# West Texas Export GTC

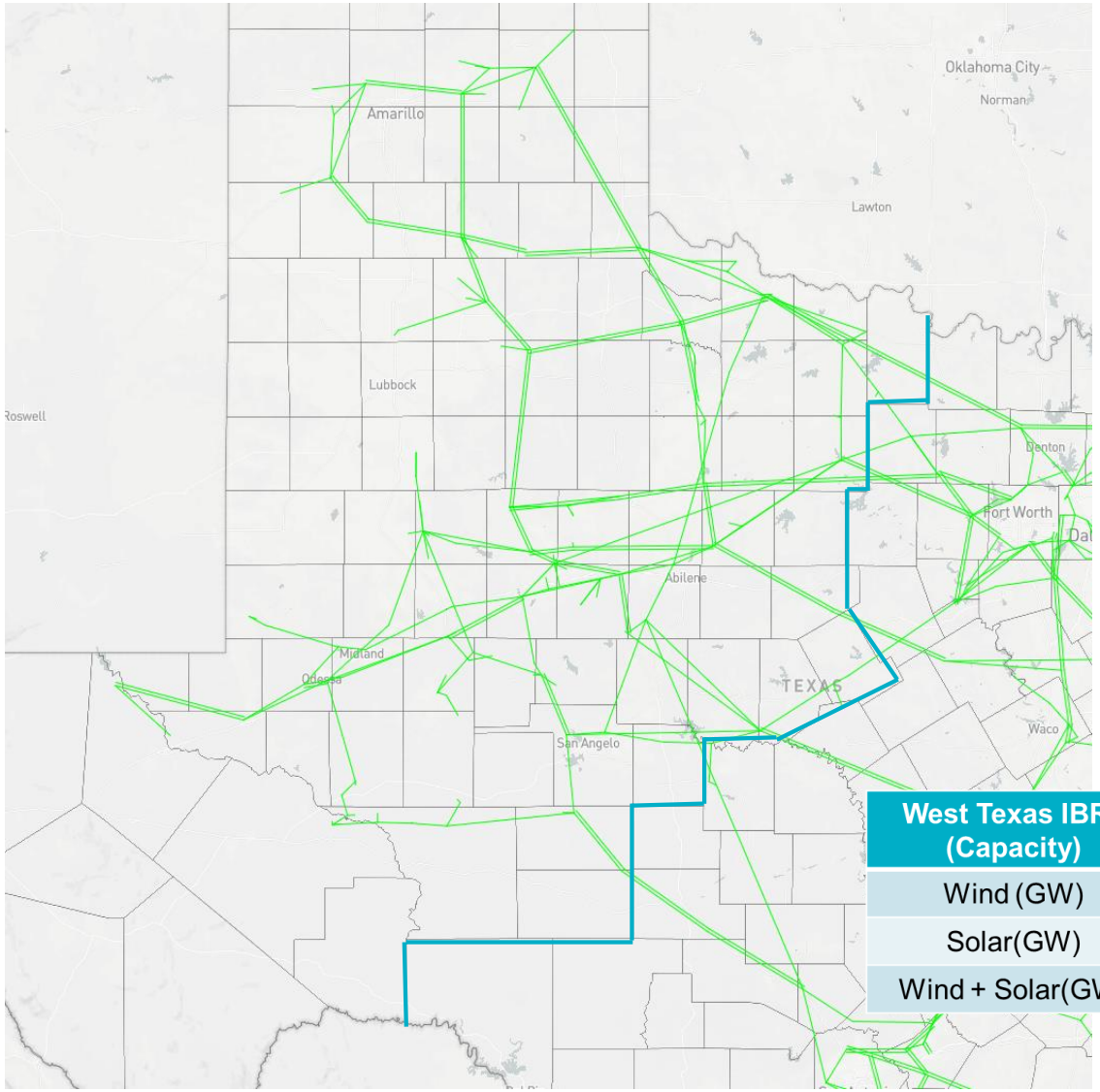
## Transmission Operations Planning

**ROS Meeting**
**10/08/2020**

# Background

- On June 24, ERCOT implemented a new West to Central GTC (W_TO_C) to manage the stability constraint with the installation of new Generation Resources in the ERCOT West Central area
- 2020 Q4 QSA concluded that the new West to Central GTC needs to be expanded to address the stability issue triggered by synchronization of new generation added in the West Texas
- On Oct. 1, ERCOT implemented a new West Texas Export GTC - WESTEX (replaced the W_TO_C) to manage the stability constraint with the installation of new Generation Resources in the ERCOT West Texas area

# West Texas GTC Study Area




## Study Area Tie lines

- 345kV lines: 16
- 138kV lines: 8
- 69kV lines: 7
- Counties: 82

## IBR Generation Installed Capacity

- ~22 GW Wind
- ~6 GW Solar

| West Texas IBRs (Capacity) | QSA Q2 2020/ W_TO_C GTC | QSA Q3 2020 | QSA Q4 2020 |
|---|---|---|---|
| Wind (GW) | 21.6 | 22.0 | 22.3 |
| Solar(GW) | 4.0 | 4.5 | 5.7 |
| Wind + Solar(GW) | 25.6 | 26.5 | 28 |

