



PUC Project No. 46304
Oversight Relating to the Southern Cross Transmission (SCT) DC Tie
Voltage Support Service (Directive 8)

Date: 03/03/2022

Market stakeholder input: RPG 04/24/2018, RPG 11/27/2018, RPG 01/22/2019, RPG 02/19/2019, RPG 03/12/2019, ROS 05/02/2019, ROS 12/03/2020, TAC 01/20/2021

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.
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Note: This determination concerns only the voltage support service portion of Directive 8. Directive 8 Primary Frequency Response (PFR) was addressed by ERCOT Board on 08/07/2018.

Determination: To accommodate the Southern Cross DC Tie, any DC Tie facility that has an initial energization date after January 1, 2021, and any DC Tie facility that is replaced after that date, should be required to have at least 0.95 power factor leading/lagging reactive power capability. NPRR1098, Direct Current Tie (DC Tie) Reactive Power Capability Requirements and NOGRR234, Related to NPRR1098, Direct Current Tie (DC Tie) Reactive Power Capability Requirements, which were approved by the Public Utility Commission on XXXXX, revised the Protocols and Operating Guide to require that new or replaced DC Tie facilities shall have at least 0.95 power factor leading/lagging reactive power capability.

Technical Reasons for Determination

The Southern Cross DC Tie facility was not originally designed to have any reactive power capability to support ERCOT system voltage. However, any level of imports and exports over a DC Tie will cause reactive losses on the ERCOT system. ERCOT’s study performed pursuant to PUC Directive 6 (regarding transmission upgrades needed to address congestion) identified a voltage stability limit for exports of 1,289 MW during high-wind, low-load conditions, which would require the installation of additional reactive capability to accommodate exports in excess of that amount during those conditions. ERCOT’s study noted that, if the Southern Cross DC Tie provided the equivalent of 0.95 power factor leading and lagging reactive power capability, fewer transmission upgrades would be needed to achieve full export capability under the studied conditions.

ERCOT currently requires Generation Resources and Energy Storage Resources to provide voltage support. Specifically, with certain specified exceptions, Section 3.15 of the ERCOT Protocols requires Generation Resources and Energy Storage Resources to provide leading and lagging reactive capability equivalent to a 0.95 power factor. It is expected that this standard amount of reactive capability will not



always perfectly match the amount of reactive capability needed to accommodate the Resource's real power injections or withdrawals. Furthermore, a Generation Resource's or Energy Storage Resource's obligation remains the same for the life of the asset, even though the grid is always changing.

Flows across DC Ties are similar to power injections or withdrawals from Generation Resources and Energy Storage Resources. As such, ERCOT concluded that it is appropriate to require DC Ties to provide voltage support under a similar paradigm as that currently used for Generation Resources and Energy Storage Resources. Based on this conclusion, ERCOT developed the following statement of principle, which was endorsed by stakeholders on the ERCOT Technical Advisory Committee on January 27, 2021:

Any DC Tie facility that has an initial energization date after January 1, 2021, and any DC Tie facility that is replaced after that date, shall have at least 0.95 power factor leading/lagging reactive power capability.

Following TAC's endorsement of this conclusion, ERCOT sponsored NRR 1098, Direct Current Tie (DC Tie) Reactive Power Capability Requirements, and NOGRR234, Related to NRR1098, Direct Current Tie (DC Tie) Reactive Power Capability Requirements, to codify the 0.95 power factor voltage support requirement for DC Ties in the ERCOT Protocols and Operating Guide. NRR1098 and NOGRR234 were approved by the ERCOT Board on **March 8, 2022** and the Public Utility Commission of Texas (PUC) on **XXXXXX**.

NRR1098 does not require existing DC Tie Facilities to provide Reactive Power capability unless a DC Tie Facility owner makes a significant change to its Facility. This is because the existing DC Ties interconnected to the ERCOT System are all owned by TSPs, which have already installed separate reactive capability to meet their obligations related to voltage support under the Protocols, Operating Guides, and North American Electric Reliability Corporation (NERC) Reliability Standards. ERCOT concluded that requiring these TSPs to install additional capability to meet the standard proposed in this NRR would be superfluous and unnecessarily costly.

As shown in the studies performed in response to Directive 6, the decision as to whether new DC Ties should be required to provide voltage support will have an impact on what transmission is necessary to accommodate assumed flows across the Southern Cross DC Tie. Thus, the resolution of Directive 6 must follow that of Directive 8. However, PGRR077, DC Tie Planning Assumptions, which was approved by the ERCOT Board in October 2020, clarifies that ERCOT must curtail assumed DC Tie flows in its transmission planning analyses when doing so is necessary to meet reliability criteria. Under PGRR077, ERCOT would not identify any reliability-based need for additional transmission facilities on account of DC Tie flows because of the curtailment of those assumed flows in ERCOT's planning studies.