Long-Term West Texas Export Special Study - Update

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June 15, 2021

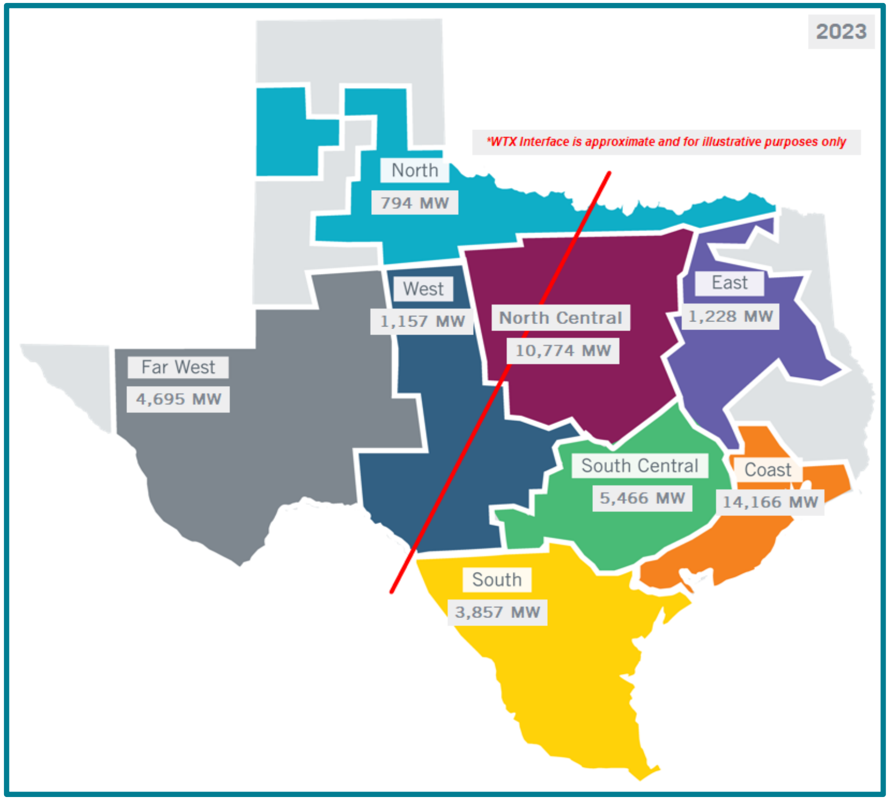
Outline

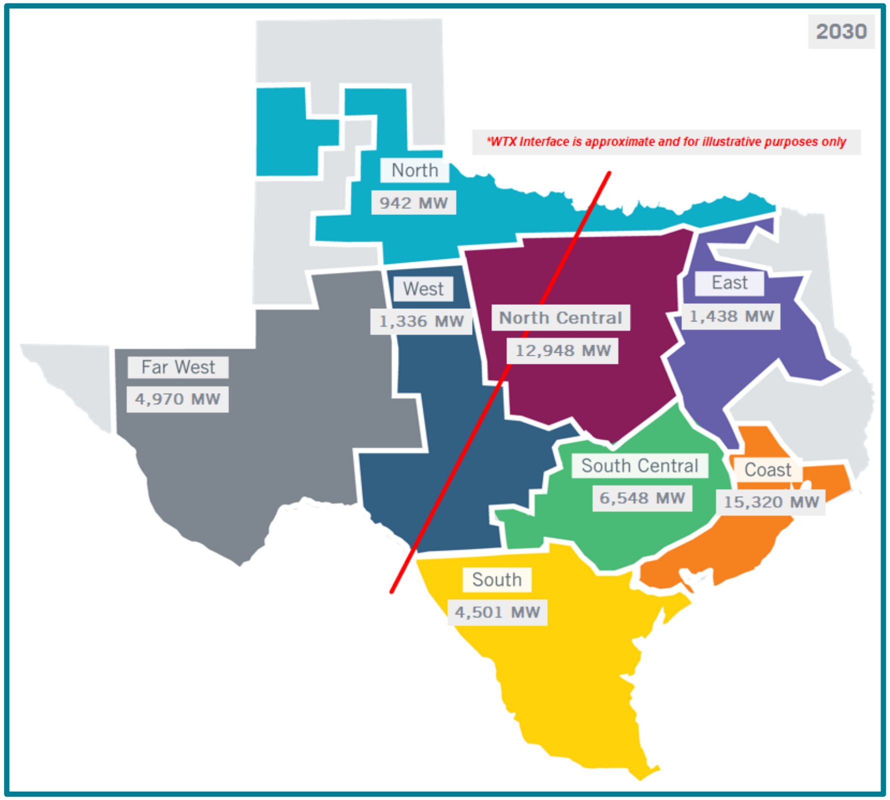
- Progress Update
- Preliminary Roadmap Results
- Next Steps

