



Tenaska Power Services

NPRR 963

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SERVICES CO.***



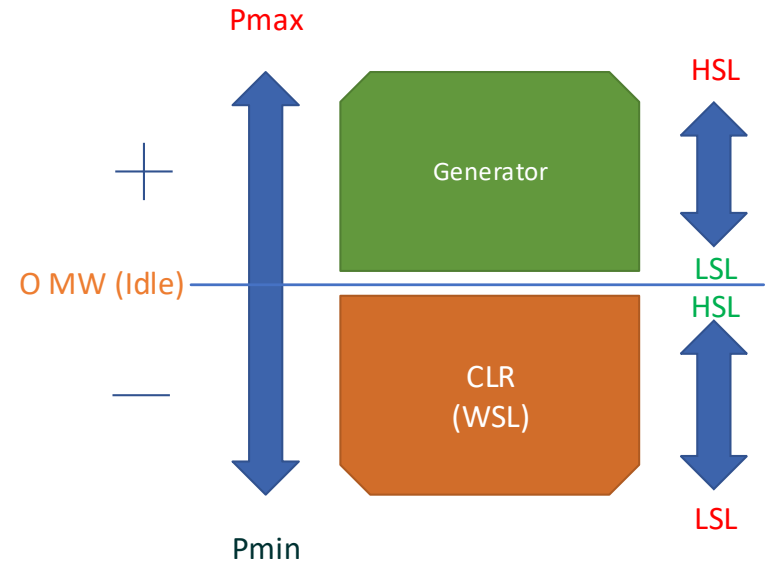
NPRR 963 Overview

ERCOT Model for Energy Storage

- ▶ Energy storage resources are modeled as two Resources in the ERCOT market:

1. Generation Resource (GR)
2. Controllable Load Resource (CLR)

- ▶ Under the current rules, the two resources have independent deviation compliance metrics.
- ▶ Bifurcated design works well for AS obligations that don't cross zero (idle).
- ▶ However, storage resources are fully capable of providing AS or energy obligations with resulting dispatches that do, or should, cross zero.
- ▶ In these cases, energy storage resources will be subject to compliance issues:
 - Basepoint Deviation
 - GREDP violations
 - CLREDP violations

