|  |  |  |  |
| --- | --- | --- | --- |
| NPRR Number | [1244](https://www.ercot.com/mktrules/issues/NPRR1244) | NPRR Title | ****Clarification of Controllable Load Resource Primary Frequency Response Responsibilities**** |
| Date of Decision | November 21, 2024 |
| Action | Approved |
| Timeline | Normal |
| Estimated Impacts | Cost/Budgetary: Between $70k and $100kProject Duration: 5 to 7 months |
| Effective Date | Upon system implementation |
| Priority and Rank Assigned | Priority – 2026; Rank – 4710 |
| Nodal Protocol Sections Requiring Revision  | 3.6.1, Load Resource Participation6.5.7.5, Ancillary Services Capacity Monitor8.5.2.1, ERCOT Required Primary Frequency Response |
| Related Documents Requiring Revision/Related Revision Requests | Nodal Operating Guide Revision Request (NOGRR) 263, Related to NPRR1244, Clarification of Controllable Load Resource Primary Frequency Response Responsibilities |
| Revision Description | This Nodal Protocol Revision Request (NPRR) aligns provisions regarding eligibility of a Controllable Load Resource that is not providing Primary Frequency Response (“PFR”) to provide ERCOT Contingency Reserve Service (ECRS), and the calculation of Physical Responsive Capability (PRC) to include only the capacity of Controllable Load Resources when they are qualified to provide Regulation Service and/or Responsive Reserve (RRS) which requires the Controllable Load Resource to be capable of providing PFR.  |
| Reason for Revision |  [Strategic Plan](https://www.ercot.com/files/docs/2023/08/25/ERCOT-Strategic-Plan-2024-2028.pdf) Objective 1 – Be an industry leader for grid reliability and resilience [Strategic Plan](https://www.ercot.com/files/docs/2023/08/25/ERCOT-Strategic-Plan-2024-2028.pdf) Objective 2 - Enhance the ERCOT region’s economic competitiveness with respect to trends in wholesale power rates and retail electricity prices to consumers [Strategic Plan](https://www.ercot.com/files/docs/2023/08/25/ERCOT-Strategic-Plan-2024-2028.pdf) Objective 3 - Advance ERCOT, Inc. as an independent leading industry expert and an employer of choice by fostering innovation, investing in our people, and emphasizing the importance of our mission General system and/or process improvement(s) Regulatory requirements ERCOT Board/PUCT Directive*(please select ONLY ONE – if more than one apply, please select the ONE that is most relevant)* |
| Justification of Reason for Revision and Market Impacts | This NPRR aligns the Nodal Protocols with NOGRR263, which clarifies Nodal Operating Guides to enable a Load Resource to register as a Controllable Load Resource even if it is not capable of providing PFR. This NPRR maintains existing provisions that require a Controllable Load Resource to be capable of providing PFR in order to be eligible to provide Regulation Service and/or RRS but eliminates this requirement as to a Controllable Load Resource that provides ECRS. This change will remove a disincentive for a Load Resource to register as a Controllable Load Resource since current provisions would eliminate the ability of the Load Resource to provide ECRS just because it registered as a Controllable Load Resource. These changes allow additional Load Resources to register as Controllable Load Resources and thereby provide ERCOT greater visibility and control over such Load Resources. |
| PRS Decision | On 8/8/24, PRS voted unanimously to recommend approval of NPRR1244 as submitted. All Market Segments participated in the vote.On 9/12/24, PRS voted unanimously to endorse and forward to TAC the 8/8/24 PRS Report as revised by PRS and 9/6/24 Impact Analysis for NPRR1244 with a recommended priority of 2025 and rank of 4530. All Market Segments participated in the vote. |
| Summary of PRS Discussion | On 8/8/24, PRS reviewed NPRR1244 and referenced NOGRR263 at ROS.On 9/12/24, PRS reviewed the 9/6/24 Impact Analysis and revised the title of NPRR1244 in response to ROS retitling NOGRR263 at their September 9, 2024 meeting. ERCOT Staff clarified that NPRR1244 is not dependent on NPRR1188, Implement Nodal Dispatch and Energy Settlement for Controllable Load Resources. |
| TAC Decision | On 9/19/24, TAC voted unanimously to recommend approval of NPRR1244 as recommended by PRS in the 9/12/24 PRS Report; and the 9/13/24 Revised Impact Analysis; with a recommended priority of 2026 and rank of 4710. All Market Segments participated in the vote.  |
| Summary of TAC Discussion | On 9/19/24, participants reviewed the 9/13/24 Revised Impact Analysis and reprioritized implementation to occur after the Real-Time Co-Optimization (RTC) project is completed.  |
| TAC Review/Justification of Recommendation |  Revision Request ties to Reason for Revision as explained in Justification  Impact Analysis reviewed and impacts are justified as explained in Justification Opinions were reviewed and discussed Comments were reviewed and discussed (if applicable) Other: (explain) |
| ERCOT Board Decision | On 10/10/24, the ERCOT Board voted unanimously to recommend approval of NPRR1244 as recommended by TAC in the 9/19/24 TAC Report. |
| PUCT Decision | On 11/21/24, the PUCT approved NPRR1244 and accompanying ERCOT Market Impact Statement as presented in Project No. 54445, Review of Protocols Adopted by the Independent Organization. |

