Generation Projects Under Construction in Texas

Map No.	Company	Facility	City (County)	Capacity (MW)	Cogen Host (MW)	Date in Service	Intercon-nection	Region
56	AES[74]	Wolf Hollow Power Plant	Granbury (Hood)	730		Mar-03	TXU	ERCOT
57	InterGen	Cottonwood Energy Project	Deweyville (Newton)	1200		Apr-03	EGS	SERC
58	FPL/Cobisa	Forney	Forney (Kaufman)	1789		Apr-03	TXU	ERCOT
59	Tenaska[75]	Kiamichi Generating Station	Kiowa, OK	1220		Apr-03	TXU	SPP/ERCOT
60	NRG Energy	Brazos Valley Energy	Thompsons (Fort Bend)	633		May-03	Reliant	ERCOT
61	South Texas Electric Co-op		Nursery (Victoria)	185		Jun-03	STEC	ERCOT
62	Entergy/NTEC[76]	Harrison County Gen Station	(Harrison)	550		Jun-03	SWEPCO	SPP
63	Calpine-Shell	Deer Park Energy Center	Deer Park (Harris)	335 438	190	Aug-03 Jun-04	Reliant	ERCOT
64	Austin Energy	Sand Hill P1	Del Valle (Travis)	300		Oct-03	AE	ERCOT
65	Tractebel	Wise County Power Project	Bridgeport (Wise)	800		Jan-04	TXU	ERCOT
66	BP/Cinergy	Texas City	Texas City (Galveston)	570	NA	Feb-04	TNMP	ERCOT
67	Reliant/Jenbacher[77]		Houston (Harris) Conroe (Montgomery)	23 8		Dec-02 Feb-03	Reliant EGS	ERCOT SERC
	12 Projects Under Construction		***Total Capacity***	***8,781***				

[74] Twenty-year agreement to sell 350 MW to Excelon Energy Company, and the balance will be marketed by affiliate AES NewEnergy.
[75] Plant is under construction in Oklahoma, however the output will be switchable between SPP and ERCOT.
[76] Project is 70% owned by Entergy and 30% owned by Northeast Texas Electric Cooperative.
[77] Project currently consists of six landfill gas generation sites. Several smaller sites @ 2 MW could be developed in the future.

Announced Generation Projects in Texas

Map No.	Company	Facility	City (County)	Capacity (MW)	Expected Construction Date	Expected Date In Service	Region
68	TXU Energy/Cielo Wind (wind)	Noelke Hill Wind Ranch P1	McCamey (Upton)	160	Mar-03	Nov-03	ERCOT
69	Sempra Energy Resources	Cedar Power Project	Dayton (Liberty)	600	Spring-03	Spring-05	ERCOT/SERC
70	Cielo Wind Power/LPL (wind)	Llano Estacado at Lubbock	Lubbock (Lubbock)	2	Jun-03	Jun-03	SPP
71	DFW Airport		(Tarrant/Dallas)	55 55	2003 2005	2005 2007	ERCOT
72	Brazos EPC	Jack County Project	(Jack)	600	Jan-04	Jan-06	ERCOT
73	Cobisa	Greenville	Greenville (Hunt)	1750	Spring-04	Spring-06	ERCOT
74	Sempra Energy Resources	MC Energy Partners	Dobbin (Montgomery)	600	Apr-04	Apr-06	ERCOT/SERC
75	Steag Power	Sterne	Sacul (Nacogdoches)	950	2Q-04	2Q-06	ERCOT/SPP
76	Texas Petrochemicals		Houston (Harris)	900	2004	2006	ERCOT
77	Orion Energy (wind)		(Culberson)	175	NA	Jul-04	ERCOT
78	Ridge Energy Storage[78]	Markham Energy Storage Center	(Matagorda)	270	NA	Dec-04	ERCOT
79	GE Power Systems (wind)[79]		Sweetwater (Nolan)	400	NA	2004	ERCOT
80	CCNG Inc[80]		San Diego (Duval)	310	NA	2Q-05	ERCOT
81	Dow Chemical		Freeport (Brazoria)	170	NA	Dec-05	ERCOT
82	Tractebel	Ennis-Tractebel II	Ennis (Ellis)	800	NA	Jan-06	ERCOT
83	Austin Energy	Sand Hill P2	Del Valle (Travis)	250	NA	Sum-07	ERCOT
	16 Projects Announced		***Total Capacity***	***8,047***			

[78] Compressed air energy storage project.
[79] Previous Enron Wind project being developed by GE Power Systems.
[80] Compressed air energy storage project which will require 60 to 70 miles of new transmission.

Delayed Generation Projects[81]

Map No.	Company	Facility	City (County)	Capacity (MW)	Expected Construction Date	Expected Date In Service	Region
84	ANP		El Paso (El Paso)	450	NA	NA	WSCC
85	ANP		Houston (Harris)	2150	NA	NA	ERCOT
86	Calpine	Amelia Energy Center	Beaumont (Jefferson)	800	NA	NA	SERC
87	Cielo	Capital Hill Wind Ranch	(Pecos)	100	NA	NA	ERCOT
88	Duke Energy[82]	Duke Energy Jack, LP	Jacksboro (Jack)	650	NA	NA	ERCOT
89	Hartburg Power		Deweyville (Newton)	800	NA	NA	SERC
90	Mirant		Weatherford (Parker)	650	NA	NA	ERCOT
91	TXU Energy/Cielo	Noelke Hill Wind Ranch P2	McCamey (Upton)	80	NA	NA	ERCOT
92	Sabine Power I/Port of Port Arthur		Port Arthur (Jefferson)[83]	1000	NA	NA	SERC
93	York Research Group (wind)	Notrees Wind Farm	(Ector, Winkler)	80	NA	NA	ERCOT
94	ExxonMobil[84]		Baytown (Harris)	170	NA	NA	ERCOT
95	City Public Service[85]		San Antonio (Bexar)	180	NA	NA	ERCOT
96	BP/Cinergy[86]		Alvin (Brazoria)	70	NA	NA	ERCOT
	13 Projects Delayed		***Total Capacity***	***7,180***			

[81] An announced project which does not have a projected in-service date is listed as delayed.
[82] Filed air permit request on 9/25/02
[83] Fuel for this plant would be provided by a petroleum coke gasification facility to be constructed in Port Arthur.
[84] Filed air permit request on 10/4/02
[85] Filed air permit request on 10/15/02
[86] Recently reactivated, air permit request under review

Cancelled Projects

Map No.	Company	Facility	City (County)	Capacity (MW)	Year Cancelled	Region
X1	Steag Power		Ennis (Ellis)	1200	2001	ERCOT
X2	KM Power		(Harris)	1070	2001	ERCOT
X3	Constellation Power	Gateway Power Project	Gilmer (Upshur)	800	2001	SPP
X4	KM Power		Boonville (Wise)	510	2001	ERCOT
X5	ANP		Edinburg (Hidalgo)	550	2002	ERCOT
X6	Celanese		Pasadena (Harris)	284	2002	ERCOT
X7	Newport Generation	Palestine Power Project	Palestine (Anderson)	1600	2002	ERCOT
X8	Dynegy[87]	Lyondell expansion	(Harris)	155	2003	ERCOT
X9	Texas Independent Energy[88]	Archer Power Partners	Holliday (Archer)	500	2003	ERCOT
X10	Duke Energy[89]		(Bell)	500	2003	ERCOT
X11	Calpine[90]	Channel Energy Center exp.	Houston (Harris)	180	2003	ERCOT
	11 Projects Cancelled		***Total Capacity***	***7,349***		

[87] Air permit expired
[88] Air permit expired
[89] Air permit expired
[90] Air permit request withdrawn

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NPRR Number	863	NPRR Title	Creation of ERCOT Contingency Reserve Service and Revisions to Responsive Reserve
Date of Decision		February 12, 2019	
Action		Approved	
Timeline		Normal	
Effective Date		Upon system implementation, but no earlier than January 1, 2020 for Fast Frequency Response (FFR)-related language, and no earlier than January 1, 2022 for ERCOT Contingency Reserve Service (ECRS)-related language	
Priority and Rank Assigned		Priority – 2019; Rank – 2650	
Nodal Protocol Sections Requiring Revision		2.1, Definitions 2.2, Acronyms and Abbreviations 3.2.5, Publication of Resource and Load Information 3.2.6.2.1, Peak Load Estimate 3.6.1, Load Resource Participation 3.8.3, Quick Start Generation Resources 3.8.4, Hydro Generation Resources 3.9.1, Current Operating Plan (COP) Criteria 3.16, Standards for Determining Ancillary Service Quantities 3.17.2, Responsive Reserve Service 3.17.4, Responsive Reserve Service (new) 3.18, Resource Limits in Providing Ancillary Service 4.2.1.1, Ancillary Service Plan 4.4.7.1, Self-Arranged Ancillary Service Quantities 4.4.7.1.1, Negative Self-Arranged Ancillary Service Quantities 4.4.7.2, Ancillary Service Offers 4.4.7.2.1, Ancillary Service Offer Criteria 4.4.7.3, Ancillary Service Trades 4.5.2, Ancillary Service Insufficiency 4.6.2.3.1, Day-Ahead Make-Whole Payment 4.6.4.1.3, Responsive Reserve Service Payment 4.6.4.1.5, Responsive Reserve Payment (new) 4.6.4.2.3, Responsive Reserve Service Charge 4.6.4.2.5, Responsive Reserve Charge (new) 6.1, Introduction 6.4.9.2, Supplemental Ancillary Services Market 6.5.1.2, Centralized Dispatch 6.5.5.2, Operational Data Requirements 6.5.7.2, Resource Limit Calculator 6.5.7.5, Ancillary Services Capacity Monitor 6.5.7.6, Load Frequency Control 6.5.7.6.1, LFC Process Description 6.5.7.6.2, LFC Deployment	

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	6.5.7.6.2.2, Deployment of Responsive Reserve Service 6.5.7.6.2.3, Deployment and Recall of ERCOT Contingency Reserve Service (new) 6.5.7.6.2.3, Non-Spinning Reserve Service Deployment 6.5.9.3.3, Watch 6.5.9.4, Energy Emergency Alert 6.5.9.4.1, General Procedures Prior to EEA Operations 6.5.9.4.2, EEA Levels 6.5.9.4.3, Restoration of Market Operations 6.6.5.1, Resource Base Point Deviation Charge 6.6.5.1.1, General Generation Resource and Controllable Load Resource Base Point Deviation Charge 6.7.1, Payments for Ancillary Service Capacity Sold in a Supplemental Ancillary Services Market (SASM) or Reconfiguration Supplemental Ancillary Services Market (RSASM) 6.7.2, Payments for Ancillary Service Capacity Assigned in Real-Time Operations 6.7.2.1, Charges for Infeasible Ancillary Service Capacity Due to Transmission Constraints 6.7.2.2, Real-Time Adjustments to Day-Ahead Make Whole Payments due to Ancillary Services Infeasibility Charges 6.7.3, Charges for Ancillary Service Capacity Replaced Due to Failure to Provide 6.7.4, Adjustments to Cost Allocations for Ancillary Services Procurement 6.7.5, Real-Time Ancillary Service Imbalance Payment or Charge 6.7.7, Adjustments to Net Cost Allocations for Real-Time Ancillary Services 8.1, QSE and Resource Performance Monitoring 8.1.1.1, Ancillary Service Qualification and Testing 8.1.1.2, General Capacity Testing Requirements 8.1.1.2.1.2, Responsive Reserve Service Qualification 8.1.1.2.1.6, Responsive Reserve Qualification (new) 8.1.1.3.2, Responsive Reserve Service Capacity Monitoring Criteria 8.1.1.3.4, Responsive Reserve Capacity Monitoring Criteria (new) 8.1.1.4.1, Regulation Service and Generation Resource/Controllable Load Resource Energy Deployment Performance 8.1.1.4.2, Responsive Reserve Service Energy Deployment Criteria 8.1.1.4.3, Non-Spinning Reserve Service Energy Deployment Criteria 8.1.1.4.4, Responsive Reserve Energy Deployment Criteria (new) 8.5.1.1, Governor in Service 8.5.1.3, Wind-powered Generation Resource (WGR) Primary Frequency Response 8.5.2, Primary Frequency Response Measurements 8.5.2.1, ERCOT Required Primary Frequency Response

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	9.2.3, DAM Settlement Charge Types 9.5.3, Real-Time Market Settlement Charge Types
Related Documents Requiring Revision/Related Revision Requests	Nodal Operating Guide ERCOT Methodologies for Determining Minimum Ancillary Service Requirements
Revision Description	This Nodal Protocol Revision Request (NPRR) modifies Responsive Reserve (RRS) to be primarily a frequency response service and creates a new Ancillary Service: ERCOT Contingency Reserve Service (ECRS).
Reason for Revision	☐ Addresses current operational issues. ☐ Meets Strategic goals (tied to the ERCOT Strategic Plan or directed by the ERCOT Board). ☒ Market efficiencies or enhancements ☐ Administrative ☐ Regulatory requirements ☐ Other: (explain) *(please select all that apply)*
Business Case	RRS has been a staple of the current suite of Ancillary Services since the beginning of the Zonal Market. This Ancillary Service has always consisted of two components, a Primary Frequency Response component and a 10-minute energy deployment component, and is a reflection of the technology available at the beginning of the market to provide the service - thermal Generation Resources. As technology has advanced, changes have been made to RRS to allow new participants to enter the market (e.g. Load Resources), however, the product has always remained a multi-component Ancillary Service which has proven not to be conducive to the entry of new participants, nor is it conducive to the efficient procurement and deployment of Ancillary Services on the ERCOT System. Several NPRRs with reasonable merit have failed to survive the stakeholder process as a direct result of the inflexibility of the current RRS product. Under the current version of North American Electric Reliability Corporation (NERC) Reliability Standard BAL-001-1-TRE, Primary Frequency Response in the ERCOT Region, all On-Line Generation Resources are required to have their Governors in service and provide Primary Frequency Response unless exempted by the Balancing Authority (ERCOT). As a result, all Generation Resources on the system are providing an uncompensated service to the

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	ERCOT System and are subject to compliance risk regardless of whether the Resource has a RRS Ancillary Service Resource Responsibility at the time. Additionally, this free service results in increased wear and tear and Operations and Maintenance (O&M) costs that are borne by the generator owner. As is the case with most things that are provided for free, Primary Frequency Response has become used most frequently and often masks the requirements needed to operate the ERCOT grid since its usage front runs the usage of other Ancillary Services which ultimately impacts price formation. This NPRR allows those Generation Resources that do not have an RRS and/or Regulation Service Ancillary Service Resource Responsibility to widen their Governor Dead-Bands, thereby reducing compliance risk borne by Generation Resources located in ERCOT if they are not providing those services. This NPRR also introduces a new product, ECRS, which provides ERCOT with additional flexibility and tools while also liberating the 10-minute component from RRS. Lastly, in order to make the Ancillary Service set more technology agnostic, the language is modified so that any Generation Resource capable of operating in synchronous condenser fast-response mode can provide RRS, and not just hydro Generation Resources. By separating the 10-minute component from RRS and creating two distinct Ancillary Service products, barriers to entry are removed, market efficiencies are realized, unnecessary regulatory compliance risk is removed, Resources are appropriately compensated for the service(s) that they provide, and ERCOT is provided with more granular tools to address the changing Resource mix of the ERCOT Region. The qualitative and quantitative benefits are further described in the 12/6/18 ERCOT comments.
Credit Work Group Review	ERCOT Credit Staff and the Credit Work Group (Credit WG) have reviewed NPRR863 and do not believe that it requires changes to credit monitoring activity or the calculation of liability.
PRS Decision	On 1/18/18, PRS unanimously voted to table NPRR863 and refer the issue to ROS and WMS. All Market Segments were present for the vote. On 10/18/18, PRS voted via roll call vote to recommend approval of NPRR863 as amended by the 10/1/18 STEC comments. There were two opposing votes from the Independent Generator (Invenergy, Luminant) Market Segment and six abstentions from the Consumer (2) (Occidental, Nucor), Cooperative (2) (LCRA, PEC), Independent Retail Electric Provider (IREP) (Direct), and Municipal

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	(Austin Energy) Market Segments. All Market Segments were present for the vote. On 11/15/18, PRS unanimously voted to table NPRR863 for one month. All Market Segments were present for the vote. On 12/13/18, PRS voted to endorse and forward to TAC the 10/18/18 PRS Report as revised by PRS and Impact Analysis for NPRR863 with a recommended priority of 2019 and rank of 2650. There were two opposing votes from the Independent Generator (Luminant) and Municipal (Austin Energy) Market Segments and three abstentions from the Consumer (Occidental), Cooperative (LCRA), and Independent Generator (Invenergy) Market Segments. All Market Segments were present for the vote.
Summary of PRS Discussion	On 1/18/18, the sponsor reviewed the intent of NPRR863. Some participants raised concerns of possible conflicts between NPRR863 and NERC Reliability Standard BAL-001-TRE-1. On 10/18/18, participants discussed the merits of NPRR863, with some participants noting their support of the NPRR863 at this time is largely based on generating an Impact Analysis for continued discussion on the cost-benefit of the proposed Ancillary Service changes and implementation timelines. On 11/15/18, participants requested tabling of NPRR863 to allow for additional review of the Impact Analysis, the expected impacts of NPRR863 on system inertia and reliability, and the potential project impacts (time and cost) of Real-Time Co-optimization ("RTC") on the implementation of NPRR863. On 12/13/18, participants reviewed the 12/6/18 ERCOT comments, Impact Analysis, and Business Case for NPRR863. Some participants expressed a desire to phase in the RRS portions of NPRR863 ahead of ECRS, and ERCOT Staff agreed to work with the sponsor on potential project and implementation timelines.
TAC Decision	On 1/30/19, TAC voted via roll call vote to recommend approval of NPRR863 as recommended by PRS in the 12/13/18 PRS Report with a recommended effective date of no earlier than January 1, 2020 for FFR-related language and no earlier than January 1, 2022 for ECRS-related language. There were four opposing votes from the Consumer (2) (CMC Steel Texas, Air Liquide), Independent Generator (Luminant), and IREP (Reliant) Market Segments and one abstention from the Cooperative (LCRA) Market Segment. All Market Segments were present for the vote.

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Summary of TAC Discussion	On 1/30/19, participants discussed the 1/16/19 STEC comments, the potential positive and negative impacts of a single versus phased implementation on system inertia and Ancillary Service markets, and the potential for overlap of project resources between NPRR863 and RTC.
ERCOT Opinion	ERCOT supports approval of NPRR863 as it unbundles the existing RRS service and revises the Ancillary Service framework to efficiently meet future reliability needs.
Board Decision	On 2/12/19, the ERCOT Board approved NPRR863 as recommended by TAC in the 1/30/19 TAC Report.

Sponsor	
Name	Clif Lange
E-mail Address	clif@stec.org
Company	South Texas Electric Coop., Inc. (STEC)
Phone Number	361-485-6206
Cell Number	361-894-3465
Market Segment	Cooperative

Market Rules Staff Contact	
Name	Cory Phillips
E-Mail Address	cory.phillips@ercot.com
Phone Number	512-248-6464

Comments Received	
Comment Author	**Comment Summary**
ERCOT 012918	Presented foundational issues with NPRR863 as submitted
WMS 020118	Requested PRS continue to table NPRR863 to allow further review by the Qualified Scheduling Entity (QSE) Managers Working Group (QMWG) and the Demand Side Working Group (DSWG)
ROS 020218	Requested PRS continue to table NPRR863 for further review by the Performance, Disturbance, Compliance Working Group (PDCWG)
ERCOT 021218	Provided further detail on concerns with the NPRR863 language for consideration by working groups

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STEC 042618	Proposed several edits to NPRR863 based on feedback from Market Participants and ERCOT Staff
Apex 052418	Endorsed NPRR863
ERCOT 070618	Proposed additional clarifying edits on top of the 4/26/18 STEC comments
CPS Energy 071618	Proposed additional clarifying edits on top of the 7/6/18 ERCOT comments
STEC 080118	Proposed additional edits on top of the 7/16/18 CPS Energy comments to replace references to RRS with ECRS
Mountaineer 080218	Endorsed NPRR863
ROS 080918	Endorsed NPRR863 as amended by the 8/1/18 STEC comments
ERCOT 082918	Responded to stakeholder questions regarding qualification, noting that ERCOT expects the qualification status of existing RRS providers would rollover into the new Frequency Responsive Service (FRS)
STEC 083018	Proposed revisions to: (i) include additional sections of the Protocols that were previously missed in order to align those sections with the proposed product sets; (ii) clarify that Quick Start Generation Resources (QSGRs) providing ECRS once recalled must go through the decommitment decision process; (iii) remove ECRS deployment from Base Point deviation consideration since Generation Resource providing ECRS will receive Security-Constrained Economic Dispatch (SCED) Base Points which are already part of base point deviation calculation; and (iv) provide additional clarifications to Settlement equations and bill determinants.
WMS 090618	Requested PRS continue to table NPRR863 for one additional month
STEC 100118	Reverted all uses of Frequency Response Service (FRS) back to the original name Responsive Reserve (RRS)
WMS 101118	Endorsed NPRR863 as amended by the 10/1/18 STEC comments
ERCOT 120618	Provided estimates of quantitative and qualitative benefits related to reduced RRS procurement quantities under NPRR863
STEC 011619	Proposed a phased approach for NPRR863, with changes to RRS and FFR implemented no earlier than January 1, 2020, and changes to ECRS implemented no earlier than January 1, 2022

Market Rules Notes

Administrative changes to the language were made and authored as "ERCOT Market Rules."

