

Pecos West Intertie

ERCOT Regional Planning Meeting

Tuesday, July 19, 2022



Pecos West HVDC Intertie Overview

Benefits

- Application of controllable High-Voltage Direct Current technology can benefit the power system in many ways, such as operational security, reliability, performance and economy
- Compared with AC systems, HVDC systems are more flexible and contribute to enhancing system resilience
- HVDC facilitates power system operations by providing flexible power flow control and voltage regulating abilities
- HVDC increases the integration of renewable resources by reducing the possibility of low-frequency and voltage oscillations
- HVDC contributes on enhancing the resilience of power system after extreme natural disasters

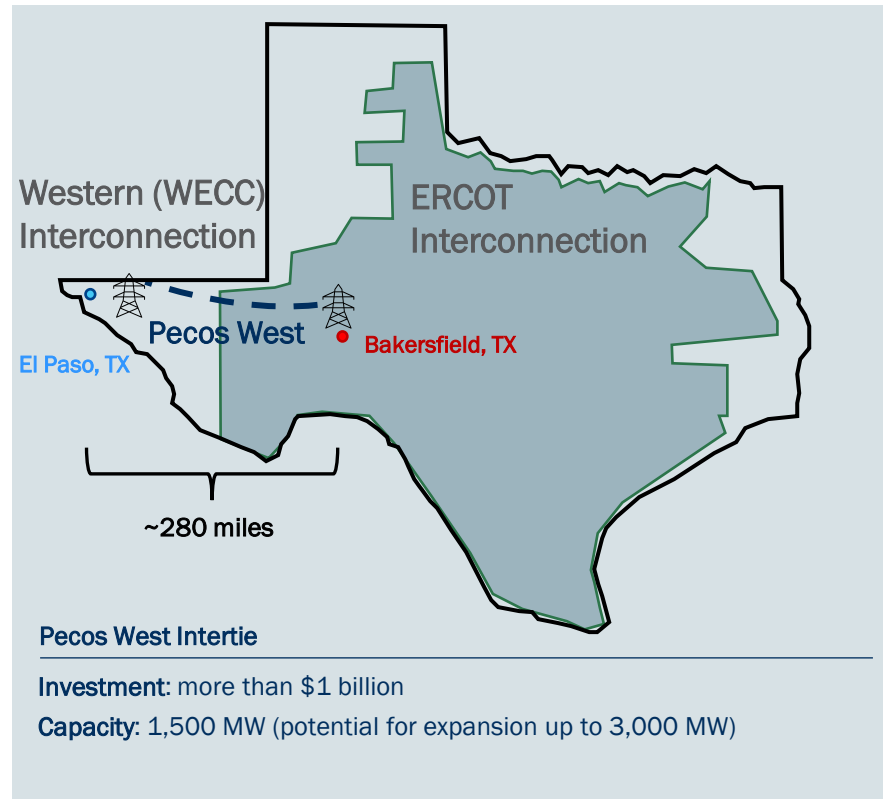
Technical Features: HVDC

- Higher power density than AC in comparable right-of-way
- Small footprint reduces environmental impacts
- Can connect asynchronous AC systems
- Fast, bi-directional control of power flow
- Ancillary services capabilities

