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| NPRR Number | [1111](http://www.ercot.com/mktrules/issues/NPRR1111) | NPRR Title | Related to SCR819, Improving IRR Control to Manage GTC Stability Limits |
| Date of Decision | | March 7, 2022 | |
| **Action** | | Recommended Approval | |
| Timeline | | Urgent | |
| Proposed Effective Date | | Upon implementation of System Change Request (SCR) 819, Improving IRR Control to Manage GTC Stability Limits | |
| Priority and Rank Assigned | | Not applicable | |
| Nodal Protocol Sections Requiring Revision | | 3.8.8, DC-Coupled Resources  6.5.7.4, Base Points  6.5.7.9, Compliance with Dispatch Instructions  6.6.5.2, IRR Generation Resource Base Point Deviation Charge 6.6.5.3, Resources Exempt from Deviation Charges  6.6.5.5, Energy Storage Resource Set Point Deviation Charge for Over Performance  8.1.1.4.1, Regulation Service and Generation Resource/Controllable Load Resource Energy Deployment Performance | |
| Related Documents Requiring Revision/Related Revision Requests | | SCR819 | |
| Revision Description | | This Nodal Protocol Revision Request (NPRR) expands the use of the Security-Constrained Economic Dispatch (SCED) Base Point Below High Dispatch Limit (“SBBH”) flag to signify that ERCOT has instructed an Intermittent Renewable Resource (IRR) or Direct Current (DC)-Coupled Resources not to exceed its Base Point. These changes improve the control of IRRs in order to more efficiently manage Generic Transmission Constraint (GTC) stability limits. Additionally, the Base Point Deviation Charge threshold for IRRs is adjusted to encourage better SCED Base Point control. | |
| Reason for Revision | | Addresses current operational issues.  Meets Strategic goals (tied to the [ERCOT Strategic Plan](http://www.ercot.com/content/wcm/lists/144926/ERCOT_Strategic_Plan_2019-2023.pdf) or directed by the ERCOT Board).  Market efficiencies or enhancements  Administrative  Regulatory requirements  Other: (explain)  *(please select all that apply)* | |
| Business Case | | Today, when a GTC interface flow is approaching a Generic Transmission Limit (GTL), SCED dispatches a Generation Resource’s unit based on its Shift Factor and the Generation Resource’s offer. For IRRs behind a GTC, the SBBH flag is set for those marginal units and a corresponding SCED Base Point is sent to reduce Megawatt (MW) output to prevent the GTC interface flow from exceeding the GTL. As the number of IRRs continue to increase behind GTCs, it is becoming more difficult to manage the interface flow below the GTL. This can largely be attributed to infra-marginal units of IRRs not being required to follow a SCED Base Point while being allowed to rapidly increase MW output during high wind and solar ramp periods. The increased output from these infra-marginal IRR units can outpace the reduction of MWs from marginal units.  This NPRR expands the use of the SBBH flag to also be used as a “Not To Exceed” instruction for infra-marginal IRRs and DC-Coupled Resources not already following a SCED Base Point with a Shift Factor greater than 2% for a given GTC. This will give SCED the capability to issue a Base Point to both marginal and infra-marginal IRRs, providing greater and more efficient control of a GTC interface flow. This improvement in control furthers system reliability. This also permits ERCOT Operators to potentially control closer to the calculated limit, allowing for additional generation export behind a GTC. Historically, ERCOT Operators have been required to reduce a GTL’s discount factor, limiting the overall interface flow, in order to prevent infra-marginal wind ramps triggering a GTL exceedance.  Additionally, the Base Point Deviation Charge threshold percentage is being adjusted from 10% to 5%. This aligns with the threshold for thermal and storage Resources. It is imperative that all Resources maintain their SCED Base Point, otherwise efficiencies that this NPRR is attempting achieve will not be realized. | |
| Credit Work Group Review | | ERCOT Credit Staff and the Credit Work Group (Credit WG) have reviewed NPRR1111 and do not believe that it requires changes to credit monitoring activity or the calculation of liability. | |
| PRS Decision | | On 12/14/21, PRS voted via roll call to waive notice for NPRR1111. There was one abstention from the Independent Generator (Calpine) Market Segment. PRS then voted via roll call to grant NPRR1111 Urgent status, and to table NPRR1111 and refer the issue to ROS and WMS. There was one opposing vote from the Independent Generator (Calpine) Market Segment. All Market Segments participated in both votes.  On 1/13/22, PRS voted unanimously via roll call to recommend approval of NPRR1111 as submitted and to forward to TAC NPRR1111 and the Impact Analysis. All Market Segments participated in the vote. | |
| Summary of PRS Discussion | | On 12/14/21, participants expressed a desire for discussion of NPRR1111 at ROS and WMS. Participants also reviewed the timeline for approval and anticipated implementation.  On 1/13/22, participants noted the 1/6/22 WMS comments and 1/12/22 ROS comments endorsing SCR819 and NPRR1111. | |
| TAC Decision | | On 1/31/22, TAC voted unanimously via roll call to recommend approval of NPRR1111 as recommended by PRS in the 1/13/22 PRS Report. All Market Segments participated in the vote. | |
| Summary of TAC Discussion | | On 1/31/22, TAC reviewed the ERCOT Opinion and ERCOT Market Impact Statement for NPRR1111. | |
| ERCOT Opinion | | ERCOT supports approval of NPRR1111. | |
| ERCOT Market Impact Statement | | ERCOT Staff has reviewed NPRR1111 and believes the market impact for NPRR1111 provides market efficiencies/enhancements by improving the dispatch of Base Points to Resources to account for the ramping of uncurtailed IRRs and reducing the chance of violating GTLs. | |
| ERCOT Board Decision | | On 3/7/22, the ERCOT Board recommended approval of NPRR1111 as recommended by TAC in the 1/31/22 TAC Report. | |

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| Sponsor | |
| Name | Freddy Garcia / Pengwei Du |
| E-mail Address | [Freddy.Garcia@ercot.com](mailto:Freddy.Garcia@ercot.com) / [Pengwei.Du@ercot.com](mailto:Pengwei.Du@ercot.com) |
| Company | ERCOT |
| Phone Number | 512-248-4245 / 512-248-6453 |
| Cell Number |  |
| Market Segment | Not applicable |

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| **Market Rules Staff Contact** | |
| **Name** | Cory Phillips |
| **E-Mail Address** | [cory.phillips@ercot.com](mailto:cory.phillips@ercot.com) |
| **Phone Number** | 512-248-6464 |

