during declared Emergency Condition through a DC Tie *p* as instructed by a Dispatch Instruction. |
| CAEDCT | # | *Cost Adder for Emergency DC Tie Import*—A multiplier of 1.10. |
| *q* | none | A QSE. |
| *p* | none | A DC Tie Settlement Point. |

(3) The total of the payments to each QSE for all energy imported into the ERCOT System through DC Ties for the 15-minute Settlement Interval is calculated as follows:

RTDCIMPAMTQSETOT *q, p* = (RTDCIMPAMT *q, p*+ RTEDCIMPAMT *q, p*)

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| RTDCIMPAMTQSETOT *q, p* | $ | *Real-Time DC Import Amount QSE Total per QSE*⎯The total of the payments to QSE *q* for energy imported into the ERCOT System through DC Ties *p,* for the 15-minute Settlement Interval. |
| RTDCIMPAMT *q, p* | $ | *Real-Time DC Import Amount per QSE per Settlement Point*—The payment to QSE *q* for DC Tie import through DC Tie *p*, for the 15-minute Settlement Interval. |
| RTEDCIMPAMT *q, p* | $ | *Real-Time Emergency DC Import Amount per QSE per Settlement Point*⎯The payment to QSE *q* for emergency DC Tie import through DC Tie *p*, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A DC Tie Settlement Point. |

6.6.3.5 Real-Time Payment for a Block Load Transfer Point

(1) ERCOT shall pay each QSE for the energy delivered to an ERCOT Load through a Block Load Transfer (BLT) Point that is registered for Settlement when that Load is moved from the ERCOT Control Area to a non-ERCOT Control Area. The payment for a given 15-minute Settlement Interval is calculated as follows:

BLTRAMT *q, bltp, p* = (-1) \* MAX {RTSPPEW *p*, (VEEPBLTP *q, bltp*) *\** CABLT} \* BLTR *q, p, bltp*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| BLTRAMT *q, bltp, p* | $ | *Block Load Transfer Resource Amount per QSE per Settlement Point per BLT Point*⎯The payment to QSE *q* for the BLT Resource that delivers energy to Load Zone *p* through BLT Point *bltp*, for the 15-minute Settlement Interval. |
| RTSPPEW *p* | $/MWh | *Real-Time Settlement Point Price per Settlement Point Energy-Weighted*⎯The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval, that is weighted by the state estimated Load of the Load Zone of each SCED interval within the 15-minute Settlement Internal. |
| VEEPBLTP *q, bltp* | $/MWh | *Verified Emergency Energy Price at BLT Point*⎯The ERCOT verified cost for the energy delivered to an ERCOT Load through BLT Point *bltp*. |
| CABLT | none | *Cost Adder for Block Load Transfer*⎯A multiplier of 1.10. |
| BLTR *q, p, bltp* | MWh | *Block Load Transfer Resource per QSE per Settlement Point per BLT Point*⎯The energy delivered to an ERCOT Load in Load Zone *p* through BLT Point *bltp* represented by QSE *q*, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A Load Zone Settlement Point. |
| *bltp* | none | A BLT Point. |

(2) The total of the payments to each QSE for all energy delivered to ERCOT Loads through BLT Points for the 15-minute Settlement Interval is calculated as follows:

BLTRAMTQSETOT *q* = BLTRAMT *q, bltp, p*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| 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 System through BLT Points for the 15-minute Settlement Interval. |
| BLTRAMT *q, bltp , p* | $ | *Block Load Transfer Resource Amount per QSE per Settlement Point per BLT Point*—The payment to QSE *q* for the BLT Resource at BLT Point *bltp*, which delivers energy to Load Zone *p*, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A Load Zone Settlement Point. |
| *bltp* | none | A BLT Point. |

(3) For the purpose of Settlement, ERCOT shall treat the energy associated with the Presidio Exception like energy delivered to an ERCOT Load through a BLT Point that is moved from the ERCOT Control Area to a non-ERCOT Control Area, by allowing for compensation of verified costs associated with the energy. After receipt and verification of the invoiced cost associated with the Presidio Exception, ERCOT shall compensate for the energy associated with the Presidio Exception using the monthly verified cost multiplied by the Cost Adder for Block Load Transfer defined in paragraph (1) above. ERCOT shall uplift the cost to QSEs representing Load using the monthly LRS per QSE as defined in Section 7.5.7, Method for Distributing CRR Auction Revenues. Costs associated with the Presidio Exception must be submitted to ERCOT within 90 days of the last day of the month that the costs were incurred.

|  |
| --- |
| [NPRR1030: Replace paragraph (3) above with the following upon system implementation:]  (3) For the purpose of Settlement, ERCOT shall treat the energy associated with the Presidio Exception like energy delivered to an ERCOT Load through a BLT Point that is moved from the ERCOT Control Area to a non-ERCOT Control Area, by allowing for compensation of verified costs associated with the energy. After receipt and verification of the invoiced cost associated with the Presidio Exception, ERCOT shall compensate for the energy associated with the Presidio Exception using the monthly verified cost multiplied by the Cost Adder for Block Load Transfer defined in paragraph (1) above. ERCOT shall uplift the cost to QSEs representing Load using the same methodology as defined in Section 7.5.7, Method for Distributing CRR Auction Revenues. Costs associated with the Presidio Exception must be submitted to ERCOT within 90 days of the last day of the month that the costs were incurred. |

(a) The monthly payment to be calculated as follows:

**MBLTAMT *q, p* = (-1) \* VMEBLTP *q, p*  *\** CABLT**

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Definition** |
| MBLTAMT *q, p* | $ | *Monthly Block Load Transfer Amount per QSE per Settlement Point*⎯The payment to QSE *q* for the delivered energy to Load Zone *p* for the month. |
| VMEBLTP *q, p* | $/MWh | *Verified Monthly Energy Cost*⎯The ERCOT verified monthly cost for the energy delivered to an ERCOT Load as determined by an invoice submitted to ERCOT. |
| CABLT | none | *Cost Adder for Block Load Transfer*⎯A multiplier of 1.10. |
| *q* | none | A QSE. |
| *p* | none | A Load Zone Settlement Point. |

(b) The total of the payments to each QSE for all energy delivered to ERCOT Loads through BLT Points for the 15-minute Settlement Interval is calculated as follows:

**MBLTAMTQSETOT *q* =  MBLTAMT *q, p***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Definition** |
| MBLTAMTQSETOT *q* | $ | *Monthly Block Load Transfer Amount QSE Total per QSE*⎯The total of the payments to QSE *q* for energy delivered into the ERCOT System for the month. |
| MBLTAMT *q, p* | $ | *Monthly Block Load Transfer Amount per QSE per Settlement Point*⎯The payment to QSE *q* for the delivered energy to Load Zone *p* for the month. |
| *q* | none | A QSE. |
| *p* | none | A Load Zone Settlement Point. |

(c) ERCOT shall calculate each QSE’s monthly BLT charge as follows:

LAMBLTAMT *q* = (-1) \* MLRS *q*\* MBLTAMTTOT

MBLTAMTTOT =  MBLTAMTQSETOT *q*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| 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. |
| MBLTAMTQSETOT *q* | $ | *Monthly Block Load Transfer Amount QSE Total per QSE*⎯The total of the payments to QSE *q* for energy delivered into the ERCOT System for the month. |
| LAMBLTAMT *q* | $ | *Load-Allocated Monthly BLT Amount* *per QSE*—Monthly BLT charge for QSE *q*. |
| MBLTAMTTOT | $ | *Monthly BLT Amount ERCOT wide Total*—The total monthly BLT charge for all QSEs. |
| *q* | none | A QSE. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1030: Replace paragraph (c) above with the following upon system implementation:]  (c) ERCOT shall calculate each QSE’s monthly BLT charge as follows:  **LAMBLTAMT *q* = (-1) \* (MBLTDC *q* + MBLTNDC *q*)**  Where:  MBLTNDC *q* = MLRS *q*\* (MBLTAMTTOT - MBLTDC *q*)  MBLTDC *q* = DCMLRS *q*\* MBLTAMTTOT  MBLTAMTTOT =  MBLTAMTQSETOT *q*  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | Variable | Unit | Description | | LAMBLTAMT *q* | $ | *Load-Allocated Monthly BLT Amount* *per QSE*—Sum of the monthly BLT charges for Loads and DC Tie exports for QSE *q*. | | DCMLRS *q* | none | *DC Tie Export Monthly Load Ratio Share per QSE*—The ratio share calculated for QSE *q* with DC Tie Exports for the calendar 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. | | MBLTAMTQSETOT *q* | $ | *Monthly Block Load Transfer Amount QSE Total per QSE*⎯The total of the payments to QSE *q* for energy delivered into the ERCOT System for the month. | | MBLTDC *q* | $ | *Monthly BLT Amount* *for DC Tie Exports* *per QSE*—Monthly BLT amount for DC Tie exports for QSE *q*. | | MBLTNDC *q* | $ | *Monthly BLT Amount for Non-DC Tie Loads* *per QSE*—Monthly BLT amount for Loads (excluding DC Tie exports) for QSE *q*. | | MBLTAMTTOT | $ | *Monthly BLT Amount ERCOT wide Total*—The total monthly BLT payment for all QSEs. | | *q* | none | A QSE. | |

**6.6.3.6 Real-Time High Dispatch Limit Override Energy Payment**

(1) If ERCOT directs a reduction in a Generation Resource’s real power output by employing a manual High Dispatch Limit (HDL) override and the reduction causes the QSE to suffer a demonstrable financial loss, the QSE may be eligible for a Real-Time High Dispatch Limit Override Energy Payment, as calculated below, upon providing documented proof of that loss. In order to qualify for this payment the QSE must:

(a) Have complied with ERCOT Dispatch Instructions to reduce real power output;

(b) Have received a SCED Base Point equal to the Resource’s HDL override, during the 15-minute Settlement Interval;

(c) Have incurred a demonstrable financial loss associated with variable cost components of DAM obligations or energy purchase or sale provisions of bilateral contracts (as opposed to lost opportunity costs), in consequence of the HDL override; and

(d) File a timely Settlement and billing dispute, including the following items:

(i) An attestation signed by an officer or executive with authority to bind the QSE;

(ii) The dollar amount and calculation of the financial loss by Settlement Interval;

(iii) An explanation of the nature of the loss and how it was attributable to the HDL override; and

(iv) Sufficient documentation to support the QSE’s calculation of the amount of the financial loss.

(2) ERCOT 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. ERCOT will provide Notice of its acceptance or rejection of the claim for the High Dispatch Limit Override Energy Payment within 15 Business Days of the updated submission.

(3) The Energy Offer Curve used to calculate the Real-Time High Dispatch Limit Override Energy Payment will be the most recent valid Energy Offer Curve received by ERCOT that was effective for the disputed interval(s) when the HDL override was issued. If no curve exists for the interval being disputed, ERCOT will use the most recent valid Energy Offer Curve received before the HDL override was issued for an interval prior to the disputed interval(s).

The payment shall be calculated as follows:

**HDLOEAMT *q, r, p, i* = (-1) \* Min {HDLOAL *q, r, p, i*, Max(0, ((RTSPP*p, i* – RTRSVPOR *i* – RTRDP *i* – RTEOCOST *q, r, i*) \* HDLOQTY *q, r, p, i* ))}**

Where:

HDLOQTY *q, r, p, i* = Max(0, (¼ (HDLOBRKP *q, r, p, i* – AVGHDL *q, r, p, i*)))

HDLOBRKP *q, r, p, i* = Min(AVGHASL *q, r, p, i* , HDLOBRKPCP *q, r, p, i* )

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| HDLOAL ***q, r, p, i*** | $ | *High Dispatch Limit override attested losses -* The financial loss to the QSE due to the HDL override as attested by the QSE in accordance with paragraph (1)(d) above. |
| HDLOEAMT ***q, r, p, i*** | $ | *High Dispatch Limit override energy amount per QSE per Generation Resource*—The payment to QSE *q* for an ERCOT-issued HDL override for Generation Resource *r* at Settlement Point *p* for the 15-minute Settlement Interval *i*. For a combined cycle Resource, *r* is a Combined Cycle Train. |
| HDLOBRKP***q, r, p, i*** | MW | *High Dispatch Limit override break point per QSE per Resource*—The point on the Energy Offer Curve corresponding to the lesser of the AVGHASL or the interception between the RTSPP of the Generation Resource *r* represented by QSE *q* minus the Real-Time Reserve Price for On-Line Reserves and the Real-Time On-Line Reliability Deployment Price and the Energy Offer Curve of Generation Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval *i*. For a combined cycle Resource, *r* is a Combined Cycle Train. |
| AVGHDL***q, r, p, i*** | MW | *Average High Dispatch Limit per QSE per Settlement Point per Resource*—The time-weighted average of all 4-second HDL values calculated by the Resource Limit Calculator, subject to the manual HDL override, for the Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p* within the 15-minute Settlement Interval *i*.  For a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| AVGHASL ***q, r, p, i*** | MW | *Average High Ancillary Service Limit per QSE per Settlement Point per Resource*—The time-weighted average High Ancillary Service Limit (HASL) calculated every four seconds by the Resource Limit Calculator for the Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p* within the 15-minute Settlement Interval *i*.  For a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| HDLOBRKPCP*q, r, p, i* | MW | *High Dispatch Limit override break point at clearing price per QSE per Resource*—The MW value on the Energy Offer Curve corresponding to the Real-Time Settlement Point Price of Generation Resource *r* represented by QSE *q* at Settlement Point *p* minus the Real-Time Reserve Price for On-Line Reserves and the Real-Time On-Line Reliability Deployment Price. For a combined cycle Resource, *r* is a Combined Cycle Train. |
| RTEOCOST *q, r, i* | $/MWh | Real-Time Energy Offer Curve Cost Cap - The Energy Offer Curve Cost Cap 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 Cost Caps. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| HDLOQTY *q, r, p, i* | MWh | *High Dispatch Limit override quantity per QSE per Generation Resource—* The difference between the HDLOBRKP and the AVGHDL due to an ERCOT-issued HDL override for Generation Resource *r* represented by QSE *q* at Settlement Point *p* for the 15-minute Settlement Interval *i*. For a combined cycle Resource, *r* is a Combined Cycle Train. |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. |
| RTRSVPOR *i* | $/MWh | *Real-Time Reserve Price for On-Line Reserves*⎯The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval *i*. |
| RTRDP *i* | $/MWh | *Real-Time On-Line Reliability Deployment Price* ⎯The Real-Time price for the 15-minute Settlement Interval *i*, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time On-Line Reliability Deployment Price Adder. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource. |
| *p* | none | A Resource Node Settlement Point. |
| *i* | none | A 15-minute Settlement Interval. |

(4) The total compensation to each QSE for an HDL override for the 15-minute Settlement Interval is calculated as follows:

**HDLOEAMTQSETOT *q, i*  = HDLOEAMT *q, r, p, i***

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| HDLOEAMT *q, r, p, i* | $ | *High Dispatch Limit override energy amount per QSE per Generation Resource*—The payment to QSE *q* for an ERCOT-issued HDL override for Generation Resource *r* at Settlement Point *p* for the 15-minute Settlement Interval *i*. For a combined cycle Resource, *r* is a Combined Cycle Train. |
| HDLOEAMTQSETOT *q, i* | $ | *High Dispatch Limit override energy amount QSE total per QSE*—The total of the energy payments to QSE *q* as compensation for HDL overrides for this QSE for the 15-minute Settlement Interval *i*. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource. |
| *p* | none | A Resource Node Settlement Point. |
| *i* | none | A 15-minute Settlement Interval. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1010: Replace Section 6.6.3.6 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  **6.6.3.6 Real-Time High Dispatch Limit Override Energy Payment**  (1) If ERCOT directs a reduction in a Generation Resource’s real power output by employing a manual High Dispatch Limit (HDL) override and the reduction causes the QSE to suffer a demonstrable financial loss, the QSE may be eligible for a Real-Time High Dispatch Limit Override Energy Payment, as calculated below, upon providing documented proof of that loss. In order to qualify for this payment the QSE must:  (a) Have complied with ERCOT Dispatch Instructions to reduce real power output;  (b) Have received a SCED Base Point equal to the Resource’s HDL override, during the 15-minute Settlement Interval;  (c) Have incurred a demonstrable financial loss associated with variable cost components of DAM obligations or energy purchase or sale provisions of bilateral contracts (as opposed to lost opportunity costs), in consequence of the HDL override; and  (d) File a timely Settlement and billing dispute, including the following items:  (i) An attestation signed by an officer or executive with authority to bind the QSE;  (ii) The dollar amount and calculation of the financial loss by Settlement Interval;  (iii) An explanation of the nature of the loss and how it was attributable to the HDL override; and  (iv) Sufficient documentation to support the QSE’s calculation of the amount of the financial loss.  (2) ERCOT 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. ERCOT will provide Notice of its acceptance or rejection of the claim for the High Dispatch Limit Override Energy Payment within 15 Business Days of the updated submission.  (3) The Energy Offer Curve used to calculate the Real-Time High Dispatch Limit Override Energy Payment will be the most recent valid Energy Offer Curve received by ERCOT that was effective for the disputed interval(s) when the HDL override was issued. If no curve exists for the interval being disputed, ERCOT will use the most recent valid Energy Offer Curve received before the HDL override was issued for an interval prior to the disputed interval(s).  (4) The amount recoverable under this section shall be offset by any Ancillary Service Imbalance revenues received by the QSE that the QSE would not have earned had ERCOT not issued an HDL override.  The payment shall be calculated as follows:  **HDLOEAMT *q, r, p, i* = (-1) \* Min {HDLOAL *q, r, p, i*, Max(0, ((RTSPP*p, i* – RTRDP *i* – RTEOCOST *q, r, i* ) \* HDLOQTY *q, r, p, i* ))}**  Where:  HDLOQTY *q, r, p, i* = Max(0, (¼ (HDLOBRKP *q, r, p, i* – AVGHDL *q, r, p, i*)))  HDLOBRKP *q, r, p, i* = Min(AVGHSL *q, r, p, i* , HDLOBRKPCP *q, r, p, i* )  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | HDLOAL ***q, r, p, i*** | $ | *High Dispatch Limit override attested losses -* The financial loss to the QSE due to the HDL override as attested by the QSE in accordance with paragraph (1)(d) above. | | HDLOEAMT ***q, r, p, i*** | $ | *High Dispatch Limit override energy amount per QSE per Generation Resource*—The payment to QSE *q* for an ERCOT-issued HDL override for Generation Resource *r* at Settlement Point *p* for the 15-minute Settlement Interval *i*. For a combined cycle Resource, *r* is a Combined Cycle Train. | | HDLOBRKP***q, r, p, i*** | MW | *High Dispatch Limit override break point per QSE per Resource*—The point on the Energy Offer Curve corresponding to the lesser of the AVGHSL or the interception between the RTSPP of the Generation Resource *r* represented by QSE *q* minus the Real-Time Reliability Deployment Price for Energy and the Energy Offer Curve of Generation Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval *i*. For a combined cycle Resource, *r* is a Combined Cycle Train. | | AVGHDL***q, r, p, i*** | MW | *Average High Dispatch Limit per QSE per Settlement Point per Resource*—The time-weighted average of all 4-second HDL values calculated by the Resource Limit Calculator, subject to the manual HDL override, for the Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p* within the 15-minute Settlement Interval *i*.  For a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | AVGHSL ***q, r, p, i*** | MW | *Average High Sustained Limit per QSE per Settlement Point per Resource*—The time-weighted average High Sustained Limit (HSL) for the Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p* within the 15-minute Settlement Interval *i*.  For a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | HDLOBRKPCP*q, r, p, i* | MW | *High Dispatch Limit override break point at clearing price per QSE per Resource*—The MW value on the Energy Offer Curve corresponding to the Real-Time Settlement Point Price of Generation Resource *r* represented by QSE *q* at Settlement Point *p* minus the Real-Time Reliability Deployment Price for Energy. For a combined cycle Resource, *r* is a Combined Cycle Train. | | RTEOCOST *q, r, i* | $/MWh | *Real-Time Energy Offer Curve Cost Cap—*The Energy Offer Curve Cost Cap for Resource *r* represented by QSE *q*, for the Resource’s generation above the Low Sustained Limit (LSL) for the Settlement Interval *i*. See Section 4.4.9.3.3, Energy Offer Curve Cost Caps. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | HDLOQTY *q, r, p, i* | MWh | *High Dispatch Limit override quantity per QSE per Generation Resource—* The difference between the HDLOBRKP and the AVGHDL due to an ERCOT-issued HDL override for Generation Resource *r* represented by QSE *q* at Settlement Point *p* for the 15-minute Settlement Interval *i*. For a combined cycle Resource, *r* is a Combined Cycle Train. | | RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. | | RTRDP *i* | $/MWh | *Real-Time Reliability Deployment Price* *for Energy*⎯The Real-Time price for the 15-minute Settlement Interval *i*, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time Reliability Deployment Price Adder for Energy. | | *q* | none | A QSE. | | *r* | none | A Generation Resource. | | *p* | none | A Resource Node Settlement Point. | | *i* | none | A 15-minute Settlement Interval. |   (5) The total compensation to each QSE for an HDL override for the 15-minute Settlement Interval is calculated as follows:  **HDLOEAMTQSETOT *q, i*  = HDLOEAMT *q, r, p, i***  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | HDLOEAMT *q, r, p, i* | $ | *High Dispatch Limit override energy amount per QSE per Generation Resource*—The payment to QSE *q* for an ERCOT-issued HDL override for Generation Resource *r* at Settlement Point *p* for the 15-minute Settlement Interval *i*. For a combined cycle Resource, *r* is a Combined Cycle Train. | | HDLOEAMTQSETOT *q, i* | $ | *High Dispatch Limit override energy amount QSE total per QSE*—The total of the energy payments to QSE *q* as compensation for HDL overrides for this QSE for the 15-minute Settlement Interval *i*. | | *q* | none | A QSE. | | *r* | none | A Generation Resource. | | *p* | none | A Resource Node Settlement Point. | | *i* | none | A 15-minute Settlement Interval. | |

6.6.3.7 Real-Time High Dispatch Limit Override Energy Charge

(1) ERCOT shall allocate to QSEs on an LRS basis the total amount of the payment specified in Section 6.6.3.6, Real-Time High Dispatch Limit Override Energy Payment. The charge to each QSE for a given 15-minute Settlement Interval is calculated as follows:

LAHDLOEAMT *q, i*  = (-1) \* HDLOEAMTTOT \* LRS *q, i*

Where:

HDLOEAMTTOT*i* =  HDLOEAMTQSETOT *q, i*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| LAHDLOPEAMT *q* | $ | *Load-Allocated High Dispatch Limit override energy amount per QSE*—The charge to QSE *q* for an HDL override, for the 15-minute Settlement Interval. |
| HDLOEAMTTOT *i* | $ | *High Dispatch Limit energy amount total*—The total of payments to all QSEs for HDL overrides, for the 15-minute Settlement Interval *i*. |
| HDLOEAMTQSETOT *q, i* | $ | *High Dispatch Limit override energy amount QSE total per QSE*—The total of the energy payments to QSE *q* as compensation for an HDL override for this QSE for the 15-minute Settlement Interval *i*. |
| LRS *q, i* | none | *The Load Ratio Share* calculated for QSE *q* for the 15-minute Settlement Interval *i*. See Section 6.6.2.2, QSE Load Ratio Share for a 15-Minute Settlement Interval. |
| *q* | none | A QSE. |
| *i* | none | A 15-minute Settlement Interval. |

**6.6.3.8 Real-Time Payment or Charge for Energy from a Settlement Only Distribution Generator (SODG) or a Settlement Only Transmission Generator (SOTG)**

(1) The payment or charge to each QSE for energy from an SODG or an SOTG shall be based on an identified nodal energy price, RTESOGPR, as described in this subsection, with the following exceptions:

(a) An SODG or SOTG that has opted out of nodal pricing as described in paragraph (5) below; or

(b) Any site with one or more ESS SODGs or SOTGs where the ESS capacity constitutes more than 50% of the site’s total SOG nameplate capacity.

(2) For an SODG, the price used as the basis for the 15-minute Real-Time price calculation is the time-weighted price at the Electrical Bus associated with this mapped Load in the Network Operations Model. For an SOTG, the price used as the basis for the 15-minute Real-Time price calculation is the time-weighted price at the Electrical Bus as determined by ERCOT in review of the meter location of the SOTG in the Network Operations Model. SODG and SOTG sites will be represented as a single unit in the ERCOT Settlement system.

(3) For an SODG or an SOTG, the total payment or charge for each 15-minute Settlement Interval shall be calculated as follows:

MEBSOGNET *q,* *gsc* = Max(0, MEBSOG *q, gsc, b*)

If MEBSOGNET *q, gsc* = 0 for a 15-minute Settlement Interval, then

The Load is included in the Real-Time AML per QSE and is included in the Real-Time energy imbalance payment or charge at a Load Zone.

Otherwise, when MEBSOGNET *q, gsc* > 0 for a 15-minute Settlement Interval, then

**RTESOGSAMT *q,* *gsc* = (-1) \* [( RTESOGPR *b* \* MEBSOG *q, gsc, b*)]**

Where the price for the SOTG or SODG is determined as follows:

**RTESOGPR *b* = Max [-$251, ((SDWF *y* \* RTLMP *b, y*) + RTRSVPOR + RTRDP)]**

Where:

RTRSVPOR = (SDWF *y* \* RTORPA *y*)

RTRDP = (SDWF *y* \* RTORDPA *y*)

SDWF *y* = TLMP *y* / TLMP *y*

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| RTESOGSAMT*q,**gsc* | $ | *Real-Time Energy for SODG and SOTG Site Amount* —The total payment or charge to QSE *q* for SODG or SOTG site *gsc* for the 15-minute Settlement Interval. |
| RTESOGPR *b* | $/MWh | *Real-Time Price for the Energy Metered for each SODG or SOTG Site* ⎯The Real-Time price at Electrical Bus *b* for the Settlement Meter for the SODG or SOTG site for the 15-minute Settlement Interval. |
| MEBSOGNET *q, gsc* | MWh | *Net Metered energy at gsc for an SODG or SOTG Site* ⎯The net sum for all Settlement Meters for SODG or SOTG site *gsc* represented by QSE *q*. A positive value indicates an injection of power to the ERCOT System. |
| MEBSOG *q,* *gsc, b* | MWh | *Metered energy at bus for an SODG or SOTG Site* ⎯The metered energy by the Settlement Meter(s) at Electrical Bus *b* for SODG or SOTG site *gsc* represented by QSE *q*. A positive value represents energy produced, and a negative value represents energy consumed. |
| RTRSVPOR | $/MWh | *Real-Time Reserve Price for On-Line Reserves*⎯The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval. |
| RTORPA*y* | $/MWh | *Real-Time On-Line Reserve Price Adder per interval*⎯The Real-Time On-Line Reserve Price Adder for the SCED interval *y*. |
| RTRDP | $/MWh | *Real-Time On-Line Reliability Deployment Price* ⎯The Real-Time price for the 15-minute Settlement Interval, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time On-Line Reliability Deployment Price Adder. |
| RTORDPA*y* | $/MWh | *Real-Time On-Line Reliability Deployment Price Adder* ⎯The Real-Time Price Adder that captures the impact of reliability deployments on energy prices for the SCED interval *y*. |
| SDWF *y* | None | *SCED Duration Weighting Factor per interval*⎯The weight used in the SODG or SOTG price calculation for the portion of the SCED interval *y* within the Settlement Interval. |
| RTLMP *b, y* | $/MWh | *Real-Time Locational Marginal Price at bus per interval*⎯The Real-Time LMP at Electrical Bus *b*, for the SCED interval *y*. |
| TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the SCED interval *y* within the Settlement Interval. |
| *gsc* | none | A generation site code. |
| *b* | none | An Electrical Bus. |
| *y* | None | A SCED interval in the 15-minute Settlement Interval. The summation is over the total number of SCED runs that cover the 15-minute Settlement Interval. |

(4) The total net payments and charges to each QSE for energy from SODGs and SOTGs for the 15-minute Settlement Interval is calculated as follows:

**RTESOGAMTQSETOT *q* = RTESOGSAMT *q, gsc***

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| 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. |
| RTESOGSAMT *q, gsc* | $ | *Real-Time Energy for SODG and SOTG Site Amount* —The total payment or charge to QSE *q* for an SODG or SOTG site *gsc* for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *gsc* | none | A generation site code. |

(5) Notwithstanding anything else in this Section except paragraphs (6) and (7) below, a Resource Entity may opt out of nodal pricing and continue Load Zone Settlement for any SODG or SOTG if, by January 1, 2019, the SODG or SOTG was operational or was subject to a Power Purchase or Tolling Agreement (PPA) or Transmission and/or Distribution Service Provider (TDSP) interconnection agreement, or had an executed agreement with a developer. By December 31, 2019, the Resource Entity must submit a properly completed Section 23, Form N, Pricing Election for Settlement Only Distribution Generators and Settlement Only Transmission Generators. Any SODG or SOTG relying on a PPA or TDSP interconnection agreement or agreement with a developer must also have achieved Initial Synchronization for the full Resource capacity before June 1, 2020 to be eligible to opt out of nodal pricing. A Resource Entity must provide ERCOT documented proof of any PPA, TDSP interconnection agreement, or developer agreement that it relies on as a basis for any election under this paragraph. This election is valid through the earlier of December 31, 2029 or the date on which the election is revoked pursuant to paragraph (8) of this Section. On January 1, 2030, all SODGs and SOTGs will be subject to nodal pricing.

(6) For any SODG or SOTG for which the applicable Resource Entity has elected to opt out of nodal pricing, ERCOT shall settle the output of the SODG or SOTG using the Load Zone Settlement Point Price for the duration of the opt-out period so long as the SODG or SOTG is not physically modified for any purpose, including to increase the capacity of the unit or change the fuel type of the unit, except as necessary for routine maintenance or repairs to address normal wear and tear.

(7) If at any time ERCOT determines that the SODG or SOTG fails to meet the opt-out conditions in paragraph (6) above, ERCOT shall settle the output of the SODG or SOTG at the applicable nodal price as soon as practicable after providing written notice to the affected Resource Entity.

(8) A Resource Entity that has opted out of nodal pricing for one or more SODGs or SOTGs pursuant to paragraph (5) of this Section may withdraw that election and begin receiving applicable nodal pricing for one or more such generators by submitting a properly completed election form (Section 23, Form N). An election of nodal pricing is irrevocable. ERCOT will effectuate the transition of an SODG or SOTG to nodal pricing in ERCOT Settlement systems as soon as practicable.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR995 and NPRR1010: Replace applicable portions of Section 6.6.3.8 above with the following upon system implementation for NPRR995; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]  6.6.3.8 Real-Time Payment or Charge for Energy from a Settlement Only Distribution Generator (SODG), Settlement Only Transmission Generator (SOTG), Settlement Only Distribution Energy Storage System (SODESS), or Settlement Only Transmission Energy Storage System (SOTESS)  (1) The payment or charge to each QSE for energy from an SODG, SOTG, SODESS, or SOTESS shall be based on an identified nodal energy price, RTESOPR, as described in this subsection, with the exception of an SODG or SOTG that has opted out of nodal pricing as described in paragraph (7) below.  (2) For an SODG or an SODESS, the price used as the basis for the 15-minute Real-Time price calculation is the time-weighted price at the Electrical Bus associated with this mapped Load in the Network Operations Model. For an SOTG or an SOTESS, the price used as the basis for the 15-minute Real-Time price calculation is the time-weighted price at the Electrical Bus as determined by ERCOT in review of the meter location of the SOTG or SOTESS in the Network Operations Model. Load that is not WSL will be included in the Real-Time AML per QSE. Each SODG, SOTG, SODESS, and SOTESS site will be represented as a single unit in the ERCOT Settlement system.  (3) For an SODG, SOTG, SODESS, or SOTESS, the total payment or charge for each 15-minute Settlement Interval shall be calculated as follows:  MEBSOGNET *q,* *gsc* = Max(0, MEBSOG *q, gsc, b*)  If MEBSOGNET *q, gsc* = 0 for a 15-minute Settlement Interval, then  The Load is included in the Real-Time AML per QSE, excluding WSL.  Otherwise, when MEBSOGNET *q, gsc* > 0 for a 15-minute Settlement Interval, then  RTGSOAMT *q,* *gsc* = (-1) \* [(RTESOPR *b* \* MEBSOG *q, gsc, b*)]  (4) For an SODESS or SOTESS, the total payment or charge for each 15-minute Settlement Interval shall be calculated as follows:  **RTWSLSOAMT *q, gsc* = (-1) \* [(RTESOPR *b* \* WSOL *q, gsc, b*)]**  **RTNWSLSOAMT *q, gsc*= (-1) \* [(RTESOPR *b* \* NWSOL *q, gsc, b*)]**  (5) The price for the SOTG, SODG, SODESS, or SOTESS is determined as follows:  RTESOPR *b* = Max [-$251, ((SDWF *y* \* RTLMP *b, y*) + RTRDP)]  Where:  RTRDP = (SDWF *y* \* RTRDPA *y*)  SDWF *y* = TLMP *y* / TLMP *y*  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | RTGSOAMT*q,**gsc* | $ | *Real-Time Generation for SODG, SOTG, SODESS, or SOTESS Site Amount* —The total payment or charge for generation to QSE *q* for SODG, SOTG, SODESS, or SOTESS site *gsc* for the 15-minute Settlement Interval. | | RTWSLSOAMT*q,**gsc* | $ | *Real-Time WSL for SODESS or SOTESS Site Amount* —The total payment or charge for WSL to QSE *q* for the SODESS or SOTESS site *gsc* for the 15-minute Settlement Interval. | | RTNWSLSOAMT*q,**gsc* | $ | *Real-Time Non-WSL for SODESS or SOTESS Site Amount* —The total payment or charge for Non-WSL Settlement Only Charging Load to QSE *q* for the SODESS or SOTESS site *gsc* for the 15-minute Settlement Interval. | | RTESOPR *b* | $/MWh | *Real-Time Price for the Energy Metered for each SODG, SOTG, SODESS, or SOTESS Site* ⎯The Real-Time price at Electrical Bus *b* for the Settlement Meter for the SODG, SOTG, SODESS*,* or SOTESS site for the 15-minute Settlement Interval. | | MEBSOGNET *q, gsc* | MWh | *Net Metered energy at gsc for an SODG, SOTG, SODESS or SOTESS Site* ⎯The net sum for all Settlement Meters for SODG, SOTG, SODESS, or SOTESS site *gsc* represented by QSE *q*. A positive value indicates an injection of power to the ERCOT System. | | MEBSOG *q,* *gsc, b* | MWh | *Metered energy at bus for an SODG, SOTG, SODESS, or SOTESS Site* ⎯The metered energy by the Settlement Meter(s) at Electrical Bus *b* for SODG, SOTG, SODESS*,* orSOTESS site *gsc* represented by QSE *q* for the 15-minute Settlement Interval. A positive value represents energy produced, and a negative value represents energy consumed. | | WSOL *q, gsc, b* | MWh | *WSL for an SODESS or SOTESS Site*⎯The WSL as measured for an SODESS or SOTESS site *gsc* at Electrical Bus *b*, represented by QSE *q,* represented as a negative value, for the 15-minute Settlement Interval. | | NWSOL *q, gsc, b* | MWh | *Non-WSL Settlement Only Charging Load for an SODESS or SOTESS Site*⎯The Non-WSL Settlement Only Charging Load as measured for an SODESS or SOTESS site *gsc* at Electrical Bus *b*, represented by QSE *q,* represented as a negative value, for the 15-minute Settlement Interval. | | RTRDP | $/MWh | *Real-Time Reliability Deployment Price for Energy* ⎯The Real-Time price for the 15-minute Settlement Interval, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time Reliability Deployment Price Adder for Energy. | | RTRDPA*y* | $/MWh | *Real-Time Reliability Deployment Price Adder for Energy* ⎯The Real-Time price adder that captures the impact of reliability deployments on energy prices for the SCED interval *y*. | | SDWF *y* | None | *SCED Duration Weighting Factor per interval* ⎯The weight used in the SODG, SOTG, SODESS, or SOTESS price calculation for the portion of the SCED interval *y* within the Settlement Interval. | | RTLMP *b, y* | $/MWh | *Real-Time Locational Marginal Price at bus per interval* ⎯The Real-Time LMP at Electrical Bus *b*, for the SCED interval *y*. | | TLMP *y* | second | *Duration of SCED interval per interval* ⎯The duration of the SCED interval *y* within the Settlement Interval. | | *gsc* | none | A generation site code. | | *b* | none | An Electrical Bus. | | *y* | None | A SCED interval in the 15-minute Settlement Interval. The summation is over the total number of SCED runs that cover the 15-minute Settlement Interval. |   (6) The total net payments and charges to each QSE for energy from SODGs, SOTGs, SODESSs, or SOTESSs for the 15-minute Settlement Interval is calculated as follows:  RTESOAMTQSETOT *q* = (RTGSOAMT *q, gsc* + RTWSLSOAMT *q, gsc*+ RTNWSLSOAMT *q, gsc*)  The above variables are defined as follows:   | Variable | Unit | Definition | | --- | --- | --- | | RTESOAMTQSETOT *q* | $ | *Real-Time Energy Payment or Charge per QSE for SODGs, SOTGs, SODESSs, or SOTESSs* —The payment or charge to QSE *q* for Real-Time energy from SODGs, SOTGs, SODESSs, or SOTESSs, for the 15-minute Settlement Interval. | | RTGSOAMT *q, gsc* | $ | *Real-Time Generation for SODG, SOTG, SODESS, or SOTESS Site Amount* —The total payment or charge for generation to QSE *q* for SODG, SOTG, SODESS, or SOTESS site *gsc* for the 15-minute Settlement Interval. | | RTWSLSOAMT*q,**gsc* | $ | *Real-Time WSL for SODESS or SOTESS Site Amount* —The total payment or charge for WSL to QSE *q* for the SODESS or SOTESS site *gsc* for the 15-minute Settlement Interval. | | RTNWSLSOAMT*q,**gsc* | $ | *Real-Time Non-WSL for SODESS or SOTESS Site Amount* —The total payment or charge for Non-WSL Settlement Only Charging Load to QSE *q* for the SODESS or SOTESS site *gsc* for the 15-minute Settlement Interval. | | *q* | none | A QSE. | | *gsc* | none | A generation site code. |   (7) Notwithstanding anything else in this Section except paragraphs (8) and (9) below, a Resource Entity may opt out of nodal pricing and continue Load Zone Settlement for any SODG or SOTG if, by January 1, 2019, the SODG or SOTG was operational or was subject to a Power Purchase or Tolling Agreement (PPA) or Transmission and/or Distribution Service Provider (TDSP) interconnection agreement, or had an executed agreement with a developer. By December 31, 2019, the Resource Entity must submit a properly completed Section 23, Form N, Pricing Election for Settlement Only Distribution Generators and Settlement Only Transmission Generators. Any SODG or SOTG relying on a PPA or TDSP interconnection agreement or agreement with a developer must also have achieved Initial Synchronization for the full Resource capacity before June 1, 2020 to be eligible to opt out of nodal pricing. A Resource Entity must provide ERCOT documented proof of any PPA, TDSP interconnection agreement, or developer agreement that it relies on as a basis for any election under this paragraph. This election is valid through the earlier of December 31, 2029 or the date on which the election is revoked pursuant to paragraph (10) of this Section. On January 1, 2030, all SODGs and SOTGs will be subject to nodal pricing.  (8) For any SODG or SOTG for which the applicable Resource Entity has elected to opt out of nodal pricing, ERCOT shall settle the output of the SODG or SOTG using the Load Zone Settlement Point Price for the duration of the opt-out period so long as the SODG or SOTG is not physically modified for any purpose, including to increase the capacity of the unit or change the fuel type of the unit, except as necessary for routine maintenance or repairs to address normal wear and tear.  (9) If at any time ERCOT determines that the SODG or SOTG fails to meet the opt-out conditions in paragraph (8) above, ERCOT shall settle the output of the SODG or SOTG at the applicable nodal price as soon as practicable after providing written notice to the affected Resource Entity.  (10) A Resource Entity that has opted out of nodal pricing for one or more SODGs or SOTGs pursuant to paragraph (7) of this Section may withdraw that election and begin receiving applicable nodal pricing for one or more such generators by submitting a properly completed election form (Section 23, Form N). An election of nodal pricing is irrevocable. ERCOT will effectuate the transition of an SODG or SOTG to nodal pricing in ERCOT Settlement systems as soon as practicable. |

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

(1) The congestion payment or charge to each QSE submitting a Self-Schedule calculated based on the difference in Real-Time Settlement Point Prices at the specified sink and the source of the Self-Schedule multiplied by the amount of the Self-Schedule. The congestion charge to each QSE for each of its Self-Schedule for a given 15-minute Settlement Interval is calculated as follows:

RTCCAMT *q, s*  = (RTSPP *sink, s* – RTSPP *source, s*) \* (SSQ *q, s* \* ¼)

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| RTCCAMT *q, s* | $ | *Real-Time Congestion Cost Amount per QSE per Self-Schedule*—The congestion charge to QSE *q* for its Self-Schedule *s*, for the 15-minute Settlement Interval. |
| RTSPP *sink, s* | $/MWh | *Real-Time Settlement Point Price at the Sink of Self-Schedule*—The Real-Time Settlement Point Price at the sink of the Self-Schedule *s*, for the 15-minute Settlement Interval. |
| RTSPP *source, s* | $/MWh | *Real-Time Settlement Point Price at the Source of Self-Schedule*—The Real-Time Settlement Point Price at the source of the Self-Schedule *s*, for the 15-minute Settlement Interval. |
| SSQ *q,s* | MW | *Self-Schedule Quantity per Self-Schedule*—The QSE *q*’s Self Schedule MW quantity for Self-Schedule *s*, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *s* | none | A Self-Schedule. |
| *sink* | none | Sink Settlement Point |
| *source* | none | Source Settlement Point |

(2) The total net congestion payments and charges to each QSE for all its Self-Schedules for the 15-minute Settlement Interval is calculated as follows:

RTCCAMTQSETOT *q* = RTCCAMT *q, s*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| 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. |
| RTCCAMT *q, s* | $ | *Real-Time Congestion Cost Amount per QSE per Self-Schedule*—The congestion payment or charge to QSE *q* for its Self-Schedule *s*, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *s* | none | A Self-Schedule. |

6.6.5 Base Point Deviation Charge

|  |
| --- |
| ***[NPRR1029: Replace the title for Section 6.6.5 above with the following upon system implementation:]***  ***6.6.5 Set Point Deviation Charge*** |

6.6.5.1 Resource Base Point Deviation Charge

(1) A QSE for a Generation Resource or Controllable Load Resource shall pay a Base Point Deviation Charge if the Resource did not follow Dispatch Instructions and Ancillary Service deployments within defined tolerances, except when the Dispatch Instructions and Ancillary Service deployments violate the Resource Parameters. The Base Point Deviation Charge does not apply to Generation Resources when Adjusted Aggregated Base Point (AABP) is less than the Resource’s average telemetered LSL, the QSE’s Generation Resources are operating in Constant Frequency Control (CFC) mode, or any time during the Settlement Interval when the telemetered Resource Status is set to ONTEST or STARTUP. The Base Point Deviation Charge does not apply to a Controllable Load Resource if the computed Base Point is equal to the snapshot of its telemetered power consumption for all SCED runs during the Settlement Interval or any time during the Settlement Interval when the telemetered Resource Status is set to OUTL. The desired output from a Generation Resource or desired consumption from a Controllable Load Resource during a 15-minute Settlement Interval is calculated as follows:

AABP*q, r, p, i* = AVGBP*q, r, p, i* + AVGREG*q, r, p, i*

Where:

AVGBP*q, r, p, i* =  (AVGBP5M *q, r, p, i, y*) / 3

AVGREG*q, r, p, i* =  (AVGREG5M *q, r, p, i, y*) / 3

AVGREG5M *q, r, p, i, y*=(AVGREGUP5M*q, r, p, i, y* - AVGREGDN5M*q, r, p, i, y*)

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| AABP *q, r, p, i* | MW | *Adjusted Aggregated Base Point per QSE per Settlement Point per Resource*—The aggregated Base Point adjusted for Ancillary Service deployments of Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, AABP is calculated for the Combined Cycle Train considering all SCED Dispatch Instructions to any Combined Cycle Generation Resources within the Combined Cycle Train. |
| AVGBP *q, r, p, i* | MW | *Average Base Point per QSE per Settlement Point per Resource*—The average of the five-minute clock interval Base Points over the 15-minute Settlement Interval *i* for Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*. |
| AVGBP5M *q, r, p, i, y* | MW | *Average five-minute clock interval Base Point per QSE per Settlement Point per Resource*—The average Base Point for the Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the five-minute clock interval *y* within the 15-minute Settlement Interval *i*. The time-weighted average of the linearly ramped Base Points in a five-minute clock interval *y*. 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 clock interval *y*. 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).  The linear ramp is recalculated each time that a new Base Point is received from SCED. AVGBP5M is equal to the ABP value calculated for use in Generation Resource Energy Deployment Performance (GREDP) or the ABP value calculated for use in the Controllable Load Resource Energy Deployment Performance (CLREDP), as described in Section 8.1.1.4.1, Regulation Service and Generation Resource/Controllable Load Resource Energy Deployment Performance. |
| AVGREG *q, r, p, i* | MW | *Average Regulation Instruction per QSE per Settlement Point per Resource* —The average of the five-minute clock interval *y* Regulation Instruction Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p* over the 15-minute Settlement Interval *i*. |
| AVGREG5M *q, r, p, i, y* | MW | *Total Average five-minute clock interval Regulation Instruction per QSE per Settlement Point per Resource*—The total amount of regulation that the Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p* should have produced based on Load Frequency Control (LFC) deployment signals over the five-minute clock interval *y* within the 15-minute Settlement Interval *i*. |
| AVGREGUP5M *q, r, p, i, y* | MW | *Average Regulation Instruction Up per QSE per Settlement Point per Resource*—The amount of Regulation Up Service (Reg-Up) that the Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p* should have produced based on LFC deployment signals over the five-minute clock interval *y* within the 15-minute Settlement Interval *i*. |
| AVGREGDN5M *q, r, p, i, y* | MW | *Average Regulation Instruction Down per QSE per Settlement Point per Resource*—The amount of Regulation Down Service (Reg-Down) that the Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p* should have produced based on LFC deployment signals over the five-minute clock interval *y* within the 15-minute Settlement Interval *i*. |
| *q* | none | A QSE. |
| *p* | none | A Settlement Point. |
| *r* | none | A Generation Resource or Controllable Load Resource. |
| *i* | None | A 15-minute Settlement Interval |
| *y* | none | A five-minute clock interval in the Settlement Interval. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR963, NPRR1010, and NPRR1014: Replace applicable portions of Section 6.6.5.1 above with the following upon system implementation for NPRR963 or NPRR1014; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]  **6.6.5.1 Resource Set Point Deviation Charge**  (1) A QSE for a Generation Resource, ESR, or Controllable Load Resource shall pay a Set Point Deviation Charge if the Resource did not follow UDSPs within defined tolerances, except when the UDSPs violate the Resource Parameters.  (2) The desired output from a Generation Resource, ESR, or Controllable Load Resource during a 15-minute Settlement Interval is calculated as follows:  **AASP*q, r, p, i* =  (AVGSP5M *q, r, p, i, y*) / 3**  The above variables are defined as follows:   | Variable | Unit | Definition | | --- | --- | --- | | AASP *q, r, p, i* | MW | *Average Aggregated Set Point per QSE per Settlement Point per Resource*—The average of the Average Five Minute Clock Interval Set Point (AVGSP5M) of Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, AASP is calculated for the Combined Cycle Train considering all UDSPs to any Combined Cycle Generation Resources within the Combined Cycle Train. | | AVGSP5M *q, r, p, i, y* | MW | *Average Five Minute Clock Interval Set Point per QSE per Settlement Point per Resource –*The time-weighted average of the Updated Desired Set Point (UDSP) that Resource *r* for QSE *q* at Settlement Point *p* should have produced, for the five-minute clock interval *y* within the 15-minute Settlement Interval *i*. AVGSP5M is equal to the ASP value calculated for use in Generation Resource Energy Deployment Performance (GREDP), Controllable Load Resource Energy Deployment Performance (CLREDP), or Energy Storage Resource Energy Deployment Performance (ESREDP), as described in Section 8.1.1.4.1, Regulation Service and Generation Resource/Controllable Load Resource/Energy Storage Resource Energy Deployment Performance. | | *q* | none | A QSE. | | *p* | none | A Settlement Point. | | *r* | none | A Generation Resource, ESR, or Controllable Load Resource. | | *i* | none | A 15-minute Settlement Interval | | *y* | none | A five-minute clock interval in the Settlement Interval. | |

*6.6.5.1.1 General Generation Resource and Controllable Load Resource Base Point Deviation Charge*

(1) Unless one of the exceptions specified in paragraphs (2) and (3) below applies, ERCOT shall charge a Base Point Deviation Charge for a Resource other than those described in Section 6.6.5.2, IRR Generation Resource Base Point Deviation Charge, and Section 6.6.5.3, Resources Exempt from Deviation Charges, when the telemetered generation of the Generation Resource or telemetered power consumption of the Controllable Load Resource over the 15-minute Settlement Interval is outside the tolerances defined later in this Section 6.6.5.1.1.

(2) ERCOT may not charge a QSE a Base Point Deviation Charge under paragraph (1) above when both of the following apply:

(a) The deviation of the Resource over the 15-minute Settlement Interval is in a direction that contributes to frequency corrections that resolve an ERCOT System frequency deviation; and

(b) The ERCOT System frequency deviation is greater than +/-0.05 Hz at any time during the 15-minute Settlement Interval.

(3) ERCOT may not charge a QSE a Base Point Deviation Charge under paragraph (1) above for any 15-minute Settlement Interval during which:

(a) ERCOT Contingency Reserve Service (ECRS) was deployed; or

(b) Responsive Reserve (RRS) was manually deployed by ERCOT.

|  |
| --- |
| [NPRR963: Delete Section 6.6.5.1.1 above upon system implementation and renumber accordingly.] |

6.6.5.1.1.1 Base Point Deviation Charge for Over Generation

(1) ERCOT shall charge a QSE for a Generation Resource for over-generation that exceeds the following tolerance. The tolerance is the greater of:

(a) 5% of the average of the Base Points in the Settlement Interval adjusted for any Ancillary Service deployments; or

(b) Five MW for metered generation above the average of the Base Points in the Settlement Interval adjusted for any Ancillary Service deployments.

(2) The over-generation charge to each QSE for each Generation Resource at each Resource Node Settlement Point is calculated as follows:

BPDAMT *q, r, p, i*  = Max (PR1, RTSPP *p, i*) \* OGEN *q, r, p, i*

Where:

OGEN *q, r, p, i*  = Max [0, (TWTG *q, r, p, i*  – ¼ \* Max (((1 + K1) \* AABP *q, r, p, i*), (AABP *q, r, p, i* + Q1)))]

TWTG *q, r, p, i =* ( (AVGTG5M *q, r, p, i, y*) / 3) \* ¼

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| BPDAMT *q, r, p, i* | $ | *Base Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Generation Resource *r* at Resource Node *p*, for its deviation from Base Point, for the 15-minute Settlement Interval *i*. The Base Point Deviation Charge is charged to the Combined Cycle Train for all Combined Cycle Generation Resources. |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. |
| TWTG *q, r, p, i* | MWh | *Time-Weighted Telemetered Generation per QSE per Settlement Point per Resource*—The telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| AABP *q, r, p, i* | MW | *Adjusted Aggregated Base Point per QSE per Settlement Point per Resource*—The aggregated Base Point adjusted for Ancillary Service deployments, of Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p,* for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, AABP is calculated for the Combined Cycle Train considering all SCED Dispatch Instructions to any Combined Cycle Generation Resources within the Combined Cycle Train. |
| AVGTG5M *q, r, p, i, y* | MW | *Average Telemetered Generation for the 5 Minutes*—The average telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the five-minute clock interval *y*, within the 15-minute Settlement Interval *i*. |
| OGEN *q, r, p, i* | MWh | *Over Generation Volumes per QSE per Settlement Point per Resource*—The amount over-generated by the Generation Resource *r* represented by QSE *q* at Resource Node *p* for the 15- minute Settlement Interval *i*. |
| PR1 | $/MWh | The price to use for the Base Point Deviation Charge for over-generation when RTSPP is less than $20/MWh, $20/MWh. |
| K1 | none | The percentage tolerance for over-generation, 5%. |
| Q1 | MW | The MW tolerance for over-generation, five MW. |
|  | | |
| *q* | none | A QSE. |
| *p* | none | A Settlement Point. |
| *r* | none | A non-exempt, non-Intermittent Renewable Resource (IRR). |
| *y* | none | A five-minute clock interval in the Settlement Interval. |
| *i* | none | A 15-minute Settlement Interval. |
|  | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR879, NPRR963, and NPRR1010: Replace applicable portions of Section 6.6.5.1.1.1 above with the following upon system implementation for NPRR879 or NPRR963; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; and renumber accordingly:]  6.6.5.2 Set Point Deviation Charge for Over Generation  (1) For Generation Resources that are not Energy Storage Resources (ESRs), ERCOT shall charge a QSE for a Generation Resource, including an Intermittent Renewable Resource (IRR) with an Ancillary Service award for at least one SCED interval within the 15-minute Settlement Interval, for over-generation that exceeds the following tolerance. The tolerance is the greater of:  (a) 5% of the AASP in the Settlement Interval; or  (b) Five MW above the AASP in the Settlement Interval.  (2) For instances in which an IRR has not received an Ancillary Service award or is not part of an IRR Group in which an IRR receives an Ancillary Service award for any SCED interval within the 15-minute Settlement Interval, Set Point Deviation Charges will be determined per Section 6.6.5.4, IRR Generation Resource Set Point Deviation Charge.  (3) The over-generation charge to each QSE for each Generation Resource, that is not part of an IRR Group or an ESR, at each Resource Node Settlement Point is calculated as follows:  SPDAMT *q, r, p, i*  = Max (PR1, RTSPP *p, i*) \* OGEN *q, r, p, i*  Where:  OGEN *q, r, p, i*  = Max [0, (TWTG *q, r, p, i*  – ¼ \* Max (((1 + K1) \* AASP *q, r, p, i*), (AASP *q, r, p, i* + Q1)))]  TWTG *q, r, p, i =* ( (AVGTG5M *q, r, p, i, y*) / 3) \* ¼  (4) If any IRR in an IRR Group is awarded Ancillary Services for at least one SCED interval within the 15-minute Settlement Interval, then the deviation penalty is determined for the IRR Group and evenly allocated and charged to each IRR within that IRR Group as follows:  SPDAMT *q, r, p, i* = Max (PR1, RTSPP *p, i*) \* OGEN *q, r, p, i*  Where:  OGEN *q, r, p, i*  = Max [0, (TWTG *q, wg, p, i*  – ¼ \* Max (((1 + K1) \* AASP *q, wg, p, i*),  (AASP *q, wg, p, i* + Q1)))] / N  TWTG *q, wg, p, i* =  ( (AVGTG5M *q, r, p, i, y*) / 3) \* ¼  AASP *q, wg, p, i* = (AASP *q, r, p, i*)  The above variables are defined as follows:   | Variable | Unit | Definition | | --- | --- | --- | | SPDAMT *q, r, p, i* | $ | *Set Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Generation Resource *r* at Resource Node *p*, for its deviation from AASP, for the 15-minute Settlement Interval *i*. The Set Point Deviation Charge is charged to the Combined Cycle Train for all Combined Cycle Generation Resources. | | RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. | | TWTG *q, r, p, i* | MWh | *Time-Weighted Telemetered Generation per QSE per Settlement Point per Resource*—The telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | AASP *q, r, p, i* | MW | *Average Aggregated Set Point per QSE per Settlement Point per Resource*—The average of the Average Five Minute Clock Interval Set Point (AVGSP5M) of Generation Resource *r* represented by QSE *q* at Settlement Point *p,* for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, AASP is calculated for the Combined Cycle Train considering all UDSPs to any Combined Cycle Generation Resources within the Combined Cycle Train. | | AVGTG5M *q, r, p, i, y* | MW | *Average Telemetered Generation for the 5 Minutes*—The average telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the five-minute clock interval *y*, within the 15-minute Settlement Interval *i*. | | OGEN *q, r, p, i* | MWh | *Over Generation Volumes per QSE per Settlement Point per Resource*—The amount over-generated by the Generation Resource *r* represented by QSE *q* at Resource Node *p* for the 15-minute Settlement Interval *i*. | | PR1 | $/MWh | The price to use for the Set Point Deviation Charge for over-generation when RTSPP is less than $20/MWh, $20/MWh. | | K1 | none | The percentage tolerance for over-generation, 5%. | | Q1 | MW | The MW tolerance for over-generation, five MW. | | N | none | The number of IRRs within an IRR Group. | | *q* | none | A QSE. | | *p* | none | A Settlement Point. | | *r* | none | A non-exempt Resource. | | *y* | none | A five-minute clock interval in the Settlement Interval. | | *i* | none | A 15-minute Settlement Interval. | | *wg* | none | An IRR Group. | |

6.6.5.1.1.2 Base Point Deviation Charge for Under Generation

(1) ERCOT shall charge a QSE for a Generation Resource for under generation if the metered generation is below the lesser of:

(a) 95% of the average of the Base Points in the Settlement Interval adjusted for any Ancillary Service deployments; or

(b) The average of the Base Points in the Settlement Interval adjusted for any Ancillary Service deployments minus five MW.

(2) The under-generation charge to each QSE for each Generation Resource at each Resource Node Settlement Point for a given 15-minute Settlement Interval is calculated as follows:

**BPDAMT *q, r, p, i* = -1 \* Min (PR2, RTSPP *p, i*) \* Min (1, KP) \* UGEN *q, r, p, i***

Where:

UGEN *q, r, p, i* = Max [0, [Min ((1- K2) \* ¼\* AABP *q, r, p, i* ,

¼ \* (AABP *q, r, p, i* - Q2)) - TWTG *q, r, p, i*]]

TWTG *q, r, p, i =* ( (AVGTG5M *q, r, p, i, y*) / 3) \* ¼

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| BPDAMT *q, r, p, i* | $ | *Base Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Generation Resource *r* at Resource Node *p*, for its deviation from Base Point, for the 15-minute Settlement Interval *i*. A Base Point Deviation Charge is charged to the Combined Cycle Train for all Combined Cycle Generation Resources. |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. |
| TWTG *q, r, p, i* | MWh | *Time-Weighted Telemetered Generation per QSE per Settlement Point per Resource*—The telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| AABP*q, r, p, i* | MW | *Adjusted Aggregated Base Point*—The aggregated Base Point adjusted for Ancillary Service deployments of Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, AABP is calculated for the Combined Cycle Train considering all SCED Dispatch Instructions to any Combined Cycle Generation Resources within the Combined Cycle Train. |
| AVGTG5M *q, r, p, i, y* | MW | *Average Telemetered Generation for the 5 Minutes* —The average telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the five-minute clock interval *y*, within the 15-minute Settlement Interval *i*. |
| UGEN *q, r, p, i* | MWh | *Under Generation Volumes per QSE per Settlement Point per Resource*—The amount under-generated by the Generation Resource *r* represented by QSE *q* at Resource Node *p* for the 15-minute Settlement Interval *i*. |
| KP | none | The coefficient applied to the Settlement Point Price for under-generation charge, 1.0. |
| PR2 | $/MWh | The price to use for the Base Point Deviation Charge for under-generation calculation when RTSPP is greater than -$20/MWh, -$20/MWh. |
| K2 | none | The percentage tolerance for under-generation, 5%. |
| Q2 | MW | The MW tolerance for under-generation, five MW. |
|  | | |
| *q* | none | A QSE. |
| *p* | none | A Settlement Point. |
| *r* | none | A non-exempt, non-IRR. |
| *y* | none | A five-minute clock interval in the Settlement Interval. |
| *i* | none | A 15-minute Settlement Interval. |
|  | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR879, NPRR963, and NPRR1010: Replace applicable portions of Section 6.6.5.1.1.2 above with the following upon system implementation for NPRR879 or NPRR963; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]  **6.6.5.2.1 Set Point Deviation Charge for Under Generation**  (1) For Generation Resources that are not ESRs, ERCOT shall charge a QSE for a Generation Resource, including an IRR awarded Ancillary Service for at least one SCED interval within the 15-minute Settlement Interval, for under-generation if the telemetered generation is below the lesser of:  (a) 95% of the AASP in the Settlement Interval; or  (b) The AASP in the Settlement Interval minus five MW.  (2) For instances in which an IRR is not awarded Ancillary Service or is not part of an IRR Group in which an IRR is awarded Ancillary Service for any SCED interval within the 15-minute Settlement Interval, Set Point Deviation Charges will be determined per Section 6.6.5.4, IRR Generation Resource Set Point Deviation Charge.  (3) The under-generation charge to each QSE for each Generation Resource, that is not part of an IRR Group or an ESR, at each Resource Node Settlement Point for a given 15-minute Settlement Interval is calculated as follows:  **SPDAMT *q, r, p, i* = -1 \* Min (PR2, RTSPP *p, i*) \* Min (1, KP) \* UGEN *q, r, p, i***  Where:  UGEN *q, r, p, i* = Max [0, [Min ((1- K2) \* ¼\* AASP *q, r, p, i* ,  ¼ \* (AASP *q, r, p, i* - Q2)) - TWTG *q, r, p, i*]]  TWTG *q, r, p, i =* ( (AVGTG5M *q, r, p, i, y*) / 3) \* ¼  (4) If any IRR in an IRR Group is awarded Ancillary Service for at least one SCED interval within the 15-minute Settlement Interval, then the deviation penalty is determined for the IRR Group and evenly allocated and charged to each IRR within that IRR Group as follows:  **SPDAMT *q, r, p, i*  = -1 \* Min (PR2, RTSPP *p, i*) \* Min (1, KP) \* UGEN *q, r, p, i***  Where:  UGEN *q, r, p, i*  = Max [0, [Min ((1 - K2) \* ¼\* AASP *q, wg, p, i* ,  ¼ \* (AASP *q, wg, p, i* - Q2)) - TWTG *q, wg, p, i*]] / N  TWTG *q, wg, p, i* = ( (AVGTG5M *q, r, p, i, y*) / 3) \* ¼  AASP *q, wg, p, i* = (AASP *q, r, p, i*)  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | Variable | Unit | Definition | | SPDAMT *q, r, p, i* | $ | *Set Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Generation Resource *r* at Resource Node *p*, for its deviation from AASP, for the 15-minute Settlement Interval *i*. A Set Point Deviation Charge is charged to the Combined Cycle Train for all Combined Cycle Generation Resources. | | RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. | | TWTG *q, r, p, i* | MWh | *Time-Weighted Telemetered Generation per QSE per Settlement Point per Resource*—The telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | AASP*q, r, p, i* | MW | *Average Aggregated Set Point*—The average of the Average Five Minute Clock Interval Set Point (AVGSP5M) of Generation Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, AASP is calculated for the Combined Cycle Train considering all UDSPs to any Combined Cycle Generation Resources within the Combined Cycle Train. | | AVGTG5M *q, r, p, i, y* | MW | *Average Telemetered Generation for the 5 Minutes* —The average telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the five-minute clock interval *y*, within the 15-minute Settlement Interval *i*. | | UGEN *q, r, p, i* | MWh | *Under-Generation Volumes per QSE per Settlement Point per Resource*—The amount under-generated by the Generation Resource *r* represented by QSE *q* at Resource Node *p* for the 15-minute Settlement Interval *i*. | | KP | none | The coefficient applied to the Settlement Point Price for under-generation charge, 1.0. | | PR2 | $/MWh | The price to use for the Set Point Deviation Charge for under-generation calculation when RTSPP is greater than -$20/MWh, -$20/MWh. | | K2 | none | The percentage tolerance for under-generation, 5%. | | Q2 | MW | The MW tolerance for under-generation, five MW. | | N | none | The number of IRRs within an IRR Group. | | *q* | none | A QSE. | | *p* | none | A Settlement Point. | | *r* | none | A non-exempt Resource. | | *y* | none | A five-minute clock interval in the Settlement Interval. | | *i* | none | A 15-minute Settlement Interval. | | *wg* | none | An IRR Group. | |

6.6.5.1.1.3 Controllable Load Resource Base Point Deviation Charge for Over Consumption

(1) ERCOT shall charge a QSE for a Controllable Load Resource for over-consumption that exceeds the following tolerance. The tolerance is the greater of:

(a) XO% of the average of the Base Points in the Settlement Interval adjusted for any Ancillary Service deployments; or

(b) YO MW for power consumption above the average of the Base Points in the Settlement Interval adjusted for any Ancillary Service deployments.

(2) The Controllable Load Resource Base Point Deviation Charge for over-consumption variables XO and YO shall be subject to review and approval by the Technical Advisory Committee (TAC) and shall be posted to the ERCOT website no later than three Business Days after TAC approval.

(3) The charge to each QSE for non-excused over-consumption for each Controllable Load Resource during a 15-minute Settlement Interval in which the Controllable Load Resource has received a Base Point is calculated as follows:

BPDAMT *q, r, p, i* = -1 \* Min (PRZ1, RTSPP *p, i*) \* Min (1, KP1) \* OCONSM*q, r, p, i*

Where:

OCONSM *q, r, p, i*  = Max [0, (ATPC *q, r, p, i* - ¼\* Max (((1 + KLR1) \* AABP *q, r, p, i*), (AABP *q, r, p, i* + QLR1)))]

ATPC *q, r, p, i* = ( (AVGTPC5M *q, r, p, i, y*) / 3) \* ¼

The above variables are defined as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | Unit | Definition | |
| BPDAMT *q, r, p, i* | $ | *Base Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Generation Resource or Controllable Load Resource *r* at Settlement Point *p*, for its deviation from Base Point, for the 15-minute Settlement Interval *i*. | |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. | |
| ATPC *q, r, p, i* | MWh | *Average Telemetered Power Consumption per QSE per Settlement Point per Controllable Load Resource*—The average telemetered power consumption of the Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i.* |
| AABP *q, r, p, i* | MW | *Adjusted Aggregated Base Point per QSE per Settlement Point per Resource*—The aggregated Base Point adjusted for Ancillary Service deployments of Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i*. |
| AVGTPC5M *q, r, p, i, y* | MW | *Average Telemetered Power Consumption for the 5 Minutes*—The average telemetered power consumption of Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the five-minute clock interval *y*, within the 15-minute Settlement Interval *i*. | |
| OCONSM *q, r, p, i* | MWh | *Over-Consumption Volumes per QSE per Settlement Point per Controllable Load Resource*—The amount over-consumed by the Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p* for the 15-minute Settlement Interval *i*. | |
| KP1 | none | The coefficient applied to the Settlement Point Price for over-consumption charge, 1.0. | |
| PRZ1 | $/MWh | The price to use for the charge calculation when RTSPP is greater than -$20, -$20/MWh. | |
| KLR1 | none | The percentage tolerance for over-consumption of a Controllable Load Resource, XO%. | |
| QLR1 | MW | The MW tolerance for over-consumption of a Controllable Load Resource, YO MW. | |
| *q* | none | A QSE. | |
| *p* | none | A Settlement Point. | |
| *r* | none | A Controllable Load Resource. | |
| *i* | none | A 15-minute Settlement Interval. | |
| *y* | none | A five-minute clock interval in the Settlement Interval. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR963, NPRR1010, and NPRR1014: Replace applicable portions of Section 6.6.5.1.1.3 above with the following upon system implementation for NPRR963 or NPRR1014; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; and renumber accordingly:]  6.6.5.3 Controllable Load Resource Set Point Deviation Charge for Over Consumption  (1) ERCOT shall charge a QSE of a Controllable Load Resource, for over-consumption that exceeds the following tolerance. The tolerance is the greater of:  (a) XO% of the AASP in the Settlement Interval; or  (b) YO MW above the AASP in the Settlement Interval.  (2) The Controllable Load Resource Set Point Deviation Charge for over-consumption variables XO and YO shall be subject to review and approval by the Technical Advisory Committee (TAC) and shall be posted to the ERCOT website no later than three Business Days after TAC approval.  (3) The charge to each QSE for non-excused over-consumption for each Controllable Load Resource, during a 15-minute Settlement Interval is calculated as follows:  SPDAMT *q, r, p, i* = -1 \* Min (PRZ1, RTSPP *p, i*) \* Min (1, KP1) \* OCONSM*q, r, p, i*  Where:  OCONSM *q, r, p, i*  = Max [0, (ATPC *q, r, p, i* - ¼\* Max (((1 + KLR1) \* AASP *q, r, p, i*), (AASP *q, r, p, i* + QLR1)))]  ATPC *q, r, p, i* = ( (AVGTPC5M *q, r, p, i, y*) / 3) \* ¼  The above variables are defined as follows:   |  |  |  |  | | --- | --- | --- | --- | | Variable | Unit | Definition | | | SPDAMT *q, r, p, i* | $ | *Set Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Controllable Load Resource *r* at Settlement Point *p*, for its deviation from AASP, for the 15-minute Settlement Interval *i*. | | | RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. | | | ATPC *q, r, p, i* | MWh | *Average Telemetered Power Consumption per QSE per Settlement Point per Controllable Load Resource*—The average telemetered power consumption of the Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i.* | | AASP *q, r, p, i* | MW | *Average Aggregated Set Point for the Resource per QSE per Settlement Point per Resource*—The average of the Average Five Minute Clock Interval Set Point (AVGSP5M) of Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i*. | | AVGTPC5M *q, r, p, i, y* | MW | *Average Telemetered Power Consumption for the 5 Minutes*—The average telemetered power consumption of Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the five-minute clock interval *y*, within the 15-minute Settlement Interval *i*. | | | OCONSM *q, r, p, i* | MWh | *Over-Consumption Volumes per QSE per Settlement Point per Controllable Load Resource*—The amount over-consumed by the Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p* for the 15-minute Settlement Interval *i*. | | | KP1 | none | The coefficient applied to the Settlement Point Price for over-consumption charge, 1.0. | | | PRZ1 | $/MWh | The price to use for the charge calculation when RTSPP is greater than -$20, -$20/MWh. | | | KLR1 | none | The percentage tolerance for over-consumption of a Controllable Load Resource, XO%. | | | QLR1 | MW | The MW tolerance for over-consumption of a Controllable Load Resource, YO MW. | | | *q* | none | A QSE. | | | *p* | none | A Settlement Point. | | | *r* | none | A Controllable Load Resource. | | | *i* | none | A 15-minute Settlement Interval. | | | *y* | none | A five-minute clock interval in the Settlement Interval. | | |

6.6.5.1.1.4 Controllable Load Resource Base Point Deviation Charge for Under Consumption

(1) ERCOT shall charge a QSE for a Controllable Load Resource for under-consumption if the average telemetered power consumption is below than the lesser of:

(a) [100-XU]% of the average of the Base Points in the Settlement Interval adjusted for any Ancillary Service deployments; or

(b) The average of the Base Points in the Settlement Interval adjusted for any Ancillary Service deployments minus YU MW.