Progress Update

Tasks	Description	Status	Comments
1	Study Case Developments	Complete	
2	Year 2030 Simulation and Improvement Identification	In Progress	
3	Year 2023 Simulation and Improvement Identification	In Progress	
4	System Needs and Potential Improvements	In Progress	
5	Reports	Not Started	

Overview of Load in the Reliability Cases





- The economics cases use 8760 hourly load profiles
- Based on the received comments in May RPG, IBRs in East and Coast weather zones in the 2030 scenario will be updated to align with the IBR developments modeled in the 2023 scenario

Preliminary Observations -- 2030 Scenario

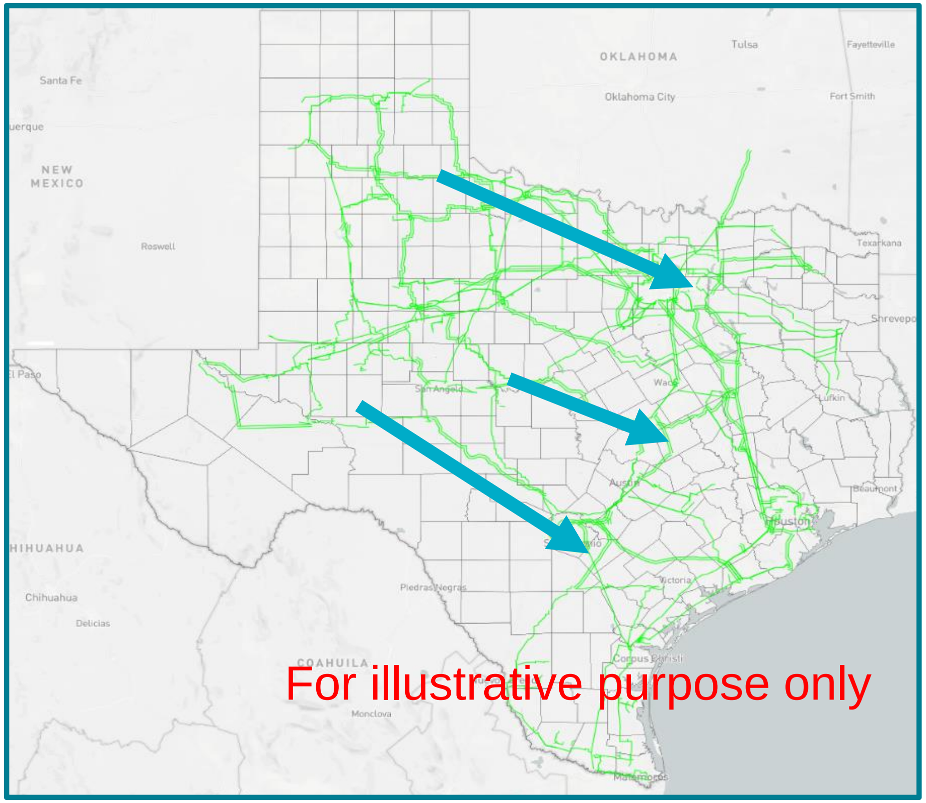
- Estimated Transfer Capability Improvement