Please note that the following NPRR(s) also propose revisions to the following section(s):

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- NPRR885, Must-Run Alternative (MRA) Details and Revisions Resulting from PUCT Project No. 46369, Rulemaking Relating to Reliability Must-Run Service
  - Section 6.5.5.2
  - Section 6.7.5
  - Section 9.5.3

- NPRR906, Clarifying the Decision Making Entity Process
  - Section 3.2.5

- NPRR910, Clarify Treatment of RUC Resource that has a Day-Ahead Market Three-Part Supply Award
  - Section 6.7.5

- NPRR912, Settlement of Switchable Generation Resources (SWGRs) Instructed to Switch to ERCOT
  - Section 6.7.5

- NPRR914, Addition of Controllable Load Resources to 60-Day Reports
  - Section 3.2.5

- NPRR917, Nodal Pricing for Settlement Only Distribution Generators (SODGs) and Settlement Only Transmission Generators (SOTGs)
  - Section 9.5.3

- NPRR919, Exemption from Governor Primary Frequency Response Control for Certain Resources in Private Use Networks
  - Section 8.5.1.1

- NPRR920, Change to Ramp Rate Calculation in Resource Limit Calculator
  - Section 6.5.7.2

- NPRR921, RTF-2 Elimination of the Terms All-Inclusive Generation Resource and All-Inclusive Resource
  - Section 8.1.1.4.2
  - Section 8.5.1.1
  - Section 8.5.2
  - Section 8.5.2.1

Please note the baseline Protocol language in the following sections has been updated to reflect the incorporation of the following NPRRs into the Protocols:

- NPRR815, Revise the Limitation of Load Resources Providing Responsive Reserve (RRS) Service (unboxed 6/1/18)
  - Section 3.16

- NPRR825, Require ERCOT to Issue a DC Tie Curtailment Notice Prior to Curtailing any DC Tie Load (unboxed 10/1/18)

- Section 6.5.9.3.3

- NPRR841, Real-Time Adjustments to Day-Ahead Make Whole Payments due to Ancillary Services Infeasibility Charges (incorporated 3/1/18)
  - Section 6.7.2.2
  - Section 6.7.4

- NPRR843, Short-Term System Adequacy and AS Offer Disclosure Reports Additions (partially unboxed 10/26/18, remainder unboxed 12/14/18)
  - Section 3.2.5

- NPRR847, Exceptional Fuel Cost Included in the Mitigated Offer Cap (incorporated 9/1/18)
  - Section 9.5.3

- NPRR857, Creation of Direct Current Tie Operator Market Participant Role (incorporated 11/1/18)
  - Section 6.5.1.2
  - Section 6.5.9.3.3
  - Section 6.5.9.4

- NPRR860, Day-Ahead Market (DAM) Clean-Up (incorporated 5/1/18)
  - Section 4.4.7.2
  - Section 4.5.2

- NPRR862, Updates to Address Revisions under PUCT Project 46369 (incorporated 9/1/18)
  - Section 9.5.3

- NPRR879, SCED Base Point, Base Point Deviation, and Performance Evaluation Changes for IRRs that Carry Ancillary Services (incorporated 1/1/19)
  - Section 6.5.7.2
  - Section 8.1.1.4.1

- NPRR883, Adjustment to Settlement Equation for Ancillary Services Assignment (incorporated 11/1/18)
  - Section 6.7.2

- NPRR889, RTF-1 Replace Non-Modeled Generator with Settlement Only Generator (incorporated 1/1/19)
  - Section 6.5.5.2

- NPRR895, Inclusion of Photo-Voltaic Generation Resources (PVGRs) in Real-Time Ancillary Service Imbalance Payment or Charge (incorporated 1/1/19)
  - Section 6.7.5

- NPRR901, Switchable Generation Resource Status Code (incorporated 1/1/19)

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- Section 3.9.1

Proposed Protocol Language Revision

2.1 DEFINITIONS

Emergency Ramp Rate

The maximum rate of change (up and down) in MW per minute of a Resource to provide ~~Responsive Reserve (RRS)~~ERCOT Contingency Reserve Service (ECRS) that is deployed by ERCOT and that is provided to ERCOT in up to ten segments, each represented by a single MW per minute value (across the capacity of the Resource), which describes the available rate of change for the given range (between High Sustained Limit (HSL) and Low Sustained Limit (LSL)) of the generation or consumption of a Resource. In Real-Time SCED Dispatch, the up and down Emergency Ramp Rates are telemetered by the QSE to ERCOT and represent the total capacity (in MW) that the Resource can change from its current actual generation or consumption within the next five minutes divided by five.

Fast Frequency Response (FFR)

The automatic self-deployment and provision by a Resource of their obligated response within 15~~30~~ cycles after frequency meets or drops below a preset threshold, or a deployment in response to~~via~~ an ERCOT Verbal Dispatch Instruction (VDI) within 10 minutes. ~~FFR includes~~ Resources capable of automatically self-deploying and providing their full Ancillary Service Resource Responsibility within 15~~30~~ cycles after frequency meets or drops below a preset threshold and sustaining ~~a~~that full response for at least 15 minutes may provide ~~Frequency Response Service (FRS)~~Responsive Reserve (RRS) ~~an hour if providing Primary Frequency Response Service (PFRS), and three hours if providing Responsive Reserve (RRS).~~

~~Frequency Response Service (FRS)~~Responsive Reserve (RRS)

An Ancillary Service that provides operating reserves that ~~is~~are intended to:

(a) Arrest frequency decay within the first few seconds of a significant frequency deviation on the ERCOT Transmission Grid using Primary Frequency Response, Fast Frequency Response (FFR), and interruptible Load;

(b) After the first few seconds of a significant frequency deviation, help arrest and stabilize frequency; and

(c) Provide energy or continued Load interruption during the implementation of the Energy Emergency Alert (EEA);

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High Ancillary Service Limit (HASL)

A dynamically calculated MW upper limit on a Resource to reserve the part of the Resource's capacity committed for Ancillary Service, calculated as described in Section 6.5.7.2, Resource Limit Calculator. HASL is also included in Section 5.7.4.1.1, Capacity Shortfall Ratio Share, and in the Reliability Unit Commitment (RUC) optimization ~~but is not adjusted for Non-Frequency Responsive Capacity (NFRC) as in Section 6.5.7.2~~ but is not adjusted for Non-Frequency Responsive Capacity (NFRC) as in Section 6.5.7.2.

Load Frequency Control (LFC)

The deployment of those Controllable Load Resources and Generation Resources that are providing Regulation Service to ensure that system frequency is maintained within predetermined limits and the deployment of those Controllable Load Resources and Generation Resources that are providing ERCOT Contingency Reserve Service (ECRS) ~~Responsive Reserve Service~~ when necessary as backup regulation. LFC does include the deployment of Responsive Reserve (RRS) (manual) and ECRS from Generation Resources and Controllable Load Resources. LFC does not include the deployment of ECRS or ~~Frequency Response Service (FRS)~~RRS ~~Responsive Reserve~~ by Load Resources when deployed as a block under EEA procedures.

~~**Primary Frequency Response Service (PFRS)**~~

~~An Ancillary Service that provides operating reserves that is intended to:~~

~~(a) Arrest frequency within the first few seconds of a significant frequency deviation on the ERCOT Transmission Grid using Primary Frequency Response and interruptible Load; and~~

~~(b) After the first few seconds of a significant frequency deviation, help restore frequency to its scheduled value to return the system to normal.~~

ERCOT Contingency Reserve Service (ECRS)

~~**Responsive Reserve (RRS)**~~

An Ancillary Service that provides operating reserves that is intended to:

(a) Restore ~~Primary Frequency Response Service~~Responsive Reserve (~~PFRS~~RRS) within ten minutes of a frequency deviation that results in significant depletion of ~~PFRS~~RRS by restoring frequency to its scheduled value to return the system to normal~~Arrest frequency decay within the first few seconds of a significant frequency deviation on the ERCOT Transmission Grid using Primary Frequency Response and interruptible Load~~;

~~(b) After the first few seconds of a significant frequency deviation, help restore frequency to its scheduled value to return the system to normal;~~

(~~c~~b) Provide energy or continued Load interruption ~~during~~ to avoid~~prior to~~ or during the implementation of ~~the~~an Energy Emergency Alert (EEA); and

(~~d~~c) Provide backup regulation.

2.2 ACRONYMS AND ABBREVIATIONS

ECRS	ERCOT Contingency Reserve Service
FFR	Fast Frequency Response
~~PFR~~RRS	~~Primary Frequency Response Service~~Responsive Reserve
~~RRS~~	~~Responsive Reserve~~

3.2.5 Publication of Resource and Load Information

Commented [CP1]: Please note NPRRs 906 and 914 also propose revisions to this section.

(1) Two days after the applicable Operating Day, ERCOT shall post on the MIS Public Area for the ERCOT System and, if applicable, for each Disclosure Area, the information derived from the first complete execution of SCED in each 15-minute Settlement Interval. The Disclosure Area is the 2003 ERCOT CMZs. Posting requirements will be applicable to Generation Resources and Controllable Load Resources physically located in the defined Disclosure Area. This information shall not be posted if the posting of the information would reveal any individual Market Participant's Protected Information. The information posted by ERCOT shall include:

(a) An aggregate energy supply curve based on non-IRR Generation Resources with Energy Offer Curves that are available to SCED. The energy supply curves will be calculated beginning at the sum of the Low Sustained Limits (LSLs) and ending at the sum of the HSLs for non-IRR Generation Resources with Energy Offer Curves, with the dispatch for each Generation Resource constrained between the Generation Resource's LSL and HSL. The result will represent the ERCOT System energy supply curve economic dispatch of the non-IRR Generation Resources with Energy Offer Curves at various pricing points, not taking into consideration any physical limitations of the ERCOT System;

(b) An aggregate energy supply curve based on Wind-powered Generation Resources (WGRs) with Energy Offer Curves that are available to SCED. The energy supply curves will be calculated beginning at the sum of the LSLs and ending at the sum of the HSLs for WGRs with Energy Offer Curves, with the dispatch for each WGR constrained between the WGR's LSL and HSL. The result will represent the ERCOT System energy supply curve economic dispatch of the WGRs with Energy Offer Curves at various pricing points, not taking into consideration any physical limitations of the ERCOT System;

(c) An aggregate energy supply curve based on PhotoVoltaic Generation Resources (PVGRs) with Energy Offer Curves that are available to SCED. The energy supply curves will be calculated beginning at the sum of the LSLs and ending at the sum of the HSLs for PVGRs with Energy Offer Curves, with the dispatch for each PVGR constrained between the PVGR's LSL and HSL. The result will represent the ERCOT System energy supply curve economic dispatch of the PVGRs with Energy Offer Curves at various pricing points, not taking into consideration any physical limitations of the ERCOT System;

(d) The sum of LSLs, sum of Output Schedules, and sum of HSLs for Generation Resources without Energy Offer Curves;

(e) The sum of the Base Points, High Ancillary Service Limit (HASL) and Low Ancillary Service Limit (LASL) of non-IRR Generation Resources with Energy Offer Curves, sum of the Base Points, HASL and LASL of WGRs with Energy Offer Curves, sum of the Base Points, HASL and LASL of PVGRs with Energy Offer Curves, and the sum of the Base Points, HASL and LASL of all remaining Generation Resources dispatched in SCED;

(f) The sum of the telemetered Generation Resource net output used in SCED; and

(g) An aggregate energy Demand curve based on the Real-Time Market (RTM) Energy Bid curves available to SCED. The energy Demand curve will be calculated beginning at the sum of the Low Power Consumptions (LPCs) and ending at the sum of the Maximum Power Consumptions (MPCs) for Controllable Load Resources with RTM Energy Bids, with the dispatch for each Controllable Load Resource constrained between the Controllable Load Resource's LPC and MPC. The result will represent the ERCOT System Demand response capability available to SCED of the Controllable Load Resources with RTM Energy Bids at various pricing points, not taking into consideration any physical limitations of the ERCOT System.

(2) Two days after the applicable Operating Day, ERCOT shall post on the MIS Public Area for the ERCOT System the following information derived from the first complete execution of SCED in each 15-minute Settlement Interval:

(a) Each telemetered Dynamically Scheduled Resource (DSR) Load, and the telemetered DSR net output(s) associated with each DSR Load; and

(b) The actual ERCOT Load as determined by subtracting the Direct Current Tie (DC Tie) Resource actual telemetry from the sum of the telemetered Generation Resource net output as used in SCED.

(3) Two days after the applicable Operating Day, ERCOT shall post on the MIS Public Area the following information for the ERCOT System and, if applicable, for each Disclosure Area from the DAM for each hourly Settlement Interval:

(a) An aggregate energy supply curve based on all energy offers that are available to the DAM, not taking into consideration Resource Startup Offer or Minimum-Energy Offer or any physical limitations of the ERCOT System. The result will represent the energy supply curve at various pricing points for energy offers available in the DAM;

(b) Aggregate minimum energy supply curves based on all Minimum-Energy Offers that are available to the DAM;

(c) An aggregate energy Demand curve based on the DAM Energy Bid curves available to the DAM, not taking into consideration any physical limitations of the ERCOT System;

(d) The aggregate amount of cleared energy bids and offers including cleared Minimum-Energy Offer quantities;

(e) The aggregate Ancillary Service Offers (prices and quantities) in the DAM, for each type of Ancillary Service regardless of a Resource's On-Line or Off-Line status. For ~~Frequency Response Service (FRS)~~Responsive Reserve (RRS) and ERCOT Contingency Reserve Service (ECRS)~~Responsive Reserve (RRS) Service~~, ERCOT shall separately post aggregated offers from Generation Resources, Controllable Load Resources, and non-Controllable Load Resources. Linked Ancillary Service Offers will be included as non-linked Ancillary Service Offers;

(f) The aggregate Self-Arranged Ancillary Service Quantity, for each type of service, by hour;

(g) The aggregate amount of cleared Ancillary Service Offers; and

(h) The aggregate Point-to-Point (PTP) Obligation bids (not-to-exceed price and quantities) for the ERCOT System and the aggregate PTP Obligation bids that sink in the Disclosure Area for each Disclosure Area.

(4) ERCOT shall post on the MIS Public Area the following information for each Resource for each 15-minute Settlement Interval 60 days prior to the current Operating Day:

(a) The Generation Resource name and the Generation Resource's Energy Offer Curve (prices and quantities):

(i) As submitted;

(ii) As submitted and extended (or truncated) with proxy Energy Offer Curve logic by ERCOT to fit to the operational HSL and LSL values that are available for dispatch by SCED; and

(iii) As mitigated and extended for use in SCED, including the Incremental and Decremental Energy Offer Curves for DSRs;

(b) The Generation Resource name and the Generation Resource's Output Schedule;

(c) For a DSR, the DSR Load and associated DSR name and DSR net output;

(d) The Generation Resource name and actual metered Generation Resource net output;

(e) The self-arranged Ancillary Service by service for each QSE;

(f) The following Generation Resource data using a single snapshot during the first SCED execution in each Settlement Interval:

(i) The Generation Resource name;

(ii) The Generation Resource status;

(iii) The Generation Resource HSL, LSL, HASL, LASL, High Dispatch Limit (HDL), and Low Dispatch Limit (LDL);

(iv) The Generation Resource Base Point from SCED;

(v) The telemetered Generation Resource net output used in SCED;

(vi) The Ancillary Service Resource Responsibility for each Ancillary Service; and

(vii) The Generation Resource Startup Cost and minimum energy cost used in the Reliability Unit Commitment (RUC); and

(g) The following Load Resource data using a single snapshot during the first SCED execution in each Settlement Interval:

(i) The Load Resource name;

(ii) The Load Resource status;

(iii) The Maximum Power Consumption (MPC for a Load Resource);

(iv) The Low Power Consumption (LPC for a Load Resource);

(v) The telemetered real power consumption; and

(vi) The Ancillary Service Resource Responsibility for each Ancillary Service.

(5) If any Real-Time Locational Marginal Price (LMP) exceeds 50 times the Fuel Index Price (FIP) during any 15-minute Settlement Interval for the applicable Operating Day, ERCOT shall post on the MIS Public Area the portion of any Generation Resource's as-submitted and as-mitigated and extended Energy Offer Curve that is at or above 50 times

the FIP for each 15-minute Settlement Interval seven days after the applicable Operating Day.

(6) If any Market Clearing Price for Capacity (MCPC) for an Ancillary Service exceeds 50 times the FIP for any Operating Hour in a DAM or Supplemental Ancillary Services Market (SASM) for the applicable Operating Day, ERCOT shall post on the MIS Public Area the portion on any Resource's Ancillary Service Offer that is at or above 50 times the FIP for that Ancillary Service for each Operating Hour seven days after the applicable Operating Day.

(7) ERCOT shall post on the MIS Public Area the offer price and the name of the Entity submitting the offer for the highest-priced offer selected or Dispatched by SCED 48 hours after the end of the applicable Operating Day. If multiple Entities submitted the highest-priced offers selected, all Entities shall be identified on the MIS Public Area.

(8) ERCOT shall post on the MIS Public Area the bid price and the name of the Entity submitting the bid for the highest-priced bid selected or Dispatched by SCED 48 hours after the end of the applicable Operating Day. If multiple Entities submitted the highest-priced bids selected, all Entities shall be identified on the MIS Public Area.

(9) ERCOT shall post on the MIS Public Area the offer price and the name of the Entity submitting the offer for the highest-priced Ancillary Service Offer selected in the DAM for each Ancillary Service 48 hours after the end of the applicable Operating Day. This same report shall also include the highest-priced Ancillary Service Offer selected for any SASMs cleared for that same Operating Day. If multiple Entities submitted the highest-priced offers selected, all Entities shall be identified on the MIS Public Area. The report shall specify whether the Ancillary Service Offer was selected in a DAM or a SASM.

(10) ERCOT shall post on the MIS Public Area for each Operating Day the following information for each Resource:

(a) The Resource name;

(b) The names of the Entities providing information to ERCOT;

(c) The names of the Entities controlling each Resource. ERCOT shall determine whether the Entity is in control of each Resource in accordance with subsection (e) of P.U.C. SUBST. R. 25.502, Pricing Safeguards in Markets Operated by the Electric Reliability Council of Texas; and

(d) Flag for Reliability Must-Run (RMR) Resources.

(11) ERCOT shall post on the MIS Public Area the following information from the DAM for each hourly Settlement Interval for the applicable Operating Day 60 days prior to the current Operating Day:

(a) The Generation Resource name and the Generation Resource's Three-Part Supply Offer (prices and quantities), including Startup Offer and Minimum-Energy Offer, available for the DAM;

(b) For each Settlement Point, individual DAM Energy-Only Offer Curves available for the DAM and the name of the QSE submitting the offer;

(c) The Resource name and the Resource's Ancillary Service Offers available for the DAM;

(d) For each Settlement Point, individual DAM Energy Bids available for the DAM and the name of the QSE submitting the bid;

(e) For each Settlement Point, individual PTP Obligation bids available to the DAM that sink at the Settlement Point and the QSE submitting the bid;

(f) The awards for each Ancillary Service from DAM for each Generation Resource;

(g) The awards for each Ancillary Service from DAM for each Load Resource;

(h) The award of each Three-Part Supply Offer from the DAM and the name of the QSE receiving the award;

(i) For each Settlement Point, the award of each DAM Energy-Only Offer from the DAM and the name of the QSE receiving the award;

(j) For each Settlement Point, the award of each DAM Energy Bid from the DAM and the name of the QSE receiving the award; and

(k) For each Settlement Point, the award of each PTP Obligation bid from the DAM that sinks at the Settlement Point, including whether or not the PTP Obligation bid was Linked to an Option, and the QSE submitting the bid.