|  |
| --- |
| **Opinions** |
| **Credit Review** | ERCOT Credit Staff and the Credit Finance Sub Group (CFSG) have reviewed NPRR1244 and do not believe that it requires changes to credit monitoring activity or the calculation of liability. |
| **Independent Market Monitor Opinion** | IMM has no opinion on NPRR1244. |
| **ERCOT Opinion** | ERCOT supports approval of NPRR1244. |
| **ERCOT Market Impact Statement** | ERCOT Staff has reviewed NPRR1244 and believes that it provides a positive market impact to enable a Load Resource to register as a Controllable Load Resource even if it is not capable of providing PFR. Specifically, this NPRR enables Controllable Load Resources that are not capable of providing PFR to be eligible to provide ECRS and Non-Spinning Reserve (Non-Spin). A Controllable Load Resource that is capable of providing PFR will continue to be required to respond to frequency disturbances with a Governor droop. |

|  |
| --- |
| Sponsor |
| Name | Jim Gant |
| E-mail Address | jgant@prioritypower.com |
| Company | Priority Power Management LLC |
| Phone Number |  |
| Cell Number | 214-562-1807 |
| Market Segment | Independent Retail Electric Provider (IREP) |

|  |
| --- |
| **Market Rules Staff Contact** |
| **Name** | Jordan Troublefield |
| **E-Mail Address** | Jordan.Troublefield@ercot.com  |
| **Phone Number** | 512-248-6521 |

|  |
| --- |
| **Comments Received** |
| **Comment Author** | **Comment Summary** |
| None |  |

|  |
| --- |
| **Market Rules Notes** |

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

* NPRR1188, Implement Nodal Dispatch and Energy Settlement for Controllable Load Resources
	+ Section 3.6.1
	+ Section 6.5.7.5
* NPRR1235, Dispatchable Reliability Reserve Service as a Stand-Alone Ancillary Service
	+ Section 6.5.7.5
* NPRR1246, Energy Storage Resource Terminology Alignment for the Single-Model Era
	+ Section 3.6.1

|  |
| --- |
| Proposed Protocol Language Revision |

***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) Responsive Reserve (RRS) 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 controlled by high-set under-frequency relay;

(iv) ERCOT Contingency Reserve Service (ECRS) as a Controllable Load Resource qualified for SCED Dispatch, or as a Load Resource that may or may not be controlled by high-set under-frequency relay;