(2) The Controllable Load Resource Base Point Deviation Charge for under-consumption variables XU and YU shall be subject to review and approval by TAC and shall be posted to the ERCOT website no later than three Business Days after TAC approval.

(3) The charge to each QSE for non-excused under-consumption of each Controllable Load Resource during a 15-minute Settlement Interval in which the Controllable Load Resource has received a Base Point is calculated as follows:

BPDAMT *q, r, p, i* = Max (PRZ2, RTSPP *p, i*) \* UCONSM*q, r, p, i*

Where:

UCONSM *q, r, p, i*  = Max [0, [Min ((1 – KLR2) \* ¼\* AABP *q, r, p, i* ,¼ \* (AABP *q, r, p, i* – QLR2)) – ATPC *q, r, p, i*]]

ATPC *q, r, p, i =*  ( (AVGTPC5M *q, r, p, i, y*) / 3) \* ¼

The above variables are defined as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | Unit | Definition | |
| BPDAMT *q, r, p, i* | $ | *Base Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Generation Resource or Controllable Load Resource *r* at Settlement Point *p*, for its deviation from Base Point, for the 15-minute Settlement Interval *i*. | |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. | |
| ATPC *q, r, p, i* | MWh | *Average Telemetered Power Consumption per QSE per Settlement Point per Controllable Load Resource*—The average telemetered power consumption of the Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i.* |
| AABP *q, r, p, i* | MW | *Adjusted Aggregated Base Point per QSE per Settlement Point per Resource*—The aggregated Base Point adjusted for Ancillary Service deployments of Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i*. |
| AVGTPC5M *q, r, p, i, y* | MW | *Average Telemetered Power Consumption for the 5 Minutes*—The average telemetered power consumption of Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the five-minute clock interval *y*, within the 15-minute Settlement Interval *i*. | |
| UCONSM *q, r, p, i* | MWh | *Under Consumption Volumes per QSE per Settlement Point per Controllable Load Resource*—The amount under-consumed by the Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p* for the 15-minute Settlement Interval *i*. | |
| PRZ2 | $/MWh | The price to use for the Base Point Deviation Charge for under-consumption calculation when RTSPP is less than $20/MWh, $20/MWh. | |
| KLR2 |  | The percentage tolerance for under-consumption of a Controllable Load Resource, XU%. | |
| QLR2 | MW | The MW tolerance for under-consumption of a Controllable Load Resource, YU MW. | |
| *q* | none | A QSE. | |
| *p* | none | A Settlement Point. | |
| *r* | none | A Controllable Load Resource. | |
| *i* | none | A 15-minute Settlement Interval. | |
| *y* | none | A five-minute clock interval in the Settlement Interval. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR963, NPRR1010, and NPRR1014: Replace applicable portions of Section 6.6.5.1.1.4 above with the following upon system implementation for NPRR963 or NPRR1014; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]  6.6.5.3.1 Controllable Load Resource Set Point Deviation Charge for Under Consumption  (1) ERCOT shall charge a QSE for a Controllable Load Resource, for under-consumption if the average telemetered power consumption is below than the lesser of:  (a) [100-XU]% of the AASP in the Settlement Interval; or  (b) The AASP in the Settlement Interval minus YU MW.  (2) The Controllable Load Resource Set Point Deviation Charge for under-consumption variables XU and YU shall be subject to review and approval by TAC and shall be posted to the ERCOT website no later than three Business Days after TAC approval.  (3) The charge to each QSE for non-excused under-consumption of each Controllable Load Resource, during a 15-minute Settlement Interval is calculated as follows:  SPDAMT *q, r, p, i* = Max (PRZ2, RTSPP *p, i*) \* UCONSM*q, r, p, i*  Where:  UCONSM *q, r, p, i*  = Max [0, [Min ((1 – KLR2) \* ¼\* AASP *q, r, p, i* ,¼ \* (AASP *q, r, p, i* – QLR2)) – ATPC *q, r, p, i*]]  ATPC *q, r, p, i =*  ( (AVGTPC5M *q, r, p, i, y*) / 3) \* ¼  The above variables are defined as follows:   |  |  |  |  | | --- | --- | --- | --- | | Variable | Unit | Definition | | | SPDAMT *q, r, p, i* | $ | *Set Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Controllable Load Resource *r* at Settlement Point *p*, for its deviation from AASP, for the 15-minute Settlement Interval *i*. | | | RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. | | | ATPC *q, r, p, i* | MWh | *Average Telemetered Power Consumption per QSE per Settlement Point per Controllable Load Resource*—The average telemetered power consumption of the Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i.* | | AASP *q, r, p, i* | MW | *Average Aggregated Set Point for the Resource per QSE per Settlement Point per Resource*—The average of the Average Five Minute Clock Interval Set Point (AVGSP5M) of Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i*. | | AVGTPC5M *q, r, p, i, y* | MW | *Average Telemetered Power Consumption for the 5 Minutes*—The average telemetered power consumption of Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the five-minute clock interval *y*, within the 15-minute Settlement Interval *i*. | | | UCONSM *q, r, p, i* | MWh | *Under-Consumption Volumes per QSE per Settlement Point per Controllable Load Resource*—The amount under-consumed by the Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p* for the 15-minute Settlement Interval *i*. | | | PRZ2 | $/MWh | The price to use for the Set Point Deviation Charge for under-consumption calculation when RTSPP is less than $20/MWh, $20/MWh. | | | KLR2 |  | The percentage tolerance for under-consumption of a Controllable Load Resource, XU%. | | | QLR2 | MW | The MW tolerance for under-consumption of a Controllable Load Resource, YU MW. | | | *q* | none | A QSE. | | | *p* | none | A Settlement Point. | | | *r* | none | A Controllable Load Resource. | | | *i* | none | A 15-minute Settlement Interval. | | | *y* | none | A five-minute clock interval in the Settlement Interval. | | |

**6.6.5.2 IRR Generation Resource Base Point Deviation Charge**

(1) ERCOT shall charge a QSE for an IRR a Base Point Deviation Charge if the IRR metered generation is more than 10% above its Adjusted Aggregated Base Point and the flag signifying that the IRR has received a Base Point below the HDL used by SCED has been received.

(2) The charge to each QSE for non-excused over-generation of each IRR that is not included in an IRR Group at each Resource Node Settlement Point during a 15-minute Settlement Interval, is calculated as follows:

If the flag signifying that the IRR has received a Base Point below the HDL used by SCED is not set in all SCED intervals within the 15-minute Settlement Interval:

BPDAMT *q, r, p, i* = 0

Otherwise, if the flag signifying that the IRR has received a Base Point below the HDL used by SCED is set in all SCED intervals within the 15-minute Settlement Interval:

BPDAMT *q, r, p, i* = Max (PR1, RTSPP *p, i*) \* OGENIRR*q, r, p, i*

Where:

OGENIRR *q, r, p, i*  = Max [0, TWTG *q, r, p, i*  – ¼ \* AABP *q, r, p, i \**  (1 + KIRR)]

TWTG *q, r, p, i =*  ( (AVGTG5M *q, r, p, i, y*) / 3) \* ¼

(3) The charge to each QSE for non-excused over-generation of each IRR that is included in an IRR Group, at each Resource Node Settlement Point, if the Real-Time metered generation is greater than the upper tolerance during a 15-minute Settlement Interval, is calculated as follows:

If the flag signifying that the IRR has received a Base Point below the HDL used by SCED is not set in all SCED intervals within the 15-minute Settlement Interval for any of the IRRs within an IRR Group, then for all IRRs within an IRR Group:

**BPDAMT *q, r, p* = 0**

If the flag signifying that the IRR has received a Base Point below the HDL used by SCED is set in all SCED intervals within the 15-minute Settlement Interval for any of the IRRs within an IRR Group, then the deviation penalty is determined for the IRR Group and evenly allocated and charged to each IRR within that IRR Group:

**BPDAMT *q, r, p* = [Max (PR1, RTSPP *p*) \* OGENIRR *q, wg, i* ] / N**

Where:

OGENIRR *q, wg, i*  = Max [0, TWTG *q, wg, i*  – ¼ \* AABP *q, wg, i \**  (1 + KIRR)]

TWTG *q, wg, i =*  (TWTG *q, r, p, i*)

AABP *q, wg, i* = (AABP *q, r, p, i*)

The above variables are defined as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| Variable | Unit | Definition | |
| BPDAMT *q, r, p, i* | $ | *Base Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Generation Resource *r* at Resource Node *p*, for its deviation from Base Point, for the 15-minute Settlement Interval *i*. | |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Resource Node *p*, for the 15-minute Settlement Interval *i*. | |
| TWTG *q, r, p, i* | MWh | *Time-Weighted Telemetered Generation per QSE per Settlement Point per Resource*—The telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the 15-minute Settlement Interval *i.* |
| AABP *q, r, p, i* | MW | *Adjusted Aggregated Base Point Generation per QSE per Settlement Point per Resource*—The aggregated Base Point adjusted for Ancillary Service deployments, of Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i.* |
| AVGTG5M *q, r, p, i, y* | MW | *Average Telemetered Generation for the 5 Minutes*—The average telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the five-minute clock interval *y*, within the 15-minute Settlement Interval *i*. | |
| OGENIRR *q, r, p, i* | MWh | *Over Generation Volumes per QSE per Settlement Point per IRR Generation Resource*—The amount over generated by the IRR *r* represented by QSE *q* at Resource Node *p* for the 15-minute Settlement Interval *i*. | |
| PR1 | $/MWh | The price to use for the charge calculation when RTSPP is less than $20/MWh, $20/MWh. | |
| KIRR | none | The percentage tolerance for over-generation of an IRR, 10%. | |
| N | none | The number of IRRs within an IRR Group. | |
| *q* | none | A QSE. | |
| *p* | none | A Settlement Point. | |
| *r* | none | An IRR Generation Resource or an IRR within an IRR Group. | |
| *i* | none | A 15-minute Settlement Interval. | |
| *y* | none | A five-minute clock interval in the Settlement Interval. | |
| *wg* | none | An IRR Group. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR879, NPRR963, NPRR1010, and NPRR1111: Replace applicable portions of Section 6.6.5.2 above with the following upon system implementation for NPRR879 or NPRR963; upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation of SCR819 for NPRR1111; and renumber accordingly:]  **6.6.5.4 IRR Generation Resource Set Point Deviation Charge**  (1) ERCOT shall charge a QSE for an IRR a Set Point Deviation Charge if the IRR telemetered generation is more than 5% above its AASP, the flag signifying that the IRR has received a Base Point below the HDL used by SCED has been received or the IRR has been instructed not to exceed its Base Point, and the IRR is not awarded Ancillary Service and is not part of an IRR Group in which at least one IRR is awarded Ancillary Service for at least one SCED interval within the 15-minute Settlement Interval.  (2) For instances in which an IRR is awarded Ancillary Service or is part of an IRR Group in which at least one IRR is awarded Ancillary Service for at least one SCED interval within the 15-minute Settlement Interval, Set Point Deviation Charges will be determined per Section 6.6.5.2, Set Point Deviation Charge for Over Generation, and Section 6.6.5.2.1, Set Point Deviation Charge for Under Generation.  (3) The charge to each QSE for non-excused over-generation of each IRR that is not included in an IRR Group at each Resource Node Settlement Point during a 15-minute Settlement Interval, is calculated as follows:  If the flag signifying that the IRR has received a Base Point below the HDL used by SCED or the IRR has been instructed not to exceed its Base Point is not set in all SCED intervals within the 15-minute Settlement Interval:  SPDAMT *q, r, p, i* = 0  Otherwise, if the flag signifying that the IRR has received a Base Point below the HDL used by SCED or the IRR has been instructed not to exceed its Base Point is set in all SCED intervals within the 15-minute Settlement Interval:  SPDAMT *q, r, p, i* = Max (PR1, RTSPP *p, i*) \* OGENIRR*q, r, p, i*  Where:  OGENIRR *q, r, p, i*  = Max [0, TWTG *q, r, p, i*  – ¼ \* AASP *q, r, p, i \**  (1 + KIRR)]  TWTG *q, r, p, i =*  ( (AVGTG5M *q, r, p, i, y*) / 3) \* ¼  (4) The charge to each QSE for non-excused over-generation of each IRR that is included in an IRR Group, at each Resource Node Settlement Point, if the telemetered generation is greater than the upper tolerance during a 15-minute Settlement Interval, is calculated as follows:  If the flag signifying that the IRR has received a Base Point below the HDL used by SCED or the IRR has been instructed not to exceed its Base Point is not set in all SCED intervals within the 15-minute Settlement Interval for any of the IRRs within an IRR Group, then for all IRRs within an IRR Group:  **SPDAMT *q, r, p* = 0**  If the flag signifying that the IRR has received a Base Point below the HDL used by SCED or the IRR has been instructed not to exceed its Base Point is set in all SCED intervals within the 15-minute Settlement Interval for any of the IRRs within an IRR Group, then the deviation penalty is determined for the IRR Group and evenly allocated and charged to each IRR within that IRR Group:  **SPDAMT *q, r, p* = Max (PR1, RTSPP *p*) \* OGENIRR *q, r, i***  Where:  OGENIRR *q, r, i*  = Max [0, TWTG *q, wg, i*  – ¼ \* AASP *q, wg, i \**  (1 + KIRR)] / N  TWTG *q, wg, i =*  (TWTG *q, r, p, i*)  AASP *q, wg, i* = (AASP *q, r, p, i*)  The above variables are defined as follows:   |  |  |  |  | | --- | --- | --- | --- | | Variable | Unit | Definition | | | SPDAMT *q, r, p, i* | $ | *Set Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Generation Resource *r* at Resource Node *p*, for its deviation from AASP, for the 15-minute Settlement Interval *i*. | | | RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Resource Node *p*, for the 15-minute Settlement Interval *i*. | | | TWTG *q, r, p, i* | MWh | *Time-Weighted Telemetered Generation per QSE per Settlement Point per Resource*—The telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the 15-minute Settlement Interval *i.* | | AASP *q, r, p, i* | MW | *Average Aggregated Set Point Generation per QSE per Settlement Point per Resource*—The average of the Average Five Minute Clock Interval Set Point (AVGSP5M) of Generation Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i.* | | AVGTG5M *q, r, p, i, y* | MW | *Average Telemetered Generation for the 5 Minutes*—The average telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the five-minute clock interval *y*, within the 15-minute Settlement Interval *i*. | | | OGENIRR *q, r, p, i* | MWh | *Over Generation Volumes per QSE per Settlement Point per IRR Generation Resource*—The amount over generated by the IRR *r* represented by QSE *q* at Resource Node *p* for the 15-minute Settlement Interval *i*. | | | PR1 | $/MWh | The price to use for the charge calculation when RTSPP is less than $20/MWh, $20/MWh. | | | KIRR | none | The percentage tolerance for over-generation of an IRR, 5%. | | | N | none | The number of IRRs within an IRR Group. | | | *q* | none | A QSE. | | | *p* | none | A Settlement Point. | | | *r* | none | An IRR Generation Resource not awarded Ancillary Service or an IRR within an IRR Group where no member of the IRR Group was awarded Ancillary Service. | | | *i* | none | A 15-minute Settlement Interval. | | | *y* | none | A five-minute clock interval in the Settlement Interval. | | | *wg* | none | An IRR Group. | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR963, NPRR1010, NPRR1014, NPRR1029, and NPRR1111: Insert applicable portions of Section 6.6.5.5 below upon system implementation for NPRR963, NPRR1014, and NPRR1029; upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation of SCR819 for NPRR1111; and renumber accordingly:]  **6.6.5.5 Energy Storage Resource Set Point Deviation Charge for Over Performance**  (1) ERCOT shall charge a QSE for an ESR a Set Point Deviation Charge for over-performance if the telemetered generation or consumption exceeds the specified tolerance.  (2) The tolerance is the greater of 3% of the AASP for the ESR in the Settlement Interval, or three MW above the AASP for the ESR in the Settlement Interval if the Resource meets the following conditions:  (a) The ESR is not a DC-Coupled Resource; or  (b) The ESR is a DC-Coupled Resource and meets the conditions to be treated in the same manner as an ESR as specified in paragraph (1) of Section 3.8.7, DC-Coupled Resources, anytime during the Settlement Interval.  (3) The tolerance will be 5% of the AASP for a DC-Coupled Resource in the Settlement Interval if the ESR meets the conditions to be treated in the same manner as an IRR as specified in paragraph (2) of Section 3.8.7.  (4) The deviation charge for over-performance for each QSE for each ESR at each Resource Node Settlement Point will be calculated as follows:  If the ESR meets the conditions of paragraph (3) above and a flag signifying that the DC-Coupled Resource has received a Base Point below the HDL used by SCED or it has been instructed not to exceed its Base Point is not set in all SCED intervals within the 15-minute Settlement Interval, then:  **SPDAMT *q, r, p, i* = 0**  Otherwise:  **SPDAMT *q, r, p, i* = Max (PR3, RTSPP *p, i*) \* OPESR*q, r, p, i***  Where:  If the ESR meets the conditions of paragraph (2) above, then:  OPESR *q, r, p, i*  = Max [0, (TWTG *q, r, p, i* – ¼ \* Max [(AASP *q, r, p, i +* ABS (K3\* AASP *q, r, p, i*))*,* (AASP *q, r, p, i* + Q3)])]  If the ESR meets the conditions of paragraph (3) above, then:  OPESR *q, r, p, i*  = Max [0, (TWTG *q, r, p, i* – ¼ \* (AASP *q, r, p, i +* ABS (K5\* AASP *q, r, p, i*)))]  Where:  TWTG *q, r, p, i =*  ( (AVGTG5M *q, r, p, i, y*) / 3) \* ¼  The above variables are defined as follows:   | Variable | Unit | Definition | | --- | --- | --- | | SPDAMT *q, r, p, i* | $ | *Set Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Resource *r* at Resource Node *p*, for its deviation from AASP, for the 15-minute Settlement Interval *i*. | | RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. | | TWTG *q, r, p, i* | MWh | *Time-Weighted Telemetered Generation per QSE per Settlement Point per Resource*—The telemetered generation or consumption of Resource *r* represented by QSE *q* at Resource Node *p*, for the 15-minute Settlement Interval *i*. | | AASP *q, r, p, i* | MW | *Average Aggregated Set Point per QSE per Settlement Point per Resource*—The average of the Average Five Minute Clock Interval Set Point (AVGSP5M) of Resource *r* represented by QSE *q* at Settlement Point *p,* for the 15-minute Settlement Interval *i*. | | AVGTG5M *q, r, p, i, y* | MW | *Average Telemetered Generation for the 5 Minutes*—The average telemetered generation or consumption of Resource *r* represented by QSE *q* at Resource Node *p*, for the five-minute clock interval *y*, within the 15-minute Settlement Interval *i*. | | OPESR *q, r, p, i* | MWh | *Over-Performance Volumes per QSE per Settlement Point per Resource*—The amount the ESR *r* over-performed*,* represented by QSE *q* at Resource Node *p,* for the 15-minute Settlement Interval *i*. | | PR3 | $/MWh | The price to use for the Set Point Deviation Charge for over-performance when RTSPP is less than $20/MWh, $20/MWh. | | K3 | none | The percentage tolerance for over-performance per paragraph (2) above, 3%. | | K5 | none | The percentage tolerance for over-performance per paragraph (3) above, 5%. | | Q3 | MW | The MW tolerance for over-performance, three MW. | | *q* | none | A QSE. | | *p* | none | A Settlement Point. | | *r* | none | An ESR. | | *y* | none | A five-minute clock interval in the Settlement Interval. | | *i* | none | A 15-minute Settlement Interval. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR963, NPRR1010, NPRR1014, and NPRR1029: Insert applicable portions of Section 6.6.5.5.1 below upon system implementation for NPRR963, NPRR1014, or NPRR1029; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]  **6.6.5.5.1 Energy Storage Resource Set Point Deviation Charge for Under Performance**  (1) ERCOT shall charge a QSE for an ESR a Set Point Deviation Charge for under-performance if the telemetered generation or consumption is below the specified tolerance.  (2) The tolerance is the lesser of 3% of the AASP for the ESR in the Settlement Interval, or three MW below the AASP for the ESR in the Settlement Interval, if the Resource meets the following conditions:  (a) The ESR is not a DC-Coupled Resource; or  (b) The ESR is a DC-Coupled Resource and meets the conditions to be treated in the same manner as an ESR as specified in paragraph (1) of Section 3.8.7, DC-Coupled Resources, anytime during the Settlement Interval.  (3) The deviation charge for under-performance for each QSE for each ESR at each Resource Node Settlement Point will be calculated as follows:  **SPDAMT *q, r, p, i* = (-1) \* Min (PR4, RTSPP *p, i*) \* Min (1, KP2) \* UPESR*q, r, p, i***  Where:  If the ESR meets the conditions of paragraph (2) above, then:  UPESR *q, r, p, i*  = Max [0, ¼ \* Min [(AASP *q, r, p, i* - ABS (K4 \* AASP *q, r, p, i*)), (AASP *q, r, p, i* - Q4)] - TWTG *q, r, p, i*]  Else:  UPESR *q, r, p, i* = 0  Where:  TWTG *q, r, p, i =*  ( (AVGTG5M *q, r, p, i, y*) / 3) \* ¼  The above variables are defined as follows:   | Variable | Unit | Definition | | --- | --- | --- | | SPDAMT *q, r, p, i* | $ | *Set Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Resource *r* at Resource Node *p*, for its deviation from AASP, for the 15-minute Settlement Interval *i*. | | RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. | | TWTG *q, r, p, i* | MWh | *Time-Weighted Telemetered Generation per QSE per Settlement Point per Resource*—The telemetered generation or consumption of Resource *r* represented by QSE *q* at Resource Node *p*, for the 15-minute Settlement Interval *i*. | | AASP *q, r, p, i* | MW | *Average Aggregated Set Point per QSE per Settlement Point per Resource*—The average of the Average Five Minute Clock Interval Set Point (AVGSP5M) of Resource *r* represented by QSE *q* at Settlement Point *p,* for the 15-minute Settlement Interval *i*. | | AVGTG5M *q, r, p, i, y* | MW | *Average Telemetered Generation for the 5 Minutes*—The average telemetered generation or consumption of Resource *r* represented by QSE *q* at Resource Node *p*, for the five-minute clock interval *y*, within the 15-minute Settlement Interval *i*. | | UPESR *q, r, p, i* | MWh | *Under-Performance Volumes per QSE per Settlement Point per Resource*—The amount the ESR *r* under-performed represented by QSE *q* at Resource Node *p,* for the 15-minute Settlement Interval *i*. | | PR4 | $/MWh | The price to use for the Set Point Deviation Charge for under-performance when RTSPP is greater than -$20/MWh, -$20/MWh. | | K4 | none | The percentage tolerance for under-performance, 3%. | | Q4 | MW | The MW tolerance for under-performance, three MW. | | KP2 | none | The coefficient applied to the Settlement Point Price for under-performance charge, 1.0. | | *q* | none | A QSE. | | *p* | none | A Settlement Point. | | *r* | none | An ESR. | | *y* | none | A five-minute clock interval in the Settlement Interval. | | *i* | none | A 15-minute Settlement Interval. | |

6.6.5.3 Resources Exempt from Deviation Charges

(1) Resource Base Point Deviation Charges do not apply to the following:

(a) Reliability Must-Run (RMR) Units;

(b) Dynamically Scheduled Resources (DSRs) (except as described in Section 6.4.2.2, Output Schedules for Dynamically Scheduled Resources);

(c) Qualifying Facilities (QFs) that do not submit an Energy Offer Curve for the Settlement Interval;

(d) Quick Start Generation Resources (QSGRs) during the 15-minute Settlement Interval after the start of the first SCED interval in which the QSGR is deployed; or

(e) Settlement Intervals in which Emergency Base Points were issued to the Resource.

|  |
| --- |
| [NPRR863, NPRR963, NPRR1000, NPRR1010, NPRR1014, NPRR1046, NPRR1058, and NPRR1111: Replace applicable portions of Section 6.6.5.3 above with the following upon system implementation for NPRR863, NPRR963, NPRR1014, or NPRR1058; upon system implementation of NPRR1000 for NPRR1000 and NPRR1046; upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation of SCR819 for NPRR1111; and renumber accordingly:]  6.6.5.6 Resources Exempt from Deviation Charges  (1) Set Point Deviation Charges do not apply to any QSE for the 15-minute Settlement Interval during the following events:  (a) Responsive Reserve (RRS) was manually deployed by ERCOT;  (b) ERCOT Contingency Reserve Service (ECRS) was deployed; or  (c) ERCOT System Frequency deviation is both greater than +0.05 Hz and less than -0.05 Hz within the same Settlement Interval.  (2) Set Point Deviation Charges do not apply to the QSE for the Resource for the 15-minute Interval for the following:  (a) The deviation of the Resource over the 15-minute Settlement Interval is in a direction that contributes to frequency corrections that resolve an ERCOT System frequency deviation and ERCOT System frequency deviation is greater than +/-0.05 Hz at any time during the 15-minute Settlement Interval;  (b) The Resource is a Reliability Must-Run (RMR) Unit;  (c) Emergency Base Points were issued to the Resource; or  (d) Resource is operating in Constant Frequency Control (CFC) mode.  (3) In addition to the exemptions listed in paragraph (1) and (2) of this Section, Set Point Deviation Charges do not apply to the QSE for a Generation Resource for the 15-minute Settlement Interval for the following:  (a) AASP is less than the Resource’s average telemetered LSL;  (b) The Generation Resource is telemetering a status of ONTEST or STARTUP anytime during the Settlement Interval;  (c) Qualifying Facilities (QFs) that do not submit an Energy Offer Curve prior to the end of the Adjustment Period for the Settlement Interval;  (d) Quick Start Generation Resources (QSGRs) during the 15-minute Settlement Interval after the start of the first SCED interval in which the QSGR is deployed; or  (e) The flag signifying that an IRR has received a Base Point below the HDL used by SCED or the IRR has been instructed not to exceed its Base Point is not set in all SCED intervals within the 15-minute Settlement Interval. For IRR Groups, the flag signifying that an IRR has received a Base Point below the HDL used by SCED or the IRR has been instructed not to exceed its Base Point is not set in all SCED intervals within the 15-minute Settlement Interval for any of the IRRs within the IRR Group.  (4) In addition to the exemptions listed in paragraph (1) and (2) of this Section, Set Point Deviation Charges do not apply to the QSE for the Controllable Load Resource for the 15-minute Settlement Interval if the following occur:  (a) The UDSP is equal to the snapshot of its telemetered power consumption for all SCED runs during the Settlement Interval; or  (b) The Controllable Load Resource is telemetering a status of OUTL anytime during the Settlement Interval.  (5) In addition to the exemptions listed in paragraph (1) and (2) of this Section, Set Point Deviation Charges do not apply to the QSE for the ESR for the 15-minute Settlement Interval if the following occur:  (a) The ESR is telemetering a status of ONTEST anytime during the Settlement Interval; or  (b) The AASP is less than its average telemetered LSL. |

6.6.5.4 Base Point Deviation Payment

(1) ERCOT shall pay the Base Point Deviation Charges collected from the QSEs representing Resources to the QSEs representing Load based on LRS. The payment to each QSE for a given 15-minute Settlement Interval is calculated as follows:

LABPDAMT *q* = (-1) \* BPDAMTTOT \* LRS *q*

Where:

BPDAMTTOT = BPDAMTQSETOT *q*

BPDAMTQSETOT *q* = BPDAMT *q, r, p*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| LABPDAMT *q* | $ | *Load-Allocated Base Point Deviation Amount per QSE*—QSE *q*’s share of the total charge for all Resources’ Base Point deviations, based on LRS for the 15-minute Settlement Interval. |
| BPDAMTTOT | $ | *Base Point Deviation Amount Total*—The total of Base Point Deviation Charges to all QSEs for all Resources, for the 15-minute Settlement Interval. |
| BPDAMTQSETOT *q* | $ | *Base Point Deviation Amount QSE Total per QSE*—The total of Base Point Deviation Charges to QSE *q* for all Resources represented by this QSE, for the 15-minute Settlement Interval. |
| BPDAMT *q, r, p* | $ | *Base Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Generation Resource or Controllable Load Resource *r* at Settlement Node *p*, for its deviation from Base Point, for the 15-minute Settlement Interval. A Base Point Deviation Charge is charged to the Combined Cycle Train for all Combined Cycle Generation Resources. |
| 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. |
| *p* | none | A Settlement Point. |
| *r* | none | A Generation Resource or Controllable Load Resource. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1010: Replace Section 6.6.5.4 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  **6.6.5.4 Set Point Deviation Payment**  (1) ERCOT shall pay the Set Point Deviation Charges collected from the QSEs representing Resources to the QSEs representing Load based on LRS. The payment to each QSE for a given 15-minute Settlement Interval is calculated as follows:  **LASPDAMT *q* = (-1) \* SPDAMTTOT \* LRS *q***  Where:  SPDAMTTOT = SPDAMTQSETOT *q*  SPDAMTQSETOT *q* = SPDAMT *q, r, p*  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | LASPDAMT *q* | $ | *Load-Allocated Set Point Deviation Amount per QSE*—QSE *q*’s share of the total charge for all Resources’ Set Point deviations, based on LRS for the 15-minute Settlement Interval. | | SPDAMTTOT | $ | *Set Point Deviation Amount Total*—The total of Set Point Deviation Charges to all QSEs for all Resources, for the 15-minute Settlement Interval. | | SPDAMTQSETOT *q* | $ | *Set Point Deviation Amount QSE Total per QSE*—The total of Set Point Deviation Charges to QSE *q* for all Resources represented by this QSE, for the 15-minute Settlement Interval. | | SPDAMT *q, r, p* | $ | *Set Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Generation Resource or Controllable Load Resource *r* at Settlement Node *p*, for its deviation from AASP, for the 15-minute Settlement Interval. A Set Point Deviation Charge is charged to the Combined Cycle Train for all Combined Cycle Generation Resources. | | 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. | | *p* | none | A Settlement Point. | | *r* | none | A Generation Resource or Controllable Load Resource. | |

6.6.6 Reliability Must-Run Settlement

|  |
| --- |
| [NPRR885: Replace Section 6.6.6 above with the following upon system implementation:]  6.6.6 Reliability Must-Run and Must-Run Alternative Settlement |

6.6.6.1 RMR Standby Payment

(1) The Standby Payment for RMR Service is paid to each QSE representing an RMR Unit for each RMR Unit for each contracted hour under performance requirements set forth in Section 22, Attachment B, Standard Form Reliability Must-Run Agreement, and other performance requirements in these Protocols. For Initial Settlement, the Standby Payment is either the “Initial Standby Cost” stated in the RMR Agreement or the revised Standby Cost calculated in accordance with paragraph (2) of Section 3.14.1.13, Updated Budgets During the Term of an RMR Agreement. For Final and True-Up Settlements, the Standby Payment is based on the RMR Unit’s actual Eligible Cost, if available.

(2) The Standby Payment to each QSE for each RMR Unit for each hour is calculated as follows:

RMRSBAMT *q, r* = (-1) \* RMRSBPR *q, r*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| RMRSBAMT *q, r* | $ | *Reliability Must Run Standby Payment per QSE per Resource by hour*—The Standby Payment to QSE *q* for RMR Unit *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRSBPR *q, r* | $ per hour | *Reliability Must Run Standby Price per QSE per Resource by hour*—The hourly standby cost for RMR Unit *r* represented by QSE *q*, for the hour. See item (3) below. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | An RMR Unit. |

(3) For the Initial Settlement and resettlements executed before true-up and before actual cost data is submitted, the standby price of an RMR Unit is either the “Initial Standby Cost” stated in the RMR Agreement or the revised Standby Cost calculated in accordance with paragraph (2) of Section 3.14.1.13. For other resettlements, the standby price of an RMR Unit for each hour is calculated as follows:

**RMRSBPR *q, r* = (RMRMNFNCC *q, r* \* (1 + RMRIF \* RMRCRF *q, r* \* RMRARF *q, r*) + RMRMNFCC *q, r*) / MH *q, r***

Where:

RMR Capacity Reduction Factor

If (RMRTCAPA *q, r* + RMRTCAP *q, r* ≥ RMRCCAP *q, r*), then RMRCRF *q, r* = 1

Otherwise

RMRCRF *q, r* = Max (0, 1 – 2 \* (RMRCCAP *q, r* – RMRTCAP *q, r*) **/** RMRCCAP *q, r*)

RMR Availability Reduction Factor

If (RMRHREAF *q, r* ≥ RMRTA *q, r*), then RMRARF *q, r* = 1

Otherwise

RMRARF *q, r* = Max (0, 1 - (RMRTA *q, r* – RMRHREAF *q, r*) \* 2)

RMR Hourly Rolling Equivalent Availability Factor

RMRHREAF *q, r* = Min (1,  (RMRAFLAG *q, r, hr* \* HSL*q, r, hr*) /  RMRCCAP *q, r*)

Availability for a Combined Cycle Train will be determined pursuant to contractual terms but no more than once per hour.

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| RMRSBPR *q, r* | $ per hour | *Reliability Must-Run Standby Price per QSE per Resource by hour*—The hourly standby cost for RMR Unit *r* represented by QSE *q,* for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRARF *q, r* | none | *Reliability Must-Run Availability Reduction Factor per QSE per Resource by hour*—The availability reduction factor of RMR Unit *r* represented by QSE *q*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRCRF *q, r* | none | *Reliability Must-Run Capacity Reduction Factor per QSE per Resource by hour*—The capacity reduction factor of the RMR Unit *r* represented by QSE *q*, for the hour. See paragraph (2) of Section 3.14.1.17, Incentive Factor. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRCCAP *q, r* | MW | *Reliability Must-Run Contractual Capacity per QSE per Resource*—The seasonal capacity of RMR Unit *r* represented by QSE *q* as specified in the RMR Agreement. The monthly value is allocated evenly across all hours for all days in the month. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRTCAP *q, r* | MW | *Reliability Must-Run Testing Capacity by hour*—The testing capacity of RMR Unit *r* represented by QSE *q*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRTA *q, r* | none | *Reliability Must-Run Target Availability per QSE per Resource*—The Target Availability of RMR Unit *r* represented by QSE *q*, as specified in the RMR Agreement and divided by 100 to convert a percentage to a fraction. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRHREAF *q, r* | none | *Reliability Must-Run Hourly Rolling Equivalent Availability Factor per QSE per Resource by hour*—The equivalent availability factor of RMR Unit *r* represented by QSE *q* over the current hour plus the prior 4379 hours for which availability is required under the RMR Agreement, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. The available capacity is calculated in accordance with paragraph (3) of Section 3.14.1.17. |
| RMRMNFNCC *q, r* | $ | *Reliability Must-Run Monthly Non-Fuel Non-Capital Cost per QSE per Resource*—The actual non-capital and non-fuel Eligible Cost of RMR Unit *r* represented by QSE *q*, for the month. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRMNFCC *q, r* | $ | *Reliability Must-Run Monthly Non-Fuel Capital Cost per QSE per Resource*—The actual non-fuel and capital Eligible Cost of RMR Unit *r* represented by QSE *q*, for the month. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. Notwithstanding the above, reservation and transportation costs associated with firm fuel supplies as described in paragraph (1)(a)(vi) of Section 3.14.1.10, Eligible Costs, shall be included herein. |
| MH *q, r* | hour | *Number of Hours in the Month per QSE per Resource*—The total number of hours of the month, when RMR Unit *r* represented by QSE *q* is under an RMR Agreement. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRIF | none | *Reliability Must Run Incentive Factor*—The Incentive Factor of RMR Units under RMR Agreement. |
| RMRARF *q, r* | none | *Reliability Must-Run Availability Reduction Factor per QSE per Resource by hour*—The availability reduction factor of RMR Unit *r* represented by QSE *q*, as calculated for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| HSL *q, r, hr* | MW | *High Sustained Limit*—The High Sustained Limit (HSL) of a Generation Resource as defined in Section 2.1, Definitions, for the hour that includes the Settlement Interval *i*. Where for a combined cycle Resource, *r* is a Combined Cycle Generation Resource. |
| RMRAFLAG *q, r, hr* | none | *RMR Availability Flag per QSE per Resource by hour*—The flag of the availability of RMR Unit *r* represented by QSE *q* as determined by the Current Operating Plan (COP), 1 for available and 0 for unavailable, for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| RMRTCAPA*q, r* | MW | *Reliability Must-Run Testing Capacity Adjustment by hour*—The testing capacity adjustment factor, in the event an ERCOT Operator has deemed that a RMR Unit’s Tested Capacity did not materially affect the reliability of the ERCOT System, of an RMR Unit *r* represented by QSE *q*, for the hour. See paragraph (2) of Section 3.14.1.17. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | An RMR Unit. |
| *hr* | none | The index for a given hour and all the previous 4379 hours for which availability is required under the RMR Agreement. |
| 4380 | none | The number of hours in a six-month period. |

(4) The total of the Standby Payments to each QSE for all RMR Units represented by this QSE for a given hour is calculated as follows:

RMRSBAMTQSETOT *q* = RMRSBAMT *q, r*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| RMRSBAMTQSETOT q | $ | *Reliability Must-Run Standby Amount QSE Total per QSE*⎯The total of the Standby Payments to QSE *q* for all RMR Units represented by this QSE for the hour. |
| RMRSBAMT q, r | $ | *Reliability Must-Run Standby Payment per QSE per Resource*—The Standby Payment to QSE *q* for RMR Unit *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | An RMR Unit. |

6.6.6.2 RMR Payment for Energy

(1) Payment for energy on the Initial Settlement and settlements executed before true-up and before actual cost data is submitted must be calculated using the estimated input/output curve and startup fuel as specified in the RMR Agreement, the actual energy produced and the FIP. The payment for energy for all other settlements must be based on actual fuel costs for the RMR Unit. The payment for energy for each hour is calculated as follows:

RMREAMT *q, r*= (-1) \* (((FIP + RMRCEFA *q, r*) \* RMRSUFQ *q, r* / RMRH *q, r*) \* RMRALLOCFLAG *q, r* + (((FIP + RMRCEFA *q, r*) \* RMRHR *q, r, i* + RMRVCC *q, r*) \* RTMG *q, r, i*))

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| RMREAMT *q, r* | $ | *Reliability Must-Run Energy Amount per QSE per Resource by hour*—The energy payment to QSE *q* for RMR Unit *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| FIP | $/MMBtu | *Fuel Index Price*—The FIP for the Operating Day. |
| RMRSUFQ *q, r* | MMBtu | *Reliability Must-Run Startup Fuel Quantity per QSE per Resource*⎯The Estimated Start Up Fuel specified in the RMR Agreement for RMR Unit *r* represented by QSE *q*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRH *q, r,h* | hour | *Reliability Must-Run Hours*—The number of hours during which RMR Unit *r* represented by QSE *q* is instructed On-Line for the Operating Day. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRALLOCFLAG *q, r* | none | *Reliability Must-Run Startup Flag per QSE per Resource by hour*—The number that indicates whether or not the startup fuel cost of RMR Unit *r* represented by QSE *q* is allocated to the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. The startup fuel cost will be allocated equally to all contiguous intervals for which there is an eligible start. The RMRALLOCFLAG q, r value is 1 if the startup fuel cost is allocated; otherwise, its value is 0.  The RMRALLOCFLAG q, r for eligibility is determined in Sections 5.6.2, RUC Startup Cost Eligibility, and 5.6.3, Forced Outage of a RUC-Committed Resource, for start-up payments and commitments in either the Reliability Unit Commitment (RUC) or DAM. |
| RMRHR *q, r, i* | MMBtu /MWh | *Reliability Must-Run Heat Rate per QSE per Resource by Settlement Interval by hour*—The multiplier determined based on the input/output curve and the Real-Time generation of RMR Unit *r* represented by QSE *q*, for the 15-minute Settlement Interval *i* in the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRVCC *q, r* | $/MWh | *Reliability Must-Run Variable Cost Component per QSE per Resource*—The monthly cost component that is used to adjust the energy cost calculation to reflect the actual fuel costs of RMR Unit *r* represented by QSE *q*. The value is initially set to zero. For resettlements, see item (2) below. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RTMG *q, r, i,* | MWh | *Real-Time Metered Generation per QSE per Resource by Settlement Interval by hour*—The Real-Time energy from RMR Unit *r* represented by QSE *q*, for the 15-minute Settlement Interval *i* in the hour *h*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRCEFA*q, r* | $/MMBtu | *Reliability Must-Run Contractual Estimated Fuel Adder*—The Estimated Fuel Adder that is contractually agreed upon in Section 22, Attachment B, Standard Form Reliability Must-Run Agreement. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. The fuel adder will be subsequently trued up to reflect actual fuel costs as set forth in item (1) above. |
| *q* | none | A QSE. |
| *r* | none | An RMR Unit. |
| *i* | none | A 15-minute Settlement Interval. |

(2) If the RMR actual fuel cost is filed in accordance with the timeline in these Protocols, the monthly RMR variable cost component is calculated for the subsequent resettlements as follows:

RMRVCC *q, r*= (RMRMFCOST *q, r* + RMREAMT *q, r, f, h*) /

(RTMG *q, r, i*)

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| RMRVCC *q, r* | $/MWh | *Reliability Must-Run Variable Cost Component per QSE per Resource*—The monthly cost component that is used to adjust the energy cost calculation to reflect the actual fuel costs of RMR Unit *r* represented by QSE *q*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRMFCOST *q, r* | $ | *Reliability Must-Run Monthly actual Fuel Cost per QSE per Resource*—The monthly actual fuel cost of RMR Unit *r* represented by QSE *q*, for the month. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RTMG *q, r, i* | MWh | *Real-Time Metered Generation per QSE per Resource by Settlement Interval*—The Real-Time energy from RMR Unit *r* represented by QSE *q* for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMREAMT *q, r, f, h* | $ | *Reliability Must-Run Energy Amount per QSE per Resource by hour*—The energy payment to QSE *q* for RMR Unit *r*, for the hour *h,* from the former Settlement Statement *f*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | An RMR Unit. |
| *h* | none | An hour in the month. |
| *i* | none | A 15-minute Settlement Interval in the month. |
| *f* | none | Amount from former settlement run. |

(3) The total of the payments for energy to each QSE for all RMR Units represented by this QSE for a given hour is calculated as follows:

RMREAMTQSETOT *q* = RMREAMT *q, r*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| RMREAMTQSETOT *q* | $ | *Reliability Must-Run Energy Amount QSE Total per QSE*⎯The total of the energy payments to QSE *q* for all RMR Units represented by this QSE for the hour. |
| RMREAMT *q, r* | $ | *Reliability Must-Run Energy Amount per QSE per Resource by hour*—The energy payment to QSE *q* for RMR Unit *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | An RMR Unit. |

6.6.6.3 RMR Adjustment Charge

(1) Each QSE that represents an RMR Unit shall pay a charge designed to recover the net total revenues from RUC settlements, and from Real-Time settlements received by that QSE for all RMR Units that it represents, except that the charge does not include net revenues received by the QSE for the RMR Standby Payments calculated under Section 6.6.6.1, RMR Standby Payment, and the RMR energy payments calculated under Section 6.6.6.2, RMR Payment for Energy.

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

RMRAAMT *q* = (-1) \* [((-1) \* RESREV *q, r, gsc, p* + EMREAMT *q, r, p, i* + RUCMWAMT *q, r, p* + RUCCBAMT *q, r, p* + RUCDCAMT *q, r, p* + VSSEAMT *q, r, p, i* + VSSVARAMT *q, r, i*)]

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| RMRAAMT *q* | $ | *RMR Adjustment Charge per QSE*—The adjustment from QSE *q* Standby Payments and energy payments for all RMR Units represented by this QSE, for the revenues received for the same RMR Units from RUC and Real-Time operations, for the hour. |
| EMREAMT *q, r, p, i* | $ | *Emergency Energy Amount per QSE per Settlement Point per unit per interval*—The payment to QSE *q* for the additional energy produced by RMR Unit *r* at Resource Node *p* in Real-Time during the Emergency Condition, for the 15-minute Settlement Interval *i*. Payment for emergency energy is made to the Combined Cycle Train.   |  | | --- | | [NPRR1010 and NPRR1014: Replace applicable portions of the definition above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation for NPRR1014:]  *Emergency Energy Amount per QSE per Settlement Point per unit per interval*—The payment to QSE *q* as additional compensation for the additional energy or Ancillary Services produced or consumed by Resource *r* at Resource Node *p* in Real-Time during the Emergency Condition, for the 15-minute Settlement Interval *i*. Payment for emergency energy is made to the Combined Cycle Train. | |
| RESREV *q, r, gsc, p* | $ | *Resource Share Revenue Settlement Payment*—The RMR Resource share of the total payment to the entire Facility with a net metering arrangement attributed to Resource *r* that is part of a generation site code *gsc* for the QSE *q* at Settlement Point *p*. |
| RUCMWAMT *q, r, p* | $ | *RUC Make-Whole Amount per QSE per Settlement Point per unit*—The amount calculated for RMR Unit *r* committed in RUC at Resource Node *p* to make whole the Startup Cost and minimum-energy cost of this unit, for the hour. See Section 5.7.1, RUC Make-Whole Payment. When one or more Combined Cycle Generation Resources are committed by RUC, payment is made to the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
| RUCCBAMT *q, r* | $ | *RUC Clawback Charge per QSE per unit*—The RUC Clawback Charge to QSE *q* for RMR Unit *r*, for the hour. See Section 5.7.2, RUC Clawback Charge. When one or more Combined Cycle Generation Resources are committed by RUC, a charge is made to the Combined Cycle Train for all RUC-committed Combined Cycle Generation Resources. |
| RUCDCAMT *q, r, p* | $ | *RUC Decommitment Amount per QSE per Settlement Point per unit*—The amount calculated for RMR Unit *r* at Resource Node *p* represented by QSE *q* due to ERCOT de-commitment, for the hour. When one or more Combined Cycle Generation Resources are decommitted by RUC, payment is made to the Combined Cycle Train for all RUC-decommitted Combined Cycle Generation Resources. |
| VSSEAMT *q, r, p, i* | $ | *Voltage Support Service Energy Amount per QSE per Settlement Point per unit per interval* —The compensation to QSE *q* for ERCOT-directed power reduction from RMR Unit *r* at Resource Node *p* to provide Voltage Support Service (VSS), for the 15-minute Settlement Interval *i*. Payment for VSS is made to the Combined Cycle Train. |
| VSSVARAMT *q, r, i* | $ | *Voltage Support Service VAr Amount per QSE per Unit*—The payment to QSE *q* for the VSS provided by RMR Unit *r*, for the 15-minute Settlement Interval *i*. Payment for VSS is made to the Combined Cycle Train. |
| *q* | none | A QSE. |
| *gsc* | none | A generation site code. |
| *p* | none | A Resource Node Settlement Point. |
| *r* | none | An RMR Unit. |
| *i* | none | A 15-minute Settlement Interval in the hour. |

6.6.6.4 RMR Charge for Unexcused Misconduct

(1) If a Misconduct Event, as defined in the RMR Agreement, is not excused as provided in the RMR Agreement, then ERCOT shall charge the QSE that represents the RMR Unit an unexcused misconduct amount of $10,000 for each unexcused Misconduct Event as follows:

RMRNPAMT *q, r* = $10,000 \* RMRNPFLAG*q,r*

The above variable is defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| RMRNPAMT *q, r* | $ | *Reliability Must-Run Unexcused Misconduct Charge per QSE per Resource*—The charge to QSE *q* for the unexcused Misconduct Event of RMR Unit *r* for an Operating Day. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RMRNPFLAG *q, r* | $ | *Reliability Must-Run Non-Performance Flag per QSE per Resource*—A flag for the QSE *q* for the unexcused Misconduct Event of RMR Unit *r* for an Operating Day. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | An RMR Unit. |

(2) The total of the charges to each QSE for unexcused Misconduct Events of all RMR Units represented by this QSE for a given Operating Day is calculated as follows:

RMRNPAMTQSETOT *q* = RMRNPAMT *q, r*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| RMRNPAMTQSETOT *q* | $ | *Reliability Must-Run Unexcused Misconduct Amount QSE Total per QSE*⎯The total of the charges to QSE *q* for unexcused Misconduct Events of the RMR Units represented by this QSE for the Operating Day. |
| RMRNPAMT *q, r* | $ | *Reliability Must-Run Unexcused Misconduct Charge per QSE per Resource*—The charge to QSE *q* for the unexcused Misconduct Event of RMR Unit *r* for the Operating Day. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | An RMR Unit. |

6.6.6.5 RMR Service Charge

(1) The total RMR cost for all RMR Units is allocated to the QSEs representing Loads based on LRS. The RMR Service charge to each QSE for a given hour is calculated as follows:

LARMRAMT *q* = (-1) \* (RMRSBAMTTOT + RMREAMTTOT   
+ RMRAAMTTOT + RMRNPAMTTOT / H) \* HLRS *q*

Where:

RMR Standby Amount Total

RMRSBAMTTOT = RMRSBAMTQSETOT *q*

RMR Energy Amount Total

RMREAMTTOT = RMREAMTQSETOT *q*

RMR Adjustment Charge Total

RMRAAMTTOT = RMRAAMT *q*

RMR Non-Performance Amount Total

RMRNPAMTTOT = RMRNPAMTQSETOT *q*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| LARMRAMT *q* | $ | *Load-Allocated Reliability Must-Run Amount per QSE*—The amount charged to QSE *q* based on its LRS of the difference between the amount paid to all QSEs for RMR Service under Section 6.6.6, Reliability Must-Run Settlement, and the amount that would have been paid to the QSEs for the same RMR Units if they were not providing RMR Service under the other parts of this Section 6, Adjustment Period and Real-Time Operations, and Section 5, Transmission Security Analysis and Reliability Unit Commitment. |
| RMRSBAMTTOT | $ | *RMR Standby Amount Total*—The total of the Standby Payments to all QSEs for all RMR Units, for the hour. |
| RMREAMTTOT | $ | *RMR Energy Amount Total*—The total of the energy cost payments to all QSEs for all RMR Units, for the hour. |
| RMRAAMTTOT | $ | *RMR Adjusted Amount Total*—The total of the adjusted amounts from all QSEs representing RMR Units for the revenues received for these units from RUC, Real-Time operations and Ancillary Service markets, for the hour. |
| RMRNPAMTTOT | $ | *RMR Non-Performance Amount Total*—The total of the charges to all QSEs for unexcused Misconduct Events of all RMR Units, for the Operating Day. |
| HLRS *q* | none | The hourly LRS calculated for QSE *q* for the hour. See Section 6.6.2.4, QSE Load Ratio Share for an Operating Hour. |
| RMRSBAMTQSETOT *q* | $ | *Reliability Must-Run Standby Amount QSE Total per QSE*⎯The total of the Standby Payments to QSE *q* for the RMR Units represented by the same QSE for the hour. |
| RMREAMTQSETOT *q* | $ | *Reliability Must-Run Energy Amount QSE Total per QSE*⎯The total of the energy payments to QSE *q* for the RMR Units represented by the same QSE for the hour. |
| RMRAAMT *q* | $ | *RMR Adjusted Amount per QSE*—The adjustment from QSE *q* Standby Payments and energy payments for all RMR Units represented by this QSE, for the revenues received for the same RMR Units from RUC and Real-Time operations, for the hour. |
| RMRNPAMTQSETOT *q* | $ | *Reliability Must-Run Unexcused Misconduct Amount QSE Total per QSE*⎯The total of the charges to QSE *q* for unexcused Misconduct Events of the RMR Units represented by the same QSE for the Operating Day. |
| *q* | none | A QSE. |
| H | none | The number of hours of the Operating Day. |

6.6.6.6 Method for Reconciling RMR Actual Eligible Costs, RMR and MRA Contributed Capital Expenditures, and Miscellaneous RMR Incurred Expenses

(1) No later than 30 days after the Real-Time Market (RTM) True-Up Statement is issued for the termination date of the RMR Agreement, ERCOT shall issue a miscellaneous Invoice to charge the QSE representing the RMR Unit for any overpayments to the QSE representing the RMR Unit as described in Section 3.14.1.16, Reconciliation of Actual Eligible Costs, and contributed capital expenditures described in Section 3.14.1.19, Charge for Contributed Capital Expenditures. Refunded contributed capital expenditures are prorated evenly and on a monthly basis over the RMR Agreement period before being allocated to Load on an hourly LRS basis. Refunded overpayments described in Section 3.14.1.16 are allocated directly to the month in which the overpayment occurred before being allocated to Load on an hourly LRS basis. A separate Invoice will be sent for each RMR Agreement.

(a) The one-time charge to the QSE to collect the lump sum of over-payments and contributed capital expenditures is calculated as follows:

RMRRAMT *q, r, c* = RMRCE *q, r, c* + RMROP *q, r, c, m*

(b) The one-time payment is calculated as follows:

LARMRRAMT *q* = (-1) \*  (MRMRCE *m +* RMROP *q, r, c, m*)/ MH *m* \*

HLRS *q, m*

Where:

MRMRCE *m* = RMRCE *q, r, c* / CM *q, r, c*

The HLRS used will be the HLRS for each day within the contracted month *m*. The most recent approved HLRS available at time the miscellaneous Invoice is posted will be used. The miscellaneous Invoice will not be re-calculated with subsequent Settlement runs unless required by a dispute or Alternative Dispute Resolution (ADR). If a dispute or ADR requires ERCOT to re-issue the miscellaneous Invoice, the most recent approved HLRS values will be used.

(c) Upon issuance of the miscellaneous Invoice, ERCOT shall issue a Market Notice containing the values of RMROP, RMRCE, and the Settlement run containing the HLRS that was used in the Settlement.

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| RMRRAMT *q, r, c* | **$** | *Reliability Must-Run Reconciled Amount –*The lump sum charge to the QSE *q* representing the RMR Unit *r* that reconciles any contributed capital expenditure amounts and any over-payments to the QSE during the period of the RMR Agreement *c*. |
| RMRCE *q, r, c* | $ | *Reliability Must-Run Capital Expenditure Refund*– The lump sum amount of contributed capital expenditures for the QSE *q* representing the RMR Unit *r* for the period of the RMR Agreement *c* to be refunded to ERCOT per Section 3.14.1.19. |
| RMROP *q, r, c, m* | $ | *Reliability Must-Run Over-Payment –* The amount of overpayments to the QSE *q* representing the RMR Unit *r* for the month *m* during the period of the RMR Agreement *c* to be refunded to ERCOT per Section 3.14.1.19. This amount cannot be negative. |
| MRMRCE *m* | $ | *Monthly Reliability Must-Run Capital Expenditure Refund* – The lump sum amount of contributed capital expenditures for the month *m* refunded to ERCOT per Section 3.14.1.19 pro-rated over the number of months of the RMR Agreement. |
| LARMRRAMT *q* | $ | *Load Allocated Reliability Must-Run Reconciled Amount* – The amount of refunded capital expenditures paid to QSE *q* based on its HLRS. |
| HLRS *q, m* | none | *Hourly Load Ratio Share per QSE* – The hourly LRS calculated for QSE *q* for the hour for month *m*. See Section 6.6.2.4, QSE Load Ratio Share for an Operating Hour. |
| MH *m* | hour | *Number of Hours in the Month* —The total number of hours in the month *m*, which overlaps a month in which an RMR Agreement was effective. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| CM *q, r, c* | none | The number of months of the RMR Agreement period. |
| *m* | none | A month in the RMR Agreement period. |
| *q* | none | A QSE. |
| *c* | none | An RMR Agreement. |
| *r* | none | An RMR Unit. |

(2) ERCOT shall issue a miscellaneous Invoice allocating expenses incurred related to the processing of an RMR Agreement or validation and/or processing of RMR budgets on an LRS basis. ERCOT shall issue the miscellaneous Invoice no later than 30 days after the RTM True-Up Statement is issued for the last day of the calendar month in which ERCOT incurred the expense. A separate Invoice will be sent for each RMR Agreement.

(a) The one-time charge is calculated as follows:

LARMROEIAMT *q* = (-1) \*  RMROEIAMT *m* / MH *m* \* HLRS *q, m*

The HLRS used will be the HLRS for each day within the contracted month *m*. The most recent approved HLRS available at the time the miscellaneous Invoice is posted will be used. The miscellaneous Invoice will not be re-calculated with subsequent Settlement runs unless required by a dispute or ADR. If a dispute or ADR requires ERCOT to re-issue the miscellaneous Invoice, the most recent approved HLRS values will be used.

(b) Upon issuance of the miscellaneous Invoice, ERCOT shall issue a Market Notice containing the value of RMROEIAMT and the Settlement run containing the HLRS that was used in the Settlement.

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| RMROEIAMT *m* | $ | *RMR Other Expense Incurred Amount –* The amount of expenses incurred in the validation and processing of an RMR Agreement, for the month *m*, that are not paid to the QSE representing the RMR Unit e.g. third-party expenses incurred in the evaluation and validation of submitted RMR budgets. |
| LARMROEIAMT *q* | $ | *Load Allocated RMR Other Expense Incurred Amount* – The amount of other expenses incurred charged to QSE *q* based on its HLRS. |
| HLRS *q, m* | none | *Hourly Load Ratio Share per QSE* – The hourly LRS calculated for QSE *q* for the hour for month *m*. See Section 6.6.2.4, QSE Load Ratio Share for an Operating Hour. |
| MH *m* | hour | *Number of Hours in the Month* —The total number of hours in the month *m*, which overlaps a month in which an RMR Agreement was effective. |
| *m* | none | A month in the RMR Agreement period. |
| *q* | none | A QSE. |
| *r* | none | An RMR Unit. |

(3) ERCOT shall collect and distribute Must-Run Alternative (MRA) contributed capital expenditures described in Section 3.14.1.19 as follows:

(a) The one-time charge to the QSE to collect the lump sum of contributed capital expenditures will be reflected as:

MRACERAMT *q, r, c*

(b) The one-time payment is calculated as follows:

LAMRACERAMT *q* = (-1) \*  MMRACER / MH *q, r* \* HLRS *q*

Where:

MMRACER = MRACERAMT *q, r, c* / CM *q, r, c*

The HLRS used will be the HLRS for each day within the contracted month M. The most recent approved HLRS available at time the miscellaneous Invoice is posted will be used. The miscellaneous Invoice will not be re-calculated with subsequent Settlement runs unless required by a dispute or ADR. If a dispute or ADR requires ERCOT to re-issue the miscellaneous Invoice, the most recent approved HLRS values will be used.