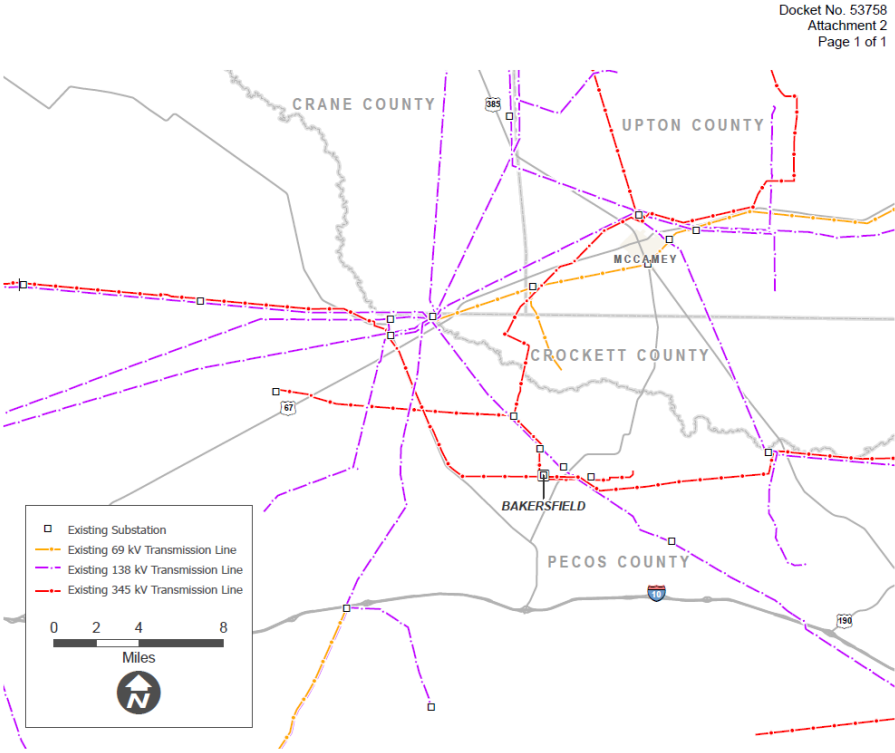
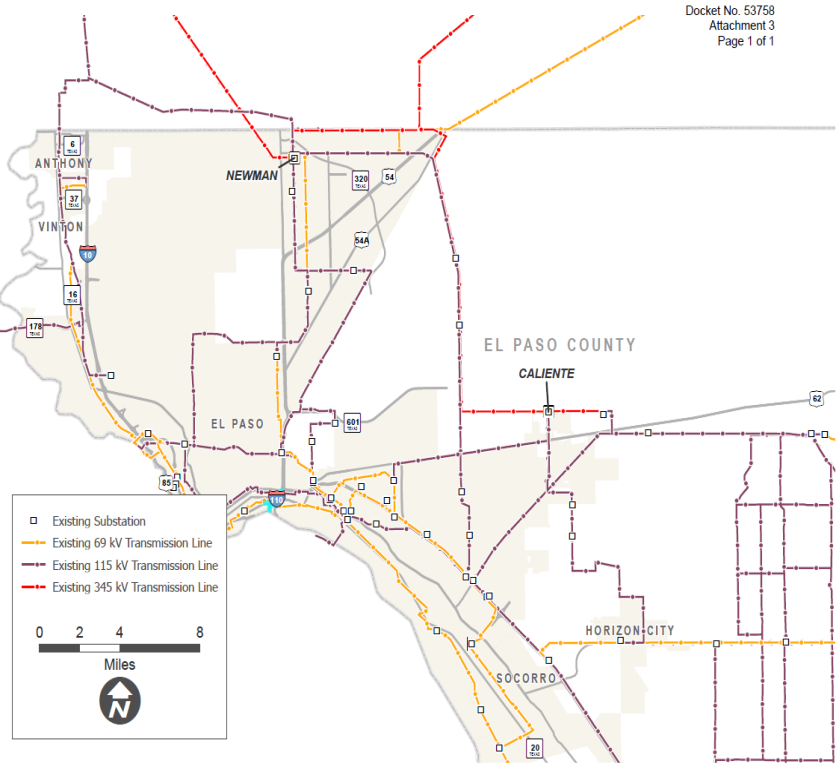