(v) Non-Spinning Reserve (Non-Spin) as a Controllable Load Resource qualified for SCED Dispatch or as a Load Resource that is not a Controllable Load Resource and that is not controlled by under-frequency relay; and

(vi) A Load Resource that is not a Controllable Load Resource cannot simultaneously provide Non-Spin and RRS in Real-Time;

(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

|  |
| --- |
| ***[NPRR1007: Replace paragraph (c) above with the following upon system implementation of the Real-Time Co-Optimization (RTC) project:]***(c) Emergency Response Service (ERS) for hours in which the Load Resource has a Resource Status of OUTL; 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 is its Load Zone Settlement Point. For an Energy Storage Resource (ESR), the Settlement Point for the charging Load withdrawn by the modeled Controllable Load Resource associated with the ESR is the Resource Node of the modeled Generation Resource associated with the ESR.

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

|  |
| --- |
| ***[NPRR1000: Delete paragraph (6) above upon system implementation and renumber accordingly.]*** |

(7) Each Resource Entity that represents one or more Load Resources shall ensure that each Load Resource it represents meets at least one of the following conditions:

(a) The Load Resource is not located behind an Electric Service Identifier (ESI ID) that corresponds to a Critical Load;

(b) The Load Resource is located behind an ESI ID that corresponds to a Critical Load, but the Load Resource is not a Critical Load and does not include a Critical Load; or

(c) The Load Resource is located behind an ESI ID that corresponds to a Critical Load, but electric service from the ERCOT System is not required for the provision of the critical service due to the availability of back-up generation or other technologies at the site.

(8) As a condition of obtaining and maintaining registration as a Load Resource, the Resource Entity for the Load Resource must have submitted an attestation, in a form deemed acceptable by ERCOT, stating that one of the conditions set forth in paragraph (7) above is true, and that if either of the conditions in paragraph (7)(b) or (7)(c) is true, then all of the Load Resource’s offered Demand response capacity will be available if deployed by ERCOT during an emergency.

(9) Each QSE that represents one or more ERS Resources shall ensure that each ERS Resource identified in any ERS Submission Form submitted by the QSE meets at least one of the following conditions:

(a) The ERS Resource and each site within the ERS Resource are not located behind an ESI ID or unique meter identifier that corresponds to a Critical Load and are not used to support a Critical Load; or

(b) The ERS Resource or one or more sites within the ERS Resource are behind an ESI ID or unique meter identifier that corresponds to a Critical Load, but the ERS Resource and each site within the ERS Resource are not a Critical Load, do not include a Critical Load, and are not used to support a Critical Load; or

(c) The ERS Resource or one or more sites within the ERS Resource are behind an ESI ID or unique meter identifier that corresponds to a Critical Load, but electric service from the ERCOT System is not required for the provision of the critical service due to the availability of back-up generation or other technologies at the site, and neither the ERS Resource nor any site within the ERS Resource is used to support a Critical Load.

**6.5.7.5 Ancillary Services Capacity Monitor**

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

(a) RRS capacity from:

(i) Generation Resources;

(ii) Load Resources excluding Controllable Load Resources;

(iii) Controllable Load Resources; and

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

(b) Ancillary Service Resource Responsibility for RRS from:

(i) Generation Resources;

(ii) Load Resources excluding Controllable Load Resources;

(iii) Controllable Load Resources; and

(iv) Resources capable of FFR;

(c) ECRS capacity from:

(i) Generation Resources;

(ii) Load Resources excluding Controllable Load Resources;

(iii) Controllable Load Resources; and

(iv) Quick Start Generation Resources (QSGRs);

(d) Ancillary Service Resource Responsibility for ECRS from:

(i) Generation Resources;

(ii) Load Resources excluding Controllable Load Resources; and

(iii) Controllable Load Resources; and

(iv) QSGRs;

(e) ECRS deployed to Generation and Load Resources;

(f) Non-Spin available from:

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

(ii) Undeployed Load Resources;