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| MRACERAMT *q, r, c* | $ | *Must-Run Alternative Capital Expenditure Refund Amount* – The lump sum amount of contributed capital expenditures refunded to ERCOT per Section 3.14.1.19. |
| MMRACER | $ | *Monthly Must-Run Alternative Capital Expenditure Refund* – The lump sum amount of contributed capital expenditures refunded to ERCOT per Section 3.14.1.19 pro-rated over the number of months of the MRA Agreement. |
| LAMRACERAMT *q* | $ | *Load Allocated Must-Run Alternative Capital Expenditure Refund Amount* – The amount of refunded capital expenditures paid to QSE *q* based on its HLRS. |
| HLRS *q* | none | *Hourly Load Ratio Share per QSE* – The hourly LRS calculated for QSE *q* for the hour for month M. See Section 6.6.2.4, QSE Load Ratio Share for an Operating Hour. |
| MH *q, r* | hour | *Number of Hours in the Month per QSE per Resource*—The total number of hours in the month, when MRA *r* represented by QSE *q* is under an MRA Agreement. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Train. |
| CM *q, r, c* | none | The number of months of the MRA Agreement period. |
| M | none | A month in the MRA Agreement period. |
| D | none | The number of days in the month. |
| *q* | none | A QSE. |
| *c* | none | An MRA Agreement. |
| *r* | none | An MRA. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR885: Insert Section 6.6.6.7 below upon system implementation:]  **6.6.6.7 MRA Standby Payment**  (1) The Standby Payment for MRA Service is paid to each QSE representing an MRA for each MRA Contracted Hour under performance requirements set forth in Section 22, Attachment N, Standard Form Must-Run Alternative Agreement, the MRA Request for Proposal (RFP), and the Protocols.  (2) The standby payment to each QSE representing a Generation Resource MRA registered is calculated as follows for each hour:  MRASBAMT *q, r, h* = (-1) \* MRASBPR *q, r, m* \* MRACCAP *q, r, m* \* MRAGRCRF *q, r, m* \* MRAARF *q, r, m*  Where:  MRAGRCRF *q, r, m* = (MRATCAP *q, r, m* + MRATCAPA *q, r, m*) /MRACCAP *q, r, m*  (3) The standby payment to each QSE representing an Other Generation MRA or Demand Response MRA is calculated as follows for each hour:  MRASBAMT *q, r, h* = (-1) \* MRASBPR *q, r, m* \* MRACCAP *q, r, m* \* MRAEPRF*q, r, m* \* MRAARF *q, r, m*  (4) The MRA Capacity Availability Reduction Factor (MRAARF) is calculated as:  For initial Settlement  MRAARF *q, r, m* = 1  For all other resettlements  If MRACMAF *q, r, m*  ≥ 95% \* MRATA *q, r, m*  MRAARF*q, r, m* = 1  If 85% \* MRATA *q, r, m* ≤ MRACMAF *q, r,m*  < 95%\* MRATA *q, r, m*  MRAARF*q, r, m* = MRACMAF *q, r, m*  If MRACMAF *q, r, m*  < 85% \* MRATA *q, r, m*  MRAARF*q, r, m* = (MRACMAF *q, r, m )2*  Where:  For an MRA registered as a Generation Resource,  MRACMAF *q, r, m*  =  (MRAMAH *q, r, h* ) / (MH *q, r, m)*  And,  For an MRA not registered as a Generation Resource, the availability factor is calculated pursuant to Section 3.14.4.6.4, MRA Availability Measurement and Verification.  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | MRASBAMT *q, r, h* | $ | *Must-Run Alternative Standby Amount per QSE per Resource by hour*—The hourly standby payment amount for MRA *r* represented by QSE *q*, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Train. | | MRASBPR *q, r, m* | $/MW per hour | *Must-Run Alternative Standby Price per QSE per Resource per MW per hour*—The hourly standby price per MW for MRA *r* represented by QSE *q*, for the month *m*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Train. | | MRAEPRF *q, r, m* | None | *Must-Run Alternative Event Performance Reduction Factor per QSE per Resource*—The Event Performance Reduction Factor of the MRA *r* represented by QSE *q*, for each hour of the month m, as calculated per Section 3.14.4.6.5, MRA Event Performance Measurement and Verification. If the MRAEPRF for the month is not available then the most recent MRAEPRF prior to month of the Operating Day shall be used. If no previous MRAEPRF is available then MRAEPRF shall be set to 1. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | MRAGRCRF *q, r, m* | None | *Must-Run Alternative Generation Resource Capacity Reduction Factor per QSE per Resource per month* —The capacity reduction factor of the Generation Resource MRA *r* represented by QSE *q*, for each hour of the month *m*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | MRACCAP*q, r, m* | MW | *Must-Run Alternative Contract Capacity per QSE per Resource*—The capacity of MRA *r* represented by QSE *q* as specified in the MRA Agreement, for the MRA Contracted Month *m*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | MRAARF *q, r, m* | None | *Must-Run Alternative Availability Reduction Factor per QSE per Resource*—The availability reduction factor of MRA *r* represented by QSE *q*, for each hour of the MRA Contracted Month *m*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | MRATCAPA*q, r, m* | MW | *Must-Run Alternative Testing Capacity Adjustment per month*—The testing capacity adjustment factor of an MRA *r* represented by QSE *q*, for each hour of the MRA Contracted Month *m*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | MRATCAP *q, r, m* | MW | *Must-Run Alternative Testing Capacity per month*—The testing capacity value of MRA *r* represented by QSE *q*, for each hour of the MRA Contracted Month *m*. If the MRATCAP for the month is not available then the most recent MRATCAP prior to month of the Operating Day shall be used. If no previous MRATCAP is available, then MRATCAP shall be set to MRACCAP. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Train. | | MRATA *q, r, m* | None | *Must-Run Alternative Target Availability per QSE per Resource per Month*—The monthly Target Availability of MRA *r* represented by QSE *q*, as specified in the MRA Agreement and divided by 100 to convert a percentage to a fraction. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Train. | | MRACMAF *q, r, m* | None | *Must-Run Alternative Calculated Monthly Availability Factor per QSE per Resource*—The calculated monthly availability factor of MRA *r* represented by QSE *q*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | MRAMAH *q, r, h* | Hour | *Number of Available Hours in the Month per QSE per Resource*— For an MRA registered as a Generation Resource, the total number of hours in the month when the MRA *r* represented by QSE *q* was available for the MRA Contracted Hours if the MRA’s Availability Plan and telemetry both indicate availability for that hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | MH *q, r, m* | Hour | *Number of Total MRA Contracted Hours in the Month per QSE per Resource*—The total number of MRA Contracted Hours in the month for the MRA *r* represented by QSE *q* as indicated in the MRA Agreement. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | *h* | None | A MRA Contracted Hour under the MRA Agreement for the MRA Contracted month. | | *q* | None | A QSE. | | *r* | None | An MRA. | | *m* | None | An MRA Contracted Month under the MRA Agreement. |   (5) The total of the Standby Payments for all MRAs represented by the QSE for a given hour is calculated as follows:  MRASBAMTQSETOT *q*= MRASBAMT *q, r, h*  The above variables are defined as follows:   | Variable | Unit | Definition | | --- | --- | --- | | MRASBAMTQSETOT *q* | $ | *Must-Run Alternative Standby Amount Total per QSE per hour* ⎯ The total of the Standby Payments for all MRAs represented by the QSE *q* for the hour. | | MRASBAMT *q, r, h* | $ | *Must-Run Alternative Standby Amount per QSE per Resource by hour* —The hourly standby payment amount for MRA *r* represented by QSE *q*, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Train. | | *q* | None | A QSE. | | *r* | None | An MRA. | | *h* | None | An MRA Contracted Hour under the MRA Agreement for the calendar month. |   (6) The total of the Standby Payments for a given hour is calculated as follows:  MRASBAMTTOT =  MRASBAMTQSETOT *q*  The above variables are defined as follows:   | Variable | Unit | Definition | | --- | --- | --- | | MRASBAMTTOT | $ | *Must-Run Alternative Standby Amount Total* ⎯The total of the Standby Payments to all QSEs *q* for all MRAs for the hour. | | MRASBAMTQSETOT *q* | $ | *Must-Run Alternative Standby Amount Total per QSE per hour* ⎯The total of the Standby Payments for all MRAs represented by the QSE *q* for the hour. | | *q* | None | A QSE. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR885: Insert Section 6.6.6.8 below upon system implementation:]  **6.6.6.8 MRA Contributed Capital Expenditures Payment**  (1) The contributed capital expenditure payment to each QSE for each MRA for each MRA Contracted Hour of each month is calculated as follows:  MRACAPEXAMT *q, r* = (-1) \* MRAMCAPEX *q, r, m* / MH *q, r, m*  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | MRACAPEXAMT *q, r* | $ | *Must-Run Alternative Contributed Capital Expenditures Amount per QSE per Resource per hour*— The total monthly contributed capital expenditure payment for MRA *r* represented by QSE *q*, allocated to each MRA Contracted Hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Train. | | MRAMCAPEX *q, r, m* | $ | *Must-Run Alternative Monthly Contributed Capital Expenditures per QSE*— The total monthly contributed capital expenditures for MRA *r* represented by QSE *q*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Train. | | MH *q, r, m* | hour | *Number of Total Contracted Hours in the Month per QSE per Resource*—The total number of MRA Contracted Hours in the MRA Contracted Month *m* for the MRA *r* represented by QSE *q* as indicated in the MRA Agreement. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | *q* | none | A QSE. | | *r* | none | An MRA. | | *m* | none | An MRA Contracted Month under the MRA Agreement. |   (2) The total of the contributed capital expenditure payments for all MRAs represented by the QSE for a given hour is calculated as follows:  MRACAPEXAMTQSETOT *q* = MRACAPEXAMT *q, r*  The above variables are defined as follows:   | Variable | Unit | Definition | | --- | --- | --- | | MRACAPEXAMTQSETOT *q* | $ | *Must-Run Alternative Contributed Capital Expenditures per QSE per hour* – The total contributed capital expenditures for all MRAs *r* represented by QSE *q* for the MRA Contracted Hour. | | MRACAPEXAMT *q, r* | $ | *Must-Run Alternative Contributed Capital Expenditures Amount per QSE per Resource* – The total monthly contributed capital expenditure payment for MRA *r* represented by QSE q, allocated to each MRA Contracted Hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Train. | | *q* | none | A QSE. | | *r* | none | An MRA. |   (3) The total contributed capital expenditure payments for a given MRA Contracted Hour is calculated as follows:  MRACAPEXAMTTOT =  MRACAPEXAMTQSETOT *q*  The above variables are defined as follows:   | Variable | Unit | Definition | | --- | --- | --- | | MRACAPEXAMTTOT | $ | *Must-Run Alternative Contributed Capital Expenditures per hour* – The total contributed capital expenditures to all QSEs for all MRAs for the MRA Contracted Hour. | | MRACAPEXAMTQSETOT *q* | $ | *Must-Run Alternative Contributed Capital Expenditures per QSE per hour* – The total contributed capital expenditures for all MRAsrepresented by QSE *q* for the MRA Contracted Hour. | | *q* | none | A QSE. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR885: Insert Section 6.6.6.9 below upon system implementation:]  **6.6.6.9 MRA Payment for Deployment Event**  (1) The deployment event payment to each QSE representing a Generation Resource MRA:  MRADEAMT *q, r, h* = (-1) \* Max{EDPRICE *q, r, m*, (FIP + MRACEFA *q, r*) \* MRAPSUFQ *q, r*} \* MRAFLAG *q, r, h* */* MRAH *q, r*  (2) The deployment event payment to each QSE representing a Demand Response MRA or Other Generation MRA:  MRADEAMT *q, r, h* = (-1) \* Max{EDPRICE *q, r*, (FIP + MRACEFA *q, r*) \*  MRAPSUFQ *q, r*} \* MRAEPRF *q, r, m* */* MRAH *q, r*  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | MRADEAMT *q, r, h* | $ | *Must-Run Alternative Deployment Event Amount per QSE per Resource by hour*—The deployment event payment to QSE *q* for MRA *r*, for the MRA Contracted Hour *h*. Where for a Combined Cycle Train, the Resource r is the Combined Cycle Train. | | FIP | $/MMBtu | *Fuel Index Price*—The FIP for the Operating Day. | | EDPRICE *q, r* | $ | *Event Deployment Price per QSE per Resource*—The event deployment price to QSE *q* for MRA *r*, as specified in the MRA Agreement. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | MRAEPRF *q, r, m* | None | *Must-Run Alternative Event Performance Reduction Factor per QSE per Resource* —The event performance reduction factor of the MRA *r* represented by QSE *q*, for each hour of the month *m*, as calculated per Section 3.14.4.6.5, MRA Event Performance Measurement and Verification. If the MRAEPRF for the month is not available then the most recent MRAEPRF prior to the month of the Operating Day shall be used. If no previous MRAEPRF is available then MRAEPRF shall be set to 1. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | MRAPSUFQ *q, r* | MMBtu | *Must-Run Alternative Proxy Startup Fuel Quantity per QSE per Resource*⎯The proxy start up fuel quantity specified in the MRA Agreement for MRA *r* represented by QSE *q*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | MRAH *q, r* | Hour | *Must-Run Alternative Hours*—The number of hours during which MRA *r* represented by QSE *q* received a deployment instruction for each deployment event for the Operating Day. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | MRAFLAG *q, r, h* | none | *Must-Run Alternative Flag –* An indicator to signify that an MRA *r* represented by QSE *q* followed the deployment instruction for the event for the hour *h*. An MRAFLAG value of 1 represents followed and a 0 represents did not follow the deployment. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | MRACEFA*q, r* | $/MMBtu | *Must-Run Alternative Contractual Estimated Fuel Adder*—The Estimated Fuel Adder for the MRA *r* represented by QSE *q* as specified in the MRA Agreement. Where for a Combined Cycle Train, the Generation Resource *r* is the Combined Cycle Train. | | *q* | none | A QSE. | | *r* | none | An MRA. | | *m* | none | An MRA Contracted Month under the MRA Agreement. | | *h* | none | An MRA Contracted Hour under the MRA Agreement for the MRA Contracted Month. |   (3) The total of the deployment event payments for all MRAs represented by the QSE for a given MRA Contracted Hour is calculated as follows:  MRADEAMTQSETOT *q* =  MRADEAMT *q, r, h*  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | MRADEAMTQSETOT *q* | $ | *Must-Run Alternative Deployment Event Amount per QSE by hour*—The total of the deployment event payments for all MRAs *r*, represented by the QSE q for the hour. | | MRADEAMT *q, r, h* | $ | *Must-Run Alternative Deployment Event Amount per QSE per Resource by hour*—The deployment event payment to QSE *q* for MRA *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | *q* | none | A QSE. | | *r* | none | An MRA. | | *h* | none | An MRA Contracted Hour under the MRA Agreement for the MRA Contracted Month. |   (4) The total of the deployment event payments for a given MRA Contracted Hour is calculated as follows:  MRADEAMTTOT =  MRADEAMTQSETOT *q*  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | MRADEAMTTOT | $ | *Must-Run Alternative Deployment Event Amount Total by hour*—The total deployment event payment to all QSEs for all MRAs, for the hour. | | MRADEAMTQSETOT *q* | $ | *Must-Run Alternative Deployment Event Amount per QSE by hour*—The total of the deployment event payments for all MRAs represented by the QSE *q* for the MRA Contracted Hour. | | *q* | none | A QSE. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR885, NPRR1010, and NPRR1014: Insert applicable portions of Section 6.6.6.10 below upon system implementation for NPRR885 or NPRR1014; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010:]  **6.6.6.10 MRA Variable Payment for Deployment**  (1) The variable payment to each QSE representing a Generation Resource MRA:  Outside of the MRA Contracted Hours, a Generation Resource MRA shall be treated in Settlements in the same manner as any Generation Resource registered with ERCOT  For MRA Contracted Hours with a deployment instruction:  MRAVAMT *q, r, h* = (-1) \* (MRAGRCVP *q, r, h* – MRARTREV *q, r, h*)  For MRA Contracted Hours without a deployment instruction:  MRAVAMT *q, r, h* = (-1) \* (Min (MRAGRCVP *q, r, h*, MRARTREV *q, r, h*) – MRARTREV *q, r, h*)  Where,  MRAGRCVP *q, r, h* = Max [VPRICE *q*, *r*, (FIP + MRACEFA *q, r*) \*  MRAPHR *q, r*] \* Min(RTMG *q, r, p, i*, MRACCAP*q, r, m* / 4)  MRARTREV *q,*r,h = Max [0, (RESREV*q, r, gsc, p, i*+ (-1) \* (EMREAMT *q, r, p, i* +  VSSVARAMT *q, r, i*+ VSSEAMT *q, r, i*))]  (2) The variable payment to each QSE representing an Other Generation MRA:  For MRA Contracted Hours with a deployment instruction:  MRAVAMT *q, r, h* = (-1) \* (MRACVP *q, r, h* – MRACRTREV *q, r, h*)  For MRA Contracted Hours without a deployment instruction:  MRAVAMT *q, r,h* = (-1) \* (Min(MRACVP *q, r, h*, MRACRTREV *q, r, h*) –MRACRTREV *q, r, h*)  Where,  MRACVP *q, r, h*= Max[VPRICE *q, r*, (FIP + MRACEFA *q, r*) \* MRAPHR *q, r* ] \*  RTVQ *q, r, i*  MRACRTREV *q, r, h*= (Max(0, Min(RTVQ *q, r, i* , MRACCAP*q, r, m* / 4) \* RTSPP *p, i*))  Where,  RTVQ *q, r, i* = MRAIPF *q, r,i* \* MRACCAP*q, r, m* / 4  (3) The variable payment to each QSE representing a Demand Response MRA:  For MRA Contracted Hours with a deployment instruction:  MRAVAMT*q, r*, *h* = (-1) \* Max[VPRICE *q, r*, (FIP + MRACEFA *q, r*) \* MRAPHR *q, r* ] \* RTVQ *q, r, i*  Where,  RTVQ *q, r, i* = MRAIPF *q, r,i* \* MRACCAP*q, r, m* / 4  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | MRAVAMT *q, r, h* | $ | *Must-Run Alternative Variable Amount per QSE per Resource by hour*—The variable payment to QSE *q* for MRA *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | MRAGRCVP *q, r, h* | $ | *Must-Run Alternative Generation Resource Calculated Variable Payment per QSE per Resource -* The variable payment to QSE *q* for Generation Resource MRA *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | FIP | $/MMBtu | *Fuel Index Price*—The FIP for the Operating Day. | | MRARTREV*q, r*, *h* | $ | *Must-Run Alternative Real-Time Revenues per QSE per Resource by hour*—The revenues received in Real-Time for QSE *q* for MRA *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | MRACCAP*q, r, m* | MW | *Must-Run Alternative Contract Capacity per QSE per Resource*—The capacity of MRA *r* represented by QSE *q* as specified in the MRA Agreement, for the month. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | MRAIPF *q, r, i* | none | *Must-Run Alternative Interval Performance Factor per QSE per Resource for the interval*— The interval performance factor of the MRA *r* represented by QSE *q*, for the 15-minute Settlement Interval *i*. | | MRACVP *q, r,h* | $ | *Must-Run Alternative Calculated Variable Payment per QSE per Resource -* The variable payment to QSE *q* for an Other Generation MRA or Demand Response MRA *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | VSSVARAMT *q, r, i* | $ | *Voltage Support Service VAr Amount per QSE per Generation Resource -* The payment to QSE *q* for the VSS provided by Generation Resource MRA *r*, for the 15-minute Settlement Interval *i*. Where for a combined cycle resource, *r* is a Combined Cycle Train. | | VSSEAMT *q, r, i* | $ | *Voltage Support Service Energy Amount per QSE per Generation Resource*—The lost opportunity payment to QSE *q* for ERCOT-directed VSS from Generation Resource MRA *r* for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train. | | RESREV *q, r, gsc, p, i* | $ | *Resource Share Revenue Settlement Payment*—The Resource share of the total payment to the entire Facility with a net metering arrangement attributed to Generation Resource MRA *r* that is part of a generation site code *gsc* for the QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i*. | | EMREAMT *q, r, p, i* | $ | *Emergency Energy Amount per QSE per Settlement Point per unit per interval—*The payment to QSE *q* as additional compensation for the additional energy or Ancillary Services produced or consumed by Resource MRA *r* at Resource Node *p* in Real-Time during the Emergency Condition, for the 15-minute Settlement Interval *i*. Payment for emergency energy is made to the Combined Cycle Train. | | VPRICE *q, r* | $/MWh | *Must-Run Alternative Variable Price per QSE per Resource*—The variable price for QSE *q* for MRA *r*, as specified in the MRA Agreement. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | MRAPHR *q, r* | MMBtu /MWh | *Must-Run Alternative Proxy Heat Rate per QSE per Resource – A proxy heat rate value for* MRA *r* represented by QSE *q, as* specified in the MRA Agreement. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | MRACRTREV *q, r, h* | $ | *Must-Run Alternative Calculated Real-Time Revenues per QSE per Resource* —The calculated variable revenue to QSE *q* for MRA *r*, for the hour. | | RTVQ *q, r, i,* | MWh | *Real-Time Variable Quantity per QSE per Resource by Settlement Interval* — The Real-Time variable quantity for MRA *r* represented by QSE *q*, for the 15-minute Settlement Interval *i*. | | RTMG *q, r, p, i* | MWh | *Real-Time Metered Generation per QSE per Settlement Point per Generation Resource*—The metered generation of Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | MRACEFA*q, r* | $/MMBtu | *Must-Run Alternative Contractual Estimated Fuel Adder*—The Estimated Fuel Adder that is contractually agreed upon in Section 22, Attachment N, Standard Form Must-Run Alternative Agreement. Where for a Combined Cycle Train, the Generation Resource *r* is the Combined Cycle Train. | | RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price*⎯The Real-Time Settlement Point Price at the Settlement Point *p* for the 15-minute Settlement Interval *i*. | | *q* | none | A QSE. | | *r* | none | An MRA. | | *m* | none | An MRA Contracted Month. | | *h* | none | An MRA Contracted Hour for the MRA Contracted Month. | | *i* | none | A 15-minute Settlement Interval during the MRA Contracted Hours. | | *gsc* | none | A generation site code. | | *p* | none | A Resource Node Settlement Point. |   (2) The total of the variable payments for all MRAs represented by the QSE for a given hour is calculated as follows:  MRAVAMTQSETOT *q* =  MRAVAMT *q, r, h*  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | MRAVAMTQSETOT *q* | $ | *Must-Run Alternative Variable Amount Total per QSE by hour*—The total variable payment for all MRAs *r,* represented by the QSE *q*, for the hour. | | MRAVAMT *q, r, h* | $ | *Must-Run Alternative Variable Amount per QSE per Resource by hour*—The variable payment to QSE *q* representing MRA *r* for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | *q* | none | A QSE. | | *r* | none | An MRA. | | *h* | none | An MRA Contracted Hour for the MRA Contracted Month. |   (3) The total of the variable payments for a given MRA Contracted Hour is calculated as follows:  MRAVAMTTOT =  MRAVAMTQSETOT *q*  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | MRAVAMTTOT | $ | *Must-Run Alternative Variable Amount Total by hour*—The total variable payments for the MRA Contracted Hour. | | MRAVAMTQSETOT *q* | $ | *Must-Run Alternative Variable Amount Total per QSE by hour*—The total variable payment for all MRAs*,* represented by the QSE *q*, for the MRA Contracted Hour. | | *q* | none | A QSE. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR885: Insert Section 6.6.6.11 below upon system implementation:]  **6.6.6.11 MRA Charge for Unexcused Misconduct**  (1) If one or more Misconduct Events are not excused, as provided for in Section 3.14.4.8, MRA Misconduct Events, then ERCOT shall charge the QSE that represents the MRA an unexcused misconduct amount for the Operating Day as follows:  MRAUMAMT *q, r,h* = $10,000 \* MRAUMFLAG *q, r*, *d* / MRACH *q, r*, *d*  The above variable is defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | MRAUMAMT *q, r, h* | $ | *Must-Run Alternative Unexcused Misconduct Charge per QSE per Resource*—The charge to QSE *q* for the unexcused Misconduct Event of MRA *r* for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | MRAUMFLAG *q, r, d* | none | *Must-Run Alternative Unexcused Misconduct Flag per QSE per Resource*—A flag for the QSE *q* for the unexcused Misconduct Event of MRA *r* for an Operating Day *d*. The MRAUMFLAG of MRA represented by QSE *q*, 1 for a unexcused misconduct and 0 for none, for the day. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | MRACH *q, r, d* | hour | *Must-Run Alternative Contract Hours in the Operating Day –* The number of MRA Contracted Hours for QSE *q* for the MRA *r* for an Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | *q* | none | A QSE. | | *r* | none | An MRA. | | *d* | none | An Operating Day within a month under an MRA Agreement | | *h* | none | An MRA Contracted Hour for the MRA Contracted Month. |   (2) The total of the charges to each QSE for unexcused Misconduct Events of all MRAs represented by this QSE for a given hour is calculated as follows:  MRAUMAMTQSETOT *q* = MRAUMAMT *q, r*, *h*  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | MRAUMAMTQSETOT *q* | $ | *Must-Run Alternative Unexcused Misconduct Amount per QSE*⎯The total of the charges to QSE *q* for unexcused Misconduct Events of the MRAs for an MRA Contracted Hour. | | MRAUMAMT *q, r, h* | $ | *Must-Run Alternative Unexcused Misconduct Charge per QSE per Resource*—The charge to QSE *q* for the unexcused Misconduct Event of MRA *r* for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | *q* | none | A QSE. | | *r* | none | An MRA. | | *h* | none | An MRA Contracted Hour for the MRA Contracted Month. |   (3) The total of the charges to all QSEs for unexcused Misconduct Events of all MRAs for an MRA Contracted Hour is calculated as follows:  MRAUMAMTTOT =  MRAUMAMTQSETOT *q*  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | MRAUMAMTTOT | $ | *Must-Run Alternative Unexcused Misconduct Amount Total per hour* ⎯The total of the charges for unexcused Misconduct Events for the hour. | | MRAUMAMTQSETOT *q* | $ | *Must-Run Alternative Unexcused Misconduct Amount per QSE*⎯The total of the charges to QSE *q* for unexcused Misconduct Events of the MRAs for an MRA Contracted Hour. | | *q* | none | A QSE. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR885: Insert Section 6.6.6.12 below upon system implementation:]  **6.6.6.12 MRA Service Charge**  (1) The total MRA cost for all MRAs is allocated to the QSEs representing Loads based on HLRS. The MRA Service charge to each QSE for a given hour is calculated as follows:  LAMRAAMT *q* = (-1) \* (MRASBAMTTOT + MRACAPEXAMTTOT + MRADEAMTTOT + MRAVAMTTOT + MRAUMAMTTOT) \* HLRS *q*  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | LAMRAAMT *q* | $ | *Load-Allocated Must-Run Alternative Amount per QSE*—The MRA cost allocated to QSE *q* based on its HLRS. | | MRASBAMTTOT | $ | *Must-Run Alternative Standby Amount Total ⎯*The total of the Standby Payments to all QSEs *q* for all MRAs for the hour. | | MRACAPEXAMTTOT | $ | *Must-Run Alternative Contributed Capital Expenditures per hour* - The total contributed capital expenditures to all QSEs *q* for all MRAs *r* for the hour. | | MRADEAMTTOT | $ | *Must-Run Alternative Deployment Event Amount Total by hour—*The total deployment event payment to all QSEs *q* for all MRAs *r*, for the hour. | | MRAVAMTTOT | $ | *Must-Run Alternative Variable Amount Total by hour—*The total variable payments for the hour. | | MRAUMAMTTOT | $ | *Must-Run Alternative Unexcused Misconduct Amount Total per hour* ⎯The total of the charges for unexcused Misconduct Events for the hour. | | HLRS*q* | none | *The hourly LRS calculated for QSE q for the hour*. See Section 6.6.2.4, QSE Load Ratio Share for an Operating Hour. | | *q* | none | A QSE. | |

6.6.7 Voltage Support Settlement

6.6.7.1 Voltage Support Service Payments

(1) All other Generation Resources shall be eligible for compensation for Reactive Power production in accordance with Section 6.5.7.7, Voltage Support Service, only if ERCOT issues a Dispatch Instruction that results in the following unit operation:

(a) When ERCOT instructs the Generation Resource to exceed its Unit Reactive Limit (URL) and the Generation Resource provides additional Reactive Power, then ERCOT shall pay for the additional Reactive Power provided at a price that recognizes the avoided cost of reactive support Resources on the transmission network.

(b) Any real power reduction directed by ERCOT through VDIs to provide for additional reactive capability for voltage support must be compensated as a lost opportunity payment

(2) The payment for a given 15-minute Settlement Interval to each QSE representing a Generation Resource that operates in accordance with an ERCOT Dispatch Instruction is calculated as follows:

Depending on the Dispatch Instruction, payment for Volt-Amperes reactive (VAr):

If VSSVARLAG *q, r* > 0

VSSVARAMT *q, r* = (-1) \* VSSVARPR \* VSSVARLAG *q, r*

If VSSVARLEAD *q, r* > 0

VSSVARAMT *q, r* = (-1) \* VSSVARPR \* VSSVARLEAD *q, r*

Where:

VSSVARLAG *q, r* = Max [0, Min (¼ \* VSSVARIOL *q, r*, RTVAR *q, r*) – (¼ \* URLLAG *q, r*)]

VSSVARLEAD *q, r* = Max {0, [(¼ \* URLLEAD *q, r* ) – Max ((¼ \* VSSVARIOL *q, r*), RTVAR *q, r*)]}

URLLAG *q,r* = 0.32868 \* HSL *q,r*

URLLEAD *q,r* = (-1) \* 0.32868 \* HSL *q,r*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| VSSVARAMT *q, r* | $ | *Voltage Support Service VAr Amount per QSE per Generation Resource -* The payment to QSE *q* for the VSS provided by Generation Resource *r*, for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train. |
| VSSVARPR | $/MVArh | *Voltage Support Service VAr Price -* The price for instructed MVAr beyond a Generation Resource’s URL currently is $2.65/MVArh (based on $50.00/installed kVAr). |
| VSSVARLAG *q, r* | MVArh | *Voltage Support Service VAr Lagging per QSE per Generation Resource -* The instructed portion of the Reactive Power above the Generation Resource’s lagging URL for Generation Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train. |
| VSSVARLEAD *q, r* | MVArh | *Voltage Support Service VAr Leading per QSE per Generation Resource* - The instructed portion of the Reactive Power below the Generation Resource’s leading URL for Generation Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train. |
| VSSVARIOL *q, r* | MVAr | *Voltage Support Service VAr Instructed Output Level per QSE per Generation Resource*—The instructed Reactive Power output level of Generation Resource *r* represented by QSE *q*, lagging Reactive Power if positive and leading Reactive Power if negative, for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train. |
| RTVAR *q, r* | MVArh | *Real-Time VAr per QSE per Resource*—The netted Reactive Energy measured for Generation Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train. |
| URLLAG *q, r* | MVAr | *Unit Reactive Limit Lagging per QSE per Resource*—The URL for lagging Reactive Power of the Generation Resource *r* represented by QSE *q* as determined in accordance with these Protocols. Its value is positive. Where for a combined cycle resource, *r* is a Combined Cycle Train. |
| URLLEAD *q, r* | MVAr | *Unit Reactive Limit Leading per QSE per Resource*—The URL for leading Reactive Power of the Generation Resource *r* represented by QSE *q* as determined in accordance with these Protocols. Its value is negative. Where for a combined cycle resource, *r* is a Combined Cycle Train. |
| HSL *q, r* | MW | *High Sustained Limit*—The HSL of a Generation Resource as defined in Section 2, Definitions and Acronyms, for the hour that includes the Settlement Interval *i*. Where for a combined cycle resource, *r* is a Combined Cycle Generation Resource. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource. |

(3) The total additional compensation to each QSE for VSS for the 15-minute Settlement Interval is calculated as follows:

**VSSVARAMTQSETOTq =**  **VSSVARAMT***q,r*

| Variable | Unit | Definition |
| --- | --- | --- |
| VSSVARAMT *q, r* | $ | *Voltage Support Service VAr Amount per QSE per Generation Resource*—The payment to QSE *q* for the VSS provided by Generation Resource *r*, for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train. |
| VSSVARAMTQSETOT *q* | $ | *Voltage Support VAr Amount QSE total per QSE*—The total of the payments to QSE *q* as compensation for VSS by this QSE for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource. |

(4) The lost opportunity payment, if applicable:

VSSEAMT *q, r* = (-1) \* Max (0, (RTSPP*p* – RTEOCOST *q, r, i*) \* Max (0, (HSL *q, r* \* ¼ - RTMG *q, r*)))

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| VSSEAMT *q, r* | $ | *Voltage Support Service Energy Amount per QSE per Generation Resource*—The lost opportunity payment to QSE *q* for ERCOT-directed VSS from Generation 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 Generation 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 a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| HSL *q, r* | MW | *High Sustained Limit Generation per QSE per Settlement Point per Resource*—The HSL of Generation 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 Generation per QSE per Settlement Point per Resource*—The LSL of Generation 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. |
| *p* | none | A Resource Node Settlement Point. |

(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:

VSSEAMTQSETOT *q* = 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 Generation Resource*—The lost opportunity payment to QSE *q* for ERCOT-directed VSS from Generation 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. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1014: Replace Section 6.6.7.1 above with the following upon system implementation:]  **6.6.7.1 Voltage Support Service Payments**  (1) All other Generation Resources or ESRs shall be eligible for compensation for Reactive Power production in accordance with Section 6.5.7.7, Voltage Support Service, only if ERCOT issues a Dispatch Instruction that results in the following unit operation:  (a) When ERCOT instructs the Generation Resource or ESR to exceed its Unit Reactive Limit (URL) and the Generation Resource or ESR provides additional Reactive Power, then ERCOT shall pay for the additional Reactive Power provided at a price that recognizes the avoided cost of reactive support Resources on the transmission network.  (b) Any real power reduction directed by ERCOT through VDIs to provide for additional reactive capability for voltage support must be compensated as a lost opportunity payment  (2) The payment for a given 15-minute Settlement Interval to each QSE representing a Generation Resource or ESR that operates in accordance with an ERCOT Dispatch Instruction is calculated as follows:  Depending on the Dispatch Instruction, payment for Volt-Amperes reactive (VAr):  If VSSVARLAG *q, r* > 0  VSSVARAMT *q, r* = (-1) \* VSSVARPR \* VSSVARLAG *q, r*  If VSSVARLEAD *q, r* > 0  VSSVARAMT *q, r* = (-1) \* VSSVARPR \* VSSVARLEAD *q, r*  Where:  VSSVARLAG *q, r* = Max [0, Min (¼ \* VSSVARIOL *q, r*, RTVAR *q, r*) – (¼ \* URLLAG *q, r*)]  VSSVARLEAD *q, r* = Max {0, [(¼ \* URLLEAD *q, r* ) – Max ((¼ \* VSSVARIOL *q, r*), RTVAR *q, r*)]}  And:  If an ESR has a net withdrawal for the Settlement Interval, then:  URLLAG *q,r* = 0.32868 \* ABS(LSL *q,r*)  URLLEAD *q,r* = (-1) \* 0.32868 \* ABS(LSL *q,r*)  Otherwise:  URLLAG *q,r* = 0.32868 \* HSL *q,r*  URLLEAD *q,r* = (-1) \* 0.32868 \* HSL *q,r*  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | VSSVARAMT *q, r* | $ | *Voltage Support Service VAr Amount per QSE per Resource -* The payment to QSE *q* for the VSS provided by Resource *r*, for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train. | | VSSVARPR | $/MVArh | *Voltage Support Service VAr Price -* The price for instructed MVAr beyond a Resource’s URL currently is $2.65/MVArh (based on $50.00/installed kVAr). | | VSSVARLAG *q, r* | MVArh | *Voltage Support Service VAr Lagging per QSE per Resource -* The instructed portion of the Reactive Power above the Generation Resource’s lagging URL for Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train. | | VSSVARLEAD *q, r* | MVArh | *Voltage Support Service VAr Leading per QSE per Resource* - The instructed portion of the Reactive Power below the Resource’s leading URL for Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train. | | VSSVARIOL *q, r* | MVAr | *Voltage Support Service VAr Instructed Output Level per QSE per Resource*—The instructed Reactive Power output level of Resource *r* represented by QSE *q*, lagging Reactive Power if positive and leading Reactive Power if negative, for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train. | | RTVAR *q, r* | MVArh | *Real-Time VAr per QSE per Resource*—The netted Reactive Energy measured for Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train. | | URLLAG *q, r* | MVAr | *Unit Reactive Limit Lagging per QSE per Resource*—The URL for lagging Reactive Power of the Resource *r* represented by QSE *q* as determined in accordance with these Protocols. Its value is positive. Where for a combined cycle resource, *r* is a Combined Cycle Train. | | URLLEAD *q, r* | MVAr | *Unit Reactive Limit Leading per QSE per Resource*—The URL for leading Reactive Power of the Resource *r* represented by QSE *q* as determined in accordance with these Protocols. Its value is negative. Where for a combined cycle resource, *r* is a Combined Cycle Train. | | HSL *q, r* | MW | *High Sustained Limit*—The HSL of Resource *r* represented by QSE *q* as defined in Section 2, Definitions and Acronyms, for the hour that includes the Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Generation Resource. | | LSL *q, r* | MW | *Low Sustained Limit*—The LSL for Resource *r* represented by QSE *q*, as defined in Section 2, for the hour that includes the Settlement Interval. | | *q* | none | A QSE. | | *r* | none | A Generation Resource or ESR. |   (3) The total additional compensation to each QSE for voltage support service for the 15-minute Settlement Interval is calculated as follows:  **VSSVARAMTQSETOTq =**  **VSSVARAMT***q,r*   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | VSSVARAMT *q, r* | $ | *Voltage Support Service VAr Amount per QSE per Resource*—The payment to QSE *q* for the VSS provided by Resource *r*, for the 15-minute Settlement Interval. Where for a combined cycle resource, *r* is a Combined Cycle Train. | | VSSVARAMTQSETOT *q* | $ | *Voltage Support VAr Amount QSE total per QSE*—The total of the payments to QSE *q* as compensation for VSS by this QSE for the 15-minute settlement interval. | | *q* | None | A QSE. | | *r* | None | A Generation Resource or ESR. |   (4) The lost opportunity payment, if applicable:  If an ESR has a net withdrawal for the Settlement Interval, then:  **VSSEAMT *q, r* = (-1) \* Max (0, RTSPP*p* ) \* Max (0, (ABS(LSL *q, r* \* ¼ - NETVSSA *q, r*)))**  Otherwise:  VSSEAMT *q, r* = (-1) \* Max (0, (RTSPP*p* – RTEOCOST *q, r, i*) \* Max (0, (HSL *q, r* \* ¼ - NETVSSA *q, r*)))  Where:  NETVSSA *q, r* = RTCL *q, r +* RTMG *q, r*  For an ESR that is not a WSL:  RTCL *q, r* =  MEBR *q, r, b*  And for an ESR that is a WSL:  RTCL *q, r* =  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:  **VSSEAMTQSETOT *q* =** **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. | |

6.6.7.2 Voltage Support Charge

(1) ERCOT shall charge each QSE representing LSEs the total payment for VSS as specified in Section 6.6.7.1, Voltage Support Service Payments, based on a LRS. The charge to each QSE for a given 15-minute Settlement Interval is calculated as follows:

LAVSSAMT *q* = (-1) \* (VSSVARAMTTOT + VSSEAMTTOT) \* LRS *q*

Where:

VSSVARAMTTOT = VSSVARAMTQSETOT *q*

VSSEAMTTOT = VSSEAMTQSETOT *q*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| LAVSSAMT *q* | $ | *Load-Allocated Voltage Support Service Amount per QSE*—The charge to QSE *q* for VSS, for the 15-minute Settlement Interval. |
| VSSVARAMTTOT | $ | *Voltage Support Service var Amount Total*—The total of payments to all QSEs providing VSS, for the 15-minute Settlement Interval. |
| VSSVARAMTQSETOT *q* | $ | *Voltage Support Service var Amount QSE Total per QSE*⎯The total of the payments to QSE *q* for providing VSS for the 15-minute Settlement Interval. |
| LRS *q* | none | *The Load Ratio Share* 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. |
| VSSEAMTTOT | $ | *Voltage Support Service Lost Opportunity Amount Total*—The total of payments to all QSEs providing VSS in lieu of energy, for the 15-minute Settlement Interval. |
| VSSEAMTQSETOT *q* | $ | *Voltage Support Service Lost Opportunity Amount QSE Total per QSE*⎯The total of the payments to QSE *q* for providing VSS in lieu of energy, for the 15-minute Settlement Interval. |
| *q* | none | A QSE. |

6.6.8 Black Start Capacity

6.6.8.1 Black Start Hourly Standby Fee Payment

(1) ERCOT shall pay an Hourly Standby Fee to the QSEs representing a Black Start Resource. This standby fee is determined through a competitive bi-annual bidding process, with an adjustment for reliability based on a six-month rolling availability equal to 85% in accordance with Section 22, Attachment D, Standard Form Black Start Agreement.

(2) The Black Start Hourly Standby Fee is subject to reduction and claw-back provisions as described in Section 8.1.1.2.1.5, System Black Start Capability Qualification and Testing.

(3) ERCOT shall pay a Black Start Hourly Standby Fee payment to each QSE for each Black Start Resource. The payment for each hour is calculated as follows:

BSSAMT *q, r* = (-1) \* BSSPR *q, r* \* BSSARF *q, r*

Where:

Black Start Service Availability Reduction Factor

If (BSSHREAF *q, r* ≥ 0.85)

BSSARF *q, r* = 1

Otherwise

BSSARF *q, r* = Max (0, 1 - (0.85 - BSSHREAF *q, r*) \* 2)

Black Start Service Hourly Rolling Equivalent Availability Factor

If (BSSEH *q, r* < 4380)

BSSHREAF *q, r* = 1

Otherwise

BSSHREAF *q, r* = ( BSSAFLAG *q,r,hr*) / 4380

Availability for a Combined Cycle Train will be determined pursuant to contractual terms but no more than once per hour.

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| BSSAMT *q, r* | $ | *Black Start Service Amount per QSE per Resource by hour*—The standby payment to QSE *q* for the Black Start Service (BSS) provided by Resource *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| BSSPR *q, r* | $ per hour | *Black Start Service Price per QSE per Resource*—The standby price of BSS Resource *r* represented by QSE *q*, as specified in the Black Start Agreement. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| BSSARF *q, r* | none | *Black Start Service Availability Reduction Factor per QSE per Resource by hour*—The availability reduction factor of Resource *r* represented by QSE *q* under the Black Start Agreement, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| BSSHREAF *q, r* | none | *Black Start Service Hourly Rolling Equivalent Availability Factor per QSE per Resource by hour*—The equivalent availability factor of the BSS Resource *r* represented by QSE *q* over 4,380 hours, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| BSSEH *q, r* | none | *Black Start Service Elapsed number of Hours per QSE per Resource by hour*—The number of the elapsed hours of BSS Resource *r* represented by QSE *q* since the beginning of the BSS Agreement, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| BSSAFLAG *q, r, hr* | none | *Black Start Service Availability Flag per QSE per Resource by hour*—The flag of the availability of BSS Resource *r* represented by QSE *q*, 1 for available and 0 for unavailable, for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | A BSS Resource. |
| *hr* | none | The index of a given hour and the previous 4379 hours. |
| 4380 | none | The number of hours in a six-month period. |

(3) The total of the payments to each QSE for all BSS Resources represented by this QSE for a given hour is calculated as follows:

BSSAMTQSETOT *q* = BSSAMT *q, r*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| BSSAMTQSETOT *q* | $ | *Black Start Service Amount QSE Total per QSE*⎯The total of the payments to QSE *q* for BSS provided by all the BSS Resources represented by this QSE for the hour *h*. |
| BSSAMT *q, r* | $ | *Black Start Service Amount per QSE per Resource*—The standby payment to QSE *q* for BSS provided by Resource *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | A BSS Resource. |

6.6.8.2 Black Start Capacity Charge

(1) ERCOT shall allocate the total Black Start Service Capacity payment to the QSEs representing Loads based on a LRS. The resulting charge to each QSE for a given hour is calculated as follows:

LABSSAMT *q* = (-1) \* BSSAMTTOT \* HLRS *q*

Where:

BSSAMTTOT = BSSAMTQSETOT *q*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| LABSSAMT *q* | $ | *Load-Allocated Black Start Service Amount per QSE*—The charge allocated to QSE *q* for the BSS, for the hour. |
| BSSAMTQSETOT *q* | $ | *Black Start Service Amount QSE Total per QSE*—The Black Start Service payment to QSE *q* for BSS Resource *r*, for the hour. |
| BSSAMTTOT | $ | *Black Start Service Amount QSE Total ERCOT-Wide —* The total of the payments to QSE *q* for BSS provided by all the BSS Resource represented by this QSE for the hour h. |
| HLRS *q* | none | The hourly LRS calculated for QSE *q* for the hour. See Section 6.6.2.4, QSE Load Ratio Share for an Operating Hour. |
| *q* | none | A QSE. |

6.6.9 Emergency Operations Settlement

(1) Due to Emergency Conditions or Watches, additional compensation for each Generation Resource for which ERCOT provides an Emergency Base Point may be awarded to the QSE representing the Generation Resource. If the Emergency Base Point is higher than the SCED Base Point immediately before the Emergency Condition or Watch and the Settlement Point Price at the Resource Node is lower than the Generation Resource’s Energy Offer Curve price at the Emergency Base Point, ERCOT shall pay the QSE additional compensation for the additional energy above the SCED Base Point.

(2) In accordance with paragraph (8) of Section 8.1.1.2, General Capacity Testing Requirements, QSEs that receive a VDI to operate the designated Generation Resource for an unannounced Generation Resource test may be considered for additional compensation utilizing the formula as stated in Section 6.6.9.1, Payment for Emergency Power Increase Directed by ERCOT. If the test period SCED Base Point is higher than the SCED Base Point immediately before the test period and the Settlement Point Price at the Resource Node is lower than the Generation Resource’s Energy Offer Curve price, or MOC if no offer exists, at the test Base Point, and the test was not a retest requested by the QSE, ERCOT shall pay the QSE additional compensation for the additional energy above the pre-test SCED Base Point. For the purpose of this Settlement, and limited to Settlement Intervals inclusive of the unannounced Generation Resource test, SCED Base Points will be used in place of the Emergency Base Point.

(3) A QSE that represents a QSGR that comes On-Line as a result of a Base Point greater than zero shall be considered for additional compensation using the formula in Section 6.6.9.1 when the Base Point is less than or equal to its applicable Seasonal net minimum sustainable rating provided in the Resource Registration data. If the Resource Settlement Point Price at the QSGR’s Resource Node is lower than the Energy Offer Curve price, capped per the MOC pursuant to Section 4.4.9.4.1, Mitigated Offer Cap, at the aggregated Base Point during the 15-minute Settlement Interval, ERCOT shall pay the QSE additional compensation for the amount of energy from the Off-Line zero Base Point to the aggregated output level. For the purpose of this Settlement, inclusive of the first Settlement Interval in which the QSGR is deployed by SCED from a current SCED Base Point equal to zero MW to a Base Point greater than zero, SCED Base Points will be used in place of the Emergency Base Point. The compensation specified in this paragraph continues over all applicable Intervals until SCED no longer needs the QSGR to generate energy pursuant to Section 3.8.3.1, Quick Start Generation Resource Decommitment Decision Process, and there is no manual Low Dispatch Limit (LDL) override in place on the QSGR.

(4) QSEs that received Base Points that are inconsistent with Real-Time Settlement Point Prices and QSEs that receive a manual override from the ERCOT Operator shall be considered for additional compensation using the formula in Section 6.6.9.1. If the Resource Settlement Point Price at the Resource Node is lower than the Energy Offer Curve price, capped per the MOC pursuant to Section 4.4.9.4.1, at the held Base Point during the 15-minute Settlement Interval, ERCOT shall pay the QSE additional compensation for the amount of energy from a zero Base Point to the held Base Point. The held Base Point is the Base Point that the QSE received due to a manual override by ERCOT Operator or the Base Point received by the QSE that ERCOT identified as inconsistent with Real-Time Settlement Point Prices. For the purpose of this Settlement, and limited to the held Settlement Intervals inclusive of the manual override or Base Points identified as inconsistent with prices, SCED Base Points will be used in place of the Emergency Base Point.

(5) In accordance with Section 6.3, Adjustment Period and Real-Time Operations Timeline, if ERCOT sets any SCED interval as failed, then QSEs shall be considered for additional compensation using the formula in Section 6.6.9.1. For the purpose of this Settlement, and limited to the failed SCED interval, SCED Base Points will be used in place of the Emergency Base Point.

(6) For each 15-minute Settlement Interval, a QSGR that receives a manual override from the ERCOT Operator shall only be considered for compensation under paragraph (4) above.

(7) For a QSGR, the MOC curve used to cap the Energy Offer Curve shall not include the variable Operations and Maintenance (O&M) adjustment cost to start the Resource from first fire to LSL, including the startup fuel described in paragraph (1)(c) of Section 4.4.9.4.1 for all emergency operations Settlement calculations with the exception of paragraph (3) above.

(8) QSEs that receive a VDI to operate its Resources for an unannounced CFC test, as described in the ERCOT Operating Guides, or have been instructed to operate in CFC mode, may be considered for additional compensation utilizing the formula in Section 6.6.9.1. If the Resource Settlement Point Price at the Resource Node is lower than the Energy Offer Curve price, capped per the MOC pursuant to Section 4.4.9.4.1, at the Emergency Base Point during the CFC period, ERCOT shall pay the QSE additional compensation for the amount of energy from a zero Base Point to the Emergency Base Point for each Resource that provided CFC. Compensation for a CFC test will not be provided if the test was a retest requested by the QSE. For the purpose of this Settlement, and limited to Settlement Intervals inclusive of the CFC period, the Emergency Base Point shall be set to the Average Telemetered Generation for the 5 Minutes (AVGTG5M). Only Resources that moved in the direction to correct frequency are eligible to receive compensation for providing CFC.

(9) If Emergency Base Points or SCED Base Points are unavailable, corrupted or otherwise unusable for Settlement purposes due to system conditions, hardware failure, or software failure, the Real-Time Metered Generation (RTMG) will be used to create proxy Base Points pursuant to Section 6.6.9.1. If the RTMG is not available the most accurate available generation data as determined by ERCOT will be used to create proxy Base Points pursuant to Section 6.6.9.1. ERCOT shall issue a Market Notice stating the Operating Day and Settlement Intervals that were impacted and the generation data that was used to create proxy Base Points.

|  |
| --- |
| [NPRR1010, NPRR1014, and NPRR1058: Replace applicable portions of Section 6.6.9 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation for NPRR1014 or NPRR1058:]  ***6.6.9 Emergency Operations Settlement***  (1) Due to Emergency Conditions or Watches, additional compensation for each Generation Resource or Energy Storage Resource (ESR) for which ERCOT provides an Emergency Base Point may be awarded to the QSE representing the Generation Resource or ESR. If the Resource was instructed to increase generation at a Settlement Point price that is lower than the price based on their Energy Offer Curve or Energy Bid/Offer Curve, or if the Resource was instructed to increase withdrawal at a Settlement Point price that is higher than the price based on their Energy Bid/Offer Curve, ERCOT shall pay the QSE additional compensation for the change from the SCED Base Point immediately before the Emergency Condition or Watch, per paragraph (1) in Section 6.6.9.1, Payment for Emergency Operations Settlement. The Energy Offer Curve and Energy/Bid Offer Curve shall be capped by the Mitigated Offer Cap (MOC).  (2) In accordance with paragraph (8) of Section 8.1.1.2, General Capacity Testing Requirements, QSEs that receive a VDI to operate the designated Generation Resource for an unannounced Generation Resource test may be considered for additional compensation utilizing the formula as stated in paragraph (1) in Section 6.6.9.1. If the test period SCED Base Point is higher than the SCED Base Point immediately before the test period and the Settlement Point Price at the Resource Node is lower than the Generation Resource’s Energy Offer Curve price, or MOC if no offer exists, at the test Base Point, and the test was not a retest requested by the QSE, ERCOT shall pay the QSE additional compensation for the additional energy above the pre-test SCED Base Point. For the purpose of this Settlement, and limited to Settlement Intervals inclusive of the unannounced Generation Resource test, SCED Base Points will be used in place of the Emergency Base Point.  (3) A QSE that represents a QSGR that comes On-Line as a result of a Base Point greater than zero shall be considered for additional compensation using the formula in paragraph (2) in Section 6.6.9.1 when the Base Point is less than or equal to its applicable Seasonal net minimum sustainable rating provided in the Resource Registration data. For the 15-minute Settlement Interval, the process for additional compensation compares the Resource’s energy and Ancillary Services revenue with the Resource’s revenue target, as defined in Section 6.6.9.1, considering both Ancillary Service awards and Base Points, where the Energy Offer Curve is capped per the MOC. For the purpose of this Settlement, inclusive of the first Settlement Interval in which the QSGR is deployed by SCED from a current SCED Base Point equal to zero MW to a Base Point greater than zero, SCED Base Points will be used in place of the Emergency Base Point. The compensation specified in this paragraph continues over all applicable Intervals until SCED no longer needs the QSGR to generate energy pursuant to Section 3.8.3.1, Quick Start Generation Resource Decommitment Decision Process, and there is no manual Low Dispatch Limit (LDL) override in place on the QSGR.  (4) QSEs that received Base Points that are inconsistent with Real-Time Settlement Point Prices and QSEs that receive a manual override from the ERCOT Operator shall be considered for additional compensation using the formula in paragraph (2) in Section 6.6.9.1. For the 15-minute Settlement Interval, the process for additional compensation compares the Resource’s energy and Ancillary Services revenue with the Resource’s revenue target, as defined in Section 6.6.9.1, considering both the Ancillary Service awards and held Base Points, where the Energy Offer Curve or the Energy Bid/Offer Curve is capped per the MOC. The held Base Point is the Base Point that the QSE received due to a manual override by ERCOT Operator or the Base Point received by the QSE that ERCOT identified as inconsistent with Real-Time Settlement Point Prices. For the purpose of this Settlement, and limited to the held Settlement Intervals inclusive of the manual override or Base Points identified as inconsistent with prices, SCED Base Points will be used in place of the Emergency Base Point.  (5) In accordance with Section 6.3, Adjustment Period and Real-Time Operations Timeline, if ERCOT sets any SCED interval as failed, then QSEs shall be considered for additional compensation using the formula in paragraph (1) in Section 6.6.9.1. For the purpose of this Settlement, and limited to the failed SCED interval, SCED Base Points will be used in place of the Emergency Base Point.  (6) For each 15-minute Settlement Interval, a QSGR that receives a manual override from the ERCOT Operator shall only be considered for compensation under paragraph (4) above.  (7) For a QSGR, the MOC curve used to cap the Energy Offer Curve shall not include the variable Operations and Maintenance (O&M) adjustment cost to start the Resource from first fire to LSL, including the startup fuel described in paragraph (1)(d) of Section 4.4.9.4.1 for all emergency operations Settlement calculations with the exception of paragraph (3) above.  (8) Any QSE that receives a VDI to operate its Resource for an unannounced CFC test, as described in the ERCOT Operating Guides, or that has been instructed to operate in CFC mode, may be considered for additional compensation utilizing the formula in paragraph (1) in Section 6.6.9.1. If the Resource increased generation at a Settlement Point Price that is lower than the price based on the Energy Offer Curve or Energy Bid/Offer Curve, or if the Resource was instructed to increase withdrawal at a Settlement Point Price that is higher than the price based on its Energy Bid/Offer Curve, ERCOT shall pay the QSE additional compensation for the amount of energy from a zero Base Point to the Emergency Base Point for each Resource that provided CFC. Compensation for a CFC test will not be provided if the test was a retest requested by the QSE. For the purpose of this Settlement, and limited to Settlement Intervals inclusive of the CFC period, the Emergency Base Point shall be set to the Average Telemetered Generation for the 5 Minutes (AVGTG5M) and the Energy Offer Curve and Energy/Bid Offer Curve shall be capped by the MOC. Only Resources that moved in the direction to correct frequency are eligible to receive compensation for providing CFC.  (9) If Emergency Base Points or SCED Base Points are unavailable, corrupted or otherwise unusable for Settlement purposes due to system conditions, hardware failure, or software failure, the Real-Time Metered Generation (RTMG) and Real-Time Charging Load (RTCL) will be used to create proxy Base Points pursuant to Section 6.6.9.1. If the RTMG and RTCL are not available, the most accurate available generation and withdrawal data as determined by ERCOT will be used to create proxy Base Points pursuant to Section 6.6.9.1. ERCOT shall issue a Market Notice stating the Operating Day and Settlement Intervals that were impacted and the generation data that was used to create proxy Base Points.  (10) The Energy Offer Curve or Energy Bid/Offer Curve used to calculate the Emergency Base Point Price (EBPPR) will be the Energy Offer Curve or Energy Bid/Offer Curve that was submitted by the QSE and effective for the applicable Operating Hour at the time of the triggering event that led to emergency Settlement consideration, except when the QSE has received Base Points that are inconsistent with Real-Time Settlement Point Prices, as described in paragraph (4) above. In the case of the condition described in paragraph (3) above, the triggering event would be the first interval in which the QSGR comes On-Line as a result of a Base Point greater than zero.  (11) For ESRs that qualify for emergency Settlement, for purposes of this section, the MOC curve used to cap the Energy Bid/Offer Curve shall be set to the highest Real-Time Settlement Point Price (RTSPP) at the Resource’s Settlement Point for the Operating Day. |

6.6.9.1 Payment for Emergency Power Increase Directed by ERCOT

(1) If the Emergency Base Point issued to a Generation Resource is higher than the SCED Base Point immediately before the Emergency Condition or Watch, then ERCOT shall pay the QSE an additional compensation for the Resource at its Resource Node Settlement Point. The payment for a given 15-minute Settlement Interval is calculated as follows:

EMREAMT *q, r, p* = (-1) \* EMREPR *q, r, p* \* EMRE *q, r, p*

Where:

EMREPR *q, r, p* = Max (0, EBPWAPR *q, r, p* – RTSPP *p*)

EBPWAPR *q, r, p* = (EBPPR *q, r, p, y* \* EBP *q, r, p, y* \* TLMP *y*) **/**

(EBP*q, r, p, y* \* TLMP *y*)

EMRE *q, r, p* = Max (0, Min (AEBP*q, r, p*, RTMG *q, r, p*) – ¼ \* BP *q, r, p*)

AEBP*q, r, p* =  (EBP *q, r, p, y* \* TLMP*y* / 3600)

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| EMREAMT *q, r, p* | $ | *Emergency Energy Amount per QSE per Settlement Point per Resource*—The payment to QSE *q* as additional compensation for the additional energy produced by Generation Resource *r* at Resource Node *p* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| EMREPR *q, r, p* | $/MWh | *Emergency Energy Price per QSE per Settlement Point per Resource*—The compensation rate for the additional energy produced by Generation Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| EMRE *q, r, p* | MWh | *Emergency Energy per QSE per Settlement Point per Resource*—The additional energy produced by Generation Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| EBPWAPR *q, r, p* | $/MWh | *Emergency Base Point Weighted Average Price per QSE per Settlement Point per Resource*—The weighted average of the energy prices corresponding with the Emergency Base Points on the Energy Offer Curve for Resource *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| BP *q, r, p* | MW | *Base Point per QSE per Settlement Point per Resource*—The Base Point of Resource *r* at Resource Node *p* represented by QSE *q* from the SCED prior to the Emergency Condition or Watch. For a Combined Cycle Train, the Resource *r* must be one of the registered Combined Cycle Generation Resources within the Combined Cycle Train. |
| AEBP*q, r, p* | MWh | *Aggregated Emergency Base Point*—The Generation Resource’s aggregated Emergency Base Point, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, AEBP is calculated for the Combined Cycle Train considering all emergency Dispatch Instructions to any Combined Cycle Generation Resources within the Combined Cycle Train. |
| EBP *q, r, p, y* | MW | *Emergency Base Point per QSE per Settlement Point per Resource by interval*—The Emergency Base Point of Resource *r* at Resource Node *p* represented by QSE *q* for the Emergency Base Point interval or SCED interval *y*. If a Base Point instead of an Emergency Base Point is effective during the interval *y*, its value equals the Base Point. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| EBPPR *q, r, p, y* | $/MWh | *Emergency Base Point Price per QSE per Settlement Point per Resource by interval*—The average incremental energy cost calculated per the Energy Offer Curve, capped by the MOC pursuant to Section 4.4.9.4.1, Mitigated Offer Cap, for the output levels between the SCED Base Point immediately before the Emergency Condition or Watch and the Emergency Base Point of Resource *r* at Resource Node *p* represented by QSE *q* for the Emergency Base Point interval or SCED interval *y*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| RTSPP *p* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval. |
| RTMG *q, r, p* | MWh | *Real-Time Metered Generation per QSE per Settlement Point per Resource*—The metered generation of Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| TLMP *y* | second | *Duration of Emergency Base Point interval or SCED interval per interval*—The duration of the portion of the Emergency Base Point interval or SCED interval *y* within the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A Resource Node Settlement Point. |
| *r* | none | A Generation Resource. |
| *y* | none | An Emergency Base Point interval or SCED interval that overlaps the 15-minute Settlement Interval. |
| 3600 | none | The number of seconds in one hour. |

(2) The extension of the Energy Offer Curve is used to calculate the Emergency Base Point Price. If the Emergency Base Point MW value is greater than the largest MW value on the Energy Offer Curve submitted by the QSE for the Resource, then the Energy Offer Curve is extended to the Emergency Base Point MW value with a $/MWh value that is the MOC (pursuant to Section 4.4.9.4.1) for the highest MW output on the Energy Offer Curve submitted by the QSE for the Resource.

Q1 Q2 SCED Q3 EBP MW

$/

MWh

P 3

P2

P1

The area under the capped Energy Offer Curve equals

(EBPPR \* (EBP – SCED BP))

Mitigated Offer Cap

Extended portion of Energy Offer Curve

Q1 Q2 SCED Q3 EBP MW

$/

MWh

P 3

P2

P1

The area under the capped Energy Offer Curve equals

(EBPPR \* (EBP – SCED BP))

Mitigated Offer Cap

Extended portion of Energy Offer Curve

(3) The total additional compensation to each QSE for emergency power increases of Generation Resources for the 15-minute Settlement Interval is calculated as follows:

EMREAMTQSETOT *q* = EMREAMT *q, r, p*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| EMREAMTQSETOT *q* | $ | *Emergency Energy Amount QSE Total per QSE*⎯The total of the payments to QSE *q* as additional compensation for emergency power increases of the Generation Resources represented by this QSE for the 15-minute Settlement Interval. |
| EMREAMT *q, r, p* | $ | *Emergency Energy Amount per QSE per Settlement Point per Resource*—The payment to QSE *q* as additional compensation for the additional energy produced by Generation Resource *r* at Resource Node *p* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *p* | none | A Resource Node Settlement Point. |
| *r* | none | A Generation Resource. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1010 and NPRR1014: Replace applicable portions of Section 6.6.9.1 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation for NPRR1014:]  **6.6.9.1 Payment for Emergency Operations Settlement**  (1) ERCOT shall pay the QSE additional compensation for the Resource at its Resource Node Settlement Point during the Settlement Intervals that qualify for emergency Settlement as described in Section 6.6.9, Emergency Operations Settlement. The payment for a given 15-minute Settlement Interval is calculated as follows:  **EMREAMT *q, r, p* = (-1) \* (EMREPRGEN *q, r, p* \* EMREGEN *q, r, p*)**  **+ EMREPRLOAD *q, r, p* \* EMRELOAD *q, r, p***  Where:  If any EBP > 0 then:  EMREPRGEN *q, r, p* = Max (0, EBPWAPRGEN *q, r, p* – RTSPP *p*)  EBPWAPRGEN *q, r, p* = (EBPPR *q, r, p, y* \* Max (0.001, EBP *q, r, p, y*) \* TLMP *y*) **/**  (Max (0.001, EBP *q, r, p, y*)\* TLMP *y*)  EMREGEN *q, r, p* = Max (0, Min (AEBPGEN*q, r, p*, RTMG *q, r, p*) – ¼ \* Max (0, BP *q, r, p*))  AEBPGEN*q, r, p* =  (Max (0, EBP *q, r, p, y*) \* TLMP*y* / 3600)  If any EBP < 0 then:  EMREPRLOAD *q, r, p* = Max (0, RTSPP *p* – EBPWAPRLOAD *q, r, p* )  EBPWAPRLOAD *q, r, p* = (EBPPR *q, r, p, y* \* Min (-0.001, EBP *q, r, p, y*) \* TLMP *y*) **/**  (Min (-0.001, EBP *q, r, p, y*)\* TLMP *y*)  EMRELOAD *q, r, p* = Min (0, Max (AEBPLOAD*q, r, p*, RTCL *q, r, p*) – ¼ \* Min (0, BP *q, r, p*))  AEBPLOAD *q, r, p* =  (Min (0, EBP *q, r, p, y*) \* TLMP*y* / 3600)  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | EMREAMT *q, r, p* | $ | *Emergency Energy Amount per QSE per Settlement Point per Resource*—The payment to QSE *q* as additional compensation for the additional energy or Ancillary Services produced or consumed by Resource *r* at Resource Node *p* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | EMREPRGEN *q, r, p* | $/MWh | *Emergency Energy Price for Generation per QSE per Settlement Point per Resource*—The compensation rate for the generation produced by Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | EMREPRLOAD *q, r, p* | $/MWh | *Emergency Energy Price for Charging Load per QSE per Settlement Point per Resource*—The compensation rate for the charging load for Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | EMREGEN *q, r, p* | MWh | *Emergency Energy for Generation per QSE per Settlement Point per Resource*—The generation produced by Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | EMRELOAD *q, r, p* | MWh | *Emergency Energy for Charging Load per QSE per Settlement Point per Resource*—The charging load for Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | EBPWAPRGEN *q, r, p* | $/MWh | *Emergency Base Point Weighted Average Price for Generation per QSE per Settlement Point per Resource*—The weighted average of the Emergency Base Point Prices corresponding with the positive Emergency Base Points, for Resource *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | EBPWAPRLOAD *q, r, p* | $/MWh | *Emergency Base Point Weighted Average Price for Charging Load per QSE per Settlement Point per Resource*—The weighted average of the Emergency Base Point Prices corresponding with the negative Emergency Base Points, for Resource *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | BP *q, r, p* | MW | *Base Point per QSE per Settlement Point per Resource*—The Base Point of Resource *r* at Resource Node *p* represented by QSE *q* from the SCED prior to the Emergency Condition or Watch. For a Combined Cycle Train, the Resource *r* must be one of the registered Combined Cycle Generation Resources within the Combined Cycle Train. | | AEBPGEN*q, r, p* | MWh | *Aggregated Emergency Base Point for Generation*—The aggregation of the positive Emergency Base Points for the Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, AEBP is calculated for the Combined Cycle Train considering all emergency Dispatch Instructions to any Combined Cycle Generation Resources within the Combined Cycle Train. | | AEBPLOAD*q, r, p* | MWh | *Aggregated Emergency Base Point for Charging Load*—The aggregation of the negative Emergency Base Points for the Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval. | | EBP *q, r, p, y* | MW | *Emergency Base Point per QSE per Settlement Point per Resource by interval*—The Emergency Base Point of Resource *r* at Resource Node *p* represented by QSE *q* for the Emergency Base Point interval or SCED interval *y*. If a Base Point instead of an Emergency Base Point is effective during the interval *y*, its value equals the Base Point. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | EBPPR *q, r, p, y* | $/MWh | *Emergency Base Point Price per QSE per Settlement Point per Resource by interval*—The average incremental energy cost calculated per the Energy Offer Curve or Energy Bid/Offer Curve corresponding to the Emergency Base Point for Resource *r* at Resource Node *p* represented by QSE *q* for the Emergency Base Point interval or SCED interval *y*. The Energy Offer Curve shall be capped by the MOC pursuant to Section 4.4.9.4.1, Mitigated Offer Cap and the Energy Bid/Offer Curve shall be capped by the maximum RTSPP at the Settlement Point for the Operating Day, per paragraph (10)(b) of Section 6.6.9. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTSPP *p* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval. | | RTMG *q, r, p* | MWh | *Real-Time Metered Generation per QSE per Settlement Point per Resource*—The metered generation of Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTCL *q, r, p* | MWh | *Real-Time Charging Load per QSE per Resource per Settlement Point* —The charging load for Resource *r* at Resource Node *p* represented by the QSE *q,* represented as a negative value,for the 15-minute Settlement Interval. | | TLMP *y* | second | *Duration of Emergency Base Point interval or SCED interval per interval*—The duration of the portion of the Emergency Base Point interval or SCED interval *y* within the 15-minute Settlement Interval. | | *q* | none | A QSE. | | *p* | none | A Resource Node Settlement Point. | | *r* | none | A Generation Resource or ESR. | | *y* | none | An Emergency Base Point interval or SCED interval that overlaps the 15-minute Settlement Interval. | | 3600 | none | The number of seconds in one hour. |   (2) ERCOT shall pay the QSE additional compensation for the Resource at its Resource Node Settlement Point during the Settlement Intervals that qualify for emergency Settlement as described in Section 6.6.9, Emergency Operations Settlement. The payment for a given 15-minute Settlement Interval is calculated as follows:  **EMREAMT *q, r, p*  = Min (0, RTENET *q, r, p* + RTASNET *q, r, p*)**  (a) Where the Real-Time Energy Net Revenue is calculated as follows:  RTENET *q, r, p* = RTEREV*q, r, p*  - RTEREVT*q, r, p*  Where:  RTEREV*q, r, p* = RTSPP *q, r, p* \* (EMREGEN *q, r, p* + EMRELOAD *q, r, p*)  RTEREVT*q, r, p* = EBPWAPRGEN *q, r, p* \* EMREGEN *q, r, p* +  EBPWAPRLOAD *q, r, p* \* EMRELOAD *q, r, p*  If any EBP > 0 then:  EBPWAPRGEN *q, r, p* = (EBPPR *q, r, p, y* \* Max (0.001, EBP *q, r, p, y* )\* TLMP *y*) **/**  (Max (0.001, EBP *q, r, p, y*)\* TLMP *y*)  EMREGEN *q, r, p* = Max (0, Min (AEBPGEN*q, r, p*, RTMG *q, r, p*))  AEBPGEN*q, r, p* =  (Max (0, EBP *q, r, p, y*) \* TLMP*y* / 3600)  If any EBP < 0 then:  EBPWAPRLOAD *q, r, p* = (EBPPR *q, r, p, y* \* Min (-0.001, EBP *q, r, p, y*) \* TLMP *y*) **/**  (Min (-0.001, EBP*q, r, p, y*)\* TLMP *y*)  EMRELOAD *q, r, p* = Min (0, Max (AEBPLOAD*q, r, p*, RTCL *q, r, p*))  AEBPLOAD *q, r, p* =  (Min (0, EBP *q, r, p, y*) \* TLMP*y* / 3600)  (b) Where the Real-Time Ancillary Services Net Revenue is calculated as follows:  RTASNET*q, r* = RTRUNET *q, r*+ RTRDNET *q, r*+ RTNSNET *q, r* + RTRRNET *q, r* + RTECRNET *q, r*  Where for Reg-Up:  RTRUNET *q, r*  = RTRUREV *q, r* - (¼)\* RTRUREVT *q, r, p*  RTRUREVT*q, r, p* = RTRUWAPR *q, r, p* \* RTRUAWD *q, r*  RTRUWAPR *q, r, p* = (RTRUOPR *q, r, p, y* \* Max (0.001, RTRUAWDS *q, r, p, y*) \* TLMP *y*) **/**  (Max (0.001, RTRUAWDS *q, r, p, y*)\* TLMP *y*)  Where for Reg-Down:  RTRDNET *q, r* = RTRDREV *q, r*  - (¼)\* RTRDREVT *q, r, p*  RTRDREVT*q, r, p* = RTRDWAPR *q, r, p* \* RTRDAWD *q, r*  RTRDWAPR *q, r, p* = (RTRDOPR *q, r, p, y* \* Max (0.001, RTRDAWDS *q, r, p, y* ) \* TLMP *y*) **/**  (Max (0.001, RTRDAWDS *q, r, p, y*)\* TLMP *y*)  Where for RRS:  RTRRNET *q, r*  = RTRRREV *q, r*  - (¼)\* RTRRREVT *q, r, p*  RTRRREVT*q, r, p* = RTRRWAPR *q, r, p* \* RTRRAWD *q, r*  RTRRWAPR *q, r, p* = (RTRROPR *q, r, p, y* \* Max (0.001, RTRRAWDS *q, r, p, y*) \* TLMP *y*) **/**(Max (0.001, RTRRAWDS *q, r, p, y*)\* TLMP *y*)  Where for Non-Spin:  RTNSNET *q, r*  = RTNSREV *q, r*  - (¼)\* RTNSREVT *q, r, p*  RTNSREVT*q, r, p* = RTNSWAPR *q, r, p* \* RTNSAWD *q, r*  RTNSWAPR *q, r, p* = (RTNSOPR *q, r, p, y* \* Max (0.001, RTNSAWDS *q, r, p, y* ) \* TLMP *y*) **/**(Max (0.001, RTNSAWDS *q, r, p, y*)\* TLMP *y*)  Where for ERCOT Contingency Reserve (ECRS):  RTECRNET *q, r*  = RTECRREV *q, r*  - (¼)\* RTECRREVT *q, r*  RTECRREVT*q, r, p* = RTECRWAPR *q, r, p* \* RTECRAWD *q, r*  RTECRWAPR *q, r, p* = (RTECROPR *q, r, p, y* \* Max (0.001, RTECRAWDS *q, r, p, y*) \* TLMP *y*) **/** (Max (0.001, RTECRAWDS *q, r, p, y*)\* TLMP *y*)  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | EMREAMT *q, r, p* | $ | *Emergency Energy Amount per QSE per Settlement Point per Resource*—The payment to QSE *q* as additional compensation for the additional energy or Ancillary Services produced or consumed by Resource *r* at Resource Node *p* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTENET *q, r, p* | $ | *Real-Time Energy Net Revenue–* The net difference between the Real-Time Energy Revenue and the Real-Time Energy Revenue Target for QSE *q* for Resource *r* at Resource node *p* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTASNET *q, r,* | $ | *Real-Time Ancillary Service Net Revenue –* The sum of the Ancillary Service net revenues for QSE *q* for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTEREV *q, r, p* | $ | *Real-Time Energy Revenue*— The calculated Real-Time energy revenue at the RTSPP for QSE *q* calculated forResource *r* at Resource node *p* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | EMREGEN *q, r, p* | MWh | *Emergency Energy for Generation per QSE per Settlement Point per Resource*—The generation produced by Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | EMRELOAD *q, r, p* | MWh | *Emergency Energy for Charging Load per QSE per Settlement Point per Resource*—The charging load for Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTEREVT *q, r, p* | $ | *Real-Time Energy Revenue Target –* The energy revenue target at the EBPWAPRGEN and EBPWAPRLOAD of the Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | EBPWAPRGEN *q, r, p* | $/MWh | *Emergency Base Point Weighted Average Price for Generation per QSE per Settlement Point per Resource*—The weighted average of the Emergency Base Point Prices corresponding with the positive Emergency Base Points for Resource *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | EBPWAPRLOAD *q, r, p* | $/MWh | *Emergency Base Point Weighted Average Price for Charging Load per QSE per Settlement Point per Resource*—The weighted average of the Emergency Base Point Prices corresponding with the negative Emergency Base Points, for Resource *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | AEBPGEN*q, r, p* | MWh | *Aggregated Emergency Base Point for Generation*—The aggregation of the positive Emergency Base Points for the Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, AEBP is calculated for the Combined Cycle Train considering all emergency Dispatch Instructions to any Combined Cycle Generation Resources within the Combined Cycle Train. | | AEBPLOAD*q, r, p* | MWh | *Aggregated Emergency Base Point for Charging Load*—The aggregation of the negative Emergency Base Points for the Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval. | | EBP *q, r, p, y* | MW | *Emergency Base Point per QSE per Settlement Point per Resource by interval*—The Emergency Base Point of Resource *r* at Resource Node *p* represented by QSE *q* for the Emergency Base Point interval or SCED interval *y*. If a Base Point instead of an Emergency Base Point is effective during the interval *y*, its value equals the Base Point. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | EBPPR *q, r, p, y* | $/MWh | *Emergency Base Point Price per QSE per Settlement Point per Resource by interval*—The average incremental energy cost calculated per the Energy Offer Curve or Energy Bid/Offer Curve corresponding to the Emergency Base Point for Resource *r* at Resource Node *p* represented by QSE *q* for the Emergency Base Point interval or SCED interval *y*. The Energy Offer Curve shall be capped by the MOC pursuant to Section 4.4.9.4.1, Mitigated Offer Cap, and the Energy Bid/Offer Curve shall be capped by the maximum RTSPP at the Settlement Point for the Operating Day, per paragraph (10)(b) of Section 6.6.9. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTSPP *p* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval. | | RTMG *q, r, p* | MWh | *Real-Time Metered Generation per QSE per Settlement Point per Resource*—The metered generation of Resource *r* at Resource Node *p* represented by QSE *q* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTCL *q, r, p* | MWh | *Real-Time Charging Load per QSE per Resource per Settlement Point* —The charging load for Resource *r* at Resource Node *p* represented by the QSE *q,* represented as a negative value,for the 15-minute Settlement Interval. | | RTRUNET *q, r* | $ | *Real-Time Reg-Up Net Revenue–* The difference between the Real-Time Reg-Up Revenue and the Real-Time Reg-Up Revenue Target for QSE *q* for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRDNET *q, r* | $ | *Real-Time Reg-Down Net Revenue –* The difference between calculated revenue for the Real-Time Reg-Down Revenue and the Real-Time Reg-Down Revenue Target for QSE *q* for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRRNET *q, r* | $ | *Real-Time Responsive Reserve Net Revenue –* The difference between Real-Time RRS Revenue and the Real-Time RRS Revenue Target for QSE *q* for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTNSNET *q, r* | $ | *Real-Time Non-Spin Net Revenue –* The difference between Real-Time Non-Spin Revenue and the Real-Time Non-Spin Revenue Target for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTECRNET *q, r* | $ | *Real-Time ERCOT Contingency Reserve Service Net Revenue –* The difference between Real-Time ECRS Revenue and the Real-Time ECRS Revenue Target for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRUREV *q, r* | $ | *Real-Time Reg-Up Revenue*— The calculated Real-Time Reg-Up revenue for QSE *q* calculated forResource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRDREV *q, r* | $ | *Real-Time Reg-Down Revenue*— The calculated Real-Time Reg-Down revenue for QSE *q* calculated forResource *r* for the 15-minute Settlement interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRRREV *q, r* | $ | *Real-Time Responsive Reserve Revenue*— The calculated Real-Time RRS revenue for QSE *q* calculated forResource *r* for the 15-minute Settlement interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTNSREV *q, r* | $ | *Real-Time Non-Spin Revenue*— The calculated Real-Time Non-Spin revenue for QSE *q* calculated forResource *r* for the 15-minute Settlement interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTECRREV *q, r* | $ | *Real-Time ERCOT Contingency Reserve Service Revenue*— The calculated Real-Time ECRS revenue for QSE *q* calculated forResource *r* for the 15-minute Settlement interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRUREVT *q, r* | $ | *Real-Time Reg-Up Revenue Target –* The revenue target of the Reg-Up award to Resource *r* represented by QSE *q* based on the Ancillary Service Offer for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRDREVT *q, r* | $ | *Real-Time Reg-Down Revenue Target –* The revenue target of the Reg-Down award to Resource *r* represented by QSE *q* based on the Ancillary Service Offer for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRRREVT *q, r* | $ | *Real-Time Responsive Reserve Revenue Target –* The revenue target of the RRS award to Resource *r* represented by QSE *q* based on the Ancillary Service Offer for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTNSREVT *q, r* | $ | *Real-Time Non-Spin Revenue Target –* The revenue target of the Non-Spin award to Resource *r* represented by QSE *q* based on the Ancillary Service Offer for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTECRREVT *q, r* | $ | *Real-Time ERCOT Contingency Reserve Service Revenue Target –* The revenue target of the ECRS award to Resource *r* represented by QSE *q* based on the Ancillary Service Offer for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRUWAPR *q, r, p* | $/MW | *Real-Time Reg-Up Weighted-Average Price –* The weighted average of the Ancillary Service Offer prices corresponding with the Reg-Up awards on the Ancillary Service Offer curves for Resource *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRDWAPR *q, r, p* | $/MW | *Real-Time Reg-Down Weighted-Average Price –* The weighted average of the Ancillary Service Offer prices corresponding with the Reg-Down awards on the Ancillary Service Offer curves for Resource *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRRWAPR *q, r, p* | $/MW | *Real-Time Responsive Reserve Weighted-Average Price –* The weighted average of the Ancillary Service Offer prices corresponding with the RRS awards on the Ancillary Service Offer curves for Resource *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTNSWAPR *q, r, p* | $/MW | *Real-Time Non-Spin Weighted-Average Price –* The weighted average of the Ancillary Service Offer prices corresponding with the Non-Spin awards on the Ancillary Service Offer curves for Resource *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTECRWAPR *q, r, p* | $/MW | *Real-Time ERCOT Contingency Reserve Service Weighted-Average Price –* The weighted average of the Ancillary Service Offer prices corresponding with the ECRS awards on the Ancillary Service Offer curves for Resource *r* at Resource Node *p* represented by QSE *q*, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRUAWD *q, r* | MW | *Real-Time Reg-Up Award per Resource per QSE*— The Reg-Up amount awarded to QSE *q* for Resource *r* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRDAWD *q, r* | MW | *Real-Time Reg-Down Award per Resource per QSE*— The Reg-Down amount awarded to QSE *q* for Resource *r* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRRAWD *q, r* | MW | *Real-Time Responsive Reserve Award per Resource per QSE*— The RRS amount awarded to QSE *q* for Resource *r* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTNSAWD *q, r* | MW | *Real-Time Non-Spin Award per Resource per QSE*— The Non-Spin amount awarded to QSE *q* for Resource *r* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTECRAWD *q, r* | MW | *Real-Time ERCOT Contingency Reserve Service Award per Resource per QSE*— The ECRS amount awarded to QSE *q* for Resource *r* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRUOPR *q, r, p, y* | $/MW | *Real-Time Reg-Up Offer Price –* The price on the Ancillary Service Offer curve at the Reg-Up award of Resource *r* at Resource Node *p* represented by QSE *q* for the SCED interval *y*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTRDOPR *q, r, p, y* | $/MW | *Real-Time Reg-Down Offer Price –* The price on the Ancillary Service Offer curve at the Reg-Down award of Resource *r* at Resource Node *p* represented by QSE *q* for the SCED interval *y*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTRROPR *q, r, p, y* | $/MW | *Real-Time Responsive Reserve Offer Price –* The price on the Ancillary Service Offer curve at the RRS award of Resource *r* at Resource Node *p* represented by QSE *q* for the SCED interval *y*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTNSOPR *q, r, p, y* | $/MW | *Real-Time Non-Spin Offer Price –* The price on the Ancillary Service Offer curve at the Non-Spin award of Resource *r* at Resource Node *p* represented by QSE *q* for the SCED interval *y*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTECROPR *q, r, p, y* | $/MW | *Real-Time ERCOT Contingency Reserve Service Offer Price –* The price on the Ancillary Service Offer curve at the ECRS award of Resource *r* at Resource Node *p* represented by QSE *q* for the SCED interval *y*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTRUAWDS *q, r, p, y* | MW | *Real-Time Reg-Up Award per Resource per QSE per SCED interval -* The Reg-Up amount awarded to QSE *q* for Resource *r* in Real-Timefor the SCED interval *y.* Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTRDAWDS *q, r, p, y* | MW | *Real-Time Reg-Down Award per Resource per QSE per SCED interval -* The Reg-Down amount awarded to QSE *q* for Resource *r* in Real-Timefor the SCED interval *y.* Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTRRAWDS *q, r, p, y* | MW | *Real-Time Responsive Reserve Award per Resource per QSE per SCED interval -* The RRS amount awarded to QSE *q* for Resource *r* in Real-Timefor the SCED interval *y.* Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTNSAWDS *q, r, p, y* | MW | *Real-Time Non-Spin Award per Resource per QSE per SCED interval -* The Non-Spin amount awarded to QSE *q* for Resource *r* in Real-Timefor the SCED interval *y.* Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTECRAWDS *q, r, p, y* | MW | *Real-Time ERCOT Contingency Reserve Service Award per Resource per QSE per SCED interval -* The ECRS amount awarded to QSE *q* for Resource *r* in Real-Timefor the SCED interval *y.* Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | TLMP *y* | second | *Duration of Emergency Base Point interval or SCED interval per interval*—The duration of the portion of the Emergency Base Point interval or SCED interval *y* within the 15-minute Settlement Interval. | | *q* | none | A QSE. | | *p* | none | A Resource Node Settlement Point. | | *r* | none | A Generation Resource or ESR. | | *y* | none | An Emergency Base Point interval or SCED interval that overlaps the 15-minute Settlement Interval. | | 3600 | none | The number of seconds in one hour. |   (3) The extension of the Energy Offer Curve or Energy Bid/Offer Curve is used to calculate the Emergency Base Point Price. If the Emergency Base Point MW value is greater than the largest MW value on the Energy Offer Curve or Energy Bid/Offer Curve submitted by the QSE for the Resource, then the Energy Offer Curve or Energy Bid/Offer Curve is extended to the Emergency Base Point MW value with a $/MWh value that is the MOC (pursuant to Section 4.4.9.4.1) for the highest MW output on the Energy Offer Curve or Energy Bid/Offer Curve submitted by the QSE for the Resource.  Q1 Q2 SCED Q3 EBP MW  $/  MWh  P 3  P2  P1  The area under the capped Energy Offer Curve equals  (EBPPR \* (EBP – SCED BP))  Mitigated Offer Cap  Extended portion of Energy Offer Curve  Q1 Q2 SCED Q3 EBP MW  $/  MWh  P 3  P2  P1  The area under the capped Energy Offer Curve equals  (EBPPR \* (EBP – SCED BP))  Mitigated Offer Cap  Extended portion of Energy Offer Curve  (4) The total additional compensation to each QSE for emergency Settlement of Resources for the 15-minute Settlement Interval is calculated as follows:  **EMREAMTQSETOT *q* = EMREAMT *q, r, p***  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | EMREAMTQSETOT *q* | $ | *Emergency Energy Amount QSE Total per QSE*⎯The total of the payments to QSE *q* as additional compensation for additional energy or Ancillary Services of the Resources represented by this QSE for the 15-minute Settlement Interval. | | EMREAMT *q, r, p* | $ | *Emergency Energy Amount per QSE per Settlement Point per Resource*—The payment to QSE *q* as additional compensation for the additional energy or Ancillary Services produced or consumed by Resource *r* at Resource Node *p* in Real-Time during the Emergency Condition or Watch, for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | *q* | none | A QSE. | | *p* | none | A Resource Node Settlement Point. | | *r* | none | A Generation Resource or ESR. | |

