February 5, 2019

Southern Cross Transmission Comments on Directive 9 ancillary services requirements studies

Southern Cross Transmission LLC (SCT) appreciates the opportunity to provide these comments regarding ERCOT's Directive 9 studies regarding ancillary services requirements as discussed at the January 16, 2019 meeting of the Performance Disturbance Compliance Working Group (PDCWG).

1. Non-Spinning Reserve Service (NSRS)

1-1 Removal of the NSRS floor

The latest draft of the SCT ancillary services impact study (version 10, distributed to the PDCWG by e-mail on Jan. 21, 2019) contains several references to the NSRS floor which is no longer in effect since the Dec. 11, 2018 ERCOT Board decision to remove the floor in the 2019 ancillary services procurement methodology document. The NSRS section of the Directive 9 study document should be revisited and updated.

2. Responsive Reserve Service (RRS)

2-1 Resource Contingency Criteria (RCC)

ERCOT appears to have offered two different understandings of the relationship between the SCT DC Tie and ERCOT's RCC. In the draft Directive 9 study report presented at the September 2018 PDCWG meeting (version 2), ERCOT stated on page 3, "Per the current RRS methodology, the RRS quantity to be procured at ERCOT is determined to cover the risk for the instantaneous loss of 2,750 MW (per NERC BAL-003 RRC). As the maximum importing capacity of the SCT DC Tie (2000 MW) does not exceed 2,750 MW, the current RRS quantities remain sufficient after the SCT DC Die is integrated. This could be subject to future changes if NERC revises the RCC definition."

However, in version 10 of the draft report circulated to the PDCWG in January 2019, ERCOT wrote in Section 3.3 (there are no page numbers on draft v10), "NERC has explained that ERCOT's RCC is based on largest N-2 loss-of-resource event criteria. Currently, the loss of 2 STP units is recognized as the largest N-2 loss-of-resource event and as a result ERCOT's current RCC is 2,750 MW. Upon interconnection of the SCT DC Tie there is a potential that ERCOT's RCC may change." In the accompanying footnote, ERCOT notes that NERC is currently reviewing the RCC definition.

These are obviously two different statements and Southern Cross Transmission assumes ERCOT now believes the most recent version is accurate. But ERCOT's evolving understanding raises a number of questions:

The Oct. 2012 NERC document cited by ERCOT updating its understanding of the RCC definition does not, in fact, say "N-2 loss-of-resource event criteria" as stated by ERCOT in Section 3.3. Rather, it states that for ERCOT, the RCC "would be the loss of the two largest generating units in the interconnection." The applicable N-2 event for each of the 3 North American Interconnections are all co-sited units (STP

1&2 in ERCOT, Palo Verde 1&2 in the West, and Nelson DC Bi-poles 1&2 in the East). Can ERCOT please explain the basis for its assumption that NERC criteria would require the RCC to be the SCT DC Tie plus one STP unit? Does it matter that the SCT DC Tie and either STP unit will be located hundreds of miles apart? Does it matter that one is a generating unit and the other is a DC Tie? Why or why not?

SCT understands there is a NERC standard drafting process underway for BAL-003 which could alter the RCC definition and therefore understands ERCOT's reference to that process in the draft report. However, it is not clear to SCT exactly how that standard may change or what such a change would mean to ERCOT and SCT is wary of projecting possible future standards into the current Directive 9 effort, particularly any policy recommendations based upon such a projection.

2-2 RRS Study Case Selection and Preliminary Study Results

In the "SC Overshoot" presentation made at the Jan. 16, 2019 PDCWG meeting, ERCOT displayed preliminary results showing "RRS Quantity Increases" (p. 9) resulting from a simulated RRS Study using the cases found on p.5. While SCT understands the study scope includes evaluating RRS impacts when no import limit is imposed upon the SCT DC Tie and SCT understands ERCOT's desire to study impacts under various system inertia conditions, SCT is unsure of the value of the low inertia cases given that they all occur during conditions in which a 2,000 MW import to the ERCOT market is highly unlikely, *e.g.*, 2 a.m. in March, midnight in October, *etc*. Given that system economics do not support such import scenarios, SCT does not think the results of these scenarios are useful foundations for policymaking recommendations. If ERCOT believes the off-peak hours and off-peak season case studies of high import volumes are instructive, it would be helpful for ERCOT to explain why. In the alternative, it would be useful if ERCOT would document why such cases are not particularly instructive for the purpose of determining RRS requirements for the ERCOT system.

3. Frequency Overshoot Study

3-1 Case Selection

The addition of Cases 4 and 5 to the frequency overshoot study raises a few questions and concerns:

3-1-1 As a procedural matter, SCT is concerned that subsequent to the PDCWG's agreement with the Directive 9 ancillary services requirements study scope, ERCOT gathered additional input from a closed meeting of the Dynamics Working Group in mid-Nov. 2018 and modified the study scope by adding new cases and new assumptions. Not only was the study modified in a non-public setting which excluded SCT, but neither SCT nor the stakeholders were notified of the changes until ERCOT publicly released interim study results to PDCWG in mid-Jan. The ERCOT stakeholder process allows certain working groups to hold closed meetings to discuss sensitive material but a process also exists for those groups to hold an open public meeting prior to their closed door sessions. SCT is disappointed that ERCOT did not utilize that process in this instance, despite SCT's request. While the DWG-recommended additions to the study address interesting questions, SCT counsels that the directives stemming from PUCT Docket No. 45624 are narrowly scoped by the PUCT to address SCT integration issues, they are not background against which to explore broader system issues, particularly given the direct assignment to SCT of the study costs associated with the directives. As discussed further below, SCT is not convinced that piggybacking early stage theoretical work regarding possible future systemwide load dampening characteristics onto the Directive 9 study is appropriate.

