

## NPRR258 – Grey-Boxed Language

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NPRR Number	258	NPRR Title	Synchronization with PRR824 and PRR833 and Additional Clarifications
Nodal Protocol Section Grey-Boxed		8.1.1.4.1, Regulation Service and Generation Resource/Controllable Load Resource Energy Deployment Performance	

### Current Grey-Boxed Protocol Language

#### **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, ERCOT shall compute the GREDP for each Generation Resource that is On-Line and released to Security-Constrained Economic Dispatch (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:

$$\text{GREDP (\%)} = \text{ABS}[((\text{ATG} - \text{AEPFR})/(\text{ABP} + \text{ARI})) - 1.0]*100$$

$$\text{GREDP(MW)} = \text{ABS}(\text{ATG} - \text{AEPFR} - \text{ABP} - \text{ARI})$$

Where:

ATG = Average Telemetered Generation = the average telemetered generation of the Generation Resource for the five-minute clock interval

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

EPFR = Estimated Primary Frequency Response = if (  $|\Delta\text{frequency}| \geq \text{frequency deviation deadband}$ , (frequency bias \*  $\Delta\text{frequency}$ )\*10,0)

**[NPRR258: Replace the above paragraph with the following upon system implementation:]**

$\Delta\text{frequency}$  is actual frequency minus 60 Hz

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EPFR = Estimated Primary Frequency Response (MW) = if  $|\Delta\text{frequency}| \leq \text{Governor Dead-Band}$  then EPFR = zero, if not then if  $\Delta\text{frequency} > \text{zero}$ , EPFR =  $(\Delta\text{frequency} - \text{Governor Dead-Band}) / ((\text{droop value} * 60) - \text{Governor Dead-Band}) * \text{HSL} * -1$ , if not then if  $\Delta\text{frequency} < \text{zero}$ , EPFR =  $(\Delta\text{frequency} + \text{Governor Dead-Band}) / ((\text{droop value} * 60) - \text{Governor Dead-Band}) * \text{HSL} * -1$

AEPFR = Average Estimated Primary Frequency Response = an Estimated Primary Frequency Response will be calculated every four seconds using a Resource specific frequency bias (MW/0.1 Hz) and Governor Dead-Band (Hz), both provided by the Resource Entity, and the frequency deviation (Hz) and averaged for the five-minute clock interval

**[NPRR258: Replace the above paragraph with the following upon system implementation:]**

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 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 ("DSR Portfolio"), ERCOT shall calculate an aggregate GREDP as a percentage and in MWs for those Resources as follows:

$$\text{GREDP (\%)} = \text{ABS}[(\sum_{\text{DSR}} \text{ATG} - \sum_{\text{DSR}} \text{DBPOS} + \text{Intra-QSE Purchase} - \text{Intra-QSE Sale} - \text{ARRDDSLR} - \text{ANSDDSLR} - \sum_{\text{DSR}} \text{AEPFR}) / (\text{ATDSRL} + \sum_{\text{DSR}} \text{ARI}) - 1.0] * 100$$

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$$\text{GREDP (MW)} = \text{ABS}(\sum_{\text{DSR}} \text{ATG} - \sum_{\text{DSR}} \text{DBPOS} - \text{ATDSRL} - \text{ARRDDSRLR} - \text{ANSDDSRLR} + \text{Intra-QSE Purchase} - \text{Intra-QSE Sale} - \sum_{\text{DSR}} \text{AEPFR} - \sum_{\text{DSR}} \text{ARI})$$

Where:

$\sum_{\text{DSR}} \text{ATG}$  = 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

$\sum_{\text{DSR}} \text{ARI}$  = 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 Dynamically Scheduled Resource (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”

$\sum_{\text{DSR}} \text{AEPFR}$  = 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

$\sum_{\text{DSR}} \text{DBPOS}$  = 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 ONRRCLR, ERCOT shall compute the CLREDP. The CLREDP will be calculated both as a percentage and in MWs as follows:

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$$\text{CLREDP (\%)} = \text{ABS}[\frac{(\text{ATPC} + \text{AEPFR})}{(\text{ASPC} - \text{ANSD} - \text{ARRD} - \text{ARI})} - 1.0] * 100$$

$$\text{CLREDP (MW)} = \text{ABS}(\text{ATPC} - (\text{ASPC} - \text{AEPFR} - \text{ANSD} - \text{ARRD} - \text{ARI}))$$

