



# Sharyland Utilities' HVDC Interconnection: Part 1





# Sharyland Utilities, L.P.

- Newest Investor Owned Utility in Texas
- A “greenfield” utility focusing on power reliability
- Our Service Territory is encompassed by the Master Planned Development of Sharyland Plantation





# South Texas Location

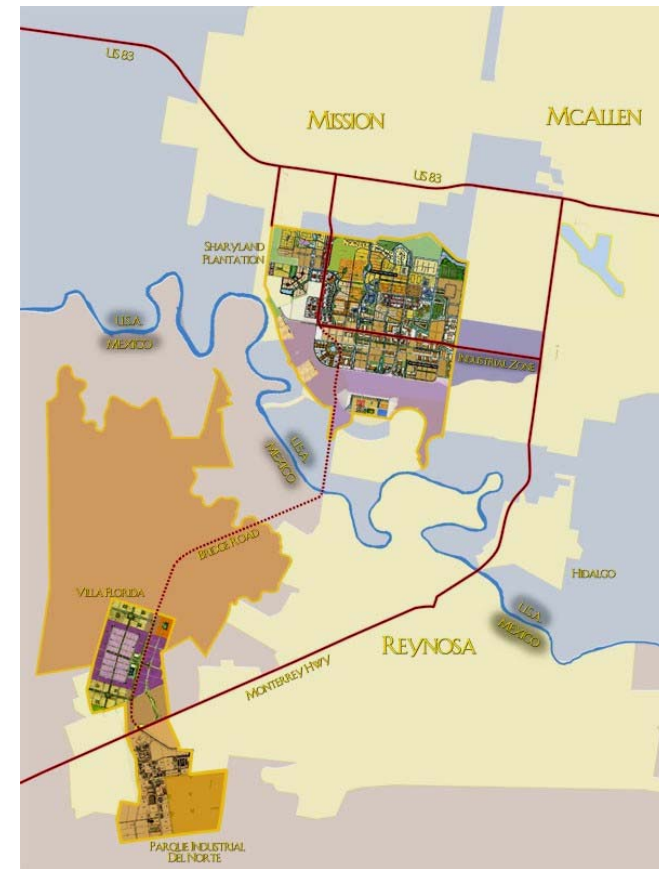
- Located in the Cities of Mission and McAllen, TX
- Directly across the border from Reynosa, Tamaulipas, MX
- 150 miles from Financial and Industrial Center of Monterrey, Nuevo Leon, MX





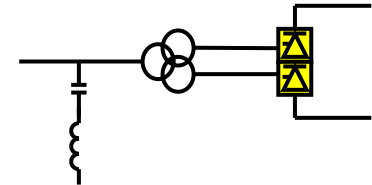
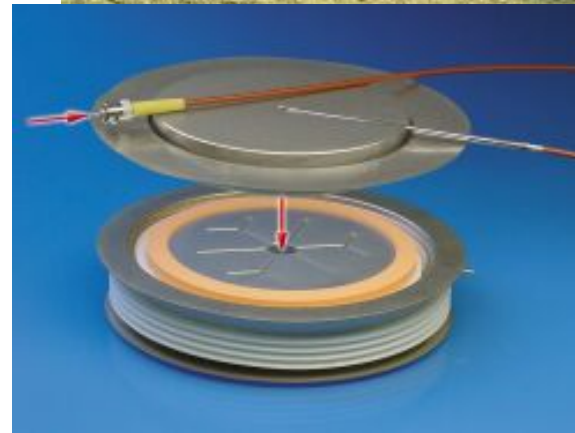
# The Master Plan

- South Texas Metro Area
  - Young Work Force
  - Economy
- Reynosa, Tamaulipas, MX
  - Large Industrial Parks
  - Fortune 500 Companies
- Monterrey, Nuevo Leon, MX
  - Industrial Center



