PUC Project No. 46304

Oversight Relating to the Southern Cross Transmission (SCT) DC Tie

Ancillary Services (Directive 9)

Date: XX/XX/2021

Market stakeholder input: PDCWG 8/23/2018, 09/12/2018, 10/22/2018, 01/16/2019, 02/13/2019

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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: Frequency risks associated with exports over the Southern Cross DC Tie could be addressed by procuring a new type of Ancillary Service. However, procurement of additional new Ancillary Services will be unnecessary because the ERCOT Board of Directors has approved Nodal Protocol Revision Request (NPRR) 1034, Frequency-Based Limits on DC Tie Imports and Exports, which will give ERCOT authority to establish limits on DC Tie transfers and to curtail DC Tie Schedules when necessary to address the risk of unacceptable frequency deviations.***

***While the loss of the DC Tie at its maximum import of 2,000 MW would exceed ERCOT’s single largest contingency of 1,420 MW, no adjustment to Responsive Reserve Service (RRS) or Non-Spinning Reserve Service procurement is necessary to address the impact of such an event. Specifically, North American Electric Reliability Corporation (NERC) Reliability Standard BAL-003-2, which became effective in December 2020, clarifies that the loss of a bi-pole DC Tie that is capable of operating in single-pole mode, such as the DC Tie proposed by Southern Cross Transmission LLC (SCT), would count as two separate contingencies, not one. Based on this guidance, ERCOT has concluded that additional RRS quantities are not necessary to address import-related frequency risk if this proposed design is implemented. Similarly, because ERCOT’s current methodology for procuring Non-Spinning Reserve Service is no longer based on the value of ERCOT’s single largest contingency ERCOT is not required to procure additional Non-Spinning quantities to meet ERCOT’s obligation under NERC Reliability Standard BAL-002-2 standard.***

***ERCOT has also determined that no changes to Regulation Service are necessary because DC Tie ramp will be adequately addressed by System Change Request (SCR) 800, Addition of DC Tie Ramp to GTBD Calculation, and NPRR 999, DC Tie Ramp Limitations. ERCOT has identified no other necessary changes to Ancillary Services to accommodate the Southern Cross DC tie.***

Technical reasons for determination

ERCOT conducted studies to evaluate the potential Ancillary Service needs associated with the interconnection of the Southern Cross DC Tie. ERCOT’s studies considered the operational impacts of a loss of the Southern Cross DC Tie when importing up to its maximum import capability of 2,000 MW and when exporting up to its maximum export capability of 2,100 MW. ERCOT identified potential needs under each of its existing Ancillary Services—RRS, Non-Spinning Reserve Service, and Regulation Service—and also considered whether any new Ancillary Service would be needed.

*Ancillary Services for Significant Frequency Excursions*

ERCOT procures RRS to address under-frequency risk associated with unexpected generator trips. Each December, ERCOT identifies minimum quantities of RRS to be procured in each hour of the next year based on studies that determine the amount of RRS needed at various inertia levels to avoid triggering Under Frequency Load Shed (UFLS) for a loss of generation equal to ERCOT’s Resource Loss Protection Criteria (RLPC), which is equal to the two largest single contingencies in ERCOT, in accordance with NERC Reliability Standard BAL-003-2. ERCOT’s current RLPC of 2805 MW is based on the two South Texas Project Nuclear units, which are currently rated at approximately 1,400 MW each.

ERCOT’s evaluation of the Ancillary Service impacts of the Southern Cross DC Tie initially identified a potential frequency risk associated with both imports and exports over the DC Tie. With respect to the frequency risk associated with a loss of the Southern Cross DC Tie when importing, ERCOT’s studies originally determined that it would need to procure additional RRS to address the potential negative impact on frequency because the Southern Cross DC Tie would be capable of importing 2,000 MW, which would become the single largest contingency on the ERCOT system, and which would therefore increase ERCOT’s RLPC (then known as Resource Contingency Criteria (RCC)) from 2,750 MW to 3,275 MW.