Pecos West Overview

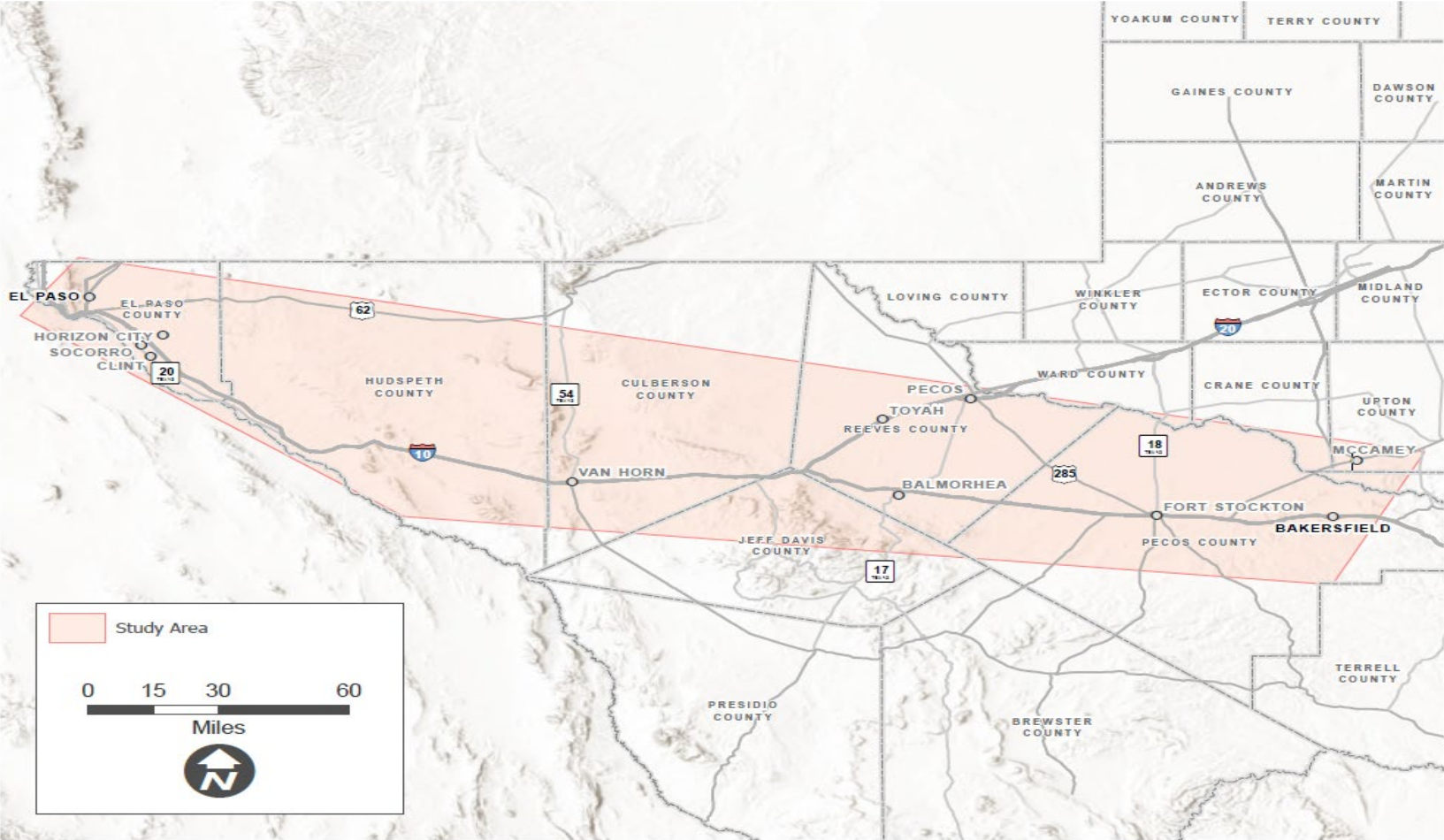
- Grid United Texas LLC (“GU”) is a Houston, TX-based energy company:
 - Developing ~280-mile, 1,500 MW **Pecos West Intertie** HVDC transmission tie with potential for expansion up to 3,000 MW
 - Connecting Bakersfield, TX to El Paso, providing critical link between ERCOT and Western Interconnection
 - COD – Expected Dec 2029
- Project offers significant **reliability benefits** to ERCOT
 - **Electric Power Engineers, LLC** is conducting in-depth reliability studies
- Pecos West also provides new markets for producers and reduced renewable curtailment with negligible impact on ERCOT prices
 - **nFront Consulting** performed a 2027 study year Security Constrained Economic Dispatch (SCED) model of ERCOT and WECC



POI – Bakersfield 345kV (LCRA owned) and Caliente 345kV (El Paso Electric Owned)



Routing Study Area



Regulatory Overview

- Filed Pecos West Direct Current Tie Operator (DCTO) CCN on July 5th 2022
- FERC application can be filed 180 days after DCTO CCN filing
- Targeting filing routing CCN in late 2023, followed thereafter with land acquisition upon approval of CCN (late '24)

	Target Date	Progress update	Next Steps
File DCTO CCN	• Early summer	• Filed July 5th, 2022 • PUCT Docket 53758	• File request for PUC certification approval as a DC Tie operator under PURA §§ 37.051(c-1) and 37.056
File FERC Application	• Late 2022	• Project will <u>not</u> synchronously connect grids	• Develop and file FERC 210, 211 and 212 application
File routing CCN	• Mid to late 2023	• GU is initiating in-depth environmental assessment and routing study with Power Engineers	• Amend PUC certification for routing of DC Tie line facilities between ERCOT and WECC
ERCOT market rules	• throughout	• Grid United committed to cooperatively working with ERCOT throughout process	• Work with ERCOT to finalize market rules applicable to DC Tie operators