(12) ERCOT shall post on the MIS Public Area the following information from any applicable SASMs for each hourly Settlement Interval for the applicable Operating Day 60 days prior to the current Operating Day:

(a) The Resource name and the Resource's Ancillary Service Offers available for any applicable SASMs;

(b) The awards for each Ancillary Service from any applicable SASMs for each Generation Resource; and

(c) The awards for each Ancillary Service from any applicable SASMs for each Load Resource.

Board Report

3.2.6.2.1 Peak Load Estimate

(1) ERCOT shall prepare, at least annually, a forecast of the total peak Load for both summer and winter Peak Load Seasons for the current year and a minimum of ten future years using an econometric forecast, taking into account econometric inputs, weather conditions, demographic data and other variables as deemed appropriate by ERCOT. The firm Peak Load Season estimate shall be determined by the following equation:

FIRMPKLD $_{s,\,i}$ **=** **TOTPKLD** $_{s,\,i}$ **– LRECRRS** $_{s,\,i}$ **– LRFRSRRS** $_{s,\,i}$ **– LRNSRS** $_{s,\,i}$ **– ERS** $_{s,\,i}$ **– CLR** $_{s,\,i}$ **– ENERGYEFF** $_{s,\,i}$

The above variables are defined as follows:

Variable	Unit	Definition
FIRMPKLD $_{s,\,i}$	MW	*Firm Peak Load Estimate*—The Firm Peak Load Estimate for the Peak Load Season *s* for the year *i*.
TOTPKLD $_{s,\,i}$	MW	*Total Peak Load Estimate*—The Total Peak Load Estimate for the Peak Load Season *s* for the year *i*.
LRECRRS $_{s,\,i}$	MW	*Load Resource providing ~~RRS~~ECRS*—The amount of ~~RRS~~ECRS a Load Resource is providing for the Peak Load Season *s* for the year *i*.
LRFRSRRS $_{s,\,i}$	MW	*Load Resource providing ~~FRS~~RRS*—The amount of ~~FRS~~RRS a Load Resource is providing for the Peak Load Season *s* for the year *i*.
LRNSRS $_{s,\,i}$	MW	*Load Resource providing Non-Spinning Reserve (Non-Spin)*—The estimated amount of Non-Spin that Load Resources are providing for the Peak Load Season *s* for the year *i*.

<table>
<tr><td>ERS $_{s, i}$</td><td>MW</td><td>Emergency Response Service (ERS)—The estimated amount of ERS for the Peak Load Season s for the year i calculated as follows:
<table>
<tr><th>Year (i)</th><th>Winter Peak Load</th><th>Summer Peak Load</th></tr>
<tr><td>Current Year (i = 1)</td><td>The simple average of the amount of ERS procured by ERCOT for the current year Standard Contract Term of October 1 to January 31 for the ERS Time Periods covering all or any part of Hour Ending 0600 and Hour Ending 1800.</td><td>The amount of ERS procured by ERCOT for the current year Standard Contract Term of June 1 through September 30 for an ERS Time Period covering all or any part of Hour Ending 1800.</td></tr>
<tr><td>Second Year (i = 2)</td><td>The current year Winter Peak Load ERS amount escalated by the compound annual growth rate of the three Winter Peak Load ERS amounts preceding the current year.</td><td>The current year Summer Peak Load ERS amount escalated by the compound annual growth rate of the three Summer Peak Load ERS amounts preceding the current period.</td></tr>
<tr><td>Third Year (i = 3)</td><td>The second year Winter Peak Load ERS amount escalated by the compound annual growth rate of the three Winter Peak Load ERS amounts preceding the current year.</td><td>The second year Summer Peak Load ERS amount escalated by the compound annual growth rate of the three Summer Peak Load ERS amounts preceding the current year.</td></tr>
<tr><td>Years after Third Year (i > 3)</td><td>Equal to third year amount.</td><td>Equal to third year amount.</td></tr>
</table></td></tr>
<tr><td>CLR $_{s, i}$</td><td>MW</td><td>Amount of Controllable Load Resource—Estimated amount of Controllable Load Resource that is available for Dispatch by ERCOT during the current year i for the Peak Load Season s not already included in LRECRRS, LRRRS, or LRNSRS. This value does not include Wholesale Storage Load (WSL).</td></tr>
<tr><td>ENERGYEFF $_{s, i}$</td><td>MW</td><td>Amount of Energy Efficiency Programs Procured—Estimated amount of energy efficiency programs procured by Transmission and/or Distribution Service Providers (TDSPs) pursuant to P.U.C. SUBST. R. 25.181, Energy Efficiency Goal, for the Peak Load Season s for the year i. ERCOT may also consider any energy efficiency and/or Demand response initiatives reported by Non-Opt-In Entities (NOIEs).</td></tr>
<tr><td>i</td><td>None</td><td>Year.</td></tr>
<tr><td>s</td><td>None</td><td>Peak Load Season.</td></tr>
</table>

3.6.1 Load Resource Participation

(1) A Load Resource may participate by providing:

(a) Ancillary Service:

(i) Regulation Up (Reg-Up) Service as a Controllable Load Resource capable of providing Primary Frequency Response;

(ii) Regulation Down (Reg-Down) Service as a Controllable Load Resource capable of providing Primary Frequency Response;

(iii) ~~Frequency Response Service (FRS)~~Responsive Reserve (RRS) as a Controllable Load Resource qualified for Security-Constrained Economic Dispatch (SCED) Dispatch and capable of providing Primary Frequency Response, or a Load Resource controlled by high-set under-frequency relay;

(iv) ERCOT Contingency Reserve Service (ECRS)~~Responsive Reserve (RRS) Service~~ as a Controllable Load Resource qualified for ~~Security-Constrained Economic Dispatch (~~SCED~~)~~ Dispatch and capable of providing Primary Frequency Response, or as a Load Resource that may or may not be controlled by high-set under-frequency relay; and

(~~i~~v) Non-Spinning Reserve (Non-Spin) Service as a Controllable Load Resource qualified for SCED Dispatch;

(b) Energy in the form of Demand response from a Controllable Load Resource in Real-Time via SCED;

(c) Emergency Response Service (ERS) for hours in which the Load Resource does not have an Ancillary Service Resource Responsibility; and

(d) Voluntary Load response in Real-Time.

(2) Except for voluntary Load response and ERS, loads participating in any ERCOT market must be registered as a Load Resource and are subject to qualification testing administered by ERCOT.

(3) All ERCOT Settlements resulting from Load Resource participation are made only with the Qualified Scheduling Entity (QSE) representing the Load Resource.

(4) A QSE representing a Load Resource and submitting a bid to buy for participation in SCED, as described in Section 6.4.3.1, RTM Energy Bids, must represent the Load Serving Entity (LSE) serving the Load of the Load Resource. If the Load Resource is an Aggregate Load Resource (ALR), the QSE must represent the LSE serving the Load of all sites within the ALR.

(5) The Settlement Point for a Controllable Load Resource with a Real-Time Market (RTM) Energy Bid is its Load Zone Settlement Point.

(6) QSEs shall not submit offers for Load Resources containing sites associated with a Dynamically Scheduled Resource (DSR).

Board Report

3.8.3 Quick Start Generation Resources

(1) The QSE for a Quick Start Generation Resource (QSGR) that is available for deployment by SCED shall set the COP Resource Status to OFFQS, and the COP Low Sustained Limit (LSL) and COP HSL values to the expected sustainable LSL and HSL for the QSGR for the hour. If the QSGR is providing Non-Spinning Reserve (Non-Spin) service, then the Ancillary Service Resource Responsibility for Non-Spin shall be set to the Resource's QSE-assigned Non-Spin responsibility in the COP. If the QSGR is providing ERCOT Contingency Reserve Service (ECRS)~~Responsive Reserve (RRS)~~, then the Ancillary Service Resource Responsibility for ~~RRS~~ECRS shall be set to the Resource's QSE-assigned ~~RRS~~ECRS responsibility in the COP.

(2) The QSGR that is available for deployment by SCED shall telemeter a Resource Status of OFFQS and a LSL of zero prior to receiving a deployment instruction from SCED. This status is necessary in order for SCED to recognize that the Resource can be Dispatched. The status of the breaker shall be open and the output of the Resource shall be zero in order for the State Estimator to correctly assess the state of the system. After being deployed for energy from SCED, the Resource shall telemeter an LSL equal to or less than the Resource's actual output until the Resource has ramped to its physical LSL. After reaching its physical LSL, the QSGR shall telemeter an LSL that reflects its physical LSL. The QSGR that is providing Off-Line Non-Spin shall always telemeter an Ancillary Service Resource Responsibility for Non-Spin to reflect the Resource's Non-Spin obligation and shall always telemeter an Ancillary Service Schedule for Non-Spin of zero to make the capacity available for SCED.

(3) A QSGR with a telemeter breaker status of open and a telemeter Resource Status OFFQS shall not provide Regulation Service or ~~Responsive Reserve (RRS)~~~~Primary Frequency Response Service~~Responsive Reserve (~~PFRS~~RRS).

(4) ERCOT shall adjust the QSGR's Mitigated Offer Cap (MOC) curve as described in Section 4.4.9.4.1, Mitigated Offer Cap.

(5) For a QSGR that is physically Off-Line, the Resource Entity shall submit a Normal Ramp Rate curve and Emergency Ramp Rate curve indicating QSGR's ability to reach its ten-minute tested output from zero output in five minutes. This is necessary to prevent SCED from deploying multiple QSGRs due to ramp limitation in the first five minutes after being Dispatched by SCED. QSGRs shall be exempt from Base Point Deviation Charges as described in Section 6.6.5.3, Resources Exempt from Deviation Charges.

(6) Any hour in which the QSE for the QSGR has shown the Resource as available for SCED Dispatch as described in this Section 3.8.3 is considered a QSE-Committed Interval.

(7) QSEs must submit and maintain an Energy Offer Curve for their QSGRs for all hours in which the COP Resource Status is submitted as OFFQS. If a valid Energy Offer Curve or an Output Schedule does not exist for any QSGR for which a Resource Status of OFFQS is telemetered 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. For use as SCED inputs, ERCOT shall create proxy Energy Offer Curves for the Resource as described in paragraph (4) of Section 6.5.7.3, Security Constrained Economic Dispatch.

(8) Other than for the potential decommitment of a QSGR as described in Section 3.8.3.1, Quick Start Generation Resource Decommitment Decision Process, following a SCED QSGR deployment, the QSGR is expected to follow the SCED Base Points.

3.8.4 ~~Hydro~~ Generation Resources Operating in Synchronous Condenser Fast Response Mode

(1) A QSE is considered to have performed for the amount of its RF~~F~~RS obligation for the MW amount provided by a ~~hydro~~ Generation Resource operating in synchronous condenser fast-response mode and triggered by an under-frequency relay device at the frequency set point specified in paragraph (3)(~~b~~c) of Section 3.18, Resource Limits in Providing Ancillary Service, without corresponding RF~~F~~RS deployment by ERCOT. This provision applies only for the duration when ~~hydro~~ RF~~F~~RS MW is deployed by automatic under-frequency relay action.

3.9.1 Current Operating Plan (COP) Criteria

(1) Each QSE that represents a Resource must submit a COP to ERCOT that reflects expected operating conditions for each Resource for each hour in the next seven Operating Days.

(2) Each QSE that represents a Resource shall update its COP reflecting changes in availability of any Resource as soon as reasonably practicable, but in no event later than 60 minutes after the event that caused the change.

(3) The Resource capacity in a QSE's COP must be sufficient to supply the Ancillary Service Supply Responsibility of that QSE.

(4) Load Resource COP values may be adjusted to reflect Distribution Losses in accordance with Section 8.1.1.2, General Capacity Testing Requirements.

(5) A COP must include the following for each Resource represented by the QSE:

(a) The name of the Resource;

(b) The expected Resource Status:

(i) Select one of the following for Generation Resources synchronized to the ERCOT System that best describes the Resource's status. Unless otherwise provided below, these Resource Statuses are to be used for COP and/or Real-Time telemetry purposes, as appropriate.

(A) ONRUC – On-Line and the hour is a RUC-Committed Hour;

(B) ONREG – On-Line Resource with Energy Offer Curve providing Regulation Service;

(C) ON – On-Line Resource with Energy Offer Curve;

(D) ONDSR – On-Line Dynamically Scheduled Resource (DSR);

(E) ONOS – On-Line Resource with Output Schedule;

(F) ONOSREG – On-Line Resource with Output Schedule providing Regulation Service;

(G) ONDSRREG – On-Line DSR providing Regulation Service;

(H) FRRSUP – Available for Dispatch of Fast Responding Regulation Service (FRRS). This Resource Status is only to be used for Real-Time telemetry purposes;

(I) ONTEST – On-Line blocked from Security-Constrained Economic Dispatch (SCED) for operations testing (while ONTEST, a Generation Resource may be shown on Outage in the Outage Scheduler);

(J) ONEMR – On-Line EMR (available for commitment or dispatch only for ERCOT-declared Emergency Conditions; the QSE may appropriately set LSL and High Sustained Limit (HSL) to reflect operating limits);

(K) ONFRRS – On-Line as a synchronous condenser ~~(hydro)~~ providing ~~Frequency~~ Responsiveeive Reserve~~Reserve Service~~ (RFRRS) but unavailable for Dispatch by SCED and available for commitment by RUC;

(L) ONECRS – On-Line as a synchronous condenser providing ERCOT Contingency Response Service (ECRS) but unavailable for Dispatch by SCED and available for commitment by RUC;

(ML) ONOPTOUT – On-Line and the hour is a RUC Buy-Back Hour;

(NM) SHUTDOWN – The Resource is On-Line and in a shutdown sequence, and has no Ancillary Service Obligations other than Off-Line Non-Spinning Reserve (Non-Spin) which the Resource will provide following the shutdown. This Resource Status is only to be used for Real-Time telemetry purposes; ~~and~~

(ON) STARTUP – The Resource is On-Line and in a start-up sequence and has no Ancillary Service Obligations. This Resource Status is only to be used for Real-Time telemetry purposes;.

(PO) OFFQS – Off-Line but available for SCED deployment. Only qualified Quick Start Generation Resources (QSGRs) may utilize this status;. and

(QP) ONFFRFRSRRS – Available for Dispatch of FRSRRS providing Fast Frequency Response (FFR) from Generation Resources. This Resource Status is only to be used for Real-Time telemetry purposes.; and

~~(Q) ONFFRRRS – Available for Dispatch of RRS providing FFR from Generation Resources. This Resource Status is only to be used for Real-Time telemetry purposes.~~

(ii) Select one of the following for Off-Line Generation Resources not synchronized to the ERCOT System that best describes the Resource's status. These Resource Statuses are to be used for COP and/or Real-Time telemetry purposes, as appropriate.

(A) OUT – Off-Line and unavailable;

(B) OFFNS – Off-Line but reserved for Non-Spin;

(C) OFF – Off-Line but available for commitment in the Day-Ahead Market (DAM) and RUC; and

(D) EMR – Available for commitment as a Resource contracted by ERCOT under Section 3.14.1, Reliability Must Run, or under paragraph (2) of Section 6.5.1.1, ERCOT Control Area Authority, or available for commitment only for ERCOT-declared Emergency Condition events; the QSE may appropriately set LSL and HSL to reflect operating limits; and

[NPRR901: Insert item (E) below upon system implementation:]

(E) EMRSWGR – Switchable Generation Resource (SWGR) operating in a non-ERCOT Control Area; and

(iii) Select one of the following for Load Resources. Unless otherwise provided below, these Resource Statuses are to be used for COP and/or Real-Time telemetry purposes.

(A) ONRGL – Available for Dispatch of Regulation Service by Load Frequency Control (LFC) and, for any remaining Dispatchable capacity, by SCED with a Real-Time Market (RTM) Energy Bid;

(B) FRRSUP – Available for Dispatch of FRRS by LFC and not Dispatchable by SCED. This Resource Status is only to be used for Real-Time telemetry purposes;

(C) FRRSDN - Available for Dispatch of FRRS by LFC and not Dispatchable by SCED. This Resource Status is only to be used for Real-Time telemetry purposes;

(D) ONCLR – Available for Dispatch as a Controllable Load Resource by SCED with an RTM Energy Bid;

(E) ONRL – Available for Dispatch of ~~RRSECRS Service~~RRS, excluding Controllable Load Resources; ~~and~~

(F) ONECL – Available for Dispatch of ECRS, excluding Controllable Load Resources;

(G~~F~~) OUTL – Not available;

(~~E~~HG) ONFFR~~FRS~~RRS~~RRS~~L – Available for Dispatch of ~~FRS~~RRS ~~Service~~, excluding Controllable Load Resources. This Resource Status is only to be used for Real-Time telemetry purposes;

~~(E) ONFFRRRSL – Available for Dispatch of RRS providing FFR from qualified Load Resources excluding Controllable Load Resources. This Resource Status is only to be used for Real-Time telemetry purposes;~~

(c) The HSL;

(i) For Load Resources other than Controllable Load Resources, the HSL should equal the expected power consumption;

(d) The LSL;

(i) For Load Resources other than Controllable Load Resources, the LSL should equal the expected Low Power Consumption (LPC);

(e) The High Emergency Limit (HEL);

(f) The Low Emergency Limit (LEL); and

(g) Ancillary Service Resource Responsibility capacity in MW for:

(i) Regulation Up (Reg-Up);

(ii) Regulation Down (Reg-Down);

(iii) ~~FRS~~RRS;

(~~ii~~iv) ~~RRS~~ECRS ~~Service~~; ~~and~~and

(~~iv~~) Non-Spin~~; and~~.

~~(v) Primary Frequency Response Service (PFRS).~~

(6) For Combined Cycle Generation Resources, the above items are required for each operating configuration. In each hour only one Combined Cycle Generation Resource in a Combined Cycle Train may be assigned one of the On-Line Resource Status codes described above.

(a) During a RUC study period, if a QSE's COP reports multiple Combined Cycle Generation Resources in a Combined Cycle Train to be On-Line for any hour, then until the QSE corrects its COP, the On-Line Combined Cycle Generation Resource with the largest HSL is considered to be On-Line and all other Combined Cycle Generation Resources in the Combined Cycle Train are considered to be Off-Line. Furthermore, until the QSE corrects its COP, the Off-Line Combined Cycle Generation Resources as designated through the application of this process are ineligible for RUC commitment or de-commitment Dispatch Instructions.

(b) For any hour in which QSE-submitted COP entries are used to determine the initial state of a Combined Cycle Generation Resource for a DAM or Day-Ahead Reliability Unit Commitment (DRUC) study and the COP shows multiple Combined-Cycle Generation Resources in a Combined Cycle Train to be in an On-line Resource Status, then until the QSE corrects its COP, the On-Line Combined Cycle Generation Resource that has been On-Line for the longest time from the last recorded start by ERCOT systems, regardless of the reason for the start, combined with the COP Resource Status for the remaining hours of the current Operating Day, is considered to be On-Line at the start of the DRUC study period and all other COP-designated Combined Cycle Generation Resources in the Combined Cycle Train are considered to be Off-Line.

(c) ERCOT systems shall allow only one Combined Cycle Generation Resource in a Combined Cycle Train to offer Off-Line Non-Spin in the DAM or Supplemental Ancillary Services Market (SASM).

(i) If there are multiple Non-Spin offers from different Combined Cycle Generation Resources in a Combined Cycle Train, then prior to execution of the DAM, ERCOT shall select the Non-Spin offer from the Combined Cycle Generation Resource with the highest HSL for consideration in the DAM and ignore the other offers.