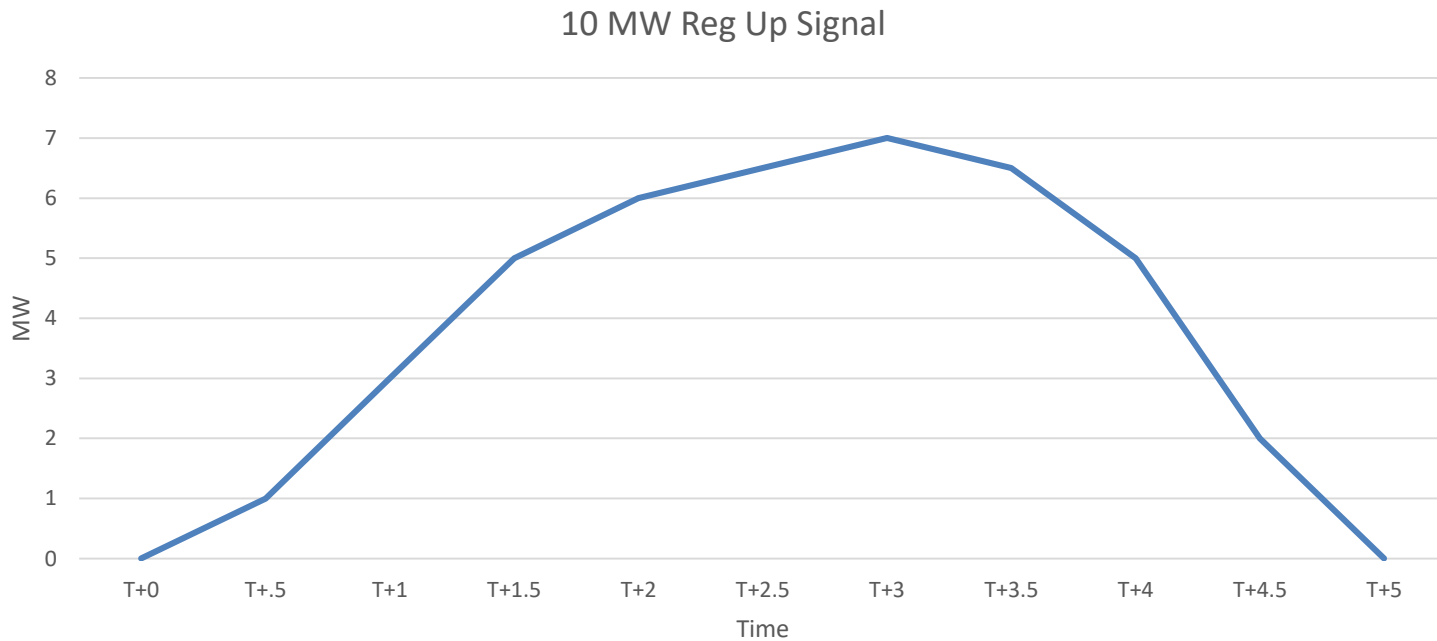


Problem Example Overview -- Regulation

- ▶ A hypothetical 10 MW/20MWh battery wants to offer 10 MW of Reg-Up for one hour.
- ▶ The QSE submits an offer for the GR of the battery for 10MW Reg Up and is awarded 10MW.
- ▶ Intraday, the battery needs to bias towards charging during the hour. Therefore, the QSE submits the following:
 - A Consumption Schedule for the CLR for 5 MW.
 - Adjusted COP for CLR with 5 MW AS responsibility (previously zero MW).
 - Adjusted COP for GR with 5 MW AS responsibility (previously 10MW).

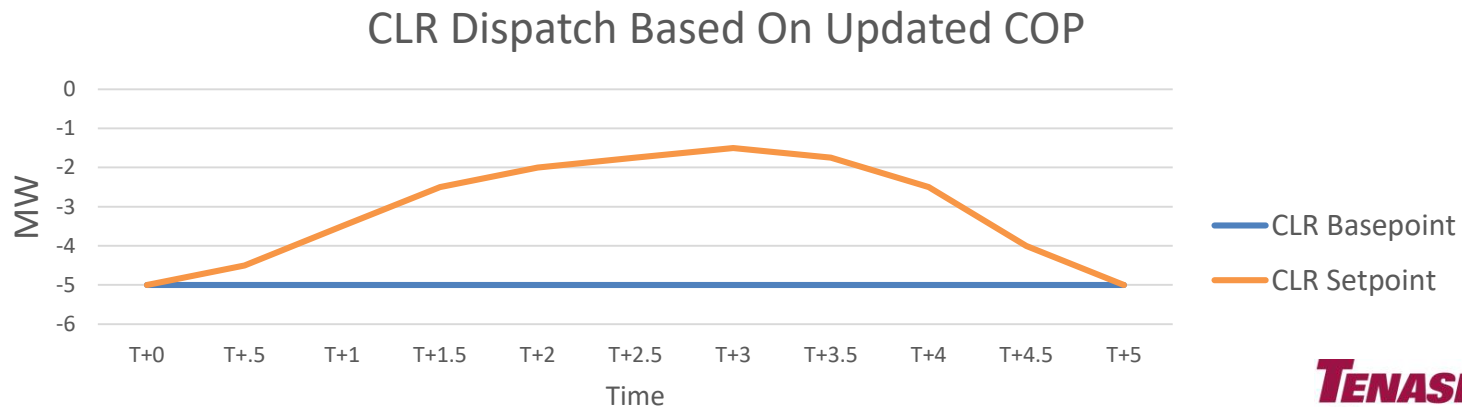
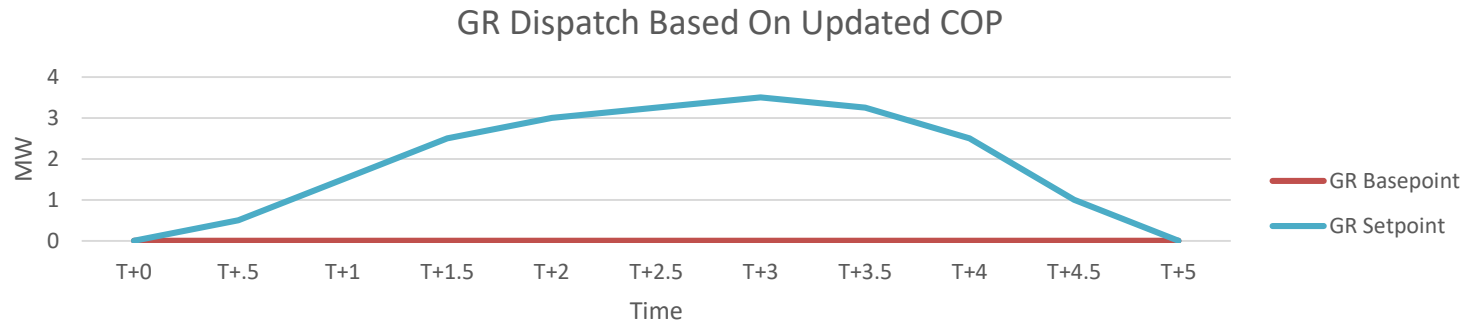
Problem Example – Regulation Signal

