SCT Determination Summary for Directive 8, PFR requirement only

Date: 1/12/2018

Market stakeholder input: PDCWG 10/11/2017, 11/8/2017, 1/12/2018, 2/14/2018, ROS 3/1/2018

PDCWG action: On 12/13/17, PDCWG discussed this topic. This document was amended based on additional input. On 01/12/18, PDCWG discussed this topic and reviewed this document. No further action was taken. On 2/14/18, PDCWG voted to endorse this Directive 8, PFR determination.

ROS action: On 3/1/18, ROS discussed this topic and reviewed this document. No further action was taken.

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| **Directive #8 - Frequency response and voltage support** | **ERCOT shall (a) study and determine whether Southern Cross Transmission or any other entity scheduling flows across the Southern Cross DC tie should be required to provide or procure voltage support service or primary frequency response, or their technical equivalents, (b) implement any necessary revisions to its standards, guides, systems, and protocols, as appropriate, and (c) certify to the Commission when it has completed these actions.** |

* ***Determination: Regarding frequency response in Directive 8, currently ERCOT and PDCWG members do not see the need for the SCT DC Tie or entities scheduling across the DC Tie to provide governor-like frequency response.***
  + Technical reasons for determination of no PFR requirement
    - Every Generator (except Nuclear and older wind turbines exempted by ERCOT, and including capacity that certain generators have that is not frequency responsive) in ERCOT is required to have their Governor in-service and must respond to frequency deviations provided it’s not physically limited by frequency-responsive headroom and LSL.
    - ERCOT procures minimum Responsive Reserve Service (RRS) from Generators to ensure sufficient headroom is available to respond to frequency events. ERCOT’s PFR requirements are primarily geared towards avoiding firm load shed triggered by Under-Frequency Load Shed (UFLS) scheme at 59.30 Hz for loss of 2,750 MW, which is the defined Resource Contingency Criteria (RCC) per NERC BAL-003-01 Standard. The maximum import capability of the SC DC Tie is 2000 MW which is smaller than the RCC of 2750 MW. The detailed report that provides background on the current RRS study, its case setup, modeling assumptions, study methodology and study results can be accessed on ROS meeting page [Nov 2, 2017 ROS meeting page](http://www.ercot.com/calendar/2017/11/2/108743-ROS) under the meeting materials related to agenda item 5.
    - ERCOT competitively procures RRS to maintain PFR by reserving frequency responsive head-room from selected Generators, all the other generators are not required to reserve a head-room to provide PFR but need to have their governor in service and respond if they have available frequency responsive head-room.
    - Current DC Ties in ERCOT (which are substantially smaller in their/import/export capacity) are not required to be PFR capable (current total 1150 MW from existing DC Ties).
    - Currently per NERC requirement BAL-001-TRE-1 and ERCOT protocols, Primary Frequency Response (PFR) in the ERCOT region is required and provided by generation resources.
    - The ERCOT system currently exceeds minimum PFR requirements under the BAL-003 standard. The report that tracks ERCOT’s Interconnection Minimum Frequency Response (IMFR) performance during Frequency Measurable Events (FMEs) per BAL-TRE-001 can be accessed on [ERCOT website link](http://mis.ercot.com/misapp/GetReports.do?reportTypeId=13454&reportTitle=BAL-001-TRE%20IMFR%20Performance&showHTMLView=&mimicKey).
    - A DC Tie is not a Resource, it is rather a transmission element that is capable of quickly controlling flows. Even though the DC Tie has the capability to respond quickly and change the MW flow extremely fast, the entity (BA/RC) on other side of the DC Tie must agree to the sudden change in flow their system when providing PFR to ERCOT Grid. ERCOT has not yet determined the technical feasibility of PFR provision from DC Ties given the complexities associated with coordinating such service with neighboring Balancing Authorities and their market participants.
  + Requirements considered
    - * NERC BAL-003-1.1 – BA Frequency Response Measure is greater than its requirement.
      * NERC BAL-002-1 – Recover Area Control Error (ACE) within 15 minutes of a Most Severe Single Contingency (MSSC) event and recover reserves.
      * NERC BAL-001-2 – Control Performance Standard (CPS) 1 – Maintain score greater than 100, recover ACE within 30 minutes.
      * NERC BAL-001-TRE-1 – Generation resource requirement for governor
  + Implementation details for ERCOT determination
    - No changes to protocols or guides
    - No system impacts
  + Related/emerging issues:
    - During frequency events, DC Ties can be ramping to export more energy (wrong direction to recover frequency) and not seen by SCED.
      * This should be considered regardless of the SCT directives due to the impacts associated with the current DC Ties.
        + ERCOT should consider proposing a SCR to include net DC Tie ramp contribution into SCED calculations
        + ERCOT should consider if Ties are big enough that ERCOT/SCED should suspend (or reverse) ramping
    - Consensus in PDCWG of importance for PFR to be a paid service
    - Need to study if more ancillary services required due to size of DC Tie (Directive #9)
    - For the unexpected (low probability) scenario of full import during High Wind Low Load (HWLL) conditions, there may be a possibility that synchronous generation has been displaced to a point where inertia is below critical level.
    - While ERCOT and PDCWG members do not see a need to require SCT to provide PFR, the integration of a DC Tie of this size will require ERCOT to review (possibly staging) the Frequency threshold at which Load Resources providing RRS get deployed.