(ii) Combined Cycle Generation Resources offering Off-Line Non-Spin must be able to transition from the shutdown state to the offered Combined Cycle Generation Resource On-Line state and be capable of ramping to the full amount of the Non-Spin offered.

(d) The DAM and RUC shall honor the registered hot, intermediate or cold Startup Costs for each Combined Cycle Generation Resource registered in a Combined Cycle Train when determining the transition costs for a Combined Cycle Generation Resource. In the DAM and RUC, the Startup Cost for a Combined Cycle Generation Resource shall be determined by the positive transition cost from the On-Line Combined Cycle Generation Resource within the Combine Cycle Train or from a shutdown condition, whichever ERCOT determines to be appropriate.

(7) ERCOT may accept COPs only from QSEs.

(8) For the first 168 hours of the COP, ERCOT will update the HSL values for Wind-powered Generation Resources (WGRs) with the most recently updated Short-Term Wind Power Forecast (STWPF), and the HSL values for PhotoVoltaic Generation Resources (PVGRs) with the most recently updated Short-Term PhotoVoltaic Power Forecast (STPPF). ERCOT will notify the QSE via an Extensible Markup Language (XML) message each time COP HSL values are updated with the forecast values. A QSE representing a WGR may override the STWPF HSL value but must submit an HSL value that is less than or equal to the amount for that Resource from the most recent STWPF provided by ERCOT; a QSE representing a PVGR may override the STPPF HSL value but must submit an HSL value that is less than or equal to the amount for that Resource from the most recent STPPF provided by ERCOT.

(9) A QSE representing a Generation Resource that is not actively providing Ancillary Services or is providing Off-Line Non-Spin that the Resource will provide following the shutdown, may only use a Resource Status of SHUTDOWN to indicate to ERCOT through telemetry that the Resource is operating in a shutdown sequence or a Resource Status of ONTEST to indicate in the COP and through telemetry that the Generation Resource is performing a test of its operations either manually dispatched by the QSE or by ERCOT as part of the test. A QSE representing a Generation Resource that is not actively providing Ancillary Services may only use a Resource Status of STARTUP to indicate to ERCOT through telemetry that the Resource is operating in a start-up sequence requiring manual control and is not available for Dispatch.

(10) If a QSE has not- submitted a valid COP for any Generation Resource for any hour in the DAM or RUC Study Period, then the Generation Resource is considered to have a Resource Status as OUT thus not available for DAM awards or RUC commitments for those hours.

(11) If a COP is not available for any Resource for any hour from the current hour to the start of the DAM period or RUC study, then the Resource Status for those hours are

considered equal to the last known Resource Status from a previous hour's COP or from telemetry as appropriate for that Resource.

(12) A QSE representing a Resource may only use the Resource Status code of EMR for a Resource whose operation would have impacts that cannot be monetized and reflected through the Resource's Energy Offer Curve or recovered through the RUC make-whole process or if the Resource has been contracted by ERCOT under Section 3.14.1 or under paragraph (2) of Section 6.5.1.1. If ERCOT chooses to commit an Off-Line unit with EMR Resource Status that has been contracted by ERCOT under Section 3.14.1 or under paragraph (2) of Section 6.5.1.1, the QSE shall change its Resource Status to ONRUC. Otherwise, the QSE shall change its Resource Status to ONEMR.

(13) A QSE representing a Resource may use the Resource Status code of ONEMR for a Resource that is:

(a) On-Line, but for equipment problems it must be held at its current output level until repair and/or replacement of equipment can be accomplished; or

(b) A hydro unit.

(14) A QSE operating a Resource with a Resource Status code of ONEMR may set the HSL and LSL of the unit to be equal to ensure that SCED does not send Base Points that would move the unit.

[NPRR901: Insert paragraph (15) below upon system implementation:]

(15) A QSE representing a Resource may use the Resource Status code of EMRSWGR only for an SWGR.

3.16 Standards for Determining Ancillary Service Quantities

(1) ERCOT shall comply with the requirements for determining Ancillary Service quantities as specified in these Protocols and the ERCOT Operating Guides.

~~(2) ERCOT shall procure no less than the following amounts for each of the following Ancillary Services:~~

~~(a) Primary Frequency Response Service (PFRS) 1,150 MW;~~

~~(b) Responsive Reserve (RRS) 2,300 MW; and~~

~~(c) Non-Spinning Reserve (Non-Spin) 1,350 MW.~~

(2~~3~~) ERCOT shall, at least annually, determine with supporting data, the methodology for determining the quantity requirements for each Ancillary Service needed for reliability~~.~~, ~~ERCOT shall also determine on an annual basis~~including:

(a) The percentage or MW limit of ERCOT Contingency Reserve Service (ECRS)~~Responsive Reserve (RRS)~~ allowed ~~including the minimum capacity required~~ from Load Resources ~~providing Primary Frequency Response to~~that can providing~~e Responsive Reserve (ECRRS) calculated on a monthly basis;~~,

~~(b) The miniminum capacity required from PFR Resources providing PFR and providing PFRS Up, which shall not be less than the greater of two times the ERCOT frequency bias or 1,150 MW shall not be less than 1,150 MW;~~

(b~~e~~) The maximum amount (MW) of ~~Frequency Response Service~~Responsive Reserve (~~PFRS~~RRS) that can be provided by Resources capable of Fast Frequency Response (FFR);

(c~~d~~) T~~t~~he maximum amount (MW) of Regulation Up Service (Reg-Up) that can be provided by Resources providing Fast Responding Regulation Up Service (FRRS-Up);~~,~~ and

(d~~e~~) T~~t~~he maximum amount (MW) of Regulation Down Service (Reg-Down) that can be provided by Resources providing Fast Responding Regulation Down Service (FRRS-Down).

(e~~f~~) The minimum capacity required from Resources providing ~~FRS~~RRS using Primary Frequency Response ~~and providing~~participating in FRS shall not be less than 1,150 MW.

(3~~4~~) The ERCOT Board shall review and approve ERCOT's methodology for determining the minimum Ancillary Service requirements, the minimum capacity required from Resources providing Primary Frequency Response to provide ~~RRSECRS~~RRS, the maximum amount of ~~PFRS~~RRS that can be provided by Resources capable of FFR, and the maximum amount of Reg-Up and Reg-Down that can be provided by Resources providing FRRS-Up and FRRS-Down.

(4~~5~~4) If ERCOT determines a need for additional Ancillary Service Resources under these Protocols or the ERCOT Operating Guides, after an Ancillary Service Plan for a specified day has been posted, ERCOT shall inform the market by posting notice on the Market Information System (MIS) Public Area, of ERCOT's intent to procure additional Ancillary Service Resources under Section 6.4.9.2, Supplemental Ancillary Services Market. ERCOT shall post the reliability reason for the increase in service requirements.

(5~~6~~5) Monthly, ERCOT shall determine and post on the MIS Secure Area a minimum capacity required from Resources providing ~~F~~RRS using Primary Frequency Response. The remaining capacity required for ~~F~~RRS may be supplied by all Resources qualified to provide ~~F~~RRS including Load Resources on high-set under-frequency relays, provided that ~~F~~RRS from these Load Resources shall be limited to 60% of the total ERCOT ~~F~~RRS requirement. ERCOT may increase the minimum capacity required from Resources providing R~~F~~RRS using Primary Frequency Response if it believes that the current posted quantity will have a negative impact on reliability or if it would require additional Regulation Service to be deployed.

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~~(6) Monthly, ERCOT shall determine and post on the MIS Secure Area a minimum capacity required from Resources providing RRSECRS. The amount of Load Resources excluding Controllable Load Resources that may or may not be on high-set under-frequency relays providing RRSECRS is limited to 50% of the total ERCOT RRSECRS requirement.~~

(6~~7~~) The amount of ~~RRS~~ ~~FRS~~RRS that a Qualified Scheduling Entity (QSE) can self-arrange using a Load Resource excluding Controllable Load Resources is limited to its Load Ratio Share (LRS) of the capacity allowed to be provided by Resources not providing ~~RRS~~ ~~FRS~~RRS using Primary Frequency Response established in paragraph (5) above, provided that ~~RRS~~ ~~FRS~~RRS from these Load Resources shall be limited to 60% of the total ERCOT ~~RRS~~ ~~FRS~~RRS requirement.

~~(8) The amount of RRSECRS that a QSE can self-arrange using a Load Resource excluding Controllable Load Resources is limited to the lower of:~~

~~(a) 50% of its RRSECRS Ancillary Service Obligation, or~~

~~(b) A reduced percentage of its RRSECRS Ancillary Service Obligation based on the limit established by ERCOT in paragraph (6) above.~~

(8~~7~~9) However, a QSE may ~~bid~~ offer more of the Load Resource above the percentage limit established by ERCOT for sale of ~~RRS~~ ~~FRS~~RRS to other Market Participants. The total amount of ~~FR~~RS ~~Service~~ using the Load Resource ~~excluding Controllable Load Resources~~ procured by ERCOT is also limited to the capacity established in paragraph (5~~6~~5) above, up to the lesser of the 60% limit or the limit established by ERCOT in paragraph (5~~6~~5) above.

(8) Monthly, ERCOT shall determine and post on the MIS Secure Area a minimum capacity required from Resources providing ECRS. The amount of Load Resources excluding Controllable Load Resources that may or may not be on high-set under-frequency relays providing ECRS is limited to 50% of the total ERCOT ECRS requirement.

(9) The amount of ECRS that a QSE can self-arrange using a Load Resource excluding Controllable Load Resources is limited to the lower of:

(a) 50% of its ECRS Ancillary Service Obligation; or

(b) A reduced percentage of its ECRS Ancillary Service Obligation based on the limit established by ERCOT in paragraph (8) above.

(8~~9~~10) A QSE may offer more of the Load Resource above the percentage limit established by ERCOT for sale of ~~RRS~~ECRS to other Market Participants. The total amount of ~~RRS~~ECRS using the Load Resource excluding Controllable Load Resources procured by ERCOT is also limited to the lesser of the 50% limit or the limit established by ERCOT in paragraph (9~~8~~) above.

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(11) The maximum MW amount of capacity from Resources providing FRRS-Up is limited to 65 MW. ERCOT may reduce this limit if it believes that this amount will have a negative impact on reliability or if this limit would require additional Regulation Service to be deployed.

(9102) The maximum MW amount of capacity from Resources providing FRRS-Down is limited to 35 MW. ERCOT may reduce this limit if it believes that this amount will have a negative impact on reliability or if this limit would require additional Regulation Service to be deployed.

(1103) Resources can only provide FRRS-Up or FRRS-Down if awarded Regulation Service in the Day-Ahead Market (DAM) for that particular Resource, up to the awarded quantity.

3.17.2 ERCOT Contingency Reserve Service~~Responsive Reserve Service~~

(1) ERCOT Contingency Reserve Service (ECRS)~~Responsive Reserve (RRS)~~ is a service used to restore or maintain the frequency of the ERCOT System:

(a) In response to~~, or to prevent, significant frequency deviations~~ significant depletion of ~~Primary Frequency Response Service~~Responsive Reserve (~~PFRS~~RRS);

(b) As backup Regulation Service; and

(c) By providing energy to avoid getting into or during~~during~~ an Energy Emergency Alert (EEA).

(2) ECR~~R~~RS may be provided through one or more of the following means:

(a) ~~By using frequency-dependent response f~~From On-Line or Off-Line Resources as prescribed in the Operating Guides ~~to help restore the frequency within the first few seconds of an event that causes~~following a significant frequency deviation in the ERCOT System; and

(b) Either manually or by using a four-second signal to provide energy on deployment by ERCOT.

(3) ECR~~R~~RS may be used to provide energy prior to or during the implementation of an EEA. ~~Under the~~ EEA, ECR~~R~~RS provides ~~generation~~ Resource capacity, or capacity from ~~Controllable Load Resources or~~ interruptible Load available for deployment on ten minutes' notice.

(4) ECR~~R~~RS may be provided by:

(a) Unloaded, On-Line Generation Resource capacity;

(b) Quick Start Generation Resources (QSGRs);

~~(c) Resources capable of Fast Frequency Response (FFR);~~

(~~dc~~) Load Resources that may or may not be controlled by high-set, under-frequency relays;

(~~ed~~) Controllable Load Resources; and

(~~dfe~~) ~~Hydro RRS~~Generation Resources operating in synchronous condenser fast-response mode as defined in the Operating Guides.

3.17.4 ~~Primary Frequency Response Service~~Responsive Reserve Service

(1) ~~Primary Frequency Response Service~~Responsive Reserve (~~PFRS~~RRS) is a service used to restore or maintain the frequency of the ERCOT System in response to a significant frequency deviation.

(2) ~~PFRS~~RRS is automatically self-deployed by Resources in a manner that results in real power increases or decreases ~~that are proportional to the amount of frequency deviation that occurs~~.

(3) ~~PFRS~~RRS may be provided by:

(a) On-Line Generation Resource capable of providing Primary Frequency Response with the capacity excluding Non-Frequency Responsive Capacity (NFRC)~~pacity~~; ~~and~~

(b) Resources capable of providing Fast Frequency Response (FFR) and sustaining their response for up to 15 minutes;

(c) Load Resources controlled by high-set under-frequency relays; and

(d) Generation Resources operating in synchronous condenser fast-response mode as defined in the Operating Guides.

3.18 Resource Limits in Providing Ancillary Service

(1) For both Generation Resources and Load Resources the High Sustained Limit (HSL) must be greater than or equal to the Low Sustained Limit (LSL) and the sum of the Resource-specific designation of capacity to provide, ~~Frequency Response Service (FRS)~~Responsive Reserve (RRS), ERCOT Contingency Reserve Service (ECRS)~~Responsive Reserve (RRS)~~, Regulation Up (Reg-Up), Regulation Down (Reg-Down), and Non-Spinning Reserve (Non-Spin).

(2) For Non-Spin, the amount of Non-Spin provided must be less than or equal to the HSL for Off-Line Generation Resources.

(3) For ~~RRS~~ECRS ~~Service~~:

(a) The full amount of ~~RRS~~ECRS provided from an On-Line Generation Resource ~~must be less than or equal to 20% of thermal unit HSL for an Ancillary Service Offer, and~~ must be less than or equal to ten times the Emergency Ramp Rate~~, and must be frequency responsive~~;

(b) The full amount of ~~RRS~~ECRS provided by a Quick Start Generation Resource (QSGR) must be less than or equal to its proven ten-minute capability as demonstrated pursuant to paragraph (16) of Section 8.1.1.2, General Capacity Testing Requirements;

(~~b~~c) ~~Hydro~~ Generation Resources operating in the synchronous condenser fast-response mode may provide ~~RRS~~ECRS up to the ~~hydro~~ Generation Resource's proven 20-second response capability (which may be 100% of the HSL). The initiation setting of the automatic under-frequency relay setting shall not be lower than 59.80 Hz; and

~~(cd) For any hydro Generation Resource with a 5% or less droop setting operating as a generator, the amount of RRS provided may never be more than 20% of the HSL; and~~and

(~~d~~ed) For any Load Resources controlled by under-frequency relay and providing ECRS, t~~T~~he initiation setting of the automatic under-frequency relay setting ~~for Load Resources providing RRS~~ECRS shall not be lower than 59.70 Hz. To provide ECRS, Load Resources are not required to be controlled by under-frequency relays~~with a delay time of no greater than 20 cycles~~~~The amount of RRS provided from a Load Resource must be less than or equal to the HSL minus the sum of the LSL, Reg-Up Resource Responsibility, Reg-Down Resource Responsibility, and Non-Spin Resource Responsibility.~~; and

~~(f) The amount of RRS provided from a Resource capable of Fast Frequency Response (FFR) must be less or equal to one-third of its rated discharge capacity over threeone hours. The initiation setting of the automatic self-deployment of the Resource providing RRS as FFR must be no lower than 59.8850 Hz.~~

(4) For ~~PFRS~~RRS:

(a) The full amount of ~~PFRS~~RRS awarded to or self-arranged from an On-Line Generation Resource is dependent upon the verified droop characteristics of the Resource. ERCOT shall calculate and update, using the methodology described in the Nodal Operating Guide, a maximum MW amount of ~~PFRS~~RRS for each Generation Resource subject to verified droop performance. The default value for any newly qualified Generation Resource shall be 20% of its HSL. A Private Use Network with a registered Resource may use the gross HSL for qualification and establishing a limit on the amount of ~~FRS~~RRS capacity that the Resource within the Private Use Network can provide ~~that is no greater than 5.0% and no less than 3.0%~~;

(b) ~~Hydro~~ Generation Resources operating in the synchronous condenser fast-response mode may provide ~~PFRS~~RRS up to the ~~hydro~~ Generation Resource's proven 20-second response capability (which may be 100% of the HSL). The initiation setting of the automatic under-frequency relay setting shall not be lower than 59.80 Hz.~~;~~ Once deployed, a Resource~~s~~ telemetering a Resource Status of ON~~FRS~~RRS shall telemeter an ~~FRS~~RRS Ancillary Service Schedule of zero, and when recalled by ERCOT after frequency recovers above 59.98 Hz, such Resource shall telemeter an ~~FRS~~RRS Ancillary Service Schedule that shall be a non-zero value equal to its ~~FRS~~RRS Ancillary Service Responsibility;

(c) The initiation setting of the automatic under-frequency relay setting for Load Resources providing ~~FRS~~RRS shall not be lower than 59.70 Hz~~For any hydro Generation Resource with a 5% or less droop setting operating as a generator, the amount of PFRS provided may never be more than 20% of the HSL~~; and

(d) The amount of ~~P~~FRS~~RRS~~RRS provided from a Resource capable of providing FFR must be less than or equal to its ~~one hour~~15-minute rated ~~discharge~~ capacity. The initiation setting of the automatic self-deployment of the Resource providing ~~PFRS~~RRS as FFR must be no lower than 59.8~~9~~5 Hz. A Resource providing ~~PFRS~~RRS as FFR that is deployed shall~~may~~ not recall ~~their~~its capacity until system frequency is greater than 59.98 Hz. Once deployed, a Resource~~s~~ telemetering a Resource Status of ONFFR~~FRS~~RRS or ONFFRRRSL shall telemeter an ~~FRS~~RRS Ancillary Service Schedule of zero, and when recalled, such Resource shall telemeter an ~~FRS~~RRS Ancillary Service Schedule that shall be a non-zero value equal to its ~~FRS~~RRS Ancillary Service Responsibility. Once recalled, a Resource providing ~~PFRS~~RRS as FFR must restore ~~their~~its full ~~PFRS~~RRS Ancillary Service Resource Responsibility within 15 minutes after cessation of deployment or as otherwise directed by ERCOT.

4.2.1.1 Ancillary Service Plan

(1) ERCOT shall analyze the expected Load conditions for the Operating Day and develop an Ancillary Service Plan that identifies the Ancillary Service MW necessary for each hour of the Operating Day. The MW of each Ancillary Service required may vary from hour to hour depending on ERCOT System conditions. ERCOT must post the Ancillary Service Plan to the Market Information System (MIS) Public Area by 0600 of the Day-Ahead.

(2) If ERCOT determines that an Emergency Condition may exist that would adversely affect ERCOT System reliability, it may change the percentage of Load Resources that are allowed to provide ~~Responsive Reserve (RRS) Service~~ERCOT Contingency Reserve Service (ECRS) and ~~Frequency Response Service (FRS)~~Responsive Reserve (RRS) from the monthly amounts determined previously, as described in Section 3.16, Standards for Determining Ancillary Service Quantities, and must post any change in the percentage to the MIS Public Area by 0600 of the Day-Ahead.

(3) ERCOT shall determine the total required amount of each Ancillary Service under Section 3.16, or use its operational judgment and experience to change the daily quantity of each required Ancillary Service.

(4) ERCOT shall include in the Ancillary Service Plan enough capacity to automatically control frequency with the intent to meet North American Electric Reliability Corporation (NERC) Reliability Standards.

(5) Once specified by ERCOT for an hour and published on the MIS Public Area, Ancillary Service quantity requirements for an Operating Day may not be decreased.