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| **Comments Received** | |
| **Comment Author** | **Comment Summary** |
| WMS 010622 | Endorsed NPRR1111 as submitted |
| ROS 011222 | Endorsed NPRR1111 as submitted |

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| **Market Rules Notes** |

None

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| Proposed Protocol Language Revision |

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| ***[NPRR1029: Insert Section 3.8.8 below upon system implementation:]***  ***3.8.8 DC-Coupled Resources***  (1) A DC-Coupled Resource shall be treated in the same manner as an Energy Storage Resource (ESR) for the purposes of determining Set Point Deviation Charges, as described in Section 6.6.5, Set Point Deviation Charge, and Energy Storage Resource Energy Deployment Performance (ESREDP), as described in Section 8.1.1.4.1, Regulation Service and Generation Resource/Controllable Load Resource/Energy Storage Resource Energy Deployment Performance, under one of the following conditions:  (a) The Resource was awarded Ancillary Service;  (b) The Resource’s instantaneous MW Injection or MW Withdrawal includes non-zero MW from the ESS component of the DC-Coupled Resource; or  (c) The Resource’s telemetered HSL or LSL includes the ESS capability.  (2) At all other times, a DC-Coupled Resource shall be treated in the same manner as an IRR for the purposes of determining Set Point Deviation Charges, as described in Section 6.6.5, and ESREDP, as described in Section 8.1.1.4.1.  (3) A QSE representing a DC-Coupled Resource that does not meet any of the conditions in paragraph (1) above:  (a) Shall set the Resource’s telemetered HSL equal to the current net output capability of the intermittent renewable generation component of the DC-Coupled Resource; and  (b) Shall set the Resource’s output at or below the SCED Base Point telemetered by ERCOT if the Resource receives a flag indicating that SCED has dispatched it below the Resource’s HDL used by SCED or that it has been instructed not to exceed its Base Point. |

6.5.7.4 Base Points

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

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

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

(c) Time of the Dispatch Instruction;

(d) Flag indicating SCED has dispatched a Generation Resource or Controllable Load Resource below HDL used by SCED or an IRR has been instructed not to exceed its Base Point;

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

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

(f) Other information relevant to that Dispatch Instruction.

6.5.7.9 Compliance with Dispatch Instructions

(1) Except as otherwise specified in this Section, each TSP and each QSE shall comply fully and promptly with a Dispatch Instruction issued to it, unless in the sole and reasonable judgment of the TSP or QSE, such compliance would create an undue threat to safety, undue risk of bodily harm or undue damage to equipment, or the Dispatch Instruction is otherwise not in compliance with these Protocols.

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| [NPRR857: Replace paragraph (1) above with the following upon system implementation:]  (1) Except as otherwise specified in this Section, each TSP, DCTO, and QSE shall comply fully and promptly with a Dispatch Instruction issued to it, unless in the sole and reasonable judgment of the TSP, DCTO, or QSE, such compliance would create an undue threat to safety, undue risk of bodily harm or undue damage to equipment, or the Dispatch Instruction is otherwise not in compliance with these Protocols. |

(2) If the recipient of a Dispatch Instruction does not comply because in the sole and reasonable judgment of the TSP or QSE, such compliance would create an undue threat to safety, undue risk of bodily harm, or undue damage to equipment, then the TSP or QSE must immediately notify ERCOT and provide the reason for non-compliance.

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| [NPRR857: Replace paragraph (2) above with the following upon system implementation:]  (2) If the recipient of a Dispatch Instruction does not comply because in the sole and reasonable judgment of the TSP, DCTO, or QSE, such compliance would create an undue threat to safety, undue risk of bodily harm, or undue damage to equipment, then the TSP, DCTO, or QSE must immediately notify ERCOT and provide the reason for non-compliance. |

(3) If the recipient of a Dispatch Instruction recognizes that the Dispatch Instruction conflicts with other valid instructions or is invalid, the recipient shall immediately notify ERCOT of the conflict and request resolution. ERCOT shall resolve the conflict by issuing another Dispatch Instruction.

(4) ERCOT’s final Dispatch Instruction to a QSE in effect applies for all Protocol-related processes. If the QSE does not comply after receiving the final Dispatch Instruction, the QSE remains liable for failure to meet its obligations under the Protocols and remains liable for any charges resulting from such failure.

(5) ERCOT’s final Dispatch Instruction to a TSP in effect applies for all Protocol-related processes. If the TSP does not comply after receiving the final Dispatch Instruction, the TSP remains liable for such failure under these Protocols under the TSP’s Agreement with ERCOT.

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| [NPRR857: Replace paragraph (5) above with the following upon system implementation:]  (5) ERCOT’s final Dispatch Instruction to a TSP or DCTO in effect applies for all Protocol-related processes. If the TSP or DCTO does not comply after receiving the final Dispatch Instruction, the TSP or DCTO remains liable for such failure under these Protocols under the TSP’s or DCTO’s Agreement with ERCOT. |

(6) In all cases in which compliance with a Dispatch Instruction is disputed, both ERCOT and the QSE or TSP shall document their communications, agreements, disagreements, and reasons for their actions, to enable resolution of the dispute through the Alternative Dispute Resolution (ADR) process in Section 20, Alternative Dispute Resolution Procedure.

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| [NPRR857: Replace paragraph (6) above with the following upon system implementation:]  (6) In all cases in which compliance with a Dispatch Instruction is disputed, both ERCOT and the QSE, TSP, or DCTO shall document their communications, agreements, disagreements, and reasons for their actions, to enable resolution of the dispute through the Alternative Dispute Resolution (ADR) process in Section 20, Alternative Dispute Resolution Procedure. |

(7) An Intermittent Renewable Resource (IRR) must comply with Dispatch Instructions when receiving a flag signifying that the IRR has received a Base Point below the HDL used by SCED or the IRR has been instructed not to exceed its Base Point.

**6.6.5.2 IRR Generation Resource Base Point Deviation Charge**

(1) ERCOT shall charge a QSE for an IRR a Base Point Deviation Charge if the IRR metered generation is more than 5% above its Adjusted Aggregated Base Point and the flag signifying that the IRR has received a Base Point below the HDL used by SCED or the IRR has been instructed not to exceed its Base Point has been received.