(iii) Off-Line Generation Resources; and

(iv) Resources with Output Schedules;

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

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

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

(iii) Load Resources;

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

(v) QSGRs;

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

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

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

(k) Available capacity:

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

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

(iii) Without Energy Offer Curves in the ERCOT System that can be used to increase Generation Resource Base Points in SCED;

(iv) Without Energy Offer Curves in the ERCOT System that can be used to decrease Generation Resource Base Points in SCED;

(v) With RTM Energy Bid curves from available Controllable Load Resources in the ERCOT System that can be used to decrease Base Points (energy consumption) in SCED;

(vi) With RTM Energy Bid curves from available Controllable Load Resources in the ERCOT System that can be used to increase Base Points (energy consumption) in SCED;

(vii) From Resources participating in SCED plus the Reg-Up, ECRS, and RRS from Load Resources and the Net Power Consumption minus the Low Power Consumption from Load Resources with a validated Real-Time RRS and ECRS Schedule;

(viii) From Resources included in item (vii) above plus reserves from Resources that could be made available to SCED in 30 minutes;

(ix) In the ERCOT System that can be used to increase Generation Resource Base Points in the next five minutes in SCED; and

(x) In the ERCOT System that can be used to decrease Generation Resource Base Points in the next five minutes in SCED;

(l) Aggregate telemetered HSL capacity for Resources with a telemetered Resource Status of EMR;

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

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

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

**PRC1 = Min(Max((RDF\*(HSL-NFRC) – Actual Net Telemetered Output)i , 0.0) , 0.2\*RDF\*(HSL-NFRC)i),**

where the included On-Line Generation Resources do not include WGRs, nuclear Generation

Resources, or Generation Resources with an output less than or equal to 95% of telemetered LSL or

with a telemetered status of ONTEST, ONHOLD, STARTUP, or SHUTDOWN.





***WGRs***

***online***

***All***

***WGR***

***online***

***i***

**PRC2 = Min(Max((RDFW\*HSL – Actual Net Telemetered Output)i , 0.0) , 0.2\*RDFW\*HSLi),**

where the included On-Line WGRs only include WGRs that are Primary Frequency Response-capable.

****

**PRC3 = ((Synchronous condenser output)i as qualified by item (8) of Operating Guide Section 2.3.1.2, Additional Operational Details for Responsive Reserve and ERCOT Contingency Reserve Service Providers))**

**PRC4 = (Min(Max((Actual Net Telemetered Consumption – LPC), 0.0), ECRS and RRS Ancillary Service Resource Responsibility \* 1.5) from all Load Resources controlled by high-set under frequency relays carrying an ECRS and/or RRS Ancillary Service Resource Responsibility)i**





***resources***

***load***

***online***

***All***

***resource***

***load***

***online***

***i***





***resources***

***load***

***online***

***All***

***resource***

***load***

***online***

***i***

**PRC5 = Min(Max((LRDF\_1\*Actual Net Telemetered Consumption – LPC)i, 0.0), (0.2 \* LRDF\_1 \* Actual Net Telemetered Consumption)) from all Controllable Load Resources active in SCED and qualified for Regulation Service and/or RRS and carrying Ancillary Service Resource Responsibility**

**PRC6 = Min(Max((LRDF\_2 \* Actual Net Telemetered Consumption – LPC)i, 0.0), (0.2 \* LRDF\_2 \* Actual Net Telemetered Consumption)) from all Controllable Load Resources active in SCED and qualified for Regulation Service and/or RRS and not carrying Ancillary Service Resource Responsibility**





***resources***

***load***

***online***

***All***

***resource***

***load***

***online***

***i***

**PRC7 = (Capacity from Resources capable of providing FFR)i**





***resources***

***FFR***

***online***

***All***

***resource***

***FFR***

***online***

***i***

**PRC8 = (If discharging or idle, Min(X% of HSL based on droop, HSL-ESR-Gen “injection”, the capacity that can be sustained for 15 minutes per the State of Charge), else Min(X% of (HSL – LSL(ESR “charging”) based on droop, the capacity that can be sustained for 15 minutes per the State of Charge – LSL(ESR “charging”)))**