4.4.7.1 Self-Arranged Ancillary Service Quantities

(1) For each Ancillary Service, a QSE may self-arrange all or a portion of the Ancillary Service Obligation allocated to it by ERCOT. QSEs may not self-arrange Regulation Service amounts that include Fast Responding Regulation Up Service (FRRS-Up) or Fast Responding Regulation Down Service (FRRS-Down) quantities. In addition, a QSE may self-arrange up to ~~100~~10050 MW of ERCOT Contingency Reserve Service (ECRS)~~Responsive Reserve (RRS)~~, 10050 MW of ~~Primary Frequency Response Service~~Responsive Reserve (~~PFRS~~RRS), 25 MW of Regulation Up Service (Reg-Up), 25 MW of Regulation Down Service (Reg-Down), and ~~100~~50 MW of Non-Spinning Reserve (Non-Spin) in excess of its corresponding Ancillary Service Obligation, provided that the amount self-arranged from the QSE's Resources for a given Ancillary Service shall not exceed the amount of the QSE's Ancillary Services Obligation for that Ancillary Service. If a QSE elects to self-arrange Ancillary Service capacity, then ERCOT shall not pay the QSE for the Self-Arranged Ancillary Service Quantities for the portion that meets its Ancillary Service Obligation. Any Self-Arranged Ancillary Service Quantities in excess of a QSE's Ancillary Service Obligation will be considered to be offered in the DAM or Supplemental Ancillary Service Market (SASM), as applicable, for $0/MWh.

(2) The QSE must indicate before 1000 in the Day-Ahead the Self-Arranged Ancillary Service Quantities, by service, so ERCOT can determine how much Ancillary Service capacity, by service, needs to be obtained through the DAM.

(3) At or after 1000 in the Day-Ahead, a QSE may not change its Self-Arranged Ancillary Service Quantities unless ERCOT opens a SASM.

(4) Before 1430 in the Day-Ahead, all Self-Arranged Ancillary Service Quantities must be represented by physical capacity, either by Generation Resources or Load Resources, or backed by Ancillary Service Trades.

(5) The QSE may self-arrange Reg-Up, Reg-Down, ~~RRS~~ECRS, ~~PFRS~~RRS, and Non-Spin.

(6) The QSE may self-arrange Ancillary Services from one or more Resources it represents and/or through an Ancillary Service Trade.

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(7) The additional Self-Arranged Ancillary Service Quantity specified by the QSE in response to a SASM notice by ERCOT to obtain additional Ancillary Services in the Adjustment Period cannot be more than ~~10~~50100 MWs of ~~RRS~~ECRS, ~~50~~100 MW of ~~PFRS~~RRS, 25 MWs of Reg-Up, 25 MWs of Reg-Down, and ~~100~~50 MWs of Non-Spin greater than the additional Ancillary Service amount allocated by ERCOT to that QSE, as stated in the SASM notice, and cannot be changed once committed to ERCOT.

(8) If a QSE does not self-arrange all of its Ancillary Service Obligation, ERCOT shall procure the remaining amount of that QSE's Ancillary Service Obligation.

(9) For self-arranged ~~RRS~~RRS or ECRS ~~Service~~, the QSE shall indicate the quantity of the service that is provided from:

(a) Generation Resources;

(b) Controllable Load Resources; and

(c) Load Resources that may or may not be controlled by high-set under-frequency relays.

4.4.7.1.1 Negative Self-Arranged Ancillary Service Quantities

(1) A QSE may submit a negative Self-Arranged Ancillary Service Quantity in the DAM. ERCOT shall procure all negative Self-Arranged Ancillary Service Quantities submitted by a QSE.

(2) Procurements of negative Self-Arranged Ancillary Service Quantities by ERCOT shall be settled in the same manner as Ancillary Service Obligations that are not self-arranged and according to the charges defined in Section 4.6.4.2, Charges for Ancillary Services Procurement in the DAM, and Section 6.7, Real-Time Settlement Calculations for the Ancillary Services.

(3) A QSE may not submit a negative Self-Arranged Ancillary Service Quantity in the DAM that is less than -500 MW per Ancillary Service. For negative self-arranged ~~FRS~~RRS and ~~RRS~~ECRS, the QSE shall not specify Fast Frequency Response (FFR) Resources, Controllable Load Resources, and Load Resources controlled by high-set under-frequency relays. For compliance purposes, a QSE may not submit a negative Self-Arranged Ancillary Service Quantity in the DAM that is greater in magnitude than the absolute value of the net sales of its Ancillary Service Trades per Ancillary Service.

4.4.7.2 Ancillary Service Offers

(1) By 1000 in the Day-Ahead, a QSE may submit Generation Resource-specific Ancillary Service Offers to ERCOT for the DAM and may offer the same Generation Resource

capacity for any or all of the Ancillary Service products simultaneously with any Energy Offer Curves from that Generation Resource in the DAM. A QSE may also submit Ancillary Service Offers in a SASM. Offers of more than one Ancillary Service product from one Generation Resource may be inclusive or exclusive of each other and of any Energy Offer Curves, as specified according to a procedure developed by ERCOT.

(2) By 1000 in the Day-Ahead, a QSE may submit Load Resource-specific Ancillary Service Offers for Regulation Service, Non-Spin, ~~FRS~~RRS, and ~~RRS~~ECRS to ERCOT and may offer the same Load Resource capacity for any or all of those Ancillary Service products simultaneously. Offers of more than one Ancillary Service product from one Load Resource may be inclusive or exclusive of each other, as specified according to a procedure developed by ERCOT.

(3) Ancillary Service Offers remain active for the offered period until:

(a) Selected by ERCOT;

(b) Automatically inactivated by the software at the offer expiration time specified by the QSE when the offer is submitted; or

(c) Withdrawn by the QSE, but a withdrawal is not effective if the deadline for submitting offers has already passed.

(4) A Load Resource that is not a Controllable Load Resource may specify whether its Ancillary Service Offer for ~~RRS~~ECRS may only be procured by ERCOT as a block.

(5) A Load Resource that is not a Controllable Load Resource may specify whether its Ancillary Service Offer for ~~FRS~~RRS may only be procured by ERCOT as a block.

(6~~5~~) A QSE that submits an On-Line Ancillary Service Offer without also submitting a Three-Part Supply Offer for the DAM for any given hour will be considered by the DAM to be self-committed for that hour, as long as an Ancillary Service Offer for Off-Line Non-Spin was not also submitted for that hour. When the DAM considers a self-committed offer for clearing, the Resource constraints identified in paragraph (4)(c)(ii) of Section 4.5.1, DAM Clearing Process, other than HSL, are ignored. A Combined Cycle Generation Resource will be considered by the DAM to be self-committed based on an On-Line Ancillary Service Offer submittal if:

(a) Its QSE submits an On-Line Ancillary Service Offer without also submitting a Three-Part Supply Offer for the DAM for any Combined Cycle Generation Resource within the Combined Cycle Train for that hour;

(b) No Ancillary Service Offer for Off-Line Non-Spin for any Combined Cycle Generation Resource within the Combined Cycle Train is submitted for that hour; and

(c) No On-Line Ancillary Service Offer for any other Combined Cycle Generation Resource within the Combined Cycled Train is submitted for that hour.

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4.4.7.2.1 Ancillary Service Offer Criteria

(1) Each Ancillary Service Offer must be submitted by a QSE and must include the following information:

(a) The selling QSE;

(b) The Resource represented by the QSE from which the offer would be supplied;

(c) The quantity in MW and Ancillary Service type from that Resource for this specific offer and the specific quantity in MW and Ancillary Service type of any other Ancillary Service offered from this same capacity;

(d) An Ancillary Service Offer linked to a Three-Part Supply Offer from a Resource designated to be Off-Line for the offer period in its COP may only be struck if the Three-Part Supply Offer is struck. The total capacity struck must be within limits as defined in item (4)(c)(iii) of Section 4.5.1, DAM Clearing Process;

(e) An Ancillary Service Offer linked to other Ancillary Service Offers or an Energy Offer Curve from a Resource designated to be On-Line for the offer period in its COP may only be struck if the total capacity struck is within limits as defined in item (4)(c)(iii) of Section 4.5.1;

(f) The first and last hour of the offer;

(g) A fixed quantity block, or variable quantity block indicator for the offer:

(i) If a fixed quantity block, not to exceed 150 MW, which may only be offered by a Load Resource controlled by high-set under-frequency relay providing ~~FRS~~RRS or ~~RRS~~ECRS, and which may clear at a Market Clearing Price for Capacity (MCPC) below the Ancillary Service Offer price for that block, the single price (in $/MW) and single quantity (in MW) for all hours offered in that block; or

(ii) If a variable quantity block, which may be offered by a Generation Resource or a Load Resource, the single price (in $/MW) and single "up to" quantity (in MW) contingent on the purchase of all hours offered in that block; and

(h) The expiration time and date of the offer.

(2) A valid Ancillary Service Offer in the DAM must be received before 1000 for the effective DAM. A valid Ancillary Service Offer in an SASM must be received before the applicable deadline for that SASM.

(3) No Ancillary Service Offer price may exceed the System-Wide Offer Cap (SWCAP) (in $/MW). No Ancillary Service Offer price may be less than $0 per MW.

(4) The minimum amount per Resource for each Ancillary Service product that may be offered is one-tenth (0.1) MW.

(5) A Resource may offer more than one Ancillary Service.

(6) Offers for Load Resources may be adjusted to reflect Distribution Losses in accordance with Section 8.1.1.2, General Capacity Testing Requirements.

(7) A Load Resource that is qualified to perform as a Controllable Load Resource may not offer to provide Ancillary Services as a Controllable Load Resource and a Load Resource controlled by high-set under-frequency relay simultaneously behind a common breaker.

4.4.7.3 Ancillary Service Trades

(1) An Ancillary Service Trade is the information for a QSE-to-QSE transaction that transfers an obligation to provide Ancillary Service capacity between a buyer and a seller.

(2) An Ancillary Service Trade that is reported to ERCOT by 1430 in the Day-Ahead changes the Ancillary Service Supply Responsibility of the buyer and seller in the DRUC process. An Ancillary Service Trade that is reported to ERCOT after 1430 in the Day-Ahead changes the Ancillary Service Supply Responsibility of the buyer and seller in any applicable HRUC process, the deadline for which is after the trade is submitted.

(3) As soon as practicable, ERCOT shall notify each QSE through the Messaging System of any of its Ancillary Service Trades that are invalid Ancillary Service Trades. The QSE may correct and resubmit any invalid Ancillary Service Trade, but the reporting time of the trade is determined by when the validated Ancillary Service Trade was submitted and not when the original invalid Ancillary Service Trade was submitted.

(4) A QSE with an Ancillary Service Supply Responsibility for ~~RRS~~ECRS, originally designated to be provided by a Generation Resource, may transfer its responsibility via Ancillary Service Trade(s) to another QSE only if that QSE designates the ~~RRS~~ECRS will be provided by a Generation Resource.

~~(5) A QSE with an Ancillary Service Supply Responsibility for RRS, originally designated to be provided by a Resource capable of Fast Frequency Response (FFR), may transfer its responsibility via Ancillary Service Trade(s) to another QSE only if that QSE designates the RRS will be provided by either:~~

~~(a) A Generation Resource;~~

~~(b) A Resource capable of FFR providing RRS triggered with under-frequency relays set at 59.805 Hz; or~~

~~(c) A Load Resource providing RRS triggered with under-frequency relays set at 59.70 Hz.~~

(5~~6~~) A QSE with an Ancillary Service Supply Responsibility for ~~RRS~~ECRS, originally designated to be provided by a Load Resource providing ~~RRS~~ECRS triggered with or without under-frequency relays set at 59.70 Hz, may transfer its responsibility via Ancillary Service Trade(s) to another QSE only if that QSE designates the ~~RRS~~ECRS will be provided by either:

(a) A Generation Resource; or

(b) A Load Resource providing ~~RRS~~ECRS triggered with or without under-frequency relays set at 59.70 Hz.

(6~~7~~) The table below shows the ~~RRS~~ECRS trades that are allowed for each type of original responsibility:

	Allowable ~~RRS~~ECRS Ancillary Service Trades		
Original Responsibility	**Generation Resource**	**~~Resource capable of FFR~~**	**Load Resource ~~triggered at 59.7 Hz~~**
Generation Resource	Yes	~~No~~	No
~~Resource providing FFR~~	~~Yes~~	~~Yes~~	~~Yes~~
Load Resource ~~triggered at 59.7 Hz~~	Yes	~~No~~	Yes

(7) The table below shows the ~~FRS~~RRS trades that are allowed for each type of original responsibility:

	Allowable ~~FRS~~RRS Ancillary Service Trades		
Original Responsibility	**Generation Resource**	**Resource capable of FFR triggered at 59.85 Hz**	**Load Resource triggered at 59.7 Hz**
Generation Resource	Yes	No	No
Resource providing FFR triggered at 59.85 Hz	Yes	Yes	Yes
Load Resource triggered at 59.7 Hz	Yes	No	Yes

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4.5.2 Ancillary Service Insufficiency

(1) ERCOT shall determine if there is an insufficiency in Ancillary Service Offers. If ERCOT receives insufficient Ancillary Service Offers in the DAM to procure one or more required Ancillary Service such that the Ancillary Service Plan is deficient and system security and reliability is threatened:

(a) ERCOT shall declare an Ancillary Service insufficiency and issue a Watch under Section 6.5.9.3.3, Watch.

(b) ERCOT shall request additional Ancillary Service Offers.

(i) A QSE may resubmit an offer for an Ancillary Service that it submitted before the Watch for the same Ancillary Service quantity block, but the resubmitted offer must meet the following criteria to be considered a valid offer:

(A) The offer quantity may not be less than the offer quantity submitted before the Watch, unless the resubmitted offer quantity is priced lower than the offer quantity submitted before the Watch; and

(B) For the amount of the offer quantity that is equal to or greater than the offer quantity submitted before the Watch, the offer must be priced equal to or less than the price of the offer submitted before the Watch.

(ii) A QSE may submit an offer for an additional Ancillary Service quantity block that was not submitted before the Watch. The incremental amount of the offer may be submitted at a price subject to the offer cap, provided the offer quantity of the Ancillary Service block from paragraph (i) above is not less than the offer quantity submitted before the Watch.

(iii) A QSE that did not submit an Ancillary Service Offer prior to the Watch may submit a new Ancillary Service Offer at a price subject to the offer cap.

(c) ERCOT shall not begin executing the DAM sooner than 30 minutes after issuing the Watch. If the additional Ancillary Service Offers are still insufficient to supply the Ancillary Service required in the Day-Ahead Ancillary Service Plan, then ERCOT shall run the DAM by reducing the Ancillary Service Plan quantities only for purposes of the DAM by the amount of insufficiency.

(d) When ERCOT must reduce the Ancillary Service Plan for purposes of the DAM due to insufficient Ancillary Service Offers, ERCOT shall preserve the Ancillary Service Plan in the DAM in the following order of priority:

(i) Regulation Up (Reg-Up);

(ii) Regulation Down (Reg-Down);

(iii) ~~Primary Frequency Response Service~~Responsive Reserve (~~PFRS~~RRS);

(iv) ERCOT Contingency Reserve Service (ECRS)~~Responsive Reserve (RRS)~~; and

(~~i~~v) Non-Spin.

(2) ERCOT shall procure the difference in capacity between the Day-Ahead Ancillary Service Plan and the DAM-reduced Ancillary Service Plan amounts using the Supplemental Ancillary Service Market (SASM) process in accordance with Section 6.4.9.2.2, SASM Clearing Process. If the SASM process is insufficient, then ERCOT may acquire the insufficient amount of Ancillary Services from Hourly Reliability Unit Commitment (HRUC) Resources that are qualified to provide the needed Ancillary Service. ERCOT may also issue a Watch and procure Ancillary Services in accordance with Section 6.5.9.3.3.

4.6.2.3.1 Day-Ahead Make-Whole Payment

(1) ERCOT shall pay the QSE a Day-Ahead Make-Whole Payment for an eligible Resource for each Operating Hour in a DAM-commitment period.

(2) Any Ancillary Service Offer cleared for the same Operating Hour, QSE, and Generation Resource as a Three-Part Supply Offer cleared in the DAM shall be included in the calculation of the Day-Ahead Make-Whole Payment.

(3) 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 the Day-Ahead Make-Whole Amount is calculated for the Combined Cycle Train.

(4) For an Aggregate Generation Resource (AGR), Startup Cost shall be scaled according to the ratio of the maximum number of its generators online during a contiguous block of DAM-committed Intervals, as indicated by telemetry, compared to the total number of generators registered to the AGR and used in the approved verifiable cost for the AGR.

(5) The Day-Ahead Make-Whole Payment to each QSE for each DAM-committed Generation Resource is calculated as follows:

$$\mathbf{DAMWAMT}_{q,p,r,h} = \mathbf{(-1)} * \mathbf{Max}\left(0, \mathbf{DAMGCOST}_{q,p,r} + \sum_h \mathbf{DAEREV}_{q,p,r,h} + \sum_h \mathbf{DAASREV}_{q,r,h}\right) * \mathbf{DAESR}_{q,p,r,h} / \left(\sum_h \mathbf{DAESR}_{q,p,r,h}\right)$$

(6) The Day-Ahead Make-Whole Guaranteed Costs are calculated for each eligible DAM-Committed Generation Resource as follows:

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For non-Combined Cycle Trains,

$$DAMGCOST_{q,p,r} = Min(DASUO_{q,p,r}, DASUCAP_{q,p,r}) + \sum_h (Min(DAMEO_{q,p,r,h}, DAMECAP_{p,q,r,h}) * DALSL_{q,p,r,h}) + \sum_h (DAAIEC_{q,p,r,h} * (DAESR_{q,p,r,h} - DALSL_{q,p,r,h}))$$

For a Resource which is not an AGR,

If ERCOT has approved verifiable Startup Costs and minimum-energy costs for the Resource,

Then: $DASUCAP_{p,q,r}$ = verifiable Startup Costs $_{q,r,s}$

$DAMECAP_{p,q,r,h}$ = verifiable minimum-energy costs $_{q,r,i}$

Otherwise: $DASUCAP_{p,q,r}$ = Resource Category Startup Offer Generic Cap (RCGSC)

$DAMECAP_{p,q,r,h}$ = Resource Category Minimum-Energy Generic Cap (RCGMEC)

For an AGR,

$$DAMGCOST_{q,p,r} = DASUPR_{q,p,r} + \sum_h (Min(DAMEO_{q,p,r,h}, DAMECAP_{p,q,r,h}) * DALSL_{q,p,r,h}) + \sum_h (DAAIEC_{q,p,r,h} * (DAESR_{q,p,r,h} - DALSL_{q,p,r,h}))$$

Where:

$$DASUPR_{q,p,r} = Min(DASUO_{q,p,r}, DASUCAP_{q,p,r})$$

If ERCOT has approved verifiable Startup Costs

Then: $DASUCAP_{q,p,r}$ = $Max_c(AGRRATIO_{q,p,r}) *$ verifiable Startup Costs $_{q,r}$

Where: $AGRRATIO_{q,p,r} = AGRMAXON_{q,p,r} / AGRTOT_{q,p,r}$

Otherwise: $DASUCAP_{q,p,r} = Max_c(AGGRATIO_{q,p,r}) * RCGSC$

For Combined Cycle Trains,

$$DAMGCOST_{q,p,r} = Min(DASUO_{q,p,r}, DASUCAP_{q,p,r}) + \sum_h (Min(DAMEO_{q,p,r,h}, DAMECAP_{q,p,r,h}) * DALSL_{q,p,r,h}) + (Max(0, Min(DASUO_{afterCCGR}, DASUCAP_{afterCCGR}) - Min(DASUO_{beforeCCGR},$$

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$DASUCAP_{beforeCCGR}))$ + $\sum_{h}$ ($DAAIEC_{q,p,r,h}$ * ($DAESR_{q,p,r,h}$ – $DALSL_{q,p,r,h}$))

(7) The Day-Ahead Make-Whole Revenue is calculated for each DAM-Committed Generation Resource as follows:

$DAEREV_{q,p,r,h}$ = (-1) * $DASPP_{p,h}$ * $DAESR_{q,p,r,h}$

$DAASREV_{q,r,h}$ = ((-1) * $MCPCRU_{DAM,h}$ * $PCRUR_{r,q,DAM,h}$)

+ ((-1) * $MCPCRD_{DAM,h}$ * $PCRDR_{r,q,DAM,h}$)

+ ((-1) * $MCPC\sout{R}\underline{EC}R_{DAM,h}$ * $PC\sout{RR}\underline{EC}RR_{r,q,DAM,h}$)

+ ((-1) * $MCPCNS_{DAM,h}$ * $PCNSR_{r,q,DAM,h}$)

+ ((-1) * $MCPC\sout{PF}RR\sout{S}_{DAM,h}$ * $PC\sout{NPF}RRR_{r,q,DAM,h}$)

The above variables are defined as follows:

Variable	Unit	Definition
$DAMWAMT_{q,p,r,h}$	$	*Day-Ahead Make-Whole Payment per QSE per Settlement Point per Resource 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.
$DAMGCOST_{q,p,r}$	$	*Day-Ahead Market Guaranteed Amount per QSE per Settlement Point per Resource*—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.
$DAEREV_{q,p,r,h}$	$	*Day-Ahead Energy Revenue per QSE per Settlement Point per Resource by 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.
$DAASREV_{q,r,h}$	$	*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 Market Clearing Price for Capacity (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.
$DASPP_{p,h}$	$/MWh	*Day-Ahead Settlement Point Price by Settlement Point by hour*—The DAM Settlement Point Price at Resource Node *p* for the hour *h*.
$DAESR_{q,p,r,h}$	MW	*Day-Ahead Energy Sale from Resource per QSE by Settlement Point per Resource by hour*—The amount of energy cleared through Three-Part Supply Offers in the DAM for Resource *r* at Resource Node *p* represented by QSE *q* for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.