3-1-2 In the Jan. 16 presentation to PDCWG in the table on page 2, "Scenarios Used for Frequency Overshoot Study," for Case No. 4, it appears the Load column value should be 30.4 GW, not 26.9 GW as published. During the PDCWG discussion, SCT understood ERCOT to say the Case 4 load had to be lowered in order to keep system inertia down to 120 GW*s. Is that correct? SCT understands the table on page 2 was originally completed prior to running the overshoot studies and was meant to provide a high-level overview of the cases. Now that adjustments have been made to refine the cases and specific values are known, SCT recommends the overshoot scenarios table should be updated with actual values as shown below:

Scenarios Prior to Exporting 2100 MW on the DC Tie:

Scenario Name	Inertia (GW·s)	Load (MW)	Wind (MW)	Synchronous Gen (MW)
CASE 0	130	34,784	15,511	19,274
CASE 1	130	34,579	10,000	24,579
CASE 2	130	32,552	5,000	27,552
CASE 3	130	32,555	3,500	29,055
CASE 4	120	30,479	3,500	26,979
CASE 5	110	27,770	3,500	24,270

Scenarios After Exporting 2100 MW on the DC Tie:

Scenario Name	Inertia (GW·s)	Load (MW)	Wind (MW)	Synchronous Gen (MW)
CASE 0	130	34,784	15,511	21,373
CASE 1	130	34,579	10,000	26,679
CASE 2	130	32,552	5,000	27,552
CASE 3	130	30,455	3,500	29,055
CASE 4	120	28,379	3,500	26,979
CASE 5	110	25,670	3,500	24,270

3-1-3 SCT is unsure what value is derived from studying a 2,100 MW export in Cases 3-5 given the very low wind production in those scenarios and correspondingly low economic prospects for a 2,100 MW export during such conditions. Perhaps it would make sense in those scenarios to back the export level down in incremental steps to see where the "break points" occur in low system inertia conditions. Although ERCOT provided such export limits for select 0% DR study runs in its interim results, ERCOT did not do so for any of the 2% DR study runs.

3-2 Study Methodology and Assumptions

In addition to the procedural concerns regarding the addition of 0% load dampening ratio (DR) sensitivity in the frequency overshoot study, SCT is also concerned about the technical merits of its

inclusion in the frequency overshoot study. Although the use of variable speed motors is an identified emerging issue in system planning and system protection analysis, it strikes SCT as both odd and inappropriate that the Directive 9 study is the first time ERCOT has performed an RRS analysis using a 0% DR assumption. To the best of SCT's knowledge, ERCOT does not yet have any evidence-based projections for this phenomenon and SCT thinks it unreasonable to assume that all load dampening characteristics will disappear from the ERCOT system during a time frame applicable to the interconnection of the SCT DC Tie given the vast number of existing motors throughout the ERCOT system that would need to be replaced with variable speed units. Although ERCOT's interest in this emerging issue may be genuine, this particular study is not the appropriate place to conduct such early stage analysis.

3-3 Study Results

3-3-1 In the Jan. 16 presentation to PDCWG on page 4, "Limit Imposed on SC DC Tie Export," two different limits are published in the key at the top and the results at the bottom for Case 5 (DR=0). One is 1,538 MW, the other is 1,488 MW. During the PDCWG discussion, ERCOT agreed to investigate which is the correct value and make the correction.

3-3-2 For both the procedural concerns and technical reasons described above, SCT does not support inclusion of the DR sensitivity cases (DR=0) in the study results. As demonstrated by ERCOT's interim results, half of the 0% DR cases fail to arrest the frequency excursion at or below 60.6. An unsurprising result, perhaps, given the erasure of the entire system's dampening characteristic – a fundamentally different system characteristic than exists today. For Cases 4-5, system load was lowered almost to the annual minimum, wind was throttled down to 3.5 GW, and system inertia was set below any level yet experienced in ERCOT.

Case 5 with 2% DR is the one failing case that provides policymaking value to the Directive 9 effort. The load and generation assumptions are credible for a stress case scenario and although the system inertia value of 110 GW*s is well below ERCOT's historically low system inertia reading of 127 GW*s last October and well above the 100 GW*s level ERCOT has identified as "critical inertia," SCT recognizes the general trend and appreciates the accompanying general concern that system inertia is likely to continue to decline with further wind and solar penetration and that ERCOT's critical inertia level will also, therefore, likely rise in the future absent some mitigating measure such as implementation of Fast Frequency Response (FFR) service. SCT believes Case 5 with 2% DR is a useful extreme study and the identified export limit should be considered in the study results and recommendations.

4. NPRR 863 considerations

4-1 NPRR 863 status

In the three months which have passed between public stakeholder discussions of the SCT Directive 9 studies, NPRR 863 has continued to advance toward adoption, having been recommended by TAC on Jan. 30, 2019. Heretofore, NPRR 863 and the SCT Directive 9 studies have been on parallel, yet, distinct tracks. Now that NPRR 863 appears to be headed for adoption and implementation (at least the FFR component, if not the ECRS component) prior to SCT's planned in-service date, SCT wonders if it is useful and possible to consider the Directive 9 questions under the assumption that at least the FFR portion of NPRR863 is effective, if not the entire NPRR. Given ERCOT's stated expectations of improved system

frequency control during low inertia conditions post-NPRR 863, does it not make sense to consider the SCT DC Tie under such an improved system operating scenario?