***ESR***

***online***

***All***

***ESR***

***online***

***i***

**Excludes ESR capacity used to provide FFR**

**PRC = PRC1 + PRC2 + PRC3 + PRC4 + PRC5 + PRC6 + PRC7 + PRC8**

The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| PRC1 | MW | Generation On-Line greater than 0 MW |
| PRC2 | MW | WGRs On-Line greater than 0 MW |
| PRC3 | MW | Synchronous condenser output |
| PRC4 | MW | Capacity from Load Resources carrying ECRS Ancillary Service Resource Responsibility |
| PRC5 | MW | Capacity from Controllable Load Resources active in SCED and qualified for Regulation Service and/or RRS and carrying Ancillary Service Resource Responsibility |
| PRC6 | MW | Capacity from Controllable Load Resources active in SCED and qualified for Regulation Service and/or RRS and not carrying Ancillary Service Resource Responsibility |
| PRC7 | MW | Capacity from Resources capable of providing FFR |
| PRC8 | MW | ESR capacity capable of providing Primary Frequency Response |
| PRC | MW | Physical Responsive Capability |
| X | Percentage | Percent threshold based on the Governor droop setting of ESRs |
| RDF |  | The currently approved Reserve Discount Factor  |
| RDFW |  | The currently approved Reserve Discount Factor for WGRs |
| LRDF\_1 |  | The currently approved Load Resource Reserve Discount Factor for Controllable Load Resources carrying Ancillary Service Resource Responsibility |
| LRDF\_2 |  | The currently approved Load Resource Reserve Discount Factor for Controllable Load Resources not carrying Ancillary Service Resource Responsibility |
| NFRC | MW | Non-Frequency Responsive Capacity |

(2) Each QSE shall operate Resources providing Ancillary Service capacity to meet its obligations. If a QSE experiences temporary conditions where its total obligation for providing Ancillary Service cannot be met on the QSE’s Resources, then the QSE may add additional capability from other Resources that it represents. It adds that capability by changing the Resource Status and updating the Ancillary Service Schedules and Ancillary Services Resource Responsibility of the affected Resources and notifying ERCOT under Section 6.4.9.1, Evaluation and Maintenance of Ancillary Service Capacity Sufficiency. If the QSE is unable to meet its total obligations to provide committed Ancillary Services capacity, the QSE shall notify ERCOT immediately of the expected duration of the QSE’s inability to meet its obligations. ERCOT shall determine whether replacement Ancillary Services will be procured to account for the QSE’s shortfall according to Section 6.4.9.1.

(3) The Load Resource Reserve Discount Factors (RDFs) for Controllable Load Resources (LRDF\_1 and LRDF\_2) shall be subject to review and approval by TAC.