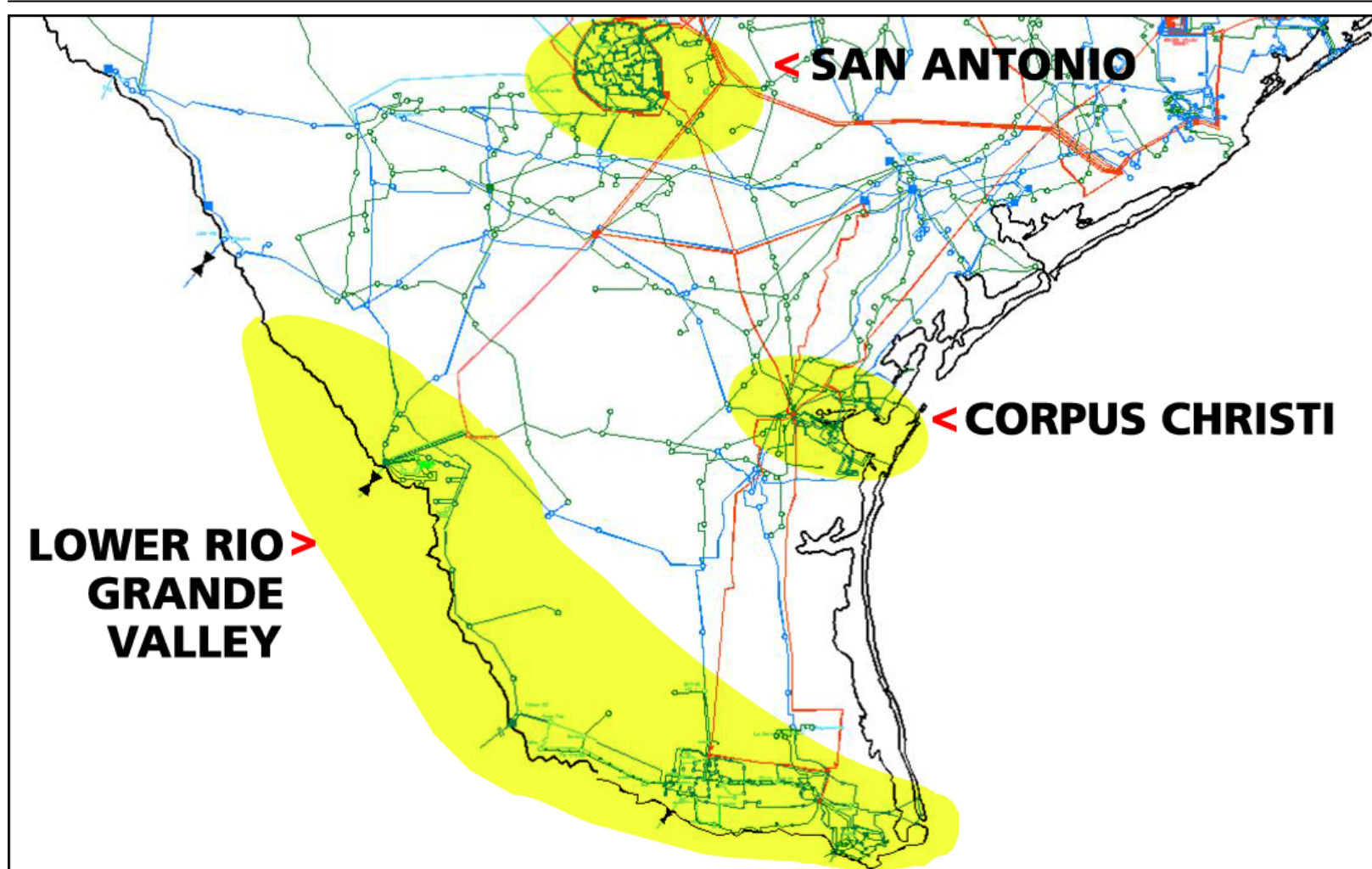
# What is an HVDC Tie?

- Power transfer between grids (states/countries)
- Provides “firewall” protection for each side
- Neglects the system characteristics to allow them to be matched.  
(Asynchronous Tie)