Options	Estimated Power Transfer Improvement [1]	Estimated Cost	Notes
A typical 345-kV double circuit (DCKT)	< 1 GW	√√	• Not effective for long distance transfer • Complex Subsynchronous Resonance (SSR) issues need to be addressed if adding series capacitors
A low impedance 345-kV DCKT	1~1.2 GW	√√	• Not widely implemented
A typical 500-kV DCKT	1.3~1.6 GW	√√√	• Additional transformers are needed to connect to the existing grid • ~4 transformers per circuit
VSC-HVDC	1~2 GW	√√√	• Suitable for long distance power transfer • Need further discussion on the system operation and market operation
Reactive Devices	2~4 Mvar/MW	√	• Additional reactive devices alone could increase the operational risk to have voltage instability occur near nominal voltage

(1). Based on steady state voltage stability limit. An approximation based on the tested options. Could vary depending on the location and type of stability constraints.

Consideration of Transmission Improvements -- 2030 Scenario

- Need in the north portion of WTX:
  - projected IBR capacity in North zone (~28GW)
- Need in the central and southern portion of WTX
  - projected IBR capacity in West (~16.8GW) and Far West (~21.2GW) zones
- Reduce the stress to the existing major WTX transfer paths
  - Voltage support
  - Angle separation

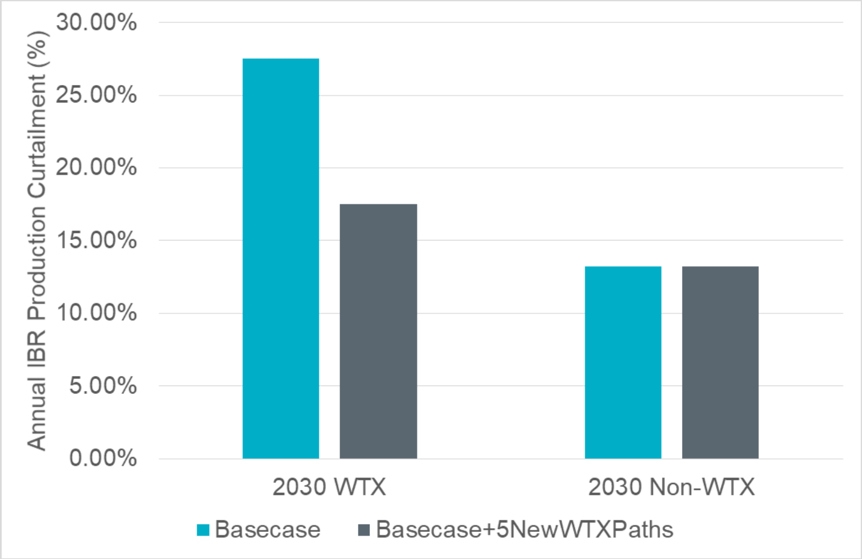


Preliminary Observations -- 2030 Scenario

- Various new transfer paths were tested to identify the potential most effective improvements to WTX transfer capability.
- For example, one test that included 5 new WTX transfer paths indicated the WTX transfer limit could be increased from 13.7 GW to 19.5 GW and WTX IBR curtailment could be reduced from 26% to 17.5%[(1)]

(1). Based on the assumed low impedance 345-kV circuits. The results can vary depends on the tested options and technologies.

- The WTX transfer limit was estimated based on steady state voltage stability assessment
- Further WTX transfer improvement may not effectively reduce IBR curtailment due to other thermal constraints



Next Steps

- Update the IBR development in Coast and East zones in the 2030 scenario to align with the IBR development modeled in the 2023 scenario
- Continue to identify the most effective potential improvements for the 2030 scenario, and assess the impact of those identified potential improvements in the 2023 scenario following existing planning assessment criteria
- Plan to complete the study in Q3 and present the final results at future RPG meetings
- Comments can be provided to Shun Hsien (Fred) Huang shuang@ercot.com