# West Texas Export GTC Study

- Stability study included 5 operational conditions
  - Uniform dispatch of wind and solar (at ~64%)
  - High Wind with Solar Off (Wind at ~82%), represents high wind at night or relatively higher dispatch in northern West Texas
  - Medium Wind with Max Solar (Wind ~55%, Solar 100%), represents max. solar during daytime or relatively higher dispatch in southern West Texas
  - Dallas Load +3 GW, Houston Load -3 GW (Wind and Solar at ~64%), represent different distribution patterns across DFW/Houston load variance
  - Houston Load +3 GW, Dallas Load -3 GW (Wind and Solar at ~64%), represent different distribution patterns across DFW/Houston load variance

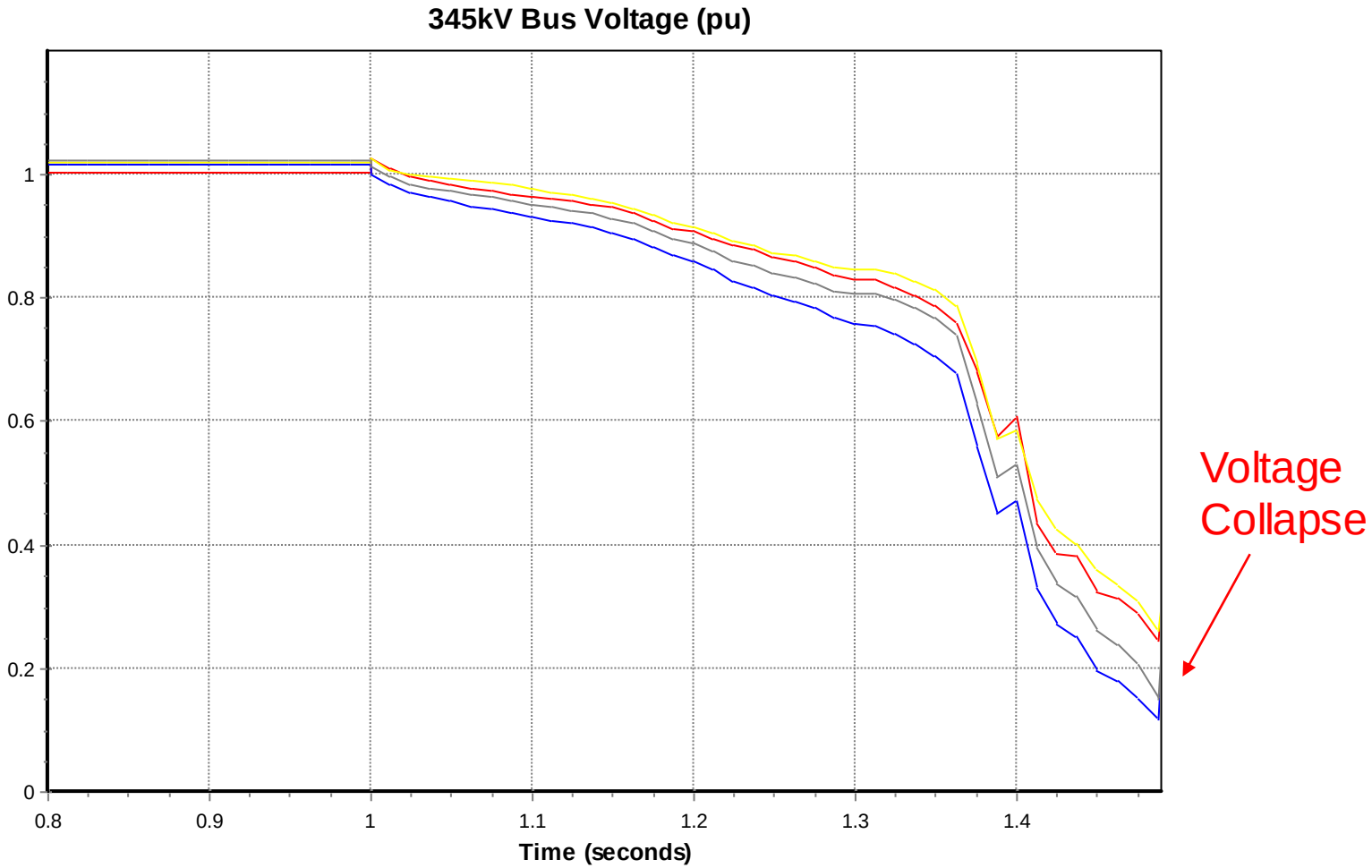
# West Texas Export GTC Study

- Included 5 GTC interface alternatives
  - Expanding the existing West to Central GTC to include W. Shack - Sam/Nav 345 kV (7*345kV lines)
  - W. Shack - Sam/Nav + C Crossing – Willow Creek + Bighill - Kendall + Brown - Killen (8*345kV lines)
  - Two options that include separate North & South Interface
    - WTX_North: W. Shack - Sam/Nav + C Crossing – Willow Creek (4*345kV lines)
    - WTX_South: Bighill - Kendall + Brown - Killeen (4*345kV lines)