Electric Power Engineers, LLC Studies

Goal:

- Determine possible ERCOT reliability impacts for the proposed 1,500 MW HVDC Tie facilities (expandable to 3,000 MW) to be interconnected at either LCRA TSC Bakersfield 345 kV Station or AEP Solstice 345 kV Station
- Expected commercial operation date of Q4 2028
- Identify contingencies of concern, thermal overloads, and unacceptable voltages caused by the addition of the proposed Pecos West Intertie within the proposed study area
- ERCOT Planning Guide requirements
- Includes extreme contingency analysis

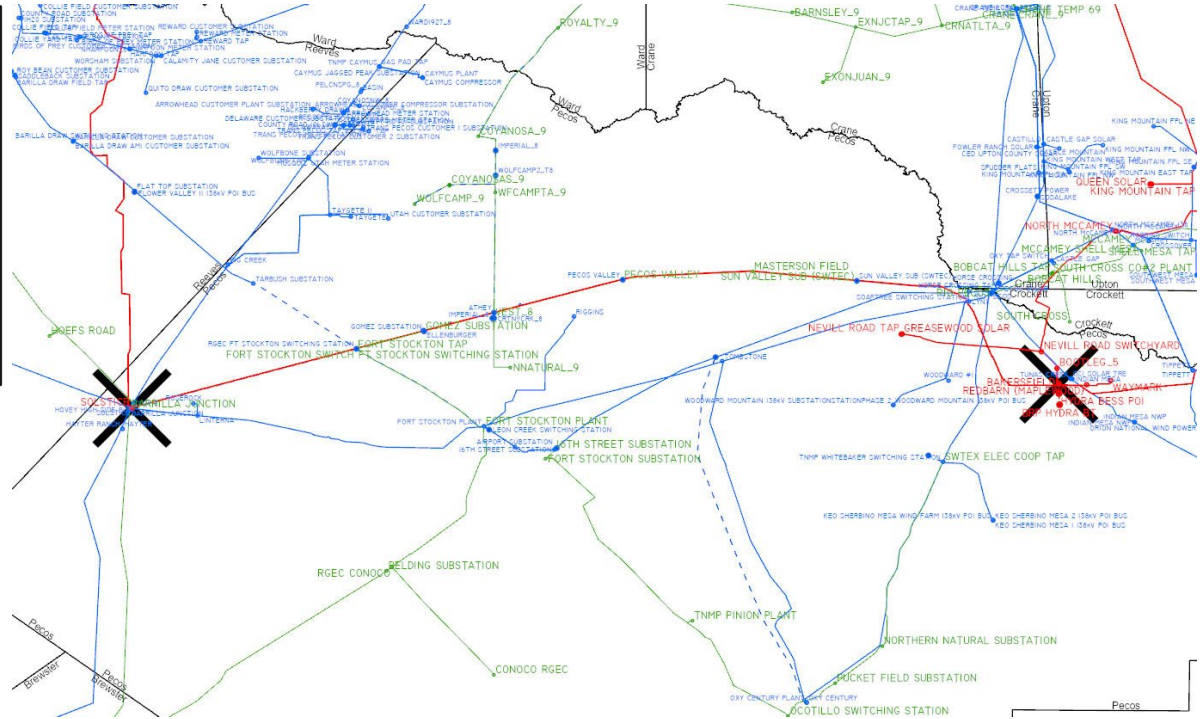
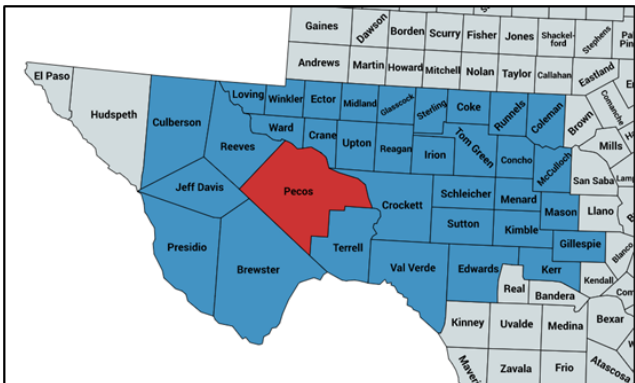
Inputs:

- Transmission map showing nearby transmission elements, queued projects and the POI(s)
- Latest ERCOT 2028 Summer Peak and 2025 HWLL base case models
- Transmission system topology in the 2025 HWLL base case within the Study Area matched to the transmission system topology from the 2028 Summer Peak case
- Include planned generation additions near and around the study area which meet ERCOT Planning Guide Section 6.9(1) (PG 6.9(1))

Outputs:

- Export and Import Transfer Analysis

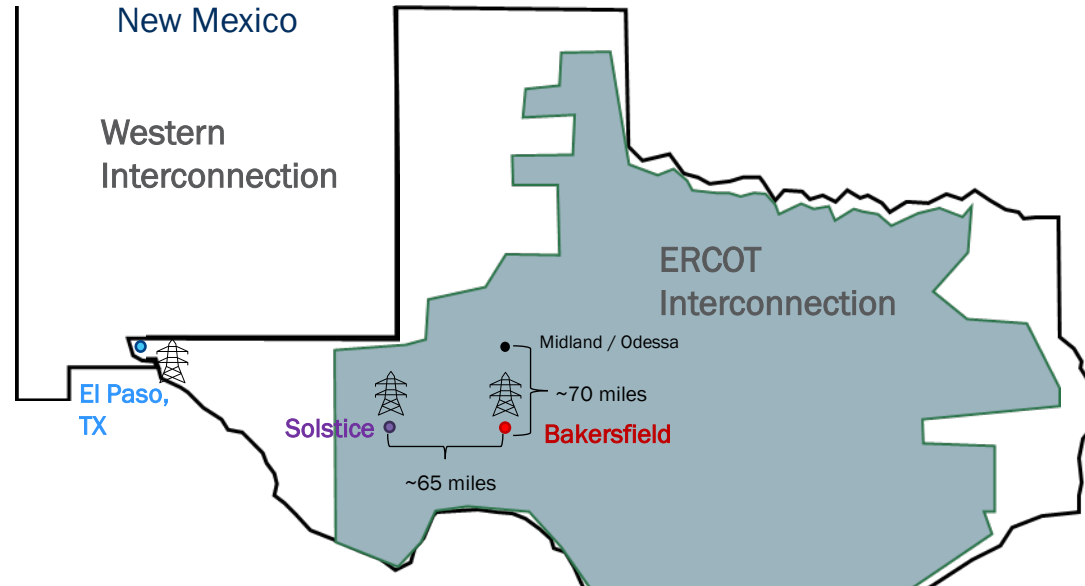
Study Area & Map



Solstice vs Bakersfield

- Examined two different 345 kV stations for interconnection, AEP Solstice and LCRA TSC Bakersfield in Pecos County
- Based upon the 2028 Summer Peak base case steady state study transfer analysis, interconnection at LCRA TSC Bakersfield provides for **2,600 to 2,300 MW** of import/export capability
- Interconnection at AEP Solstice provided less import/export capability of **1,300 to 1,000 MW**

Project Map



nFront Consulting SCED Study

nFront performed a Security Constrained Economic Dispatch (SCED) model of ERCOT and WECC in 2027 to determine the operations and impact of the Pecos West Intertie

Goal:

Develop a base case for how a proposed HVDC interconnection between WECC (El Paso Electric Company) and ERCOT (at the existing LCRA TSC Bakersfield Switching Station) would operate and what effect it would have on both El Paso Electric and ERCOT

El Paso Electric Inputs:

- Load, generation fleet from 2020 IRP including new additions by 2027
- Newman 5, Montana 4, Rio Grande 8 & 9 set as must-run on El Paso Electric's system
- El Paso Electric is committed to receive its share of Palo Verde when it does not cause oversupply

ERCOT Inputs:

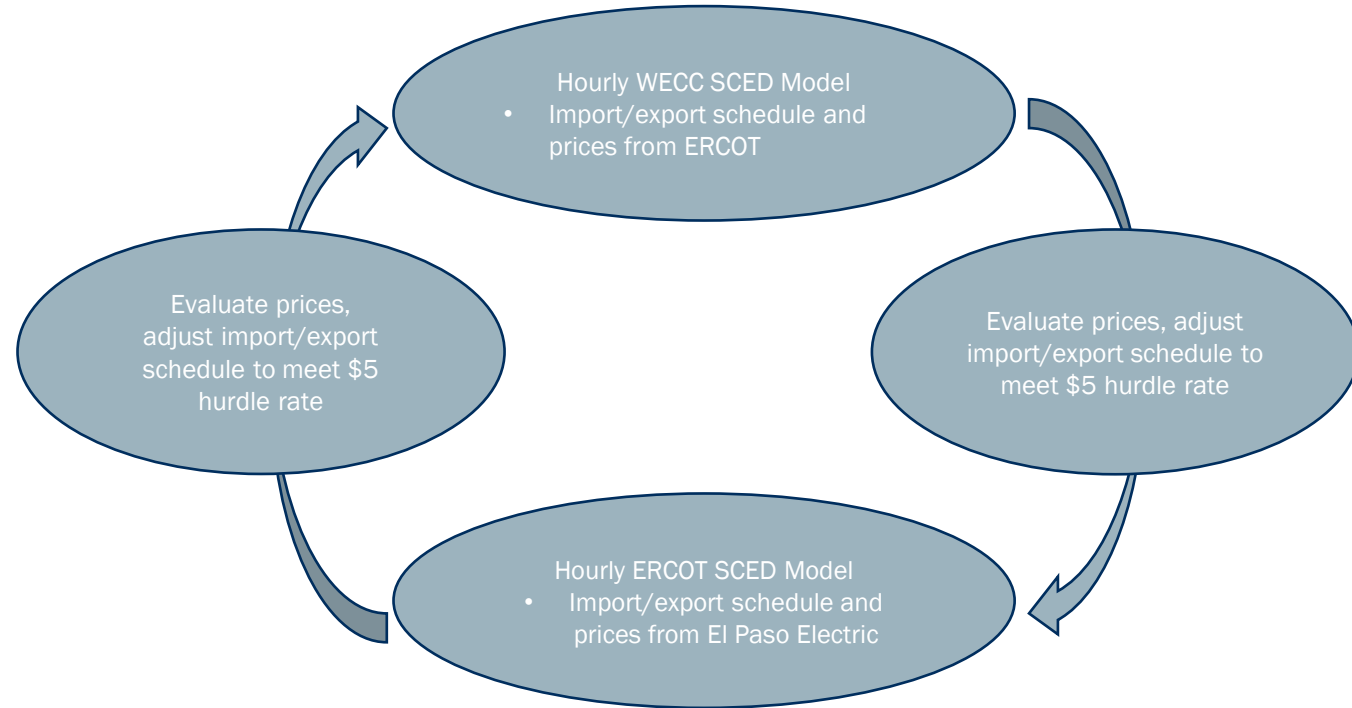
- ERCOT load, transmission, and generation fleet set in line with ERCOT RTEP assumptions and methodology
- Proposed transmission reliability upgrades to address load growth were included

Additional Parameters

- Used a \$5/MWh hurdle rate to account for use of El Paso Electric transmission system and ERCOT export charges
- Natural Gas prices from the S&P Global quarterly gas forecast

Iterative method used to determine utilization of HVDC Tie

- El Paso Electric and ERCOT modeled independently with import/export schedules on the HVDC Tie passed back and forth between them
- Modeled in a "status quo" world: WECC balancing authorities schedule and coordinate subject to OATT hurdle rates. Limited zero-cost inter-BA transfer capability available during dispatch to simulate CAISO-EIM participation
- Objective: maximize total benefit of the HVDC Tie subject to \$5 hurdle rate out of both ERCOT and El Paso Electric