- ▶ Given the following 5-minute 10MW aggregated regulation signal:



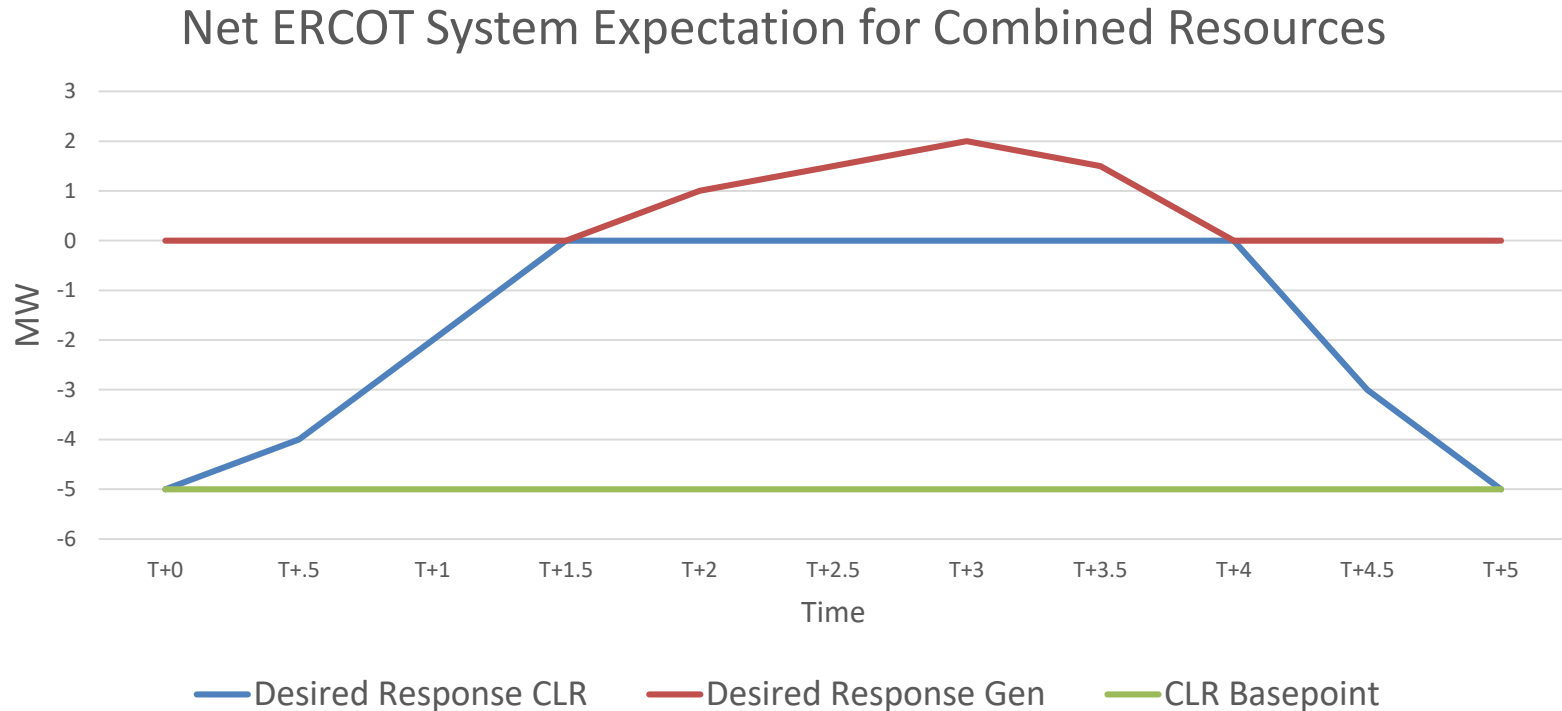
Problem Example – Current Reg Up Dispatch