(2) The charge to each QSE for non-excused over-generation of each IRR that is not included in an IRR Group at each Resource Node Settlement Point during a 15-minute Settlement Interval, is calculated as follows:

If the flag signifying that the IRR has received a Base Point below the HDL used by SCED or the IRR has been instructed not to exceed its Base Point is not set in all SCED intervals within the 15-minute Settlement Interval:

BPDAMT *q, r, p, i* = 0

Otherwise, if the flag signifying that the IRR has received a Base Point below the HDL used by SCED or the IRR has been instructed not to exceed its Base Point is set in all SCED intervals within the 15-minute Settlement Interval:

BPDAMT *q, r, p, i* = Max (PR1, RTSPP *p, i*) \* OGENIRR*q, r, p, i*

Where:

OGENIRR *q, r, p, i*  = Max [0, TWTG *q, r, p, i*  – ¼ \* AABP *q, r, p, i \**  (1 + KIRR)]

TWTG *q, r, p, i =*  ( (AVGTG5M *q, r, p, i, y*) / 3) \* ¼

(3) The charge to each QSE for non-excused over-generation of each IRR that is included in an IRR Group, at each Resource Node Settlement Point, if the Real-Time metered generation is greater than the upper tolerance during a 15-minute Settlement Interval, is calculated as follows:

If the flag signifying that the IRR has received a Base Point below the HDL used by SCED or the IRR has been instructed not to exceed its Base Point is not set in all SCED intervals within the 15-minute Settlement Interval for any of the IRRs within an IRR Group, then for all IRRs within an IRR Group:

**BPDAMT *q, r, p* = 0**

If the flag signifying that the IRR has received a Base Point below the HDL used by SCED or the IRR has been instructed not to exceed its Base Point is set in all SCED intervals within the 15-minute Settlement Interval for any of the IRRs within an IRR Group, then the deviation penalty is determined for the IRR Group and evenly allocated and charged to each IRR within that IRR Group:

**BPDAMT *q, r, p* = [Max (PR1, RTSPP *p*) \* OGENIRR *q, wg, i* ] / N**

Where:

OGENIRR *q, wg, i*  = Max [0, TWTG *q, wg, i*  – ¼ \* AABP *q, wg, i \**  (1 + KIRR)]

TWTG *q, wg, i =*  (TWTG *q, r, p, i*)



AABP *q, wg, i* = (AABP *q, r, p, i*)



The above variables are defined as follows:

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| Variable | Unit | Definition | |
| BPDAMT *q, r, p, i* | $ | *Base Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Generation Resource *r* at Resource Node *p*, for its deviation from Base Point, for the 15-minute Settlement Interval *i*. | |
| RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Resource Node *p*, for the 15-minute Settlement Interval *i*. | |
| TWTG *q, r, p, i* | MWh | *Time-Weighted Telemetered Generation per QSE per Settlement Point per Resource*—The telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the 15-minute Settlement Interval *i.* |
| AABP *q, r, p, i* | MW | *Adjusted Aggregated Base Point Generation per QSE per Settlement Point per Resource*—The aggregated Base Point adjusted for Ancillary Service deployments, of Generation Resource or Controllable Load Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i.* |
| AVGTG5M *q, r, p, i, y* | MW | *Average Telemetered Generation for the 5 Minutes*—The average telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the five-minute clock interval *y*, within the 15-minute Settlement Interval *i*. | |
| OGENIRR *q, r, p, i* | MWh | *Over Generation Volumes per QSE per Settlement Point per IRR Generation Resource*—The amount over generated by the IRR *r* represented by QSE *q* at Resource Node *p* for the 15-minute Settlement Interval *i*. | |
| PR1 | $/MWh | The price to use for the charge calculation when RTSPP is less than $20/MWh, $20/MWh. | |
| KIRR | none | The percentage tolerance for over-generation of an IRR, 5%. | |
| N | none | The number of IRRs within an IRR Group. | |
| *q* | none | A QSE. | |
| *p* | none | A Settlement Point. | |
| *r* | none | An IRR Generation Resource or an IRR within an IRR Group. | |
| *i* | none | A 15-minute Settlement Interval. | |
| *y* | none | A five-minute clock interval in the Settlement Interval. | |
| *wg* | none | An IRR Group. | |

