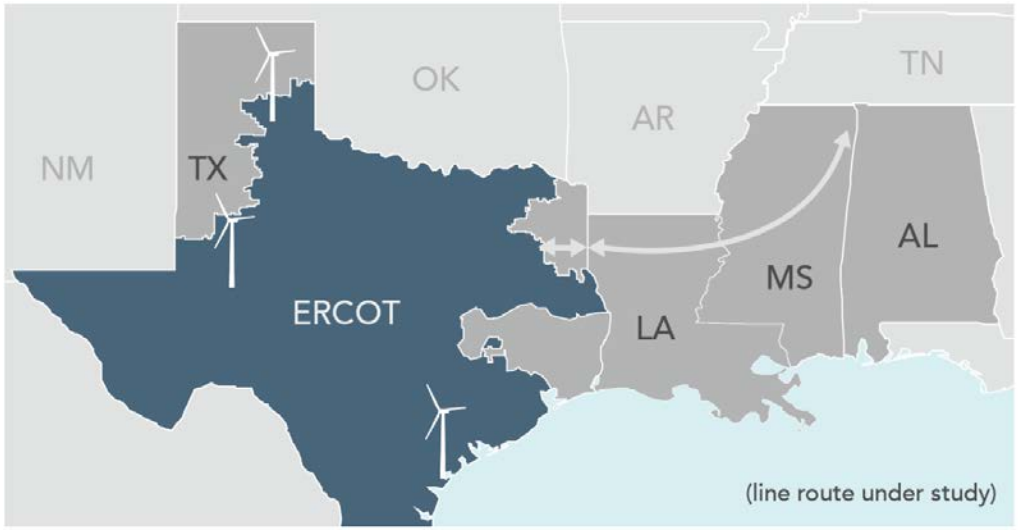
Southern Cross Transmission (SCT) DC Project Study– Status Update

ERCOT Transmission Planning
January 22, 2019

Overview

- The objective of this SCT interconnection study is to identify transmission facility upgrades that will be required to meet the ERCOT and NERC Transmission Planning reliability standards and to manage congestion resulting from power flows over the Southern Cross DC project.
- Presented Scope at April RPG: http://www.ercot.com/calendar/2018/4/24/138683-RPG
- Scope Revision, Assumptions, Initial Findings at November RPG: http://www.ercot.com/calendar/2018/11/27/138709-RPG



Notable Case Updates

Directive 6 Steady State	Summer Peak	350 MW Import
	HWLL	2100 MW Export
Directive 6 Dynamic Stability	Summer Peak	2000 MW Import/ 2100 MW Export
	HWLL	2000 MW Import/ 2100 MW Export

- Ratings of Panola to Rusk lines were increased from 1,631 to 3,078 MVA per Pattern Update
- Forney – Seagoville/Tri Corner 345 kV Double-circuit Line (TPIT 7022)

SCT Import/Export Capability Under Existing System Condition

- Import:
  - No thermal or dynamics violations for 350 MW import
  - Thermal violations were observed if the import exceeds 547 MW
  - No dynamics violations for imports at 547 MW
  - Numerous violations were observed for imports up to 2,000 MW
- Export:
  - No thermal or dynamic violations up to 1,280 MW export
  - Voltage collapse was observed if the export exceeds 1,289 MW

Import/Export Level (MW)	Limiting Condition(1)	Contingency
547 (Import)	Thermal Violation (Elkton - Tyler Switch 138 kV)	Tri Corner - Elkton Tri Corner - Tyler Grande (P7)
1,289 (Export)	Voltage Collapse (2)	P7

(1) Based on 2% Power Transfer Distribution Factor (PTDF) and Outage Transfer Distribution Factor (OTDF) cutoffs
(2) Voltage Collapse is assumed at 0.80 p.u. voltage

Upgrades Options to Support Base Case Transfer Levels

Option	Description
A	• 540 Mvar Dynamic Reactive Device at 345 kV Rusk Substation • 3 * 175 Mvar Synchronous Condensers at 345 kV Panola Substation
B	• A new 38 mile Martin Lake to Panola 345 kV double circuits • 2* 175 Mvar Synchronous Condensers at 345 kV Panola Substation

- Both Option A and B can support the base case transfer levels but may have different performance characteristics
- The synchronous condensers at Panola will provide both the dynamic reactive support to the transmission grid and improve the system strength that is required to support the SCT LCC-HVDC transfers on the ERCOT grid
- The identified dynamic reactive capability need at Rusk 345 kV Substation is the total amount needed for reliable response. The selection (SVC, STATCOM, or Sync Condenser) and implementation (size and maintenance) of such dynamic reactive need would require additional assessment

Upgrades Need to Support Full SCT Transfer Levels

- With Options to support base case transfer included, a sensitivity study was conducted to determine if any additional upgrades need to accommodate full SCT transfer level from “stability” perspective.
  - Summer Peak: 2000 MW Import / 2100 MW Export
  - HWLL: 2000 MW Import / 2100 MW Export

- Reliability issue: angular instability of generators in the East Texas at higher SCT import level
  - New transfer path is needed between East Texas and ERCOT main grid

Upgrade Options to Support Full SCT Transfer Levels

• Option	• Description
Sen-A	• A new 345 kV circuit from Rusk to Trinidad
Sen-B	• A new 345 kV circuit from Rusk to Forest Grove
Sen-C	• A new 345 kV circuit from Nacogdoches to Lufkin • A new 345 kV circuit from Lufkin to Jewett
Sen-D	• A new 345 kV circuit from Nacogdoches to Herty North to Lufkin • A new 345 kV circuit from Lufkin to Jewett 345 kV line

- These options are only tested in the dynamic studies.
- The stability assessment for these options under full SCT import/export in both summer peak and HWLL is still in progress.

Upgrades Need to Support Base Case Transfer Levels if SCT can provide VSS as defined in Protocol 3.15

- Per PUCT directive 8, this study will also examine if there is any upgrades need if SCT is required to provide VSS as defined in ERCOT Protocol 3.15.
  - SCT VSS model assumption:
    - Point of Interconnection: Panola 345 kV substation
    - SCT Full Capability: 2000 MW import/2100 MW export
    - SCT Reactive Capability: +/- ~690 Mvar (at POI)
- This assessment is in progress.

Next Steps and Tentative Schedule

- ❑ Complete dynamic studies
- ❑ Complete Directive 8 VSS assessment
- ❑ Obtain cost estimates for the identified transmission upgrade options from TSPs
- ❑ Complete the study results in Q1 2019

QUESTIONS?

Please submit comments to: ben.richardson@ercot.com