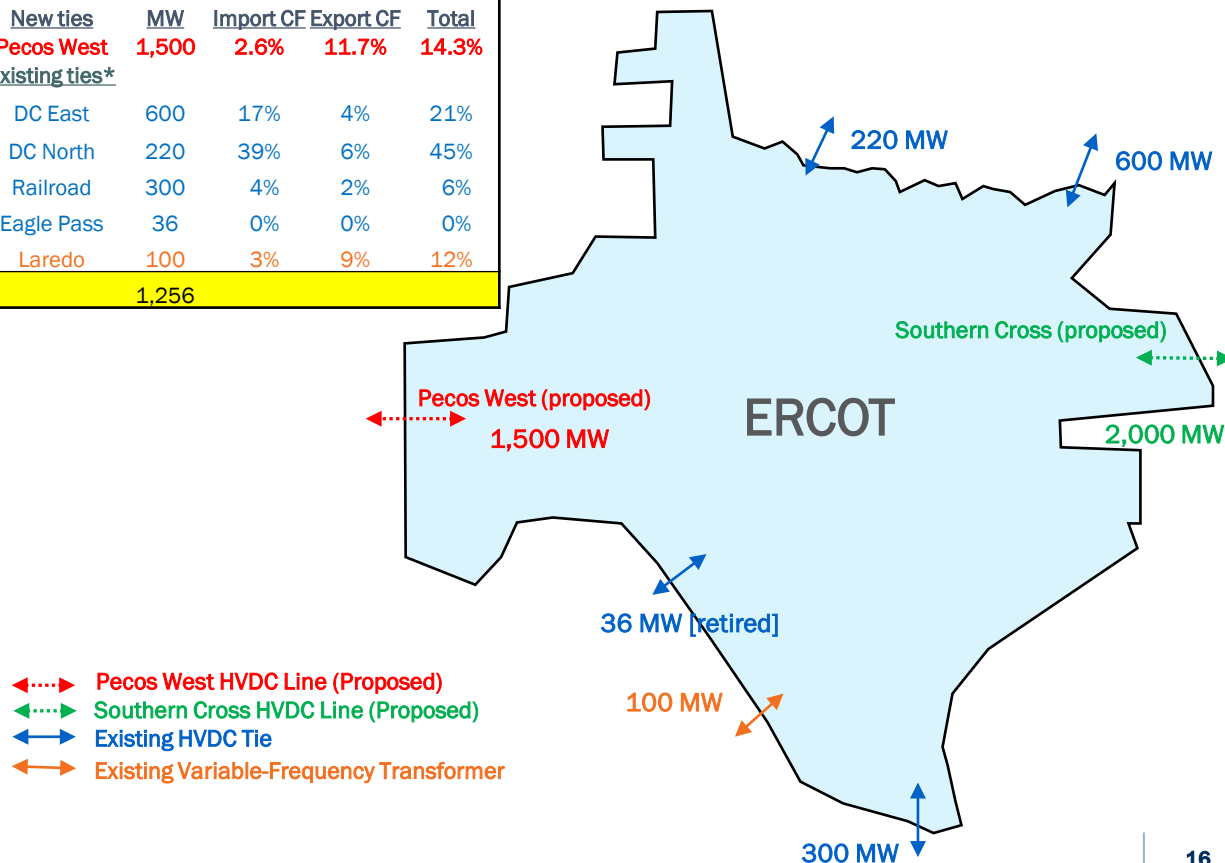


Existing and Proposed HVDC Ties in Texas

Pecos West Expected Operations

- Bidirectional transfer between ERCOT and El Paso
- Primarily utilized to export power from ERCOT to El Paso
- Initial studies indicate >1.5M MWh/year exported and >300k MWh/year imported
- Low-capacity factor utilization belies that the line is being used in ~44% of hours in the year

New ties	MW	Import CF	Export CF	Total
Pecos West	1,500	2.6%	11.7%	14.3%
Existing ties*				
DC East	600	17%	4%	21%
DC North	220	39%	6%	45%
Railroad	300	4%	2%	6%
Eagle Pass	36	0%	0%	0%
Laredo	100	3%	9%	12%
	1,256			



* Existing tie utilization based on 2021 operating data from ERCOT

Benefits of Pecos West Intertie

- HVDC can regulate the exchanged powers among several regions in a short time with the ability to independently control the active and reactive power of conversion stations
- Several operation modes (PQ, AFC, V/f, PF etc.) provides ERCOT operators additional flexibility in day-to-day grid operations
- Converter stations can provide dynamic voltage response like the performance of a ~ 500 MVAR STATCOM helping stabilize the grid
- The power conversion stations of HVDC systems are capable to provide black start service after extreme natural events.



Renewable Curtailment Benefit Scenario

Scenario: Very high renewable days with high curtailment (i.e. when gas units are used for inertial response)

HVDC solution: excess renewables could be exported west

Future Studies?

- Update Steady State power flow analysis with the addition Bearkat to North McCamey to Sand Lake Double Circuit 345 kV Line
 - Delaware Basin Load Sensitivity
- Transient Stability analysis
- Short Circuit analysis
- SSR Interaction studies (after final equipment selection)
- Additional SCED scenario studies



www.gridunited.com



<http://www.linkedin.com/company/grid-united>



info@gridunited.com