- ▶ With the responsibility split by the QSE between CLR and GR, current compliance metrics (GREDP, CLREDP, Basepoint Dev.) would expect the following, clearly infeasible, response (setpoint = basepoint + regulation signal):



Problem Example – Desired Reg Up Dispatch

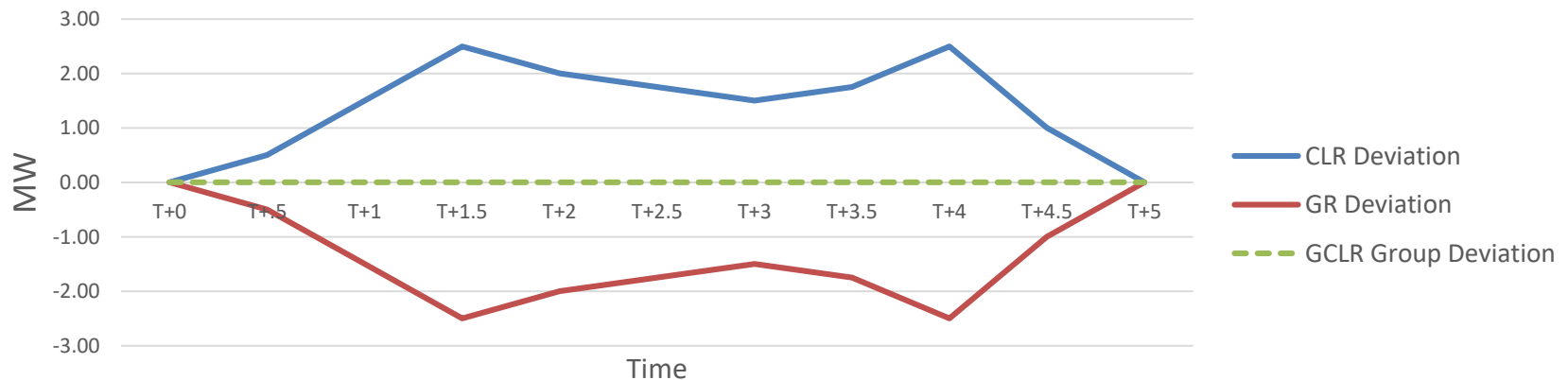
- ▶ When, in fact, what ERCOT needs is the following response, that cannot be properly measured for performance by ERCOT's current compliance rules:



Problem Example – Deviations and GCLR Group Solution

- ▶ By providing the full, correct, and feasible response for the total ERCOT regulation signal for the two resources' responsibilities by aggregating through QSE's SCADA, QSE would be subject to compliance deviations.
- ▶ GCLR Group proposed in NPRR 963 nets deviations, therefore:
 - ERCOT will receive the desired signal.
 - QSE will not be subject to compliance penalties received from infeasible dispatches:

Deviations Resulting from Providing Proper Response



Summary

- ▶ Current market design does not allow energy storage to fully participate in all market products without compliance issues and causes problems for State of Charge management.
- ▶ Problem affects Regulation, RRS, and PFR/Governor response through one or more of CLREDP, GREDP, and Basepoint Deviation compliance metrics.
- ▶ Final solution will come with a new single Energy Storage Resource type to replace current bifurcated model, that will allow negative to positive MW dispatches.
- ▶ Final solution will not be implemented until RTC.
- ▶ NPRR 963 GCLR concept provides interim solution with low system and market impact. Solution is similar to the already implemented IRR Group concept.



Thank you