

ERCOT Business Practice:

Procedure for Calculating RRS Limits for Individual Resources

**Version 1.0**

Document Revisions

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PROTOCOL DISCLAIMER

This Business Practice describes ERCOT Systems and the response of these systems to Market Participant submissions incidental to the conduct of operations in the ERCOT Texas Nodal Market implementation and is not intended to be a substitute for the ERCOT Nodal Protocols (available at http://www.ercot.com/mktrules/nprotocols/current), as amended from time to time. If any conflict exists between this document and the ERCOT Nodal Protocols, the ERCOT Nodal Protocols shall control in all respects.

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Responsive Reserve Service

Response Reserve Service (RRS) is an operating reserve on Generation Resources, Load Resources, and Resources capable of providing Fast Frequency Response (FFR) maintained by ERCOT to help control the frequency of the system. RRS on Generation Resources and Controllable Load Resources (CLR) that are capable of providing Primary Frequency Response (PFR) can be released to Security Constrained Economic Dispatch (SCED) during scarcity conditions as outlined in the Nodal Operating Guide Section 4.8, Responsive Reserve Service During Scarcity Conditions.

# RRS MW Limits for Individual Resources

Thermal Resources that have scored greater than or equal to 0.75 score for PFR initial and PFR sustained measures (computed per Nodal Operating Guide Section 8J, Initial and Sustained Measurements for Primary Frequency Response) for three or more consecutive Frequency Measurable Events (FMEs) over the period of two calendar months, shall continue to be subject to 20% of their respective High Sustained Limit (HSL) as their RRS limit. Thermal Resources that fail the above check will be subject to a review of their respective RRS limit using the process outlined in Section 3.

The default MW limit for any new Generation Resource providing RRS shall be set to 20% of its HSL. A Private Use Network (PUN) with a registered Resource may use its gross HSL for qualifying and establishing a limit on the amount of RRS capacity that the Resources within the PUN can provide.

Non-Thermal Resources RRS threshold may be updated to be higher or lower than 20% threshold based on their droop performance characteristics, actual tests, and the need to keep the frequency responsive capability fairly distributed across multiple resources.

# Calculating RRS MW Limits for Individual Resources

For Resources that fails the PFR initial and PFR sustained measures for three or more consecutive FMEs over the period of two calendar months, ERCOT shall establish MW limit for providing RRS based on their respective performance during Frequency Measurable Events (FME) or any limitations exhibited within its dynamic models or through droop performance tests on as needed basis.

If the RRS limit is to be determined based upon Resources performance during an FME then such RRS limit shall be calculated as follows,

1. The MW Limit for each Generation Resource and CLR will be calculated using the droop performance during an FME. The Calculated Droop Performance and RRS MW Limit for an FME is calculated as follows:

$$Calculated Droop Performance (Droop)=\frac{(Unit\_{HSL}-NFRC) \*(∆Hz -Unit\_{DB})}{ScheduledFrequency \* ∆MW}$$

$$Calculated RRS MW Limit= \frac{0.01\*ScheduledFrequency}{ScheduledFrequency\*Droop-Unit\_{DB}}$$

1. A median of the calculated MW Limits in the last five FMEs prior to the failure in the FME that triggered the review under Section 3 will be computed for each individual Generation Resource and CLR.
2. A median of all FMEs during previous two months prior to the failure in the FME that triggered the review under Section 3 will be computed for each individual Generation Resource and CLR.
3. RRS MW limit will be established based on lower of the values computed in Steps 2 and 3.

Note if a Generation Resource or CLRs’s performance during an FME is excluded per the current process (BAL-TRE-001) from the rolling average calculation, the Resource’s performance will also be excluded from the RRS MW Limit calculation. Also note that all members of a Combined Cycle Plants will be evaluated as one Generation Resource for the purposes of this evaluation.

## Calculation Definitions

**Delta Hertz (∆Hz):** The pre-perturbation [the 16-second period of time before t(0)] average frequency minus the post-perturbation [the 32-second period of time starting 20 seconds after t(0)] average frequency

**Delta MW (∆MW):** The pre-perturbation average MW of the Resource minus the post-perturbation average MW of the Resource

**Scheduled Frequency:** The frequency value to be maintained on the system, always 60 Hz

**Non-Frequency Responsive Capability (NFRC):** The telemetered portion of a Generation Resource’s HSL that represents the sustainable non-Dispatched power augmentation capability from duct firing, inlet air cooling, auxiliary boilers, or other methods which does not immediately respond, arrest, or stabilize frequency excursions during the first minutes following a disturbance without secondary frequency response or instructions from ERCOT

**Unit Dead Band (UnitDB):** The range of deviations of system frequency (+/-) that produces no PFR

## RRS MW Limit Updates

ERCOT will recalculate the MW Limit on each individual Generation Resource and CLR on a rolling basis utilizing the last ten evaluated FMEs. ERCOT shall post on the MIS Certified area the MW limit for each Resource providing RRS for each quarter by the 20th day of the first month of the previous quarter. For example, for the first quarter of the year, ERCOT shall post the MW Limit for each Resource by October 20th of the previous year.