**TAC Emergency Conditions List**

Items/Actions Assigned to PDCWG

Discussion Summary from 7/16/21 PDCWG

*6 Resource Telemetry: Ensure accurate exchange of Resource telemetry information related to PRC to enhance situational awareness during EEA events.*

Problem—ERCOT currently does not have a way of telling how much generation and how much reserves are being provided by units experiencing a problem. The generator, when trouble shooting the problem, does not have time to adjust every telemetry point and, if did, would be guesses at best. The generator’s priority in this situation is first safety and then ensuring the plant does not trip offline.

Recommendation – create a new Resource Status Code (ONHOLD), that would be used to meet the telemetry and COP requirements in NPRR 1085. This status indicates a unit is experiencing an issue and that all telemetry and capability to follow dispatch are uncertain. ERCOT could decide whether the headroom on ONHOLD units should be included or not in operating reserves. If the ONHOLD status can be automated, it would offer many benefits

Suggestion—ERCOT should have a check for units that aren’t able to meet their basepoints over multiple SCED runs or that have locked the ramp rate very low (say 0.1MW/min). The headroom on these units should be questioned. (i.e. It could be that the unit has lowered the ramp rate because it is transitioning stages or because the plant is experiencing an issue.)

Suggestion—ERCOT should develop a recommendation for how a QSE should pre-position non-NFRC units that have an AS obligation in the upcoming hour. (This is a problem when prices are high and slow-moving unit needs to back down for an upcoming AS obligation.)

Suggestion – ERCOT should investigate additional metrics in addition to PRC that inform operators of grid conditions.

Suggestion—consider modifying the Power Balance Penalty Curve to avoid forgoing actual generation and leaning on regulation.

NPRR1085 relates to this topic

*30 Frequency Relay Points: Analyze load shed responsibilities related to frequencies for generation and load and ensure alignment.*

Mostly still asking/collecting questions –

* Is 59.3 Hz the optimal value for UFLS?
* Should there be additional frequency points where some automatic load shed occurs (59.4)?
* What are the risks of damaging generator turbines when frequency remains below 59.4 Hz (refer to Item 45 for some answers)?
* Can FFR frequency triggers be changed and/or tied to ROCOF? (Probably not tied to ROCOF – measurement capabilities are lacking – see NPRR863)
* Is it appropriate and necessary for some Load Shed orders to be allowed up to 30 minutes to execute?

Suggestion – ERCOT could consider sending an RFI to GOs or QSEs to ask about turbine damage risk when operating frequency is below 59.4 Hz.

NOGRR224 relates to this topic

*44 Ancillary Service Products: Review existing ancillary service products and determine if existing suite of products and amounts is adequate based on lessons learned from the February 2021 winter weather event.*

What about the ongoing ERCOT/consultant study of AS distibution (regional, technology type)? Study results not expected until Q1 2022. The results should be valuable in responding to this issue/question. Nitika will provide status on this study at September PDCWG.

Most PDCWG discussion under this topic revolves around ESRs so far.

Can ESR-RRS deployment and charging rules be improved (Shams)?

ROS questions from 7/8 were discussed – the questions directly relate to this topic/issue. It was explained in the 7/16 PDCWG that the PDCWG does not have any tools to assess AS sufficiency – ERCOT brings a summary of results of the Ancillary Service Methodology to PDCWG every fall for review and approval (before going to ROS & TAC), but the tools and analysis are all run by ERCOT.

Consider making RRS a purely frequency responsive service (Reg already is) – i.e. do not release RRS (and Reg) capacity to SCED (similar to treatment once ECRS is implemented).

Consider procuring additional RRS as Contingency Reserve (until ECRS is implemented) to replenish frequency-deployed RRS and restore frequency. RRS is already held behind the HASL and is a 10-minute energy product (similar to ECRS). This additional RRS (ECRS-equivalent portion) could be released to SCED during capacity scarcity situations.

Consider a minimum duration limit on ESRs providing (non-FFR) RRS and NSRS. ERCOT does not have visibility into what the state of charge will be on ESRs in upcoming hours and thus does not know whether an ESR will provide RRS from the gen or CLR side. (ESRs providing RRS switched between gen and CLR during the February 15th frequency event.) Understanding this is crucial to planning how much load needs to be shed in an emergency to create headroom. For every 1mw switching from gen to clr requires an incremental 1mw of load shed during an emergency (to create headroom for the CLR to charge). With some load shed taking up to 30min to perform, it is important to know this amount ahead of time. Combining a minimum duration with restricting manual deployments of RRS will ensure a higher confidence of reserves.

*45 Frequency: Analyze system frequency leading up to EEA conditions and determine impact of low frequency on generation and load tripping.*

LP turbine blades and end windings have a natural frequency that makes them vulnerable to operating at frequencies below 59.4 Hz – particularly true for larger generators. PDCWG is pursuing more specific and technical details from turbine OEMs.

There were also issues dealing with interactions between generator control system tuning and the Interconnection frequency on 2/15, prior to the major frequency event. Steam drum type generators are particularly vulnerable to this issue. 2,000 MW of thermal generation was negatively impacted by frequency instability between 01:30 and 03:00 on 2/15. One particular, and important factor here is generator tuning that is specifically designed to maximize BAL-001-TRE frequency response scoring – that tuning design had very harmful impacts to performance of some generators on 2/15.

PDCWG is requestion more detailed information about how ERCOT calculates PRC in order to investigate more options to improve system reliability with regard to frequency stability and generator telemetry.

Open question – could sub 59.4 Hz frequency have been avoided on 2/15 if Load Shed, or other actions to recover undeployed Ancillary Services had been taken earlier? PDCWG is investigating whether it makes sense to recommend that ERCOT use more conditions than just PRC to make EEA, Load Shed, and other reliability decisions. Another question to be investigated at August PDCWG – what was the behavior of all Ancillary Service deployment/undeployment and delivery performance for 2 hours prior to major frequency excursion?

*91 Could FFR play a bigger role?*

Suggestion – modify FFR offer values and reassess FFR frequency triggers. (Likely needs WMS and/or OWG involvement) Additional FFR frequency triggers may facilitate increasing FFR allocation above 450 MW.

Open questions – Is it good or bad for reliability that we are steadily replacing Load Resources with FFR? Do ESRs provide the service as reliably as traditional Load Resources? Is the 450 MW bucket restriction for FFR included in the ongoing ERCOT consultant study of Ancillary Services? (No)

*100 How did batteries providing FFR perform? Were FFR providers allowed to charge and if not, what penalties did they get charged?*

No ESR had bid for FFR during the time of the Feb 14/15 winter event.

*10X How batteries qualify for AS and the impact of their duration limits.*

ESR qualifications for AS and duration/charging requirements were defined by a set of 9 NPRRs that stakeholders developed in the Battery Energy Storage Task Force.

*10Y Assessment of dynamic stability had the underfrequency relays asserted during the winter storm event. Given the amount of non-underfrequency load shed, the percentage of underfrequency load in-service had increased. If the increased percentage of underfrequency load had been shed would generation remain stable?*

Topic not started yet – can’t find an assignee. And the question seems murky, unclear.