6.6.9.2 Charge for Emergency Power Increases

(1) The total cost for additional compensation for emergency power increases and unannounced Generation Resource tests is allocated to the QSEs representing Loads based on LRS. The charge to each QSE for a given 15-minute Settlement Interval is calculated as follows:

LAEMREAMT *q* = (-1) \* EMREAMTTOT \* LRS *q*

Where:

EMREAMTTOT = EMREAMTQSETOT *q*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| LAEMREAMT *q* | $ | *Load-Allocated Emergency Energy Amount per QSE*—The QSE *q*’s Load-allocated amount of the total payments for all the Generation Resources with Real-Time Emergency Base Points, for the 15-minute Settlement Interval. |
| EMREAMTTOT | $ | *Emergency Energy Amount Total*⎯The total of the payments to all QSEs as additional compensation for emergency power increases of the Generation Resources for the 15-minute Settlement Interval. |
| EMREAMTQSETOT *q* | $ | *Emergency Energy Amount QSE Total per QSE*⎯The total of the payments to QSE *q* as additional compensation for emergency power increases of the Generation Resources represented by this QSE 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. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1010 and NPRR1014: Replace applicable portions of Section 6.6.9.2 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation for NPRR1014:]  **6.6.9.2 Charge for Emergency Operations Settlement**  (1) The total cost for additional compensation for emergency Settlement as calculated in Section 6.6.9.1, Payment for Emergency Operations Settlement, is allocated to the QSEs representing Loads based on LRS. The charge to each QSE for a given 15-minute Settlement Interval is calculated as follows:  **LAEMREAMT *q* = (-1) \* EMREAMTTOT \* LRS *q***  Where:  EMREAMTTOT = EMREAMTQSETOT *q*  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | LAEMREAMT *q* | $ | *Load-Allocated Emergency Energy Amount per QSE*—The QSE *q*’s Load-allocated amount of the total payments for all the Resources with Real-Time Emergency Base Points, for the 15-minute Settlement Interval. | | EMREAMTTOT | $ | *Emergency Energy Amount Total*⎯The total of the payments to all QSEs as additional compensation for additional energy or Ancillary Services of the Resources for the 15-minute Settlement Interval. | | EMREAMTQSETOT *q* | $ | *Emergency Energy Amount QSE Total per QSE*⎯The total of the payments to QSE *q* as additional compensation for additional energy or Ancillary Services of the Resources represented by this QSE 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. | |

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 payments or charges under Section 6.6.3.8, Real-Time Payment or Charge for Energy from a Settlement Only Distribution Generator (SODG) or a Settlement Only Transmission Generator (SOTG);

|  |
| --- |
| [NPRR995: Replace item (f) above with the following upon system implementation:]  (f) Real-Time Energy payments or charges under Section 6.6.3.8, Real-Time Payment or Charge for Energy from a Settlement Only Distribution Generator (SODG), Settlement Only Transmission Generator (SOTG), Settlement Only Distribution Energy Storage System (SODESS), or Settlement Only Transmission Energy Storage System (SOTESS); |

(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 + RTESOGAMTTOT + RTCCAMTTOT + RTOBLAMTTOT / 4 + RTOBLLOAMTTOT / 4) \* LRS *q*

|  |
| --- |
| [NPRR995: Replace the formula “LARTRNAMT q” above with the following upon system implementation:]  **LARTRNAMT *q* = (-1) \* (RTEIAMTTOT + BLTRAMTTOT + RTDCIMPAMTTOT + RTESOAMTTOT + RTCCAMTTOT + RTOBLAMTTOT / 4 + RTOBLLOAMTTOT / 4) \* LRS *q*** |

Where:

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

RTEIAMTTOT =  RTEIAMTQSETOT *q*

Total Real-Time Payment for BLT Resources

BLTRAMTTOT =  BLTRAMTQSETOT *q*

Total Real-Time Payment for DC Tie Imports

RTDCIMPAMTTOT = RTDCIMPAMTQSETOT *q*

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

RTCCAMTTOT = RTCCAMTQSETOT *q*

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

RTOBLAMTTOT = RTOBLAMTQSETOT *q*

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

RTOBLLOAMTTOT = RTOBLLOAMTQSETOT *q*

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

RTESOGAMTTOT = RTESOGAMTQSETOT *q*

|  |
| --- |
| [NPRR995: Replace the language above with the following upon system implementation:]  Total Real-Time Payment or Charge for energy from SODGs, SOTGs, SODESSs, or SOTESSs  RTESOAMTTOT =  RTESOAMTQSETOT *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. |
| 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. |
| 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. |
| 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. |
| 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. |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | [NPRR995: Replace the variables “RTESOGAMTQSETOT q” and “RTESOGAMTTOT” above with the following upon system implementation:]   |  |  |  | | --- | --- | --- | | RTESOAMTQSETOT *q* | $ | *Real-Time Energy Payment or Charge per QSE for SODGs, SOTGs, SODESSs, or SOTESSs* —The payment or charge to QSE *q* for Real-Time energy from SODGs, SOTGs, SODESSs, or SOTESSs, for the 15-minute Settlement Interval. | | RTESOAMTTOT | $ | *Real-Time Energy Amount Total from all SODGs, SOTGs, SODESSs, or SOTESSs* —The total net payments and charges to all QSEs for Real-Time energy from SODGs, SOTGs, SODESSs, or SOTESSs, 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:

**LARTRNAMT *q* = (-1) \* (RTEIAMTTOT + BLTRAMTTOT + RTDCIMPAMTTOT + RTESOGAMTTOT + RTCCAMTTOT + NDRTOBLAMTTOT / 4 + NDRTOPTAMTTOT / 4 + NDRTOPTRAMTTOT / 4 + NDRTOBLRAMTTOT / 4) \* LRS *q***

|  |
| --- |
| [NPRR995: Replace the formula “LARTRNAMT q” above with the following upon system implementation:]  **LARTRNAMT *q* = (-1) \* (RTEIAMTTOT + BLTRAMTTOT + RTDCIMPAMTTOT + RTESOAMTTOT + 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)

RTEIAMTTOT =  RTEIAMTQSETOT *q*

Total Real-Time Payment for BLT Resources

BLTRAMTTOT =  BLTRAMTQSETOT *q*

Total Real-Time Payment for DC Tie Imports

RTDCIMPAMTTOT = RTDCIMPAMTQSETOT *q*

Total Real-Time Congestion Payment or Charge for Self Schedules

RTCCAMTTOT = RTCCAMTQSETOT *q*

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

NDRTOBLAMTTOT =  NDRTOBLAMTOTOT *o*

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

NDRTOPTAMTTOT =  NDRTOPTAMTOTOT *o*

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

NDRTOPTRAMTTOT = NDRTOPTRAMTOTOT *o*

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

NDRTOBLRAMTTOT =  NDRTOBLRAMTOTOT *o*

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

RTESOGAMTTOT = RTESOGAMTQSETOT *q*

|  |
| --- |
| [NPRR995: Replace the language above with the following upon system implementation:]  Total Real-Time Payment or Charge for energy from SODGs, SOTGs, SODESSs, or SOTESSs  RTESOAMTTOT =  RTESOAMTQSETOT *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. |
| 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. |
| 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. |
| 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. |
| 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. |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | [NPRR995: Replace the variables “RTESOGAMTQSETOT q” and “RTESOGAMTTOT” above with the following upon system implementation:]   |  |  |  | | --- | --- | --- | | RTESOAMTQSETOT *q* | $ | *Real-Time Energy Payment or Charge per QSE for SODGs, SOTGs, SODESSs, or SOTESSs* —The payment or charge to QSE *q* for Real-Time energy from SODGs, SOTGs, SODESSs, or SOTESSs, for the 15-minute Settlement Interval. | | RTESOAMTTOT | $ | *Real-Time Energy Amount Total from all SODGs, SOTGs, SODESSs, or SOTESSs* —The total net payments and charges to all QSEs for Real-Time energy from SODGs, SOTGs, SODESSs, or SOTESSs, 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. |
| *q* | none | A QSE. |
| *o* | none | A CRR Owner. |

6.6.11 Emergency Response Service Capacity

6.6.11.1 Emergency Response Service Capacity Payments

(1) ERCOT shall pay, for each Emergency Response Service (ERS) Contract Period, the QSEs representing ERS Resources as follows:

ERSPAMT *qc(tp)d* = COMPAMT *qc(tp)d +* SPAMT *qc(tp)d*

ERSPAMTQSETOT *qcd* = ERSPAMT *qc(tp)d*

ERSPAMTTOT *c(tp)d* = ERSPAMT *qc(tp)d*

Where:

COMPAMT *qc(tp)d* = -1 \* ERSPRICE *qc(tp)d* \* COMPDELQSEMW *qcd(tp)d*\* TPH *c(tp)d*

SPAMT *qc(tp)d* = -1 \* (ERSPRICE  *qc(tp)d \** (Min(SPCUL *qc(tp)d,* SPDELQSEMW *qc(tp)d*)*\** TPH *c(tp)d*)

COMPDELQSEMW *qc(tp)d*  = COMPDELMW *qce(tp)d*

COMPDELMWTOT *c(tp)d* = COMPDELQSEMW *qc(tp)d*

SPDELQSEMW *qc(tp)d*  = SPDELMW *qce(tp)d*

SPDELMWTOT *c(tp)d* =  SPDELQSEMW *qc(tp)d*

COMPDELMW *qce(tp)d* = ERSTESTPF *qred* \* COMPOFFERMW *qce(tp)d* \* (ERSAFWT *qcd* \* Min (ERSAFCOMB *qrd*,1) + (1 - ERSAFWT *qcd*) \* Min (ERSEPF *qrd*,1))

SPDELMW *qc(tp)d* = ERSTESTPF *qred* \* SPOFFERMW *qce(tp)d* \* (ERSAFWT *qcd* \* Min(ERSAFCOMB *qrd*,1) + (1 – ERSAFWT *qcd*) \* Min(ERSEPF *qrd*,1))

The ERS Self-Provision Capacity Upper Limit for each self-providing QSE shall be calculated by ERCOT using a two-pass process for each of the four ERS service types. The first pass will consist of simultaneously solving for all QSEs’ ERS Self-Provision Capacity Upper Limits with the constraint that each QSE’s ERS Self-Provision Capacity Upper Limit will equal its LRS multiplied by the total capacity awarded for competitive offers, plus the sum of all QSEs’ ERS Self-Provision Capacity Upper Limits. The second pass will repeat the solution of the equations with a QSE’s delivered self-provided MW capacity (adjusted for availability and/or event performance) substituted for the ERS Self-Provision Capacity Upper Limit if the delivered MW capacity is less than the first pass calculation of the ERS Self-Provision Capacity Upper Limit.

Pass 1:

For QSE 1:

SPCUL*1c(tp)d*= ERSLRS *1c(tp)d* \* (COMPDELMWTOT *c(tp)d* + SPCUL *1c(tp)d* + SPCUL *2c(tp)d*+ … + SPCUL*nc(tp)d*)

For QSE 2:

SPCUL*2c(tp)d*= ERSLRS *2c(tp)d* \* (COMPDELMWTOT *c(tp)d* + SPCUL *1c(tp)d* + SPCUL *2c(tp)d*+ … + SPCUL*nc(tp)d*)

…

For QSE n:

SPCUL*nc(tp)d*= ERSLRS *nc(tp)d* \* (COMPDELMWTOT *c(tp)d* + SPCUL *1c(tp)d* + SPCUL *2c(tp)d*+ … + SPCUL*nc(tp)d*)

Pass 2:

For QSE 1:

SPCUL*1c(tp)d*= ERSLRS *1c(tp)d* \* (COMPDELMWTOT *c(tp)d* +

Min(SPDELMW *1c(tp)d,*SPCUL *1c(tp)d*) +

Min(SPDELMW *2c(tp)d,*SPCUL *2c(tp)d*)

+ … + Min(SPDELMW *nc(tp)d,*SPCUL *nc(tp)d*))

For QSE 2:

SPCUL*2c(tp)d*= ERSLRS *2c(tp)d* \* (COMPDELMWTOT *c(tp)d* +

Min(SPDELMW *1c(tp)d,*SPCUL *1c(tp)d*) +

Min(SPDELMW *2c(tp)d,*SPCUL *2c(tp)d*)

+ … + Min(SPDELMW *nc(tp)d,*SPCUL *nc(tp)d*))

…

For QSE n:

SPCUL*nc(tp)d*= ERSLRS *nc(tp)d* \* (COMPDELMWTOT *c(tp)d* +

Min(SPDELMW *1c(tp)d,*SPCUL *1c(tp)d*) +

Min(SPDELMW *2c(tp)d,*SPCUL *2c(tp)d*)

+ … + Min(SPDELMW *nc(tp)d,*SPCUL *nc(tp)d*))

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| ERSPAMT *qc(tp)d* | $ | *ERS Payment Amount per QSE per ERS Contract Period per ERS Time Period per ERS Service Type*—ERS total payment to QSE *q* for ERS Contract Period *c,* and ERS Time Period *tp* and ERS service type *d*. |
| COMPAMT *qc(tp)d* | $ | *Competitive Amount per QSE per ERS Contract Period per ERS Time Period per ERS Service Type*—ERS total payment to QSE *q* for all competitively procured ERS Resources delivered for ERS Contract Period *c*, and ERS Time Period *tp* and ERS service type *d*. |
| SPAMT *qc(tp)d* | $ | *Self-Procured Amount* *per QSE per ERS Contract Period per ERS Time Period per ERS Service Type*—ERS total payment to QSE *q* for its self-provided ERS Resources for ERS Contract Period *c*, ERS Time Period *tp* and ERS service type *d*. |
| ERSPAMTQSETOT *q* | $ | *ERS Payment QSE Total per QSE*—The total ERS total payments to QSE *q*. |
| ERSPAMTTOT *c(tp)d* | $ | *ERS Payment Amount Total per ERS Contract Period per ERS Time Period per ERS Service Type*—Total of all ERS payments for ERS Contract Period *c*, ERS Time Period *tp* and ERS service type *d*. |
| ERSPRICE *qc(tp)d* | $/MW per hour | *Price of the Highest Offer Cleared per QSE per ERS Contract Period per ERS Time Period per ERS Service Type*—Contracted clearing price for QSE *q* for ERS Contract Period *c*, ERS Time Period *tp* and ERS service type *d*. |
| COMPDELMW *qce(tp)d* | MW | *Competitive Delivered MW per QSE per ERS Contract Period per ERS Resource per ERS Time Period per ERS Service Type*—ERS capacity delivered by the QSE *q* for ERS Contract Period *c,* competitive ERS Resource *e*, ERS Time Period *tp* and ERS service type *d*. |
| TPH *c(tp)d* | Hours | Hours in ERS Time Period *tp* for ERS Contract Period *c*, and ERS service type *d*.  For ERS Resources *e* whose obligation is not exhausted in an ERS Contract Period *c,* the number of hours in that ERS Time Period *tp* in that ERS Contract Period *c*.  For ERS Resources *e* whose obligation is exhausted in an ERS Contract Period *c*, the number of hours in that ERS Time Period *tp* from the beginning of the ERS Contract Period *c* to the end of the ERS Standard Contract Term. |
| ERSTESTPF *qred* | None | *ERS Test Performance Factor per QSE per ERS Standard Contract Term per ERS Resource per ERS Service Type*—Test performance factor for QSE *q* in ERS Standard Contract Term *r* for ERS Resource *e* and ERS service type *d* as calculated pursuant to Section 8.1.3.3.1, Suspension of Qualification of Non-Weather-Sensitive Emergency Response Service Resources and/or their Qualified Scheduling Entities. |
| SPDELMW *qc(tp)d* | MW | *Self-Provided Delivered MW* *per QSE per ERS Contract Period per ERS Resource per ERS Time Period per ERS Service Type*—Total ERS capacity self-provided and delivered by QSE *q* for ERS Contract Period *c,* ERS Resource *e*, ERS Time Period *tp* and ERS service type *d*. |
| COMPDELQSEMW *qc(tp)d* | MW | *Competitive Delivered MW Total per QSE per ERS Contract Period per ERS Time Period per ERS service type*—Total ERS competitive capacity delivered by QSE *q* for ERS Contract Period *c* and ERS Time Period *tp* and ERS service type *d*. |
| COMPDELMWTOT *c(tp)d* | MW | *Competitive Delivered MW Total per ERS Contract Period per ERS Time Period per ERS Service Type*—Total ERS competitive capacity delivered by all QSEs for ERS Contract Period *c*, ERS Time Period *tp* and ERS service type *d*. |
| SPDELQSEMW *qc(tp)d* | MW | *Self-Provision Delivered Total MW per QSE per ERS Contract Period per ERS Time Period per ERS Service Type*—Total ERS self-provision capacity delivered by QSE *q* for ERS Contract Period *c* and ERS Time Period *tp* and ERS service type *d*. |
| SPDELMWTOT *c(tp)d* | MW | *Self-Provision Delivered Total MW per ERS Contract Period per ERS Time Period per ERS Service Type*—Total ERS self-provision capacity delivered by all QSE *q* for ERS Contract Period *c* and ERS Time Period *tp* and ERS service type *d*. |
| COMPOFFERMW *qce(tp)d* | MW | *Competitive Offered MW Total per QSE per ERS Contract Period per ERS Resource per ERS Time Period per ERS Service Type*—ERS capacity offered by QSE *q* for ERS Contract Period *c*, competitive ERS Resource *e* and ERS Time Period *tp* and ERS service type *d*. |
| ERSAFWT*qcd* | None | *Availability Settlement weighting factor per QSE per ERS Contract Period per ERS Service Type*—The weighting factor for QSE *q* for ERS Contract Period *c*, and ERS service type *d* to apply for Settlement as calculated pursuant to Section 8.1.3.1.3.3, Contract Period Availability Calculations for Emergency Response Service Resources. |
| ERSAFCOMB *qrd* | None | *Time- and Capacity-Weighted ERS Availability Factor per QSE per ERS Standard Contract Term per ERS Service Type*—The availability factor for QSE *q* for ERS Standard Contract Term *r* and ERS service type *d,* as calculated pursuant to Section 8.1.3.3, Payment Reductions and Suspension of Qualification of Emergency Response Service Resources and/or their Qualified Scheduling Entities. |
| ERSEPF *qrd* | None | *ERS Event Performance Factor per QSE per ERS Standard Contract Term per ERS Service Type*—Event performance factor for QSE *q* in ERS Standard Contract Term *r* and ERS service type *d* as calculated pursuant to Section 8.1.3.3.1. |
| SPCUL *qc(tp)d* | MW | *Self-Provision Capacity Upper Limit per QSE per ERS Contract Period per ERS Time Period per ERS Service Type*—The ERS Self-Provision Capacity Upper Limit calculated by ERCOT for a self-providing QSE for ERS Contract Period *c* and ERS Time Period *tp* by simultaneously solving for all QSEs’ obligations with the constraint that each QSE’s ERS Self-Provision Capacity Upper Limit does not exceed its obligation. |
| SPOFFERMW *qce(tp)d* | MW | *Self-Provision Offer MW per QSE per ERS Contract Period per ERS Resource per ERS Time Period per ERS Service Type*—ERS capacity offered as self-provision by QSE *q* for ERS Contract Period *c*, ERS Resource *e*, ERS Time Period *tp* and ERS service type *d*. |
| ERSLRS *qc(tp)* | None | *ERS Load Ratio Share per QSE per ERS Contract Period per ERS Time Period per ERS Service Type*—ERS LRS for QSE *q* for ERS Contract Period *c*, ERS Time Period *tp* and ERS service type *d,* calculated starting with the first hour of the ERS Contract Period and ending with the earlier of the last hour of the ERS Contract Period or the hour containing the recall instruction in an ERS deployment event that results in the exhaustion of a QSE portfolio’s ERS obligation. If the resultant QSE-level share is negative, the QSE’s share will be set to zero and all other QSE shares will be adjusted on a pro rata basis such that the sum of all shares is equal to one. |
| *q* | None | A QSE. |
| *c* | None | ERS Contract Period. |
| *r* | None | ERS Standard Contract Term. |
| *tp* | None | Hours in an ERS Time Period. |
| *e* | None | An ERS Resource procured from a QSE for an ERS Contract Period. |
| *co* | None | The number of competitive ERS Resources procured from a QSE for an ERS Contract Period. |
| *s* | None | The number of self-provided ERS Resources procured from a QSE for an ERS Contract Period. |
| *n* | None | The number of QSEs for an ERS Contract Period. |
| *d* | None | ERS service type (Weather-Sensitive ERS-10, Non-Weather-Sensitive ERS-10, Weather-Sensitive ERS-30, or Non-Weather-Sensitive ERS-30). |

6.6.11.2 Emergency Response Service Capacity Charge

(1) ERCOT shall allocate costs for an ERS service type and ERS Contract Period based on the LRS of each QSE during each ERS Time Period in an ERS Contract Period. A QSE’s LRS for an ERS Time Period shall be the QSE’s total Load for the ERS Time Period divided by the total ERCOT Load in the ERS Time Period. For the first Settlement of the ERS Contract Period as described in paragraph (1) of Section 9.14.5, Settlement of Emergency Response Service, LRS will be calculated using the latest Settlement Load for each Operating Day in the ERS Contract Period. For the resettlement of the ERS Contract Period as described in paragraph (2) of Section 9.14.5, the LRS will be calculated using the true-up Load for each Operating Day in the ERS Contract Period.

(2) ERCOT shall calculate each QSE’s ERS capacity charge as follows:

LAERSAMT  *qc(tp)d* = ERSLRS *qc(tp)d*\* ERSPAMTTOT *c(tp)d*

LAERSAMTQSETOT*q* = LAERSAMT *q(tp)d*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| ERSPAMTTOT *c(tp)d* | $ | *ERS Payment Amount Total per ERS Contract Period per ERS Time Period per ERS Service Type*—Total of all ERS payments for ERS Contract Period *c,* ERS Time Period *tp* and ERS service type *d*. |
| ERSLRS *qc(tp)d* | None | *ERS Load Ratio Share per QSE per ERS Contract Period per ERS Time Period per ERS Service Type*—ERS LRS for QSE *q* for ERS Contract Period *c,* ERS Time Period *tp* and ERS service type *d,* calculated starting with the first hour of the ERS Contract Period and ending with the earlier of the last hour of the ERS Contract Period or the hour containing the recall instruction in an ERS deployment event that results in the exhaustion of a QSE portfolio’s ERS obligation. If the resultant QSE-level share is negative, the QSE’s share will be set to zero and all other QSE shares will be adjusted on a pro rata basis such that the sum of all shares is equal to one. |
| LAERSAMT *qc(tp)d* | $ | *Load-Allocated ERS Amount* *per QSE per ERS Contract Period per ERS Time Period per ERS Service Type*—ERS charge for QSE *q* for ERS Contract Period *c,* ERS Time Period *tp* and ERS service type *d*. |
| LAERSAMTQSETOT *q* | $ | *Load-Allocated ERS Amount QSE Total per QSE*—The total ERS charge for QSE *q*. |
| *q* | None | A QSE. |
| *c* | None | ERS Contract Period. |
| *tp* | None | An ERS Time Period. |
| *d* | None | ERS service type (Weather-Sensitive ERS-10, Non-Weather-Sensitive ERS-10, Weather-Sensitive ERS-30, or Non-Weather-Sensitive ERS-30). |

6.6.12 Make-Whole Payment for Switchable Generation Resources Committed for Energy Emergency Alert (EEA)

(1) If ERCOT directs a Switchable Generation Resource (SWGR) to switch to the ERCOT Control Area for an actual or anticipated Energy Emergency Alert (EEA) condition, ERCOT shall pay the QSE representing the SWGR a Switchable Generation Make-Whole Payment (SWMWAMT) as calculated in Section 6.6.12.1, Switchable Generation Make-Whole Payment, if the QSE has:

(a) Not opted out of the RUC instruction, which may be a verbal RUC, per the process described in paragraph (14) of Section 5.5.2, Reliability Unit Commitment (RUC) Process;

(b) Complied with the RUC instruction, which may be a verbal RUC, to switch to the ERCOT Control Area and start the Resource;

(c) Submitted a timely Settlement and billing dispute, including the following items:

(i) An attestation signed by an officer or executive with authority to bind the QSE stating that the information contained in the submission is accurate;

(ii) The dollar amount and calculation of the financial loss, if applicable, by Settlement Interval for:

(A) Energy and ancillary service imbalance costs assessed under the non-ERCOT Control Area Operator’s (CAO’s) settlement process arising from DAM energy and ancillary service obligations of the SWGR in the non-ERCOT Control Area for the time period starting at the initiation of the ramp-down in the non-ERCOT Control Area to two hours following the time ERCOT released the SWGR;

(B) Incremental fuel costs incurred to comply with the instruction. Incremental fuel costs may include only those fuel costs described in Section 9.14.9, Incremental Fuel Costs for Switchable Generation Make-Whole Payment Disputes;

(C) Make-Whole Payment distribution costs for the commitment of generation resources in the non-ERCOT Control Area arising from the need to replace the energy and ancillary service obligations of the generation instructed via a RUC instruction to switch into the ERCOT Control Area;

(D) Pipeline imbalance penalty costs arising from the SWGR not consuming or consuming over its contracted fuel quantities as a result of a switch from a non-ERCOT Control Area as requested by ERCOT. Fuel imbalance penalty costs are limited to those costs assessed for the period starting at the initiation of the ramp-down in the non-ERCOT Control Area to two hours following the time ERCOT released the SWGR;

(iii) Sufficient documentation to support the QSE’s calculation of the amount of the financial loss and all submitted costs.

(2) For a SWGR without approved verifiable costs, the startup and minimum-energy costs will be determined based on generic costs as described in Section 4.4.9.2.3, Startup Offer and Minimum-Energy Offer Generic Caps. If generic costs are insufficient to cover startup and minimum-energy costs of the SWGR, the QSE may provide documentation and request that generic costs be replaced by proxy costs, if available, as determined by ERCOT.

(3) For a SWGR that is a Combined Cycle Generation Resource, all operating costs are those costs for the Combined Cycle Generation Resource within the Combined Cycle Train that is instructed for the hour. If the QSE representing a Combined Cycle Generation Resource complies with a RUC instruction by ERCOT to transition from one Combined Cycle Generation Resource to a different Combined Cycle Generation Resource within the Combined Cycle Train, the incremental cost to transition shall be included in the Switchable Generation Start-Up Cost (SWSUC), as calculated in Section 6.6.12.1, for the Combined Cycle Resource.

(4) A QSE representing a SWGR that is committed through an ERCOT instruction to switch to the ERCOT Control Area may recover lost revenue, net of saved fuel costs, attributable to a reduction in the output of other ERCOT-connected generators that are part of a Combined Cycle Train that includes the RUC-committed SWGR if the following conditions have been met:

(a) The QSE had to turn off one or more generators that were physically connected to the non-ERCOT Control Area in order to achieve the instructed switch, or had to turn off one or more generators that were physically connected to the ERCOT System in order to switch back to the non-ERCOT Control Area, in which case it must have completed the shutdown sequence within 60 minutes of the end of the RUC instruction; and

(b) As a consequence of turning off one or more generators to facilitate a switch described in paragraph (a) above, the output of one or more generators in the configuration operating in ERCOT at the time of the instruction had to be reduced.

(5) The lost revenue, net of saved fuel costs, described in paragraph (4) above shall be included in the Switchable Generation Cost Guarantee (SWCG), as calculated in Section 6.6.12.1, for the Combined Cycle Generation Resource.

(6) For a SWGR switching from a non-ERCOT Control Area, the compensation described in paragraph (4) above shall be determined for the period from the commencement of the shutdown sequence of the switched unit in the non-ERCOT Control Area until breaker close in the ERCOT Control Area. For a SWGR switching to a non-ERCOT Control Area within 60 minutes of the end of the RUC instruction, the compensation described in paragraph (4) above shall be determined for the period from the commencement of the shutdown sequence of the unit in the ERCOT System until breaker close in the non-ERCOT Control Area, with a maximum duration equal to the duration of the switch from the non-ERCOT Control Area to ERCOT pursuant to the RUC instruction.

(7) A QSE that is entitled to compensation under paragraph (4) above, or the Resource Entity for the affected SWGR, must provide the following documentation for the Combined Cycle Train to verify the lost revenue:

(a) Documentation of the Real-Time output of each unit in the Combined Cycle Train, whether operating in ERCOT or in the non-ERCOT Control Area;

(b) For thermal units, the Input-Output Equation or other documentation that allows for calculating the reduction in fuel consumption if the unit had to reduce generation;

(c) Documentation of the time the shutdown sequence started while switching to ERCOT, and if the QSE seeks recovery of lost revenues for a switch to the non-ERCOT Control Area, documentation of the time the breaker closed in the non-ERCOT Control Area, which is subject to verification with the non-ERCOT Control Area operator;

(d) Documentation showing which combustion turbine of the Combined Cycle Generation Resource is providing the auxiliary service; and

(e) Any other technical documentation ERCOT finds necessary to verify the performance and physical characteristics of the Combined Cycle Train or any component thereof, such as thermal balance diagrams.

(8) The Startup Cost for the SWGR shall include the cost for starting in the ERCOT Control Area and, if the SWGR starts up in the non-ERCOT Control Area within 24 hours of being released from ERCOT, the cost of starting in the non-ERCOT Control Area, which will be based on the same warmth state.

(9) ERCOT 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. ERCOT will provide Notice of its acceptance or rejection of the claim for the SWMWAMT within 15 Business Days of the updated submission.

(10) If ERCOT denies all or a portion of a QSE’s non-ERCOT Control Area costs, pursuant to paragraph (1)(c)(ii) above, the QSE may submit a request for ADR as described in Section 20, Alternative Dispute Resolution Procedure.

6.6.12.1 Switchable Generation Make-Whole Payment

(1) To compensate QSEs representing SWGRs that switch to the ERCOT Control Area from a non-ERCOT Control Area pursuant to an ERCOT RUC instruction for an actual or anticipated EEA condition, ERCOT shall calculate a Switchable Generation Make-Whole Payment (SWMWAMT) for an Operating Day, allocated to each instructed Operating Hour as follows:

SWMWAMT *q, r* = (-1) \* Max (0, (SWCG *q, r, d* – SWRTREV *q, r, d*)) / SWIHR *q, r, d*

Where:

SWCG *q, r, d* = SWSUC *q, r, d* + SWMEC *q, r, d* + SWOC *q, r, d* + SWAC *q, r, d* +

SWPSLR *q, r, d*

SWRTREV *q, r, d* = Max [0, (RTSPP*p, i* \* RTMG*q, r, i* + (-1) \* (EMREAMT *q, r, p, i*  + VSSVARAMT *q, r, i*+ VSSEAMT *q, r, i*) + Max(0, (RTOLHSLRA *q, r, p, i* – RTMGA *q, r, p, i*) \* (RTRSVPOR *i* + RTRDP *i*)))]

SWAC *q, r, d* = SWFC *q, r, d* + SWEIC *q, r, d* + SWASIC *q, r, d* + SWMWDC *q, r, d* + SWFIPC *q, r, d*

SWPSLR *q, r, d* = (RTSPP*p, i* \* RTLPX *q, r, i* ) – (FIP+FA) \* SFC *d*

If ERCOT has approved verifiable costs for the SWGR:

SWSUC *q, r, d* =  [SWSF \* (DAFCRS *r, s* \* (GASPERSU *r, s* \* FIP + OILPERSU *r, s* \* FOP + SFPERSU *r, s* \* SFP) + VOMS *r, s*)] + ADJSWSUC *q, r, d*

SWMEC *q, r, d* = ((AHR *r, i* \* (GASPERME *r* \* FIP + OILPERME *r* \* FOP + SFPERME *r*\* SFP + FA *r*) + VOMLSL *r*) \* Min (LSL *q, r, i* \* (¼), RTMG *q, r, i*))

SWOC *q, r, d* = [(AHR *r, i* \* ((GASPEROL *r* \* FIP + OILPEROL *r* \* FOP + SFPEROL *r* \* SFP) + FA *r*) + OM *r*) \* Max(0, (RTMG *q, r, i* – LSL *q, r, i* \* (¼)))] *-* OPC *r, d*

Where,

OPC *r, d* = ((PAHR *r, i* \* (FIP + FA) + OM *r*) \* AENG *r, i*)

If ERCOT has not approved verifiable costs for the SWGR:

SWSUC *q, r, d* =  (SWSF \* RCGSC *s, rc*) + ADJSWSUC *q, r, d*

SWMEC *q, r, d* = (RCGMEC *i, rc* \* Min (LSL *q, r, i* \* (¼), RTMG *q, r, i*))

SWOC *q, r, d* = ((PAHR *r, i* \* FIP + STOM *rc*) \* Max(0, (RTMG *q, r, i* – LSL *q, r, i* \* (¼)))) *-* OPC *r, d*

Where,

OPC *r, d* = ((PAHR *r, i* \* FIP + STOM *rc*) \* AENG *r, i*)

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| SWMWAMT *q, r* | $ | *Switchable Generation Make-Whole Payment*—The Switchable Generation Make-Whole Payment to the QSE *q,* for Resource *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| SWCG *q, r, d* | $ | *Switchable Generation Cost Guarantee*—The sum of eligible Startup Costs, minimum-energy costs, operating costs, and other Switchable Generation approved costs for Resource *r* represented by QSE *q* for all instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| OPC *r, d* | $ | *Operational Cost* – The operational cost for the Resource *r* for the Operating Day *d* in the non-ERCOT Control Area. The operating costs represent the costs the Resource would have incurred to generate the awarded energy in the non-ERCOT Control Area Day-Ahead market absent a request to switch to ERCOT. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| AENG *r, i* | MWh | *Awarded Energy Non-ERCOT Day-Ahead Market* – The awarded energy in the non-ERCOT Day-Ahead Market for the Resource *r* during the Interval *i*. The awarded energy in the non-ERCOT Control Area Day-Ahead market represents the energy award for the interval that was not generated by the Resource due to the switch to ERCOT. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| SWSUC *q ,r, d* | $ | *Switchable Generation* *Start-Up Cost* —The Startup Costs for Resource *r* represented by QSE *q* for startup hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| SWPSLR *q ,r, d* | $ | *Switchable Generation Physical Switch Lost Revenue –* The loss of revenue, net of any saved costs including avoided fuel consumption, experienced by the QSE when the Combined Cycle Generation Resource operating in ERCOT must reduce its output to accommodate a switch from a non-ERCOT Control Area of one or more turbines needed to achieve a Combined Cycle Generation Resource configuration instructed by ERCOT. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RTLPX *q, r, i* | MWh | *Real-Time Proxy Generation per QSE per Resource by Settlement Interval*—The Real-Time energy that was not generated in ERCOT by Combined Cycle Train, *r*, represented by QSE *q*, for the 15-minute Settlement Interval *i*, due to a reduction in output that was necessary to facilitate a switch of another unit in the same Combined Cycle Train to the ERCOT System from a non-ERCOT Control Area, or to a non-ERCOT Control Area from the ERCOT System, when the switch is instructed by ERCOT.  During a shutdown to switch to ERCOT, the value of RTLPX will be determined based on the reduced generation, by interval, for the period starting from the commencement of the shutdown sequence in the non-ERCOT Control Area until breaker close in ERCOT. The reduction in generation shall be determined based on the last metered output value for the Combined Cycle Generation Resource operating in ERCOT immediately prior to the commencement of the shutdown sequence in the non-ERCOT Control Area as compared with the actual metered output during the relevant period, but only to the extent ERCOT determines the reduction in output was necessary to facilitate the switch.  During a shutdown after an ERCOT release of the SWGR, the value of RTLPX will be determined based on the reduced generation, by interval, for the period starting from the commencement of the shutdown sequence in the ERCOT Control Area until breaker close in the non-ERCOT Control Area, with a maximum duration equal to the duration of the switch from the non-ERCOT Control Area to ERCOT pursuant to the RUC instruction. This proxy value will apply only if the QSE shuts down the unit within 60 minutes after the ERCOT release. The reduction in generation shall be determined based on the last metered output value for the Combined Cycle Generation Resource operating in ERCOT immediately prior to the commencement of the shutdown sequence in ERCOT, as compared with the actual metered output during the relevant period, but only to the extent ERCOT determines the reduction in output was necessary to facilitate the switch. |
| SFC *d* | MMBtu | *Saved Fuel Consumption* — Fuel quantity saved due to an output reduction of the combustion turbine(s) operating in ERCOT during the relevant period if necessary to accommodate the switch to and from the ERCOT area. |
| SWSF | none | *Switchable Generation* *Startup Factor* —The Switchable Generation Startup Factor for an SWGR. The SWSF shall be set to a value of 2 if the SWGR has a COP Resource Status of EMRSWGR within 24 hours of being released by the ERCOT Operator. Otherwise, the SWSF shall be set to a value of 1. |
| SWMEC *q, r, d* | $ | *Switchable Generation* *Minimum Energy Cost* —The minimum energy costs for Resource *r* represented by QSE *q* during instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| SWOC *q, r, d* | $ | *Switchable Generation* *Operating Cost* —The operating costs for Resource *r* represented by QSE *q* during instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. Switchable generation operating cost represents the Real-Time operating costs in ERCOT reduced by the savings in operating costs not incurred due to the switch from the non-ERCOT Control Area. |
| SWAC *q, r, d* | $ | *Switchable Generation Approved Costs –* The total amount of the calculation of financial loss, as submitted by the QSE *q* for the Resource *r,* as approved by ERCOT for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| SWFC *q, r, d* | $ | *Switchable Generator* *Fuel Cost* —The incremental fuel costs and fees for Resource *r* represented by QSE *q* for all instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. Incremental fuel costs must be based on those costs incurred as described in Section 9.14.9, Incremental Fuel Costs for Switchable Generation Make-Whole Payment. |
| SWFIPC *q, r, d* | $ | *Switchable Generator Fuel Imbalance Penalty Cost* —The fuel imbalance penalty cost for Resource *r* represented by QSE *q*, for the Operating Day, arising from the SWGR not consuming its contracted fuel quantities as a result of a switch from a non-ERCOT Control Area as requested by ERCOT. Fuel imbalance penalty costs are limited to those costs assessed for the period starting at the initiation of the ramp-down in the non-ERCOT Control Area to two hours following the time ERCOT released the SWGR. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| SWEIC *q, r, d* | $ | *Switchable Generator* *Energy Imbalance Cost* —The energy imbalance costs for Resource *r* represented by QSE *q* for instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. Energy imbalance costs represent Real-Time imbalance charges for the amount of energy the SWGR was not able to provide as required by its DAM commitment from the non-ERCOT Control Area, starting from the beginning of the ramp-down period in the other grid to two hours following the time ERCOT released the Resource. |
| SWASIC *q, r, d* | $ | *Switchable Generator* *Ancillary Services Imbalance Cost* —The Ancillary Service imbalance costs for Resource *r* represented by QSE *q* for instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. Ancillary Service imbalance costs represent Real-Time imbalance charges for the amount of Ancillary Services the SWGR was not able to provide as required by its Day-Ahead commitment from the non-ERCOT Control Area, starting from the time of shutdown in the other grid to two hours following the time ERCOT released the Resource. |
| SWMWDC *q, r, d* | $ | *Switchable Generator* *Make-Whole Payment Distribution Cost* —The Make-Whole Payment distribution costsfor Resource *r* represented by QSE *q* for instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. Make-Whole Payment distribution costs represent charges from non-ERCOT Control Area from the time of shutdown in the other grid to two hours following the time ERCOT released the Resource. |
| SWRTREV *q, r, d* | $ | *Switchable Generation Real-Time Revenues –* The sum of energy revenues for the Resource *r,* represented by QSE *q,* during all instructed hours for the Operating Day *d.*  Where for a Combined Cycle Train, Resource *r* is the Combined Cycle Train. |
| GASPERSU *r, s* | none | *Percent of Natural Gas to Operate per Start*—The percentage of natural gas used by Resource *r* to operate per start *s*, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| OILPERSU *r, s* | none | *Percent of Oil to Operate per Start*—The percentage of fuel oil used by Resource *r* to operate per start *s*, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| SFPERSU *r, s* | none | *Percent of Solid Fuel to Operate per Start*—The percentage of solid fuel used by Resource *r* to operate per start *s*, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| GASPERME *r* | None | *Percent of Natural Gas to Operate at LSL*—The percentage of natural gas used by Resource *r* to operate at LSL, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| OILPERME *r* | None | *Percent of Oil to Operate at LSL*—The percentage of fuel oil used by Resource *r* to operate at LSL, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| SFPERME *r* | None | *Percent of Solid Fuel to Operate at LSL*—The percentage of solid fuel used by Resource *r* to operate at LSL, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| DAFCRS *r, s* | MMBtu/Start | *Day-Ahead Actual Fuel Consumption Rate per Start*—The actual fuel consumption rate for Resource *r* to startup per start type *s*, adjusted by VOXR as defined in the Verifiable Cost Manual. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. For additional information, see Verifiable Cost Manual Section 3.3, Startup Fuel Consumption. |
| VOMS *r, s* | $/Start | *Variable Operations and Maintenance Cost per Start*—The operations and maintenance cost for Resource *r* to startup, per start *s*, including an adjustment for emissions costs. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. For additional information, see Verifiable Cost Manual Section 3.2, Submitting Startup Costs. |
| VOMLSL *r* | $/MWh | *Variable Operations and Maintenance Cost at LSL*—The operations and maintenance cost for Resource *r* to operate at LSL, including an adjustment for emissions costs. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. For additional information, see Verifiable Cost Manual Section 4.2, Submitting Minimum Energy Costs. |
| LSL *q, r, i* | MW | *Low Sustained Limit*—The LSL of Generation Resource *r* represented by QSE *q* for the hour that includes the Settlement Interval *i*, as submitted in the COP. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| RTMG *q, r, i* | MWh | *Real-Time Metered Generation per QSE per Resource by Settlement Interval by hour*—The Real-Time energy from Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| AHR *r, i* | MMBtu / MWh | *Average Heat Rate per Resource*– The verifiable average heat rate for the Resource *r*, for the operating level, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| OM *r* | $/MWh | *Verifiable Operations and Maintenance Cost Above LSL*– The O&M cost for Resource *r* to operate above LSL. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. See the Verifiable Cost Manual for additional information. |
| SWIHR *q, r, d* | none | *Switchable Generation Instructed Hours*—The total number of Switchable Generation instructed hours, for Resource *r* represented by QSE *q,* for the Operating Day *d*. When one or more Combined Cycle Generation Resources are committed by ERCOT, the total number of instructed hours is calculated for the Combined Cycle Train for all switchable instructed Combined Cycle Generation Resources. |
| SFP | $/MMBtu | *Solid Fuel Price*—The solid fuel index price is $1.50. |
| GASPEROL *r* | none | *Percent of Natural Gas to Operate Above LSL*—The percentage of natural gas used by Resource *r* to operate above LSL, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| OILPEROL *r* | none | *Percent of Oil to Operate Above LSL*—The percentage of fuel oil used by Resource *r* to operate above LSL, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| SFPEROL *r* | none | *Percent of Solid Fuel to Operate Above LSL*—The percentage of solid fuel used by Resource *r* to operate above LSL, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| ADJSWSUC *q, r, d* | $ | *Adjustment to Switchable Generation* *Start-Up Cost* — Adjustment to Switchable Generation Start-up Cost for Resource *r* represented by QSE *q*, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. This adjustment may include eligible startup transition costs for a Combined Cycle Train or costs for any SWGR not captured in other billing determinants. |
| RCGSC s, *rc* | $/Start | *Resource Category Generic Startup Cost*—The Resource Category Generic Startup Cost cap for the category of the Resource *rc*, according to Section 4.4.9.2.3, Startup Offer and Minimum-Energy Offer Generic Caps, for the Operating Day. |
| RCGMEC *i, rc* | $/MWh | *Resource Category Generic Minimum-Energy Cost*—The Resource Category Generic Minimum Energy Cost cap for the category of the Resource *rc*, according to Section 4.4.9.2.3, for the Operating Day. |
| PAHR *r, i* | MMBtu / MWh | *Proxy Average Heat Rate-* The proxy average heat rate for the Resource *r* for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| STOM *rc* | $/MWh | *Standard Operations and Maintenance Cost -* The standard O&M cost for the Resource Category *rc* for operations above LSL, shall be set to the minimum energy variable O&M costs, as described in paragraph (6)(c) of Section 5.6.1, Verifiable Costs. |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. |
| FIP | $/MMBtu | *Fuel Index Price*—As defined in Section 2.1, Definitions. |
| FOP | $/MMBtu | *Fuel Oil Price*—As defined in Section 2.1. |
| FA *r* | $/MMBtu | *Fuel Adder* — The fuel adder is the average cost above the index price Resource *r* has paid to obtain fuel. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. See the Verifiable Cost Manual for additional information. |
| EMREAMT *q, r, p, i* | $ | *Emergency Energy Amount per QSE per Settlement Point per unit per interval*—The payment to QSE *q* for the additional energy produced by Generation Resource *r* at Resource Node *p* in Real-Time during the Emergency Condition, for the 15-minute Settlement Interval *i*. Payment for emergency energy is made to the Combined Cycle Train. |
| VSSVARAMT *q, r, i* | $ | *Voltage Support Service VAr Amount per QSE per Generation Resource -* The payment to QSE *q* for the VSS provided by Generation Resource *r,* for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Resource *r* is a Combined Cycle Train. |
| VSSEAMT *q, r, i* | $ | *Voltage Support Service Energy Amount per QSE per Generation Resource*—The lost opportunity payment to QSE *q* for ERCOT-directed VSS from Generation Resource *r* for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Resource *r* is a Combined Cycle Train. |
| RTOLHSLRA *q, r, p, i* | MWh | *Real-Time Adjusted On-Line High Sustained Limit for the Resource*⎯The Real-Time telemetered HSL for the Resource *r* represented by QSE *q* at Resource Node *p* that is available to SCED, integrated over the 15-minute Settlement Interval *i*, as described in Section 6.7.5, Real-Time Ancillary Service Imbalance Payment or Charge. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RTMGA *q, r, p, i* | MWh | *Real-Time Adjusted Metered Generation per QSE per Settlement Point per Resource*—The adjusted metered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p* in Real-Time for the 15-minute Settlement Interval *i*, as described in Section 6.7.5. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RTRSVPOR *i* | $/MWh | *Real-Time Reserve Price for On-Line Reserves*⎯The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval *i*, as described in Section 6.7.5. |
| RTRDP *i* | $/MWh | *Real-Time On-Line Reliability Deployment Price*⎯The Real-Time price for the 15-minute Settlement Interval *i*, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time On-Line Reliability Deployment Price Adder, as described in Section 6.7.5. |
| *q* | none | A QSE. |
| *r* | none | A Switchable Generation Resource. |
| *d* | none | An Operating Day containing the RUC instruction to the SWGR. |
| *i* | none | A 15-minute Settlement Interval within the hour of an Operating Day during which the SWGR is instructed by ERCOT. |
| *s* | none | An ERCOT area start that is eligible to have its costs included in the Switchable Generation Cost Guarantee. |
| *rc* | none | A Resource Category. |
| *p* | none | A Resource Node Settlement Point. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1010 and NPRR1014: Replace applicable portions of paragraph (1) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; or upon system implementation for NPRR1014:]  (1) To compensate QSEs representing SWGRs that switch to the ERCOT Control Area from a non-ERCOT Control Area pursuant to an ERCOT RUC instruction for an actual or anticipated EEA condition, ERCOT shall calculate a Switchable Generation Make-Whole Payment (SWMWAMT) for an Operating Day, allocated to each instructed Operating Hour as follows:  **SWMWAMT *q, r* = (-1) \* Max (0, (SWCG *q, r, d* – SWRTREV *q, r, d*)) / SWIHR *q, r, d***  Where:  SWCG *q, r, d* = SWSUC *q, r, d* + SWMEC *q, r, d* + SWOC *q, r, d* + SWAC *q, r, d* +  SWPSLR *q, r, d*  SWRTREV *q, r, d* = Max [0, (RTSPP*p, i* \* RTMG*q, r, i* + (-1) \* (EMREAMT *q, r, p, i*  + VSSVARAMT *q, r, i*+ VSSEAMT *q, r, i*) + RTRUREV *q, r, i* + RTRDREV *q, r, i  +* RTRRREV *q, r, i  +* RTNSREV *q, r, i  +* RTECRREV *q, r, i* )]  SWAC *q, r, d* = SWFC *q, r, d* + SWEIC *q, r, d* + SWASIC *q, r, d* + SWMWDC *q, r, d* + SWFIPC *q, r, d*  SWPSLR *q, r, d* = (RTSPP*p, i* \* RTLPX *q, r, i* ) – (FIP+FA) \* SFC *d*  If ERCOT has approved verifiable costs for the SWGR:  SWSUC *q, r, d* =  [SWSF \* (DAFCRS *r, s* \* (GASPERSU *r, s* \* FIP + OILPERSU *r, s* \* FOP + SFPERSU *r, s* \* SFP) + VOMS *r, s*)] + ADJSWSUC *q, r, d*  SWMEC *q, r, d* = ((AHR *r, i* \* (GASPERME *r* \* FIP + OILPERME *r* \* FOP + SFPERME *r*\* SFP + FA *r*) + VOMLSL *r*) \* Min (LSL *q, r, i* \* (¼), RTMG *q, r, i*))  SWOC *q, r, d* = [(AHR *r, i* \* ((GASPEROL *r* \* FIP + OILPEROL *r* \* FOP + SFPEROL *r* \* SFP) + FA *r*) + OM *r*) \* Max(0, (RTMG *q, r, i* – LSL *q, r, i* \* (¼)))] *-* OPC *r, d*  Where,  OPC *r, d* = ((PAHR *r, i* \* (FIP + FA) + OM *r*) \* AENG *r, i*)  If ERCOT has not approved verifiable costs for the SWGR:  SWSUC *q, r, d* =  (SWSF \* RCGSC *s, rc*) + ADJSWSUC *q, r, d*  SWMEC *q, r, d* = (RCGMEC *i, rc* \* Min (LSL *q, r, i* \* (¼), RTMG *q, r, i*))  SWOC *q, r, d* = ((PAHR *r, i* \* FIP + STOM *rc*) \* Max(0, (RTMG *q, r, i* – LSL *q, r, i* \* (¼)))) *-* OPC *r, d*  Where,  OPC *r, d* = ((PAHR *r, i* \* FIP + STOM *rc*) \* AENG *r, i*)  The above variables are defined as follows:   | **Variable** | **Unit** | **Definition** | | --- | --- | --- | | SWMWAMT *q, r* | $ | *Switchable Generation Make-Whole Payment*—The Switchable Generation Make-Whole Payment to the QSE *q,* for Resource *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | SWCG *q, r, d* | $ | *Switchable Generation Cost Guarantee*—The sum of eligible Startup Costs, minimum-energy costs, operating costs, and other Switchable Generation approved costs for Resource *r* represented by QSE *q* for all instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | OPC *r, d* | $ | *Operational Cost* – The operational cost for the Resource *r* for the Operating Day *d* in the non-ERCOT Control Area. The operating costs represent the costs the Resource would have incurred to generate the awarded energy in the non-ERCOT Control Area Day-Ahead market absent a request to switch to ERCOT. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | AENG *r, i* | MWh | *Awarded Energy Non-ERCOT Day-Ahead Market* – The awarded energy in the non-ERCOT Day-Ahead Market for the Resource *r* during the Interval *i*. The awarded energy in the non-ERCOT Control Area Day-Ahead market represents the energy award for the interval that was not generated by the Resource due to the switch to ERCOT. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | SWSUC *q ,r, d* | $ | *Switchable Generation* *Start-Up Cost* —The Startup Costs for Resource *r* represented by QSE *q* for startup hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | SWPSLR *q ,r, d* | $ | *Switchable Generation Physical Switch Lost Revenue –* The loss of revenue, net of any saved costs including avoided fuel consumption, experienced by the QSE when the Combined Cycle Generation Resource operating in ERCOT must reduce its output to accommodate a switch from a non-ERCOT Control Area of one or more turbines needed to achieve a Combined Cycle Generation Resource configuration instructed by ERCOT. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTLPX *q, r, i* | MWh | *Real-Time Proxy Generation per QSE per Resource by Settlement Interval*—The Real-Time energy that was not generated in ERCOT by Combined Cycle Train, *r*, represented by QSE *q*, for the 15-minute Settlement Interval *i*, due to a reduction in output that was necessary to facilitate a switch of another unit in the same Combined Cycle Train to the ERCOT System from a non-ERCOT Control Area, or to a non-ERCOT Control Area from the ERCOT System, when the switch is instructed by ERCOT.  During a shutdown to switch to ERCOT, the value of RTLPX will be determined based on the reduced generation, by interval, for the period starting from the commencement of the shutdown sequence in the non-ERCOT Control Area until breaker close in ERCOT. The reduction in generation shall be determined based on the last metered output value for the Combined Cycle Generation Resource operating in ERCOT immediately prior to the commencement of the shutdown sequence in the non-ERCOT Control Area as compared with the actual metered output during the relevant period, but only to the extent ERCOT determines the reduction in output was necessary to facilitate the switch.  During a shutdown after an ERCOT release of the SWGR, the value of RTLPX will be determined based on the reduced generation, by interval, for the period starting from the commencement of the shutdown sequence in the ERCOT Control Area until breaker close in the non-ERCOT Control Area, with a maximum duration equal to the duration of the switch from the non-ERCOT Control Area to ERCOT pursuant to the RUC instruction. This proxy value will apply only if the QSE shuts down the unit within 60 minutes after the ERCOT release. The reduction in generation shall be determined based on the last metered output value for the Combined Cycle Generation Resource operating in ERCOT immediately prior to the commencement of the shutdown sequence in ERCOT, as compared with the actual metered output during the relevant period, but only to the extent ERCOT determines the reduction in output was necessary to facilitate the switch. | | SFC *d* | MMBtu | *Saved Fuel Consumption* — Fuel quantity saved due to an output reduction of the combustion turbine(s) operating in ERCOT during the relevant period if necessary to accommodate the switch to and from the ERCOT area. | | SWSF | None | *Switchable Generation* *Startup Factor* —The Switchable Generation Startup Factor for an SWGR. The SWSF shall be set to a value of 2 if the SWGR has a COP Resource Status of EMRSWGR within 24 hours of being released by the ERCOT Operator. Otherwise, the SWSF shall be set to a value of 1. | | SWMEC *q, r, d* | $ | *Switchable Generation* *Minimum Energy Cost* —The minimum energy costs for Resource *r* represented by QSE *q* during instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | SWOC *q, r, d* | $ | *Switchable Generation* *Operating Cost* —The operating costs for Resource *r* represented by QSE *q* during instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. Switchable generation operating cost represents the Real-Time operating costs in ERCOT reduced by the savings in operating costs not incurred due to the switch from the non-ERCOT Control Area. | | SWAC *q, r, d* | $ | *Switchable Generation Approved Costs –* The total amount of the calculation of financial loss, as submitted by the QSE *q* for the Resource *r,* as approved by ERCOT for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | SWFC *q, r, d* | $ | *Switchable Generator* *Fuel Cost* —The incremental fuel costs and fees for Resource *r* represented by QSE *q* for all instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. Incremental fuel costs must be based on those costs incurred as described in Section 9.14.9, Incremental Fuel Costs for Switchable Generation Make-Whole Payment. | | SWFIPC *q, r, d* | $ | *Switchable Generator Fuel Imbalance Penalty Cost* —The fuel imbalance penalty cost for Resource *r* represented by QSE *q*, for the Operating Day, arising from the SWGR not consuming its contracted fuel quantities as a result of a switch from a non-ERCOT Control Area as requested by ERCOT. Fuel imbalance penalty costs are limited to those costs assessed for the period starting at the initiation of the ramp-down in the non-ERCOT Control Area to two hours following the time ERCOT released the SWGR. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | SWEIC *q, r, d* | $ | *Switchable Generator* *Energy Imbalance Cost* —The energy imbalance costs for Resource *r* represented by QSE *q* for instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. Energy imbalance costs represent Real-Time imbalance charges for the amount of energy the SWGR was not able to provide as required by its DAM commitment from the non-ERCOT Control Area, starting from the beginning of the ramp-down period in the other grid to two hours following the time ERCOT released the Resource. | | SWASIC *q, r, d* | $ | *Switchable Generator* *Ancillary Services Imbalance Cost* —The Ancillary Service imbalance costs for Resource *r* represented by QSE *q* for instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. Ancillary Service imbalance costs represent Real-Time imbalance charges for the amount of Ancillary Services the SWGR was not able to provide as required by its Day-Ahead commitment from the non-ERCOT Control Area, starting from the time of shutdown in the other grid to two hours following the time ERCOT released the Resource. | | SWMWDC *q, r, d* | $ | *Switchable Generator* *Make-Whole Payment Distribution Cost* —The Make-Whole Payment distribution costsfor Resource *r* represented by QSE *q* for instructed hours, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. Make-Whole Payment distribution costs represent charges from non-ERCOT Control Area from the time of shutdown in the other grid to two hours following the time ERCOT released the Resource. | | SWRTREV *q, r, d* | $ | *Switchable Generation Real-Time Revenues –* The sum of energy revenues for the Resource *r,* represented by QSE *q,* during all instructed hours for the Operating Day *d.*  Where for a Combined Cycle Train, Resource *r* is the Combined Cycle Train. | | GASPERSU *r, s* | none | *Percent of Natural Gas to Operate per Start*—The percentage of natural gas used by Resource *r* to operate per start *s*, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | OILPERSU *r, s* | none | *Percent of Oil to Operate per Start*—The percentage of fuel oil used by Resource *r* to operate per start *s*, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | SFPERSU *r, s* | none | *Percent of Solid Fuel to Operate per Start*—The percentage of solid fuel used by Resource *r* to operate per start *s*, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | GASPERME *r* | None | *Percent of Natural Gas to Operate at LSL*—The percentage of natural gas used by Resource *r* to operate at LSL, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | OILPERME *r* | None | *Percent of Oil to Operate at LSL*—The percentage of fuel oil used by Resource *r* to operate at LSL, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | SFPERME *r* | None | *Percent of Solid Fuel to Operate at LSL*—The percentage of solid fuel used by Resource *r* to operate at LSL, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | DAFCRS *r, s* | MMBtu/Start | *Day-Ahead Actual Fuel Consumption Rate per Start*—The actual fuel consumption rate for Resource *r* to startup per start type *s*, adjusted by VOXR as defined in the Verifiable Cost Manual. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. For additional information, see Verifiable Cost Manual Section 3.3, Startup Fuel Consumption. | | VOMS *r, s* | $/Start | *Variable Operations and Maintenance Cost per Start*—The operations and maintenance cost for Resource *r* to startup, per start *s*, including an adjustment for emissions costs. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. For additional information, see Verifiable Cost Manual Section 3.2, Submitting Startup Costs. | | VOMLSL *r* | $/MWh | *Variable Operations and Maintenance Cost at LSL*—The operations and maintenance cost for Resource *r* to operate at LSL, including an adjustment for emissions costs. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. For additional information, see Verifiable Cost Manual Section 4.2, Submitting Minimum Energy Costs. | | LSL *q, r, i* | MW | *Low Sustained Limit*—The LSL of Generation Resource *r* represented by QSE *q* for the hour that includes the Settlement Interval *i*, as submitted in the COP. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTMG *q, r, i* | MWh | *Real-Time Metered Generation per QSE per Resource by Settlement Interval by hour*—The Real-Time energy from Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | AHR *r, i* | MMBtu / MWh | *Average Heat Rate per Resource*– The verifiable average heat rate for the Resource *r*, for the operating level, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | OM *r* | $/MWh | *Verifiable Operations and Maintenance Cost Above LSL*– The O&M cost for Resource *r* to operate above LSL. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. See the Verifiable Cost Manual for additional information. | | SWIHR *q, r, d* | none | *Switchable Generation Instructed Hours*—The total number of Switchable Generation instructed hours, for Resource *r* represented by QSE *q,* for the Operating Day *d*. When one or more Combined Cycle Generation Resources are committed by ERCOT, the total number of instructed hours is calculated for the Combined Cycle Train for all switchable instructed Combined Cycle Generation Resources. | | SFP | $/MMBtu | Solid Fuel Price—The solid fuel index price is $1.50. | | GASPEROL *r* | none | *Percent of Natural Gas to Operate Above LSL*—The percentage of natural gas used by Resource *r* to operate above LSL, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | OILPEROL *r* | none | *Percent of Oil to Operate Above LSL*—The percentage of fuel oil used by Resource *r* to operate above LSL, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | SFPEROL *r* | none | *Percent of Solid Fuel to Operate Above LSL*—The percentage of solid fuel used by Resource *r* to operate above LSL, as approved in the verifiable cost process. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | ADJSWSUC *q, r, d* | $ | *Adjustment to Switchable Generation* *Start-Up Cost* — Adjustment to Switchable Generation Start-up Cost for Resource *r* represented by QSE *q*, for the Operating Day *d*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. This adjustment may include eligible startup transition costs for a Combined Cycle Train or costs for any SWGR not captured in other billing determinants. | | RCGSC s, *rc* | $/Start | *Resource Category Generic Startup Cost*—The Resource Category Generic Startup Cost cap for the category of the Resource *rc*, according to Section 4.4.9.2.3, Startup Offer and Minimum-Energy Offer Generic Caps, for the Operating Day. | | RCGMEC *i, rc* | $/MWh | *Resource Category Generic Minimum-Energy Cost*—The Resource Category Generic Minimum Energy Cost cap for the category of the Resource *rc*, according to Section 4.4.9.2.3, for the Operating Day. | | PAHR *r, i* | MMBtu / MWh | *Proxy Average Heat Rate-* The proxy average heat rate for the Resource *r* for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | STOM *rc* | $/MWh | *Standard Operations and Maintenance Cost -* The standard O&M cost for the Resource Category *rc* for operations above LSL, shall be set to the minimum energy variable O&M costs, as described in paragraph (6)(c) of Section 5.6.1, Verifiable Costs. | | RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. | | FIP | $/MMBtu | *Fuel Index Price*—As defined in Section 2.1, Definitions. | | FOP | $/MMBtu | *Fuel Oil Price*—As defined in Section 2.1. | | FA *r* | $/MMBtu | *Fuel Adder* — The fuel adder is the average cost above the index price Resource *r* has paid to obtain fuel. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. See the Verifiable Cost Manual for additional information. | | EMREAMT *q, r, p, i* | $ | *Emergency Energy Amount per QSE per Settlement Point per unit per interval*—The payment to QSE *q* for the additional energy or Ancillary Services produced or consumed by Resource *r* at Resource Node *p* in Real-Time during the Emergency Condition, for the 15-minute Settlement Interval *i*. Payment for emergency energy is made to the Combined Cycle Train. | | VSSVARAMT *q, r, i* | $ | *Voltage Support Service VAr Amount per QSE per Generation Resource -* The payment to QSE *q* for the VSS provided by Generation Resource *r,* for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Resource *r* is a Combined Cycle Train. | | VSSEAMT *q, r, i* | $ | *Voltage Support Service Energy Amount per QSE per Generation Resource*—The lost opportunity payment to QSE *q* for ERCOT-directed VSS from Generation Resource *r* for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Resource *r* is a Combined Cycle Train. | | RTRUREV *q, r* | $ | *Real-Time Reg-Up Revenue*— The Real-Time Reg-Up revenue for QSE *q* calculated forResource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRDREV *q, r* | $ | *Real-Time Reg-Down Revenue*— The Real-Time Reg-Down revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRRREV *q, r* | $ | *Real-Time Responsive Reserve Revenue*— The Real-Time RRS revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTNSREV *q, r* | $ | *Real-Time Non-Spin Revenue*— The Real-Time Non-Spin revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTECRREV *q, r* | $ | *Real-Time ERCOT Contingency Reserve Service Revenue*— The Real-Time ECRS revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | *q* | none | A QSE. | | *r* | none | A Switchable Generation Resource. | | *d* | none | An Operating Day containing the RUC instruction to the SWGR. | | *i* | none | A 15-minute Settlement Interval within the hour of an Operating Day during which the SWGR is instructed by ERCOT. | | *s* | none | An ERCOT area start that is eligible to have its costs included in the Switchable Generation Cost Guarantee. | | *rc* | none | A Resource Category. | | *p* | none | A Resource Node Settlement Point. | |

(2) The total compensation to each QSE for the Switchable Generation Make-Whole Payment for a given hour in the Operating Day is calculated as follows:

**SWMWAMTQSETOT *q* =  SWMWAMT *q, r***

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| SWMWAMTQSETOT ***q*** | $ | *Switchable Generation Make-Whole Payment per QSE*—The total Switchable Generation Make-Whole Payment to the QSE *q*, for the hour. |
| SWMWAMT *q, r* | $ | *Switchable Generation Make-Whole Payment*—The Switchable Generation Make-Whole Payment to the QSE *q,* for Resource *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | A Switchable Generation Resource. |

6.6.12.2 Switchable Generation Make-Whole Charge

(1) The total cost for Switchable Generation Make-Whole Payments associated with SWGRs that switch to the ERCOT Control Area from a non-ERCOT Control Area pursuant to an ERCOT RUC instruction for an actual or anticipated EEA condition is allocated to QSEs representing Load based on HLRS. The Switchable Generation Make-Whole Charge for a given hour is calculated as follows:

**LASWMWAMT *q* = (-1) \* SWMWAMTTOT \* HLRS *q***

Where:

SWMWAMTTOT = SWMWAMTQSETOT*q*



The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| LASWMWAMT *q* | $ | *Load Allocated Switchable Generation Make-Whole Charge Amount–* The allocated charge to QSE *q* for Switchable Generation Make-Whole Payments. |
| SWMWAMTTOT | $ | *Switchable Generation Make-Whole Payment Total—*The total Switchable Generation Make-Whole Payments to all QSEs for the hour. |
| SWMWAMTQSETOT ***q*** | $ | *Switchable Generation Make-Whole Payment per QSE* —The total Switchable Generation Make-Whole Payment to the QSE *q* for the hour. |
| HLRS *q* | none | *The Hourly Load Ratio Share calculated for QSE q for the hour*. See Section 6.6.2.4, QSE Load Ratio Share for an Operating Hour. |
| *q* | none | A QSE. |

6.6.12.3 Miscellaneous Invoice for Switchable Generation Make-Whole Payments and Charges

(1) All approved disputes shall be settled as described in Section 9.14.2, Notice of Dispute.

