SCT Determination Summary for Directive 9, MSSC issue only

Date: 07/13/2018

Market stakeholder input: OWG 11/17/2017, 01/22/2018, 02/15/2018, 03/15/2018, 04/19/2018, 07/18/2018

OWG action: On 11/17/17, OWG discussed this topic and additional information was provided; no further action was taken. On 1/22/18, OWG discussed this topic and additional information was provided; no further action was taken. On 2/15/18, OWG discussed this topic and additional information was provided; no further action was taken. On 4/19/18, OWG discussed this topic and reviewed this whitepaper. This document was amended based on additional input. On 7/18/18, OWG voted to endorse this Directive 9, MSSC determination.

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| **Directive #9 – Ancillary Services** | **ERCOT shall (a) evaluate what modifications to existing and additional ancillary services, if any, are necessary for the reliable interconnection of the Southern Cross DC tie, (b) implement any needed modifications to ancillary-services procurement, (c) recommend how the costs of such required ancillary services are to be allocated, and (d) certify to the Commission when it has completed these actions.** |

***Determination: Responding to Directive 9 is hinged on knowing the impact of the Southern Cross DC Tie on ERCOT’s Most Severe Single Largest Contingency (MSSC). ERCOT and OWG members agree that ERCOT’s MSSC will change upon interconnection of the SCT DC Tie if it is allowed to import higher than the current MSSC.***

***ERCOT and OWG members also agree that if the SCT DC Tie is limited to imports equal to or less than the existing ERCOT MSSC, then no MSSC change is required upon interconnection of the SCT DC Tie.***

***This determination only applies to MSSC and further work of identifying the Ancillary Services impacts of the SCT DC Tie while operating above the ERCOT MSSC up to the 2,000 MW import capability will be undertaken at the PDCWG. In the event if SCT DC Tie is limited to imports equal to or less than the existing ERCOT MSSC, then there would be no impacts to current ancillary services requirements that are based on the MSSC.***

Technical reasons for determination

* NERC’s BAL-002 Standard requires ERCOT to determine ERCOT’s MSSC. Per BAL-002-2 MSSC is the Balancing Contingency Event that would result in the greatest loss of resource (MW) output. Sudden loss of import due to forced outage of transmission equipment is considered a Balancing Contingency Event.
* To determine ERCOT’s MSSC, ERCOT seasonally reviews the Net Dependable Capability (NDC) for all Generation Resources (submitted in NDCRC) and NDC of all HVDC Tie imports.
* This practice of treating bipole HVDC Ties as credible single contingency for purpose of determining MSSC per BAL-002-2 is consistent with other Independent System Operators (ISOs) in North America.
  + California ISO’s MSSC is 2400 MW based on Pacific DC Intertie, a bipole DC line rated at 3,220 MW that can transfer up to 2400 MW into [California ISO’s grid](http://www.caiso.com/Documents/Presentation-BAL-002-2DisturbanceControlStandard-ContingencyReserveforRecoveryfromaBalancingContingencyEvent.pdf). This DC tie is nested within a single AC territory. Loss of the bipole tie may trigger a RAS the trips 2400 MW of generation. For meeting BAL-002-2 Contingency Reserve requirements in Day Ahead Market are based on historic (previous 30 days) Real Time DC Tie schedule and in Real Time incremental adjustments are made based on approved DC Tie schedules.
  + New England ISO’s MSSC is 2000 MW based on Quebec - New England HVDC, a bipole DC line that can transfer up to 2000 MW into New England ISO’s grid. During all other times, import limits [starting at 1,200 MW](https://urldefense.proofpoint.com/v2/url?u=https-3A__www.iso-2Dne.com_static-2Dassets_documents_2015_07_crop-5F36004.pdf&d=DwMFaQ&c=trp9rTvIdyEWh1VWB5x8_2JiPaB5oGZOtWPDws2_VoY&r=9ZGNeDAQgq6pqa1m5rjApmzP6jzzkywVgsjbDIT09Es&m=t87Ezl01hNimJEtkj-_YzTAisxQ0cTvZnO99Wd-OhDI&s=n-SlSIQ29-j8uGuekP732NBxU65Ro4zZGzM764KHoB4&e=), are imposed on the tie to ensure operational reliability criteria is not violated. Per the ISO’s [procedures](https://www.iso-ne.com/static-assets/documents/regulatory/tariff/attach_g/attachment_g.pdf) import limits from Hydro Quebec to New England are set both for hourly scheduling and during Real Time operations. Based on expected conditions the maximum import limits can be as high as 2000 MW i.e. the maximum transfer capability of the tie. Also the maximum export (New England to Hydro Quebec) has been limited to 1200 MW since the facility went into service (a transmission limit for stability).
  + Hydro Quebec’s (HQ’s) MSSC is based on Hydro Unit ~1000 MW. However under special operational configurations the DC Tie with Independent Electricity System Operator (IESO) can become HQ’s MSSC.
  + Upon interconnection the loss of the bipole Southern Cross DC Tie is a credible contingency that qualifies as a single event for the purpose of defining a Balancing Contingency Event per the current BAL-002-2 standard. Further upon interconnection of the Southern Cross DC Tie into the ERCOT grid, ERCOT’s MSSC will change to 2000 MW (the maximum import capability across this DC Tie) or to the agreed upon operating limit of the Southern Cross DC Tie. Note that if this results in a change in ERCOT’s MSSC there is a potential impact to ancillary services and Energy Emergency Alert Levels (EEA) will need to be revisited.
* Requirements considered
  + NERC BAL-002-2 – Recover Area Control Error (ACE) within 15 minutes of a Most Severe Single Contingency (MSSC) event and recover reserves.
  + EOP-011-1 – Emergency Operations
* Related/emerging issues:
  + During emergency events, ERCOT may wish to utilize SCT DC Tie import capability at a level higher than the ERCOT MSSC. Further work may be done to explore the concept of a dynamic MSSC and the impacts it would have on ancillary services requirements.
  + 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