(4) The RDFs used in the PRC calculation shall be posted to the ERCOT website no later than three Business Days after approval.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***[NPRR1010, NPRR1014, NPRR1029, and NPRR1204: Replace applicable portions of Section 6.5.7.5 above with the following upon system implementation for NPRR1014 or NPRR1029; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010 and NPRR1204:]*****6.5.7.5 Ancillary Services Capacity Monitor**(1) Every ten seconds, ERCOT shall calculate the following and provide Real-Time summaries to ERCOT Operators and all Market Participants using ICCP and postings on the ERCOT website showing the Real-Time total system amount of:(a) RRS capability from: (i) Generation Resources and ESRs in the form of PFR that can be sustained for the SCED duration requirements of PFR;(ii) Load Resources, excluding Controllable Load Resources, capable of responding via under-frequency relay;(iii) Controllable Load Resources in the form of PFR;(iv) Resources, other than ESRs, capable of Fast Frequency Response (FFR); and(v) ESRs, in the form of FFR, that can be sustained for the SCED duration requirements of FFR;(b) Ancillary Service Resource awards for RRS to: (i) Generation Resources and ESRs in the form of PFR;(ii) Load Resources, excluding Controllable Load Resources, capable of responding by under-frequency relay;(iii) Controllable Load Resources in the form of PFR; and(iv) Resources providing FFR;(c) ECRS capability from: (i) Generation Resources;(ii) Load Resources excluding Controllable Load Resources; (iii) Controllable Load Resources;(iv) Quick Start Generation Resources (QSGRs); and(v) ESRs that can be sustained for the SCED duration requirements of ECRS.(d) Ancillary Service Resource awards for ECRS to: (i) Generation Resources;(ii) Load Resources excluding Controllable Load Resources; and(iii) Controllable Load Resources;(iv) QSGRs; and(v) ESRs.(e) ECRS manually deployed by Resources with a Resource Status of ONSC; (f) Non-Spin available from: (i) On-Line Generation Resources with Energy Offer Curves;(ii) Undeployed Load Resources; (iii) Off-Line Generation Resources and On-Line Generation Resources with power augmentation;(iv) Resources with Output Schedules; and(v) ESRs that can be sustained for the SCED duration requirements of Non-Spin.(g) Ancillary Service Resource awards for Non-Spin to:(i) On-Line Generation Resources with Energy Offer Curves;(ii) On-Line Generation Resources with Output Schedules;(iii) Load Resources; (iv) Off-Line Generation Resources excluding Quick Start Generation Resources (QSGRs), including Non-Spin awards on power augmentation capacity that is not active on On-Line Generation Resources;(v) QSGRs; and(vi) ESRs.(h) Reg-Up and Reg-Down capability (for ESRs, the SCED duration requirements of Reg-Up and Reg-Down are considered);(i) Undeployed Reg-Up and Reg-Down;(j) Ancillary Service Resource awards for Reg-Up and Reg-Down;(k) Deployed Reg-Up and Reg-Down;(l) Available capacity:(i) With Energy Offer Curves in the ERCOT System that can be used to increase Generation Resource Base Points in SCED;(ii) With Energy Offer Curves in the ERCOT System that can be used to decrease Generation Resource Base Points in SCED; (iii) Without Energy Offer Curves in the ERCOT System that can be used to increase Generation Resource Base Points in SCED; (iv) Without Energy Offer Curves in the ERCOT System that can be used to decrease Generation Resource Base Points in SCED; (v) With RTM Energy Bid curves from available Controllable Load Resources in the ERCOT System that can be used to decrease Base Points (energy consumption) in SCED;(vi) With RTM Energy Bid curves from available Controllable Load Resources in the ERCOT System that can be used to increase Base Points (energy consumption) in SCED; (vii) From Resources participating in SCED plus the Reg-Up, RRS, and ECRS from Load Resources and the Net Power Consumption minus the Low Power Consumption from Load Resources with a validated Real-Time RRS and ECRS awards;(viii) With Energy Bid/Offer Curves for ESRs in the ERCOT System that can be used to increase ESR Base Points in SCED while respecting SCED duration requirements for ESR Base Points in SCED;(ix) With Energy Bid/Offer Curves for ESRs in the ERCOT System that can be used to decrease ESR Base Points in SCED while respecting SCED duration requirements for ESR Base Points in SCED; (x) Without Energy Bid/Offer Curves for ESRs in the ERCOT System that can be used to increase ESR Base Points in SCED while respecting SCED duration requirements for ESR Base Points in SCED; (xi) Without Energy Bid/Offer Curves for ESRs in the ERCOT System that can be used to decrease ESR Base Points in SCED while respecting SCED duration requirements for ESR Base Points in SCED; (xii) From Resources included in item (vii) above plus reserves from Resources that could be made available to SCED in 30 minutes;(xiii) In the ERCOT System that can be used to increase Generation Resource Base Points in the next five minutes in SCED; and(xiv) In the ERCOT System that can be used to decrease Generation Resource Base Points in the next five minutes in SCED;(xv) The total capability of Resources available to provide the following combinations of Ancillary Services, based on the Resource telemetry from the QSE and capped by the limits of the Resource:(A) Capacity