**Items**

**91 Could fast frequency response play a bigger role?**

The FFR, Fast Frequency Response Ancillary Service product is designed for an eligible Resource provider to discharge in response to frequency trigger of 59.85Hz and the eligible Resource must be capable of providing its FFR responsibility amount for fifteen minutes and then charge for fifteen minutes upon recall of the FFR deployment. ESRs not providing FFR must provide Primary Frequency Response (PFR) at all times. If any ESR were awarded FFR, during the February Winter Event it would not have been providing PFR and thus not discharging until the frequency trigger of 59.85Hz was hit. Thus, FFR would’ve been triggered on 2/15/21 during the most critical time when frequency dropped below 59.85Hz at about 01:45 and there was insufficient fast responding capacity available to arrest frequency. ESRs’ SOC were exhausted prior to the event on 2/15/21 with limited system benefits due to the limited energy available from ESRs. However, rather than such limited benefit from ESRs providing PFR, the fast injection of energy through triggered FFR would be far more beneficial in arresting frequency during the event on 2/15/21. Even if frequency dropped to 59.85Hz prior to 01:45 on 2/15/21, there seemed to be enough time just prior to 01:45 with frequency above 59.98Hz (this frequency limitation may need to be re-examined) for FFR Resources to fully charge. The extent to which FFR would’ve been able to benefit on that day depends on many factors including the amount of ESR capable of providing FFR. The significant frequency drop on 2/15/21 (even though relatively at a slow rate compared to the fast rate of change of frequency (RoCoF) FFR is meant to arrest) only lasted for a few minutes – triggered FFR may have been able to provide critical support during the 5 minutes when frequency was at 59.4Hz - which duration is well within the duration FFR resources are required to sustain response. Therefore, FFR availability on 2/15/21 would’ve provided some benefit during a critical reliability event. However, modifying the design of FFR to trigger on RoCoF is even more valuable to the grid from a reliability perspective.

When FFR was approved as an AS product it was assumed the ESR’s would operate in what came to be called a Single Model. Current ERCOT System limitations have forced ESR’s to make offers as a generator and discharge as a separate CLR in what is referred to as the Combination Model. At the same time FFR was approved by the ERCOT BOD, ECRS, ERCOT Contingency Reserve Service was also approved to allow dispatched RRS products to replenish. ECRS must be supplied within ten minutes after being instructed to do so. As of the last most recent TAC meeting report, ECRS will not be implemented until six months after the EMS upgrades are completed. Additional PFR-RRS can be used to fulfill the ECRS function in the meantime. This additional PFR-RRS (ECRS equivalent) can be released to SCED to replenish frequency deployed RRS and bring frequency back to desired levels – similar to how ECRS would be deployed. However, all other RRS should only be deployed by automatic frequency response and not released to SCED to ensure the grid is always protected (i.e. able to arrest frequency) from the sudden loss of the two largest units on the system.

Fast Frequency Response (FFR)

The automatic self-deployment and provision by a Resource of their obligated response within 15 cycles after frequency meets or drops below a preset threshold, or a deployment in response to an ERCOT Verbal Dispatch Instruction (VDI) within 10 minutes. Resources capable of automatically self-deploying and providing their full Ancillary Service Resource Responsibility within 15 cycles after frequency meets or drops below a preset threshold and sustaining that full response for at least 15 minutes may provide Responsive Reserve (RRS).

3.18 Resource Limits in Providing Ancillary Service (3) (d)

The amount of RRS provided from a Resource capable of providing Fast Frequency Response (FFR) must be less than or equal to its 15-minute rated capacity. The initiation setting of the automatic self-deployment of the Resource providing RRS as FFR must be no lower than 59.85 Hz. A Resource providing RRS as FFR that is deployed shall not recall its capacity until system frequency is greater than 59.98 Hz. Once deployed, a Resource telemetering a Resource Status of ONFFRRRS or ONFFRRRSL shall telemeter an RRS Ancillary Service Schedule of zero, and when recalled, such Resource shall telemeter an RRS Ancillary Service Schedule that shall be a non-zero value equal to its RRS Ancillary Service Responsibility. Once recalled, a Resource providing RRS as FFR must restore its full RRS Ancillary Service Resource Responsibility within 15 minutes after cessation of deployment or as otherwise directed by ERCOT.

The February storm was an issue of total sustained generation not being able to meet the load requirements. To that point, **ANY** additional generation, generation provided AS, or load provided AS could have played a bigger role. However, FFR would’ve likely provided some benefit even the relatively slow drop in frequency on 2/15/21 at around 01:45. FFR product is designed to arrest frequency during drastic drop of frequency and thus provide critical reliability support. Current FFR market design, where FFR is prorated with LR-RRS, makes the provision of FFR financially unattractive compared with PFR-RRS. ESRs providing FFR has the added benefit of lowering Critical Inertia. With ERCOT now procuring additional RRS, now is the time to ensure that disincentives to providing the critically important FFR service are removed. This goal can be very easily achieved by the following:

1. Set offer floor for all RRS offers, except FFR offers, at $0.01/MW/hr. This can be immediately implemented as a behavioral rule and thus have no system impact. The implication of this simple change is to fully award FFR offered at $0/MW/hr up to 450MW while paying the same RRS MCPC for awarded FFR. When FFR offers exceed 450MW, then FFR awards would again be prorated.
2. Trigger FFR deployment on RoCoF trigger rather than the current frequency trigger. Since this change would make FFR even more valuable to grid reliability, item 1 needs to be pursued urgently to make FFR a financially viable alternative for ESRs to provide.
3. Examine whether the 59.98Hz restriction on recharging needs modification.

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

[**Winter Event 2021 PDCWG 05142021 v3**](http://www.ercot.com/content/wcm/key_documents_lists/220113/Winter_Event_2021_PDCWG_05142021_v3.pptx)

ERCOT has reported that ESR’s did not bid for FFR during the during the February Winter Event.

**10X** **ESR qualification for AS & duration impacts**

ESR qualifications for AS and corresponding duration or charge requirements were part of the 9 NPRRs that stakeholders developed in the [Battery Energy Storage Task Force](http://www.ercot.com/committee/bestf).