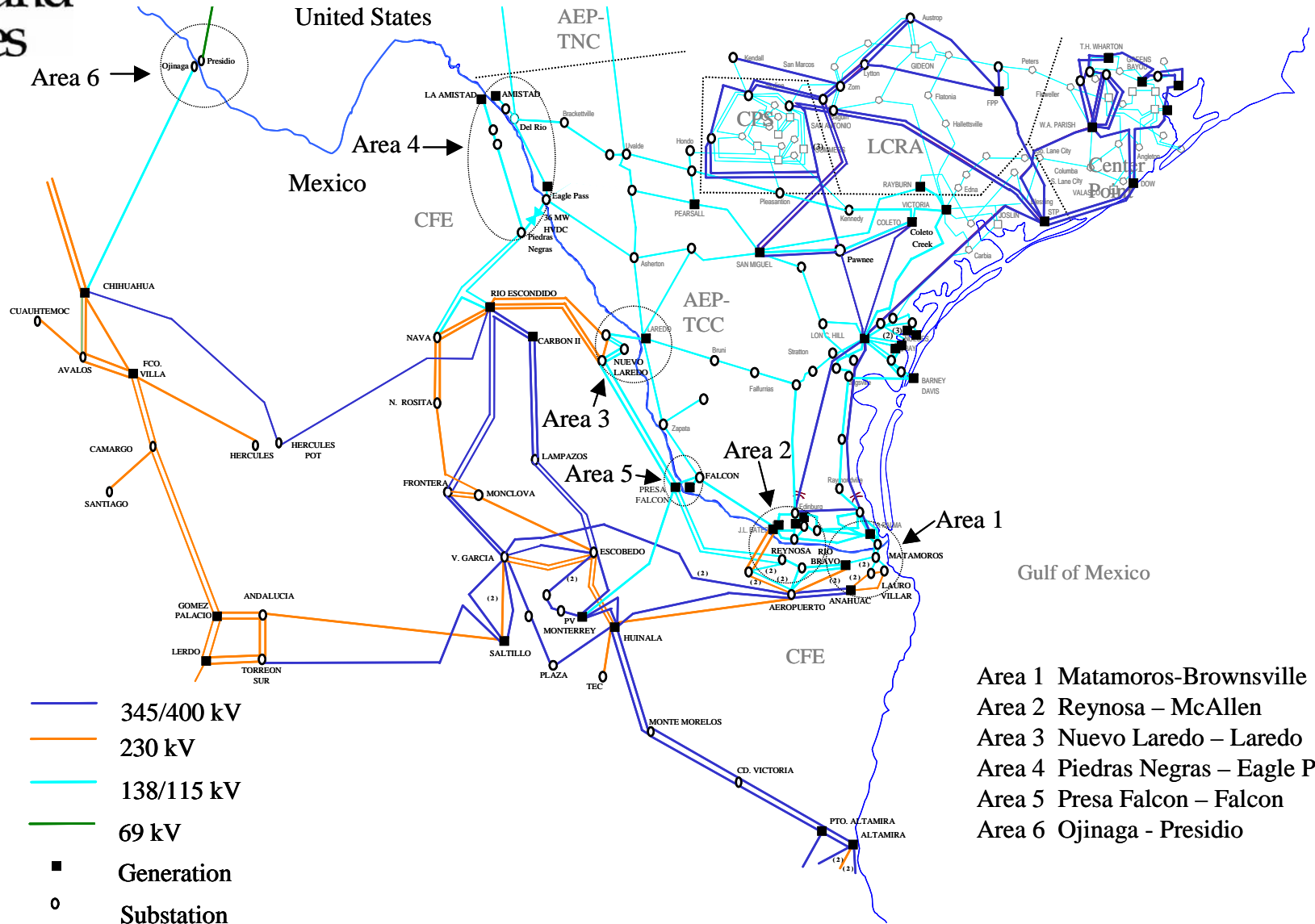


# South Texas Infrastructure





# Texas - Mexico Border Systems

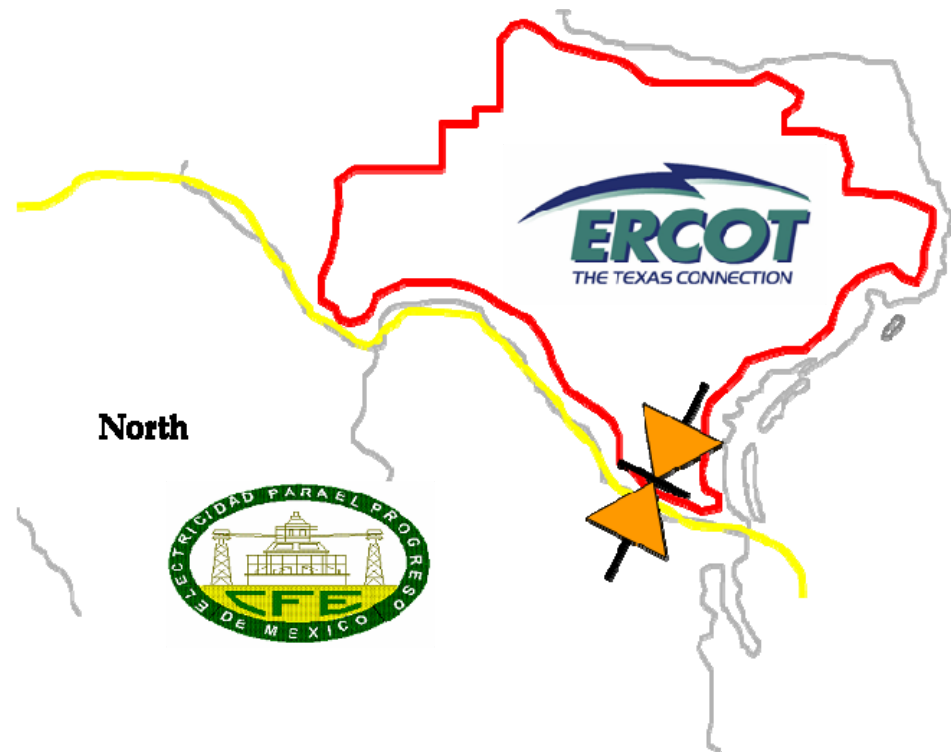


- Area 1 Matamoros-Brownsville
- Area 2 Reynosa – McAllen
- Area 3 Nuevo Laredo – Laredo
- Area 4 Piedras Negras – Eagle Pass
- Area 5 Presa Falcon – Falcon
- Area 6 Ojinaga - Presidio



# Sharyland HVDC Project

- 150 MW Back-to-Back HVDC tie expandable to 300 MW
- Classic Technology
- Operating at:
  - 138 kV AC
  - +/- 21 kV DC
- In-Service October 2007







# Basic Criteria

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- The Interconnection must be “open-access”.
  - By Tariff design, the unit is open to all users.
- The technology must block disturbances from spreading into either system.
  - The inherent nature of DC technology acts as a firewall to prevent disturbances from spreading system to system.
- It must provide for all of its own Reactive Power support.