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Variable	Unit	Definition
DASUPR $_{q, p, r}$	$/MWh	*Day-Ahead Startup Price per QSE per Settlement Point per Resource*—The derived Startup Price for an AGR *r* at Resource Node *p* represented by QSE *q*, for the first hour of the DAM-commitment period.
DASUCAP $_{q, p, r,}$	$/start	*Day-Ahead Startup Cap per QSE per Settlement Point per Resource*—The amount used for AGR *r* or Resource *r* as Startup Costs. The cap is the Resource Category Startup Offer Generic Cap (RCGSC) unless ERCOT has approved verifiable unit-specific Startup Costs for that Resource, in which case the startup cap is the scaled verifiable unit-specific Startup Cost for the AGR or the verifiable unit-specific Startup Cost for non-AGR Resources. See Section 5.6.1, Verifiable Costs, for more information on verifiable costs.
DAMECAP $_{p,q,r,h}$	$/MWh	*Day-Ahead Minimum-Energy Cap* —The amount used for Resource *r* for minimum-energy costs. The minimum cost is the Resource Category Minimum-Energy Generic Cap (RCGMEC) unless ERCOT has approved verifiable unit-specific minimum energy costs for that Resource, in which case the minimum energy cap is the verifiable unit-specific minimum energy cost. See Section 5.6.1 for more information on verifiable costs. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
RCGSC	$/Start	*Resource Category Generic Startup Cost*—The Resource Category Generic Startup Cost cap for the category of the Resource, according to Section 4.4.9.2.3, Startup Offer and Minimum-Energy Offer Generic Caps, for the Operating Day.
PCRUR $_{r, q, DAM, h}$	MW	*Procured Capacity for Reg-Up from Resource per Resource per QSE per hour in DAM*—The Regulation Up (Reg-Up) capacity quantity awarded to QSE *q* in the DAM for Resource *r* 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 $_{DAM, h}$	$/MW per hour	*Market Clearing Price for Capacity for Reg-Up per hour in DAM*—The DAM MCPC for Reg-Up for the hour *h*.
PCRDR $_{r, q, DAM, h}$	MW	*Procured Capacity for Reg-Down from Resource per Resource per QSE per hour in DAM*—The Regulation Down (Reg-Down) capacity quantity awarded to QSE *q* in the DAM for Resource *r* 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 $_{DAM, h}$	$/MW per hour	*Market Clearing Price for Capacity for Reg-Down per hour in DAM*—The DAM MCPC for Reg-Down for the hour *h*.
PC~~RR~~ECRR $_{r, q, DAM, h}$	MW	*Procured Capacity for ERCOT Contingency Reserve Service~~Responsive Reserve~~ from Resource per Resource per QSE per hour in DAM*—The ERCOT Contingency Reserve Service (ECRS)~~Responsive Reserve (RRS)~~ capacity quantity awarded to QSE *q* in the DAM for Resource *r* for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
MCPC~~R~~ECR $_{DAM, h}$	$/MW per hour	*Market Clearing Price for Capacity for ERCOT Contingency Reserve Service~~Responsive Reserve~~ per hour in DAM*—The DAM MCPC for ~~RRS~~ECRS for the hour *h*.
PCNSR $_{r, q, DAM, h}$	MW	*Procured Capacity for Non-Spin from Resource per Resource per QSE per hour in DAM*—The Non-Spinning Reserve (Non-Spin) capacity quantity awarded to QSE *q* in the DAM for Resource *r* for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.

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Variable	Unit	Definition
MCPCNS $_{DAM, h}$	$/MW per hour	*Market Clearing Price for Capacity for Non-Spin per hour in DAM*—The DAM MCPC for Non-Spin for the hour *h*.
PCP~~F~~FRRR $_{p, q, DAM, h}$	MW	*Procured Capacity for ~~Primary Frequency Response Service~~Responsive Reserve from Resource per Resource per QSE per hour in DAM*—The ~~Primary Frequency Response Service~~Responsive Reserve (~~PFRS~~RRS) capacity quantity awarded to QSE *q* in the DAM for Resource *r* for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
MCPCP~~F~~FRR $_{DAM, h}$	$/MW per hour	*Market Clearing Price for Capacity for ~~Primary Frequency Response Service~~Responsive Reserve per hour in DAM*—The DAM MCPC for ~~PFRS~~RRS for the hour *h*.
DASUO $_{q, p, r}$	$/start	*Day-Ahead Startup Offer per QSE per Settlement Point per Resource*—The Startup Offer included in the Three-Part Supply Offer submitted in the DAM associated with Resource *r* at Resource Node *p* represented by QSE *q*, for the first hour of the DAM-commitment period. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
AGRRATIO $_{q, p, r}$	none	*Aggregate Generation Resource Ratio per QSE per Settlement Point per Aggregate Generation Resource*—A value which represents the ratio of the maximum number of generators online in an hour, as indicated by telemetry, compared to the total number of generators registered to the AGR and used in the approved verifiable cost for the AGR. The value is only applicable if the Resource is an AGR.
AGRMAXON $_{q, p, r}$	none	*Aggregate Generation Resource Maximum Online per QSE per Settlement Point per Aggregate Generation Resource*—The maximum number of generators online during an hour, as indicated by telemetry. The value is only applicable if the Resource is an AGR.
AGRTOT $_{q, p, r}$	none	*Aggregate Generation Resource Total per QSE per Settlement Point per Aggregate Generation Resource*—The total number of generators registered to the AGR and used in the approved verifiable cost for the AGR. The value is only applicable if the Resource is an AGR.
DAMEO $_{q, p, r, h}$	$/MWh	*Day-Ahead Minimum-Energy Offer per QSE per Settlement Point per Resource per hour*—The Minimum-Energy Offer included in the Three-Part Supply Offer submitted in the DAM associated with Resource *r* at Resource Node *p* represented by QSE *q*, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
DALSL $_{q, p, r, h}$	MW	*Day-Ahead Low Sustained Limit per QSE per Settlement Point per Resource per hour*—The Low Sustained Limit (LSL) of Resource *r* at Resource Node *p* represented by QSE *q*, for the hour *h* as seen in the 1000 Day-Ahead snapshot. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
DAAIEC $_{q, p, r h}$	$/MWh	*Day-Ahead Average Incremental Energy Cost per QSE per Settlement Point per Resource per hour*—The average incremental energy cost, calculated according to the Energy Offer Curve capped by the generic energy price, for the output levels between the DAESR and the LSL of Resource *r* at Resource Node *p* represented by QSE *q*, for the hour *h*. Where for a Combined Cycle Train, the Resource *r* is a Combined Cycle Generation Resource within the Combined Cycle Train.
q	none	A QSE.

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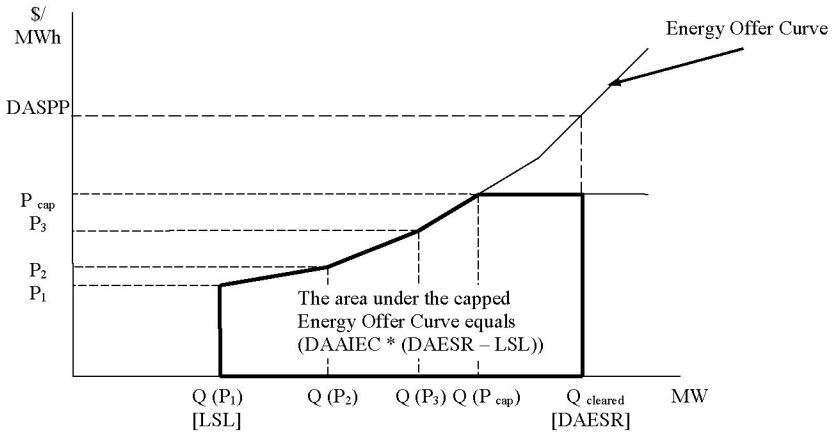
Variable	Unit	Definition
p	none	A Resource Node Settlement Point.
r	none	A DAM-committed Generation Resource.
h	none	An hour in the DAM-commitment period.
c	none	A contiguous block of DAM-committed hours.
afterCCGR	none	The Combined Cycle Generation Resource to which a Combined Cycle Train transitions.
beforeCCGR	none	The Combined Cycle Generation Resource from which a Combined Cycle Train transitions.

(8) The calculation of the Day-Ahead Average Incremental Energy Cost for each Resource for each hour is illustrated with the picture below, where P_{cap} is the Energy Offer Curve Cap. The method to calculate such cost is described in Section 4.6.5, Calculation of "Average Incremental Energy Cost" (AIEC).



(9) The total of the Day-Ahead Make-Whole Payments to each QSE for Generation Resources for a given hour is calculated as follows:

$$\mathbf{DAMWAMTQSETOT}_{q} = \sum_{p}\sum_{r}\mathbf{DAMWAMT}_{q,p,r}$$

The above variables are defined as follows:

Variable	Unit	Definition
DAMWAMTQSETOT $_q$	$	*Day-Ahead Make-Whole Payment QSE Total per QSE*—The total of the Day-Ahead Make-Whole Payments to QSE *q* for the DAM-committed Generation Resources represented by this QSE for the hour.
DAMWAMT $_{q, p, r}$	$	*Day-Ahead Make-Whole Payment per QSE per Settlement Point per Resource*—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

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Variable	Unit	Definition
		the hour. 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.
q	none	A QSE.
p	none	A Settlement Point.
r	none	A DAM-committed Generation Resource.

4.6.4.1.3 ~~Responsive~~ ERCOT Contingency Reserve Service Payment

(1) ERCOT shall pay each QSE whose Ancillary Service Offers to provide ERCOT Contingency ~~Responsive~~ Reserve Service (ECRS) to ERCOT were cleared in the DAM, for each hour as follows:

PC~~R~~ECRAMT $_q$ = (-1) * MCPCECR~~R~~ $_{DAM}$ * PCECR~~R~~ $_q$

Where:

PCECR~~R~~ $_q$ = $\sum_r$ PCECRR~~R~~ $_{r, q, DAM}$

The above variables are defined as follows:

Variable	Unit	Definition
PCECR~~R~~AMT $_q$	$	*Procured Capacity for ~~Responsive~~ ERCOT Contingency Reserve Service Amount per QSE in DAM*—The DAM ~~Responsive Reserve~~ECRS payment for QSE *q* for the hour.
PCECR~~R~~ $_q$	MW	*Procured Capacity for ~~Responsive~~ ERCOT Contingency Reserve Service per QSE in DAM*—The total ~~Responsive Reserve Service~~ECRS capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by this QSE for the hour.
PCECRR~~R~~ $_{r, q, DAM}$	MW	*Procured Capacity for ~~Responsive~~ ERCOT Contingency Reserve Service ~~from~~ Resource per Resource per QSE in DAM*—The ~~Responsive Reserve~~ECRS capacity quantity awarded to QSE *q* in the DAM 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.
MCPCECR~~R~~ $_{DAM}$	$/MW per hour	*Market Clearing Price for Capacity for ~~Responsive Reserve~~ERCOT Contingency Reserve Service in DAM*—The DAM MCPC for ~~Responsive Reserve~~ ECRS for the hour.
r	none	A Resource.
q	none	A QSE.

4.6.4.1.5 ~~Primary Frequency Response Service~~Responsive Reserve Payment

(1) ERCOT shall pay each QSE whose Ancillary Service Offers to provide ~~Primary Frequency Response Service~~Responsive Reserve (~~PFRS~~RRS) to ERCOT were cleared in the DAM, for each hour as follows:

PCPFRRAMT $_q$ = (-1) * MCPCPFRR $_{DAM}$ * PCPFRR $_q$

Where:

PCPFRR $_q$ = $\sum_r$ PCPFRRR $_{r, q, DAM}$

The above variables are defined as follows:

Variable	Unit	Definition
PCPFRRAMT $_q$	$	*Procured Capacity for ~~Primary Frequency Response~~ ~~Service~~Responsive Reserve Amount per QSE in DAM*—The DAM ~~Primary Frequency Response~~ ~~Service~~Responsive Reserve payment for QSE *q* for the hour.
PCPFRR $_q$	MW	*Procured Capacity for ~~Primary Frequency Response Service~~Responsive Reserve per QSE in DAM*—The total ~~Primary Frequency Response~~ ~~Service~~Responsive Reserve capacity quantity awarded to QSE *q* in the DAM for all the Resources represented by this QSE for the hour.
PCPFRRR $_{r, q, DAM}$	MW	*Procured Capacity for ~~Primary Frequency Response Service~~Responsive Reserve from Resource per Resource per QSE in DAM*—The ~~Primary Frequency Response Service~~Responsive Reserve capacity quantity awarded to QSE *q* in the DAM 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.
MCPCPFRR $_{DAM}$	$/MW per hour	*Market Clearing Price for Capacity for ~~Primary Frequency Response Service~~Responsive Reserve in DAM*—The DAM MCPC for ~~Primary Frequency Response~~ ~~Service~~Responsive Reserve~~three~~ for the hour.
r	none	A Resource.
q	none	A QSE.

4.6.4.2.3 ~~Responsive~~ ERCOT Contingency Reserve Service Charge

(1) Each QSE shall pay to ERCOT or be paid by ERCOT an ERCOT Contingency ~~Responsive~~ Reserve ~~(RRS)~~ Service (ECRS) charge for each hour as follows:

DA~~R~~ECRAMT $_q$ = DA~~R~~ECRPR * DAEC~~R~~RQ $_q$

Where:

DAEC~~R~~RPR = (-1) * PCEC~~R~~RAMTTOT / DA~~R~~ECRQTOT

PC~~R~~ECRAMTTOT = $\sum_q$ PC~~R~~ECRAMT $_q$

DA~~R~~ECRQTOT= $\sum_q$ DA~~R~~ECRQ $_q$

DA~~R~~ECRQ $_q$ = DA~~R~~ECRO $_q$ – DASA~~R~~ECRQ $_q$

The above variables are defined as follows:

Variable	Unit	Definition
DA~~R~~ECRAMT $_q$	$	*Day-Ahead ~~Responsive~~ ERCOT Contingency Reserve Amount per QSE*—QSE *q*'s share of the DAM cost for ~~RRS~~ECRS, for the hour.
DA~~R~~ECRPR	$/MW per hour	*Day-Ahead ~~Responsive~~ ERCOT Contingency Reserve Price*—The Day-Ahead ~~Responsive Reserve~~ECRS price for the hour.
DA~~R~~ECRQ $_q$	MW	*Day-Ahead ~~Responsive~~ ERCOT Contingency Reserve Quantity per QSE*—The QSE *q*'s Day-Ahead Ancillary Service Obligation minus its self-arranged ~~RRS~~ ECRS quantity for the hour.
PC~~R~~ECRAMTTOT	$	*Procured Capacity for ~~Responsive~~ ERCOT Contingency Reserve Amount Total in DAM*—The total of the DAM ~~RRS~~ ECRS payments for all QSEs for the hour.
PC~~R~~ECRAMT $_q$	$	*Procured Capacity for ~~Responsive~~ ERCOT Contingency Reserve Amount per QSE for DAM*—The DAM ~~RRS~~ ECRS payment for QSE *q* for the hour.
DA~~R~~ECRQTOT	MW	*Day-Ahead ~~Responsive~~ ERCOT Contingency Reserve Quantity Total*—The sum of every QSE's Day-Ahead Ancillary Service Obligation minus its self-arranged ~~RRS~~ ECRS quantity for the hour.
DA~~R~~ECRO $_q$	MW	*Day-Ahead ~~Responsive~~ ERCOT Contingency Reserve Obligation per QSE*—The ~~RRS~~ ECRS capacity obligation for QSE *q* for the DAM for the hour.
DASA~~R~~ECRQ $_q$	MW	*Day-Ahead Self-Arranged ~~Responsive~~ ERCOT Contingency Reserve Quantity per QSE*—The self-arranged ~~RRS~~ ECRS quantity submitted by QSE *q* before 1000 in the Day-Ahead.
q	none	A QSE.

4.6.4.2.5 ~~Primary Frequency Response Service~~Responsive Reserve Charge

(1) Each QSE shall pay to ERCOT or be paid by ERCOT a ~~PFRS~~RRS charge for each hour as follows:

DA~~PF~~RRAMT $_q$ = DA~~PF~~RRPR * DA~~PF~~RRQ $_q$

Where:

DA~~PF~~RRPR = (-1) * PC~~PF~~RRAMTTOT / DA~~PF~~RRQTOT

PC~~PF~~RRAMTTOT = $\sum_q$ PC~~PF~~RRAMT $_q$

DA~~PF~~RRQTOT = $\sum_q$ DA~~PF~~RRQ $_q$

DA~~PF~~RRQ $_q$ = DA~~PF~~RRO $_q$ – DASA~~PF~~RRQ $_q$

The above variables are defined as follows:

Variable	Unit	Definition
DA~~PF~~RRAMT $_q$	$	*Day-Ahead ~~Primary Frequency Response Service~~Responsive Reserve Amount per QSE*—QSE *q*'s share of the DAM cost for ~~PFRS~~RRS, for the hour.

Variable	Unit	Definition
DAPFRRPR	$/MW per hour	*Day-Ahead ~~Primary Frequency Response Service~~Responsive Reserve~~e~~ Price*—The Day-Ahead ~~PFRS~~RRS price for the hour.
DAPFRRQ $_q$	MW	*Day-Ahead ~~Primary Frequency Response Service~~Responsive Reserve~~e~~ Quantity per QSE*—The QSE *q*'s Day-Ahead Ancillary Service Obligation minus its self-arranged ~~PFRS~~RRS quantity for the hour.
PCPFRRAMTTOT	$	*Procured Capacity for ~~Primary Frequency Response Service~~Responsive Reserve~~e~~ Amount Total in DAM*—The total of the DAM ~~PFRS~~RRS payments for all QSEs for the hour.
PCPFRRAMT $_q$	$	*Procured Capacity for ~~Primary Frequency Response Service~~Responsive Reserve~~e~~ Amount per QSE for DAM*—The DAM ~~PFRS~~RRS payment for QSE *q* for the hour.
DAPFRRQTOT	MW	*Day-Ahead ~~Primary Frequency Response Service~~Responsive Reserve~~e~~ Quantity Total*—The sum of every QSE's Day-Ahead Ancillary Service Obligation minus its self-arranged ~~PFRS~~RRS quantity for the hour.
DAPFRRO $_q$	MW	*Day-Ahead ~~Primary Frequency Response Service~~Responsive Reserve~~e~~ Obligation per QSE*—The ~~PFRS~~RRS capacity obligation for QSE *q* for the DAM for the hour.
DASAPFRRQ $_q$	MW	*Day-Ahead Self-Arranged ~~Primary Frequency Response Service~~Responsive Reserve~~e~~ Quantity per QSE*—The self-arranged ~~PFRS~~RRS quantity submitted by QSE *q* before 1000 in the Day-Ahead.
q	none	A QSE.

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.