to provide Reg-Up, RRS, or both, irrespective of whether it is capable of providing ECRS or Non-Spin;(B) Capacity to provide Reg-Up, RRS, ECRS, or any combination, irrespective of whether it is capable of providing Non-Spin; and(C) Capacity to provide Reg-Up, RRS, ECRS, or Non-Spin, in any combination;(m) Aggregate telemetered HSL capacity for Resources with a telemetered Resource Status of EMR;(n) Aggregate telemetered HSL capacity for Resources with a telemetered Resource Status of OUT;(o) Aggregate net telemetered consumption for Resources with a telemetered Resource Status of OUTL; and(p) The ERCOT-wide PRC calculated as follows:**PRC1 = Min(Max((RDF\*FRCHL – FRCO)i , 0.0) , 0.2\*RDF\*FRCHLi),**where the included On-Line Generation Resources do not include WGRs, nuclear GenerationResources, or Generation Resources with an output less than or equal to 95% of telemetered LSL or with a telemetered status of ONTEST, ONHOLD, STARTUP, or SHUTDOWN.***WGRs******online******All******WGR******online******i*****PRC2 = Min(Max((RDFW\*HSL – Actual Net Telemetered Output)i , 0.0) , 0.2\*RDFW\*HSLi),**where the included On-Line WGRs only include WGRs that are Primary Frequency Response-capable.**PRC3 = ((Synchronous condenser output)i as qualified by item (8) of Operating Guide Section 2.3.1.2, Additional Operational Details for Responsive Reserve and ERCOT Contingency Reserve Service Providers))****PRC4 = (Min(Max((Actual Net Telemetered Consumption – LPC), 0.0), ECRS and RRS Ancillary Service Resource award \* 1.5) from all Load Resources controlled by high-set under-frequency relays with an ECRS and/or RRS Ancillary Service Resource award)i*****resources******load******online******All******resource******load******online******i*****PRC5 = Min(Max((LRDF\_1\*Actual Net Telemetered Consumption – LPC)i, 0.0), (0.2 \* LRDF\_1 \* Actual Net Telemetered Consumption)) from all Controllable Load Resources active in SCED and qualified for Regulation Service and/or RRS with an Ancillary Service Resource award*****resources******load******online******All******resource******load******online******i*****PRC6 = Min(Max((LRDF\_2 \* Actual Net Telemetered Consumption – LPC)i, 0.0), (0.2 \* LRDF\_2 \* Actual Net Telemetered Consumption)) from all Controllable Load Resources active in SCED and qualified for Regulation Service and/or RRS without an Ancillary Service Resource award*****resources******load******online******All******resource******load******online******i*****PRC7 = (Capacity from Resources capable of providing FFR)i*****resources******FFR******online******All******resource******FFR******online******i*****PRC8 = (If discharging or idle, Min(X% of HSL based on droop, HSL-ESR-Gen “injection”, the capacity that can be sustained for 15 minutes per the State of Charge), else Min(X% of (HSL – LSL(ESR “charging”) based on droop, the capacity that can be sustained for 15 minutes per the State of Charge – LSL(ESR “charging”)))** ***ESR******online******All******ESR******online******i*****Excludes ESR capacity used to provide FFR** **PRC9 = (If discharging or idle, Min(X% of HSL based on droop, HSL-Gen “injection”, the sum of the MW headroom available from the intermittent renewable generation component and the MW capacity that can be sustained for 15 minutes per the ESS State of Charge), else Min(X% of Real-Time Total Capacity based on droop, the sum of the MW headroom available from the intermittent renewable generation component and the MW capacity that can be sustained for 15 minutes per the ESS State of Charge))*****DC-Coupled Resources******online******All******ESR******online******i*****Excludes DC-Coupled Resource capacity used to provide FFR****PRC = PRC1 + PRC2 + PRC3+ PRC4 + PRC5 + PRC6 + PRC7 + PRC8 + PRC9**The above variables are defined as follows:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Unit** | **Description** |
| PRC1 | MW | Generation On-Line greater than 0 MW |
| PRC2 | MW | WGRs On-Line greater than 0 MW |
| PRC3 | MW | Synchronous condenser output |
| PRC4 | MW | Capacity from Load Resources with an ECRS Ancillary Service Resource award |
| PRC5 | MW | Capacity from Controllable Load Resources active in SCED and qualified for Regulation Service and/or RRS with an Ancillary Service Resource award |
| PRC6 | MW | Capacity from Controllable Load Resources active in SCED and qualified for Regulation Service and/or RRS without an Ancillary Service Resource award |
| PRC7 | MW | Capacity from Resources capable of providing FFR |
| PRC8 | MW | ESR capacity capable of providing Primary Frequency Response |
| PRC9 | MW | Capacity from DC-Coupled Resources capable of providing Primary Frequency Response |
| PRC | MW | Physical Responsive Capability |
| X | Percentage | Percent threshold based on the Governor droop setting of ESRs |
| RDF |  | The currently approved Reserve Discount Factor  |
| RDFW |  | The currently approved Reserve Discount Factor for WGRs |
| LRDF\_1 |  | The currently approved Load Resource Reserve Discount Factor for Controllable Load Resources awarded an Ancillary Service Resource award |
| LRDF\_2 |  | The currently approved Load Resource Reserve Discount Factor for Controllable Load Resources not awarded an Ancillary Service Resource award |
| FRCHL | MW | Telemetered High limit of the FRC for the Resource |
| FRCO | MW | Telemetered output of FRC portion of the Resource |