(2) ERCOT shall issue a miscellaneous Invoice to a QSE for Switchable Generation Make-Whole Payments as described in Section 6.6.12.1, Switchable Generation Make-Whole Payment.

(3) ERCOT shall issue a miscellaneous Invoice to the QSE representing Load based on the HLRS as described in Section 6.6.12.2, Switchable Generation Make-Whole Charge.

(4) ERCOT shall issue a Market Notice in conjunction with the issuance of the miscellaneous Invoice.

6.6.13 Wholesale Storage Load Reconciliation for ESRs Operating in a Private Microgrid Island

(1) A QSE representing an ESR operating in a Private Microgrid Island (PMI) configuration shall, within 96 hours of the end of such operations, submit a Settlement and billing dispute notifying ERCOT of the date and time that PMI operation began and ended.  The QSE shall also notify the interconnecting Transmission and/or Distribution Service Provider(s) (TDSP(s)) of the time and date the PMI configuration began and ended within 96 hours of the end of such operations. Following the submission of such a dispute, ERCOT shall use the outflow quantities recorded by the ERCOT-Polled Settlement (EPS) Meter measuring the ESR’s gross output net of any internal telemetered auxiliary Load, combined with any telemetered integrated auxiliary Load to determine the amount of Load served by the Resource during the period of PMI operation. ERCOT shall then determine the minimum whole number of Operating Days including and successively preceding the beginning of PMI operation for which the cumulative amount of WSL consumed on those Operating Days would equal or exceed the amount of Load served by the Resource during the period of PMI operation. ERCOT shall grant the dispute and recharacterize all WSL previously settled on each such Operating Day as non-WSL. The adjustment to Settlements based on the recharacterization of WSL will be included in the RTM Final Settlement and/or RTM True-Up Settlement for each Operating Day.

6.6.14 Firm Fuel Supply Service Capability

6.6.14.1 Firm Fuel Supply Service Fuel Replacement Costs Recovery

(1) If ERCOT approves a Firm Fuel Supply Service Resource (FFSSR) to switch to consume the reserved fuel and directs or approves a restocking pursuant to paragraph (5) of Section 3.14.5, Firm Fuel Supply Service, ERCOT shall pay the QSE representing the FFSSR for the replacement of burned fuel, if the QSE has:

(a) Complied with the Firm Fuel Supply Service (FFSS) instruction to switch to the reserved fuel;

(b) Submitted a Settlement and billing dispute consistent with the dispute process described in Section 9.14, Settlement and Billing Dispute Process;

(c) Submitted the following within 90 days of the issuance of a RTM Initial Statement for the Operating Day on which the FFSS instruction was issued:

(i) An attestation signed by an officer or executive with authority to bind the QSE stating that the information contained in the dispute is accurate;

(ii) For each deployment of FFSS, the quantity of total fuel consumed for the hours in each instance when FFSS was deployed;

(iii) For thermal units, the input-output equation or other documentation that allows for verification of fuel consumption for the hours when FFSS was deployed;

(iv) The heat content of the fuel, in terms of MMBtu/gal or similar units of measurement;

(v) The dollar amount and quantity of fuel purchased to replace the consumed fuel;

(vi) Sufficient documentation to support the QSE’s determination of the amount and cost of replaced fuel; and

(vii) Any other technical documentation within the possession of the QSE or Resource Entity which ERCOT finds reasonably necessary to verify paragraphs (i) through (vi) above. Any additional request from ERCOT for documentation or clarification of previously submitted documentation must be honored within 15 Business Days.

(2) In addition to the requirements under paragraph (1)(c) above, for a Generation Resource that was awarded FFSS using reserved fuel based on a Firm Gas Storage Agreement and is requesting compensation for the cost of the replaced fuel, the QSE or Resource Entity representing the FFSSR must show proof that it purchased and nominated fuel in sufficient quantities (in MMBtu) that was consumed during the FFSS deployment and that its actual receipts and deliveries of such replacement fuel conformed with its nominated quantities.

(3) The Firm Fuel Supply Service Fuel Replacement Cost shall only represent the replacement fuel costs not recovered during the FFSS deployment period through Day-Ahead energy sales and Real-Time energy imbalance settlement revenues related to the Resource with the FFSS award. In addition, the Firm Fuel Supply Service Fuel Replacement Cost shall only include commodity and variable transportation costs directly attributable to the replenishment of fuel for the FFSSR.

(4) ERCOT shall allocate any approved fuel replacement costs to the hours of the corresponding FFSS deployment period when the fuel was consumed following ERCOT’s approval to switch to utilize the awarded FFSS.

6.6.14.2 Firm Fuel Supply Service Hourly Standby Fee Payment and Fuel Replacement Cost Recovery

(1) ERCOT shall pay the FFSS Hourly Standby Fee to the QSE representing the primary Generation Resource. This standby fee is determined through a competitive bidding process, with an adjustment for reliability based on an Hourly Rolling Equivalent Availability Factor, as well as adjustments for capacity and deployment.

|  |
| --- |
| [NPRR1154: Replace paragraph (1) above with the following upon system implementation:]  (1) ERCOT shall pay the FFSS Hourly Standby Fee to the QSE representing the primary Generation Resource. This standby fee is determined through a competitive bidding process, with an adjustment for reliability based on an Hourly Rolling Equivalent Availability Factor, as well as adjustments for capacity and deployment. |

(2) The FFSSR will be considered available when calculating the FFSS Hourly Rolling Equivalent Availability Factor:

(a) During each non-FFSS deployment hour for which the FFSSR shows available in its Availability Plan;

(b) During any successful FFSS deployment of the FFSSR in which the FFSSR shows available in its Availability Plan; and

(c) If the reserved fuel was exhausted during an FFSS deployment, during the period when reserved fuel for FFSS is being restocked following an instruction or approval from ERCOT to do so.

(d) Additionally, in the event the FFSSR has consumed all the fuel reserved to provide FFSS and ERCOT does not issue an instruction or approval to restore FFSS capability, the FFSSR shall be considered to be available for Settlement purposes for the remainder of the FFSS obligation period in progress.

|  |
| --- |
| [NPRR1154: Replace paragraph (2) above with the following upon system implementation:]  (2) The FFSSR will be considered available when calculating the FFSS Hourly Rolling Equivalent Availability Factor:  (a) During each non-FFSS deployment hour for which the FFSSR shows available in its Availability Plan;  (b) During any successful FFSS deployment of the FFSSR in which the FFSSR shows available in its Availability Plan; and  (c) If the reserved fuel was exhausted during an FFSS deployment, during the period when reserved fuel for FFSS is being restocked following an instruction or approval from ERCOT to do so.  (d) Additionally, in the event the FFSSR has consumed all the fuel reserved to provide FFSS and ERCOT does not issue an instruction or approval to restore FFSS capability, the FFSSR shall be considered to be available for Settlement purposes for the remainder of the FFSS obligation period in progress. |

(3) The FFSS Hourly Standby Fee is subject to reduction and claw-back provisions as described in Section 8.1.1.2.1.6, Firm Fuel Supply Service Resource Qualification, Testing, Decertification, and Recertification.

(4) ERCOT shall pay an FFSS payment to each QSE for each FFSSR. The FFSS payment for each hour of November 15 through March 15, i.e., during the FFSS obligation period, is calculated as follows:

FFSSAMT *q, r* = (-1) \* (FFSSSBF *q, r +* FFSSFRC *q, r*)

Where:

FFSSSBF *q, r* = FFSSPR *q, r* \* FFSSCRF *q, r* \* FFSSARF *q, r* \* (1 - FFSSDRP)

And:

FFSS Capacity Reduction Factor

If (FFSSTCAP *q, r* ≥ FFSSACAP *q, r*)

Then: FFSSCRF *q, r* = 1

Otherwise: FFSSCRF *q, r* = Max (0, 1 – 2 \* (FFSSACAP *q, r* – FFSSTCAP *q, r*) **/**

FFSSACAP *q, r*)

FFSS Availability Reduction Factor

If (FFSSHREAF *q, r* ≥ 0.90)

Then: FFSSARF *q, r* = 1

Otherwise: FFSSARF *q, r* = Max (0, 1 - (0.90 - FFSSHREAF *q, r*) \* 2)

FFSS Hourly Rolling Equivalent Availability Factor

If the FFSSR is a Combined Cycle Resource:

Then: FFSSHREAF *q, train* = [max *train, hr* (max(FFSEDFLAG *q, train, hr*,

FFSSAFLAG *q, ccgr, hr*)\* (min(HSL *q, ccgr, hr*, FFSSACAP *q,*

*train*)))] / FFSSACAP *q, train*)

Otherwise:

FFSSHREAF *q, r* = max(FFSEDFLAG *q, r, hr*, FFSSAFLAG *q, r, hr*)\* (min(HSL *q, r, hr*, FFSSACAP *q, r*))) / FFSSACAP *q, r*)

Availability for a Combined Cycle Train will be determined pursuant to terms set forth in the Request for Proposal (RFP) but no more than once per hour.

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| FFSSAMT *q, r* | $ | *Firm Fuel Supply Service Amount per QSE per Resource by hour*—The payment to QSE *q* for the FFSS assigned to the primary Generation Resource *r*, for the hour, calculated each hour of November 15 through March 15 during the awarded FFSS obligation period. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| FFSSPR *q, r* | $ per hour | *Firm Fuel Supply Service Price per QSE per Resource*—The standby price of the primary Generation Resource *r* represented by QSE *q*, as specified in the FFSS award. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| FFSSCRF *q, r* | none | *Firm Fuel Supply Service Capacity Reduction Factor per QSE per Resource by hour*—The capacity reduction factor assigned to the primary Generation Resource *r*, represented by QSE *q*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| HSL *q, r, hi* | MW | *High Sustained Limit*—The HSL of the primary Generation Resource or the alternate Generation Resource *r* represented by QSE *q* as submitted in the COP, for the hour *h*. Where for a combined cycle Resource *r* is a Combined Cycle Generation Resource. |
| FFSSFRC *q, r* | $ per hour | *Firm Fuel Supply Service Fuel Replacement Cost*—The fuel costs and fees to replace the burned fuel by the FFSSR, not recovered during the FFSS deployment period, paid to the primary Generation Resource *r* represented by QSE *q* for each FFSS instructed hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| FFSSDRP *q, r, h* | none | *Firm Fuel Supply Service Deployment Reduction Percentage*—The percentage of the Firm Fuel Supply Service Standby Fee subject to clawback per paragraphs (9) through (16) of Section 8.1.1.2.1.6 for the QSE *q*, assigned to the primary Generation Resource *r*, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| FFSSSBF *q, r* | $ | *Firm Fuel Supply Service Standby Fee per QSE per Resource by hour*—The standby fee to QSE *q* assigned to the primary Generation Resource *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| FFSSTCAP *q, r* | MW | *Firm Fuel Supply Service Testing Capacity per QSE per Resource*—The tested capacity of the primary Generation Resource *r*, represented by QSE *q*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| FFSSACAP *q, r* | MW | *Firm Fuel Supply Service Awarded Capacity per QSE per Resource*—The awarded FFSS capacity of the primary Generation Resource *r*, represented by QSE *q* as specified in the FFSS award, applicable to each hour of November 15 through March 15 during the awarded FFSS obligation period. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| FFSSARF *q, r* | none | *Firm Fuel Supply Service Availability Reduction Factor per QSE per Resource by hour*—The availability reduction factor assigned to the primary Generation Resource *r* represented by QSE *q* for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| FFSSHREAF *q, r* | none | *Firm Fuel Supply Service Hourly Rolling Equivalent Availability Factor per QSE per Resource by hour*—The equivalent availability factor assigned to the primary Generation Resource *r* represented by QSE *q* over 1,452 hours, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| FFSSAFLAG *q, r, hr* | none | *Firm Fuel Supply Service Availability Flag per QSE per Resource by hour*—The flag of the availability assigned to the primary Generation Resource or the alternate Generation Resource *r* represented by QSE *q*, 1 for available and 0 for unavailable, for the hour. The availability flag shall be determined based on FFSSR availability for the current operating hour and the previous 1,451 hours of November 15 through March 15 during the awarded FFSS obligation period. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| FFSEDFLAG *q, r, hr* | none | *Firm Fuel Supply Event Deployment Flag per QSE per Resource by hour*—The flag of successful FFSS deployment assigned to the primary Generation Resource *r* for the approved hours to restock reserved fuel for providing FFSS following the instruction or approval from ERCOT, or in the event the FFSSR has consumed all the fuel reserved to provide FFSS and ERCOT does not issue an instruction or approval to restock reserved fuel, represented by QSE *q*, 1 for available and 0 for unavailable, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | A primary or alternate Generation Resource approved by ERCOT to provide FFSS. |
| *hr* | none | The index of a given hour and the previous 1,451 hours counted only during each hour of November 15 through March 15 during the awarded FFSS obligation period. |
| *h* | none | The Operating Hour. |
| *train* | none | A Combined Cycle Train. |
| *ccgr* | none | A Combined Cycle Generation Resource within the Combined Cycle Train. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1154: Replace paragraph (4) above with the following upon system implementation:]  (4) ERCOT shall pay an FFSS payment to each QSE for each FFSSR. The FFSS payment for each hour of November 15, through March 15, i.e., during the FFSS obligation period, is calculated as follows:  FFSSAMT *q, r, h* = (-1) \* (FFSSSBF *q, r, h +* FFSSFRC *q, r, h*)  Where:  FFSSSBF *q, r, h* = FFSSAWARD *q, r, h* \* FFSSCRF *q, r, h* \* FFSSARF *q, r, h* \* (1 - FFSSDRP *q, r, h*)  FFSSAWARD *q, r, h* = FFSSPR *q, r, h* \* FFSSACAP *q, r, h*  And:  FFSS Capacity Reduction Factor  If (FFSSTCAP *q, r, h* ≥ FFSSACAP *q, r, h*)  Then: FFSSCRF *q, r, h* = 1  Otherwise: FFSSCRF *q, r, h* = Max (0, 1 – 2 \* (FFSSACAP *q, r, h* – FFSSTCAP *q, r, h*) **/**  FFSSACAP *q, r, h*)  FFSS Availability Reduction Factor  If (FFSSHREAF *q, r, h* ≥ 0.90)  Then: FFSSARF *q, r, h* = 1  Otherwise: FFSSARF *q, r, h* = Max (0, 1 - (0.90 - FFSSHREAF *q, r, h*) \* 2)  FFSS Hourly Rolling Equivalent Availability Factor  FFSSHREAF *q, r, h* = max(AVCAP *q, r, hr*)) / FFSSACAP *q, r, hr*)  Where,  If the Resource is a Combined Cycle Train:  AVCAP*q, r, hr*  = max*train,hr* (max(FFSEDFLAG *q, train, hr*, FFSSAFLAG *q, ccgr, hr*)\* min(HSL *q, ccgr, hr*, FFSSACAP*q, train, hr*))  Otherwise:  AVCAP *q, r, hr* = max(FFSEDFLAG *q, r, hr*, FFSSAFLAG *q, r, hr*)\* min(HSL *q, r, hr*, FFSSACAP *q, r, hr*)  Availability for a Combined Cycle Train will be determined pursuant to terms set forth in the RFP but no more than once per hour.  The above variables are defined as follows:   | Variable | Unit | Definition | | --- | --- | --- | | FFSSAMT *q, r, h* | $ | *Firm Fuel Supply Service Amount per QSE per Resource by hour*—The payment to QSE *q* assigned to the FFSS for the primary Generation Resource *r*, for the hour, calculated each hour of November 15 through March 15 during the awarded FFSS obligation period. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | FFSSAWARD *q, r, h* | $ | *Firm Fuel Supply Service Award Amount per QSE by hour—*The payment to the QSE *q* for the FFSS awarded to the primary Generation Resource *r* for each hour *h*, during the awarded FFSS obligation period. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | FFSSPR *q, r, h* | $/MW per hour | *Firm Fuel Supply Service Price per QSE per Resource by hour*—The standby price of the primary Generation Resource *r* represented by QSE *q*, as specified in the FFSS award. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | FFSSCRF *q, r, h* | none | *Firm Fuel Supply Service Capacity Reduction Factor per QSE per Resource by hour*—The capacity reduction factor assigned to the primary Generation Resource *r*, represented by QSE *q*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | HSL *q, r, hr* | MW | *High Sustained Limit*—The HSL of the primary Generation Resource or the alternate Generation Resource *r* represented by QSE *q* as submitted in the COP, for the hour *h*. Where for a combined cycle Resource *r* is a Combined Cycle Generation Resource. | | FFSSFRC *q, r, h* | $ per hour | *Firm Fuel Supply Service Fuel Replacement Cost*—The fuel costs and fees to replace the burned fuel by the FFSSR, not recovered during the FFSS deployment period, paid to the primary Generation Resource *r* represented by QSE *q* for each FFSS instructed hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | FFSSDRP *q, r, h* | none | *Firm Fuel Supply Service Deployment Reduction Percentage*—The percentage of the Firm Fuel Supply Service Standby Fee subject to clawback per paragraphs (9) through (16) of Section 8.1.1.2.1.6, Firm Fuel Supply Service Resource Qualification, Testing, Decertification, and Recertificationfor the QSE *q*, assigned to the primary Generation Resource *r*, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | FFSSSBF *q, r, h* | $ | *Firm Fuel Supply Service Standby Fee per QSE per Resource by hour*—The standby fee to QSE *q* for the FFSS assigned to the primary Generation Resource *r*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | FFSSTCAP *q, r, h* | MW | *Firm Fuel Supply Service Testing Capacity per QSE per Resource*—The tested capacity of the primary Generation Resource *r*, represented by QSE *q*, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | FFSSACAP *q, r, hr* | MW | *Firm Fuel Supply Service Awarded Capacity per QSE per Resource*—The awarded FFSS capacity of the primary Generation Resource *r*, represented by QSE *q* as specified in the FFSS award, applicable to each hour of November 15 through March 15 during the awarded FFSS obligation period. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | FFSSARF *q, r, h* | none | *Firm Fuel Supply Service Availability Reduction Factor per QSE per Resource by hour*—The availability reduction factor assigned to the primary Generation Resource *r* represented by QSE *q* for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | FFSSHREAF *q, r, h* | none | *Firm Fuel Supply Service Hourly Rolling Equivalent Availability Factor per QSE per Resource by hour*—The equivalent availability factor assigned to the primary Generation Resource *r* represented by QSE *q* over 1,452 hours, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | FFSSAFLAG *q, r, hr* | none | *Firm Fuel Supply Service Availability Flag per QSE per Resource by hour*—The flag of the availability assigned to the primary Generation Resource or the alternate Generation Resource *r* represented by QSE *q*, 1 for available and 0 for unavailable, for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | FFSEDFLAG *q, r, hr* | none | *Firm Fuel Supply Event Deployment Flag per QSE per Resource by hour*—The flag of successful FFSS deployment assigned to the primary Generation Resource *r* for the approved hours to restock reserved fuel for providing FFSS following the instruction or approval from ERCOT, or in the event the FFSSR has consumed all the fuel reserved to provide FFSS and ERCOT does not issue an instruction or approval to restock reserved fuel, represented by QSE *q*, 1 for successful and 0 for unsuccessful, for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | AVCAP *q, r, hr* | MW | *Available Capacity per Resource by hour*—The available capacity assigned to the primary Generation Resource *r* represented by QSE *q* as calculated for the hour. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | *q* | none | A QSE. | | *r* | none | A primary or alternate Generation Resource approved by ERCOT to provide FFSS. | | *hr* | none | The index of a given hour and the previous 1,451 hours counted only during each hour of November 15 through March 15 during the awarded FFSS obligation period. | | *h* | none | The Operating Hour. | | *train* | none | A Combined Cycle Train or an alternate Combined Cycle Train approved by ERCOT. | | *ccgr* | none | A Combined Cycle Generation Resource within the Combined Cycle Train. | |

(5) The total of the payments to each QSE for all FFSSRs represented by this QSE for a given hour is calculated as follows:

FFSSAMTQSETOT *q* = FFSSAMT *q, r*

The above variables are defined as follows:

| Variable | Unit | Definition |
| --- | --- | --- |
| FFSSAMTQSETOT *q* | $ | *Firm Fuel Supply Service Amount QSE Total per QSE*⎯The total of the payments to QSE *q* for FFSS provided by all the FFSS Resources represented by this QSE for the hour. |
| FFSSAMT *q, r* | $ | *Firm Fuel Supply Service Amount per QSE per Resource*—The payment to QSE *q* for the FFSS assigned to the primary Generation Resource *r*, for the hour, calculated each hour of November 15 through March 15 during the awarded FFSS obligation period. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | A primary or alternate Generation Resource approved by ERCOT to provide FFSS. |

6.6.14.3 Firm Fuel Supply Service Capacity Charge

(1) ERCOT shall allocate the total FFSS capacity and fuel replacement payment to the QSEs representing Loads based on an hourly LRS. The resulting charge to each QSE for a given hour is calculated as follows:

LAFFSSAMT *q* = (-1) \* FFSSAMTTOT \* HLRS *q*

Where:

FFSSAMTTOT = FFSSAMTQSETOT *q*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Definition |
| LAFFSSAMT *q* | $ | *Load-Allocated Firm Fuel Supply Service Amount per QSE*—The charge allocated to QSE *q* for the FFSS, for the hour. |
| FFSSAMTQSETOT *q* | $ | *Firm Fuel Supply Service Amount QSE Total per QSE*⎯The total of the payments to QSE *q* for FFSS provided by all the FFSSRs represented by this QSE for the hour. |
| FFSSAMTTOT | $ | *Firm Fuel Supply Service Amount QSE Total ERCOT-Wide—*The total of the payments to all QSEs for FFSS for the hour. |
| HLRS *q* | none | The hourly LRS calculated for QSE *q* for the hour. See Section 6.6.2.4, QSE Load Ratio Share for an Operating Hour. |
| *q* | none | A QSE. |

6.7 Real-Time Settlement Calculations for the Ancillary Services

6.7.1 Payments for Ancillary Service Capacity Sold in a Supplemental Ancillary Services Market (SASM) or Reconfiguration Supplemental Ancillary Services Market (RSASM)

(1) If a Supplemental Ancillary Services Market (SASM) or a Reconfiguration Supplemental Ancillary Services Market (RSASM) is executed for one or more Operating Hours for any reason, ERCOT shall pay Qualified Scheduling Entities (QSEs) for their Ancillary Service Offers cleared in the SASM or RSASM, based on the Market Clearing Price for Capacity (MCPC) for that SASM or RSASM and that service. By service and by SASM or RSASM, the payment to each QSE for a given Operating Hour is calculated as follows:

(a) For Regulation Up Service (Reg-Up), if applicable:

RTPCRUAMT *q, m* = (-1) \* MCPCRU *m* \* RTPCRU *q, m*

Where:

RTPCRU *q,**m* = PCRUR *q, r, m*

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| RTPCRUAMT *q, m* | $ | *Procured Capacity for Reg-Up Amount by QSE by market*—The payment to QSE *q* for the Ancillary Service Offers cleared in the market *m* to provide Reg-Up, for the hour. |
| MCPCRU *m* | $/MW per hour | *Market Clearing Price for Capacity for Reg-Up by market—*The MCPC for Reg-Up from the market *m*, for the hour. |
| RTPCRU *q, m* | MW | *Procured Capacity for Reg-Up by QSE by market—*The portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* to provide Reg-Up, for the hour. |
| PCRUR *q, r, m* | MW | *Procured Capacity for Reg-Up from Resource per Resource per QSE by market*—The Reg-Up capacity quantity awarded to QSE *q* in the market *m* for Resource *r* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| *m* | none | An Ancillary Service market (SASM or RSASM). |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource. |

(b) For Regulation Down Service (Reg-Down), if applicable:

RTPCRDAMT *q, m* = (-1) \* MCPCRD *m* \* RTPCRD *q, m*

Where:

RTPCRD *q,**m* = PCRDR *r, q, m*

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| RTPCRDAMT *q, m* | $ | *Procured Capacity for Reg-Down Amount by QSE by market*—The payment to QSE *q* for the Ancillary Service Offers cleared in the market *m* to provide Reg-Down, for the hour. |
| MCPCRD *m* | $/MW per hour | *Market Clearing Price for Capacity for Reg-Down by market—*The MCPC for Reg-Down from the market *m*, for the hour. |
| RTPCRD *q, m* | MW | *Procured Capacity for Reg-Down by QSE by market—*The portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* to provide Reg-Down, for the hour. |
| PCRDR *r, q, m* | MW | *Procured Capacity for Reg-Down from Resource per Resource per QSE by market*—The Reg-Down capacity quantity awarded to QSE *q* in the market *m* for Resource *r* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| *m* | none | An Ancillary Service market (SASM or RSASM). |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource. |

(c) For Responsive Reserve (RRS), if applicable:

RTPCRRAMT *q, m* = (-1) \* MCPCRR *m* \* RTPCRR *q, m*

Where:

RTPCRR *q,**m* = PCRRR *q, r, m*

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| RTPCRRAMT *q, m* | $ | *Procured Capacity for Responsive Reserve Amount by QSE by market*—The payment to QSE *q* for the Ancillary Service Offer cleared in the market *m* to provide RRS, for the hour. |
| MCPCRR *m* | $/MW per hour | *Market Clearing Price for Capacity for Responsive Reserve by market—*The MCPC for RRS from the market *m*, for the hour. |
| RTPCRR *q, m* | MW | *Procured Capacity for Responsive Reserve by QSE by market—*The portion of QSE *q* Ancillary Service Offers cleared in the market *m* to provide RRS, for the hour. |
| PCRRR *q,r, m* | MW | *Procured Capacity for Responsive Reserve from Resource per Resource per QSE by market*—The RRS capacity quantity awarded to QSE *q* in the market *m* for Resource *r* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| *m* | none | An Ancillary Service market (SASM or RSASM). |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource. |

(d) For Non-Spinning Reserve (Non-Spin), if applicable:

RTPCNSAMT *q, m* = (-1) \* MCPCNS *m* \* RTPCNS *q, m*

Where:

RTPCNS *q,**m* = PCNSR *q, r, m*

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| RTPCNSAMT *q, m* | $ | *Procured Capacity for Non-Spin Amount by QSE by market*—The payment to QSE *q* for Ancillary Service Offer cleared in the market *m* to provide Non-Spin, for the hour. |
| MCPCNS *m* | $/MW per hour | *Market Clearing Price for Capacity for Non-Spin by market—*The MCPC for Non-Spin from the market *m*, for the hour. |
| RTPCNS *q, m* | MW | *Procured Capacity for Non-Spin by QSE by market—*The portion of QSE *q*’s Ancillary Service Offer cleared in the market *m* to provide Non-Spin, for the hour. |
| PCNSR *q,r, m* | MW | *Procured Capacity for Non-Spin from Resource per Resource per QSE by market*—The Non-Spin capacity quantity awarded to QSE *q* in the market *m* for Resource *r* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| *m* | none | An Ancillary Service market (SASM or RSASM). |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource. |

(e) For ERCOT Contingency Reserve Service (ECRS), if applicable:

**RTPCECRAMT *q, m* = (-1) \* MCPCECR *m* \* RTPCECR *q, m***

Where:

RTPCECR *q,**m* = PCECRR *q, r, m*

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| RTPCECRAMT *q, m* | $ | *Procured Capacity for ERCOT Contingency Reserve Service Amount by QSE by market*—The payment to QSE *q* for the Ancillary Service Offer cleared in the market *m* to provide ECRS, for the hour. |
| MCPCECR *m* | $/MW per hour | *Market Clearing Price for Capacity for ERCOT Contingency Reserve Service by market—*The MCPC for ECRS from the market *m*, for the hour. |
| RTPCECR *q, m* | MW | *Procured Capacity for ERCOT Contingency Reserve Service by QSE by market—*The portion of QSE *q* Ancillary Service Offers cleared in the market *m* to provide ECRS, for the hour. |
| PCECRR *q, r, m* | MW | *Procured Capacity for ERCOT Contingency Reserve Service from Resource per Resource per QSE by market*—The ECRS capacity quantity awarded to QSE *q* in the market *m* for Resource *r* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| *m* | none | An Ancillary Service market (SASM or RSASM). |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource. |

|  |
| --- |
| [NPRR1010: Delete Section 6.7.1 above upon system implementation of the Real-Time Co-Optimization (RTC) project.] |

***6.7.2 Payments for Ancillary Service Capacity Assigned in Real-Time Operations***

(1) Resources that have received an Ancillary Service Assignment during a Watch as set forth in paragraph (4) of Section 6.5.9.3.3, Watch, may receive a payment for the un-deployed quantity of Ancillary Service reserves associated with each hour of the Ancillary Service Assignment if the Resource’s dispatch is limited by the Ancillary Service Assignment. ERCOT will provide a Verbal Dispatch Instruction (VDI) to every QSE with an On-Line Resource with an Ancillary Service Assignment. The QSE must file a Settlement dispute to be considered for the Real-Time assigned Ancillary Services payment amount. The payment to each QSE and Resource for the 15-minute Settlement Interval in which the Resource received an Ancillary Service Assignment will be made when the Resource is dispatched to its High Ancillary Service Limit (HASL) in at least one Security-Constrained Economic Dispatch (SCED) interval in the 15-minute Settlement Interval. The payment shall be calculated as follows.

(a) For Reg-Up, if applicable:

**RTAURUAMTQSETOT *q =*   RTAURUAMT *q r, p, i***

Where:

RTAURUAMT *q, r, p, i* = (-1) \* 1/4 \* RTAURUR *q, r, p* \* (RTSPP *p, i* - RTRSVPOR - RTRDP)

RTRSVPOR = (RNWF *y* \* RTORPA *y*)

RTRDP = (RNWF *y* \* RTORDPA *y*)

RNWF *y*=TLMP *y* / TLMP *y*

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| RTAURUAMTQSETOT *q* | $ | *Real-Time Assigned Un-Deployed Regulation Up Payment Amount per QSE*⎯The payment to QSE *q* for a Real-Time un-deployed Reg-Up Ancillary Service Assignment. |
| RTAURUAMT *q*, *r, p, i* | $ | *Real-Time Assigned Un-Deployed Regulation Up Payment Amount per Resource per QSE*⎯The payment to QSE *q* for a Real-Time un-deployed Reg-Up Ancillary Service Assignment to Resource *r* at the Settlement Point *p* for the 15-minute Settlement Interval *i*. |
| RTAURUR *q, r, p* | MW | *Real-Time Assigned Un-Deployed Regulation Up Quantity per Resource per QSE*⎯The quantity of un-deployedReg-Up assigned under a Watch to a QSE *q* for Resource *r* at Settlement Point *p* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*⎯The Real-Time Settlement Point Price at the Settlement Point *p* for the 15-minute Settlement Interval *i*. |
| RTRSVPOR | $/MWh | *Real-Time Reserve Price for On-Line Reserves*⎯The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval. |
| RTRDP | $/MWh | *Real-Time On-Line Reliability Deployment Price*⎯The Real-Time price for the 15-minute Settlement Interval, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time On-Line Reliability Deployment Price Adder. |
| TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the SCED interval *y*. |
| RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Resource Node Settlement Point Price calculation for the portion of the SCED interval *y* within the 15-minute Settlement Interval. |
| RTORPA*y* | $/MWh | *Real-Time On-Line Reserve Price Adder per interval*⎯The Real-Time On-Line Reserve Price Adder for the SCED interval *y*. |
| RTORDPA*y* | $/MWh | *Real-Time On-Line Reliability Deployment Price Adder*⎯The Real-Time Price Adder that captures the impact of reliability deployments on energy prices for the SCED interval *y*. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resourcethat was allocated Reg-Up Ancillary Service Assignment by the QSE. |
| *p* | none | A Settlement Point for the Resource Node that was allocated Reg-Up Ancillary Service Assignment by the QSE. |
| *i* | none | A 15-minute Settlement Interval in the Operating Hour. |
| *y* | none | A SCED interval in the 15-minute Settlement Interval. |

(b) For RRS, if applicable:

**RTAURRAMTQSETOT *q =*   RTAURRAMT *q r, p, i***

Where:

RTAURRAMT *q, r, p, i* = (-1) \* 1/4 \* RTAURRR *q, r, p* \* (RTSPP *p, i* – RTRSVPOR)

RTRSVPOR = (RNWF *y* \* RTORPA *y*)

RNWF *y* = TLMP *y* / TLMP *y*

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| RTAURRAMTQSETOT *q* | $ | *Real-Time Assigned Un-Deployed Responsive Reserve Payment Amount per QSE*⎯The payment to QSE *q* for a Real-Time un-deployed RRS Ancillary Service Assignment. |
| RTAURRAMT *q, r, p, i* | $ | *Real-Time Assigned Un-Deployed Responsive Reserve Payment Amount per Resource per QSE*⎯The payment to QSE *q* for a Real-Time un-deployed RRS Ancillary Service Assignment to Resource *r* at the Settlement Point *p* for the 15-minute Settlement Interval *i*. |
| RTAURRR *q, r, p* | MW | *Real-Time Assigned Un-Deployed Responsive Reserve Quantity per Resource per QSE*⎯The quantity of un-deployed RRS assigned under a Watch to a QSE *q* for Resource *r* at the Settlement Point *p* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*⎯The Real-Time Settlement Point Price at the Settlement Point *p* for the 15-minute Settlement Interval *i*. |
| RTRSVPOR | $/MWh | *Real-Time Reserve Price for On-Line Reserves*⎯The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval. |
| TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the SCED interval *y*. |
| RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Resource Node Settlement Point Price calculation for the portion of the SCED interval *y* within the 15-minute Settlement Interval. |
| RTORPA*y* | $/MWh | *Real-Time On-Line Reserve Price Adder per interval*⎯The Real-Time On-Line Reserve Price Adder for the SCED interval *y*. |
| RTORDPA*y* | $/MWh | *Real-Time On-Line Reliability Deployment Price Adder*⎯The Real-Time Price Adder that captures the impact of reliability deployments on energy prices for the SCED interval *y*. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resourcethat was allocated RRS Ancillary Service Assignment by the QSE. |
| *p* | none | A Settlement Point for the Resource Node that was allocated RRS Ancillary Service Assignment by the QSE. |
| *i* | none | A 15-minute Settlement Interval in the Operating Hour. |
| *y* | none | A SCED interval in the 15-minute Settlement Interval. |

(c) For ECRS, if applicable:

**RTAUECRAMTQSETOT *q =*   RTAUECRAMT *q r, p, i***

Where:

RTAUECRAMT *q r, p, i* = (-1) \* 1/4 \* RTAUECRR *q, r, p* \* (RTSPP *p, i* – RTRSVPOR **-** RTRDP)

RTRSVPOR = (RNWF *y* \* RTORPA *y*)

RTRDP = (RNWF *y* \* RTORDPA *y*)

RNWF *y* = TLMP *y* / TLMP *y*

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| RTAUECRAMTQSETOT *q* | $ | *Real-Time Assigned Un-Deployed ERCOT Contingency Reserve Service Payment Amount per QSE*⎯The payment to QSE *q* for a Real-Time un-deployed ECRS Ancillary Service Assignment. |
| RTAUECRAMT *q, r, p,**i* | $ | *Real-Time Assigned Un-Deployed ERCOT Contingency Reserve Service Payment Amount per Resource per QSE*⎯The payment to QSE *q* for a Real-Time un-deployed ECRS Ancillary Service Assignment to Resource *r* at the Settlement Point *p* for the 15-minute Settlement Interval *i*. |
| RTAUECRR *q, r, p* | MW | *Real-Time Assigned Un-Deployed ERCOT Contingency Reserve Service Quantity per Resource per QSE*⎯The quantity of un-deployed ECRS assigned under a Watch to a QSE *q* for Resource *r* at the Settlement Point *p* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*⎯The Real-Time Settlement Point Price at the Settlement Point *p* for the 15-minute Settlement Interval *i*. |
| RTRSVPOR | $/MWh | *Real-Time Reserve Price for On-Line Reserves*⎯The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval. |
| RTRDP | $/MWh | *Real-Time On-Line Reliability Deployment Price*⎯The Real-Time price for the 15-minute Settlement Interval, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time On-Line Reliability Deployment Price Adder. |
| TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the SCED interval *y*. |
| RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Resource Node Settlement Point Price calculation for the portion of the SCED interval *y* within the 15-minute Settlement Interval. |
| RTORPA*y* | $/MWh | *Real-Time On-Line Reserve Price Adder per interval*⎯The Real-Time On-Line Reserve Price Adder for the SCED interval *y*. |
| RTORDPA*y* | $/MWh | *Real-Time On-Line Reliability Deployment Price Adder*⎯The Real-Time Price Adder that captures the impact of reliability deployments on energy prices for the SCED interval *y*. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resourcethat was allocated ECRS Ancillary Service Assignment by the QSE. |
| *p* | none | A Settlement Point for the Resource Node that was allocated ECRS Ancillary Service Assignment by the QSE. |
| *i* | none | A 15-minute Settlement Interval in the Operating Hour. |
| *y* | none | A SCED interval in the 15-minute Settlement Interval. |

|  |
| --- |
| [NPRR1010: Delete Section 6.7.2 above upon system implementation of the Real-Time Co-Optimization (RTC) project.] |

**6.7.2.1 Charges for Infeasible Ancillary Service Capacity Due to Transmission Constraints**

(1) A charge to each QSE with Ancillary Service Supply Responsibility that is deemed infeasible by ERCOT as a result of a transmission constraints, whether or not a SASM is executed, is calculated as follows:

(a) For Reg-Up, if applicable:

**RUINFQAMT *q* = MCPCRU *DAM* \* RUINFQ *q***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| RUINFQAMT *q* | $ | *Reg-Up Infeasible Quantity Amount per QSE*— The charge to QSE *q* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for Reg-Up, for the hour. |
| MCPCRU *DAM* | $/MW per hour | *Market Clearing Price for Capacity for Reg-Up in DAM*—The DAM MCPC for Reg-Up, for the hour. |
| RUINFQ *q* | MW | *Reg-Up Infeasible Quantity per QSE —*QSE *q*’s total capacity associated with infeasibleAncillary Service Supply Responsibilities for Reg-Up, for the hour. |
| *q* | none | A QSE. |

(b) For Reg-Down, if applicable:

**RDINFQAMT *q* = MCPCRD *DAM* \* RDINFQ *q***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| RDINFQAMT *q* | $ | *Reg-Down Infeasible Quantity Amount per QSE*— The charge to QSE *q* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for Reg-Down, for the hour. |
| MCPCRD *DAM* | $/MW per hour | *Market Clearing Price for Capacity for Reg-Down in DAM*—The DAM MCPC for Reg-Down, for the hour. |
| RDINFQ *q* | MW | *Reg-Down Infeasible Quantity per QSE —*QSE *q*’s total capacity associated with infeasibleAncillary Service Supply Responsibilities for Reg-Down, for the hour. |
| *q* | none | A QSE. |

(c) For RRS, if applicable:

**RRINFQAMT *q* = MCPCRR *DAM* \* RRINFQ *q***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| RRINFQAMT *q* | $ | *Responsive Reserve Infeasible Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for RRS, for the hour. |
| MCPCRR *DAM* | $/MW per hour | *Market Clearing Price for Capacity for Responsive Reserve in DAM*—The DAM MCPC for RRS, for the hour. |
| RRINFQ *q* | MW | *Responsive Reserve Infeasible Quantity per QSE —*QSE *q*’s total capacity associated with infeasibleAncillary Service Supply Responsibilitiesfor RRS, for the hour. |
| *q* | none | A QSE. |

(d) For Non-Spin, if applicable:

**NSINFQAMT *q* = MCPCNS *DAM* \* NSINFQ *q***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| NSINFQAMT *q* | $ | *Non-Spin Infeasible Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for Non-Spin, for the hour. |
| MCPCNS *DAM* | $/MW per hour | *Market Clearing Price for Capacity for Non-Spin in DAM*—The DAM MCPC for Non-Spin, for the hour. |
| NSINFQ *q* | MW | *Non-Spin Infeasible Quantity per QSE—*QSE *q*’s total capacity associated with infeasible Ancillary Service Supply Responsibilities for Non-Spin, for the hour. |
| *q* | none | A QSE. |

(e) For ECRS, if applicable:

**ECRINFQAMT *q* = MCPCECR *DAM* \* ECRINFQ *q***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| ECRINFQAMT *q* | $ | *ERCOT Contingency Reserve Service Infeasible Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for ECRS, for the hour. |
| MCPCECR *DAM* | $/MW per hour | *Market Clearing Price for Capacity for ERCOT Contingency Reserve Service in DAM*—The DAM MCPC for ECRS, for the hour. |
| ECRINFQ *q* | MW | *ERCOT Contingency Reserve Service Infeasible Quantity per QSE —*QSE *q*’s total capacity associated with infeasibleAncillary Service Supply Responsibilitiesfor ECRS, for the hour. |
| *q* | none | A QSE. |

|  |
| --- |
| [NPRR1010: Delete Section 6.7.2.1 above upon system implementation of the Real-Time Co-Optimization (RTC) project.] |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR841 and NPRR863: Insert applicable portions of Section 6.7.2.2 below upon system implementation:]  **6.7.2.2 Real-Time Adjustments to Day-Ahead Make Whole Payments due to Ancillary Services Infeasibility Charges**  (1) ERCOT shall pay the QSE for which ERCOT calculates a charge for infeasible Ancillary Service capacity due to transmission constraints a Real-Time Day-Ahead Make-Whole Payment for an eligible Resource for each Operating Hour in a DAM commitment period.  (2) The guaranteed cost, energy revenue, and Ancillary Service revenue calculated for each Combined Cycle Generation Resource are each summed for the Combined Cycle Train, and the Real-Time Day-Ahead Make-Whole Amount is calculated for the Combined Cycle Train.  RTDAMWAMT *q, r, p, h* = (-1)\*Max(0,DAMGCOST *q, r, p* + DAEREV *q, r, p, h* + INFQAR *q, r, p, h* + DAASREV *q, r, h* + DAMWAMT *q, r, p, h*) \* ASINFQR *q, r, p, h* / ASINFQR *q, r, p, h*  Where:  INFQAR *q, r, p, h =*RUINFQAR *q, r, p, h* + RDINFQAR *q, r, p, h* + RRINFQAR *q, r, p, h* + NSINFQAR *q, r, p, h* + ECRINFQAR *q, r, p, h*  And,  RUINFQAR *q, r, p, h =* MCPCRU*DAM* \* RUINFQR *q, r, p, h*  RDINFQAR *q, r, p, h =* MCPCRD*DAM* \* RDINFQR *q, r, p, h*  RRINFQAR *q, r, p, h =* MCPCRR*DAM* \* RRINFQR *q, r, p, h*  NSINFQAR *q, r, p, h =* MCPCNS*DAM* \* NSINFQR *q, r, p, h*  ECRINFQAR *q, r, p, h =* MCPCECR*DAM* \* ECRINFQR *q, r, p, h*  ASINFQR *q, r, p, h =*RUINFQR *q, r, p, h* + RDINFQR *q, r, p, h* + RRINFQR *q, r, p, h* +  NSINFQR *q, r, p, h* + ECRINFQR *q, r, p, h*  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | **Variable** | **Unit** | **Description** | | RTDAMWAMT *q, r, p, h* | $ | *Real-Time Day-Ahead Make-Whole Payment Amount per QSE per Resource per Settlement Point per hour* ⎯The Real-Time calculated payment to QSE *q* to make-whole the Startup Cost and energy costs of Resource *r* committed in the DAM at Resource Node *p* for the hour *h*. When a Combined Cycle Generation Resource is committed in the DAM, payment is made to the Combined Cycle Train for the DAM-committed Combined Cycle Generation Resource. | | DAMGCOST *q, r, p* | $ | *Day-Ahead Market Guaranteed Amount per QSE per Resource per Settlement Point* ⎯The sum of the Startup Cost and the operating energy costs of the DAM-committed Resource *r* at Resource Node *p* represented by QSE *q*, for the DAM-commitment period. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | DAEREV *q, r, p, h* | $ | *Day-Ahead Energy Revenue per QSE per Resource per Settlement Point per hour* ⎯The revenue received in the DAM for Resource *r* at Resource Node *p* represented by QSE *q*, based on the DAM Settlement Point Price, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | INFQAR *q, r, p, h* | $ | *Infeasible Quantity Amount per QSE per Resource per Settlement Point per hour* —The dollar amount to QSE *q* for Resource *r* of its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibility, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | DAMWAMT *q, r, p, h* | $ | *Day-Ahead Make-Whole Payment per QSE per Resource per Settlement Point per hour* ⎯The payment to QSE *q* to make-whole the Startup Cost and energy cost of Resource *r* committed in the DAM at Resource Node *p* for the hour *h*. When a Combined Cycle Generation Resource is committed in the DAM, payment is made to the Combined Cycle Train for the DAM-committed Combined Cycle Generation Resource. | | DAASREV *q, r, h* | $ | *Day-Ahead Ancillary Service Revenue per QSE per Resource by hour*⎯The revenue received in the DAM for Resource *r* represented by QSE *q*, based on the MCPC for each Ancillary Service in the DAM, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RUINFQAR *q, r, p, h* | $ | *Reg-Up Infeasible Quantity Amount per QSE per Resource per Settlement Point per hour* — The dollar amount to QSE *q,* for Resource *r,* for its capacity associated with infeasible deployment of Ancillary Service Supply Responsibility for Reg-Up, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | MCPCRU *DAM* | $/MW per hour | *Market Clearing Price for Capacity for Reg-Up in DAM*—The DAM MCPC for Reg-Up for the hour. | | RDINFQAR *q, r, p, h* | $ | *Reg-Down Infeasible Quantity Amount per QSE per Resource per Settlement Point per hour* — The dollar amount to QSE *q,* for Resource *r,* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibility for Reg-Down, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | MCPCRD *DAM* | $/MW per hour | *Market Clearing Price for Capacity for Reg-Down in DAM*—The DAM MCPC for Reg-Down for the hour. | | RRINFQAR *q, r, p, h* | $ | *Responsive Reserve Infeasible Quantity Amount per QSE per Resource per Settlement Point per hour* — The dollar amount to QSE *q,* for Resource *r,* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibility for RRS, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | MCPCRR *DAM* | $/MW per hour | *Market Clearing Price for Capacity for Responsive Reserve in DAM*—The DAM MCPC for RRS for the hour. | | NSINFQAR *q, r, p, h* | $ | *Non-Spin Infeasible Quantity Amount per QSE per Resource per Settlement Point per hour* — The dollar amount to QSE *q,* for Resource *r,* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibility for Non-Spin, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | MCPCNS *DAM* | $/MW per hour | *Market Clearing Price for Capacity for Non-Spin Service in DAM*—The DAM MCPC for Non-Spin for the hour. | | ECRINFQAR *q, r, p, h* | $ | *ERCOT Contingency Reserve Service Infeasible Quantity Amount per QSE per Resource per Settlement Point per hour* — The dollar amount to QSE *q,* for Resource *r,* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibility for ECRS, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | MCPCECR *DAM* | $/MW per hour | *Market Clearing Price for Capacity for ERCOT Contingency Reserve Service in DAM*—The DAM MCPC for ECRS for the hour. | | ASINFQR *q, r, p, h* | MW | *Ancillary Service Infeasible Quantity per QSE per Resource per Settlement Point per hour —* The Resource *r* total capacity associated with infeasibleAncillary Service Supply Responsibility, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RUINFQR *q, r, p, h* | MW | *Reg-Up Infeasible Quantity per QSE per Resource per Settlement Point per hour —*The Resource *r* totalcapacity associated with infeasibleAncillary Service Supply Responsibility for Reg-Up, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RDINFQR *q, r, p, h* | MW | *Reg-Down Infeasible Quantity per QSE per Resource per Settlement Point per hour —* The Resource *r* total capacity associated with infeasibleAncillary Service Supply Responsibility for Reg-Down, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RRINFQR *q, r, p, h* | MW | *Responsive Reserve Infeasible Quantity per QSE per Resource per Settlement Point per hour —* The Resource *r* total capacity associated with infeasibleAncillary Service Supply Responsibility for RRS, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | NSINFQR *q, r, p, h* | MW | *Non-Spin Infeasible Quantity per QSE per Resource per Settlement Point per hour —* The Resource *r* total capacity associated with infeasible Ancillary Service Supply Responsibility for Non-Spin, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | ECRINFQR *q, r, p, h* | MW | *ERCOT Contingency Reserve Service Infeasible Quantity per QSE per Resource per Settlement Point per hour —* The Resource *r* total capacity associated with infeasibleAncillary Service Supply Responsibility for ECRS, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | *h* | none | An hour in the DAM-commitment period. | | *q* | none | A QSE. | | *r* | none | A DAM-committed Generation Resource. | | *p* | none | A Resource Node Settlement Point. |   (3) The total Real-Time Day-Ahead Make-Whole Payments to each QSE for Generation Resources for a given hour is calculated as follows:  RTDAMWAMTQSETOT *q, h* =  RTDAMWAMT *q, r, p, h*  And,  RTDAMWAMTTOT *h* =  RTDAMWAMTQSETOT *q, h*  The above variables are defined as follows:   | Variable | Unit | Definition | | --- | --- | --- | | RTDAMWAMTQSETOT *q, h* | $ | *Real-Time Day-Ahead Make-Whole Payment Amount per QSE per hour*⎯The Real-Time calculated payment to QSE *q* to make-whole the Startup Cost and energy costs of all Resources *r* committed in the DAM at Resource Node *p* for the hour *h*. | | RTDAMWAMT *q, r, p, h* | $ | *Real-Time Day-Ahead Make-Whole Payment Amount per QSE per Resource per Settlement Point per hour* ⎯The Real-Time calculated payment to QSE *q* to make-whole the Startup and energy costs of Resource *r* committed in the DAM at Resource Node *p* for the hour *h*. For a Combined Cycle Generation Resource is committed in the DAM, payment is made to the Combined Cycle Train for the DAM-committed Combined Cycle Generation Resource. | | RTDAMWAMTTOT *h* | $ | *Real-Time Day-Ahead Make-Whole Payment Amount per hour*⎯The Real-Time calculated payment to all QSEs to make-whole the Startup and energy costs of all Resources *r* committed for the hour *h*. | | *h* | none | An hour in the DAM-commitment period. | | *q* | none | A QSE. | | *r* | none | A DAM-committed Generation Resource. | | *p* | none | A Resource Node Settlement Point. |   (4) For each QSE for which ERCOT calculates a Real-Time DAM Make-Whole payment an adjustment for each Ancillary Service is computed as follows:  RUMWINFA *q ,h* = RTDAMWAMT *q, r, p, h* \* RUINFQR *q , r, p, h* / ASINFQR *q, r, p, h*  RDMWINFA *q, h* = RTDAMWAMT *q, r, p, h* \* RDINFQR *q, r, p, h* / ASINFQR*q, r, p, h*  RRMWINFA *q, h* = RTDAMWAMT *q, r, p, h* \* RRINFQR*q, r, p, h* / ASINFQR*q, r, p, h*  NSMWINFA *q, h* = RTDAMWAMT *q , r, p, h* \* NSINFQR *q, r, p, h* / ASINFQR*q, r, p, h*  ECRMWINFA *q, h* = RTDAMWAMT *q, r, p, h* \* ECRINFQR*q, r, p, h* / ASINFQR*q, r, p, h*  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | **Variable** | **Unit** | **Description** | | RUMWINFA *q, h* | $ | *Regulation Up Make-Whole Infeasible Amount per QSE per hour*⎯ The total Real-Time calculated payment to QSE *q,* for its contribution of Regulation Up Ancillary Service, to make-whole the Startup and energy costs of all Resources committed in the DAM for the hour *h*. | | RDMWINFA *q, h* | $ | *Regulation Down Make-Whole Amount per QSE per hour* ⎯ The total Real-Time calculated payment to QSE *q,* for its contribution of Reg-Down, to make-whole the Startup and energy costs of all Resources committed in the DAM for the hour *h*. | | RRMWINFA *q, h* | $ | *Responsive Reserve Make-Whole Infeasible Amount per QSE per hour* ⎯ The total Real-Time calculated payment to QSE *q,* for its contribution of RRS, to make-whole the Startup and energy costs of all Resources committed in the DAM for the hour *h*. | | NSMWINFA *q, h* | $ | *Non-Spin Make-Whole Infeasible Amount per QSE per hour* ⎯ The total Real-Time calculated payment to QSE *q,* for its contribution of Non-Spin, to make-whole the Startup and energy costs of all Resources committed in the DAM for the hour *h*. | | ECRMWINFA *q, h* | $ | *ERCOT Contingency Reserve Service Make-Whole Infeasible Amount per QSE per hour* ⎯ The total Real-Time calculated payment to QSE *q,* for its contribution of ECRS, to make-whole the Startup and energy costs of all Resources committed in the DAM for the hour *h*. | | RTDAMWAMT *q, r, p, h* | $ | *Real-Time Day-Ahead Make-Whole Payment Amount per QSE per Resource per Settlement Point per hour* ⎯The Real-Time calculated payment to QSE *q* to make-whole the Startup Cost and energy costs of Resource *r* committed in the DAM at Resource Node *p* for the hour *h*. When a Combined Cycle Generation Resource is committed in the DAM, payment is made to the Combined Cycle Train for the DAM-committed Combined Cycle Generation Resource. | | RUINFQR *q, r, p, h* | MW | *Reg-Up Infeasible Quantity per QSE per Resource per Settlement Point per hour —*The Resource *r total* capacity associated with infeasibleAncillary Service Supply Responsibility for Reg-Up, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RDINFQR *q, r, p, h* | MW | *Reg-Down Infeasible Quantity per QSE per Resource per Settlement Point per hour —* The Resource *r* total capacity associated with infeasibleAncillary Service Supply Responsibility for Reg-Down, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RRINFQR *q, r, p, h* | MW | *Responsive Reserve Infeasible Quantity per QSE per Resource per Settlement Point per hour —* The Resource *r* total capacity associated with infeasibleAncillary Service Supply Responsibility for RRS, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | NSINFQR *q, r, p, h* | MW | *Non-Spin Infeasible Quantity per QSE per Resource per Settlement Point per hour —* The Resource *r* total capacity associated with infeasible Ancillary Service Supply Responsibility for Non-Spin, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | ECRINFQR *q, r, p, h* | MW | *ERCOT Contingency Reserve Service Infeasible Quantity per QSE per Resource per Settlement Point per hour —* The Resource *r* total capacity associated with infeasibleAncillary Service Supply Responsibility for ECRS, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | ASINFQR *q, r, p, h* | MW | *Ancillary Service Infeasible Quantity per QSE per Resource per Settlement Point per hour —* The Resource *r* total capacity associated with infeasibleAncillary Service Supply Responsibility, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | *h* | none | An hour in the DAM-commitment period. | | *q* | none | A QSE. | | *r* | none | A DAM-committed Generation Resource. | | *p* | none | A Resource Node Settlement Point. | |

|  |
| --- |
| [NPRR1010: Delete Section 6.7.2.2 above upon system implementation of the Real-Time Co-Optimization (RTC) project.] |

6.7.3 Charges for Ancillary Service Capacity Replaced Due to Failure to Provide

(1) A charge to each QSE that fails on its Ancillary Service Supply Responsibility, whether or not a SASM is executed due to its failure to supply, is calculated based on the greatest of the MCPC in the Day-Ahead Market (DAM) or any SASM for the same Operating Hour. Included in the failed quantity is the charge to each QSE that reduces its Ancillary Service Supply Responsibility by an RSASM, which is calculated based on the cleared MCPC associated with the RSASM. By service, the charge to each QSE for a given Operating Hour is calculated as follows:

(a) The total charge of failure on Ancillary Service Supply Responsibility for Reg-Up by QSE, if applicable:

**RUFQAMTQSETOT *q* = RUFQAMT *q +* RRUFQAMT *q***

Where:

RUFQAMT *q* = ((MCPCRU *m*) \* RUFQ *q*)

RRUFQAMT *q* = MCPCRU *rs* \* RRUFQ *q,* *rs*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| RUFQAMTQSETOT *q* | $ | *Reg-Up Failure Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Up, for the hour. |
| RRUFQAMT *q* | $ | *Reconfiguration Reg-Up Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Up, for the hour. |
| RUFQAMT *q* | $ | *Reg-Up Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with failures on its Ancillary Service Supply Responsibility for Reg-Up, for the hour. |
| MCPCRU *m* | $/MW per hour | *Market Clearing Price for Capacity for Reg-Up by market—*The MCPC for Reg-Up in the market *m*, for the hour. |
| MCPCRU *rs* | $/MW per hour | *Market Clearing Price for Capacity for Reg-Up by RSASM—*The MCPC for Reg-Up in the RSASM *rs*, for the hour. |
| RUFQ *q* | MW | *Reg-Up Failure Quantity per QSE—*QSE *q* total capacity associated with failures on its Ancillary Service Supply Responsibility for Reg-Up, for the hour. |
| RRUFQ *q, rs* | MW | *Reconfiguration Reg-Up Failure Quantity per QSE—*QSE *q* total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Up, for the hour. |
| *rs* | none | The RSASM for the given Operating Hour. |
| *m* | none | The DAM, SASM, or RSASM for the given Operating Hour. |
| *q* | none | A QSE. |

(b) The total charge of failure on Ancillary Service Supply Responsibility for Reg-Down by QSE, if applicable:

**RDFQAMTQSETOT *q* = RDFQAMT *q +* RRDFQAMT *q***

Where:

RDFQAMT *q* = ((MCPCRD *m*) \* RDFQ *q*)

RRDFQAMT *q* = MCPCRD *rs* \* RRDFQ *q,* *rs*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| RDFQAMTQSETOT *q* | $ | *Reg-Down Failure Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Down, for the hour. |
| RRDFQAMT *q* | $ | *Reconfiguration Reg-Down Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Down, for the hour. |
| RDFQAMT *q* | $ | *Reg-Down Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with failures on its Ancillary Service Supply Responsibility for Reg-Down, for the hour. |
| MCPCRD *m* | $/MW per hour | *Market Clearing Price for Capacity for Reg-Down by market—*The MCPC for Reg-Down in the market *m*, for the hour. |
| MCPCRD *rs* | $/MW per hour | *Market Clearing Price for Capacity for Reg-Down by RSASM—*The MCPC for Reg-Down in the RSASM *rs*, for the hour. |
| RDFQ *q* | MW | *Reg-Down Failure Quantity per QSE*—QSE *q*’s total capacity associated with failures on its Ancillary Service Supply Responsibility for Reg-Down, for the hour. |
| RRDFQ *q, rs* | MW | *Reconfiguration Reg-Down Failure Quantity per QSE*—QSE *q*’s total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Down, for the hour. |
| *rs* | none | The RSASM for the given Operating Hour. |
| *m* | none | The DAM, SASM, or RSASM for the given Operating Hour. |
| *q* | none | A QSE. |

(c) The total charge of failure on Ancillary Service Supply Responsibility for RRS by QSE, if applicable:

**RRFQAMTQSETOT *q* = RRFQAMT *q +* RRRFQAMT *q***

Where:

RRFQAMT *q* = ((MCPCRR *m*) \* RRFQ *q*)

RRRFQAMT *q* = MCPCRR *rs* \* RRRFQ *q,* *rs*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| RRFQAMTQSETOT *q* | $ | *Responsive Reserve Failure Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for RRS, for the hour. |
| RRRFQAMT *q* | $ | *Reconfiguration Responsive Reserve Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for RRS, for the hour. |
| RRFQAMT *q* | $ | *Responsive Reserve Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with failures on its Ancillary Service Supply Responsibility for RRS, for the hour. |
| MCPCRR *m* | $/MW per hour | *Market Clearing Price for Capacity for Responsive Reserve per market—*The MCPC for RRS in the market *m*, for the hour. |
| MCPCRR *rs* | $/MW per hour | *Market Clearing Price for Capacity for Responsive Reserve per RSASM—*The MCPC for RRS in the RSASM *rs*, for the hour. |
| RRFQ *q* | MW | *Responsive Reserve Failure Quantity per QSE -* QSE *q*’s total capacity associated with failures on its Ancillary Service Supply Responsibility for RRS, for the hour. |
| RRRFQ *q, rs* | MW | *Reconfiguration Responsive Reserve Failure Quantity per QSE—*QSE *q*’s total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for RRS, for the hour. |
| *rs* | none | The RSASM for the given Operating Hour. |
| *m* | none | The DAM, SASM, or RSASM for the given Operating Hour. |
| *q* | none | A QSE. |

(d) The total charge of failure on Ancillary Service Supply Responsibility for Non-Spin by QSE, if applicable:

**NSFQAMTQSETOT *q* = NSFQAMT *q +* RNSFQAMT *q***

Where:

NSFQAMT *q* = ((MCPCNS *m*) \* NSFQ *q*)

RNSFQAMT *q* = MCPCNS *rs* \* RNSFQ *q,* *rs*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| NSFQAMTQSETOT *q* | $ | *Non-Spin Failure Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for Non-Spin, for the hour. |
| RNSFQAMT *q* | $ | *Reconfiguration Non-Spin Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Non-Spin, for the hour. |
| NSFQAMT *q* | $ | *Non-Spin Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with failures on its Ancillary Service Supply Responsibility for Non-Spin, for the hour. |
| MCPCNS *m* | $/MW per hour | *Market Clearing Price for Capacity for Non-Spin by market—*The MCPC for Non-Spin in the market *m*, for the hour. |
| MCPCNS *rs* | $/MW per hour | *Market Clearing Price for Capacity for Non-Spin by RSASM—*The MCPC for Non-Spin in the RSASM *rs*, for the hour. |
| NSFQ *q* | MW | *Non-Spin Failure Quantity per QSE—*QSE *q*’s total capacity associated with failures on its Ancillary Service Supply Responsibility for Non-Spin, for the hour. |
| RNSFQ *q, rs* | MW | *Reconfiguration Non-Spin Failure Quantity per QSE—*QSE *q*’s total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Non-Spin, for the hour. |
| *rs* | None | The RSASM for the given Operating Hour. |
| *m* | None | The DAM, SASM, or RSASM for the given Operating Hour. |
| *q* | None | A QSE. |

(e) The total charge of failure on Ancillary Service Supply Responsibility for ECRS by QSE, if applicable:

**ECRFQAMTQSETOT *q* = ECRFQAMT *q +*RECRFQAMT *q***

Where:

ECRFQAMT *q* = ((MCPCECR *m*) \* ECRFQ *q*)

RECRFQAMT *q* = MCPCECR *rs* \* RECRFQ *q,* *rs*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| ECRFQAMTQSETOT *q* | $ | *ERCOT Contingency Reserve Service Failure Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for ECRS, for the hour. |
| RECRFQAMT *q* | $ | *Reconfiguration ERCOT Contingency Reserve Service Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for ECRS, for the hour. |
| ECRFQAMT *q* | $ | *ERCOT Contingency Reserve Service Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with failures on its Ancillary Service Supply Responsibility for ECRS, for the hour. |
| MCPCECR *m* | $/MW per hour | *Market Clearing Price for Capacity for ERCOT Contingency Reserve Service per market—*The MCPC for ECRS in the market *m*, for the hour. |
| MCPCECR *rs* | $/MW per hour | *Market Clearing Price for Capacity for ERCOT Contingency Reserve Service per RSASM—*The MCPC for ECRS in the RSASM *rs*, for the hour. |
| ECRFQ *q* | MW | *ERCOT Contingency Reserve Service Failure Quantity per QSE -* QSE *q*’s total capacity associated with failures on its Ancillary Service Supply Responsibility for ECRS, for the hour. |
| RECRFQ *q, rs* | MW | *Reconfiguration ERCOT Contingency Reserve Service Failure Quantity per QSE—*QSE *q*’s total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for ECRS, for the hour. |
| *rs* | none | The RSASM for the given Operating Hour. |
| *m* | none | The DAM, SASM, or RSASM for the given Operating Hour. |
| *q* | none | A QSE. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1149: Replace Section 6.7.3 above with the following upon system implementation:]  ***6.7.3 Charges for a Failure to Provide Ancillary Service***  (1) A charge to each QSE that fails to provide its Ancillary Service Supply Responsibility, whether or not a SASM is executed due to its failure to provide, is calculated by service for a given Operating Hour, as follows:  (a) The total charge of failure on Ancillary Service Supply Responsibility for Reg-Up by QSE, if applicable:  **RUFQAMTQSETOT *q* = RUFQAMT *q +*RRUFQAMT *q***  Where:  RUFQAMT *q* = Max(MCPCRU *m*, AVGRTASIP) \* (RUFQ *q*+TRUFQ *q*)  RRUFQAMT *q* = MCPCRU *rs* \* RRUFQ *q,* *rs*  AVGRTASIP = (RTRSVPOR *i* + RTRDP *i*) / 4  Where for all Resources:  TRUFQ *q* =Max ([(SARUQ *q* + RUTRSQ *q* + (RTPCRU *q, m*) + PCRU *q* + RUCRUQ *q*) – (RUTRPQ *q* + RUFQ *q* + RRUFQ *q, rs* + RUINFQ *q*)] – TELRUR *q, r*, 0)  SARUQ *q* = DASARUQ *q* + RTSARUQ *q*  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | **Variable** | **Unit** | **Description** | | RUFQAMTQSETOT *q* | $ | *Reg-Up Failure Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Up, for the hour. | | RRUFQAMT *q* | $ | *Reconfiguration Reg-Up Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Up, for the hour. | | RUFQAMT *q* | $ | *Reg-Up Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with failures on its Ancillary Service Supply Responsibility for Reg-Up, for the hour. | | MCPCRU *m* | $/MW per hour | *Market Clearing Price for Capacity for Reg-Up by market—*The MCPC for Reg-Up in the market *m*, for the hour. | | MCPCRU *rs* | $/MW per hour | *Market Clearing Price for Capacity for Reg-Up by RSASM—*The MCPC for Reg-Up in the RSASM *rs*, for the hour. | | RUFQ *q* | MW | *Reg-Up Failure Quantity per QSE—*QSE *q* total capacity associated with failures on its Ancillary Service Supply Responsibility for Reg-Up, for the hour. | | RRUFQ *q, rs* | MW | *Reconfiguration Reg-Up Failure Quantity per QSE—*QSE *q* total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Up, for the hour. | | RTRDP *i* | $/MWh | *Real-Time On-Line Reliability Deployment Price—*The Real-Time price for the 15-minute Settlement Interval *i*, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time On-Line Reliability Deployment Price Adder. | | RTRSVPOR *i* | $/MWh | *Real-Time Reserve Price for On-Line Reserves—*The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval *i*. | | AVGRTASIP | $/MW per hour | *Average Real-Time Ancillary Service Imbalance Price—*The average of the sum of the Real-Time On-Line Reliability Deployment Price and the Real-Time Reserve Price for On-Line Reserves used in the calculation of Real-Time Ancillary Service Imbalance Amount per Section 6.7.5, Real-Time Ancillary Service Imbalance Payment or Charge, for the Operating Hour. | | SARUQ *q* | MW | *Total Self-Arranged Reg-Up Quantity per QSE for all markets*—The sum of all self-arranged Reg-Up quantities submitted by QSE *q* for DAM and all SASMs. | | RUTRSQ *q* | MW | *Reg-Up Trade Sale per QSE—*QSE *q*’s total time-weighted average capacity Trade Sale for Reg-Up, for the hour. The time-weighted average value is rounded to 0.1 MW. | | RTPCRU *q, m* | MW | *Procured Capacity for Reg-Up by QSE by market—*The MW portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* (SASM or RSASM) to provide Reg-Up, for the hour. | | PCRU *q* | MW | *Procured Capacity for Reg-Up per QSE in DAM*—The total Reg-Up Service capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by the QSE, for the hour. | | RUCRUQ *q* | MW | *RUC-committed for Reg-Up per QSE—*The total quantity of Reg-Up Service committed by the RUC Process for Resources represented by QSE *q*, for the hour. | | RUTRPQ *q* | MW | *Reg-Up Trade Purchases per QSE—*QSE *q*’s total time-weighted average capacity Trade Purchasefor Reg-Up, for the hour. The time-weighted average value is rounded to 0.1 MW. | | RUINFQ *q* | MW | *Reg-Up Infeasible Quantity per QSE—*QSE *q*’s total capacity associated with infeasibleAncillary Service Supply Responsibilitiesfor Reg-Up, for the hour. | | TELRUR *q, r* | MW | *Telemetered Reg-Up Responsibility for the Resource—*The time-weighted average telemetered Reg-Up Ancillary Service Resource Responsibility for the Resource *r*, represented by QSE *q*, for the hour. The time-weighted average value is rounded to 0.1 MW. | | DASARUQ *q* | MW | *Day-Ahead Self-Arranged Reg-Up Quantity per QSE*—The self-arranged Reg-Up quantity submitted by QSE *q* before 1000 in the Day-Ahead. | | RTSARUQ *q* | MW | *Self-Arranged Reg-Up Quantity per QSE for all SASMs*—The sum of all self-arranged Reg-Up quantities submitted by QSE *q* for all SASMs due to an increase in the Ancillary Service Plan per Section 4.4.7.1, Self-Arranged Ancillary Service Quantities. | | TRUFQ *q* | MW | *Telemetered Reg-Up Failure Quantity per QSE—*Calculated failure quantity for QSE *q* by comparing its average telemetered Reg-Up Responsibility sum to its Ancillary Service Supply Responsibility for Reg-Up as calculated per paragraph (1) of Section 4.4.7.4, Ancillary Service Supply Responsibility, for the hour. | | *i* | None | A 15-minute Settlement Interval within the Operating Hour. | | *rs* | None | The RSASM for the given Operating Hour. | | *m* | None | The DAM, SASM, or RSASM for the given Operating Hour. | | *q* | None | A QSE. | | *r* | None | A Resource that is qualified to provide Reg-Up. |   (b) The total charge of failure on Ancillary Service Supply Responsibility for Reg-Down by QSE, if applicable:  **RDFQAMTQSETOT *q* = RDFQAMT *q +*RRDFQAMT *q***  Where:  RDFQAMT *q* = Max (MCPCRD *m*, AVGRTASIP) \* (RDFQ *q* + TRDFQ *q*)  RRDFQAMT *q* = MCPCRD *rs* \* RRDFQ *q,* *rs*  AVGRTASIP = (RTRSVPOR *i* + RTRDP *i*) / 4  Where for all Resources:  TRDFQ *q* =Max ([(SARDQ *q* + RDTRSQ *q* + (RTPCRD *q, m*) + PCRD *q* + RUCRDQ *q*) – (RDTRPQ *q* + RDFQ *q* + RRDFQ *q* + RDINFQ *q*)] –  TELRDR *q, r*, 0)  SARDQ *q* = DASARDQ *q* + RTSARDQ *q*  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | **Variable** | **Unit** | **Description** | | RDFQAMTQSETOT *q* | $ | *Reg-Down Failure Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Down, for the hour. | | RRDFQAMT *q* | $ | *Reconfiguration Reg-Down Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Down, for the hour. | | RDFQAMT *q* | $ | *Reg-Down Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with failures on its Ancillary Service Supply Responsibility for Reg-Down, for the hour. | | MCPCRD *m* | $/MW per hour | *Market Clearing Price for Capacity for Reg-Down by market—*The MCPC for Reg-Down in the market *m*, for the hour. | | MCPCRD *rs* | $/MW per hour | *Market Clearing Price for Capacity for Reg-Down by RSASM—*The MCPC for Reg-Down in the RSASM *rs*, for the hour. | | RDFQ *q* | MW | *Reg-Down Failure Quantity per QSE*—QSE *q*’s total capacity associated with failures on its Ancillary Service Supply Responsibility for Reg-Down, for the hour. | | RRDFQ *q, rs* | MW | *Reconfiguration Reg-Down Failure Quantity per QSE*—QSE *q*’s total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Down, for the hour. | | RTRDP *i* | $/MWh | *Real-Time On-Line Reliability Deployment Price—*The Real-Time price for the 15-minute Settlement Interval *i*, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time On-Line Reliability Deployment Price Adder. | | RTRSVPOR *i* | $/MWh | *Real-Time Reserve Price for On-Line Reserves—*The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval *i*. | | AVGRTASIP | $/MW per hour | *Average Real-Time Ancillary Service Imbalance Price*—The average of the sum of the Real-Time On-Line Reliability Deployment Price and the Real-Time Reserve Price for On-Line Reserves used in the calculation of Real-Time Ancillary Service Imbalance Amount per Section 6.7.5 for the Operating Hour. | | SARDQ *q* | MW | *Total Self-Arranged Reg-Down Quantity per QSE for all markets*—The sum of all self-arranged Reg-Down quantities submitted by QSE *q* for DAM and all SASMs. | | RDTRSQ *q* | MW | *Reg-Down Trade Sale per QSE*—QSE *q*’s total time-weighted average capacity Trade Sale for Reg-Down, for the hour. The time-weighted average value is rounded to 0.1 MW. | | RTPCRD *q, m* | MW | *Procured Capacity for Reg-Down by QSE by market—*The MW portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* (SASM or RSASM) to provide Reg-Down, for the hour. | | PCRD *q* | MW | *Procured Capacity for Reg-Down per QSE in DAM*—The total Reg-Down capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by the QSE, for the hour. | | RUCRDQ *q* | MW | *RUC-committed for Reg-Down per QSE*—The total quantity of Reg-Down committed by the RUC Process for Resources represented by QSE *q*, for the hour. | | RDTRPQ *q* | MW | *Reg-Down Trade Purchases per QSE*—QSE *q*’s total time-weighted average capacity Trade Purchasefor Reg-Down, for the hour. The time-weighted average value is rounded to 0.1 MW. | | RDINFQ *q* | MW | *Reg-Down Infeasible Quantity per QSE—*QSE *q*’s total capacity associated with infeasibleAncillary Service Supply Responsibilitiesfor Reg-Down, for the hour. | | TELRDR *q, r* | MW | *Telemetered Reg-Down Responsibility for the Resource*—The time-weighted average telemetered Reg-Down Ancillary Service Resource Responsibility for the Resource *r* that is qualified to provide Reg-Down Ancillary Service, represented by QSE *q,* for the hour. The time-weighted average value is rounded to 0.1 MW. | | DASARDQ *q* | MW | *Day-Ahead Self-Arranged Reg-Down Quantity per QSE*—The self-arranged Reg-Down quantity submitted by QSE *q* before 1000 in the Day-Ahead. | | RTSARDQ *q* | MW | *Self-Arranged Reg-Down Quantity per QSE for all SASMs*—The sum of all self-arranged Reg-Down quantities submitted by QSE *q* for all SASMs due to an increase in the Ancillary Service Plan per Section 4.4.7.1. | | TRDFQ *q* | MW | *Telemetered Reg-Down Failure Quantity per QSE—*Calculated failure quantity for QSE *q* by comparing its average telemetered Reg-Down Responsibility sum to its Ancillary Service Supply Responsibility for Reg-Down as calculated per paragraph (1) of Section 4.4.7.4, for the hour. | | *i* | None | A 15-minute Settlement Interval within the Operating Hour. | | *rs* | None | The RSASM for the given Operating Hour. | | *m* | None | The DAM, SASM, or RSASM for the given Operating Hour. | | *q* | None | A QSE. | | *r* | None | A Resource that is qualified to provide Reg-Down. |   (c) The total charge of failure on Ancillary Service Supply Responsibility for RRS by QSE, if applicable:  **RRFQAMTQSETOT *q* = RRFQAMT *q +*RRRFQAMT *q***  Where:  RRFQAMT *q* = Max(MCPCRR *m*, AVGRTASIP) \* (RRFQ *q* + TRRFQ *q*)  RRRFQAMT *q* = MCPCRR *rs* \* RRRFQ *q,* *rs*  AVGRTASIP = (RTRSVPOR *i* + RTRDP *i*) / 4  Where for all Resources:  TRRFQ *q =* Max([(SARRQ *q* + RRTRSQ *q* + (RTPCRR *q, m*) + PCRR *q* + RUCRRQ *q*) – (RRTRPQ *q* + RRFQ *q* + RRRFQ *q* + RRINFQ *q*)] –  TELRRSRC *q, r*, 0)  Where for Load Resources, other than Controllable Load Resources, during an RRS deployment event:  TELRRSRC *q, r* =Min (NPF *q, r* – LPC *q, r*, TELRRSR *q, r*) snapshot to be used will be from the time of deployment until 180 minutes after recall or if the time between a recall of Load Resources and a redeployment is less than 180 minutes, the snapshot to be used will be the time of the first deployment  Where for Load Resources, other than Controllable Load Resources, prior to an RRS deployment event:  TELRRSRC *q, r* =Min (NPF *q, r* – LPC *q, r*, TELRRSR *q, r*)  SARRQ *q* = DASARRQ *q* + RTSARRQ *q*  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | **Variable** | **Unit** | **Description** | | RRFQAMTQSETOT *q* | $ | *Responsive Reserve Failure Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for RRS, for the hour. | | RRRFQAMT *q* | $ | *Reconfiguration Responsive Reserve Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for RRS, for the hour. | | RRFQAMT *q* | $ | *Responsive Reserve Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with failures on its Ancillary Service Supply Responsibility for RRS, for the hour. | | MCPCRR *m* | $/MW per hour | *Market Clearing Price for Capacity for Responsive Reserve per market—*The MCPC for RRS in the market *m*, for the hour. | | MCPCRR *rs* | $/MW per hour | *Market Clearing Price for Capacity for Responsive Reserve per RSASM—*The MCPC for RRS in the RSASM *rs*, for the hour. | | RRFQ *q* | MW | *Responsive Reserve Failure Quantity per QSE*—QSE *q*’s total capacity associated with failures on its Ancillary Service Supply Responsibility for RRS, for the hour. | | RRRFQ *q, rs* | MW | *Reconfiguration Responsive Reserve Failure Quantity per QSE—*QSE *q*’s total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for RRS, for the hour. | | RTRDP *i* | $/MWh | *Real-Time On-Line Reliability Deployment Price—*The Real-Time price for the 15-minute Settlement Interval *i*, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time On-Line Reliability Deployment Price Adder. | | RTRSVPOR *i* | $/MWh | *Real-Time Reserve Price for On-Line Reserves—*The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval *i*. | | AVGRTASIP | $/MW per hour | *Average Real-Time Ancillary Service Imbalance Price*—The average of the sum of the Real-Time On-Line Reliability Deployment Price and the Real-Time Reserve Price for On-Line Reserves used in the calculation of Real-Time Ancillary Service Imbalance Amount per Section 6.7.5 for the Operating Hour. | | SARRQ *q* | MW | *Total Self-Arranged Responsive Reserve Quantity per QSE for all markets*—The sum of all self-arranged RRS quantities submitted by QSE *q* for DAM and all SASMs. | | RRTRSQ *q* | MW | *Responsive Reserve Trade Sale per QSE*—QSE *q*’s total time-weighted average capacity Trade Sale for RRS, for the hour. The time-weighted average value is rounded to 0.1 MW. | | RTPCRR *q, m* | MW | *Procured Capacity for Responsive Reserve per QSE by market—*The MW portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* (SASM or RSASM) to provide RRS, for the hour. | | PCRR *q* | MW | *Procured Capacity for Responsive Reserve per QSE in DAM*—The total RRS capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by the QSE, for the hour. | | RUCRRQ *q* | MW | *RUC-committed for Responsive Reserve per QSE*—The total quantity of RRS committed by the RUC Process for Resources represented by QSE *q*, for the hour. | | RRTRPQ *q* | MW | *Responsive Reserve Trade Purchases per QSE*—QSE *q*’s total time-weighted average capacity Trade Purchasefor RRS, for the hour. The time-weighted average value is rounded to 0.1 MW. | | RRINFQ *q* | MW | *Responsive Reserve Infeasible Quantity per QSE—*QSE *q*’s total capacity associated with infeasibleAncillary Service Supply Responsibilitiesfor RRS, for the hour. | | TELRRSR *q, r* | MW | *Telemetered Responsive Reserve Responsibility for the Resource*—The average time-weighted telemetered RRS Ancillary Service Resource Responsibility for the Resource *r*, represented by the QSE *q,* for the hour. The time-weighted average value is rounded to 0.1 MW. | | TELRRSRC *q, r* | MW | *Telemetered Responsive Reserve Responsibility for the Resource as Calculated*—The calculated comparison of the time-weighted average telemetered RRS Ancillary Service Resource Responsibility as compared to available capacity for the Resource *r*, represented by the QSE *q,* for the hour. | | NPF *q, r* | MW | *Non-Controllable Load Resource Net Power Consumption for the QSE*—The average NPF from Load Resource other than Controllable Load Resources *r*, represented by QSE *q,* for the hour. | | LPC *q, r* | MW | *Non-Controllable Load Resource Low Power Consumption for the QSE*—The average Low Power Consumption (LPC) from Load Resource other than Controllable Load Resources *r*, represented by QSE *q,* for the hour. | | DASARRQ *q* | MW | *Day-Ahead Self-Arranged Responsive Reserve Quantity per QSE*—The self-arranged RRS quantity submitted by QSE *q* before 1000 in the Day-Ahead. | | RTSARRQ *q* | MW | *Self-Arranged Responsive Reserve Quantity per QSE for all SASMs*—The sum of all self-arranged RRS quantities submitted by QSE *q* for all SASMs due to an increase in the Ancillary Service Plan per Section 4.4.7.1. | | TRRFQ *q* | MW | *Telemetered Responsive Reserve Failure Quantity per QSE—*Calculated failure quantity for QSE *q* by comparing its average telemetered Responsive Reserve Responsibility sum to its Ancillary Service Supply Responsibility for RRS as calculated per paragraph (1) of Section 4.4.7.4, for the hour. | | *i* | None | A 15-minute Settlement Interval within the Operating Hour. | | *rs* | None | The RSASM for the given Operating Hour. | | *m* | None | The DAM, SASM, or RSASM for the given Operating Hour. | | *q* | None | A QSE. | | *r* | None | A Resource that is qualified to provide RRS. |   (d) The total charge of failure on Ancillary Service Supply Responsibility for Non-Spin by QSE, if applicable:  **NSFQAMTQSETOT *q* = NSFQAMT *q +*RNSFQAMT *q***  Where:  NSFQAMT *q* = Max (MCPCNS *m*, AVGRTASIP) \* (NSFQ *q* + TNSFQ *q*)  RNSFQAMT *q* = MCPCNS *rs* \* RNSFQ *q,* *rs*  AVGRTASIP = (RTRSVPOR *i* + RTRDP *i*) / 4  Where for all Resources:  TNSFQ *q =* Max([(SANSQ *q* + NSTRSQ *q* + (RTPCNS *q, m*) + PCNS *q* + RUCNSQ *q*) – (NSTRPQ *q* + NSFQ *q* + RNSFQ *q* + NSINFQ *q*)] –TELNSRC *q, r*, 0)  Where for Load Resources, other than Controllable Load Resources, during a Non-Spin deployment event:  TELNSRC *q, r* = Min(NPF *q, r* – LPC *q, r* – TELECRRC *q, r*, TELNSR *q, r*) snapshot to be used will be from the time of deployment until 180 minutes after recall or if the time between a recall of Load Resources and a redeployment is less than 180 minutes, the snapshot to be used will be the time of the first deployment  Where for Load Resources, other than Controllable Load Resources, prior to a Non-Spin deployment event:  TELNSRC *q, r* = Min(NPF *q, r* – LPC *q, r* – TELECRRC *q, r*, TELNSR *q, r*)  SANSQ *q* = DASANSQ *q* + RTSANSQ *q*  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | **Variable** | **Unit** | **Description** | | NSFQAMTQSETOT *q* | $ | *Non-Spin Failure Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for Non-Spin, for the hour. | | RNSFQAMT *q* | $ | *Reconfiguration Non-Spin Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Non-Spin, for the hour. | | NSFQAMT *q* | $ | *Non-Spin Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with failures on its Ancillary Service Supply Responsibility for Non-Spin, for the hour. | | MCPCNS *m* | $/MW per hour | *Market Clearing Price for Capacity for Non-Spin by market—*The MCPC for Non-Spin in the market *m*, for the hour. | | MCPCNS *rs* | $/MW per hour | *Market Clearing Price for Capacity for Non-Spin by RSASM—*The MCPC for Non-Spin in the RSASM *rs*, for the hour. | | NSFQ *q* | MW | *Non-Spin Failure Quantity per QSE—*QSE *q*’s total capacity associated with failures on its Ancillary Service Supply Responsibility for Non-Spin, for the hour. | | RNSFQ *q, rs* | MW | *Reconfiguration Non-Spin Failure Quantity per QSE—*QSE *q*’s total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Non-Spin, for the hour. | | RTRDP *i* | $/MWh | *Real-Time On-Line Reliability Deployment Price—*The Real-Time price for the 15-minute Settlement Interval *i*, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time On-Line Reliability Deployment Price Adder. | | RTRSVPOR *i* | $/MWh | *Real-Time Reserve Price for On-Line Reserves—*The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval *i*. | | AVGRTASIP | $/MW per hour | *Average Real-Time Ancillary Service Imbalance Price*—The average of the sum of the Real-Time On-Line Reliability Deployment Price and the Real-Time Reserve Price for On-Line Reserves used in the calculation of Real-Time Ancillary Service Imbalance Amount per Section 6.7.5 for the Operating Hour. | | SANSQ *q* | MW | *Total Self-Arranged Non-Spin Quantity per QSE for all markets*—The sum of all self-arranged Non-Spin quantities submitted by QSE *q* for DAM and all SASMs. | | NSTRSQ *q* | MW | *Non-Spinning Reserve Trade Sale per QSE*—QSE *q*’s total time-weighted average capacity Trade Sale for Non-Spin, for the hour. The time-weighted average value is rounded to 0.1 MW. | | RTPCNS *q, m* | MW | *Procured Capacity for Non-Spin Reserve per QSE by market—*The MW portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* (SASM or RSASM) to provide Non-Spin, for the hour. | | PCNS *q* | MW | *Procured Capacity for Non-Spin Reserve per QSE in DAM*—The total Non-Spin capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by the QSE, for the hour. | | RUCNSQ *q* | MW | *RUC-committed for Non-Spin Reserve per QSE*—The total quantity of Non-Spin committed by the RUC Process for Resources represented by QSE *q*, for the hour. | | NSTRPQ *q* | MW | *Non-Spin Reserve Trade Purchases per QSE*—QSE *q*’s total time-weighted average capacity Trade Purchasefor Non-Spin, for the hour. The time-weighted average value is rounded to 0.1 MW. | | NSINFQ *q* | MW | *Non-Spin Reserve Infeasible Quantity per QSE—*QSE *q*’s total capacity associated with infeasibleAncillary Service Supply Responsibilitiesfor Non-Spin, for the hour. | | TELNSR *q, r* | MW | *Telemetered Non-Spin Reserve Responsibility for the Resource*—The time-weighted average telemetered Non-Spin Ancillary Service Resource Responsibility for the Resource, for the hour. The time-weighted average value is rounded to 0.1 MW. | | TELNSRC *q, r* | MW | *Telemetered Non-Spin Reserve Responsibility for the Resource as Calculated*—The time-weighted average calculated telemetered Non-Spin Ancillary Service Resource Responsibility as compared to available capacity for the Resource, for the hour. | | NPF *q, r* | MW | *Non-Controllable Load Resource Net Power Consumption for the QSE*—The average NPF from Load Resource other than Controllable Load Resources *r*, represented by QSE *q,* for the hour. | | LPC *q, r* | MW | *Non-Controllable Load Resource Low Power Consumption for the QSE*—The average LPC from Load Resource other than Controllable Load Resources *r*, represented by QSE *q,* for the hour. | | DASANSQ *q* | MW | *Day-Ahead Self-Arranged Non-Spin Reserve Quantity per QSE*—The self-arranged Non-Spin quantity submitted by QSE *q* before 1000 in the Day-Ahead. | | RTSANSQ *q* | MW | *Self-Arranged Non-Spinning Reserve Quantity per QSE for all SASMs*—The sum of all self-arranged Non-Spin quantities submitted by QSE *q* for all SASMs due to an increase in the Ancillary Service Plan per Section 4.4.7.1. | | TELECRRC *q, r* | MW | *Telemetered ERCOT Contingency Reserve Service Responsibility for the Resource as Calculated*—The time-weighted average telemetered ECRS Ancillary Service Resource Responsibility as compared to available capacity for the Resource *r*, represented by QSE *q,* for the hour. | | TNSFQ *q* | MW | *Telemetered Non-Spin Failure Quantity per QSE—*Calculated failure quantity for QSE *q* by comparing its average telemetered Non-Spin Responsibility to its Ancillary Service Supply Responsibility for Non-Spin as calculated per paragraph (1) of Section 4.4.7.4, for the hour. | | *i* | None | A 15-minute Settlement Interval within the Operating Hour. | | *rs* | None | The RSASM for the given Operating Hour. | | *m* | None | The DAM, SASM, or RSASM for the given Operating Hour. | | *q* | None | A QSE. | | *r* | None | A Resource that is qualified to provide Non-Spin. |   (e) The total charge of failure on Ancillary Service Supply Responsibility for ECRS by QSE, if applicable:  **ECRFQAMTQSETOT *q* = ECRFQAMT *q +*RECRFQAMT *q***  Where:  ECRFQAMT *q* = Max(MCPCECR *m*, AVGRTASIP) \* (ECRFQ *q* + TECRFQ *q*)  RECRFQAMT *q* = MCPCECR *rs* \* RECRFQ *q,* *rs*  AVGRTASIP = (RTRSVPOR *i* + RTRDP *i*) / 4  Where for all Resources:  TECRFQ *q =* Max ([(SAECRQ *q* + ECRTRSQ *q* +  (RTPCECR *q, m*) + PCECR *q* + RUCECRQ *q*) – (ECRTRPQ *q* + ECRFQ *q* + RECRFQ *q* + ECRINFQ *q*)] – TELECRRC *q, r*, 0)  Where for Load Resources, other than Controllable Load Resources, during an ECRS deployment event:  TELECRRC *q, r =* Min(NPF *q, r* – LPC *q, r*, TELECRR *q, r*) snapshot to be used will be from the time of deployment until 180 minutes after recall or if the time between a recall of Load Resources and a redeployment is less than 180 minutes, the snapshot to be used will be the time of the first deployment  Where for Load Resources, other than Controllable Load Resources, prior to an ECRS deployment event:  TELECRRC *q, r =* Min(NPF *q, r* – LPC *q, r*, TELECRR *q, r*)  SAECRQ *q* = DASAECRQ *q* + RTSAECRQ *q*  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | **Variable** | **Unit** | **Description** | | ECRFQAMTQSETOT *q* | $ | *ERCOT Contingency Reserve Service Failure Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for ECRS, for the hour. | | RECRFQAMT *q* | $ | *Reconfiguration ERCOT Contingency Reserve Service Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for ECRS, for the hour. | | ECRFQAMT *q* | $ | *ERCOT Contingency Reserve Service Failure Quantity Amount per QSE*—The charge to QSE *q* for its total capacity associated with failures on its Ancillary Service Supply Responsibility for ECRS, for the hour. | | RTRDP *i* | $/MWh | *Real-Time On-Line Reliability Deployment Price—*The Real-Time price for the 15-minute Settlement Interval *i*, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time On-Line Reliability Deployment Price Adder. | | RTRSVPOR *i* | $/MWh | |  | | --- | | *Real-Time Reserve Price for On-Line Reserves—*The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval *i*. | | | AVGRTASIP | $/MW per hour | *Average Real-Time Ancillary Service Imbalance Price*—The average of the sum of the Real-Time On-Line Reliability Deployment Price and the Real-Time Reserve Price for On-Line Reserves used in the calculation of Real-Time Ancillary Service Imbalance Amount per Section 6.7.5 for the Operating Hour. | | SAECRQ *q* | MW | *Total Self-Arranged ERCOT Contingency Reserve Service Quantity per QSE for all markets—*The sum of all self-arranged ECRS quantities submitted by QSE *q* for DAM and all SASMs. | | ECRTRSQ *q* | MW | *ERCOT Contingency Reserve Service Trade Sale per QSE*—QSE *q’s* total time-weighted average capacity Trade Sale for ECRS, for the hour. The time-weighted average value is rounded to 0.1 MW. | | RTPCECR *q, m* | MW | *Procured Capacity for ERCOT Contingency Reserve Service per QSE by market*—The MW portion of QSE *q’s* Ancillary Service Offers cleared in the market *m* (SASM or RSASM) to provide ECRS, for the hour. | | PCECR *q* | MW | *Procured Capacity for ERCOT Contingency Reserve Service per QSE in DAM—*The total ECRS capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by the QSE, for the hour. | | RUCECRQ *q* | MW | *RUC-committed for ERCOT Contingency Reserve Service per QSE*—The total quantity of ECRS committed by the RUC Process for Resources represented by QSE *q*, for the hour. | | ECRTRPQ *q* | MW | *ERCOT Contingency Reserve Service Trade Purchases per QSE*—QSE *q’s* total time-weighted average capacity Trade Purchase for ECRS, for the hour. The time-weighted average value is rounded to 0.1 MW. | | ECRINFQ *q* | MW | *ERCOT Contingency Reserve Service Infeasible Quantity per QSE—*QSE *q’s* total capacity associated with infeasible Ancillary Service Supply Responsibilities for ECRS, for the hour. | | TELECRR *q, r* | MW | *Telemetered ERCOT Contingency Reserve Service Responsibility for the Resource*—The time-weighted average telemetered ECRS Ancillary Service Resource Responsibility for the Resource *r*, represented by QSE *q,* for the hour. The time-weighted average value is rounded to 0.1 MW. | | TELECRRC *q, r* | MW | *Telemetered ERCOT Contingency Reserve Service Responsibility for the Resource as Calculated*—The time-weighted average telemetered ECRS Ancillary Service Resource Responsibility as compared to available capacity for the Resource *r*, represented by QSE *q,* for the hour. | | NPF *q, r* | MW | *Non-Controllable Load Resource Net Power Consumption for the QSE*—The average NPF from Load Resource other than Controllable Load Resources *r*, represented by QSE *q,* for the hour. | | LPC *q, r* | MW | *Non-Controllable Load Resource Low Power Consumption for the QSE*—The average LPC from Load Resource other than Controllable Load Resources *r*, represented by QSE *q,* for the hour. | | DASAECRQ *q* | MW | *Day-Ahead Self-Arranged ERCOT Contingency Reserve Service Quantity per QSE*—The self-arranged ECRS quantity submitted by QSE *q* before 1000 in the Day-Ahead. | | RTSAECRQ *q* | MW | *Self-Arranged ERCOT Contingency Reserve Service Quantity per QSE for all SASMs*—The sum of all self-arranged ECRS quantities submitted by QSE *q* for all SASMs due to an increase in the Ancillary Service Plan per Section 4.4.7.1. | | MCPCECR *m* | $/MW per hour | *Market Clearing Price for Capacity for ERCOT Contingency Reserve Service per market—*The MCPC for ECRS in the market *m*, for the hour. | | MCPCECR *rs* | $/MW per hour | *Market Clearing Price for Capacity for ERCOT Contingency Reserve Service per RSASM—*The MCPC for ECRS in the RSASM *rs*, for the hour. | | ECRFQ *q* | MW | *ERCOT Contingency Reserve Service Failure Quantity per QSE—*QSE *q*’s total capacity associated with failures on its Ancillary Service Supply Responsibility for ECRS, for the hour. | | RECRFQ *q, rs* | MW | *Reconfiguration ERCOT Contingency Reserve Service Failure Quantity per QSE—*QSE *q*’s total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for ECRS, for the hour. | | TECRFQ *q* | MW | *Telemetered ERCOT Contingency Reserve Service Failure Quantity per QSE—*Calculated failure quantity for QSE *q* by comparing its average telemetered ECRS Responsibility to its Ancillary Service Supply Responsibility for ECRS as calculated per paragraph (1) of Section 4.4.7.4, for the hour. | | *i* | none | A 15-minute Settlement Interval within the Operating Hour. | | *rs* | none | The RSASM for the given Operating Hour. | | *m* | none | The DAM, SASM, or RSASM for the given Operating Hour. | | *q* | none | A QSE. | | *r* | none | A Resource that is qualified to provide ECRS. | |

|  |
| --- |
| [NPRR1010: Delete Section 6.7.3 above upon system implementation of the Real-Time Co-Optimization (RTC) project.] |

6.7.4 Adjustments to Cost Allocations for Ancillary Services Procurement

(1) Each QSE for which ERCOT purchases Ancillary Service capacity in the DAM, a SASM, or an RSASM, is charged for the QSE’s share of the net costs incurred for each service. For each QSE, its share of the DAM costs has been calculated in Section 4.6.4, Settlement of Ancillary Services Procured in the DAM; its share of the net total costs incurred in the DAM, a SASM, or an RSASM less its DAM charge is calculated in this section.

(2) For Reg-Up, if applicable:

(a) The net total costs for Reg-Up for a given Operating Hour is calculated as follows:

**RUCOSTTOT = (-1) \* ((RTPCRUAMTTOT *m*) + PCRUAMTTOT + RUFQAMTTOT +**

**RUINFQAMTTOT)**

Where:

Total payment of SASM- and RSASM-procured capacity for Reg-Up by market

RTPCRUAMTTOT *m* = RTPCRUAMT *q, m*

Total payment of DAM-procured capacity for Reg-Up

PCRUAMTTOT = PCRUAMT *q*

Total charge of failure on Ancillary Service Supply Responsibility for Reg-Up

RUFQAMTTOT = RUFQAMTQSETOT *q*

Total payment of SASM- and RSASM-procured capacity for Reg-Up by QSE

RTPCRUAMTQSETOT *q* = RTPCRUAMT *q, m*

Total charge of infeasible Ancillary Service Supply Responsibility for Reg-Up

RUINFQAMTTOT =  RUINFQAMT *q*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| RUCOSTTOT | $ | *Reg-Up Cost Total*—The net total costs for Reg-Up for the hour. |
| RTPCRUAMTTOT *m* | $ | *Procured Capacity for Reg-Up Amount Total by market—*The total payments to all QSEs for the Ancillary Service Offers cleared in the market *m* for Reg-Up, for the hour. |
| RTPCRUAMT *q, m* | $ | *Procured Capacity for Reg-Up Amount per QSE by market*—The payment to QSE *q* for its Ancillary Service Offers cleared in the market *m* for Reg-Up, for the hour. |
| RUFQAMTTOT | $ | *Reg-Up Failure Quantity Amount Total*—The total charges to all QSEs for their capacity associated with failures and reconfiguration reductions on their Ancillary Service Supply Responsibilities for Reg-Up, for the hour. |
| RUFQAMTQSETOT *q* | $ | *Reg-Up Failure Quantity Amount Total per QSE*—The charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Up, for the hour. |
| RTPCRUAMTQSETOT *q* | $ | *Procured Capacity for Reg-Up Amount Total per QSE*—The total payments to a QSE *q* in all SASMs and RSASMs for the Ancillary Service Offers cleared for Reg-Up, for the hour. |
| PCRUAMT *q* | $ | *Procured Capacity for Reg-Up Amount per QSE in DAM*—The DAM Reg-Up payment for QSE *q*, for the hour. |
| RUINFQAMTTOT | $ | *Reg-Up Infeasible Quantity Amount Total* — The charge to all QSEs for their total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for Reg-Up, for the hour. |
| RUINFQAMT *q* | $ | *Reg-Up Infeasible Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for Reg-Up, for the hour. |
| PCRUAMTTOT | $ | *Procured Capacity for Reg-Up Amount Total in DAM*—The total of the DAM Reg-Up payments for all QSEs, for the hour. |
| *q* | none | A QSE. |
| *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR841: Replace paragraph (a) above with the following upon system implementation:]  (a) The net total costs for Reg-Up for a given Operating Hour is calculated as follows:  **RUCOSTTOT = (-1) \* ((RTPCRUAMTTOT *m*) + PCRUAMTTOT + RUFQAMTTOT +**  **RUINFQAMTTOT + RUMWINFATOT)**  Where:  Total payment of SASM- and RSASM-procured capacity for Reg-Up by market  RTPCRUAMTTOT *m* = RTPCRUAMT *q, m*  Total payment of DAM-procured capacity for Reg-Up  PCRUAMTTOT = PCRUAMT *q*  Total charge of failure on Ancillary Service Supply Responsibility for Reg-Up  RUFQAMTTOT = RUFQAMTQSETOT *q*  Total payment of SASM- and RSASM-procured capacity for Reg-Up by QSE  RTPCRUAMTQSETOT *q* = RTPCRUAMT *q, m*  Total charge of infeasible Ancillary Service Supply Responsibility for Reg-Up  RUINFQAMTTOT =  RUINFQAMT *q*  Total Real-Time DAM Make-Whole Payment for Reg-Up  RUMWINFATOT =  RUMWINFA *q, h*  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | **Variable** | **Unit** | **Description** | | RUCOSTTOT | $ | *Reg-Up Cost Total*—The net total costs for Reg-Up for the hour. | | RTPCRUAMTTOT *m* | $ | *Procured Capacity for Reg-Up Amount Total by market—*The total payments to all QSEs for the Ancillary Service Offers cleared in the market *m* for Reg-Up, for the hour. | | RUMWINFATOT | $ | *Reg-Up Make-Whole Infeasible Amount total*⎯ The total Real-Time calculated payment to all QSEs*,* for their contribution of Reg-Up, to make-whole the Startup and energy costs of all Resources committed in the DAM, for the hour. | | RUMWINFA *q, h* | $ | *Reg-Up Make-Whole Infeasible Amount per QSE per hour*⎯ The total Real-Time calculated payment to QSE *q,* for its contribution of Reg-Up, to make-whole the Startup and energy costs of all Resources committed in the DAM, for the hour *h*. | | RTPCRUAMT *q, m* | $ | *Procured Capacity for Reg-Up Amount per QSE by market*—The payment to QSE *q* for its Ancillary Service Offers cleared in the market *m* for Reg-Up, for the hour. | | RUFQAMTTOT | $ | *Reg-Up Failure Quantity Amount Total*—The total charges to all QSEs for their capacity associated with failures and reconfiguration reductions on their Ancillary Service Supply Responsibilities for Reg-Up, for the hour. | | RUFQAMTQSETOT *q* | $ | *Reg-Up Failure Quantity Amount Total per QSE*—The charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Up, for the hour. | | RTPCRUAMTQSETOT *q* | $ | *Procured Capacity for Reg-Up Amount Total per QSE*—The total payments to a QSE *q* in all SASMs and RSASMs for the Ancillary Service Offers cleared for Reg-Up, for the hour. | | PCRUAMT *q* | $ | *Procured Capacity for Reg-Up Amount per QSE in DAM*—The DAM Reg-Up payment for QSE *q*, for the hour. | | RUINFQAMTTOT | $ | *Reg-Up Infeasible Quantity Amount Total* — The charge to all QSEs for their total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for Reg-Up, for the hour. | | RUINFQAMT *q* | $ | *Reg-Up Infeasible Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for Reg-Up, for the hour. | | PCRUAMTTOT | $ | *Procured Capacity for Reg-Up Amount Total in DAM*—The total of the DAM Reg-Up payments for all QSEs, for the hour. | | *q* | none | A QSE. | | *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. | |

(b) Each QSE’s share of the net total costs for Reg-Up for the Operating Hour is calculated as follows:

**RUCOST *q* = RUPR \* RUQ *q***

Where:

RUPR = RUCOSTTOT / RUQTOT

RUQTOT = RUQ *q*

RUQ *q* = RUO *q* – SARUQ *q*

RUO *q* = (SARUQ *q* + (RTPCRU *q, m*)+ PCRU *q* –

RUFQ *q* – RRUFQ *q*) \* HLRS *q*

SARUQ *q*= DASARUQ *q* + RTSARUQ *q*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| RUCOST *q* | $ | *Reg-Up Cost per QSE*—QSE *q*’s share of the net total costs for Reg-Up, for the hour. |
| RUPR | $/MW per hour | *Reg-Up Price—*The price for Reg-Up calculated based on the net total costs for Reg-Up, for the hour. |
| RUCOSTTOT | $ | *Reg-Up Cost Total*—The net total costs for Reg-Up, for the hour. See item (2)(a) above. |
| RUQTOT | MW | *Reg-Up Quantity Total*—The sum of every QSE’s Ancillary Service Obligation minus its self-arranged Reg-Up quantity in the DAM and any and all SASMs, for the hour. |
| RUQ *q* | MW | *Reg-Up Quantity per QSE*—The QSE *q*’s Ancillary Service Obligation minus its self-arranged Reg-Up quantity in the DAM and any and all SASMs, for the hour. |
| RUO *q* | MW | *Reg-Up Obligation per QSE*—The Ancillary Service Obligation of QSE *q*, for the hour. |
| DASARUQ *q* | MW | *Day-Ahead Self-Arranged Reg-Up Quantity per QSE*—The self-arranged Reg-Up quantity submitted by QSE *q* before 1000 in the Day-Ahead. |
| RTSARUQ *q* | MW | *Self-Arranged Reg-Up Quantity per QSE for all SASMs*—The sum of all self-arranged Reg-Up quantities submitted by QSE *q* for all SASMs due to an increase in the Ancillary Service Plan per Section 4.4.7.1, Self-Arranged Ancillary Service Quantities. |
| RTPCRU *q, m* | MW | *Procured Capacity for Reg-Up per QSE by market—*The MW portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* to provide Reg-Up, for the hour. |
| RUFQ *q* | MW | *Reg-Up Failure Quantity per QSE—*QSE *q*’s total capacity associated with failures on its Ancillary Service Supply Responsibility for Reg-Up, for the hour. |
| RRUFQ *q* | MW | *Reconfiguration Reg-Up Failure Quantity per QSE—*QSE *q* total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Up, for the hour. |
| HLRS *q* | none | *The Hourly Load Ratio Share calculated for QSE q for the hour*. See Section 6.6.2.4, QSE Load Ratio Share for an Operating Hour. |
| PCRU *q* | MW | *Procured Capacity for Reg-Up per QSE in DAM*—The total Reg-Up capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by the QSE, for the hour. |
| SARUQ*q* | MW | *Total Self-Arranged Reg-Up Quantity per QSE for all markets*—The sum of all self-arranged Reg-Up quantities submitted by QSE *q* for DAM and all SASMs. |
| *q* | none | A QSE. |
| *m* | none | A SASM for the given Operating Hour. |

(c) The adjustment to each QSE’s DAM charge for the Reg-Up for the Operating Hour, due to changes during the Adjustment Period or Real-Time operations, is calculated as follows:

**RTRUAMT *q*= RUCOST *q* – DARUAMT *q***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| RTRUAMT *q* | $ | *Real-Time Reg-Up Amount per QSE*—The adjustment to QSE *q*’s share of the costs for Reg-Up, for the hour. |
| RUCOST *q* | $ | *Reg-Up Cost per QSE*—QSE *q*’s share of the net total costs for Reg-Up, for the hour. |
| DARUAMT *q* | $ | *Day-Ahead Reg-Up Amount per QSE*—QSE *q*’s share of the DAM cost for Reg-Up, for the hour. |
| *q* | none | A QSE. |

(3) For Reg-Down, if applicable:

(a) The net total costs for Reg-Down for a given Operating Hour is calculated as follows:

**RDCOSTTOT = (-1) \* ((RTPCRDAMTTOT *m*) + PCRDAMTTOT + RDFQAMTTOT +**

**RDINFQAMTTOT)**

Where:

Total payment of SASM- and RSASM-procured capacity for Reg-Down by market

RTPCRDAMTTOT *m* = RTPCRDAMT *q, m*

Total payment of DAM-procured capacity for Reg-Down

PCRDAMTTOT= PCRDAMT *q*

Total charge of failure on Ancillary Service Supply Responsibility for Reg-Down

RDFQAMTTOT = RDFQAMTQSETOT *q*

Total payment of SASM- and RSASM-procured capacity for Reg-Down by QSE

RTPCRDAMTQSETOT *q* = RTPCRDAMT *q, m*

Total charge of infeasible Ancillary Service Supply Responsibility for Reg-Down

RDINFQAMTTOT =  RDINFQAMT *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| RDCOSTTOT | $ | *Reg-Down Cost Total*—The net total costs for Reg-Down, for the hour. |
| RTPCRDAMTTOT *m* | $ | *Procured Capacity for Reg-Down Amount Total by market—*The total payments to all QSEs for the Ancillary Service Offers cleared in the market *m* for Reg-Down, for the hour. |
| RTPCRDAMT *q, m* | $ | *Procured Capacity for Reg-Down Amount per QSE by market*—The payment to QSE *q* for its Ancillary Service Offers cleared in the market *m* for Reg-Down, for the hour. |
| RDFQAMTTOT | $ | *Reg-Down Failure Quantity Amount Total*—The total charges to all QSEs for their capacity associated with failures on their Ancillary Service Supply Responsibilities for Reg-Down, for the hour. |
| RDFQAMTQSETOT *q* | $ | *Reg-Down Failure Quantity Amount Total per QSE*—The charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Down, for the hour. |
| RTPCRDAMTQSETOT *q* | $ | *Procured Capacity for Reg-Down Amount Total per QSE*—The total payments to a QSE *q* in all SASMs and RSASMs for the Ancillary Service Offers cleared for Reg-Down, for the hour. |
| PCRDAMT *q* | $ | *Procured Capacity for Reg-Down Amount per QSE for DAM*—The DAM Reg-Down payment for QSE *q*, for the hour. |
| PCRDAMTTOT | $ | *Procured Capacity for Reg-Down Amount Total in DAM*—The total of the DAM Reg-Down payments for all QSEs for the hour. |
| RDINFQAMTTOT | $ | *Reg-Down Infeasible Quantity Amount Total* — The charge to all QSEs for their total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for Reg-Down, for the hour. |
| RDINFQAMT *q* | $ | *Reg-Down Infeasible Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with infeasible deployment of its Ancillary Service Supply Responsibilities for Reg-Down, for the hour. |
| *q* | none | A QSE. |
| *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR841: Replace paragraph (a) above with the following upon system implementation:]  (a) The net total costs for Reg-Down for a given Operating Hour is calculated as follows:  **RDCOSTTOT = (-1) \* ((RTPCRDAMTTOT *m*) + PCRDAMTTOT + RDFQAMTTOT +**  **RDINFQAMTTOT** + **RDMWINFATOT)**  Where:  Total payment of SASM- and RSASM-procured capacity for Reg-Down by market  RTPCRDAMTTOT *m* = RTPCRDAMT *q, m*  Total payment of DAM-procured capacity for Reg-Down  PCRDAMTTOT= PCRDAMT *q*  Total charge of failure on Ancillary Service Supply Responsibility for Reg-Down  RDFQAMTTOT = RDFQAMTQSETOT *q*  Total payment of SASM- and RSASM-procured capacity for Reg-Down by QSE  RTPCRDAMTQSETOT *q* = RTPCRDAMT *q, m*  Total charge of infeasible Ancillary Service Supply Responsibility for Reg-Down  RDINFQAMTTOT =  RDINFQAMT *q*  Total Real-Time Day-Ahead Make-Whole Payment for Reg-Down  RDMWINFATOT =  RDMWINFA *q, h*  The above variables are defined as follows:   | **Variable** | **Unit** | **Description** | | --- | --- | --- | | RDCOSTTOT | $ | *Reg-Down Cost Total*—The net total costs for Reg-Down, for the hour. | | RTPCRDAMTTOT *m* | $ | *Procured Capacity for Reg-Down Amount Total by market—*The total payments to all QSEs for the Ancillary Service Offers cleared in the market *m* for Reg-Down, for the hour. | | RTPCRDAMT *q, m* | $ | *Procured Capacity for Reg-Down Amount per QSE by market*—The payment to QSE *q* for its Ancillary Service Offers cleared in the market *m* for Reg-Down, for the hour. | | RDFQAMTTOT | $ | *Reg-Down Failure Quantity Amount Total*—The total charges to all QSEs for their capacity associated with failures on their Ancillary Service Supply Responsibilities for Reg-Down, for the hour. | | RDMWINFATOT | $ | *Reg-Down Make-Whole Infeasible Amount total*⎯ The total Real-Time calculated payment to all QSEs*,* for their contribution of Reg-Down, to make-whole the Startup and energy costs of all Resources committed in the DAM, for the hour. | | RDMWINFA *q, h* | $ | *Reg-Down Make-Whole Infeasible Amount per QSE per hour*⎯ The total Real-Time calculated payment to QSE *q,* for its contribution of Reg-Down, to make-whole the Startup and energy costs of all Resources committed in the DAM, for the hour *h*. | | RDFQAMTQSETOT *q* | $ | *Reg-Down Failure Quantity Amount Total per QSE*—The charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Down, for the hour. | | RTPCRDAMTQSETOT *q* | $ | *Procured Capacity for Reg-Down Amount Total per QSE*—The total payments to a QSE *q* in all SASMs and RSASMs for the Ancillary Service Offers cleared for Reg-Down, for the hour. | | PCRDAMT *q* | $ | *Procured Capacity for Reg-Down Amount per QSE for DAM*—The DAM Reg-Down payment for QSE *q*, for the hour. | | PCRDAMTTOT | $ | *Procured Capacity for Reg-Down Amount Total in DAM*—The total of the DAM Reg-Down payments for all QSEs for the hour. | | RDINFQAMTTOT | $ | *Reg-Down Infeasible Quantity Amount Total* — The charge to all QSEs for their total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for Reg-Down, for the hour. | | RDINFQAMT *q* | $ | *Reg-Down Infeasible Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with infeasible deployment of its Ancillary Service Supply Responsibilities for Reg-Down, for the hour. | | *q* | none | A QSE. | | *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. | |

(b) Each QSE’s share of the net total costs for Reg-Down for the Operating Hour is calculated as follows:

**RDCOST *q* = RDPR \* RDQ *q***

Where:

RDPR = RDCOSTTOT / RDQTOT

RDQTOT = RDQ *q*

RDQ *q* = RDO *q* – SARDQ *q*

RDO *q* = (SARDQ *q* + (RTPCRD *q, m*) + PCRD *q* –

RDFQ *q* – RRDFQ *q*) \* HLRS *q*

SARDQ *q* = DASARDQ *q* + RTSARDQ *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| RDCOST *q* | $ | *Reg-Down Cost per QSE*—QSE *q*’s share of the net total costs for Reg-Down, for the hour. |
| RDPR | $/MW per hour | *Reg-Down Price—*The price for Reg-Down calculated based on the net total costs for Reg-Down, for the hour. |
| RDCOSTTOT | $ | *Reg-Down Cost Total*—The net total costs for Reg-Down, for the hour. See item (3)(a) above. |
| RDQTOT | MW | *Reg-Down Quantity Total*—The sum of every QSE’s Ancillary Service Obligation minus its self-arranged Reg-Down quantity in the DAM and any and all SASMs for the hour. |
| RDQ *q* | MW | *Reg-Down Quantity per QSE*—The QSE *q*’s Ancillary Service Obligation minus its self-arranged Reg-Down quantity in the DAM and any and all SASMs, for the hour. |
| RDO *q* | MW | *Reg-Down Obligation per QSE*—The Ancillary Service Obligation of QSE *q*, for the hour. |
| DASARDQ *q* | MW | *Self-Arranged Reg-Down Quantity per QSE for DAM*—The self-arranged Reg-Down quantity submitted by QSE *q* before 1000 in the Day-Ahead. |
| RTSARDQ *q* | MW | *Self-Arranged Reg-Down Quantity per QSE for all SASMs*—The sum of all self-arranged Reg-Down quantities submitted by QSE *q* for all SASMs due to an increase in the Ancillary Service Plan per Section 4.4.7.1. |
| RTPCRD *q, m* | MW | *Procured Capacity for Reg-Down per QSE by market—*The MW portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* to provide Reg-Down, for the hour. |
| RDFQ *q* | MW | *Reg-Down Failure Quantity per QSE—*QSE *q*’s total capacity associated with failures on its Ancillary Service Supply Responsibility for Reg-Down, for the hour. |
| RRDFQ *q* | MW | *Reconfiguration Reg-Down Failure Quantity per QSE*—QSE *q*’s total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Reg-Down, for the hour. |
| HLRS *q* |  | *The Hourly Load Ratio Share calculated for QSE q for the hour*. See Section 6.6.2.4. |
| PCRD *q* | MW | *Procured Capacity for Reg-Down per QSE in DAM*—The total Reg-Down capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by the QSE, for the hour. |
| SARDQ *q* | MW | *Total Self-Arranged Reg-Down Quantity per QSE for all markets*—The sum of all self-arranged Reg-Down quantities submitted by QSE *q* for DAM and all SASMs. |
| *q* | none | A QSE. |
| *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. |

(c) The adjustment to each QSE’s DAM charge for the Reg-Down for the Operating Hour, due to changes during the Adjustment Period or Real-Time operations, is calculated as follows:

**RTRDAMT *q* = RDCOST *q* – DARDAMT *q***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| RTRDAMT *q* | $ | *Real-Time Reg-Down Amount per QSE*—The adjustment to QSE *q*’s share of the costs for Reg-Down, for the hour. |
| RDCOST *q* | $ | *Reg-Down Cost per QSE*—QSE *q*’s share of the net total costs for Reg-Down, for the hour. |
| DARDAMT *q* | $ | *Day-Ahead Reg-Down Amount per QSE*—QSE *q*’s share of the DAM cost for Reg-Down, for the hour. |
| *q* | none | A QSE. |

(4) For RRS, if applicable:

(a) The net total costs for RRS for a given Operating Hour is calculated as follows:

**RRCOSTTOT = (-1) \* ((RTPCRRAMTTOT *m*) + PCRRAMTTOT + RRFQAMTTOT +**

**RRINFQAMTTOT)**

Where:

Total payment of SASM- and RSASM-procured capacity for RRS by market

RTPCRRAMTTOT *m* = RTPCRRAMT *q, m*

Total payment of DAM-procured capacity for RRS

PCRRAMTTOT= PCRRAMT *q*

Total charge of failure on Ancillary Service Supply Responsibility for RRS

RRFQAMTTOT = RRFQAMTQSETOT *q*

Total payment of SASM- and RSASM-procured capacity RRS Service by QSE

RTPCRRAMTQSETOT *q* = RTPCRRAMT *q, m*

Total charge of infeasible Ancillary Service Supply Responsibility for RRS

RRINFQAMTTOT =  RRINFQAMT *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| RRCOSTTOT | $ | *Responsive Reserve Cost Total*—The net total costs for RRS, for the hour. |
| RTPCRRAMTTOT *m* | $ | *Procured Capacity for Responsive Reserve Amount Total by market—*The total payments to all QSEs for the Ancillary Service Offers cleared in the market *m* for RRS, for the hour. |
| RTPCRRAMT *q, m* | $ | *Procured Capacity for Responsive Reserve Amount per QSE by market*—The payment to QSE *q* for its Ancillary Service Offers cleared in the market *m* for RRS, for the hour. |
| RRFQAMTTOT | $ | *Responsive Reserve Failure Quantity Amount Total*—The total charges to all QSEs for their capacity associated with failures and reconfiguration reductions on their Ancillary Service Supply Responsibilities for RRS, for the hour. |
| RRFQAMTQSETOT *q* | $ | *Responsive Reserve Failure Quantity Amount Total per QSE*—The charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for RRS, for the hour. |
| RTPCRRAMTQSETOT *q* | $ | *Procured Capacity for Responsive Reserve Amount Total per QSE*—The total payments to a QSE *q* in all SASMs and RSASMs for the Ancillary Service Offers cleared for RRS, for the hour. |
| PCRRAMT *q* | $ | *Procured Capacity for Responsive Reserve Amount per QSE for DAM*—The DAM RRS payment for QSE *q*, for the hour. |
| PCRRAMTTOT | $ | *Procured Capacity for Responsive Reserve Amount Total in DAM*—The total of the DAM RRS payments for all QSEs, for the hour. |
| RRINFQAMTTOT | $ | *Responsive Reserve Infeasible Quantity Amount Total* — The charge to all QSEs for their total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for RRS, for the hour. |
| RRINFQAMT *q* | $ | *Responsive Reserve Infeasible Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for RRS, for the hour. |
| *q* | none | A QSE. |
| *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR841: Replace paragraph (a) above with the following upon system implementation:]  (a) The net total costs for RRS for a given Operating Hour is calculated as follows:  **RRCOSTTOT = (-1) \* ((RTPCRRAMTTOT *m*) + PCRRAMTTOT + RRFQAMTTOT +**  **RRINFQAMTTOT + RRMWINFATOT)**  Where:  Total payment of SASM- and RSASM-procured capacity for RRS by market  RTPCRRAMTTOT *m* = RTPCRRAMT *q, m*  Total payment of DAM-procured capacity for RRS  PCRRAMTTOT= PCRRAMT *q*  Total charge of failure on Ancillary Service Supply Responsibility for RRS  RRFQAMTTOT = RRFQAMTQSETOT *q*  Total payment of SASM- and RSASM-procured capacity for RRS by QSE  RTPCRRAMTQSETOT *q* = RTPCRRAMT *q, m*  Total charge of infeasible Ancillary Service Supply Responsibility for RRS  RRINFQAMTTOT =  RRINFQAMT *q*  Total Real-Time Day-Ahead Make-Whole Payment for RRS  RRMWINFATOT =  RRMWINFA *q, h*  The above variables are defined as follows:   | **Variable** | **Unit** | **Description** | | --- | --- | --- | | RRCOSTTOT | $ | *Responsive Reserve Cost Total*—The net total costs for RRS, for the hour. | | RTPCRRAMTTOT *m* | $ | *Procured Capacity for Responsive Reserve Amount Total by market—*The total payments to all QSEs for the Ancillary Service Offers cleared in the market *m* for RRS, for the hour. | | RTPCRRAMT *q, m* | $ | *Procured Capacity for Responsive Reserve Amount per QSE by market*—The payment to QSE *q* for its Ancillary Service Offers cleared in the market *m* for RRS, for the hour. | | RRFQAMTTOT | $ | *Responsive Reserve Failure Quantity Amount Total*—The total charges to all QSEs for their capacity associated with failures and reconfiguration reductions on their Ancillary Service Supply Responsibilities for RRS, for the hour. | | RRMWINFATOT | $ | *Responsive Reserve Make-Whole Infeasible Amount total*⎯ The total Real-Time calculated payment to all QSEs*,* for their contribution of RRS, to make-whole the Startup and energy costs of all Resources committed in the DAM, for the hour. | | RRMWINFA *q, h* | $ | *Responsive Reserve Make-Whole Infeasible Amount per QSE per hour*⎯ The total Real-Time calculated payment to QSE *q,* for its contribution of RRS, to make-whole the Startup and energy costs of all Resources committed in the DAM, for the hour *h*. | | RRFQAMTQSETOT *q* | $ | *Responsive Reserve Failure Quantity Amount Total per QSE*—The charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for RRS, for the hour. | | RTPCRRAMTQSETOT *q* | $ | *Procured Capacity for Responsive Reserve Amount Total per QSE*—The total payments to a QSE *q* in all SASMs and RSASMs for the Ancillary Service Offers cleared for RRS, for the hour. | | PCRRAMT *q* | $ | *Procured Capacity for Responsive Reserve Amount per QSE in DAM*—The DAM RRS payment for QSE *q*, for the hour. | | PCRRAMTTOT | $ | *Procured Capacity for Responsive Reserve Amount Total in DAM*—The total of the DAM RRS payments for all QSEs, for the hour. | | RRINFQAMTTOT | $ | *Responsive Reserve Infeasible Quantity Amount Total* — The charge to all QSEs for their total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for RRS, for the hour. | | RRINFQAMT *q* | $ | *Responsive Reserve Infeasible Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for RRS, for the hour. | | *q* | none | A QSE. | | *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. | |

(b) Each QSE’s share of the net total costs for RRS for the Operating Hour is calculated as follows:

**RRCOST *q* = RRPR \* RRQ *q***

Where:

RRPR = RRCOSTTOT / RRQTOT

RRQTOT = RRQ *q*

RRQ *q* = RRO *q* – SARRQ *q*

RRO *q* = (SARRQ*q* + (RTPCRR *q, m*) + PCRR *q* –

RRFQ *q* – RRRFQ *q*) \* HLRS *q*

SARRQ *q* = DASARRQ *q* + RTSARRQ *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| RRCOST *q* | $ | *Responsive Reserve Cost per QSE*—QSE *q*’s share of the net total costs for RRS, for the hour. |
| RRPR | $/MW per hour | *Responsive Reserve Price—*The price for RRS calculated based on the net total costs for RRS, for the hour. |
| RRCOSTTOT | $ | *Responsive Reserve Cost Total*—The net total costs for RRS, for the hour. See item (4)(a) above. |
| RRQTOT | MW | *Responsive Reserve Quantity Total*—The sum of every QSE’s Ancillary Service Obligation minus its self-arranged RRS quantity in the DAM and any and all SASMs for the hour. |
| RRQ *q* | MW | *Responsive Reserve Quantity per QSE*—The QSE *q*’s Ancillary Service Obligation minus its self-arranged RRS quantity in the DAM and any and all SASMs, for the hour. |
| RRO *q* | MW | *Responsive Reserve Obligation per QSE*—The Ancillary Service Obligation of QSE *q*, for the hour. |
| DASARRQ *q* | MW | *Day-Ahead Self-Arranged Responsive Reserve Quantity per QSE*—The self-arranged RRS quantity submitted by QSE *q* before 1000 in the Day-Ahead. |
| RTSARRQ *q* | MW | *Self-Arranged Responsive Reserve Quantity per QSE for all SASMs*—The sum of all self-arranged RRS quantities submitted by QSE *q* for all SASMs due to an increase in the Ancillary Service Plan per Section 4.4.7.1. |
| RTPCRR *q, m* | MW | *Procured Capacity for Responsive Reserve per QSE by market—*The MW portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* to provide RRS, for the hour. |
| RRFQ *q* | MW | *Responsive Reserve Failure Quantity per QSE—*QSE *q*’s total capacity associated with failures on its Ancillary Service Supply Responsibility for RRS, for the hour. |
| RRRFQ *q* | MW | *Reconfiguration Responsive Reserve Failure Quantity per QSE—*QSE *q*’s total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for RRS, for the hour. |
| HLRS *q* | none | *The Hourly Load Ratio Share calculated for QSE q for the hour*. See Section 6.6.2.4. |
| PCRR *q* | MW | *Procured Capacity for Responsive Reserve per QSE in DAM*—The total RRS capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by the QSE, for the hour. |
| SARRQ *q* | MW | *Total Self-Arranged Responsive Reserve Quantity per QSE for all markets*—The sum of all self-arranged RRS quantities submitted by QSE *q* for DAM and all SASMs. |
| *q* | none | A QSE. |
| *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. |

(c) The adjustment to each QSE’s DAM charge for the RRS for the Operating Hour, due to changes during the Adjustment Period or Real-Time operations, is calculated as follows:

**RTRRAMT *q* = RRCOST *q* – DARRAMT *q***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| RTRRAMT *q* | $ | *Real-Time Responsive Reserve Amount per QSE*—The adjustment to QSE *q*’s share of the costs for RRS, for the hour. |
| RRCOST *q* | $ | *Responsive Reserve Cost per QSE*—QSE *q*’s share of the net total costs for RRS, for the hour. |
| DARRAMT *q* | $ | *Day-Ahead Responsive Reserve Amount per QSE*—QSE *q*’s share of the DAM cost for RRS, for the hour. |
| *q* | none | A QSE. |