(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 (Reg-Up), Regulation Down (Reg-Down), ~~Responsive~~ ERCOT Contingency Reserve Service (~~R~~ECRS), ~~Frequency Response Service (FRS)~~Responsive Reserve (RRS) and Non-Spinning Reserve (Non-Spin) to control frequency and solve potential reliability issues.

(4) Under Emergency Conditions, as described in Section 6.5.9, Emergency Operations, ERCOT may implement manual procedures and must keep the Market Participants informed of the status of the system.

(5) 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.

(6) 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 Nodal Protocol Revision Requests.

NPRR Comments

6.4.9.2 Supplemental Ancillary Services Market

(1) During the Adjustment Period, ERCOT may procure additional Regulation-Up (Reg-Up), Regulation Down (Reg-Down), ERCOT Contingency Reserve Service (ECRS)~~Responsive Reserve (RRS)~~, ~~Primary Frequency Response Service~~Responsive Reserve (~~PFRS~~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.

NPRR Comments

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.

NPRR Comments

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

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)~~Responsive Reserve (RRS) service~~, and Non-Spinning Reserve (Non-Spin) service to ensure operational security. ~~Primary Frequency Response Service~~Responsive Reserve (~~PFRS~~RRS) shall be self-deployed in response to frequency deviations or as specified in ~~the~~Nodal Operating Guide~~s~~ 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.

(3) ERCOT may only issue Dispatch Instructions for the Real-Time operation of Transmission Facilities to a Transmission Service Provider (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:]

(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.

6.5.5.2 Operational Data Requirements

Commented [CP2]: Please note NPRR885 also proposes revisions to this section.

(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.

NPRR Comments

(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 ~~RRS~~ECRS, update the HSL as needed, to be consistent with Resource performance limitations of ~~RRS~~ECRS provision;

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

NPRR Comments

(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 ~~RRS~~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), ~~PFRS~~RRS, ~~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.

(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.

NPRR Comments

(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;

(d) LPC (in MW);

(e) MPC (in MW);

(f) Ancillary Service Schedule (in MW) for each quantity of ~~RRS~~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~~RRS, ECRS and Non-Spin for all Load Resources;

(h) The status of the high-set under-frequency relay, if required for qualification;

(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.

NPRR Comments

(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.

(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.

(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

NPRR Comments

(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.

[NPRR829 and NPRR889: Insert applicable portions of paragraph (12) below upon system implementation:]

(12) A QSE representing a Settlement Only Generator (SOG) that elects to include the net generation of the SOG in the estimate of Real-Time Liability (RTL) shall provide ERCOT Real-Time telemetry of the net generation of the SOG.

6.5.7.2 Resource Limit Calculator

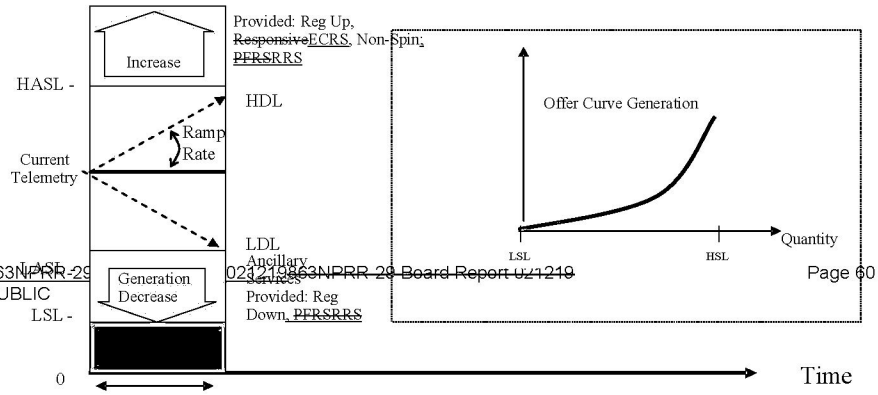
Commented [CP3]: Please note NPRR920 also proposes revisions to this section.

(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:

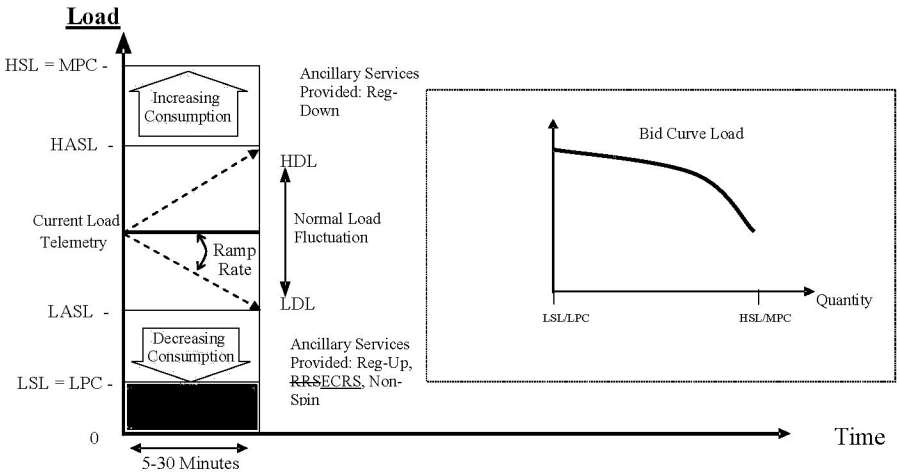
Generation Resources:

Generation



NPRR Comments

Load Resources:



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

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

Variable	Description
HASL	High Ancillary Service Limit.
HSLTELEM	High Sustained Limit provided via telemetry – per Section 6.5.5.2. ***[NPRR879: Replace the description above with the following upon system implementation:]*** For IRRs carrying Ancillary Service Resource Responsibilities and all IRRs within an IRR Group where any IRR within the IRR Group is carrying an Ancillary Service Resource Responsibility, 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.
LASL	Low Ancillary Service Limit.
~~R~~ECRSTELEM	~~R~~ECRS~~esponsive Reserve~~ 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.

NPRR Comments

~~PFRS~~RRSTELEM	~~PFRS~~RRS Ancillary Service Schedule provided via telemetry.
NFRCTELEM	NFRC currently available (unloaded) and included in the HSL of the Generation Resource with non-zero ECRS~~Responsive Reserve~~ 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 – (RUSTELEM * REGP / 5)

Variable	Description
SURAMP	SCED Up Ramp Rate.
RAMPRATE	Normal Ramp Rate up, as telemetered by the QSE, when ~~RRS~~ECRS is not deployed or when the subject Resource is not providing ~~RRS~~ECRS. Emergency Ramp Rate up, as telemetered by the QSE, for Resources deploying ~~RRS~~ECRS.
RUSTELEM	Reg-Up Ancillary Service Resource Responsibility designation provided by telemetry.
REGP	Percentage of Regulation Service for which ramp rate will be reserved in Real-Time. The value will be between one and zero. Market Participants will be notified of the change in this value.

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

SDRAMP = NORMRAMP – (RDSTELEM * REGP / 5)

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.
REGP	Percentage of Regulation Service for which ramp rate will be reserved in Real-Time. The value will be between one and zero. Market Participants will be notified of the change in this value.

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

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

NPRR Comments

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:

NPRR Comments

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

Variable	Description
LASL	Low Ancillary Service Limit.
HASL	High Ancillary Service Limit.
LPCTELEM	Low Power Consumption provided via telemetry.
ECR~~R~~RSTELEM	ECRS~~Responsive Reserve~~ Ancillary Service Schedule provided by telemetry.
RRSTELEM	Responsive Reserve 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 – (RUSTELEM * REGP / 5)

Variable	Description
SURAMP	SCED Up Ramp Rate.
RAMPRATE	Normal Ramp Rate up, as telemetered by the QSE, when ~~RRS~~ECRS is not deployed or when the subject Load Resource is not providing ~~RRS~~ECRS. Emergency Ramp Rate up, as telemetered by the QSE, for Load Resources deploying ~~RRS~~ECRS.
RUSTELEM	Reg-Up Ancillary Service Resource Responsibility designation provided by telemetry.
REGP	Percentage of Regulation Service for which ramp rate will be reserved in Real-Time. The value will be between one and zero. Market Participants will be notified of the change in this value.

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

SDRAMP = NORMRAMP – (RDSTELEM * REGP / 5)

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.
REGP	Percentage of Regulation Service for which ramp rate will be reserved in Real-Time. The value will be between one and zero. Market Participants will be notified of the change in this value.

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

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

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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.

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 MIS Public Area, giving updates of calculations every five minutes, which show the Real-Time total system amount of:

(a) ~~FRS~~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 ~~FRS~~RRS from:

(i) Generation Resources;

(ii) Load Resources excluding Controllable Load Resources;

(iii) Controllable Load Resources; and

(iv) Resources capable of FFR;

(c~~a~~) ~~RRS~~ECRS capacity from:

(i) Generation Resources;

NPRR Comments

(ii) Load Resources excluding Controllable Load Resources; ~~and~~

(iii) Controllable Load Resources; and

(iv) Quick Start Generation Resources (QSGRs); ~~and~~

~~(v) Resources capable of Fast Frequency Response (FFR);~~

(d~~b~~) Ancillary Service Resource Responsibility for ~~RRS~~ECRS from:

(i) Generation Resources;

(ii) Load Resources excluding Controllable Load Resources; and

(iii) Controllable Load Resources; and

(iv) QSGRs; ~~and~~

~~(v) Resources capable of FFR;~~

(c~~c~~) ~~RRS~~ECRS deployed to Generation and ~~Controllable~~ Load Resources;

(f~~d~~) 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~~e~~) 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 ~~Quick Start Generation Resources (~~QSGRs~~)~~; and

(v) QSGRs;

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

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

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

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(k~~i~~) 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 ~~RRS~~ECRS from Load Resources and the Net Power Consumption minus the Low Power Consumption from Load Resources with a validated Real-Time ~~RRS~~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~~j~~) Aggregate telemetered HSL capacity for Resources with a telemetered Resource Status of EMR;

(m~~k~~) Aggregate telemetered HSL capacity for Resources with a telemetered Resource Status of OUT;

(n~~l~~) Aggregate net telemetered consumption for Resources with a telemetered Resource Status of OUTL; and

(o~~m~~) The ERCOT-wide PRC calculated as follows:

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$$PRC_1 = \sum_{\substack{i=\text{online generation resource}}}^{\substack{\text{All online generation resources}}} \text{Min(Max((RDF*(HSL-NFRC) – Actual Net Telemetered Output)}_i\text{ , 0.0) , 0.2*RDF*(HSL-NFRC)}_i\text{),}$$

where the included On-Line Generation Resources do not include WGRs, nuclear Generation Resources, ~~Resources without a PFRS Ancillary Service Responsibility,~~ or Generation Resources with an output less than or equal to 95% of telemetered LSL or with a telemetered status of ONTEST, STARTUP, or SHUTDOWN.

$$PRC_2 = \sum_{i=\text{online WGR}}^{\text{All online WGRs}} \text{Min(Max((RDF}_W\text{*HSL – Actual Net Telemetered Output)}_i\text{ , 0.0) , 0.2*RDF}_W\text{*HSL}_i\text{),}$$

where the included On-Line WGRs only include WGRs that ~~with PFRS Ancillary Service Responsibility,~~are Primary Frequency Response capable~~are Primary Frequency Response capable~~.

$$PRC_3 = \sum_{i=\text{online generation resource}}^{\text{All online generation resources}} \text{((}\sout{\text{Hydro-s}}\text{Synchronous condenser output)}_i \text{ as qualified by item (8) of Operating Guide Section 2.3.1.2, Additional Operational Details for }\sout{\text{Frequency-}}\text{Responsive Reserve}\sout{\text{Service}}\text{ and ERCOT Contingency Reserve Service}\sout{\text{Responsive Reserve}}\text{ Providers))}$$

$$PRC_4 = \sum_{i=\text{online load resource}}^{\text{All online load resources}} \text{(Min(Max(Actual Net Telemetered Consumption – LPC), 0.0), }\sout{\text{RRS}}\text{ECRS and RRS Ancillary Service Resource Responsibility * 1.5) from all Load Resources controlled by high-set under frequency relays carrying an }\sout{\text{RRS}}\text{ECRS and/or RRS Ancillary Service Resource Responsibility)}_i$$

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$$PRC_5 = \sum_{i=\text{online load resource}}^{\text{All online load resources}} \text{Min}(\text{Max}((\text{LRDF\_1} * \text{Actual Net Telemetered Consumption} - \text{LPC})_i, 0.0), (0.2 * \text{LRDF\_1} * \text{Actual Net Telemetered Consumption}))$$

from all Controllable Load Resources active in SCED and carrying Ancillary Service Resource Responsibility

$$PRC_6 = \sum_{i=\text{online load resource}}^{\text{All online load resources}} \text{Min}(\text{Max}((\text{LRDF\_2} * \text{Actual Net Telemetered Consumption} - \text{LPC})_i, 0.0), (0.2 * \text{LRDF\_2} * \text{Actual Net Telemetered Consumption}))$$

from all Controllable Load Resources active in SCED and not carrying Ancillary Service Resource Responsibility

$$\underline{PRC_7 = \sum_{i=\text{online load}\underline{FFR}\text{ resource}}^{\text{All online load}\underline{FFR}\text{ resources}} (\text{Capacity from Resources capable of providing FFR} ~~\text{FRS MW supplied from Resources capable of providing FFR}~~)_i}$$

$$PRC = PRC_1 + PRC_2 + PRC_3 + PRC_4 + PRC_5 + PRC_6 \underline{+ PRC_7}$$

The above variables are defined as follows:

Variable	Unit	Description
PRC_1	MW	Generation On-Line greater than 0 MW ~~with a PFRS Ancillary Service Resource Responsibility~~
PRC_2	MW	WGRs On-Line greater than 0 MW ~~with a PFRS Ancillary Service Resource Responsibility~~
PRC_3	MW	~~Hydro s~~Synchronous condenser output
PRC_4	MW	Capacity from Load Resources ~~controlled by high set under frequency relays~~ carrying ~~RRS~~ECRS Ancillary Service Resource Responsibility
PRC_5	MW	Capacity from Controllable Load Resources active in SCED and carrying Ancillary Service Resource Responsibility
PRC_6	MW	Capacity from Controllable Load Resources active in SCED and not carrying Ancillary Service Resource Responsibility
$\underline{PRC_7}$	MW	Capacity from Resources capable of providing FFR
PRC	MW	Physical Responsive Capability
RDF		The currently approved Reserve Discount Factor
RDF_W		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

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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 MIS Public Area no later than three Business Days after approval.

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, ~~Frequency Response Service (FRS)~~Responsive Reserve (RRS), and ERCOT Contingency Response ~~RRS s~~Service (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

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SCADA to determine available Resource capacity providing Regulation Service, ~~FRS~~RRS, and ECRS~~RRS services~~.

(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 ~~FRS~~RRS or ECRS~~RRS~~. 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.

(6) If all Reg-Up capacity has been deployed, ERCOT shall use the LFC system to deploy ~~Responsive Reserve~~ECRS on Generation Resources and Controllable Load Resources. Such ~~Responsive Reserve~~ECRS deployments by ERCOT must be deployed as specified in Section ~~6.5.7.6.2.2, Deployment of Responsive Reserve Service~~6.5.7.6.2.3, 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 ~~Responsive Reserve~~~~FRS~~RRS or ECRS ~~Service~~, the QSE shall deploy units consistent with the performance criteria ~~for RRS service~~ in Sections 8.1.1.3.2, ~~Responsive~~ ERCOT Contingency Reserve Service Capacity Monitoring Criteria, Section 8.1.1.3.4, ~~Frequency Response Service~~Responsive Reserve Capacity Monitoring Criteria, ~~and~~ 8.1.1.4.2, ~~Responsive~~ ERCOT Contingency Reserve Service Energy Deployment Criteria, and 8.1.1.4.4, ~~Frequency Response Service~~Responsive Reserve Energy Deployment Criteria.

(8) The inputs for LFC include:

(a) Actual system frequency;

(b) Scheduled system frequency;

(c) Capacity available for Regulation by QSE;

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(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~~ ~~FRS~~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.

6.5.7.6.2 LFC Deployment

(1) ERCOT may deploy Regulation Service, ~~Responsive Reserve~~ ~~FRS~~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.

6.5.7.6.2.2 Deployment of Responsive Reserve ~~Responsive Frequency Reserve Response Service (FRS~~RRS)

(1) ~~FR~~RRS is intended to:

(a) Help restore the frequency within the first few seconds of a significant frequency deviation of the interconnected transmission system~~within the first few seconds of a significant frequency deviation of the interconnected transmission system~~following significant depletion of PFRS; and

(b) Provide energy during the implementation of an EEA.; ~~and~~

~~(c) Provide backup Reg-Up.~~

(2) ERCOT shall deploy R~~FR~~RS 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 providing~~following significant depletion of ~~Primary Frequency Response~~PFRS ~~as a result of a significant frequency~~

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~~deviation;FRS~~RRS energy deployment by automatic Governor response as a result of frequency deviation;

(b) Through use of an automatic Dispatch Instruction signal to deploy ~~RFRS~~RRS capacity from Generation Resources providing Primary Frequency Response or ~~deploy RFRS capacity from~~ Controllable Load Resources providing Primary Frequency Response ~~during EEA~~;

(c) By Dispatch Instructions for deployment of RF~~F~~RRS energy from a Load Resource, excluding Controllable Load Resources, by an electronic Messaging System; and

(d) RF~~F~~RRS energy deployment by automatic action of high-set under-frequency relays as a result of a significant frequency deviation.

(3) ERCOT shall deploy RF~~F~~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 RF~~F~~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 RF~~F~~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 RF~~F~~RRS Resources may also be deployed by ERCOT under Section 6.5.9, Emergency Operations.

(6) ERCOT shall allocate the deployment of RF~~F~~RRS proportionally among QSEs that provide RF~~F~~RRS using Resources that are not on high-set under-frequency relays.

(7) ERCOT shall use the SCED, ~~RRS~~ECRS, and Non-Spin as soon as practicable to minimize the prolonged use of ~~F~~FRRS energy.

(8) Once ~~F~~FRRS is deployed, the QSE's obligation to deliver ~~F~~FRRS remains in effect until specifically instructed by ERCOT to stop providing ~~F~~FRRS. However, except in an Emergency Condition, the QSE's obligation to deliver ~~F~~FRRS may not exceed the period for which the service was committed.

(9) Following the deployment or recall of a deployment by Dispatch Instruction of ~~F~~FRRS, QSE shall adjust the telemetered ~~F~~FRRS 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 ~~RFRS~~RRS as described in Section 6.5.7.2, Resource Limit Calculator, to account for such deployment.

(10) QSEs providing ~~F~~FRRS and ERCOT shall meet the deployment performance requirements specified in Section 8, Performance Monitoring.

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(11) For ~~FRS~~RRS deployment that is not automatic in response to frequency deviation, ERCOT shall issue R~~F~~RRS deployment Dispatch Instructions over ICCP for Generation Resources and Controllable Load Resources and Extensible Markup Language (XML) for all other Load Resources. Those Dispatch Instructions must contain the MW output requested. For Generation Resources and Controllable Load Resources from which ~~F~~RR~~R~~RS capacity was deployed, ERCOT shall use SCED to dispatch ~~F~~RR~~R~~RS energy. The Base Points for those Resources includes ~~F~~RR~~R~~RS 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) The amount of RRSECRS that a QSE can self-arrange using a Load Resource that is not a Controllable Load Resource is limited to the percentage amount of total RRSECRS that the Load Resource can provide as specified by ERCOT. However, a QSE may offer additional Load Resources into the ERCOT RRSECRS Ancillary Service market.~~

~~**6.5.7.6.2.4 Deployment of Primary Frequency Response Service**~~

~~(1) PFRS is intended to:~~

~~(a) Arrest frequency decay within the first few seconds of a significant frequency deviation on the ERCOT Transmission Grid using Primary Frequency Response and interruptible Load; and~~

~~(b) After the first few seconds of a significant frequency deviation, help restore frequency to its scheduled value to return the system to normal.~~

~~(2) PFRS shall be automatically self-deployed in an amount proportional to the increase or decrease in frequency deviation. The response shall be in the direction that stabilizes frequency.~~

(14~~3~~) ~~PFRS~~RRS provided from a Generation Resource shall be responsive to frequency deviations as defined in Section 8.5.1.1, Governor in Service~~greater than 60.0167 Hz and less than 59.983 Hz~~. Generation Resources providing ~~PFRS~~RRS must have a Governor droop setting that is not greater than ~~worse than~~ 5.0%~~. and no better than 3.0%.~~

(15~~4~~) ~~PFRS~~RRS provided from a Resource capable of FFR shall self-deploy their obligated response within 15~~30~~ cycles after frequency drops below 59.85~~983~~ Hz and must continue to provide a ~~proportional~~ response until the frequency increases above that level. Resources which require recharging may do so once the frequency increases above 59.990 Hz.