(2) The Load Resource Reserve Discount Factors (RDFs) for Controllable Load Resources (LRDF\_1 and LRDF\_2) shall be subject to review and approval by TAC.(3) The RDFs used in the PRC calculation shall be posted to the ERCOT website no later than three Business Days after approval.(4) ERCOT shall display on the ERCOT website and update every ten seconds a rolling view of the ERCOT-wide PRC, as defined in paragraph (1)(p) above, for the current Operating Day. |

**8.5.2.1 ERCOT Required Primary Frequency Response**

(1) All Generation Resources, ESRs, Controllable Load Resources that are capable of providing Primary Frequency Response, SOTGs, and SOTSGs shall provide Primary Frequency Response in accordance with the requirements established in the Operating Guides.

|  |
| --- |
| ***[NPRR995: Replace paragraph (1) above with the following upon system implementation:]***(1) All Generation Resources, ESRs, Controllable Load Resources that are capable of providing Primary Frequency Response, SOTGs, SOTSGs, and SOTESSs shall provide Primary Frequency Response in accordance with the requirements established in the Operating Guides.  |

(2) ERCOT shall evaluate, with the assistance of the appropriate TAC subcommittee, Primary Frequency Response during FMEs. The actual Generation Resource or ESR response must be compiled to determine if adequate Primary Frequency Response was provided.

(3) ERCOT and the appropriate TAC subcommittee shall review each FME, verifying the accuracy of data. Data that is in question may be requested from the QSE for comparison or individual Generation Resource or ESR data may be retrieved from ERCOT’s database.

|  |
| --- |
| ***[NPRR963: Replace paragraph (3) above with the following upon system implementation:]***(3) ERCOT and the appropriate TAC subcommittee shall review each FME, verifying the accuracy of data. Data that is in question may be requested from the QSE for comparison or individual Resource data may be retrieved from ERCOT’s database. |