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| [NPRR879, NPRR963, and NPRR1010: Replace applicable portions of Section 6.6.5.2 above with the following upon system implementation for NPRR879 or NPRR963; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; and renumber accordingly:]  **6.6.5.4 IRR Generation Resource Set Point Deviation Charge**  (1) ERCOT shall charge a QSE for an IRR a Set Point Deviation Charge if the IRR telemetered generation is more than 5% above its AASP, the flag signifying that the IRR has received a Base Point below the HDL used by SCED has been received or the IRR has been instructed not to exceed its Base Point, and the IRR is not awarded Ancillary Service and is not part of an IRR Group in which at least one IRR is awarded Ancillary Service for at least one SCED interval within the 15-minute Settlement Interval.  (2) For instances in which an IRR is awarded Ancillary Service or is part of an IRR Group in which at least one IRR is awarded Ancillary Service for at least one SCED interval within the 15-minute Settlement Interval, Set Point Deviation Charges will be determined per Section 6.6.5.2, Set Point Deviation Charge for Over Generation, and Section 6.6.5.2.1, Set Point Deviation Charge for Under Generation.  (3) The charge to each QSE for non-excused over-generation of each IRR that is not included in an IRR Group at each Resource Node Settlement Point during a 15-minute Settlement Interval, is calculated as follows:  If the flag signifying that the IRR has received a Base Point below the HDL used by SCED or the IRR has been instructed not to exceed its Base Point is not set in all SCED intervals within the 15-minute Settlement Interval:  SPDAMT *q, r, p, i* = 0  Otherwise, if the flag signifying that the IRR has received a Base Point below the HDL used by SCED or the IRR has been instructed not to exceed its Base Point is set in all SCED intervals within the 15-minute Settlement Interval:  SPDAMT *q, r, p, i* = Max (PR1, RTSPP *p, i*) \* OGENIRR*q, r, p, i*  Where:  OGENIRR *q, r, p, i*  = Max [0, TWTG *q, r, p, i*  – ¼ \* AASP *q, r, p, i \**  (1 + KIRR)]  TWTG *q, r, p, i =*  ( (AVGTG5M *q, r, p, i, y*) / 3) \* ¼  (4) The charge to each QSE for non-excused over-generation of each IRR that is included in an IRR Group, at each Resource Node Settlement Point, if the telemetered generation is greater than the upper tolerance during a 15-minute Settlement Interval, is calculated as follows:  If the flag signifying that the IRR has received a Base Point below the HDL used by SCED or the IRR has been instructed not to exceed its Base Point is not set in all SCED intervals within the 15-minute Settlement Interval for any of the IRRs within an IRR Group, then for all IRRs within an IRR Group:  **SPDAMT *q, r, p* = 0**  If the flag signifying that the IRR has received a Base Point below the HDL used by SCED or the IRR has been instructed not to exceed its Base Point is set in all SCED intervals within the 15-minute Settlement Interval for any of the IRRs within an IRR Group, then the deviation penalty is determined for the IRR Group and evenly allocated and charged to each IRR within that IRR Group:  **SPDAMT *q, r, p* = Max (PR1, RTSPP *p*) \* OGENIRR *q, r, i***  Where:  OGENIRR *q, r, i*  = Max [0, TWTG *q, wg, i*  – ¼ \* AASP *q, wg, i \**  (1 + KIRR)] / N  TWTG *q, wg, i =*  (TWTG *q, r, p, i*)  AASP *q, wg, i* = (AASP *q, r, p, i*)  The above variables are defined as follows:   |  |  |  |  | | --- | --- | --- | --- | | Variable | Unit | Definition | | | SPDAMT *q, r, p, i* | $ | *Set Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Generation Resource *r* at Resource Node *p*, for its deviation from AASP, for the 15-minute Settlement Interval *i*. | | | RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Resource Node *p*, for the 15-minute Settlement Interval *i*. | | | TWTG *q, r, p, i* | MWh | *Time-Weighted Telemetered Generation per QSE per Settlement Point per Resource*—The telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the 15-minute Settlement Interval *i.* | | AASP *q, r, p, i* | MW | *Average Aggregated Set Point Generation per QSE per Settlement Point per Resource*—The average of the Average Five Minute Clock Interval Set Point (AVGSP5M) of Generation Resource *r* represented by QSE *q* at Settlement Point *p*, for the 15-minute Settlement Interval *i.* | | AVGTG5M *q, r, p, i, y* | MW | *Average Telemetered Generation for the 5 Minutes*—The average telemetered generation of Generation Resource *r* represented by QSE *q* at Resource Node *p*, for the five-minute clock interval *y*, within the 15-minute Settlement Interval *i*. | | | OGENIRR *q, r, p, i* | MWh | *Over Generation Volumes per QSE per Settlement Point per IRR Generation Resource*—The amount over generated by the IRR *r* represented by QSE *q* at Resource Node *p* for the 15-minute Settlement Interval *i*. | | | PR1 | $/MWh | The price to use for the charge calculation when RTSPP is less than $20/MWh, $20/MWh. | | | KIRR | none | The percentage tolerance for over-generation of an IRR, 5%. | | | N | none | The number of IRRs within an IRR Group. | | | *q* | none | A QSE. | | | *p* | none | A Settlement Point. | | | *r* | none | An IRR Generation Resource not awarded Ancillary Service or an IRR within an IRR Group where no member of the IRR Group was awarded Ancillary Service. | | | *i* | none | A 15-minute Settlement Interval. | | | *y* | none | A five-minute clock interval in the Settlement Interval. | | | *wg* | none | An IRR Group. | | |

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| [NPRR963, NPRR1010, NPRR1014, and NPRR1029: Insert applicable portions of Section 6.6.5.5 below upon system implementation for NPRR963, NPRR1014, and NPRR1029; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; and renumber accordingly:]  **6.6.5.5 Energy Storage Resource Set Point Deviation Charge for Over Performance**  (1) ERCOT shall charge a QSE for an ESR a Set Point Deviation Charge for over-performance if the telemetered generation or consumption exceeds the specified tolerance.  (2) The tolerance is the greater of 3% of the AASP for the ESR in the Settlement Interval, or three MW above the AASP for the ESR in the Settlement Interval if the Resource meets the following conditions:  (a) The ESR is not a DC-Coupled Resource; or  (b) The ESR is a DC-Coupled Resource and meets the conditions to be treated in the same manner as an ESR as specified in paragraph (1) of Section 3.8.7, DC-Coupled Resources, anytime during the Settlement Interval.  (3) The tolerance will be 5% of the AASP for a DC-Coupled Resource in the Settlement Interval if the ESR meets the conditions to be treated in the same manner as an IRR as specified in paragraph (2) of Section 3.8.7.  (4) The deviation charge for over-performance for each QSE for each ESR at each Resource Node Settlement Point will be calculated as follows:  If the ESR meets the conditions of paragraph (3) above and a flag signifying that the DC-Coupled Resource has received a Base Point below the HDL used by SCED or it has been instructed not to exceed its Base Point is not set in all SCED intervals within the 15-minute Settlement Interval, then:  **SPDAMT *q, r, p, i* = 0**  Otherwise:  **SPDAMT *q, r, p, i* = Max (PR3, RTSPP *p, i*) \* OPESR*q, r, p, i***  Where:  If the ESR meets the conditions of paragraph (2) above, then:  OPESR *q, r, p, i*  = Max [0, (TWTG *q, r, p, i* – ¼ \* Max [(AASP *q, r, p,i +* ABS (K3\* AASP *q, r, p, i*)) *,* (AASP *q, r, p, i* + Q3)])]  If the ESR meets the conditions of paragraph (3) above, then:  OPESR *q, r, p, i*  = Max [0, (TWTG *q, r, p, i* – ¼ \* (AASP *q, r, p, i +* ABS (K5\* AASP *q, r, p, i*)))]  Where:  TWTG *q, r, p, i =*  ( (AVGTG5M *q, r, p, i, y*) / 3) \* ¼  The above variables are defined as follows:   | Variable | Unit | Definition | | --- | --- | --- | | SPDAMT *q, r, p, i* | $ | *Set Point Deviation Charge per QSE per Settlement Point per Resource*—The charge to QSE *q* for Resource *r* at Resource Node *p*, for its deviation from AASP, for the 15-minute Settlement Interval *i*. | | RTSPP *p, i* | $/MWh | *Real-Time Settlement Point Price per Settlement Point*—The Real-Time Settlement Point Price at Settlement Point *p*, for the 15-minute Settlement Interval *i*. | | TWTG *q, r, p, i* | MWh | *Time-Weighted Telemetered Generation per QSE per Settlement Point per Resource*—The telemetered generation or consumption of Resource *r* represented by QSE *q* at Resource Node *p*, for the 15-minute Settlement Interval *i*. | | AASP *q, r, p, i* | MW | *Average Aggregated Set Point per QSE per Settlement Point per Resource*—The average of the Average Five Minute Clock Interval Set Point (AVGSP5M) of Resource *r* represented by QSE *q* at Settlement Point *p,* for the 15-minute Settlement Interval *i*. | | AVGTG5M *q, r, p, i, y* | MW | *Average Telemetered Generation for the 5 Minutes*—The average telemetered generation or consumption of Resource *r* represented by QSE *q* at Resource Node *p*, for the five-minute clock interval *y*, within the 15-minute Settlement Interval *i*. | | OPESR *q, r, p, i* | MWh | *Over-Performance Volumes per QSE per Settlement Point per Resource*—The amount the ESR *r* over-performed*,* represented by QSE *q* at Resource Node *p,* for the 15-minute Settlement Interval *i*. | | PR3 | $/MWh | The price to use for the Set Point Deviation Charge for over-performance when RTSPP is less than $20/MWh, $20/MWh. | | K3 | none | The percentage tolerance for over-performance per paragraph (2) above, 3%. | | K5 | none | The percentage tolerance for over-performance per paragraph (3) above, 5%. | | Q3 | MW | The MW tolerance for over-performance, three MW. | | *q* | none | A QSE. | | *p* | none | A Settlement Point. | | *r* | none | An ESR. | | *y* | none | A five-minute clock interval in the Settlement Interval. | | *i* | none | A 15-minute Settlement Interval. | |