  - Additional filter capacity (Var support) provides for rapid injections of power from CFE into ERCOT and vice-versa during periods when peak loads or disturbances require additional support.



# Basic Criteria

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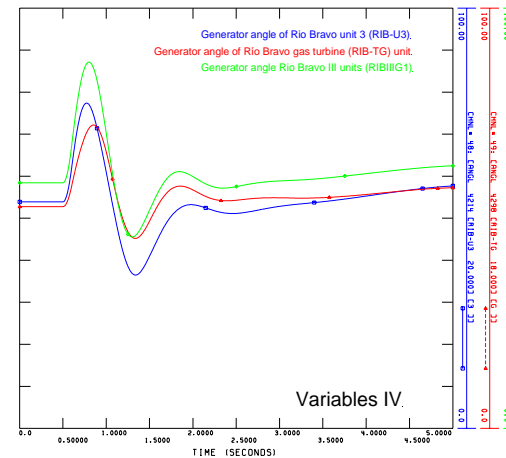
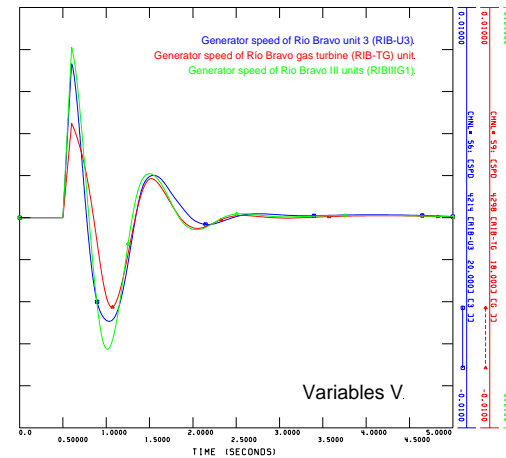
- It must provide for frequency regulation and maintain voltage at appropriate levels.
  - The control system can control or follow the frequency.
- Load pick-up and/or the ability for BlackStart in the range of 25 MW to full rated capacity was required.
  - Not inherent to conventional HVDC. However, BlackStart capability was achieved with the addition of a bypass circuit.
  - “Make-Before-Break” capability during restoration of power



# Design Issues

## Load Flow and Contingency Stability Studies

- Determine power flow levels and system response in various contingency situations
  - Loss of lines
  - Loss of generation
- Dynamic system response
  - Reactive support
  - Voltage and current disturbance