(5) For Non-Spin, if applicable:

(a) The net total costs for Non-Spin for a given Operating Hour is calculated as follows:

**NSCOSTTOT = (-1) \* ((RTPCNSAMTTOT *m***) **+ PCNSAMTTOT + NSFQAMTTOT +**

**NSINFQAMTTOT)**

Where:

Total payment of SASM- and RSASM-procured capacity for Non-Spin by market

RTPCNSAMTTOT *m* = RTPCNSAMT *q, m*

Total payment of DAM-procured capacity for Non-Spin

PCNSAMTTOT = PCNSAMT *q*

Total charge of failure on Ancillary Service Supply Responsibility for Non-Spin

NSFQAMTTOT = NSFQAMTQSETOT *q*

Total payment of SASM- and RSASM-procured capacity for Non-Spin by QSE

RTPCNSAMTQSETOT *q* = RTPCNSAMT *q, m*

Total charge of infeasible Ancillary Service Supply Responsibility for Non-Spin

NSINFQAMTTOT =  NSINFQAMT *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| NSCOSTTOT | $ | *Non-Spin Cost Total*—The net total costs for Non-Spin, for the hour. |
| RTPCNSAMTTOT *m* | $ | *Procured Capacity for Non-Spin Amount Total by market—*The total payments to all QSEs for the Ancillary Service Offers cleared in the market *m* for Non-Spin, for the hour. |
| RTPCNSAMT *q, m* | $ | *Procured Capacity for Non-Spin Amount per QSE by market*—The payment to QSE *q* for its Ancillary Service Offers cleared in the market *m* for Non-Spin, for the hour. |
| NSFQAMTTOT | $ | *Non-Spin Failure Quantity Amount Total*—The total charges to all QSEs for their capacity associated with failures and reconfiguration reductions on their Ancillary Service Supply Responsibilities for Non-Spin, for the hour. |
| NSFQAMTQSETOT *q* | $ | *Non-Spin Failure Quantity Amount Total per QSE*—The charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for Non-Spin, for the hour. |
| RTPCNSAMTQSETOT *q* | $ | *Procured Capacity for Non-Spin Amount Total per QSE*—The total payments to a QSE *q* in all SASMs and RSASMs for the Ancillary Service Offers cleared for Non-Spin, for the hour. |
| PCNSAMT *q* | $ | *Procured Capacity for Non-Spin Amount per QSE in DAM—*The DAM Non-Spin payment for QSE *q*, for the hour. |
| PCNSAMTTOT | $ | *Procured Capacity for Non-Spin Amount Total in DAM*—The total of the DAM Non-Spin payments for all QSEs, for the hour. |
| NSINFQAMTTOT | $ | *Non-Spin Infeasible Quantity Amount Total* — The charge to all QSEs for their total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for Non-Spin, for the hour. |
| NSINFQAMT *q* | $ | *Non-Spin Infeasible Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for Non-Spin, for the hour. |
| *q* | none | A QSE. |
| *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR841: Replace paragraph (a) above with the following upon system implementation:]  (a) The net total costs for Non-Spin for a given Operating Hour is calculated as follows:  **NSCOSTTOT = (-1) \* ((RTPCNSAMTTOT *m***) **+ PCNSAMTTOT + NSFQAMTTOT +**  **NSINFQAMTTOT + NSMWINFATOT)**  Where:  Total payment of SASM- and RSASM-procured capacity for Non-Spin by market  RTPCNSAMTTOT *m* = RTPCNSAMT *q, m*  Total payment of DAM-procured capacity for Non-Spin  PCNSAMTTOT = PCNSAMT *q*  Total charge of failure on Ancillary Service Supply Responsibility for Non-Spin  NSFQAMTTOT = NSFQAMTQSETOT *q*  Total payment of SASM- and RSASM-procured capacity for Non-Spin by QSE  RTPCNSAMTQSETOT *q* = RTPCNSAMT *q, m*  Total charge of infeasible Ancillary Service Supply Responsibility for Non-Spin  NSINFQAMTTOT =  NSINFQAMT *q*  Total Real-Time Day-Ahead Make-Whole Payment for Non-Spin  NSMWINFATOT =  NSMWINFA *q, h*  The above variables are defined as follows:   | **Variable** | **Unit** | **Description** | | --- | --- | --- | | NSCOSTTOT | $ | *Non-Spin Cost Total*—The net total costs for Non-Spin, for the hour. | | RTPCNSAMTTOT *m* | $ | *Procured Capacity for Non-Spin Amount Total by market—*The total payments to all QSEs for the Ancillary Service Offers cleared in the market *m* for Non-Spin, for the hour. | | RTPCNSAMT *q, m* | $ | *Procured Capacity for Non-Spin Amount per QSE by market*—The payment to QSE *q* for its Ancillary Service Offers cleared in the market *m* for Non-Spin, for the hour. | | NSFQAMTTOT | $ | *Non-Spin Failure Quantity Amount Total*—The total charges to all QSEs for their capacity associated with failures and reconfiguration reductions on their Ancillary Service Supply Responsibilities for Non-Spin, for the hour. | | NSMWINFATOT | $ | *Non Spin Make-Whole Infeasible Amount total*⎯ The total Real-Time calculated payment to all QSEs*,* for their contribution of Non-Spin, to make-whole the Startup and energy costs of all Resources committed in the DAM, for the hour. | | NSMWINFA *q, h* | $ | *Non Spin Make-Whole Infeasible Amount per QSE per hour*⎯ The total Real-Time calculated payment to QSE *q,* for its contribution of Non-Spin, to make-whole the Startup and energy costs of all Resources committed in the DAM, for the hour *h*. | | NSFQAMTQSETOT *q* | $ | *Non-Spin Failure Quantity Amount Total per QSE*—The charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for Non-Spin, for the hour. | | RTPCNSAMTQSETOT *q* | $ | *Procured Capacity for Non-Spin Amount Total per QSE*—The total payments to a QSE *q* in all SASMs and RSASMs for the Ancillary Service Offers cleared for Non-Spin, for the hour. | | PCNSAMT *q* | $ | *Procured Capacity for Non-Spin Amount per QSE in DAM—*The DAM Non-Spin payment for QSE *q*, for the hour. | | PCNSAMTTOT | $ | *Procured Capacity for Non-Spin Amount Total in DAM*—The total of the DAM Non-Spin payments for all QSEs, for the hour. | | NSINFQAMTTOT | $ | *Non-Spin Infeasible Quantity Amount Total* — The charge to all QSEs for their total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for Non-Spin, for the hour. | | NSINFQAMT *q* | $ | *Non-Spin Infeasible Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for Non-Spin, for the hour. | | *q* | none | A QSE. | | *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. | |

(b) Each QSE’s share of the net total costs for Non-Spin for the Operating Hour is calculated as follows:

**NSCOST *q* = NSPR \* NSQ *q***

Where:

NSPR = NSCOSTTOT / NSQTOT

NSQTOT = NSQ *q*

NSQ *q* = NSO *q* – SANSQ *q*

NSO *q* = (SANSQ *q* + (RTPCNS *q, m*) + PCNS *q* –

NSFQ *q* – RNSFQ *q*) \* HLRS *q*

SANSQ *q* = DASANSQ *q* + RTSANSQ *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| NSCOST *q* | $ | *Non-Spin Cost per QSE*—QSE *q*’s share of the net total costs for Non-Spin, for the hour. |
| NSPR | $/MW per hour | *Non-Spin Price—*The price for Non-Spin calculated based on the net total costs for Non-Spin, for the hour. |
| NSCOSTTOT | $ | *Non-Spin Cost Total*—The net total costs for Non-Spin for the hour. See item (5)(a) above. |
| NSQTOT | MW | *Non-Spin Quantity Total*—The sum of every QSE’s Ancillary Service Obligation minus its self-arranged Non-Spin quantity in the DAM and any and all SASMs, for the hour. |
| NSQ *q* | MW | *Non-Spin Quantity per QSE*—The difference in QSE *q*’s Ancillary Service Obligation minus its self-arranged Non-Spin quantity in the DAM and any and all SASMs, for the hour. |
| NSO *q* | MW | *Non-Spin Obligation per QSE*—The Ancillary Service Obligation of QSE *q*, for the hour. |
| DASANSQ *q* | MW | *Day-Ahead Self-Arranged Non-Spin Quantity per QSE for DAM*—The self-arranged Non-Spin quantity submitted by QSE *q* before 1000 in the Day-Ahead. |
| RTSANSQ *q* | MW | *Self-Arranged Non-Spin Quantity per QSE for all SASMs*—The sum of all self-arranged Non-Spin quantities submitted by QSE *q* for all SASMs due to an increase in the Ancillary Service Plan per Section 4.4.7.1. |
| RTPCNS *q, m* | MW | *Procured Capacity for Non-Spin per QSE by market—*The MW portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* to provide Non-Spin, for the hour. |
| NSFQ *q* | MW | *Non-Spin Failure Quantity per QSE—*QSE *q*’s total capacity associated with failures on its Ancillary Service Supply Responsibility for Non-Spin, for the hour. |
| RNSFQ *q* | MW | *Reconfiguration Non-Spin Failure Quantity per QSE—*QSE *q*’s total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for Non-Spin, for the hour. |
| HLRS *q* | none | *The Hourly Load Ratio Share calculated for QSE q for the hour*. See Section 6.6.2.4. |
| PCNS *q* | MW | *Procured Capacity for Non-Spin Service per QSE in DAM*—The total Non-Spin capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by the QSE, for the hour. |
| SANSQ *q* | MW | *Total Self-Arranged Non-Spin Supplied Quantity per QSE for all markets*—The sum of all self-arranged Non-Spin quantities submitted by QSE *q* for DAM and all SASMs. |
| *q* | none | A QSE. |
| *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. |

(c) The adjustment to each QSE’s DAM charge for the Non-Spin for the Operating Hour, due to changes during the Adjustment Period or Real-Time operations, is calculated as follows:

**RTNSAMT *q* = NSCOST *q* – DANSAMT *q***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| RTNSAMT *q* | $ | *Real-Time Non-Spin Amount per QSE*—The adjustment to QSE *q*’s share of the costs for Non-Spin, for the hour. |
| NSCOST *q* | $ | *Non-Spin Cost per QSE*—QSE *q*’s share of the net total costs for Non-Spin, for the hour. |
| DANSAMT *q* | $ | *Day-Ahead Non-Spin Amount per QSE*—QSE *q*’s share of the DAM cost for Non-Spin, for the hour. |
| *q* | none | A QSE. |

(6) For ECRS, if applicable:

(a) The net total costs for ECRS for a given Operating Hour is calculated as follows:

**ECRCOSTTOT = (-1) \* ((RTPCECRAMTTOT *m*) + PCECRAMTTOT + ECRFQAMTTOT +**

**ECRINFQAMTTOT)**

Where:

Total payment of SASM- and RSASM-procured capacity for ECRS by market

RTPCECRAMTTOT *m* = RTPCECRAMT *q, m*

Total payment of DAM-procured capacity for ECRS

PCECRAMTTOT= PCECRAMT *q*

Total charge of failure on Ancillary Service Supply Responsibility for ECRS

ECRFQAMTTOT = ECRFQAMTQSETOT *q*

Total payment of SASM- and RSASM-procured capacity ECRS Service by QSE

RTPCECRAMTQSETOT *q* = RTPCECRAMT *q, m*

Total charge of infeasible Ancillary Service Supply Responsibility for ECRS

ECRINFQAMTTOT =  ECRINFQAMT *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| ECRCOSTTOT | $ | *ERCOT Contingency Reserve Service Cost Total*—The net total costs for ECRS, for the hour. |
| RTPCECRAMTTOT *m* | $ | *Procured Capacity for ERCOT Contingency Reserve Service Amount Total by market—*The total payments to all QSEs for the Ancillary Service Offers cleared in the market *m* for ECRS, for the hour. |
| RTPCECRAMT *q, m* | $ | *Procured Capacity for ERCOT Contingency Reserve Service Amount per QSE by market*—The payment to QSE *q* for its Ancillary Service Offers cleared in the market *m* for ECRS, for the hour. |
| ECRFQAMTTOT | $ | *ERCOT Contingency Reserve Service Failure Quantity Amount Total*—The total charges to all QSEs for their capacity associated with failures and reconfiguration reductions on their Ancillary Service Supply Responsibilities for ECRS, for the hour. |
| ECRFQAMTQSETOT *q* | $ | *ERCOT Contingency Reserve Service Failure Quantity Amount Total per QSE*—The charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for ECRS, for the hour. |
| RTPCECRAMTQSETOT *q* | $ | *Procured Capacity for ERCOT Contingency Reserve Service Amount Total per QSE*—The total payments to a QSE *q* in all SASMs and RSASMs for the Ancillary Service Offers cleared for ECRS, for the hour. |
| PCECRAMT *q* | $ | *Procured Capacity for ERCOT Contingency Reserve Service Amount per QSE for DAM*—The DAM ECRS payment for QSE *q*, for the hour. |
| PCECRAMTTOT | $ | *Procured Capacity for ERCOT Contingency Reserve Service Amount Total in DAM*—The total of the DAM ECRS payments for all QSEs, for the hour. |
| ECRINFQAMTTOT | $ | *ERCOT Contingency Reserve Service Infeasible Quantity Amount Total* — The charge to all QSEs for their total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for ECRS, for the hour. |
| ECRINFQAMT *q* | $ | *ERCOT Contingency Reserve Service Infeasible Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for ECRS, for the hour. |
| *q* | none | A QSE. |
| *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR841: Replace paragraph (a) above with the following upon system implementation:]  (a) The net total costs for ECRS for a given Operating Hour is calculated as follows:  **ECRCOSTTOT = (-1) \* ((RTPCECRAMTTOT *m*) + PCECRAMTTOT + ECRFQAMTTOT +**  **ECRINFQAMTTOT + ECRMWINFATOT)**  Where:  Total payment of SASM- and RSASM-procured capacity for ECRS by market  RTPCECRAMTTOT *m* = RTPCECRAMT *q, m*  Total payment of DAM-procured capacity for ECRS  PCECRAMTTOT= PCECRAMT *q*  Total charge of failure on Ancillary Service Supply Responsibility for ECRS  ECRFQAMTTOT = ECRFQAMTQSETOT *q*  Total payment of SASM- and RSASM-procured capacity ECRS Service by QSE  RTPCECRAMTQSETOT *q* = RTPCECRAMT *q, m*  Total charge of infeasible Ancillary Service Supply Responsibility for ECRS  ECRINFQAMTTOT =  ECRINFQAMT *q*  Total Real-Time Day-Ahead Make-Whole Payment for ECRS  ECRMWINFATOT =  ECRMWINFA *q, h*  The above variables are defined as follows:   | **Variable** | **Unit** | **Description** | | --- | --- | --- | | ECRCOSTTOT | $ | *ERCOT Contingency Reserve Service Cost Total*—The net total costs for ECRS, for the hour. | | RTPCECRAMTTOT *m* | $ | *Procured Capacity for ERCOT Contingency Reserve Service Amount Total by market—*The total payments to all QSEs for the Ancillary Service Offers cleared in the market *m* for ECRS, for the hour. | | RTPCECRAMT *q, m* | $ | *Procured Capacity for ERCOT Contingency Reserve Service Amount per QSE by market*—The payment to QSE *q* for its Ancillary Service Offers cleared in the market *m* for ECRS, for the hour. | | ECRFQAMTTOT | $ | *ERCOT Contingency Reserve Service Failure Quantity Amount Total*—The total charges to all QSEs for their capacity associated with failures and reconfiguration reductions on their Ancillary Service Supply Responsibilities for ECRS, for the hour. | | ECRMWINFATOT | $ | *ERCOT Contingency Reserve Service Make-Whole Infeasible Amount total*⎯ The total Real-Time calculated payment to all QSEs*,* for their contribution of ECRS, to make-whole the Startup and energy costs of all Resources committed in the DAM, for the hour. | | ECRMWINFA *q, h* | $ | *ERCOT Contingency Reserve Service Make-Whole Infeasible Amount per QSE per hour*⎯ The total Real-Time calculated payment to QSE *q,* for its contribution of ECRS, to make-whole the Startup and energy costs of all Resources committed in the DAM, for the hour *h*. | | ECRFQAMTQSETOT *q* | $ | *ERCOT Contingency Reserve Service Failure Quantity Amount Total per QSE*—The charge to QSE *q* for its total capacity associated with failures and reconfiguration reductions on its Ancillary Service Supply Responsibility for ECRS, for the hour. | | RTPCECRAMTQSETOT *q* | $ | *Procured Capacity for ERCOT Contingency Reserve Service Amount Total per QSE*—The total payments to a QSE *q* in all SASMs and RSASMs for the Ancillary Service Offers cleared for ECRS, for the hour. | | PCECRAMT *q* | $ | *Procured Capacity for ERCOT Contingency Reserve Service Amount per QSE for DAM*—The DAM ECRS payment for QSE *q*, for the hour. | | PCECRAMTTOT | $ | *Procured Capacity for ERCOT Contingency Reserve Service Amount Total in DAM*—The total of the DAM ECRS payments for all QSEs, for the hour. | | ECRINFQAMTTOT | $ | *ERCOT Contingency Reserve Service Infeasible Quantity Amount Total* — The charge to all QSEs for their total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for ECRS, for the hour. | | ECRINFQAMT *q* | $ | *ERCOT Contingency Reserve Service Infeasible Quantity Amount per QSE*—The total charge to QSE *q* for its total capacity associated with infeasible deployment of Ancillary Service Supply Responsibilities for ECRS, for the hour. | | *q* | none | A QSE. | | *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. | |

(b) Each QSE’s share of the net total costs for ECRS for the Operating Hour is calculated as follows:

**ECRCOST *q* = ECRPR \* ECRQ *q***

Where:

ECRPR = ECRCOSTTOT / ECRQTOT

ECRQTOT = ECRQ *q*

ECRQ *q* = ECRO *q* – SAECRQ *q*

ECRO *q* = (SAECRQ*q* + (RTPCECR *q, m*) + PCECR *q* –

ECRFQ *q* – RECRFQ *q*) \* HLRS *q*

SAECRQ *q* = DASAECRQ *q* + RTSAECRQ *q*

The above variables are defined as follows:

| **Variable** | **Unit** | **Description** |
| --- | --- | --- |
| ECRCOST *q* | $ | *ERCOT Contingency Reserve Service Cost per QSE*—QSE *q*’s share of the net total costs for ECRS, for the hour. |
| ECRPR | $/MW per hour | *ERCOT Contingency Reserve Service Price—*The price for ECRS calculated based on the net total costs for ECRS, for the hour. |
| ECRCOSTTOT | $ | *ERCOT Contingency Reserve Service Cost Total*—The net total costs for ECRS, for the hour. See item (6)(a) above. |
| ECRQTOT | MW | *ERCOT Contingency Reserve Service Quantity Total*—The sum of every QSE’s Ancillary Service Obligation minus its self-arranged ECRS quantity in the DAM and any and all SASMs for the hour. |
| ECRQ *q* | MW | *ERCOT Contingency Reserve Service Quantity per QSE*—The QSE *q*’s Ancillary Service Obligation minus its self-arranged ECRS quantity in the DAM and any and all SASMs, for the hour. |
| ECRO *q* | MW | *ERCOT Contingency Reserve Service Obligation per QSE*—The Ancillary Service Obligation of QSE *q*, for the hour. |
| DASAECRQ *q* | MW | *Day-Ahead Self-Arranged ERCOT Contingency Reserve Service Quantity per QSE*—The self-arranged ECRS quantity submitted by QSE *q* before 1000 in the Day-Ahead. |
| RTSAECRQ *q* | MW | *Self-Arranged ERCOT Contingency Reserve Service Quantity per QSE for all SASMs*—The sum of all self-arranged ECRS quantities submitted by QSE *q* for all SASMs due to an increase in the Ancillary Service Plan per Section 4.4.7.1. |
| RTPCECR *q, m* | MW | *Procured Capacity for ERCOT Contingency Reserve Service per QSE by market—*The MW portion of QSE *q*’s Ancillary Service Offers cleared in the market *m* to provide ECRS, for the hour. |
| ECRFQ *q* | MW | *ERCOT Contingency Reserve Service Failure Quantity per QSE—*QSE *q*’s total capacity associated with failures on its Ancillary Service Supply Responsibility for ECRS, for the hour. |
| RECRFQ *q* | MW | *Reconfiguration ERCOT Contingency Reserve Service Failure Quantity per QSE—*QSE *q*’s total capacity associated with reconfiguration reductions on its Ancillary Service Supply Responsibility for ECRS, for the hour. |
| HLRS *q* | none | *The Hourly Load Ratio Share calculated for QSE q for the hour*. See Section 6.6.2.4. |
| PCECR *q* | MW | *Procured Capacity for ERCOT Contingency Reserve Service per QSE in DAM*—The total ECRS capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by the QSE, for the hour. |
| SAECRQ *q* | MW | *Total Self-Arranged ERCOT Contingency Reserve Service Quantity per QSE for all markets*—The sum of all self-arranged ECRS quantities submitted by QSE *q* for DAM and all SASMs. |
| *q* | none | A QSE. |
| *m* | none | An Ancillary Service market (SASM or RSASM) for the given Operating Hour. |

(c) The adjustment to each QSE’s DAM charge for the ECRS for the Operating Hour, due to changes during the Adjustment Period or Real-Time operations, is calculated as follows:

**RTECRAMT *q* = ECRCOST *q* – DAECRAMT *q***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| RTECRAMT *q* | $ | *Real-Time ERCOT Contingency Reserve Service Amount per QSE*—The adjustment to QSE *q*’s share of the costs for ECRS, for the hour. |
| ECRCOST *q* | $ | *ERCOT Contingency Reserve Service Cost per QSE*—QSE *q*’s share of the net total costs for ECRS, for the hour. |
| DAECRAMT *q* | $ | *Day-Ahead ERCOT Contingency Reserve Service Amount per QSE*—QSE *q*’s share of the DAM cost for ECRS, for the hour. |
| *q* | none | A QSE. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1010: Replace Section 6.7.4 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  6.7.4 Real-Time Settlement for Updated Day-Ahead Market Ancillary Service Obligations  (1) Each QSE is charged or paid for net obligations for each Ancillary Service procured in the DAM. DAM costs are calculated for each QSE in accordance with Section 4.6.4, Settlement of Ancillary Services Procured in the DAM. DAM net total costs for Ancillary Service procured in the DAM are re-calculated for each QSE under this Section based on Real-Time Load Ratio Share (LRS). Payments and/or charges for Ancillary Service obligations are calculated by Operating Hour as follows:  (a) For Regulation Up Service (Reg-Up), if applicable:  DARTPCRUAMT *q*= (DARUNOBL*q* -DASARUQ *q*) \* DARUPR - DARUAMT *q*  Where:  DARUNOBL *q* = DAPCRUQTOT \* HLRS *q*  DAPCRUQTOT = (PCRUR *r, q, DAM* *+* DARUOAWD *q* +DASARUQ *q*)  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | DARTPCRUAMT *q* | $ | *Day-Ahead Updated Real-Time Procured Capacity for Reg-Up Amount by QSE -* The payment or charge to QSE *q* for Reg-Up, for the re-calculated Real-Time obligation, for the Operating Hour. | | DARUPR | $/MW | *Day-Ahead Reg-Up Price*—The DAM Reg-Up price for the Operating Hour. | | DARUNOBL*q* | MW | *Day-Ahead Reg-Up New Obligation per QSE—*The updated Reg-Up Ancillary Service Obligation in Real-Time for QSE *q* for the Operating Hour. | | DARUAMT *q* | $ | *Day-Ahead Reg-Up Amount per QSE*—QSE *q*’s share of the DAM costs for Reg-Up for the Operating Hour. | | PCRUR *r, q, DAM* | MW | *Procured Capacity for Reg-Up per Resource per QSE in DAM*—The Reg-Up capacity awarded to QSE *q* in the DAM for Resource *r* for the Operating Hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | DARUOAWD *q* | MW | *Day-Ahead Reg-Up Award for the QSE* —The Reg-Up Only capacity awarded in the DAM to QSE *q* for the Operating Hour. | | HLRS *q* | none | *Hourly Load Ratio Share per QSE*—The Real-Time LRS as defined in Section 6.6.2.4, QSE Load Ratio Share for an Operating Hour, for QSE *q*, for the Operating Hour. | | DAPCRUQTOT | MW | *Day-Ahead Procured Capacity for Reg-Up Total*—The total Reg-Up capacity for all QSEs for all Reg-Up awarded and self-arranged in the DAM for the Operating Hour. | | DASARUQ *q* | MW | *Day-Ahead Self-Arranged Reg-Up Quantity per QSE*—The self-arranged Reg-Up capacity submitted by QSE *q* before 1000 in the DAM for the Operating Hour. | | *q* | none | A QSE. | | *r* | none | A Resource. |   (b) For Regulation Down Service (Reg-Down), if applicable:  DARTPCRDAMT *q*= (DARDNOBL*q*- DASARDQ *q*) \* DARDPR - DARDAMT *q*  Where:  DARDNOBL *q* = DAPCRDQTOT \* HLRS *q*  DAPCRDQTOT =  (PCRDR *r, q, DAM* + DARDOAWD *q* + DASARDQ *q*)  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | DARTPCRDAMT *q* | $ | *Day-Ahead Updated Real-Time Procured Capacity for Reg-Down Amount by QSE -* The payment or charge to QSE *q* for Reg-Down, for the re-calculated Real-Time obligation, for the Operating Hour. | | DARDPR | $/MW | *Day-Ahead Reg-Down Price*—The DAM Reg-Down price for the Operating Hour. | | DARDNOBL*q* | MW | *Day-Ahead Reg-Down New Obligation per QSE—*The updated Reg-Down Ancillary Service Obligation in Real-Time, for QSE *q*, for the Operating Hour. | | DARDAMT *q* | $ | *Day-Ahead Reg-Down Amount per QSE*—QSE *q*’s share of the DAM cost for Reg-Down, for the Operating Hour. | | PCRDR *r, q, DAM* | MW | *Procured Capacity for Reg-Down per Resource per QSE in DAM*—The Reg-Down capacity awarded to QSE *q* in the DAM for Resource *r* for the Operating Hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | DARDOAWD *q* | MW | *Day-Ahead Reg-Down Only Award for the QSE* —The Reg-Down Only capacity awarded in the DAM to QSE *q* for the Operating Hour. | | HLRS *q* | none | *Hourly Load Ratio Share per QSE*—The Real-Time as defined in Section 6.6.2.4, QSE Load Ratio Share for an Operating Hour for QSE *q*, for the Operating Hour. | | DAPCRDQTOT | MW | *Day-Ahead Procured Capacity for Reg-Down Total*—The total Reg-Down capacity for all QSEs for all Reg-Down awarded and self-arranged, in the DAM for the Operating Hour. | | DASARDQ *q* | MW | *Day-Ahead Self-Arranged Reg-Down Quantity per QSE*—The self-arranged Reg-Down capacity submitted by QSE *q* before 1000 in the DAM for the Operating Hour. | | *q* | none | A QSE. | | *r* | none | A Resource. |   (c) For Responsive Reserve (RRS), if applicable:  DARTPCRRAMT *q* = (DARRNOBL *q* – DASARRQ *q*) \* DARRPR - DARRAMT *q*  Where:  DARRNOBL *q* = DAPCRRQTOT \* HLRS *q*  DAPCRRQTOT = (PCRRR *r, q, DAM* + DARROAWD *q* + DASARRQ *q*)  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | DARTPCRRAMT *q* | $ | *Day-Ahead Updated Real-Time Procured Capacity for Responsive Reserve Amount by QSE -* The payment or charge to QSE *q* for RRS, for the re-calculated Real-Time obligation, for the Operating Hour. | | DARRPR | $/MW | *Day-Ahead Responsive Reserve Price*—The DAM RRS price for the Operating Hour. | | DARRNOBL*q* | MW | *Day-Ahead Responsive Reserve New Obligation per QSE—*The updated RRS Ancillary Service Obligation in Real-Time for QSE *q* for the Operating Hour. | | DARRAMT *q* | $ | *Day-Ahead Responsive Reserve Amount per QSE*—QSE *q*’s share of the DAM cost for RRS for the Operating Hour. | | PCRRR *r, q, DAM* | MW | *Procured Capacity for Responsive Reserve per Resource per QSE in DAM*—The RRS capacity awarded to QSE *q* in the DAM for Resource *r* for the Operating Hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | DARROAWD *q* | MW | *Day-Ahead Responsive Reserve Only Award for the QSE* —The RRS Only capacity awarded in the DAM to QSE *q* for the Operating Hour. | | HLRS *q* | none | Hourly Load Ratio Share per QSE—The Real-Time LRS as defined in Section 6.6.2.4, QSE Load Ratio Share for an Operating Hour for QSE *q* for the Operating Hour. | | DAPCRRQTOT | MW | *Day-Ahead Procured Capacity for Responsive Reserve Total* —The total RRS capacity for all QSEs for all RRS awarded and self-arranged in the DAM for the Operating Hour. | | DASARRQ *q* | MW | *Day-Ahead Self-Arranged Responsive Reserve Quantity per QSE*—The self-arranged RRS capacity submitted by QSE *q* before 1000 in the DAM for the Operating Hour. | | *q* | none | A QSE. | | *r* | none | A Resource. |   (d) For Non-Spinning Reserve (Non-Spin), if applicable:  DARTPCNSAMT *q* = (DANSNOBL *q* – DASANSQ *q*) \* DANSPR - DANSAMT *q*  Where:  DANSNOBL *q*  = DAPCNSQTOT \* HLRS *q*  DAPCNSQTOT =  (PCNSR *r, q, DAM* + DANSOAWD *q* + DASANSQ *q*)  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | DARTPCNSAMT *q* | $ | *Day-Ahead Updated Real-Time Procured Capacity for Non-Spin Amount by QSE -* The payment or charge to QSE *q* for Non-Spin for the re-calculated Real-Time obligation for the Operating Hour. | | DANSPR | $/MW | *Day-Ahead Non-Spin Price*—The DAM Non-Spin price for the Operating Hour. | | DANSNOBL*q* | MW | *Day-Ahead Non-Spin New Obligation per QSE—*The updated Non-Spin Ancillary Service Obligation in Real-Time for QSE *q* for the Operating Hour. | | PCNSR *r, q, DAM* | MW | *Procured Capacity for Non-Spin per Resource per QSE in DAM*—The Non-Spin capacity awarded to QSE *q* in the DAM for Resource *r* for the Operating Hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | DANSOAWD *q* | MW | *Day-Ahead Non-Spin Only Award for the QSE* — The Non-Spin Only capacity awarded in the DAM to QSE *q* for the Operating Hour. | | DANSAMT *q* | $ | *Day-Ahead Non-Spin Amount per QSE*—QSE *q*’s share of the DAM cost for Non-Spin for the Operating Hour. | | HLRS *q* | none | *Hourly Load Ratio Share per QSE*—The Real-Time LRS as defined in Section 6.6.2.4, QSE Load Ratio Share for an Operating Hour for QSE *q* for the Operating Hour. | | DAPCNSQTOT | MW | *Day-Ahead Procured Capacity for Non-Spin Total* —The total Non-Spin capacity for all QSEs for all Non-Spin awarded and self-arranged in the DAM for the Operating Hour. | | DASANSQ *q* | MW | *Day-Ahead Self-Arranged Non-Spin Quantity per QSE*—The self-arranged Non-Spin capacity submitted by QSE *q* before 1000 in the DAM for the Operating Hour. | | *q* | none | A QSE. | | *r* | none | A Resource. |   (e) For ERCOT Contingency Reserve Service(ECRS), if applicable:  DARTPCECRAMT *q* = (DAECRNOBL *q* – DASAECRQ *q*) \* DAECRPR –  DAECRAMT *q*  Where:  DAECRNOBL *q* = DAPCECRQTOT \* HLRS *q*  DAPCECRQTOT = (PCECRR *r, q, DAM* + DAECROAWD *q* + DASAECRQ *q*)  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | DARTPCECRAMT *q* | $ | *Day-Ahead Updated Real-Time Procured Capacity for ERCOT Contingency Reserve Service Amount by QSE -* The payment or charge to QSE *q* for ECRS for the re-calculated Real-Time obligation for the Operating Hour. | | DAECRPR | $/MW | *Day-Ahead ERCOT Contingency Reserve Price*—The DAM ECRS price for the Operating Hour. | | DAECRNOBL*q* | MW | *Day-Ahead ERCOT Contingency Reserve Service New Obligation per QSE*—The updated ECRS Ancillary Service Obligation in Real-Time for QSE *q* for the Operating Hour. | | PCECRR *r, q, DAM* | MW | *Procured Capacity for ERCOT Contingency Reserve Service per Resource per QSE in DAM*—The ECRS capacity awarded to QSE *q* in the DAM for Resource *r* for the Operating Hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | DAECROAWD *q* | MW | *Day-Ahead ERCOT Contingency Reserve Service Only Award for the QSE —* The ECRS Only capacity awarded in the DAM to QSE *q* for the Operating Hour. | | DAECRAMT *q* | $ | *Day-Ahead ERCOT Contingency Reserve Amount per QSE*—QSE *q*’s share of the DAM cost for ECRS for the Operating Hour. | | HLRS *q* | none | *Hourly Load Ratio Share per QSE*—The Real-Time LRS as defined in Section 6.6.2.4, QSE Load Ratio Share for an Operating Hour for QSE *q* for the Operating Hour. | | DAPCECRQTOT | MW | *Day-Ahead Procured Capacity for ERCOT Contingency Reserve Total*—The total ECRS capacity for all QSEs for all ECRS awarded and self-arranged in the DAM for the Operating Hour. | | DASAECRQ *q* | MW | *Day-Ahead Self-Arranged ERCOT Contingency Reserve Quantity per QSE*—The self-arranged ECRS capacity submitted by QSE *q* before 1000 in the DAM for the Operating Hour. | | *q* | none | A QSE. | | *r* | none | A Resource. | |

6.7.5 Real-Time Ancillary Service Imbalance Payment or Charge

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

(2) The payment or charge to each QSE for Ancillary Service imbalance is calculated based on the price calculation set forth in paragraph (12) of Section 6.5.7.3, Security Constrained Economic Dispatch, and applied to the following amounts for each QSE:

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

|  |
| --- |
| [NPRR987: Replace paragraph (a) above with the following upon system implementation:]  (a) The amount of Real-Time Metered Generation from all Generation Resources and Energy Storage Resources (ESRs), represented by the QSE for the 15-minute Settlement Interval; |

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

|  |
| --- |
| [NPRR987: Replace paragraph (b) above with the following upon system implementation:]  (b) The amount of On-Line capacity based on the telemetered High Sustained Limit (HSL) for all On-Line Generation Resources and ESRs, the telemetered consumption from Load Resources with a validated Ancillary Service Schedule for ECRS or RRS controlled by high-set under-frequency relay or Non-Spin, and the capacity from Controllable Load Resources available to SCED, including capacity from modeled Controllable Load Resources associated with ESRs; |

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

|  |
| --- |
| [NPRR987 and NPRR1149: Replace applicable portions of paragraph (c) above with the following upon system implementation:]  (c) The amount of Ancillary Service Resource Responsibility for Reg-Up, ECRS, RRS and Non-Spin for the QSE for the 15-minute Settlement Interval. |

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

(a) Nuclear Resources;

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

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

|  |
| --- |
| [NPRR987: Replace paragraph (c) above with the following upon system implementation:]  (c) Resources with a telemetered net real power (in MW) less than 95% of their telemetered Low Sustained Limit (LSL) excluding the following:  (i) Resources telemetering both STARTUP Resource Status and greater than zero Non-Spin Ancillary Service Responsibility; or  (ii) ESRs. |

(4) Reliability Must-Run (RMR) Units and Reliability Unit Commitment (RUC) Resources On-Line during the hour due to an ERCOT instruction, except for any RUC Resource committed by a RUC Dispatch Instruction where that Resource’s QSE subsequently opted out of RUC Settlement pursuant to paragraph (14) of Section 5.5.2, Reliability Unit Commitment (RUC) Process, those RUC Resources that had a Three-Part Supply Offer cleared in the DAM for the hour, 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 Energy Emergency Alert (EEA) condition, and any Combined Cycle Generation Resource that was RUC-committed from one On-Line configuration to a different configuration with additional capacity, as described in paragraph (3) of Section 5.5.2, will be excluded from the amounts calculated for the 15-minute Settlement Interval pursuant to paragraphs (2)(a), (b), and (c) above.

|  |
| --- |
| [NPRR885 and NPRR1092: Replace applicable portions of paragraph (4) above with the following upon system implementation:]  (4) Reliability Must-Run (RMR) Units, and Must-Run Alternatives (MRAs), and Reliability Unit Commitment (RUC) Resources On-Line during the hour due to an ERCOT instruction will be excluded from the amounts calculated for the 15-minute Settlement Interval pursuant to paragraphs (2)(a), (b), and (c) above except for:  (a) Those RUC Resources that had a Three-Part Supply Offer cleared in the DAM for the hour;  (b) 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 Energy Emergency Alert (EEA) condition;  (c) Any Combined Cycle Generation Resource that was RUC-committed from one On-Line configuration to a different configuration with additional capacity, as described in paragraph (3) of Section 5.5.2, Reliability Unit Commitment (RUC) Process; or  (d) Any RUC Resource committed by a RUC Dispatch Instruction where that Resource’s QSE subsequently opted out of RUC Settlement pursuant to paragraph (14) of Section 5.5.2. |

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

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

|  |
| --- |
| [NPRR987: Replace paragraph (6) above with the following upon system implementation:]  (6) Resources that have an Under Generation Volume (UGEN) or an Under Performance Volume (UPESR) greater than zero, and are not exempt from a Base Point Deviation Charge, as set forth in Section 6.6.5, Base Point Deviation Charge, or are not already excluded in paragraphs (3) or (4) above, for the 15-minute Settlement Interval will have the UGEN or UPESR amounts removed from the amounts calculated pursuant to paragraphs (2)(a) and (b) above. |

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

RTASIAMT *q* = (-1) \* [(RTASOLIMB *q* \* RTRSVPOR) + (RTASOFFIMB *q* \* RTRSVPOFF)]

RTRDASIAMT *q*= (-1) \* (RTASOLIMB *q* \* RTRDP)

Where:

RTASOLIMB *q*= RTOLCAP *q* – [((SYS\_GEN\_DISCFACTOR \* RTASRESP *q* ) \* ¼) – RTASOFF *q* – RTRUCNBBRESP *q*– RTCLRNSRESP *q* – RTNCLRNSRESP *q* – RTRMRRESP *q*]

|  |
| --- |
| [NPRR1131: Replace the formula “RTASOLIMB q” above with the following upon system implementation:]  RTASOLIMB *q*= RTOLCAP *q* – [((SYS\_GEN\_DISCFACTOR \* RTASRESP *q* ) \* ¼) – RTASOFF *q* – RTRUCNBBRESP *q* – RTNCLRNSRESP *q* – RTRMRRESP *q*] |

Where:

RTASOFF *q* = SYS\_GEN\_DISCFACTOR \* RTASOFFR *q, r, p*

RTRUCNBBRESP *q*= SYS\_GEN\_DISCFACTOR \*  RTRUCASA *q, r* \* ¼

RTCLRNSRESP *q* = SYS\_GEN\_DISCFACTOR \* RTCLRNSRESPR *q, r, p*

|  |
| --- |
| [NPRR1131: Delete the formula “RTCLRNSRESP q” above upon system implementation.] |

RTNCLRNSRESP *q* =  SYS\_GEN\_DISCFACTOR \* RTNCLRNSRESPR *q, r, p*

RTRMRRESP *q* = SYS\_GEN\_DISCFACTOR \* (HRRADJ *q, r, p* + HECRADJ *q, r, p* + HRUADJ *q, r, p* + HNSADJ *q, r, p*) \* ¼

RTOLCAP *q* = (RTOLHSL *q* – RTMGQ *q* – SYS\_GEN\_DISCFACTOR \* (UGENA *q, r, p*)) + RTCLRCAP *q* + RTNCLRCAP *q*

|  |
| --- |
| [NPRR987: Replace the formula “RTOLCAP q” above with the following upon system implementation:]  RTOLCAP *q* = (RTOLHSL *q* – RTMGQ *q* – SYS\_GEN\_DISCFACTOR \* ((UGENA *q, r, p* **+** UPESRA *q, r, p*))) + RTCLRCAP *q* + RTNCLRCAP *q* **+** RTESRCAP *q* |

Where:

RTNCLRCAP *q* = Min(Max(RTNCLRNPC *q* – RTNCLRLPC *q*, 0.0), (RTNCLRECRS *q +* RTNCLRRRS *q*)\* 1.5)

RTNCLRRRS *q =* SYS\_GEN\_DISCFACTOR \*  RTNCLRRRSR *q, r, p*

RTNCLRECRS *q =* SYS\_GEN\_DISCFACTOR \*  RTNCLRECRSR *q, r, p*

RTNCLRNPC *q =* SYS\_GEN\_DISCFACTOR \* RTNCLRNPCR *q, r, p*

RTNCLRLPC *q =* SYS\_GEN\_DISCFACTOR \* RTNCLRLPCR *q, r, p*

RTOLHSL *q* = SYS\_GEN\_DISCFACTOR \* RTOLHSLRA *q, r, p*

RTMGQ *q* = SYS\_GEN\_DISCFACTOR \* RTMGA *q, r, p*

If RTMGA *q, r, p* > RTOLHSLRA *q, r, p*

Then RTMGA *q, r, p* = RTOLHSLRA *q, r, p*

|  |
| --- |
| [NPRR987: Insert the language below upon system implementation:]  Where for a Controllable Load Resource other than a modeled Controllable Load Resource associated with an Energy Storage Resource (ESR): |

RTCLRCAP *q* = RTCLRNPC *q* – RTCLRLPC *q* – RTCLRNS *q* + RTCLRREG *q*

|  |
| --- |
| [NPRR1131: Replace the formula “RTCLRCAP q” above with the following upon system implementation:]  RTCLRCAP *q* = RTCLRNPC *q* – RTCLRLPC *q* + RTCLRREG *q* |

RTCLRNPC *q* = SYS\_GEN\_DISCFACTOR \* RTCLRNPCR ***q, r, p***

RTCLRLPC *q* = SYS\_GEN\_DISCFACTOR \* RTCLRLPCR ***q, r, p***

RTCLRNS *q* = SYS\_GEN\_DISCFACTOR \*  RTCLRNSR ***q, r, p***

|  |
| --- |
| [NPRR1131: Delete the formula “RTCLRNS q” above upon system implementation.] |

RTCLRREG *q* = SYS\_GEN\_DISCFACTOR \*  RTCLRREGR *q, r, p*

Where:

RTRSVPOR = image010(RNWF  *y* \* RTORPA *y*)

RTASOFFIMB *q* = RTOFFCAP *q* – (RTASOFF *q* + RTCLRNSRESP *q* + RTNCLRNSRESP *q*)

|  |
| --- |
| [NPRR1131: Replace the formula “RTASOFFIMB q” above with the following upon system implementation:]  RTASOFFIMB *q* = RTOFFCAP *q* – (RTASOFF *q* + RTNCLRNSRESP *q*) |

RTOFFCAP *q* = (SYS\_GEN\_DISCFACTOR \* RTCST30HSL *q*) + (SYS\_GEN\_DISCFACTOR \* RTOFFNSHSL *q*) + RTCLRNS *q* + RTNCLRNSCAP *q*

|  |
| --- |
| [NPRR1131: Replace the formula “RTOFFCAP q” above with the following upon system implementation:]  RTOFFCAP *q* = (SYS\_GEN\_DISCFACTOR \* RTCST30HSL *q*) + (SYS\_GEN\_DISCFACTOR \* RTOFFNSHSL *q*) + RTNCLRNSCAP*q* |

RTNCLRNSCAP *q* = Min(Max(RTNCLRNPC *q* – RTNCLRLPC *q*, 0.0), RTNCLRNS *q* \* 1.5)

RTNCLRNS *q* = SYS\_GEN\_DISCFACTOR \* RTNCLRNSR *q, r, p*

RTRSVPOFF = image010(RNWF  *y* \* RTOFFPA *y*)

RTRDP = (RNWF  *y* \* RTORDPA *y*)

RNWF *y*= TLMP *y* / TLMP *y*

|  |
| --- |
| [NPRR987: Insert the language below upon system implementation:]  Where for an ESR:  RTESRCAP *q* = (RTESRCAPR *q, g, p*)  Where:  RTESRCAPR *q, g, p* *=* Min[(RTOLHSLRA *q, r, p* – RTMGA *q, r, p* + RTCLRNPCR *q, r, p*),(RTCLRNPCR *q, r, p* + SOCT *q, r* – SOCOM *q, r*)] |

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| RTASIAMT *q* | $ | *Real-Time Ancillary Service Imbalance Amount*—The total payment or charge to QSE *q* for the Real-Time Ancillary Service imbalance associated with Operating Reserve Demand Curve (ORDC) for each 15-minute Settlement Interval. |
| RTRDASIAMT *q* | $ | *Real-Time Reliability Deployment Ancillary Service Imbalance Amount*—The total payment or charge to QSE *q* for the Real-Time Ancillary Service imbalance associated with Reliability Deployments for each 15-minute Settlement Interval. |
| RTASOLIMB *q* | MWh | *Real-Time Ancillary Service On-Line Reserve Imbalance for the QSE* ⎯The Real-Time Ancillary Service On-Line reserve imbalance for the QSE *q*, for each 15-minute Settlement Interval. |
| RTORPA*y* | $/MWh | *Real-Time On-Line Reserve Price Adder per interval*⎯The Real-Time Price Adder for On-Line Reserves for the SCED interval *y*. |
| RTOFFPA *y* | $/MWh | *Real-Time Off-Line Reserve Price Adder per interval*⎯The Real-Time Price Adder for Off-Line Reserves for the SCED interval *y*. |
| TLMP *y* | second | *Duration of SCED interval per interval*⎯The duration of the SCED interval *y*. |
| RTRDP | $/MWh | *Real-Time On-Line Reliability Deployment Price*⎯The Real-Time price for the 15-minute Settlement Interval, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time On-Line Reliability Deployment Price Adder. |
| RTORDPA*y* | $/MWh | *Real-Time On-Line Reliability Deployment Price Adder*⎯The Real-Time Price Adder that captures the impact of reliability deployments on energy prices for the SCED interval *y*. |
| RNWF *y* | none | *Resource Node Weighting Factor per interval*⎯The weight used in the Resource Node Settlement Point Price calculation for the portion of the SCED interval *y* within the 15-minute Settlement Interval. |
| RTRSVPOR | $/MWh | *Real-Time Reserve Price for On-Line Reserves*⎯The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval. |
| RTRSVPOFF | $/MWh | *Real-Time Reserve Price for Off-Line Reserves*⎯The Real-Time Reserve Price for Off-Line Reserves for the 15-minute Settlement Interval. |
| RTOLCAP *q* | MWh | *Real-Time On-Line Reserve Capacity for the QSE*⎯The Real-Time reserve capacity of On-Line Resources available for the QSE *q*, for the 15-minute Settlement Interval. |
| RTOLHSLRA *q, r, p* | MWh | *Real-Time Adjusted On-Line High Sustained Limit for the Resource*⎯The Real-Time telemetered HSL for the Resource *r* represented by QSE *q* at Resource Node *p* that is available to SCED, integrated over the 15-minute Settlement Interval, and adjusted pursuant to paragraphs (3) and (4) above. |
| RTOLHSL *q* | MWh | *Real-Time On-Line High Sustained Limit for the QSE*⎯The Real-Time telemetered HSL for all Generation Resources available to SCED, pursuant to paragraphs (3) and (4) above, integrated over the 15-minute Settlement Interval for the QSE *q*, discounted by the system-wide discount factor.   |  | | --- | | ***[NPRR987: Replace the description above with the following upon system implementation:]***  *Real-Time On-Line High Sustained Limit for the QSE*⎯The integrated Real-Time telemetered HSL for all Generation Resources, not including modeled Generation Resources associated with ESRs, available to SCED, pursuant to paragraphs (3) and (4) above, integrated over the 15-minute Settlement Interval for the QSE *q*, discounted by the system-wide discount factor. | |
| RTASRESP *q* | MW | *Real-Time Ancillary Service Supply Responsibility for the QSE*⎯The Real-Time Ancillary Service Supply Responsibility for Reg-Up, ECRS, RRS, and Non-Spin pursuant to Section 4.4.7.4, Ancillary Service Supply Responsibility, for all Generation and Load Resources for the QSE *q*, for the 15-minute Settlement Interval.   |  | | --- | | [NPRR1149: Replace the description above with the following upon system implementation:]  *Real-Time Ancillary Service Supply Responsibility for the QSE*⎯The Real-Time Ancillary Service Supply Responsibility for Reg-Up, ECRS, RRS and Non-Spin pursuant to Section 4.4.7.4, Ancillary Service Supply Responsibility, for the QSE *q*, for the 15-minute Settlement Interval. | |
| RTCLRCAP *q* | MWh | *Real-Time Capacity from Controllable Load Resources for the QSE*—The Real-Time capacity and Reg-Up minus Non-Spin available from all Controllable Load Resources available to SCED for the QSE *q*, integrated over the 15-minute Settlement Interval.   |  | | --- | | ***[NPRR987: Replace the description above with the following upon system implementation:]***  *Real-Time Capacity from Controllable Load Resources for the QSE*—The Real-Time capacity and Reg-Up minus Non-Spin available from all Controllable Load Resources, not including modeled Controllable Load Resources associated with ESRs available to SCED for the QSE *q*, integrated over the 15-minute Settlement Interval. | |
| RTNCLRCAP ***q*** | MWh | *Real-Time Capacity from Non-Controllable Load Resources carrying ERCOT Contingency Reserve or Responsive Reserve for the QSE*—The Real-Time capacity for all Load Resources other than Controllable Load Resources that have a validated Real-Time ECRS or RRS Ancillary Service Schedule for the QSE *q*, integrated over the 15-minute Settlement Interval. |
| RTNCLRRRS *q* | MWh | *Real-Time Non-Controllable Load Resources Responsive Reserve for the QSE—*The validated Real-Time telemetered RRS Ancillary Service Supply Responsibility for all Load Resources other than Controllable Load Resources for QSE *q* discounted by the system-wide discount factor, integrated over the 15-minute Settlement Interval. |
| RTNCLRRRSR *q, r, p* | MWh | *Real-Time Non-Controllable Load Resource Responsive Reserve—*The validated Real-Time telemetered RRS Ancillary Service Resource Responsibility for the Load Resource *r* (which is not a Controllable Load Resource) represented by QSE *q* at Resource Node *p*, integrated over the 15-minute Settlement Interval. |
| RTNCLRECRS *q* | MWh | *Real-Time Non-Controllable Load Resources ERCOT Contingency Reserve for the QSE—*The validated Real-Time telemetered ECRS Ancillary Service Supply Responsibility for all Load Resources other than Controllable Load Resources for QSE *q* discounted by the system-wide discount factor, integrated over the 15-minute Settlement Interval. |
| RTNCLRECRSR *q, r, p* | MWh | *Real-Time Non-Controllable Load Resource ERCOT Contingency Reserve —*The validated Real-Time telemetered ECRS Ancillary Service Resource Responsibility for the Load Resource *r* (which is not a Controllable Load Resource) represented by QSE *q* at Resource Node *p*, integrated over the 15-minute Settlement Interval. |
| RTNCLRNPCR *q, r, p* | MWh | *Real-Time Non-Controllable Load Resource Net Power Consumption—*The Real-Time net real power consumption from the Load Resource *r* (which is not a Controllable Load Resource)represented by QSE *q* at Resource Node *p* that has a validated Real-Time ECRS, RRS, or Non-Spin Ancillary Service Schedule integrated over the 15-minute Settlement Interval. |
| RTNCLRLPCR *q, r, p* | MWh | *Real-Time Non-Controllable Load Resource Low Power Consumption—*The Real-Time Low Power Consumption (LPC) from the Load Resource *r* (which is not a Controllable Load Resource)represented by QSE *q* at Resource Node *p* that has a validated Real-Time ECRS, RRS, or Non-Spin Ancillary Service Schedule integrated over the 15-minute Settlement Interval. |
| RTNCLRNPC *q* | MWh | *Real-Time Non-Controllable Load Resource Net Power Consumption for the QSE—*The Real-Time net real power consumption from all Load Resources other than Controllable Load Resources for QSE *q* that have a validated Real-Time ECRS, RRS, or Non-Spin Ancillary Service Schedule integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor. |
| RTNCLRLPC *q* | MWh | *Real-Time Non-Controllable Load Resource Low Power Consumption for the QSE—*The Real-Time LPC from all Load Resources other than Controllable Load Resourcesfor QSE *q* that have a validated Real-Time ECRS, RRS, or Non-Spin Ancillary Service Schedule integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor. |
| RTNCLRNSCAP ***q*** | MWh | *Real-Time Capacity from Non-Controllable Load Resources carrying Non-Spin for the QSE*—The Real-Time capacity for all Load Resources that are not Controllable Load Resources and that have a validated Real-Time Non-Spin Ancillary Service Schedule for the QSE *q*, integrated over the 15-minute Settlement Interval. |
| RTNCLRNSR *q, r, p* | MWh | *Real-Time Non-Spin Schedule for the Non-Controllable Load Resource ⎯*The validated Real-Time telemetered Non-Spin Ancillary Service Schedule for the Load Resource *r* that is not a Controllable Load Resources represented by QSE *q* at Resource Node *p*, integrated over the 15-minute Settlement Interval. |
| RTNCLRNS *q* | MWh | *Real-Time Non-Spin Schedule for Non-Controllable Load Resources for the QSE*⎯The Real-Time telemetered Non-Spin Ancillary Service Schedule for all Load Resources that are not Controllable Load Resources for the QSE *q*, integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor. |
| RTNCLRNSRESP *q* | MWh | *Real-Time Non-Controllable Load Resource Non-Spin Responsibility for the QSE*⎯The Real Time telemetered Non-Spin Ancillary Service Supply Responsibility for all Load Resources that are not Controllable Load Resources discounted by the system-wide discount factor for the QSE *q*, integrated over the 15-minute Settlement Interval. |
| RTNCLRNSRESPR *q, r, p* | MWh | *Real-Time Non-Controllable Load Resource Non-Spin Responsibility for the Resource*⎯The Real-Time telemetered Non-Spin Ancillary Service Resource Responsibility for the Load Resource *r* that is not a Controllable Load Resource represented by QSE *q* at Resource Node *p* integrated over the 15-minute Settlement Interval. |
| RTCLRNPCR *q, r, p* | MWh | *Real-Time Net Power Consumption from the Controllable Load Resource—*The Real-Time net real power consumption from the Controllable Load Resource *r* represented by QSE *q* at Resource Node *p* available to SCED integrated over the 15-minute Settlement Interval.   |  | | --- | | [NPRR987: Replace the description above with the following upon system implementation:]  *Real-Time Net Power Consumption from the Controllable Load Resource—*The Real-Time net real power consumption from the Controllable Load Resource or modeled Controllable Load Resource associated with an ESR, *r* represented by QSE *q* at Resource Node *p* available to SCED integrated over the 15-minute Settlement Interval. | |
| RTCLRNPC *q* | MWh | *Real-Time Net Power Consumption from Controllable Load Resources for the QSE*—The Real-Time net real power consumption from all Controllable Load Resources available to SCED integrated over the 15-minute Settlement Interval for the QSE *q* discounted by the system-wide discount factor.   |  | | --- | | [NPRR987: Replace the description above with the following upon system implementation:]  *Real-Time Net Power Consumption from Controllable Load Resources for the QSE*—The Real-Time net real power consumption from all Controllable Load Resources, not including modeled Controllable Load Resources associated with ESRs, available to SCED integrated over the 15-minute Settlement Interval for the QSE *q* discounted by the system-wide discount factor. | |
| RTCLRLPCR *q, r, p* | MWh | *Real-Time Low Power Consumption for the Controllable Load Resource—*The Real-Time LPC from the Controllable Load Resource *r* represented by QSE *q* at Resource Node *p* available to SCED integrated over the 15-minute Settlement Interval.   |  | | --- | | [NPRR987: Replace the description above with the following upon system implementation:]  *Real-Time Low Power Consumption for the Controllable Load Resource—*The Real-Time LPC from the Controllable Load Resource or modeled Controllable Load Resource associated with an ESR, *r* represented by QSE *q* at Resource Node *p* available to SCED integrated over the 15-minute Settlement Interval. | |
| RTCLRLPC *q* | MWh | *Real-Time Low Power Consumption from Controllable Load Resources for the QSE*—The Real-Time LPC from Controllable Load Resources available to SCED integrated over the 15-minute Settlement Interval for the QSE *q* discounted by the system-wide discount factor.   |  | | --- | | [NPRR987: Replace the description above with the following upon system implementation:]  *Real-Time Low Power Consumption from Controllable Load Resources for the QSE*—The Real-Time LPC from Controllable Load Resources, not including modeled Controllable Load Resources associated with ESRs, available to SCED integrated over the 15-minute Settlement Interval for the QSE *q* discounted by the system-wide discount factor. | |
| RTCLRREG *q* | MWh | *Real-Time Controllable Load Resources Regulation-Up Schedule for the QSE*—The Real-Time Reg-Up Ancillary Service Schedule from all Controllable Load Resources not available to SCED with Primary Frequency Response for the QSE *q*, integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor. |
| RTCLRREGR*q, r, p* | MWh | *Real-Time Controllable Load Resource Regulation-Up Schedule for the Resource*—The validated Real-Time Reg-Up Ancillary Service Schedule for the Controllable Load Resource not available to SCED *r* represented by QSE *q* at Resource Node *p* with Primary Frequency Response, integrated over the 15-minute Settlement Interval. |
| RTMGA *q, r, p* | MWh | *Real-Time Adjusted Metered Generation per QSE per Settlement Point per Resource*—The adjusted metered generation, pursuant to paragraphs (3) and (4) above, of Generation Resource *r* represented by QSE *q* at Resource Node *p* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| RTMGQ *q* | MWh | *Real-Time Metered Generation per QSE*—The metered generation, discounted by the system-wide discount factor, of all generation Resources represented by QSE *q* in Real-Time for the 15-minute Settlement Interval, pursuant to paragraphs (3) and (4) above.   |  | | --- | | [NPRR987: Replace the description above with the following upon system implementation:]  *Real-Time Metered Generation per QSE*—The metered generation, discounted by the system-wide discount factor, of all Generation Resources, not including modeled Generation Resources associated with ESRs, represented by QSE *q* in Real-Time for the 15-minute Settlement Interval, pursuant to paragraphs (3) and (4) above. | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | [NPRR987: Insert the variables “RTESRCAPR q, g, p”, “RTESRCAP q”, “SOCT q, r”, and “SOCOM q, r” below upon system implementation:]   |  |  |  | | --- | --- | --- | | RTESRCAPR *q, g, p* | MWh | *Real-Time Capacity from an Energy Storage Resource* –Capacity provided by an ESR *g*, represented by QSE *q* at Resource Node *p,* which considers energy limitations of the ESR and potentially higher contribution when charging for the15-minute Settlement Interval*.* | | RTESRCAP *q* | MWh | *Real-Time Capacity from Energy Storage Resources per QSE –* Capacity provided by all ESRs, represented by QSE *q*, for the 15-minute Settlement Interval. | | SOCT *q, r* | MWh | *State of Charge Telemetered by an Energy Storage Resource –* The average telemetered state of charge of Resource *r*, represented by QSE *q*, over the 15-minute Settlement Interval. | | SOCOM *q, r* | MWh | *State of Charge Operating Minimum for an Energy Storage Resource* –The average telemetered state of charge operating minimum of Resource *r*, represented by QSE *q*, over the 15-minute Settlement Interval. | | | | |
| RTASOFFIMB *q* | MWh | *Real-Time Ancillary Service Off-Line Reserve Imbalance for the QSE*⎯The Real-Time Ancillary Service Off-Line reserve imbalance for the QSE *q*, for each 15-minute Settlement Interval. |
| RTOFFCAP *q* | MWh | *Real-Time Off-Line Reserve Capacity for the QSE*⎯The Real-Time reserve capacity of Off-Line Resources available for the QSE *q*, for the 15-minute Settlement Interval.   |  | | --- | | [NPRR1069: Replace the description above with the following upon system implementation of NPRR987:]  *Real-Time Off-Line Reserve Capacity for the QSE*⎯The Real-Time reserve capacity of Off-Line Resources, not including modeled Generation Resources associated with ESRs, available for the QSE *q*, for the 15-minute Settlement Interval. | |
| RTCST30HSL *q* | MWh | *Real-Time Generation Resources with Cold Start Available in 30 Minutes*⎯The Real-Time telemetered HSLs of Generation Resources, excluding Intermittent Renewable Resources (IRRs), that have telemetered an OFF Resource Status and can be started from a cold temperature state in 30 minutes for the QSE *q*, time-weighted over the 15-minute Settlement Interval.   |  | | --- | | [NPRR1069: Replace the description above with the following upon system implementation of NPRR987:]  *Real-Time Generation Resources with Cold Start Available in 30 Minutes*⎯The Real-Time telemetered HSLs of Generation Resources, excluding Intermittent Renewable Resources (IRRs) and modeled Generation Resources associated with ESRs, that have telemetered an OFF Resource Status and can be started from a cold temperature state in 30 minutes for the QSE *q*, time-weighted over the 15-minute Settlement Interval. | |
| RTOFFNSHSL *q* | MWh | *Real-Time Generation Resources with Off-Line Non-Spin Schedule*⎯The Real-Time telemetered HSLs of Off-Line Generation Resources that have telemetered an OFFNS Resource Status for the QSE *q*, time-weighted over the 15-minute Settlement Interval.   |  | | --- | | [NPRR1069: Replace the description above with the following upon system implementation of NPRR987:]  *Real-Time Generation Resources with Off-Line Non-Spin Schedule*⎯The Real-Time telemetered HSLs of Off-Line Generation Resources, not including modeled Generation Resources associated with ESRs, that have telemetered an OFFNS Resource Status for the QSE *q*, time-weighted over the 15-minute Settlement Interval. | |
| RTASOFFR *q, r, p* | MWh | *Real-Time Ancillary Service Schedule for the Off-Line Generation Resource*⎯The validated Real-Time telemetered Ancillary Service Schedule for the Off-Line Generation Resource *r* represented by QSE *q* at Resource Node *p*, integrated over the 15-minute Settlement Interval. |
| RTASOFF *q* | MWh | *Real-Time Ancillary Service Schedule for Off-Line Generation Resources for the QSE*⎯The Real-Time telemetered Ancillary Service Schedule for all Off-Line Generation Resources discounted by the system-wide discount factor for the QSE *q*, integrated over the 15-minute Settlement Interval.   |  | | --- | | [NPRR1069: Replace the description above with the following upon system implementation of NPRR987:]  *Real-Time Ancillary Service Schedule for Off-Line Generation Resources for the QSE*⎯The Real-Time telemetered Ancillary Service Schedule for all Off-Line Generation Resources, not including modeled Generation Resources associated with ESRs, discounted by the system-wide discount factor for the QSE *q*, integrated over the 15-minute Settlement Interval. | |
| HRRADJ *q, r, p* | MW | *Ancillary Service Resource Responsibility Capacity for Responsive Reserve at Adjustment Period—*The RRS Ancillary Service Resource Responsibility for the Resource *r* represented by QSE *q* at Resource Node *p* as seen in the last Current Operating Plan (COP) and Trades Snapshot at the end of the Adjustment Period, for the hour that includes the 15-minute Settlement Interval. |
| HECRADJ *q, r, p* | MW | *Ancillary Service Resource Responsibility Capacity for ERCOT Contingency Reserve Service at Adjustment Period—*The ECRS Ancillary Service Resource Responsibility for the Resource *r* represented by QSE *q* at Resource Node *p* as seen in the last COP and Trades Snapshot at the end of the Adjustment Period, for the hour that includes the 15-minute Settlement Interval. |
|  | | |
| HRUADJ *q, r, p* | MW | *Ancillary Service Resource Responsibility Capacity for Reg-Up at Adjustment Period—*The Regulation Up Ancillary Service Resource Responsibility for the Resource *r* represented by QSE *q* at Resource Node *p* as seen in the last COP and Trades Snapshot at the end of the Adjustment Period, for the hour that includes the 15-minute Settlement Interval. |
| HNSADJ *q, r, p* | MW | *Ancillary Service Resource Responsibility Capacity for Non-Spin at Adjustment Period—*The Non-Spin Ancillary Service Resource Responsibility for the Resource *r* represented by QSE *q* at Resource Node *p* as seen in the last COP and Trades Snapshot at the end of the Adjustment Period, for the hour that includes the 15-minute Settlement Interval. |
| RTRUCNBBRESP *q* | MWh | *Real-Time RUC Ancillary Service Supply Responsibility for the QSE in Non-Buy-Back hours*⎯The Real-Time Ancillary Service Supply Responsibility for Reg-Up, ECRS, RRS, and Non-Spin pursuant to the Ancillary Service awards, for the 15-minute Settlement Interval that falls within a RUC-Committed Hour, discounted by the system-wide discount factor for the QSE *q.* |
| RTRUCASA *q, r* | MW | *Real-Time RUC Ancillary Service Awards*⎯The Real-Time Ancillary Service award to the RUC Resource *r* for Reg-Up, ECRS, RRS, and Non-Spin for the hour that includes the 15-minute Settlement Interval that falls within a RUC-Committed Hour for the QSE *q.* |
| RTCLRNSRESP *q* | MWh | *Real-Time Controllable Load Resource Non-Spin Responsibility for the QSE*⎯The Real Time telemetered Non-Spin Ancillary Service Supply Responsibility for all Controllable Load Resources available to SCED discounted by the system-wide discount factor for the QSE *q*, integrated over the 15-minute Settlement Interval.   |  | | --- | | [NPRR1069: Replace the description above with the following upon system implementation of NPRR987:]  *Real-Time Controllable Load Resource Non-Spin Responsibility for the QSE*⎯The Real Time telemetered Non-Spin Ancillary Service Supply Responsibility for all Controllable Load Resources, not including modeled Controllable Load Resources associated with ESRs, available to SCED discounted by the system-wide discount factor for the QSE *q*, integrated over the 15-minute Settlement Interval. | |
| |  | | --- | | [NPRR1131: Delete the variable “RTCLRNSRESP q” above upon system implementation.] | | | |
| RTCLRNSRESPR *q, r, p* | MWh | *Real-Time Controllable Load Resource Non-Spin Responsibility for the Resource*⎯The Real-Time telemetered Non-Spin Ancillary Service Resource Responsibility for the Controllable Load Resource *r* represented by QSE *q* at Resource Node *p* available to SCED, integrated over the 15-minute Settlement Interval.   |  | | --- | | [NPRR1069: Replace the description above with the following upon system implementation of NPRR987:]  *Real-Time Controllable Load Resource Non-Spin Responsibility for the Resource*⎯The Real-Time telemetered Non-Spin Ancillary Service Resource Responsibility for the Controllable Load Resource *r* or modeled Controllable Load Resource associated with an ESR represented by QSE *q* at Resource Node *p* available to SCED, integrated over the 15-minute Settlement Interval. | |
| |  | | --- | | [NPRR1131: Delete the variable “RTCLRNSRESPR q, r, p” above upon system implementation.] | | | |
| RTRMRRESP *q* | MWh | *Real-Time Ancillary Service Supply Responsibility for RMR Units represented by the QSE*⎯The Real-Time Ancillary Service Supply Responsibility as set forth in the end of the Adjustment Period COP for Reg-Up, ECRS, RRS, and Non-Spin for all RMR Units discounted by the system-wide discount factor for the QSE *q*, integrated over the 15-minute Settlement Interval. |
| RTCLRNSR *q, r, p* | MWh | *Real-Time Non-Spin Schedule for the Controllable Load Resource ⎯*The validated Real-Time telemetered Non-Spin Ancillary Service Schedule for the Controllable Load Resource *r* represented by QSE *q* at Resource Node *p*, integrated over the 15-minute Settlement Interval.   |  | | --- | | [NPRR987: Replace the description above with the following upon system implementation:]  *Real-Time Non-Spin Schedule for the Controllable Load Resource ⎯*The validated Real-Time telemetered Non-Spin Ancillary Service Schedule for the Controllable Load Resourceor modeled Controllable Load Resource associated with an ESR, *r* represented by QSE *q* at Resource Node *p*, integrated over the 15-minute Settlement Interval. | |
| |  | | --- | | [NPRR1131: Delete the variable “RTCLRNSR q, r, p” above upon system implementation.] | | | |
| RTCLRNS *q* | MWh | *Real-Time Non-Spin Schedule for Controllable Load Resources for the QSE*⎯The Real-Time telemetered Non-Spin Ancillary Service Schedule for all Controllable Load Resources for the QSE *q*, integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor.   |  | | --- | | [NPRR987: Replace the description above with the following upon system implementation:]  *Real-Time Non-Spin Schedule for Controllable Load Resources for the QSE*⎯The Real-Time telemetered Non-Spin Ancillary Service Schedule for all Controllable Load Resources, not including modeled Controllable Load Resources associated with ESRs, for the QSE *q*, integrated over the 15-minute Settlement Interval discounted by the system-wide discount factor. | |
| |  | | --- | | [NPRR1131: Delete the variable “RTCLRNS q” above upon system implementation.] | | | |
| SYS\_GEN\_DISCFACTOR | none | *System-Wide Discount Factor* – The system-wide discount factor used to discount inputs used in the calculation of Real-Time Ancillary Services Imbalance payment or charge is calculated as the average of the currently approved Reserve Discount Factors (RDFs) applied to the temperatures from the current Season from the year prior. |
| UGEN *q, r, p* | MWh | *Under Generation Volumes per QSE per Settlement Point per Resource*—The amount under-generated by the Generation Resource *r* represented by QSE *q* at Resource Node *p* for the 15-minute Settlement Interval. |
| UGENA *q, r, p* | MWh | *Adjusted Under Generation Volumes per QSE per Settlement Point per Resource*—The amount under-generated by the Generation Resource *r* represented by QSE *q* at Resource Node *p* for the 15-minute Settlement Interval adjusted pursuant to paragraph (6) above. |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | [NPRR987: Insert the variables “UPESR q, r, p” and “UPESRA q, r, p” below upon system implementation:]   |  |  |  | | --- | --- | --- | | UPESR *q, r, p* | MWh | *Under-Performance Volumes per QSE per Settlement Point per Resource*—The amount the ESR under-performed divided evenly among the modeled Generation and Controllable Load Resources *r* in the ESR*,* represented by QSE *q* at Resource Node *p,* for the 15-minute Settlement Interval. | | UPESRA *q, r, p* | MWh | *Adjusted Under-Performance Volumes per QSE per Settlement Point per Resource* — The amount the ESR under-performed divided evenly among the modeled Generation and Controllable Load Resources *r* in the ESR*,* represented by QSE *q* at Resource Node *p,* for the 15-minute Settlement Interval adjusted pursuant to paragraph (6) above. | | | | |
| *r* | none | A Generation or Load Resource. |
| *y* | none | A SCED interval in the 15-minute Settlement Interval. The summation is over the total number of SCED runs that cover the 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *p* | none | A Resource Node Settlement Point. |
| |  |  |  |  | | --- | --- | --- | --- | | [NPRR987: Insert the variable “g” below upon system implementation:]   |  |  |  | | --- | --- | --- | | *g* | none | An ESR. | | | | |