6.6.5.3 Resources Exempt from Deviation Charges

(1) Resource Base Point Deviation Charges do not apply to the following:

(a) Reliability Must-Run (RMR) Units;

(b) Dynamically Scheduled Resources (DSRs) (except as described in Section 6.4.2.2, Output Schedules for Dynamically Scheduled Resources);

(c) Qualifying Facilities (QFs) that do not submit an Energy Offer Curve for the Settlement Interval;

(d) Quick Start Generation Resources (QSGRs) during the 15-minute Settlement Interval after the start of the first SCED interval in which the QSGR is deployed; or

(e) Settlement Intervals in which Emergency Base Points were issued to the Resource.

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| [NPRR863, NPRR963, NPRR1000, NPRR1010, NPRR1014, and NPRR1046: Replace applicable portions of Section 6.6.5.3 above with the following upon system implementation for NPRR863, NPRR963, or NPRR1014; upon system implementation of NPRR1000 for NPRR1000 and NPRR1046; or upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1010; and renumber accordingly:]  6.6.5.6 Resources Exempt from Deviation Charges  (1) Set Point Deviation Charges do not apply to any QSE for the 15-minute Settlement Interval during the following events:  (a) Responsive Reserve (RRS) was manually deployed by ERCOT;  (b) ERCOT Contingency Reserve Service (ECRS) was deployed; or  (c) ERCOT System Frequency deviation is both greater than +0.05 Hz and less than -0.05 Hz within the same Settlement Interval.  (2) Set Point Deviation Charges do not apply to the QSE for the Resource for the 15-minute Interval for the following:  (a) The deviation of the Resource over the 15-minute Settlement Interval is in a direction that contributes to frequency corrections that resolve an ERCOT System frequency deviation and ERCOT System frequency deviation is greater than +/-0.05 Hz at any time during the 15-minute Settlement Interval;  (b) The Resource is a Reliability Must-Run (RMR) Unit;  (c) Emergency Base Points were issued to the Resource; or  (d) Resource is operating in Constant Frequency Control (CFC) mode.  (3) In addition to the exemptions listed in paragraph (1) and (2) of this Section, Set Point Deviation Charges do not apply to the QSE for a Generation Resource for the 15-minute Settlement Interval for the following:  (a) AASP is less than the Resource’s average telemetered LSL;  (b) The Generation Resource is telemetering a status of ONTEST or STARTUP anytime during the Settlement Interval;  (c) Qualifying Facilities (QFs) that do not submit an Energy Offer Curve for the Settlement Interval;  (d) Quick Start Generation Resources (QSGRs) during the 15-minute Settlement Interval after the start of the first SCED interval in which the QSGR is deployed; or  (e) The flag signifying that an IRR has received a Base Point below the HDL used by SCED or the IRR has been instructed not to exceed its Base Point is not set in all SCED intervals within the 15-minute Settlement Interval. For IRR Groups, the flag signifying that an IRR has received a Base Point below the HDL used by SCED or the IRR has been instructed not to exceed its Base Point is not set in all SCED intervals within the 15-minute Settlement Interval for any of the IRRs within the IRR Group.  (4) In addition to the exemptions listed in paragraph (1) and (2) of this Section, Set Point Deviation Charges do not apply to the QSE for the Controllable Load Resource for the 15-minute Settlement Interval if the following occur:  (a) The UDSP is equal to the snapshot of its telemetered power consumption for all SCED runs during the Settlement Interval; or  (b) The Controllable Load Resource is telemetering a status of OUTL anytime during the Settlement Interval.  (5) In addition to the exemptions listed in paragraph (1) and (2) of this Section, Set Point Deviation Charges do not apply to the QSE for the ESR for the 15-minute Settlement Interval if the following occur:  (a) The ESR is telemetering a status of ONTEST anytime during the Settlement Interval; or  (b) The AASP is less than its average telemetered LSL. |

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

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

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

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

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

Where:

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

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

∆frequency is actual frequency minus 60 Hz

EPFR = Estimated Primary Frequency Response (MW) = if │∆frequency│≤ Governor Dead-Band then EPFR = zero, if not then if ∆frequency > zero, EPFR = (∆frequency - Governor Dead-Band)/((droop value \* 60) – Governor Dead-Band) \* HSL \* -1, if not then if ∆frequency < zero, EPFR = (∆frequency + Governor Dead-Band)/((droop value \* 60) – Governor Dead-Band) \* HSL \* -1

AEPFR = Average Estimated Primary Frequency Response = the Estimated Primary Frequency Response (MW) will be calculated every four seconds using a Resource specific droop value where 5% droop = 0.05 the Governor Dead-Band (Hz) and Resource HSL (MW) provided by the Resource Entity, and the frequency deviation (Hz) from 60 Hz and averaged for the five-minute clock interval. For Combined Cycle Generation Resources, or Generation Resources that have been approved to telemeter Non-Frequency Responsive Capacity (NFRC), the HSL will be reduced by the telemetered NFRC MW to calculate the EPFR. For Combined Cycle Generation Resources, 5.78% Governor droop shall be used. The Resource-specific calculations will be aggregated for IRR Groups.