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 = an estimated Primary Frequency Response (MW) will be calculated every four seconds using a Resource specific frequency bias (MW/0.1 Hz) and Governor Dead-Band (Hz), both provided by the Resource Entity, and the frequency deviation (Hz) and averaged for the five-minute clock interval

**[NPRR258: Replace the above paragraph with the following upon system implementation:]**

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

ASPC = Average Scheduled Power Consumption = the Scheduled Power Consumption that represents zero Ancillary Service deployments averaged for the five-minute clock interval

ANSD = Average Non-Spin Deployed = the average Non-Spin service deployment for the Controllable Load Resource averaged for the five-minute clock interval. The Non-Spin service deployment is calculated by subtracting the telemetered Resource Non-Spin schedule from the telemetered Resource Non-Spin responsibility

ARRD = Average Responsive Reserve Deployed = the average RRS deployment for the Controllable Load Resource averaged for the five-minute clock interval. The RRS deployment is calculated by subtracting the telemetered Resource RRS schedule from the telemetered Resource RRS responsibility

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- (5) ERCOT shall post to the MIS Certified Area for each QSE and for all Generation Resources 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 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 ONRRCLR;
  - (c) The percentage of the monthly five-minute clock intervals during which the Generation Resource or Controllable Load Resource was providing Regulation Service;
  - (d) The percentage of the monthly five-minute clock intervals during which the Resource 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 Resource 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 ONRRCLR 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 ONRRCLR that the CLREDP was less than 2.5 MW;
  - (f) The percentage of the monthly five-minute clock intervals during which the Resource 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 Resource 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 ONRRCLR 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 ONRRCLR that the CLREDP was equal to or greater than 2.5 MW and equal to or less than 5.0 MW;

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- (h) The percentage of the monthly five-minute clock intervals during which the Resource 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 Resource 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 ONRRCLR 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 ONRRCLR 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 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 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 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 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 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 or the DSR Portfolio was providing Regulation Service that the GREDP was greater than 5.0 MW; and

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- (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. 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 during Ancillary Service Qualification and Testing as outlined in Section 8.1.1.1, Ancillary Service Qualification and Testing, and 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 "ONTEST"; and
  - (g) Certain other periods of abnormal operations as determined by ERCOT in its sole discretion.

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***[NPRR256: Replace paragraph (6) above with the following upon system implementation:]***

- (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 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 ERCOT 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;
  - (d) The five-minute clock intervals following a documented Forced Derate or Startup Loading Failure of a Generation Resource. 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 during Ancillary Service Qualification and Testing as outlined in Section 8.1.1.1, Ancillary Service Qualification and Testing, and 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 "ONTEST"; and
  - (g) Certain other periods of abnormal operations as determined by ERCOT in



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its sole discretion.

- (7) All Generation Resources that are not part of a DSR Portfolio, excluding Intermittent Renewable Resources (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 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.

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.

Additionally, all Generation Resource 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:

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.

**[NPRR256: Replace paragraph (7) above with the following upon system implementation:]**

- (7) All Generation Resources that are not part of a DSR Portfolio, excluding Intermittent Renewable Resources (IRRs), and all DSR Portfolios shall meet the following GREDP

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criteria for each month. ERCOT will report non-compliance of the following performance criteria to the reliability monitor:

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.

Additionally, all Generation Resource 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:

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 shall meet the following GREDP criteria for each month. ERCOT will report non-compliance of the following performance criteria to the reliability monitor:

An IRR 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 received a Base Point Dispatch Instruction in which the Base Point was two MW or more below the IRR's HSL used by SCED. The expected MW output includes the Resource's Base Point, Regulation Service instructions, and any expected Primary Frequency Response.

Additionally, all 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:

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

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- (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 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.

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:

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.

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

- (a) Five-minute clock intervals which begin ten minutes or less after a deployment of RRS was deployed to the Resource;
  - (b) Five-minute clock intervals which begin ten minutes or less after a recall of RRS when the Resource was deployed for RRS;
  - (c) Five-minute clock intervals which begin 30 minutes or less after a deployment of Non-Spin was deployed to the Resource; and
  - (d) 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 reviewed and set by the TAC two months before the Texas Nodal Market Implementation Date. The performance criteria will be subject to review by TAC beginning two months after the Texas Nodal Market Implementation Date and as deemed necessary. The GREDP/CLREDP performance criteria variables X, Y, and Z shall be posted to the MIS Public Area 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

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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.