NPRR Comments

(16) ~~FRS~~RRS provided by interruptible Load shall have automatic under-frequency relay setting set at no lower than 59.70 Hz

(17) ERCOT shall deploy ~~FRS~~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) ~~FRS~~RRS energy deployment during an EEA;

(b) By Dispatch Instructions for deployment of ~~FRS~~RRS energy from a Load Resource, excluding Controllable Load Resources, by an electronic Messaging System; and

(c) ~~FRS~~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 *Deployment and Recall of ERCOT Contingency Reserve Service~~Responsive Reserve Service~~*

(1) EC~~R~~RS 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 ~~or prior to~~ the implementation of an EEA; and

(c) Provide backup to Reg-Up.

(2) ERCOT shall deploy ~~RRS~~ECRS to meet NERC Standards and other performance criteria as specified in these Protocols and the Operating Guides, by one or more of the following:

(a) Automatic Dispatch Instruction signal to release ~~RRS~~ECRS capacity from Generation Resources and Controllable Load Resources to SCED; and/or

(b) Dispatch Instruction for deployment of Load Resources energy via electronic Messaging System.

(3) ERCOT shall ~~deploy~~release ~~RRS~~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 ~~RRS~~ECRS from a QSGR providing ~~RRS~~ECRS, the Resource's Ancillary Service Schedule for ~~RRS~~ECRS must be adjusted for the ERCOT instructed ~~RRS~~ECRS deployment and the Resource's status must be set to OFFQS to be available for dispatch by SCED. Once recalled

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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 ~~RRS~~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 ~~RRS~~ECRS reserves.

(6) Following an ~~RRS~~ECRS deployment, the QSE's obligation to deliver ~~RRS~~ECRS remains in effect until ERCOT issues a recall instruction or its ~~RRS~~ECRS obligation expires, whichever occurs first.

(7) Following a deployment or recall Dispatch Instruction of ~~RRS~~ECRS, a QSE shall adjust the telemetered ~~RRS~~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 ~~RRS~~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 ~~RRS~~ECRS, Base Points include ~~RRS~~ECRS energy as well as any other energy dispatched by SCED. A Resource must be able to be fully dispatched by SCED to its ~~RRS~~ECRS Ancillary Service Resource Responsibility within the ten-minute time frame according to its telemetered Emergency Ramp Rate.

(9) Each QSE providing ~~RRS~~ECRS shall meet the deployment performance requirements specified in Section 8.1.1.4.2, ERCOT Contingency Reserve Service~~Responsive Reserve Service~~ Energy Deployment Criteria.

(10) ERCOT shall issue instructions to release ~~RRS~~ECRS capacity provided from Generation Resources and Controllable Load Resources to SCED over ICCP, and shall issue deployment instructions for Load Resources providing ~~RRS~~ECRS via Extensible Markup Language (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 ~~RRS~~ECRS capacity once system frequency recovers above 59.97 Hz.

(13) ERCOT shall recall ~~RRS~~ECRS deployment provided from Load Resource that is not a Controllable Load Resource once PRC is above a pre-defined threshold, as described in the Operating Guides.

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6.5.7.6.2.~~43~~ 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 FRS~~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) Controllable Load Resources 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."

(5) 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:

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(a) Quick Start Generation Resources (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.

(6) 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.

(7) 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.

(8) 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.

(9) 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.

(10) ERCOT may deploy Non-Spin at any time in a Settlement Interval.

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(11) 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.

(12) 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.

(13) 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.

(14) ERCOT shall provide a notification to all QSEs via the MIS Public Area when any Non-Spin capacity is deployed on the ERCOT System showing the time, MW quantity and the anticipated duration of the deployment.

6.5.9.3.3 Watch

(1) A Watch is the third of four 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;

(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;

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(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 (3) 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) ~~Frequency Response Service (FRS)~~Responsive Reserve (RRS);

(b) Regulation Services;

(c~~b~~) ~~RRS~~ECRS services; and

(d~~c~~) 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.

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(5) ERCOT shall post the Watch message electronically to the MIS Public Area and shall provide verbal notice to all TSPs and QSEs via the 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:]

(5) ERCOT shall post the Watch message electronically to the MIS Public Area and shall provide verbal notice to all TSPs and QSEs via the 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.

6.5.9.4 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

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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 ~~RRSFRS~~RRS, ECRS, other Ancillary Services, and Emergency Response Service (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 all QSEs, and coordinating the implementation of the EEA levels while maintaining transmission security limits.

[NPRR857: Replace paragraph (4) above with the following upon system implementation:]

(4) ERCOT is responsible for coordinating with QSEs, DCTOs, TSPs, and DSPs to monitor ERCOT System conditions, initiating the EEA levels, notifying all QSEs, 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 Block Load Transfers (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.

(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

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~~ECRS~~~~Responsive Reserve~~Physical Responsive Capability (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 ~~RRSFRS~~RRS, ECRS and Non-Spin services as required; and

(e) ERCOT shall use the PRC and system frequency to determine the appropriate Emergency Notice and EEA levels.

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) At ERCOT's discretion, deploy available contracted ERS-30 via an XML message followed by a VDI to the all-QSE Hotline. The ERS-30 ramp period shall begin at the completion of the VDI.

(A) If less than 500 MW of ERS-30 is available for deployment, ERCOT shall deploy it as a single block.

(B) If the amount of ERS-30 available for deployment equals or exceeds 500 MW, ERCOT, at its discretion, may deploy ERS-30 as a single block or by group designation. ERCOT shall develop a random selection methodology for determining how to place ERS Resources in ERS-30 into groups, and shall describe the

methodology in a document posted to the MIS Public Area. Prior to the start of an ERS Contract Period for ERS-30, ERCOT shall notify QSEs representing ERS Resources in ERS-30 of their ERS Resources' group assignments.

(C) ERS-30 may be deployed at any time in a Settlement Interval.

(D) Upon deployment, QSEs shall instruct their ERS Resources in 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-30 deployment or the ERS-30 Resources have reached their maximum deployment time.

(E) ERCOT shall notify QSEs of the release of ERS-30 via an XML message followed by VDI to the all-QSE Hotline. The VDI shall represent the official notice of ERS-30 release. ERCOT may release ERS-30 as a block or by group designation.

(F) Upon release, an ERS Resource in ERS-30 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.

(b) QSEs shall:

(i) Ensure COPs and telemetered HSLs are updated and reflect all Resource delays and limitations; and

(ii) Suspend any ongoing ERCOT required Resource performing testing.

(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 1,375 MW:

(i) Instruct TSPs and DSPs or their agents to reduce Customer Load by using distribution voltage reduction measures, if deemed beneficial by the TSP, DSP, or their agents.

(ii) Instruct TSPs and DSPs to implement any available Load management plans to reduce Customer Load.

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(iii) Instruct QSEs to deploy available contracted ERS-10 Resources, undeployed ERS-30, and/or deploy ECRS or RFRRS (controlled by high-set under-frequency relays) supplied from Load Resources ~~(controlled by high-set under-frequency relays)~~. ERCOT may deploy ERS-10, ERS-30, ECRS or RFRRS simultaneously or separately, and in any order. ERCOT shall issue such Dispatch Instructions in accordance with the deployment methodologies described in paragraphs (iv) and (v) below and, if deploying ERS-30, the methodologies described in paragraph (1)(a)(iv) above.

(iv) ERCOT shall deploy ERS-10 via an XML message followed by a VDI to the all-QSE Hotline. The ERS-10 ramp period shall begin at the completion of the VDI.

(A) If less than 500 MW of ERS-10 is available for deployment, ERCOT shall deploy all ERS-10 Resources as a single block.

(B) If the amount of ERS-10 available for deployment equals or exceeds 500 MW, ERCOT, at its discretion, may deploy ERS-10 Resources as a single block or by group designation. ERCOT shall develop a random selection methodology for determining how to place ERS-10 Resources into groups, and shall describe the methodology in a document posted to the MIS Public Area. Prior to the start of an ERS-10 Contract Period, ERCOT shall notify QSEs representing ERS-10 Resources of their ERS-10 Resources' group assignments.

(C) ERS-10 may be deployed at any time in a Settlement Interval.

(D) Upon deployment, QSEs shall instruct ERS-10 Resources to perform at contracted levels consistent with the criteria described in Section 8.1.3.1.4 until ERCOT releases the ERS-10 deployment or the ERS-10 Resources have reached their maximum deployment times.

(E) ERCOT shall notify QSEs of the release of ERS-10 via an XML message followed by VDI to the all-QSE Hotline. The VDI shall represent the official notice of ERS-10 release. ERCOT may release ERS-10 as a block or by group designation.

(F) Upon release, an ERS-10 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.

(v) 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 RFRRS capacity supplied by Load Resources ~~(controlled by high-set under-frequency relays)~~ (controlled by high set

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under-frequency relays), QSGRs, and Resources capable of FFR in accordance with the following:

(A) Instruct QSEs to deploy half of the ECRS and RFRRS and all of the ECRS that is supplied from Load Resources (controlled by high-set under-frequency relays)(controlled by high set under-frequency relays), QSGRs, and Resources capable of FFR by instructing the QSE representing the specific Load ResourceLoad Resources to interrupt Group 1 LoadLoad Resources providing Responsive ReserveECRS and RFRRS. QSEs shall deploy Load Load Resources according to the group designation and will be given some discretion to deploy additional Load Load Resources from Group 2 if Load Load Resource operational considerations require such. Load Resources providing ECRS that are not controlled by high-set under-frequency relays shall be deployed prior to Group 1 deployment. ERCOT shall issue notification of the deployment via XML message for Load Resources, and shall issue notification via telemetry for QSGRs and Resources capable of FFR. ERCOT shall follow this XMLXML notification with a Hotline VDI, which shall initiate the ten-minute deployment period;

(B) At the discretion of the ERCOT Operator, instruct QSEs to deploy the remaining Responsive ReserveFRSRRS that is supplied from Load Resources (controlled by high-set under-frequency relays) (controlled by high set under-frequency relays), QSGRs, and Resources capable of FFR, by instructing the QSE representing the specific Load Load Resource to interrupt Group 2 Load Load Resources providing Responsive ReserveRFRRS. ERCOT shall issue notification of the deployment via XML message for Load Resources, and shall issue notification via telemetry for QSGRs and Resources capable of FFR. ERCOT shall follow this XML XML notification with a 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 both of the groups of Load Resources, QSGRs, and Resources capable of FFR providing Responsive ReservesRFRRS and ECRS at the same time. ERCOT shall issue notification of the deployment via XML message for Load Resources, and shall issue notification via telemetry for QSGRs and Resources capable of FFR.. ERCOT shall follow this XML XML notification with a Hotline VDI, which shall initiate the ten-minute deployment period; and

(D) ERCOT shall post a list of Load Resources, QSGRs, and Resources capable of FFR on the MIS Certified Area immediately

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following the DRUC for each QSE with a ~~Load~~ Load Resource obligation which may be deployed to interrupt under paragraph (A), Group 1 and paragraph (B), Group 2. ERCOT shall develop a process for determining which individual ~~Load~~ Load Resource to place in Group 1 and which to place in Group 2. ERCOT procedures shall select Group 1 and Group 2 based on a random sampling of individual ~~Load~~ Load Resources. At ERCOT's discretion, ERCOT may deploy all ~~RFRRS or ECRS provided by~~ Load Resources~~, QSGRs, and Resources capable of FFR~~ at any given time during EEA Level 2.

(vi) Unless a media appeal is already in effect, ERCOT shall issue an appeal through the public news media for voluntary energy conservation; and

(vii) With the approval of the affected non-ERCOT Control Area, TSPs, DSPs, or their agents may implement 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 1,375 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) 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 TSPs and DSPs or their agents 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.

(b) In addition to measures associated with EEA Levels 1 and 2, TSPs and DSPs or their agents will keep in mind the need to protect the safety and health of the community and the essential human needs of the citizens. Whenever possible, TSPs and DSPs or their agents shall not manually drop Load connected to under-frequency relays during the implementation of the EEA.

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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~~ ~~FRS~~RRS ~~and ECRS~~, ERCOT shall release ERS Resources and then restore curtailed DC Tie Load. Intermittent solutions of SCED do not set new LMPs until ERCOT declares that the EEA is no longer needed.

6.6.5.1 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 Low Sustained Limit (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:

$$AABP_{q,r,p,i} = AVGBP_{q,r,p,i} + AVGREG_{q,r,p,i} \text{ ~~+ AVGPFRS}_{q,r,p,i}$$

Where:

$$AVGBP_{q,r,p,i} = \sum_{y} (AVGBP5M_{q,r,p,i,y}) / 3$$

$$AVGREG_{q,r,p,i} = \sum_{y} (AVGREG5M_{q,r,p,i,y}) / 3$$

~~$$AVGPFRS_{q,r,p,i} = \sum_{y} (AVGPFRS5M_{q,r,p,i,y}) / 3$$~~

Field Code Changed

~~Where:~~

$$AVGREG5M_{q,r,p,i,y} = (AVGREGUP5M_{q,r,p,i,y} - AVGREGDN5M_{q,r,p,i,y})$$

The above variables are defined as follows:

Variable	Unit	Definition

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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 (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 (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*.

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Variable	Unit	Definition
~~AVGFRS$_{q,r,p,i}$~~	~~MW~~	~~*Average Frequency Response Service self-deployed per QSE per Settlement Point per Resource* – The average of the five-minute clock interval *y* Frequency Response Service self-deployed by the Generation Resource, or Controllable Load Resource, or Resource capable of Fast Frequency Response (FFR) *r* represented by QSE *q* at Settlement Point *p* should have produced over the 15-minute Settlement Interval *i*.~~
~~AVGPFRS5M$_{q,r,p,i,y}$~~	~~MW~~	~~*Total Average five-minute clock interval Primary Frequency Response Service self-deployed per QSE per Settlement Point per Resource* – The total amount of Primary Frequency Response Service (PFRS) that the Generation Resource, or Controllable Load Resource, or Resource capable of Fast Frequency Response (FFR) *r* represented by QSE *q* at Settlement Point *p* should have produced based on ERCOT estimated Primary Frequency Response projections based on the Resource's approved droop performance 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.

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 ~~Responsive Reserve (RRS)~~ERCOT Contingency Reserve Service (ECRS) was deployed or ~~Frequency Response Service (FRS)~~Responsive Reserve (RRS) was manually ~~is~~ deployed by ERCOT.

NPRR Comments

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 (Reg-Up), if applicable:

$$RTPCRUAMT_{q,m} = (-1) * MCPCRU_{m} * RTPCRU_{q,m}$$

Where:

$$RTPCRU_{q,m} = \sum_{r} PCRUR_{q,r,m}$$

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 (Reg-Down), if applicable:

$$RTPCRDAMT_{q,m} = (-1) * MCPCRD_{m} * RTPCRD_{q,m}$$

Where:

$$RTPCRD_{q,m} = \sum_{r} PCRDR_{r,q,m}$$

The above variables are defined as follows:

NPRR Comments

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 ERCOT Contingency Reserve Service (ECRS)~~Responsive Reserve (RRS)~~, if applicable:

RTPCECR~~R~~AMT $_{q, m}$ = (-1) * MCPC~~R~~ECR $_{m}$ * RTPC~~R~~ECR $_{q, m}$

Where:

RTPCECR~~R~~ $_{q, m}$ = $\sum_{r}$ PC~~R~~ECRR $_{q, r, m}$

The above variables are defined as follows:

Variable	Unit	Description
RTPC~~R~~ECR~~R~~AMT $_{q, m}$	$	*Procured Capacity for ERCOT Contingency Reserve Service~~Responsive Reserve~~ Amount by QSE by market*—The payment to QSE *q* for the Ancillary Service Offer cleared in the market *m* to provide ECRRS, for the hour.
MCPC~~R~~ECR $_{m}$	$/MW per hour	*Market Clearing Price for Capacity for ERCOT Contingency Reserve Service~~Responsive Reserve~~ by market*—The MCPC for ECRRS from the market *m*, for the hour.
RTPC~~R~~ECR $_{q, m}$	MW	*Procured Capacity for ERCOT Contingency Reserve Service~~Responsive Reserve~~ by QSE by market*—The portion of QSE *q* Ancillary Service Offers cleared in the market *m* to provide ECRRS, for the hour.
PC~~R~~ECRR $_{q, r, m}$	MW	*Procured Capacity for ERCOT Contingency Reserve Service~~Responsive Reserve~~ from Resource per Resource per QSE by market*—The ECRRS 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.

NPRR Comments

(d) For Non-Spinning Reserve (Non-Spin), if applicable:

$$RTPCNSAMT_{q,m} = (-1) * MCPCNS_{m} * RTPCNS_{q,m}$$

Where:

$$RTPCNS_{q,m} = \sum_{r} PCNSR_{q,r,m}$$

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 ~~Primary Frequency Response Service~~Responsive Reserve (~~PFRS~~RRS), if applicable:

$$RTPC\text{~~PF~~}RRS\text{~~S~~}AMT_{q,m} = (-1) * MCPC\text{~~PF~~}RRS\text{~~S~~}_{m} * RTPC\text{~~PF~~}RRS\text{~~S~~}_{q,m}$$

Where:

$$RTPC\text{~~PF~~}RRS\text{~~S~~}_{q,m} = \sum_{r} PC\text{~~RPF~~}RRS\text{~~S~~}_{q,r,m}$$

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The above variables are defined as follows:

Variable	Unit	Description
$RTPC\text{~~PF~~}RRS\text{~~S~~}AMT_{q,m}$	$	*Procured Capacity for ~~Primary Frequency Response Service~~Responsive Reserve Amount by QSE by market*—The payment to QSE *q* for the Ancillary Service Offer cleared in the market *m* to provide ~~PFRS~~RRS, for the hour.
$MCPC\text{~~PF~~}RRS\text{~~S~~}_{m}$	$/MW per hour	*Market Clearing Price for Capacity for ~~Primary Frequency Response Service~~Responsive Reserve by market*—The MCPC for ~~PFRS~~RRS from the market *m*, for the hour.

NPRR Comments

Variable	Unit	Description
RTPCPFRRS $_{q,m}$	MW	*Procured Capacity for ~~Responsive~~Frequency Response ~~Service~~Responsive Reserve ~~Reserve~~ by QSE by market*—The portion of QSE *q* Ancillary Service Offers cleared in the market *m* to provide ~~RRS~~FRS~~RS~~RRS, for the hour.
PCRPFRRSR $_{q,r,m}$	MW	*Procured Capacity for ~~Primary Frequency Response Service~~Responsive Reserve from Resource per Resource per QSE by market*—The ~~PFRS~~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.

6.7.2 Payments for Ancillary Service Capacity Assigned in Real-Time Operations

Commented [CP4]: Please note NPRR883 also proposes revisions to this section.

(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:

$$\mathbf{RTAURUAMTQSETOT}_{q} = \sum_{r} \mathbf{RTAURUAMT}_{q,r,p,i}$$

Field Code Changed

~~$$\mathbf{RTAURUAMT}_{q,r,p,i} = (-1) * 1/4 * \mathbf{RTAURUR}_{q,r,p} * (\mathbf{RTSPP}_{p,i} - \mathbf{RTRSVPOR} - \mathbf{RTRDP})$$~~

Where:

$$\mathrm{RTAURUAMT}_{q,r,p,i} = (-1) * 1/4 * \mathrm{RTAURUR}_{q,r,p} * (\mathrm{RTSPP}_{p,i} - \mathrm{RTRSVPOR} - \mathrm{RTRDP})$$

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

$$\mathrm{RTRDP} = \sum_{y} (\mathrm{RNWF}_{y} * \mathrm{RTORDPA}_{y})$$

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NPRR Comments

$$RNWF_y = TLMP_y / \sum_y TLMP_y$$

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-deployed Reg-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 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.
y	none	A SCED interval in the 15-minute Settlement Interval.