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

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

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

**GREDP (MW) = ABS(∑*DSR*ATG – ∑*DSR* DBPOS – ATDSRL– ARRDDSRLR – ANSDDSRLR + Intra-QSE Purchase - Intra-QSE Sale – ∑*DSR* AEPFR – ∑*DSR*ARI)**

Where:

∑*DSR* ATG = Sum of Average Telemetered Generation for all Resources with a Resource Status of ONDSR or ONDSRREG of the QSE for the five-minute clock interval

∑*DSR*ARI = Sum of Average Regulation Instruction for all Resources with a Resource Status of ONDSR or ONDSRREG of the QSE for the five-minute clock interval

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

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

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

∑*DSR*AEPFR = Sum of Average Estimated Primary Frequency Response for all Resources with a Resource Status of ONDSR or ONDSRREG of the QSE for the five-minute clock interval

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

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

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

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

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

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

Where:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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| [NPRR863, NPRR879, NPRR963, NPRR965, NPRR1000, NPRR1011, NPRR1014, NPRR1029, and NPRR1040: Replace applicable portions of Section 8.1.1.4.1 above with the following upon system implementation for NPRR863, NPRR879, NPRR963, NPRR965, NPRR1000, NPRR1014, NPRR1029, or NPRR1040; upon system implementation of the Real-Time Co-Optimization (RTC) project for NPRR1011; or upon system implementation of NPRR1000 for NPRR1046:]  8.1.1.4.1 Regulation Service and Generation Resource/Controllable Load Resource/Energy Storage Resource Energy Deployment Performance, and Ancillary Service Capacity Performance Metrics  (1) ERCOT shall compute the GREDP for each Generation Resource that is On-Line and released to SCED for Base Point Dispatch Instructions. The GREDP is calculated for each five-minute clock interval as a percentage and in MWs as follows:  **GREDP (%) = ABS[((ATG – AEPFR)/(ASP)) – 1.0] \* 100**  **GREDP (MW) = ABS(ATG – AEPFR –ASP)**  Where:  ATG = Average Telemetered Generation = the average telemetered generation of the Generation Resource or for the aggregate of the IRRs within a IRR Group for the five-minute clock interval  ∆frequency is actual frequency minus 60 Hz  EPFR = Estimated Primary Frequency Response (MW) = if │∆frequency│≤ Governor Dead-Band then EPFR = zero, if not then if ∆frequency > zero, EPFR = (∆frequency - Governor Dead-Band)/((droop value \* 60) – Governor Dead-Band) \* HSL \* -1, if not then if ∆frequency < zero, EPFR = (∆frequency + Governor Dead-Band)/((droop value \* 60) – Governor Dead-Band) \* HSL \* -1  AEPFR = Average Estimated Primary Frequency Response = the Estimated Primary Frequency Response (MW) will be calculated every four seconds using a Resource specific droop value where 5% droop = 0.05 the Governor Dead-Band (Hz) and Resource HSL (MW) provided by the Resource Entity, and the frequency deviation (Hz) from 60 Hz and averaged for the five-minute clock interval. For Combined Cycle Generation Resources with Non-Frequency Responsive Capacity (NFRC), the HSL to calculate the EPFR will be based on the Resource’s high limit of the capacity that is frequency responsive. For Combined Cycle Generation Resources, 5.78% Governor droop shall be used. The Resource-specific calculations will be aggregated for IRR Groups.  ASP = Average Set Point = the time-weighted average of the Resource’s Updated Desired Set Point (UDSP) for the five-minute clock interval  (2) For Controllable Load Resources that have a Resource Status of ONL and are acting as a Controllable Load Resource and are not part of an ESR, ERCOT shall compute the CLREDP. The CLREDP will be calculated both as a percentage and in MWs as follows:  **CLREDP (%) = ABS[((ATPC + AEPFR)/(ASP)) – 1.0] \* 100**  **CLREDP (MW) = ABS(ATPC – (ASP – AEPFR))**  Where:  ATPC = Average Telemetered Power Consumption = the average telemetered power consumption of the Controllable Load Resource for the five-minute clock interval  AEPFR = Average Estimated Primary Frequency Response = the Estimated Primary Frequency Response (MW) will be calculated every four seconds using a Resource specific droop value where 5% droop = 0.05, the Governor Dead-Band (Hz) and Resource HSL (MW) provided by the Resource Entity, and the frequency deviation (Hz) from 60 Hz and averaged for the five-minute clock interval  ASP = Average Set Point = the time-weighted average of the Resource’s UDSP for the five-minute clock interval  (3) ERCOT shall compute the ESREDP for ESRs. The ESREDP is calculated for each five-minute clock interval as a percentage and in MWs as follows:  **ESREDP (%) = ABS[((ATPF – AEPFR)/(ASP)) – 1.0] \* 100**  **ESREDP (MW) = ABS(ATPF – AEPFR – ASP)**  Where:  ATPF = Average Telemetered Power Flow = the average telemetered power flow of the Energy Storage Resource for the five-minute clock interval.  ASP = Average Set Point = the time-weighted average of UDSP, for the five-minute clock interval.  ∆frequency is actual frequency minus 60 Hz.  EPFR = Estimated Primary Frequency Response (MW) = If │∆frequency│≤ Governor Dead-Band then EPFR = zero, if not then if ∆frequency > zero, EPFR = (∆frequency - Governor Dead-Band)/((droop value \* 60) – Governor Dead-Band) \* ABS(HSL-LSL) \* -1, if not then if ∆frequency < zero, EPFR = (∆frequency + Governor Dead-Band)/((droop value \* 60) – Governor Dead-Band) \* ABS(HSL-LSL) \* -1.  AEPFR = Average Estimated Primary Frequency Response = the Estimated Primary Frequency Response (MW) will be calculated every four seconds using a Resource-specific droop value where 5% droop = 0.05, the Governor Dead-Band (Hz), Resource LSL (MW), and Resource HSL (MW) provided by the Resource Entity, and the frequency deviation (Hz) from 60 Hz and averaged for the five-minute clock interval.  (4) ERCOT shall post to the MIS Certified Area for each QSE and for all Generation Resources or Wind-powered Generation Resource (WGR) Groups, and for all Controllable Load Resources:  (a) The percentage of the monthly five-minute clock intervals during which the Generation Resource or IRR Group was On-Line and released to SCED Base Point Dispatch Instructions;  (b) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL;  (c) The percentage of the monthly five-minute clock intervals during which the Generation Resource, IRR or Controllable Load Resource was awarded Regulation Service;  (d) The percentage of the monthly five-minute clock intervals during which the Generation Resource or the IRR Group was released to SCED that the GREDP was less than 2.5% and the percentage of the monthly five-minute clock intervals during which the Generation Resource or the IRR Group was released to SCED that the GREDP was less than 2.5 MW;  (e) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was less than 2.5% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was less than 2.5 MW;  (f) The percentage of the monthly five-minute clock intervals during which the Generation Resource or the IRR Group was released to SCED that the GREDP was equal to or greater than 2.5% and equal to or less than 5.0% and the percentage of the monthly five-minute clock