CFE-Sharyland  
2007  
Maximum Import  
ERCOT System  
Case 1

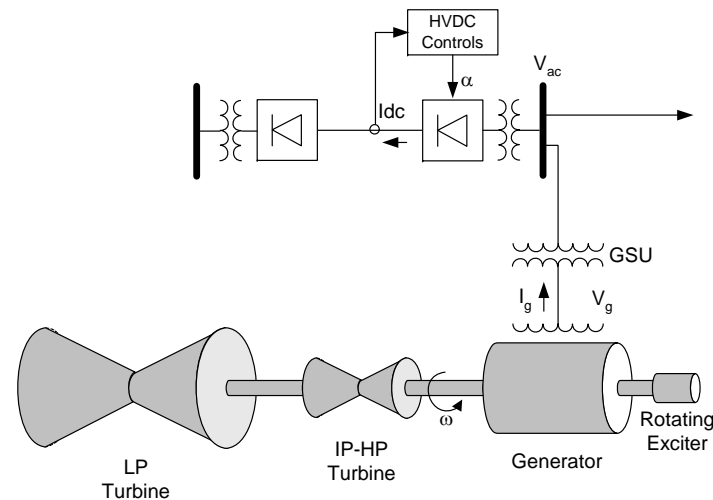
Case 1: Three-phase-to-ground fault at Aeropuerto 400 kV on line to Villa de García. Fault clearing in 6 cycles.

# Design Issues

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## Subsynchronous Torsional Interaction - SSTI

Determine the effects of vibration due to oscillation on the turbine-generator shafts on the AC Network in the vicinity of the unit.

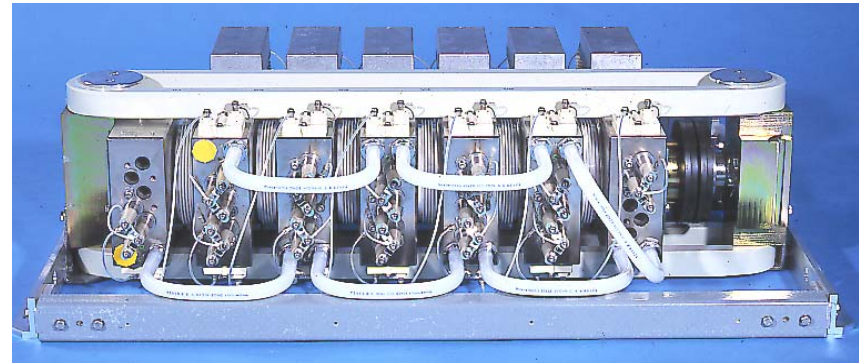


# Design Issues

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## **Additional Issues**

- Short Circuit Ratio
- Determine Harmonic effects
- Protection Coordination
- BlackStart Sequence Coordination
- Over and under voltage Coordination





# Regulatory and Permitting

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## **Presidential Permit from the United States Department of Energy**

- Justification of need
- Environmental
- Operational Requirements

## **Certificate of Convenience and Necessity (CCN) from the Public Utility Commission of Texas**

- Stakeholder discussions
- Commercial Policy implications



# Regulatory and Permitting

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## Physical Permits

- US Army Corps of Engineer
- International Boundary and Water Commission
  - Clearance over navigable waters
  - Hydrology issues
  - Levee considerations
- Mexican Counterparts
  - CILA





# Regulatory and Permitting

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**Interconnection Agreement - Sharyland Utilities and Comisión Federal de Electricidad (CFE)**

**System Support Agreement - Electric Reliability Council of Texas and Comisión Federal de Electricidad (CFE)**

**ERCOT Requirements - Protocols Revisions and changes to the Operating Guides**

**FERC Jurisdictional Issues - Declaratory Order**



# Mutual Benefits

- Enhances system reliability
- Provides access to additional generation resources
- Provides access to new wholesale markets
- Reduces environmental impact through avoidance or deferral of new generating facilities
- Reduced electric rates to consumers in both Countries.





# Why a DC Tie now?

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- Studies emphasize need for interconnections along the Texas and Mexican Border - specifically pointing out availability in Brownsville, Laredo and McAllen Areas.
- Infrastructure needed to support growth in the Rio Grande Valley
  - Joint Planning
  - More efficient use of existing infrastructure
- A DC Tie will remain useful even as economic conditions change. It is not a stranded investment.





## For more Information Contact:

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