However, since that time, NERC’s adoption of Reliability Standard BAL-003-2 has clarified that no additional Ancillary Service procurement is necessary to address this import-side frequency risk. Specifically, BAL-003-2, which became effective on December 1, 2020, incorporates by reference NERC’s *Procedure for ERO Support of Frequency Response and Frequency Bias Setting*, which provides that “a single pole block with normal clearing in a monopole or bi-pole high-voltage direct current system is a single contingency.” Southern Cross has informed ERCOT that the Southern Cross DC Tie project will be built using a bi-pole configuration. Assuming this design is implemented and the tie is able to operate in single-pole mode, the loss of each pole can be regarded as a separate contingency, in accordance with BAL-003-2. As a result, the interconnection of Southern Cross DC Tie is not expected to impact ERCOT’s RLPC or require additional RRS to address the risk of an import-side frequency deviation.

On the export side, ERCOT’s studies identified a risk of unacceptable frequency overshoot in the event of the loss of the Southern Cross DC Tie when exporting above certain levels under certain low-inertia conditions. ERCOT’s studies showed that, in those cases, the frequency overshoot could unacceptably trigger other Generation Resources to trip due to over-frequency protection. ERCOT determined that a new Ancillary Service (or a new form of RRS) that could provide a rapid generation reduction in response to a trip of the tie when exporting during certain low inertia hours would be necessary address this concern. However, ERCOT also determined that if the Southern Cross DC Tie were subject to an export limit during those certain hours, then a new Ancillary Service (such as a new form of RRS) would not be necessary.

Based on ERCOT’s conclusion, Southern Cross submitted NPRR 1034, Frequency-Based Limits on DC Tie Imports and Exports, to enable ERCOT to establish import or export limits on DC Ties during operating conditions of concern. Additionally, NPRR 1034 provides that ERCOT will curtail DC Tie Schedules when one or more DC Tie Schedules would exceed an established import or export limit. NPRR1034 was approved by the ERCOT Board of Directors on February 9, 2021, and will be implemented prior to the interconnection of the Southern Cross DC Tie. This NPRR will avoid the need for procuring additional Ancillary Services to address the risk of an unacceptable frequency deviation when the Southern Cross DC Tie is exporting from ERCOT.

*Non-Spinning Reserve Service*

ERCOT procures Non-Spinning Reserve Service to ensure sufficient capacity is available to cover large net load forecast errors or to replace deployed RRS. ERCOT procures Non-Spinning Reserve Service based on historical net-load forecast error and risk of upward ramps in net load, as adjusted for expected growth in installed wind and solar capacity. ERCOT has identified no Non-Spin impact under this criteria due to the interconnection of the Southern Cross DC Tie.

At the time of ERCOT’s study, ERCOT had a Non-Spin procurement floor equal to ERCOT’s current Most Severe Single Contingency (MSSC) for hours ending 7 through 22, which was then equivalent to 1,375 MW. However, ERCOT has modified its procurement practices in 2019 to eliminate the Non-Spin floor. Therefore, interconnection of the Southern Cross DC Tie will not impact the Non-Spin quantities to be procured.

*Regulation Service*

ERCOT deploys Regulation Service provided by generators every 4 seconds to maintain frequency between Security Constrained Economic Dispatch (SCED) intervals. Each December, ERCOT identifies minimum quantities of Regulation Up and Regulation Down for each hour of the next year based on (1) the amount of Regulation historically deployed in that hour, and (2) net-load variability, as adjusted for projected growth in installed of wind and solar generation capacity. ERCOT has determined that changes to ERCOT rules and systems will avoid any need for additional Regulation Service procurement due to the interconnection of the Southern Cross DC Tie. First, System Change Request (SCR) 800, Addition of DC Tie Ramp to GTBD Calculation, which was approved by the ERCOT Board of Directors in December 2019, will integrate scheduled DC Tie ramp into the Generation to be Dispatched (GTBD) value used by SCED. Second, NPRR 999, DC Tie Ramp Limitations, clarifies ERCOT’s authority to curtail DC Tie Schedules that would otherwise exceed the ramp capability of the system, and potentially impact system frequency. NPRR 999 was approved in October 2020 as part of the resolution of PUC Directive 3, concerning ramp rate limitations. ERCOT has determined that SCR 800 and NPRR 999 should be sufficient to address frequency issues due to ramping of the Southern Cross DC Tie. Consequently, ERCOT has determined that no further changes to Regulation Service are necessary as a condition for the interconnection of the Southern Cross DC Tie.