intervals during which the Generation Resource or the IRR Group was released to SCED that the GREDP was equal to or greater than 2.5 MW and equal to or less than 5.0 MW;  (g) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was equal to or greater than 2.5% and equal to or less than 5.0% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was equal to or greater than 2.5 MW and equal to or less than 5.0 MW;  (h) The percentage of the monthly five-minute clock intervals during which the Generation Resource or the IRR Group was released to SCED that the GREDP was greater than 5.0% and the percentage of the monthly five-minute clock intervals during which the Generation Resource or the IRR Group was released to SCED that the GREDP was greater than 5.0 MW;  (i) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was greater than 5.0% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource had a Resource Status of ONL that the CLREDP was greater than 5.0 MW;  (j) The percentage of the monthly five-minute clock intervals during which the Generation Resource or the IRR was awarded Regulation Service that the GREDP was less than 2.5% and the percentage of the monthly five-minute clock intervals during which the Generation Resource or the IRR was awarded Regulation Service that the GREDP was less than 2.5 MW;  (k) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was less than 2.5% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was less than 2.5 MW;  (l) The percentage of the monthly five-minute clock intervals during which the Generation Resource or the IRR was awarded Regulation Service that the GREDP was equal to or greater than 2.5% and equal to or less than 5.0% and the percentage of the monthly five-minute clock intervals during which the Generation Resource or the IRR was awarded Regulation Service that the GREDP was equal to or greater than 2.5 MW and equal to or less than 5.0 MW;  (m) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was equal to or greater than 2.5% and equal to or less than 5.0% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was equal to or greater than 2.5 MW and equal to or less than 5.0 MW;  (n) The percent of the monthly five-minute clock intervals during which the Generation Resource or the IRR was awarded Regulation Service that the GREDP was greater than 5.0% and the percentage of the monthly five-minute clock intervals during which the Generation Resource or the IRR was awarded Regulation Service that the GREDP was greater than 5.0 MW; and  (o) The percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was greater than 5.0% and the percentage of the monthly five-minute clock intervals during which the Controllable Load Resource was awarded Regulation Service that the CLREDP was greater than 5.0 MW.  (5) ERCOT shall calculate the GREDP/CLREDP/ESREDP under normal operating conditions. ERCOT shall not consider five-minute clock intervals during which any of the following events has occurred:  (a) The five-minute intervals within the 20-minute period following an event in which ERCOT has experienced a Forced Outage causing an ERCOT frequency deviation of greater than 0.05 Hz;  (b) Five-minute clock intervals in which ERCOT has issued Emergency Base Points to the QSE;  (c) The five-minute clock intervals following a documented Forced Derate or Startup Loading Failure of a Generation Resource, ESR, or any member IRR of an IRR Group. Upon request of the Reliability Monitor or ERCOT, the QSE shall provide the following documentation regarding each Forced Derate or Startup Loading Failure:  (i) Its generation log documenting the Forced Outage, Forced Derate or Startup Loading Failure;  (ii) QSE (COP) for the intervals prior to, and after the event; and  (iii) Equipment failure documentation which may include, but not be limited to, Generation Availability Data System (GADS) reports, plant operator logs, work orders, or other applicable information;  (d) The five-minute clock intervals where the telemetered Resource Status is set to ONTEST such as intervals during Ancillary Service Qualification and Testing as outlined in Section 8.1.1.1, Ancillary Service Qualification and Testing, or the five-minute clock intervals during general capacity testing requirements as outlined in Section 8.1.1.2, General Capacity Testing Requirements;  (e) The five-minute clock intervals where the telemetered Resource Status is set to STARTUP;  (f) The five-minute clock intervals where a Generation Resource’s ASP is below the average telemetered LSL;  (g) Certain other periods of abnormal operations as determined by ERCOT in its sole discretion;  (h) For a Controllable Load Resource, the five-minute clock intervals in which the computed Base Points are equal to the snapshot of its telemetered power consumption;  (i) For intervals where both the primary and backup Wide Area Network (WAN) connections are inoperative; and  (j) For QSGRs, the five-minute clock intervals in which the QSGR has a telemetered status of SHUTDOWN or telemeters an LSL of zero pursuant to Section 3.8.3.1, Quick Start Generation Resource Decommitment Decision Process.  (6) All Generation Resources that are not part of an ESR, excluding IRRs, shall meet the following GREDP criteria for each month. ERCOT will report non-compliance of the following performance criteria to the Reliability Monitor:  (a) A Generation Resource, excluding an IRR, must have a GREDP less than the greater of X% or Y MW for 85% of the five-minute clock intervals in the month during which GREDP was calculated.  (b) Additionally, all Generation Resources, excluding IRRs, will also be measured for performance specifically during intervals in which ERCOT has declared EEA Level 1 or greater. These Resources must meet the following GREDP criteria for the time window that includes all five-minute clock intervals during which EEA was declared. ERCOT will report non-compliance of the following performance criteria to the Reliability Monitor:  (i) A Generation Resource, excluding an IRR, must have a GREDP less than the greater of X% or Y MW. A Generation Resource cannot fail this criteria more than three five-minute clock intervals during which EEA was declared and GREDP was calculated. The performance will be measured separately for each instance in which ERCOT has declared EEA.  (7) All IRRs and IRR Groups shall meet the following GREDP criteria for each month. ERCOT will report non-compliance of the following performance criteria to the Reliability Monitor:  (a) An IRR or IRR Group must have a GREDP less than Z% or the ATG must be less than the expected MW output for 95% of the five-minute clock intervals in the month when the Resource or a member IRR of an IRR Group was not awarded Ancillary Service and received a Base Point Dispatch Instruction in which the Base Point was two MW or more below the IRR’s HSL used by SCED or the IRR was instructed not to exceed its Base Point. The expected MW output includes the Resource’s Base Point, Regulation Service instructions, and any expected Primary Frequency Response.  (b) An IRR or IRR Group must have a GREDP less than the greater of X% or Y MW for 85% of the five-minute clock intervals in the month during which the Resource or a member IRR of an IRR Group was awarded Ancillary Service.  (c) Additionally, all IRRs and IRR Groups will also be measured for performance specifically during intervals in which ERCOT has declared EEA Level 1 or greater. These Resources and IRR Groups must meet the following GREDP criteria for the time window that includes all five-minute clock intervals during which EEA was declared. ERCOT will report non-compliance of the following performance criteria to the Reliability Monitor:  (i) An IRR or IRR Group must have a GREDP less than Z% or the ATG must be less than the expected MW output. An IRR or IRR Group cannot fail this criteria more than three five-minute clock intervals during which EEA was declared and the Resource or a member of an IRR Group was not awarded Ancillary Service and received a Base Point Dispatch Instruction in which the Base Point was two MW or more below the IRR’s HSL used by SCED or the IRR was instructed not to exceed its Base Point. The performance will be measured separately for each instance in which ERCOT has declared EEA.  (ii) An IRR or IRR Group must have a GREDP less than the greater of X% or Y MW when the Resource or a member IRR of an IRR Group was awarded Ancillary Service. An IRR or IRR Group cannot fail this criteria more than three five-minute clock intervals during which EEA was declared. The performance will be measured separately for each instance in which ERCOT has declared EEA.  (8) All Controllable Load Resources that are not part of an ESR shall meet the following CLREDP criteria each month. ERCOT will report non-compliance of the following performance criteria to the Reliability Monitor:  (a) A Controllable Load Resource must have a CLREDP less than the greater of X% or Y MW for 85% of the five-minute clock intervals in the month during which CLREDP was calculated.  (b) Additionally, all Controllable Load Resources will also be measured for performance specifically during intervals in which ERCOT has declared EEA Level 1 or greater. These Resources must meet the following CLREDP criteria for the time window that includes all five-minute clock intervals during which EEA was declared. ERCOT will report non-compliance of the following Performance criteria to the Reliability Monitor:  (i) A Controllable Load Resource must have a CLREDP less than the greater of X% or Y MW. A Controllable Load Resource cannot fail this criteria more than three five-minute clock intervals during which EEA was declared and CLREDP was calculated. The performance will be measured separately for each instance in which ERCOT has declared EEA.  (c) For Controllable Load Resources which are providing RRS, ECRS, or Non-Spin, the following intervals will be excluded from these calculations:  (i) Five-minute clock intervals which begin ten minutes or less after a deployment of RRS or ECRS was deployed to the Resource;  (ii) Five-minute clock intervals which begin ten minutes or less after a recall of RRS or ECRS when the Resource was deployed for RRS or ECRS;  (iii) Five-minute clock intervals which begin 30 minutes or less after a deployment of Non-Spin was deployed to the Resource; and  (iv) Five-minute clock intervals which begin 30 minutes or less after a recall of Non-Spin when the Resource was deployed for Non-Spin.  (9) All ESRs shall meet the following ESREDP criteria each month. ERCOT will report non-compliance of the following performance criteria to the Reliability Monitor:  (a) An ESR must have an ESREDP less than the greater of V% or W MW for 85% of the five-minute clock intervals in the month during which ESREDP was calculated.  (b) Additionally, all ESRs will also be measured for performance specifically during intervals in which ERCOT has declared EEA Level 1 or greater. These Resources must meet the following ESREDP criteria for the time window that includes all five-minute clock intervals during which EEA was declared. ERCOT will report non-compliance of the following performance criteria to the Reliability Monitor:  (i) An ESR must have an ESREDP less than the greater of V% or W MW. An ESR cannot fail this criteria more than three five-minute clock intervals during which EEA was declared and ESREDP was calculated. The performance will be measured separately for each instance in which ERCOT has declared EEA.  (10) DC-Coupled Resources shall meet the following ESREDP criteria each month. ERCOT will report non-compliance of the following performance criteria to the Reliability Monitor:  (a) For each five-minute clock interval in which a DC-Coupled Resource meets the conditions in paragraph (1) of Section 3.8.7, DC-Coupled Resources, the DC-Coupled Resource must have an ESREDP less than the greater of V% or W MW for 85% of the five-minute clock intervals in the month during which ESREDP for the DC-Coupled Resource was calculated.  (b) For each five-minute clock interval in which a DC-Coupled Resource meets the conditions in paragraph (2) of Section 3.8.7, the DC-Coupled Resource must have an ESREDP less than Z% or the ATG must be less than the expected MW output for 95% of the five-minute clock intervals in the month when the DC-Coupled Resource received a Base Point Dispatch Instruction in which the Base Point was two MW or more below the DC-Coupled Resource’s HSL used by SCED or the IRR was instructed not to exceed its Base Point. The expected MW output includes the Resource’s Base Point and any expected Primary Frequency Response.  (c) Additionally, all DC-Coupled Resources will be measured for performance during intervals in which ERCOT has declared an EEA. These Resources must meet the following ESREDP criteria for the time window that includes all five-minute clock intervals during which the EEA was declared. ERCOT will report non-compliance of the following performance criteria to the Reliability Monitor:  (i) For each five-minute clock interval in which a DC-Coupled Resource meets the conditions in paragraph (1) of Section 3.8.7, the DC-Coupled Resource must have an ESREDP less than the greater of V% or W MW. A DC-Coupled Resource cannot fail this criteria more than three five-minute clock intervals during which EEA was declared and ESREDP was calculated. The performance will be measured separately for each instance in which ERCOT has declared EEA.  (ii) For each five-minute clock interval in which a DC-Coupled Resource meets the conditions in paragraph (2) of Section 3.8.7, the DC-Coupled Resource must have a ESREDP less than Z% or the ATG must be less than the expected MW output. A DC-Coupled Resource cannot fail this criteria more than three five-minute clock intervals during which EEA was declared and the DC-Coupled Resource received a Base Point Dispatch Instruction in which the Base Point was two MW or more below the DC-Coupled Resource’s HSL used by SCED or the IRR was instructed not to exceed its Base Point. The performance will be measured separately for each instance in which ERCOT has declared EEA.  (11) The GREDP/CLREDP/ESREDP performance criteria in paragraphs (6) through (10) above shall be subject to review and approval by TAC. The GREDP/CLREDP/ESREDP performance criteria variables V, W, X, Y, and Z shall be posted to the ERCOT website no later than three Business Days after TAC approval.  (12) If at the end of the month during which GREDP was calculated, a Resource has a GREDP less than X% or Y MW for 85% of the five-minute clock intervals, the Reliability Monitor shall, at the request of the QSE, recalculate GREDP excluding the five-minute clock intervals when a Resource is deployed above the unit’s ramp rate due to ramp rate sharing between energy and Regulation Service. The requesting QSE shall provide to the Reliability Monitor information validating the ramp rate violation for the intervals in dispute. |