(8) The payment to each QSE for the Ancillary Service reserves associated with RUC Resources that have received a RUC Dispatch to provide Ancillary Services in which the 15-minute Settlement Interval is part of a RUC Buy-Back Hour based on the RUC opt out provision set forth in paragraph (14) of Section 5.5.2 for a given 15-minute Settlement Interval is calculated as follows:

**RTRUCRSVAMT *q* = (-1) \* (RTRUCRESP *q* \* RTRSVPOR)**

**RTRDRUCRSVAMT *q* = (-1) \* (RTRUCRESP *q* \* RTRDP)**

Where:

RTRUCRESP *q* =  RTRUCASA *q, r* \* ¼

The above variables are defined as follows:

| Variable | Unit | Description |
| --- | --- | --- |
| RTRUCRSVAMT*q* | $ | *Real-Time RUC Ancillary Service Reserve Amount*—The total payment |to QSE *q* for the Real-Time RUC Ancillary Service Reserve payment associated with ORDC for each 15-minute Settlement Interval. |
| RTRDRUCRSVAMT *q* | $ | *Real-Time Reliability Deployment RUC Ancillary Service Reserve Amount*—The total payment |to QSE *q* for the Real-Time RUC Ancillary Service Reserve payment associated with reliability deployments for each 15-minute Settlement Interval. |
| RTRUCRESP *q* | MWh | *Real-Time RUC Ancillary Service Supply Responsibility for the QSE*⎯The Real-Time Ancillary Service Supply Responsibility pursuant to the Ancillary Service awards for Reg-Up, ECRS, RRS, and Non-Spin for all RUC Resources that have opted out per paragraph (14) of Section 5.5.2 for the QSE *q*, for the 15-minute Settlement Interval. |
| RTRUCASA *q, r* | MW | *Real-Time RUC Ancillary Service Awards*⎯The Real-Time Ancillary Service award to the RUC Resource *r* for Reg-Up, ECRS, RRS, and Non-Spin for the 15-minute Settlement Interval that falls within a RUC-Committed Hour for the QSE *q.* |
| RTRSVPOR | $/MWh | *Real-Time Reserve Price for On-Line Reserves*⎯The Real-Time Reserve Price for On-Line Reserves for the 15-minute Settlement Interval. |
| RTRDP | $/MWh | *Real-Time On-Line Reliability Deployment Price* ⎯The Real-Time price for the 15-minute Settlement Interval, reflecting the impact of reliability deployments on energy prices that is calculated from the Real-Time On-Line Reliability Deployment Price Adder. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource. |

|  |
| --- |
| [NPRR1010: Replace Section 6.7.5 above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]  ***6.7.5 Real-Time Ancillary Service Charges and Payments*** |

|  |
| --- |
| [NPRR1010: Insert Section 6.7.5.1 below upon system implementation of the Real-Time Co-Optimization (RTC) project:]  6.7.5.1 Real-Time Ancillary Service Imbalance Payment or Charge  (1) The payments or charges to each QSE for Real-Time Ancillary Services are as follows:  (a) Ancillary Service Imbalance payment or charges based on Real-Time Ancillary Service prices with an imbalance quantity determined by:  (i) The Real-Time Ancillary Service awarded; minus  (ii) The amount of Day-Ahead Market (DAM) Ancillary Service awards cleared in the DAM; minus  (iii) The amount of DAM Self Arranged Ancillary Services; plus  (iv) The amount of Ancillary Service Trades where the QSE is the buyer; minus  (v) The amount of Ancillary Service Trades where the QSE is the seller.  (b) Charges for Ancillary Service Only Offers purchased in the DAM.  (c) Charges for any Ancillary Service trade overage per paragraph (7) of Section 4.4.7.1, Self-Arranged Ancillary Service Quantities. |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1010: Insert Section 6.7.5.2 below upon system implementation of the Real-Time Co-Optimization (RTC) project:]  6.7.5.2 Regulation Up Service Payments and Charges  (1) Reg-Up Imbalance Payment or Charge:  RTRUIMBAMT *q* = (-1) \* [[RTRUREV *q, r*  – (1/4)\* (PCRUR *r, q, DAM* \* RTMCPCRU)] – (1/4)\*(DASARUQ *q* \* RTMCPCRU) + (1/4) \* (RUTP *q* – RUTS *q*) \* RTMCPCRU]  Where:  RTRUREV *q, r  =* (1/4) \* RTRUAWD *q, r* \* RTMCPCRUR *q, r*  RTMCPCRUR *q, r =*  (RURWF *q, r, p, y* \* (RTMCPCRUS *y* + RTRDPARUS *y*))  RTRUAWD *q, r*  =  (RNWF *y* \* RTRUAWDS *q, r, p, y*)  Where:  RURWF *q, r, p, y*= [max(0.001, RTRUAWDS *q, r, p, y*) \* TLMP *y*] / [max(0.001,  RTRUAWDS *q, r, p, y*) \* TLMP *y*]  And:  RNWF *y* = TLMP *y* / TLMP *y*  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | 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. | | RTRUREV *q, r* | $ | *Real-Time Reg-Up Revenue*— The Real-Time Reg-Up revenue for QSE *q* calculated forResource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRDPARUS *y* | $/MW | *Real-Time Reliability Deployment Price Adder for Ancillary Service for Reg-Up per SCED interval* - The Real-Time price adder for Reg-Up that captures the impact of reliability deployments on Reg-Up prices for the SCED interval y. | | RTRUAWD *q, r* | MW | *Real-Time Reg-Up Award per Resource per QSE*— The Reg-Up amount awarded to QSE *q* for Resource *r* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRUAWDS *q, r, p, y* | MW | *Real-Time Reg-Up Award per Resource per QSE per SCED interval -* The Reg-Up amount awarded to QSE *q* for Resource *r* in Real-Timefor the SCED interval *y.* Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTMCPCRUR *q, r* | $/MW | *Real-Time Market Clearing Price for Capacity for Reg-Up per Resource per QSE*⎯ The Real-Time MCPC for Reg-Up for Resource *r*, represented by QSE *q* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource r is the Combined Cycle Train. | | RTMCPCRUS *y* | $/MW | *Real-Time Market Clearing Price for Capacity for Reg-Up per SCED interval -* The Real-Time MCPC for Reg-Up for the SCED interval *y.* | | PCRUR *r, q, DAM* | MW | *Procured Capacity for Reg-Up per Resource per QSE in DAM*—The Reg-Up capacity awarded to QSE *q* in the DAM for Resource *r* for the Operating Hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTMCPCRU | $/MW | *Real-Time Market Clearing Price for Capacity for Reg-Up -* The Real-Time MCPC for Reg-Up for the 15-minute Settlement Interval. | | DASARUQ ***q*** | MW | *Day-Ahead Self-Arranged Reg-Up Quantity per QSE*—The self-arranged Reg-Up quantity submitted by QSE *q* before 1000 in the DAM for the Operating Hour. | | RUTP *q* | MW | *Trade Purchases for Reg-Up for the QSE—* The final approved trade purchases for QSE *q* for Reg-Up for the Operating Hour. | | RUTS *q* | MW | *Trade Sales for Reg-Up for the QSE—* The final approved trade sales for QSE *q* for Reg-Up for the Operating Hour. | | TLMP *y* | second | *Duration of SCED interval per interval -* The duration of the SCED interval *y*. | | RNWF *y* | none | *Resource Node Weighting Factor per interval -* The weight used in the Ancillary Service award calculation for the portion of the SCED interval *y* within the Settlement Interval*.* | | RURWF *q, r, p, y* | none | *Reg-Up Resource Node Weighting Factor per interval -* The Reg-Up Resource weight, based on Reg-Up awards, used in the Real-Time MCPC calculation for the portion of the SCED interval *y* within the Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | *r* | none | A Resource. | | *q* | none | A QSE. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. | | *p* | none | A Resource Node Settlement Point. |   (2) Reg-Up Only Charge:  RTRUOAMT *q* = (1/4) \* DARUOAWD *q* \* RTMCPCRU  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | 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. | | DARUOAWD *q* | MW | *Day-Ahead Reg-Up Only Award for the QSE*⎯ The Reg-Up only capacity awarded in the DAM to the QSE *q* for the Operating Hour. | | RTMCPCRU | $/MW | *Real-Time Market Clearing Price for Capacity for Reg-Up -* The Real-Time MCPC for Reg-Up for the 15-minute Settlement Interval. | | *q* | none | A QSE. |   (3) Reg-Up Trade Overage Charges:  RTRUTOAMT *q* = (1/4) \* RTRUTO *q* \* RTMCPCRU  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | 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. | | RTRUTO *q* | MW | *Real-Time Reg-Up Trade Overage for the QSE* ⎯ The quantity of submitted Reg-Up trades in excess of DAM self-arrangement quantities for the QSE *q* for the Operating Hour. | | RTMCPCRU | $/MW | *Real-Time Market Clearing Price for Capacity for Reg-Up -* The Real-Time MCPC for Reg-Up for the 15-minute Settlement Interval. | | *q* | none | A QSE. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1010: Insert Section 6.7.5.3 below upon system implementation of the Real-Time Co-Optimization (RTC) project:]  6.7.5.3 Regulation Down Service Payments and Charges  (1) Reg-Down Imbalance Payment or Charge:  RTRDIMBAMT *q* = (-1) \* [[RTRDREV *q, r* – (1/4) \* (PCRDR *r, q, DAM* \* RTMCPCRD)] – (1/4) \* (DASARDQ *q* \* RTMCPCRD) + (1/4) \* (RDTP *q* – RDTS *q*) \* RTMCPCRD]  Where:  RTRDREV *q, r  =* (1/4) \* RTRDAWD *q, r* \* RTMCPCRDR *q, r*  RTMCPCRDR *q, r =*  (RDRWF *q, r, p, y* \* (RTMCPCRDS *y* + RTRDPARDS *y*))  RTRDAWD *q, r* =  (RNWF *y* \* RTRDAWDS *q, r, p, y*)  Where:  RDRWF *q, r, p, y*= [max(0.001, RTRDAWDS *q, r, p, y*) \* TLMP *y*] / [max(0.001,  RTRDAWDS *q, r, p, y*) \* TLMP *y*]  And:  RNWF *y* = TLMP *y* / TLMP *y*  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | 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. | | RTRDAWD*q, r* | MW | *Real-Time Reg-Down Award per Resource per QSE* - The Reg-Down amount awarded to QSE *q* for Resource *r* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRDREV *q, r* | $ | *Real-Time Reg-Down Revenue*— The Real-Time Reg-Down revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRDAWDS*q, r, p, y* | MW | *Real-Time Reg-Down Award per Resource per QSE per SCED interval* - The Reg-Down Amount awarded to QSE *q* for Resource *r* in Real-Time for the SCED interval *y.* Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTMCPCRDR *q, r* | $/MW | *Real-Time Market Clearing Price for Capacity for Reg-Down per Resource per QSE*⎯ The Real-Time MCPC for Reg-Down for Resource *r*, represented by QSE *q* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTMCPCRDS *y* | $/MW | *Real-Time Market Clearing Price for Capacity for Reg-Down per SCED interval -* The Real-Time MCPC for Reg-Down for the SCED interval *y.* | | PCRDR *r, q, DAM* | MW | *Procured Capacity for Reg-Down per Resource per QSE in DAM*—The Reg-Down capacity awarded to QSE *q* in the DAM for Resource *r* for the Operating Hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTMCPCRD | $/MW | *Real-Time Market Clearing Price for Capacity for Reg-Down -* The Real-Time MCPC for Reg-Down for the 15-minute Settlement Interval. | | RTRDPARDS *y* | $/MW | *Real-Time Reliability Deployment Price Adder for Ancillary Service for Reg-Down per SCED interval* - The Real-Time price adder for Reg-Down that captures the impact of reliability deployments on Reg-Down prices for the SCED interval *y*. | | DASARDQ *q* | MW | *Day-Ahead Self-Arranged Reg-Down Quantity per QSE* —The self-arranged Reg-Down quantity submitted by QSE *q* before 1000 in the DAM for the Operating Hour. | | RDTP *q* | MW | *Trade Purchases for Reg-Down for the QSE*— The trade purchases for QSE *q* for Reg-Down for the Operating Hour. | | RDTS *q* | MW | *Trade Sales for Reg-Down for the QSE*— The trade sales for QSE *q* for Reg-Down for the Operating Hour. | | TLMP *y* | second | *Duration of SCED interval per interval -* The duration of the SCED interval *y*. | | RNWF *y* | none | *Resource Node Weighting Factor per interval -* The weight used in the Ancillary Service award calculation for the portion of the SCED interval y within the Settlement Interval. | | RDRWF *q, r, p, y* | none | *Regulation Down Resource Node Weighting Factor per interval -* The Reg-Down Resource weight, based on Reg-Down awards, used in the Real-Time MCPC calculation for the portion of the SCED interval y within the Settlement Interval. Where for a Combined Cycle Train, the Resource r is a Combined Cycle Generation Resource within the Combined Cycle Train. | | *r* | none | A Resource. | | *q* | none | A QSE. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. | | *p* | none | A Resource Node Settlement Point. |   (2) Reg-Down Only Charge:  RTRDOAMT *q* = (1/4) \* DARDOAWD *q* \* RTMCPCRD  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | 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. | | DARDOAWD *q* | MW | *Day-Ahead Reg-Down Only Award for the QSE*⎯ The Reg-Down only capacity awarded in the DAM to the QSE *q* for the Operating Hour. | | RTMCPCRD | $/MW | *Real-Time Market Clearing Price for Capacity for Reg-Down -* The Real-Time MCPC for Reg-Down for the 15-minute Settlement Interval. | | *q* | none | A QSE. |   (3) Reg-Down Trade Overage Charge:  RTRDTOAMT *q* = (1/4) \* RTRDTO *q* \* RTMCPCRD  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | 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. | | RTRDTO *q* | MW | *Real-Time Reg-Down Trade Overage for the QSE* ⎯ The quantity of submitted Reg-Down trades in excess of their DAM self- arrangement quantity for the QSE *q* for the Operating Hour. | | RTMCPCRD | $/MW | *Real-Time Market Clearing Price for Capacity for Reg-Down -* The Real-Time MCPC for Reg-Down for the 15-minute Settlement Interval. | | *q* | none | A QSE. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1010: Insert Section 6.7.5.4 below upon system implementation of the Real-Time Co-Optimization (RTC) project:]  6.7.5.4 Responsive Reserve Payments and Charges  (1) RRS Imbalance Payment or Charge:  RTRRIMBAMT *q* = (-1) \* [[RTRRREV *q, r*  – (1/4) \* (PCRRR *r, q, DAM* \* RTMCPCRR)] – (1/4) \* (DASARRQ *q* \* RTMCPCRR) + (1/4) \* (RRTP *q* – RRTS *q*) \* RTMCPCRR]  Where:  RTRRREV *q, r  =* (1/4) \* RTRRAWD *q, r* \* RTMCPCRRR *q, r*  RTMCPCRRR *q, r =*  (RRRWF *q, r, p, y* \* (RTMCPCRRS *y* + RTRDPARRS *y*))  RTRRAWD *q, r*  =  (RNWF *y* \* RTRRAWDS *q, r, p, y*)  Where:  RRRWF *q, r, p, y*= [max(0.001, RTRRAWDS *q, r, p, y*) \* TLMP *y*] / [max(0.001,  RTRRAWDS *q, r, p, y*) \* TLMP *y*]  And:  RNWF *y* = TLMP *y* / TLMP *y*  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | 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. | | RTRRAWD *q,r* | MW | *Real-Time Responsive Reserve Award per Resource per QSE*— The RRS amount awarded to QSE *q* for Resource *r* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRRREV *q, r* | $ | *Real-Time Responsive Reserve Revenue*— The Real-Time RRS revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTRDPARRS *y* | $/MW | *Real-Time Reliability Deployment Price Adder for Ancillary Service for Responsive Reserve per SCED interval* – The Real-Time price adder for RRS that captures the impact of reliability deployments on RRS prices for the SCED interval y. | | RTRRAWDS *q, r, p, y* | MW | *Real-Time Responsive Reserve Award per Resource per QSE per SCED interval -* The RRS amount awarded to QSE *q* for Resource *r* in Real-Time for the SCED interval *y.* Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTMCPCRRR *q, r* | $/MW | *Real-Time Market Clearing Price for Capacity for Responsive Reserve per Resource per QSE*⎯ The Real-Time MCPC for RRS for Resource *r*, represented by QSE *q* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTMCPCRRS *y* | $/MW | *Real-Time Market Clearing Price for Capacity for Responsive Reserve per SCED interval -* The Real-Time MCPC for RRS for the SCED interval *y.* | | PCRRR *r, q, DAM* | MW | *Procured Capacity for Responsive Reserve per Resource per QSE in DAM*—The RRS capacity awarded to QSE *q* in the DAM for Resource *r* for the Operating Hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTMCPCRR | $/MW | *Real-Time Market Clearing Price for Capacity for Responsive Reserve -* The Real-Time MCPC for RRS for the 15-minute Settlement Interval. | | DASARRQ *q* | MW | *Day-Ahead Self-Arranged Responsive Reserve Quantity per QSE*—The self-arranged RRS quantity submitted by QSE *q* before 1000 in the DAM for the Operating Hour. | | RRTP *q* | MW | *Trade Purchases for Responsive Reserve for the QSE—* The trade purchases for QSE *q* for RRS for the Operating Hour. | | RRTS *q* | MW | *Trade Sales for Responsive Reserve for the QSE —* The trade sales for QSE *q* for RRS for the Operating Hour. | | TLMP *y* | second | *Duration of SCED interval per interval -* The duration of the SCED interval *y*. | | RNWF *y* | none | *Resource Node Weighting Factor per interval -* The weight used in the Ancillary Service award calculation for the portion of the SCED interval y within the Settlement Interval. | | RRRWF *q, r, p, y* | none | *Responsive Reserve Resource Node Weighting Factor per interval -* The RRS Resource weight, based on RRS awards, used in the Real-Time MCPC calculation for the portion of the SCED interval *y* within the Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | *r* | none | A Resource. | | *q* | none | A QSE. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. | | *p* | none | A Resource Node Settlement Point. |   (2) RRS Only Charge:  RTRROAMT *q* = (1/4) \* DARROAWD *q* \* RTMCPCRR  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | 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. | | DARROAWD *q* | MW | *Day-Ahead Responsive Reserve Only Award for the QSE*⎯ The RRS only capacity awarded in the DAM to the QSE *q* for the Operating Hour. | | RTMCPCRR | $/MW | *Real-Time Market Clearing Price for Capacity for Responsive Reserve -* The Real-Time MCPC for RRS for the 15-minute Settlement Interval. | | *q* | none | A QSE. |   (3) RRS Trade Overage Charge:  RTRRTOAMT *q* = (1/4) \* RTRRTO *q* \* RTMCPCRR  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | 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. | | RTRRTO *q* | MW | *Real-Time Responsive Reserve Trade Overage for the QSE* ⎯ The quantity of submitted RRS trades in excess of their DAM self-arrangement quantity for the QSE *q* for the Operating Hour. | | RTMCPCRR | $/MW | *Real-Time Market Clearing Price for Capacity for Responsive Reserve -* The Real-Time MCPC for RRS for the 15-minute Settlement Interval. | | *q* | none | A QSE. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1010: Insert Section 6.7.5.5 below upon system implementation of the Real-Time Co-Optimization (RTC) project:]  6.7.5.5 Non-Spinning Reserve Service Payments and Charges  (1) Non-Spin Imbalance Payment or Charge:  RTNSIMBAMT *q* = (-1) \* [[RTNSREV *q, r*  – (1/4) \* (PCNSR *r, q, DAM* \* RTMCPCNS)] – (1/4) \* (DASANSQ *q* \* RTMCPCNS) + (1/4) \* (NSTP *q* – NSTS *q*) \* RTMCPCNS]  Where:  RTNSREV *q, r  =* (1/4) \* RTNSAWD *q, r* \* RTMCPCNSR *q, r*  RTMCPCNSR *q, r =*  (NSRWF *q, r, p, y* \* (RTMCPCNSS *y* + RTRDPANSS *y*))  RTNSAWD *q, r*  =  (RNWF *y* \* RTNSAWDS *q, r, p, y*)  Where:  NSRWF *q, r, p, y*= [max(0.001, RTNSAWDS *q, r, p, y*) \* TLMP *y*] / [max(0.001,  RTNSAWDS *q, r, p, y*) \* TLMP *y*]  And:  RNWF *y* = TLMP *y* / TLMP *y*  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | 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. | | RTNSAWD *q, r* | MW | *Real Time Non-Spin Award per Resource per QSE* - The Non-Spin amount awarded to QSE *q* for Resource *r* in Real-Time for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTNSREV *q, r* | $ | *Real-Time Non-Spin Revenue*— The Real-Time Non-Spin revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTNSAWDS *q, r, p, y* | MW | *Real Time Non-Spin Award per Resource per QSE* *per SCED interval* - The Non-Spin Amount awarded to QSE *q* for Resource *r* in Real-Time for the SCED interval *y.* Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | RTMCPCNSR *q,r* | $/MW | *Real-Time Market Clearing Price for Capacity for Non-Spin per Resource per QSE*⎯ The Real-Time MCPC for Non-Spin for Resource *r*, represented by QSE *q* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTMCPCNSS *y* | $/MW | *Real-Time Market Clearing Price for Capacity for Non-Spin per SCED Interval -* The Real-Time MCPC for Non-Spin for the SCED interval *y.* | | PCNSR *r, q, DAM* | MW | *Procured Capacity for Non-Spin per Resource per QSE in DAM*—The Non-Spin capacity awarded to QSE *q* in the DAM for Resource *r* for the Operating Hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | 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. | | RTRDPANSS *y* | $/MW | *Real-Time Reliability Deployment Price Adder for Ancillary Service for Non-Spin per SCED interval* - The Real-Time price adder for Non-Spin that captures the impact of reliability deployments on Non-Spin prices for the SCED interval *y*. | | DASANSQ *q* | MW | *Day-Ahead Self-Arranged Non-Spin Quantity per QSE*—The self-arranged Non-Spin quantity submitted by QSE *q* before 1000 in the DAM for the Operating Hour. | | NSTP *q* | MW | *Trade Purchases for Non-Spin for the QSE*— The trade purchases for QSE *q* for Non-Spin for the Operating Hour. | | NSTS *q* | MW | *Trade Sales for Non-Spin for the QSE—* The trade sales for QSE *q* for Non-Spin for the Operating Hour. | | TLMP *y* | second | *Duration of SCED interval per interval -* The duration of the SCED interval *y*. | | RNWF *y* | none | *Resource Node Weighting Factor per interval -* The weight used in the Ancillary Service award calculation for the portion of the SCED interval y within the Settlement Interval. | | NSRWF *q, r, p, y* | none | *Non-Spin Resource Node Weighting Factor per interval -* The Non-Spin Resource weight, based on Non-Spin awards, used in the Real-Time MCPC calculation for the portion of the SCED interval *y* within the Settlement Interval*.* Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | *r* | none | A Resource. | | *q* | none | A QSE. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. | | *p* | none | A Resource Node Settlement Point. |   (2) Non-Spin Only Charge:  RTNSOAMT *q* = (1/4) \* DANSOAWD *q* \* RTMCPCNS  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | RTNSOAMT *q* | $ | *Real-Time Non-Spin Only Amount for the QSE*— The total charge to QSE *q* in Real-Time for Non-Spin only award for each 15-minute Settlement Interval. | | DANSOAWD *q* | MW | *Day-Ahead Non-Spin Only Award for the QSE*⎯ The Non-Spin only capacity awarded in the DAM to the QSE *q* for the Operating Hour. | | 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. | | *q* | none | A QSE. |   (3) Non-Spin Trade Overage Charge:  RTNSTOAMT *q* = (1/4) \* RTNSTO *q* \* RTMCPCRNS  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | 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. | | RTNSTO *q* | MW | *Real-Time Non-Spin Trade Overage for the QSE* ⎯ The quantity of submitted Non-Spin trades in excess of their DAM self-arrangement quantity for the QSE *q* for the Operating Hour. | | 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. | | *q* | none | A QSE. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1010: Insert Section 6.7.5.6 below upon system implementation of the Real-Time Co-Optimization (RTC) project:]  6.7.5.6 ERCOT Contingency Reserve Service Payments and Charges  (1) ECRS Imbalance Payment or Charge:  RTECRIMBAMT *q* = (-1) \* [[RTECRREV*q, r* – (1/4) \* (PCECRR *r, q, DAM* \*  RTMCPCECR)] – (1/4) \* (DASAECRQ *q* \* RTMCPCECR) + (1/4) \* (ECRTP *q* – ECRTS *q*) \* RTMCPCECR]  Where:  RTECRREV *q, r  =* (1/4) \* RTECRAWD *q, r* \* RTMCPCECRR *q, r*  RTMCPCECRR *q, r =* (ECRRWF *q, r, p, y* \* (RTMCPCECRS *y* + RTRDPAECRS *y))*  RTECRAWD *q,r*  =  (RNWF *y* \* RTECRAWDS *q, r, p, y*)  Where:  ECRRWF *q, r, p, y* = [max(0.001, RTECRAWDS *q, r, p, y*) \* TLMP *y*] / [max(0.001,  RTECRAWDS *q, r, p, y*) \* TLMP *y*]  And:  RNWF *y* = TLMP *y* / TLMP *y*  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | 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. | | RTECRAWD q,r | MW | *Real-Time ERCOT Contingency Reserve Service Award per Resource per QSE*⎯ The ECRS amount awarded to QSE *q* for Resource *r* in Real-Time for 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. | | RTECRREV *q, r* | $ | *Real-Time ERCOT Contingency Reserve Service Revenue*— The Real-Time ECRS revenue for QSE *q* calculated for Resource *r* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTECRAWDS *q, r, p, y* | MW | *Real-Time ERCOT Contingency Reserve Service Award per Resource per QSE per SCED interval* - The ECRS amount awarded to QSE *q* for Resource *r* in Real-Time for the SCED interval *y.* Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTMCPCECRR *q, r* | $/MW | *Real-Time Market Clearing Price for Capacity for ERCOT Contingency Reserve Service per Resource per QSE* ⎯ The Real-Time MCPC for ECRS for Resource *r*, represented by QSE *q* for the 15-minute Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. | | RTMCPCECRS *y* | $/MW | *Real-Time Market Clearing Price for Capacity for ERCOT Contingency Reserve Service per SCED Interval* — The Real-Time MCPC for ECRS for the SCED interval *y.* | | PCECRR *r, q, DAM* | MW | *Procured Capacity for ERCOT Contingency Reserve Service per Resource per QSE in DAM*—The ECRS capacity awarded to QSE *q* in the DAM for Resource *r* for the Operating Hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | 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. | | RTRDPAECRS *y* | $/MW | *Real-Time Reliability Deployment Price Adder for Ancillary Service for ERCOT Contingency Reserve Service per SCED interval* - The Real-Time price adder for ECRS that captures the impact of reliability deployments on ECRS prices for the SCED interval *y*. | | DASAECRQ *q* | MW | *Day-Ahead Self-Arranged ERCOT Contingency Reserve Service Quantity per QSE*—The self-arranged ECRS quantity submitted by QSE *q* before 1000 in the DAM for the Operating Hour. | | ECRTP *q* | MW | *Trade Purchases for ERCOT Contingency Reserve Service for the QSE—* The trade purchases for QSE *q* for ECRS for the Operating Hour. | | ECRTS *q* | MW | *Trade Sales for ERCOT Contingency Reserve Service for the QSE—* The trade sales for QSE *q* for ECRS for the Operating Hour. | | TLMP *y* | second | *Duration of SCED interval per interval -* The duration of the SCED interval *y*. | | RNWF *y* | none | *Resource Node Weighting Factor per interval -* The weight used in the Ancillary Service award calculation for the portion of the SCED interval *y* within the Settlement Interval. | | ECRRWF *q, r, p, y* | none | *ERCOT Contingency Reserve Service Resource Node Weighting Factor per interval -* The ECRS Resource weight, based on ECRS awards, used in the Real-Time MCPC calculation for the portion of the SCED interval *y* within the Settlement Interval. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. | | *r* | none | A Resource. | | *q* | none | A QSE. | | *y* | none | A SCED interval in the 15-minute Settlement Interval. | | *p* | none | A Resource Node Settlement Point. |   (2) ECRS Only Charge:  RTECROAMT *q* = (1/4) \* DAECROAWD *q* \* RTMCPCECR  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | 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. | | DAECROAWD *q* | MW | *Day-Ahead ERCOT Contingency Service Only Award for the QSE*⎯ The ECRS only capacity awarded in the DAM to the QSE *q* for the Operating Hour. | | 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. | | *q* | none | A QSE. |   (3) ECRS Trade Overage Charge:  RTECRTOAMT *q* = (1/4) \* RTECRTO *q* \* RTMCPCRECR  The above variables are defined as follows:   | Variable | Unit | Description | | --- | --- | --- | | 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. | | RTECRTO *q* | MW | *Real-Time ERCOT Contingency Reserve Service Trade Overage for the QSE* ⎯ The quantity of submitted ECRS trades in excess of their DAM self-arrangement quantity for the QSE *q* for the Operating Hour. | | 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. | | *q* | none | A QSE. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [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:  **RTDASAMT *q* = (-1) \* Min[(RTRUILD *q* + RTRDILD *q* + RTRRILD *q* + RTNSILD*q* + RTECRILD *q* – RTEIRD** *q* **– RTASIRD *q*),** **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. | | 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. | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| [NPRR1010: Insert Section 6.7.5.8 below upon system implementation of the Real-Time Co-Optimization (RTC) project:] 6.7.5.8 Real-Time Derated Ancillary Service Capability Charge (1) The total cost for Real-Time derated Ancillary Service payments and charges is allocated to QSEs representing Load based on Load Ratio Share (LRS). The Real-Time derated Ancillary Service Payment allocations to each QSE for a given 15-minute Settlement Interval are calculated as follows:  LARTDASAMT *q* = (-1) \* RTDASAMTTOT \* LRS *q*  Where:  RTDASAMTTOT =  RTDASAMT *q*  The above variables are defined as follows:   |  |  |  | | --- | --- | --- | | **Variable** | **Unit** | **Description** | | LARTDASAMT *q* | $ | *Load Allocated Real-Time Derated Ancillary Service Amount per QSE* – The charge to QSE *q* due to a manual reduction of Ancillary Services to be awarded for the 15-minute Settlement Interval. | | RTDASAMTTOT | $ | *Real-Time Derated Ancillary Service Amount Total* —The total of all payments to all QSEs for amounts recoverable due to an ERCOT issued manual reduction of Ancillary Services to be awarded for the 15-minute Settlement Interval. | | RTDASAMT *q* | $ | *Real-Time Derated Ancillary Service Amount*—The payment to QSE *q* for amounts recoverable due to an ERCOT issued manual reduction of Ancillary Services to be awarded for the 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. | |

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 = RTASIAMT *q*

RTRUCRSVAMTTOT =  RTRUCRSVAMT *q*

RTRDASIAMTTOT = RTRDASIAMT *q*

RTRDRUCRSVAMTTOT=  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. |
| 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 =  (RTRUIMBAMT *q*)  RTRUOAMTTOT =  (RTRUOAMT *q*)  RTRUTOAMTTOT =  (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 = (RTRDIMBAMT *q*)  RTRDOAMTTOT = (RTRDOAMT *q*)  RTRDTOAMTTOT = (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 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 =  (RTRRIMBAMT *q*)  RTRROAMTTOT =  (RTRROAMT *q*)  RTRRTOAMTTOT =  (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 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 =  (RTNSIMBAMT *q*)  RTNSOAMTTOT =  (RTNSOAMT *q*)  RTNSTOAMTTOT =  (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 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 =  (RTECRIMBAMT *q*)  RTECROAMTTOT = (RTECROAMT *q*)  RTECRTOAMTTOT = (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 for QSE *q* for the 15-minute Settlement Interval. | | *q* | none | A QSE. | |

***6.7.7 Adjustments to Net Cost Allocations for Real-Time Ancillary Services***

If ERCOT assigns Ancillary Service during a Watch, the incremental cost for assigned Ancillary Service is calculated in this section.

(1) For Reg-Up, if applicable:

(a) The total costs for Reg-Up for a given Operating Hour during a Watch is calculated as follows:

**ARUCOSTTOT = (-1) \* RTAURUAMTTOT + RUCOSTTOT**

Where:

Total payment of Real-Time Ancillary Service Assignment procured capacity for un-deployed Reg-Up

RTAURUAMTTOT = RTAURUAMT*q,r,p, i*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| ARUCOSTTOT | $ | *Reg-Up Cost Total*—The total costs for Reg-Up that includes costs of assigned Ancillary Service during a Watch for the hour. |
| RUCOSTTOT | $ | *Reg-Up Cost Total*—The net total costs for Reg-Up for the hour. |
| RTAURUAMTTOT | $ | *Real-Time Assigned Un-Deployed Regulation Up Payment Amount Total for all QSEs*—The payments to all QSEs for the Real-Time un-deployed Reg-Up Ancillary Service Assignment for the hour. |
| RTAURUAMT *q,r,p,i* | $ | *Real-Time Assigned Un-Deployed Regulation Up Payment Amount per QSE*—The payment to QSE *q* for a Real-Time un-deployed Reg-Up Ancillary Service Assignment to Resource *r* at Settlement Point *p* for the 15-minute Settlement Interval *i*. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource that was allocated Reg-Up Ancillary Service Assignment by the QSE. |
| *p* | none | A Settlement Point for the Resource Node that was allocated Reg-Up Ancillary Service Assignment by the QSE. |
| *i* | none | A 15-minute Settlement Interval in the Operating Hour. |

(b) Each QSE’s share of the total costs for Reg-Up for the Operating Hour, including Ancillary Service costs assigned during a Watch is calculated as follows:

ARUCOST *q* = ARUPR \* ARUQ *q*

Where:

ARUPR = ARUCOSTTOT / ARUQTOT

ARUQTOT = ARUQ *q*

ARUQ *q* = ARUO *q* – SARUQ *q*

ARUO *q* = WAURUTOT \* HLRS *q* + RUO *q*

WAURUTOT = RTAURUR *q,r,p*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| ARUCOST *q* | $ | *Reg-Up Cost per QSE*—QSE *q*’s share of the net total costs for Reg-Up that includes costs of assigned Ancillary Service during a Watch, for the hour. |
| ARUPR | $/MW per hour | *Reg-Up Price—*The price for Reg-Up calculated based on the net total costs for Reg-Up, for the hour. |
| ARUCOSTTOT | $ | *Reg-Up Cost Total*—The total costs for Reg-Up that includes costs of assigned Ancillary Service during a Watch for the hour. |
| ARUQTOT | MW | *Reg-Up Quantity Total*—The sum of every QSE’s portion of its Ancillary Service Obligation that is not self-arranged in either DAM or any SASM that includes assigned Ancillary Service, during a Watch, for the hour. |
| ARUQ *q* | MW | *Reg-Up Quantity per QSE*—The portion of QSE *q*’s total Ancillary Service Obligation that is not self-arranged in either DAM or any SASM, that includes assigned Ancillary Service, during a Watch for the hour. |
| WAURUTOT | MW | *Watch Assigned Un-Deployed Regulation Up Quantity-* The total market wide quantity of un-deployed Reg-Up Ancillary Service Assignment for the hour. |
| RTAURUR *q,r* | MW | *Real-Time Assigned Un-Deployed Regulation Up Quantity per Resource per QSE -* The quantity of un-deployedReg-Up Ancillary Service Assignment to a QSE *q* for Resource *r* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| ARUO *q* | MW | *Reg-Up Obligation per QSE*—The Ancillary Service Obligation of QSE *q*, for the hour during a Watch. |
| RUO *q* | MW | *Reg-Up Obligation per QSE*—The Ancillary Service Obligation of QSE *q*, for the hour. |
| HLRS *q* | none | *The Hourly Load Ratio Share calculated for QSE q for the hour*. See Section 6.6.2.4, QSE Load Ratio Share for an Operating Hour. |
| SARUQ*q* | MW | *Total Self-Arranged Reg-Up Quantity per QSE for all markets*—The sum of all self-arranged Reg-Up quantities submitted by QSE *q* for DAM and all SASMs. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resourcethat was allocated Reg-Up Ancillary Service Assignment by the QSE. |
| *p* | none | A Settlement Point for the Resource Node that was allocated Reg-Up Ancillary Service Assignment by the QSE. |

(c) The incremental cost to each QSE’s for assigned Reg-Up for the Operating Hour, is calculated as follows:

**NETARTRUAMT *q* = ARUCOST *q* – RUCOST *q***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| NETARTRUAMT*q* | $ | *Real-Time Reg-Up Amount per QSE*—The net adjustment to QSE *q*’s share of the costs for assigned Reg-Up, for the hour. |
| ARUCOST*q* | $ | *Reg-Up Cost per QSE*—QSE *q*’s share of the net total costs for Reg-Up that includes costs of assigned Ancillary Service during a Watch, for the hour. |
| RUCOST *q* | $ | *Reg-Up Cost per QSE*—QSE *q*’s share of the net total costs for Reg-Up, for the hour. |
| *q* | none | A QSE. |

(2) For RRS, if applicable:

(a) The total costs for RRS for a given Operating Hour during a Watch is calculated as follows:

ARRCOSTTOT = (-1) \* RTAURRAMTTOT + RRCOSTTOT

Where:

Total payment of Real-Time Ancillary Service Assignment procured capacity for un-deployed RRS

RTAURRAMTTOT = RTAURRAMT *q, r, p, i*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| ARRCOSTTOT | $ | *Responsive Reserve Cost Total*—The net total costs for RRS that includes costs of assigned Ancillary Service during a Watch for the hour. |
| RRCOSTTOT | $ | *Responsive Reserve Cost Total*—The net total costs for RRS for the hour. |
| RTAURRAMTTOT | $ | *Real-Time Assigned Un-Deployed Responsive Reserve Payment Amount Total for all QSEs -* The payments to all QSEs for the Real-Time un-deployed RRS Ancillary Service Assignment for the hour. |
| RTAURRAMT*q, r,p,i* | $ | *Real-Time Assigned Un-Deployed Responsive Reserve Payment Amount per QSE -* The payment to QSE *q* for a Real-Time un-deployed RRS Ancillary Service Assignment to Resource *r* at Settlement Point *p* for the 15-minute Settlement Interval *i*. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource that was allocated RRS Ancillary Service Assignment by the QSE. |
| *p* | none | A Settlement Point for the Resource Node that was allocated RRS Ancillary Service Assignment by the QSE. |
| *i* | none | A 15-minute Settlement Interval in the Operating Hour. |

(b) Each QSE’s share of the net total costs for RRS for the Operating Hour, including Ancillary Service costs assigned during a Watch is calculated as follows:

ARRCOST *q* = ARRPR \* ARRQ *q*

Where:

ARRPR = ARRCOSTTOT / ARRQTOT

ARRQTOT = ARRQ *q*

ARRQ *q* = ARRO *q* – SARRQ *q*

ARRO *q* = WAURRTOT \* HLRS *q* + RRO *q*

WAURRTOT = RTAURRR *q, r, p*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| ARRCOST *q* | $ | *Responsive Reserve Cost per QSE*—QSE *q*’s share of the net total costs for RRS, that includes costs of assigned Ancillary Service during a Watch for the hour. |
| ARRPR | $/MW per hour | *Responsive Reserve Price—*The price for RRS calculated based on the net total costs for RRS that includes costs of assigned Ancillary Service during a Watch for the hour. |
| ARRCOSTTOT | $ | *Responsive Reserve Cost Total*—The net total costs for RRS that includes costs of assigned Ancillary Service during a Watch for the hour. |
| ARRQTOT | MW | *Responsive Reserve Quantity Total*—The sum of every QSE’s portion of its Ancillary Service Obligation that is not self-arranged in either DAM or any SASM that includes assigned Ancillary Service, during a Watch,, for the hour. |
| WAURRTOT | MW | *Watch Assigned Un-Deployed Responsive Reserve Quantity*—The total market wide quantity of un-deployed RRS Ancillary Service Assignment for the hour. |
| RTAURRR *q,r* | MW | *Real-Time Assigned Un-Deployed Responsive Reserve Quantity per Resource per QSE*—The quantity of un-deployed RRS Ancillary Service Assignment to a QSE *q* for Resource *r* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| ARRQ *q* | MW | *Responsive Reserve Quantity per QSE*—The portion of QSE *q*’s Ancillary Service Obligation that is not self-arranged in either DAM or any SASM, for the hour. |
| ARRO *q* | MW | *Responsive Reserve Obligation per QSE*—The Ancillary Service Obligation of QSE *q*, for the hour. |
| RRO *q* | MW | *Responsive Reserve Obligation per QSE*—The Ancillary Service Obligation of QSE *q*, for the hour. |
| HLRS *q* | none | *The Hourly Load Ratio Share calculated for QSE q for the hour*. See Section 6.6.2.4. |
| SARRQ *q* | MW | *Total Self-Arranged Responsive Reserve Quantity per QSE for all markets*—The sum of all self-arranged RRS quantities submitted by QSE *q* for DAM and all SASMs. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource that was allocated RRS Ancillary Service Assignment by the QSE. |
| *p* | none | A Settlement Point for the Resource Node that was allocated RRS Ancillary Service Assignment by the QSE. |

(c) The incremental cost to each QSE’s for assigned RRS for the Operating Hour, is calculated as follows:

**NETARTRRAMT *q* = ARRCOST *q* – RRCOST *q***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| NETARTRRAMT *q* | $ | *Real-Time Responsive Reserve Amount per QSE*—The net adjustment to QSE *q*’s share of the costs for assigned RRS, for the hour. |
| RRCOST *q* | $ | *Responsive Reserve Cost per QSE*—QSE *q*’s share of the net total costs for RRS, for the hour. |
| ARRCOST *q* | $ | *Responsive Reserve Cost per QSE*—QSE *q*’s share of the net total costs for RRS that includes costs of assigned Ancillary Service during a Watch, for the hour. |
| *q* | none | A QSE. |

(3) For ECRS, if applicable:

(a) The total costs for ECRS for a given Operating Hour during a Watch is calculated as follows:

AECRCOSTTOT = (-1) \* RTAUECRAMTTOT + ECRCOSTTOT

Where:

Total payment of Real-Time Ancillary Service Assignment procured capacity for un-deployed ECRS

RTAUECRAMTTOT = RTAUECRAMT *q, r, p, i*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| AECRCOSTTOT | $ | *ERCOT Contingency Reserve Service Cost Total*—The net total costs for ECRS that includes costs of assigned Ancillary Service during a Watch for the hour. |
| ECRCOSTTOT | $ | *ERCOT Contingency Reserve Service Cost Total*—The net total costs for ECRS for the hour. |
| RTAUECRAMTTOT | $ | *Real-Time Assigned Un-Deployed ERCOT Contingency Reserve Service Payment Amount Total for all QSEs -* The payments to all QSEs for the Real-Time un-deployed ECRS Ancillary Service Assignment for the hour. |
| RTAUECRAMT*q, r, p, i* | $ | *Real-Time Assigned Un-Deployed ERCOT Contingency Reserve Service Payment Amount per QSE -* The payment to QSE *q* for a Real-Time un-deployed ECRS Ancillary Service Assignment to Resource *r* at Settlement Point *p* for the 15-minute Settlement Interval *i*. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource that was allocated ECRS Ancillary Service Assignment by the QSE. |
| *p* | none | A Settlement Point for the Resource Node that was allocated ECRS Ancillary Service Assignment by the QSE. |
| *i* | none | A 15-minute Settlement Interval in the Operating Hour. |

(b) Each QSE’s share of the net total costs for ECRS for the Operating Hour, including Ancillary Service costs assigned during a Watch is calculated as follows:

AECRCOST *q* = AECRPR \* AECRQ *q*

Where:

AECRPR = AECRCOSTTOT / AECRQTOT

AECRQTOT = AECRQ *q*

AECRQ *q* = AECRO *q* – SAECRQ *q*

AECRO *q* = WAUECRTOT \* HLRS *q* + ECRO *q*

WAUECRTOT = RTAUECRR *q, r, p*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| AECRCOST *q* | $ | *ERCOT Contingency Reserve Service Cost per QSE*—QSE *q*’s share of the net total costs for ECRS, that includes costs of assigned Ancillary Service during a Watch for the hour. |
| AECRPR | $/MW per hour | *ERCOT Contingency Reserve Service Price—*The price for ECRS calculated based on the net total costs for ECRS that includes costs of assigned Ancillary Service during a Watch for the hour. |
| AECRCOSTTOT | $ | *ERCOT Contingency Reserve Service Cost Total*—The net total costs for ECRS that includes costs of assigned Ancillary Service during a Watch for the hour. |
| AECRQTOT | MW | *ERCOT Contingency Reserve Service Quantity Total*—The sum of every QSE’s portion of its Ancillary Service Obligation that is not self-arranged in either DAM or any SASM that includes assigned Ancillary Service, during a Watch, for the hour. |
| WAUECRTOT | MW | *Watch Assigned Un-Deployed ERCOT Contingency Reserve Service Quantity*—The total market wide quantity of un-deployed ECRS Ancillary Service Assignment for the hour. |
| RTAUECRR *q, r* | MW | *Real-Time Assigned Un-Deployed ERCOT Contingency Reserve Service Quantity per Resource per QSE*—The quantity of un-deployed ECRS Ancillary Service Assignment to a QSE *q* for Resource *r* for the hour. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| AECRQ *q* | MW | *ERCOT Contingency Reserve Service Quantity per QSE*—The portion of QSE *q*’s Ancillary Service Obligation that is not self-arranged in either DAM or any SASM, for the hour. |
| AECRO *q* | MW | *ERCOT Contingency Reserve Service Obligation per QSE*—The Ancillary Service Obligation of QSE *q*, for the hour. |
| ECRO *q* | MW | *ERCOT Contingency Reserve Service Obligation per QSE*—The Ancillary Service Obligation of QSE *q*, for the hour. |
| HLRS *q* | none | *The Hourly Load Ratio Share calculated for QSE q for the hour*. See Section 6.6.2.4. |
| SAECRQ *q* | MW | *Total Self-Arranged ERCOT Contingency Reserve Service Quantity per QSE for all markets*—The sum of all self-arranged ECRS quantities submitted by QSE *q* for DAM and all SASMs. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource that was allocated ECRS Ancillary Service Assignment by the QSE. |
| *p* | none | A Settlement Point for the Resource Node that was allocated ECRS Ancillary Service Assignment by the QSE. |

(c) The incremental cost to each QSE’s for assigned ECRS for the Operating Hour, is calculated as follows:

**NETARTECRAMT *q* = AECRCOST *q* – ECRCOST *q***

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| Variable | Unit | Description |
| NETARTECRAMT *q* | $ | *Real-Time ERCOT Contingency Reserve Service Amount per QSE*—The net adjustment to QSE *q*’s share of the costs for assigned ECRS, for the hour. |
| ECRCOST *q* | $ | *ERCOT Contingency Reserve Service Cost per QSE*—QSE *q*’s share of the net total costs for ECRS, for the hour. |
| AECRCOST *q* | $ | *ERCOT Contingency Reserve Service Cost per QSE*—QSE *q*’s share of the net total costs for ECRS that includes costs of assigned Ancillary Service during a Watch, for the hour. |
| *q* | none | A QSE. |

|  |
| --- |
| [NPRR1010: Delete Section 6.7.7 above upon system implementation of the Real-Time Co-Optimization (RTC) project.] |

6.8 Settlement for Operating Losses During an LCAP Effective Period

***6.8.1 Determination of Operating Losses During an LCAP Effective Period***

(1) In order for a Qualified Scheduling Entity (QSE) that represents a Generation Resource or Energy Storage Resource (ESR) to recover actual marginal costs for operating losses during a Low System-Wide Offer Cap (LCAP) Effective Period, and incurred as calculated in Section 6.8.2, Recovery of Operating Losses During an LCAP Effective Period, the QSE shall timely submit a Settlement and billing dispute for each affected Operating Day, consistent with the dispute process described in Section 9.14, Settlement and Billing Dispute Process. The QSE shall also submit, through the Settlement and billing dispute process, and within 60 days of the issuance of a Real-Time Market (RTM) Initial Statement for an Operating Day, the following information:

(a) For a Generation Resource:

(i) All fuel purchases used to determine the weighted average fuel price included in the calculation of the actual marginal operating fuel cost component, for the Generation Resource, for the 15-minute Settlement Interval within the Operating Day.

(b) For an ESR:

(i) The actual variable O&M rate incurred during the LCAP Effective Period in lieu of the Standard Operations and Maintenance Cost (STOM) defined in Section 6.8.2; and

(ii) The average electricity cost incurred to charge the ESR for the amount of discharge during the LCAP Effective Period.

(c) An attestation signed by an officer or executive with authority to bind the QSE stating that the information contained in the Settlement and billing dispute is accurate and that fixed costs (fees, penalties, and similar non-gas costs) were not included in the calculation of the weighted average fuel price.

(2) The calculation of operating losses under Section 6.8.2 applies only when the Real-Time Settlement Point Price for the Resource is equal to or exceeds the LCAP or when the Resource’s Energy Offer Curve is at the LCAP and the Resource receives a Dispatch Instruction or a Base Point above its Low Sustained Limit (LSL).

(3) Fuel prices may include all variable costs associated with the purchase, transportation, and storage of fuel.

(4) ERCOT will consider the documentation provided by the QSE in order to determine the weighted average fuel price for a Generation Resource or the average fuel cost for an ESR during an LCAP Effective Period.

(5) For purposes of determining operating losses during an LCAP Effective Period, ERCOT may request additional information, documentation, or clarification from the QSE. A QSE shall respond to any such request within ten Business Days.

***6.8.2 Recovery of Operating Losses During an LCAP Effective Period***

(1) ERCOT shall calculate the recovery of operating losses during an LCAP Effective Period with the actual marginal costs that exceed LCAP revenues in accordance with this Section.

(2) The actual marginal cost (AMC) and marginal energy production (MEP) used to calculate operating losses (OPL) for a Combined Cycle Train are the AMC and MEP that correspond to the Combined Cycle Generation Resource, within a Combined Cycle Train, that operates in Real-Time for the 15-minute Settlement Interval.

(3) Payment for operating losses during an LCAP Effective Period is calculated as follows:

**OPLPAMT *q, r, i* = (-1) \* (OPL *q, r, i* + ADJOPL *q, r, i*)**

Where,

For the Generation Resource:

OPL *q, r,i*  = Max(0, (AMC *q, r, i* - Max(LCAP, RTSPP *p, i*)) \* Min(RTMG *q, r, i*, MEP *q, r, i*))

If ERCOT approved verifiable costs for the Generation Resource:

AMC *q, r, i* = AHR *q, r, i* \* WAFP *q, r, i* + ROM *q, r*

MEP *q, r, i* = AMF *q, r, i* / AHR *q, r, i*

Otherwise,

AMC *q, r, i*  = PAHR *q, r, i* \* WAFP *q, r, i* + STOM *rc*

MEP *q, r, i* = AMF *q, r, i* / PAHR *q, r, i*

For ESRs:

OPL *q, r, i*  = Max(0, (AMC *q, r, i* - Max(LCAP, RTSPP *p, i*)) \* RTMG *q, r, i*)

Where,

AMC *q, r, i*  = AFC *q, r, i* + STOM *rc*

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| OPLPAMT *q, r, i* | $ | *Operating Losses Payment Amount –* The operating losses payment to the QSE *q,* for Resource *r*, for the 15-minute Settlement Interval *i* within the Operating Day. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| OPL *q, r, i* | $ | *Operating Losses* – The operating losses for Resource *r*, represented by QSE *q,* for the 15-minute Settlement Interval *i* within the Operating Day. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| ADJOPL *q, r, i* | $ | *Operating Losses* *Adjustment* – The adjustment to the operating losses for Resource *r*, represented by QSE *q,* for the 15-minute Settlement Interval *i* within the Operating Day. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| WAFP *q, r, i* | $/MMBtu | *Weighted Average Fuel Price*—The volume-weighted average price of fuel submitted to ERCOT for the LCAP Effective Period for a specific Resource *r,* represented by QSE *q,* and specific 15-minute Settlement Interval *i* within the Operating Day. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| AMC *q, r, i* | $/MWh | *Actual Marginal Cost –* The actual marginal costs for Resource *r* represented by QSE *q* for the 15-minute Settlement Interval *i* within the Operating Day. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| LCAP | $/MWh | *Low System Wide Offer Cap –* The value set per paragraph (1) of Section 4.4.11, System-Wide Offer Caps. |
| ROM *q, r* | $/MWh | *Raw Verifiable Operations and Maintenance Cost Above LSL –* The raw verifiable O&M cost for the Resource *r* represented by QSE *q* for operations above LSL. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| AMF *q, r, i* | MMBtu | *Actual Marginal Fuel per QSE per Resource -* The actual marginal purchased and delivered fuel for the Resource *r* represented by QSE *q* for the 15-minute Settlement Interval *i* within the Operating Day. The AMF represents only the fuel used to calculate the weighted average fuel price, WAFP. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. For Resources that are granted a dispute under Section 9.14.7, Disputes for RUC Make-Whole Payment for Fuel Costs, the actual marginal purchased and delivered fuel shall include only fuel for operations above LSL. |
| STOM *rc* | $/MWh | *Standard Operations and Maintenance Cost –* The standard O&M cost for the Resource category *rc* for operations above LSL, as described in paragraph (6)(c) of Section 5.6.1, Verifiable Costs. For an ESR, STOM shall be set at $0.3/MWh.   |  | | --- | | ***[NPRR1086: Replace the definition above with the following upon system implementation of NPRR1029:]***  *Standard Operations and Maintenance Cost –* The standard O&M cost for the Resource category *rc* for operations above LSL, shall be set to the minimum energy variable O&M costs, as described in paragraph (6)(c) of Section 5.6.1, Verifiable Costs. For an ESR, STOM shall be set at $0.3/MWh and for a DC-Coupled Resource, the value shall be set at $4.40/MWh. | |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price -* The Real-Time Settlement Point Price at the Settlement Point *p,* for the 15-minute Settlement Interval *i*. |
| AFC *q, r, i* | $/MWh | *Average Fuel Cost per Resource —*The average electricity cost used to charge the ESR *r* represented by QSE *q* applicable to the energy discharge for the 15-minute Settlement Interval *i* within the Operating Day. |
| AHR *q, r, i* | MMBtu / MWh | *Average Heat Rate per Resource –* The verifiable average heat rate for the Resource *r* represented by QSE *q*, for operating levels between LSL and High Sustained Limit (HSL), for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| PAHR *q, r, i* | MMBtu / MWh | *Proxy Average Heat Rate –* The proxy average heat rate for the Resource *r,* represented by QSE *q*, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| RTMG *q, r, i* | MWh | *Real-Time Metered Generation per QSE per Resource by Settlement Interval by hour—*The Real-Time energy from Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource r is the Combined Cycle Train. For Resources that are granted a dispute under Section 9.14.7, the Real-Time energy represents the energy produced for operations above LSL. |
| MEP *q, r, i* | MWh | *Marginal Energy Production per QSE per Resource by Settlement Interval* — The calculated marginal generation of Resource *r* represented by QSE *q* in Real-Time for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train. |
| *q* | None | A QSE. |
| *r* | None | A Generation Resource or ESR. |
| *i* | None | A 15-minute Settlement Interval within the Operating Day during an LCAP Effective Period. |
| *rc* | None | A Resource category |

(2) The total compensation to each QSE for operating losses during an LCAP Effective Period for the 15-minute Settlement Interval is calculated as follows:

**OPLPAMTQSETOT *q*  =  OPLPAMT *q, r, i***

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| OPLPAMTQSETOT*q* | $ | *Total Operating Losses Payment Amount per QSE –* The total operating losses payment to the QSE *q*, for all Resources, for the 15-minute Settlement Interval within the Operating Day. |
| OPLPAMT *q, r, i* | $ | *Operating Losses Payment Amount* – The operating losses payment to the QSE *q*, for Resource *r*, for the 15-minute Settlement Interval *i* within the Operating Day. Where for a Combined Cycle Train, the Resource *r* is the Combined Cycle Train. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource or ESR. |
| *i* | none | A 15-minute Settlement Interval within the Operating Day during an LCAP Effective Period. |

***6.8.3 Charges for Operating Losses During an LCAP Effective Period***

(1) All QSEs that were capacity-short in a Settlement Interval for which actual marginal costs above the LCAP are recovered will be charged for that shortage, as described in Section 6.8.3.1, Charges for Capacity Shortfalls During an LCAP Effective Period. If revenues from the charges under Section 6.8.3.1 are not enough to cover all actual marginal costs above the LCAP for a Settlement Interval, then the difference will be uplifted to all QSEs on a Load Ratio Share (LRS) basis, as described in Section 6.8.3.2, Uplift Charges for an LCAP Effective Period.

6.8.3.1 Charges for Capacity Shortfalls During an LCAP Effective Period

(1) The dollar amount charged to each QSE due to capacity shortfalls for any Settlement Intervals in an LCAP Effective Period is calculated as follows:

**LCAPCSAMT *i, q* = (-1) \* Max [(LCAPSFRS *i, q* \* OPLPAMTTOT *i*),   
(((1/4) \* LCAPSF *i, q*) \* OPLPAMTTOT *i* / OPLCAPTOT *i*)]**

Where:

OPLPAMTTOT *i*  = OPLPAMTQSETOT *i, q*

OPLCAPTOT *i* = RTMG *q, r, i*

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| LCAPCSAMT  *i, q* | $ | *LCAP Capacity-Short Amount*—The charge to a QSE *q*, due to capacity shortfall for an LCAPEffectivePeriod, for the 15-minute Settlement Interval *i*. |
| OPLPAMTQSETOT*i, q* | $ | *Total Operating Losses Payment Amount per QSE –* The total operating losses payment to the QSE *q*, for all Resources, for the 15-minute settlement interval *i* within the Operating Day. |
| OPLPAMTTOT *i* | $ | *Total Operating Losses Payment Amount –* The sum of Operating Losses Payments to all QSEs, for the 15-minute Settlement Interval *i*. |
| LCAPSFRS *i, q* | none | *LCAP Effective Period Shortfall Ratio Share*—The ratio of the QSE *q*’s capacity shortfall to the sum of all QSEs’ capacity shortfalls for an LCAP Effective Period for the 15-minute Settlement Interval *i*. See Section 6.8.3.1.1, Capacity Shortfall Ratio Share for an LCAP Effective Period. |
| LCAPSF  *i, q* | MW | *LCAP Shortfall*—The QSE *q*’s capacity shortfall for an LCAPEffective Period for the 15-minute Settlement Interval *i*. See formula in Section 6.8.3.1.1. |
| OPLCAPTOT *i* | MWh | *Operating Loss Capacity Total*—The sum of the Real-Time Metered Generation (RTMG) of all Resources compensated for an LCAP Effective Period for the 15-minute Settlement Interval *i*. |
| RTMG *q, r, i* | MWh | *Real-Time Metered Generation per QSE per Resource by Settlement Interval by hour—*The Real-Time energy from Resource *r* represented by QSE *q*, for the 15-minute Settlement Interval *i*. Where for a Combined Cycle Train, the Resource r is the Combined Cycle Train. For Resources that are granted a dispute under Section 9.14.7, Disputes for RUC Make-Whole Payment for Fuel Costs, the Real-Time energy represents the energy produced for operations above LSL. |
| *i* | none | A 15-minute Settlement Interval. |
| *q* | none | A QSE. |
| *r* | none | A Generation Resource or ESR that is compensated during an LCAP Effective Period for the hour that includes the Settlement Interval *i* . |

6.8.3.1.1 Capacity Shortfall Ratio Share for an LCAP Effective Period

(1) 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.

(2) The capacity shortfall ratio share of a specific QSE for an LCAP Effective Period is calculated, for a 15-minute Settlement Interval, as follows:

**LCAPSFRS *i, q* = LCAPSF *i, q* / LCAPSFTOT *i***

Where:

**LCAPSFTOT *i* =  LCAPSF  *i, q***

(3) The LCAP Shortfall in MW for a QSE for the 15-minute Settlement Interval is:

**LCAPSF *i, q* = Max (0, ((RTAML *q, p, i*) \*4) – LCAPCAP*q, i*)**

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

**LCAPCAP *i, q* =  LCAPHASLADJ *q, r, h* + (RUCCPADJ *q, h* – RUCCSADJ *q, h*) + (DAEP *q, p, h* – DAES *q, p, h*) + (RTQQEPADJ *q, p, i* – RTQQESADJ *q, p, i*) +  DCIMPADJ *q, p, i***

The above variables are defined as follows:

| **Variable** | **Unit** | **Definition** |
| --- | --- | --- |
| LCAPSFRS *i, q* | none | *LCAP Effective Period Shortfall Ratio Share*—The ratio of the QSE *q*’s capacity shortfall to the sum of all QSEs’ capacity shortfalls for an LCAP Effective Period for the 15-minute Settlement Interval *i*. |
| LCAPSF  *i, q* | MW | *LCAP Shortfall*—The QSE *q*’s capacity shortfall for an LCAPEffective Period for the 15-minute Settlement Interval *i*. |
| LCAPSFTOT  *i* | MW | *LCAP Shortfall Total*—The sum of all QSEs’ capacity shortfalls, for an LCAP Effective Period for a 15-minute Settlement Interval *i*. |
| LCAPCAP  *q, i* | MW | *LCAP Capacity at Adjustment Period*—The QSE *q*’s Adjustment Period calculated capacity for the 15-minute Settlement Interval *i*. |
| 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*. |
| DCIMPADJ *q, p, i* | MW | *DC Tie 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*. |
| LCAPHASLADJ *q, r, h* | MW | *LCAP Effective Period High Ancillary Services Limit at Adjustment Period*—The HASL of Resource *r,* represented by the QSE *q*, according to the Adjustment Period COP and Trades 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 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 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. |
| 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*, according to the Adjustment Period snapshot. |
| 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*, according to the Adjustment Period snapshot. |
| *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 Adjustment Period snapshot; 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 Reliability Unit Commitment (RUC) instruction for an actual or anticipated Energy Emergency Alert (EEA) condition. If the Settlement Interval is a Reliability Unit Commitment for Additional Capacity (RUCAC)-Interval, *r* represents the Combined Cycle Generation Resource that was QSE-committed at the time the RUCAC was issued. |
| *i* | none | A 15-minute Settlement Interval. |
| *h* | none | The hour that includes the Settlement Interval *i*. |

6.8.3.2 Uplift Charges for an LCAP Effective Period

(1) If the revenues from the charges under Section 6.8.3.1, Charges for Capacity Shortfalls During an LCAP Effective Period, are not enough to cover all LCAP Effective Period payments, for a 15-minute Settlement Interval, then the difference will be uplifted to all QSEs on an LRS basis as an LCAP Effective Period Uplift Charge, calculated as follows:

**LALCAPAMT *q, i* = (-1) \* [OPLPAMTTOT *i* + LCAPCSAMTTOT *i*] \* LRS *q, i***

Where:

OPLPAMTTOT *i*  = OPLPAMTQSETOT *i, q*

LCAPCSAMTTOT *i* = LCAPCSAMT *i, q*

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Definition** |
| LALCAPAMT *q, i* | $ | *Load Allocated LCAP Effective Period Uplift Charge*—The amount owed from the QSE *q,* based on LRS, for the 15-minute Settlement Interval *i*. |
| OPLPAMTQSETOT*i, q* | $ | *Total Operating Losses Payment Amount per QSE –* The total operating losses payment to the QSE *q*, for all Resources, for the 15-minute Settlement Interval *i* within the Operating Day. |
| OPLPAMTTOT *i* | $ | *Total Operating Losses Payment Amount –*The sum of operating losses payments to all QSEs, for the 15-minute Settlement Interval *i*. |
| LCAPCSAMTTOT *i* | $ | *LCAP Capacity-Short Amount Total*—The total of all charges to all QSEs *q*, due to capacity shortfall for an LCAPEffective Period, for the 15-minute Settlement Interval *i*. |
| LCAPCSAMT  *i, q* | $ | *LCAP Capacity-Short Amount*—The charge to QSE *q*, due to capacity shortfall for an LCAPEffective Period, for the 15-minute Settlement Interval *i*. |
| LRS *q, i* | none | *Load Ratio Share*—The ratio of AML to the total ERCOT AML for the 15-minute Settlement Interval. See Section 6.6.2, Load Ratio Share, item (2). |
| *i* | none | A 15-minute Settlement Interval. |
| *q* | none | A QSE. |

***6.8.4 Miscellaneous Invoice for Payments and Charges for an LCAP Effective Period***

(1) ERCOT shall issue one-time miscellaneous Invoices using the most recent available Settlement data at the time the Invoices were issued.

(2) ERCOT shall issue miscellaneous Invoices to QSEs for payment of operating losses during an LCAP Effective Period, as described in Section 6.8.2, Recovery of Operating Losses During an LCAP Effective Period.

(3) ERCOT shall issue miscellaneous Invoices and allocate costs to the impacted QSEs as described in Section 6.8.3, Charges for Operating Losses During an LCAP Effective Period.

(4) ERCOT shall issue a Market Notice in conjunction with the issuance of miscellaneous Invoices for payments or charges for an LCAP Effective Period.