    - WTX_North: W. Shack - Sam/Nav + C crossing – Willow Creek (4*345kV lines)
    - WTX_South: Existing West to Central (5*345kV lines)
  - West Export 345 kV (16*345kV lines)

# West Texas Export GTC – Stability Issue

- System Unstable at 11.84 GW transfer level under P7 contingency (No Fault)



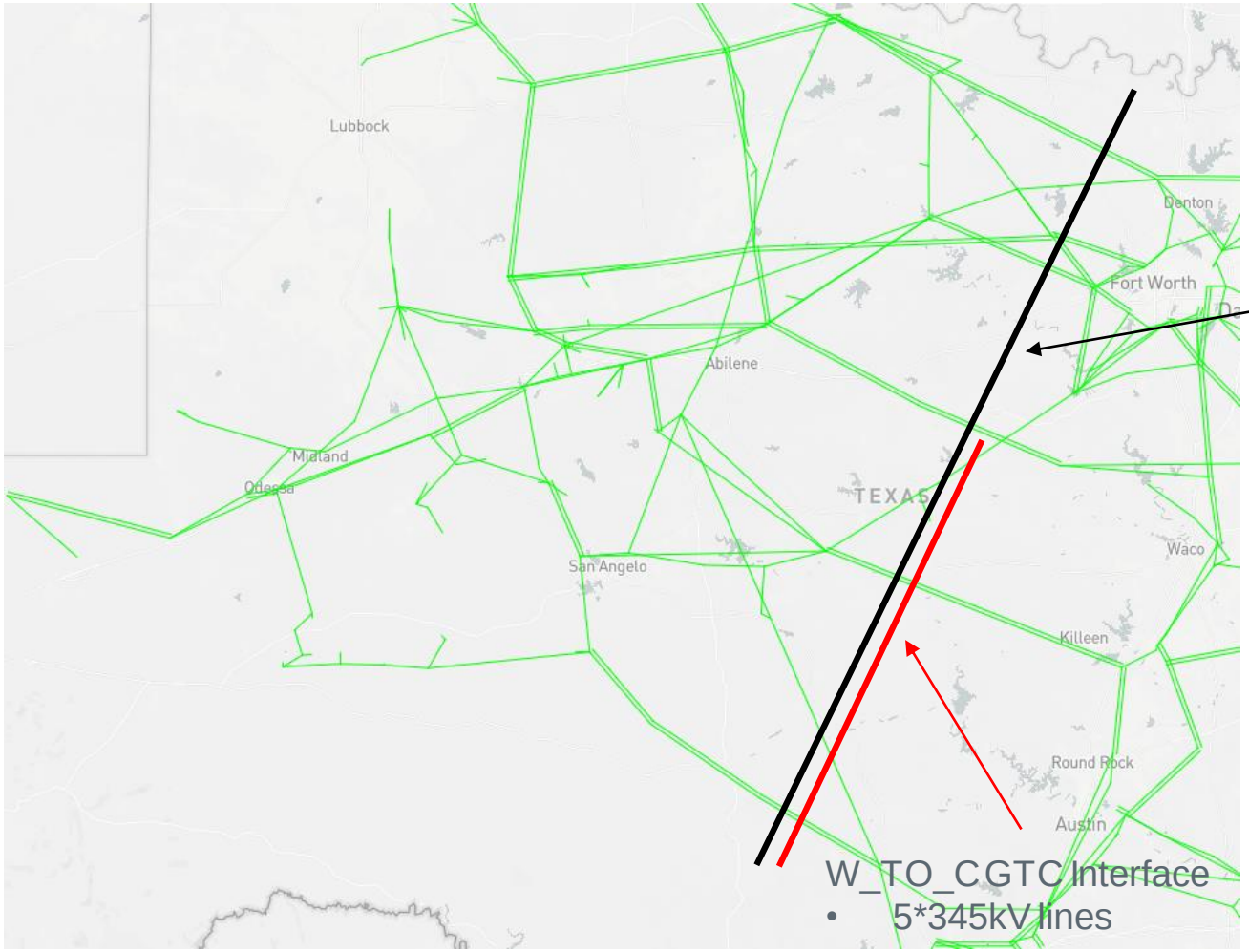
# West Texas Export GTC – Stability Issue

- Observations
  - The nature of the dynamic voltage stability phenomenon identified in the WESTEX GTC study is same as the stability issue identified in the planning West Texas Export study http://www.ercot.com/content/wcm/lists/197392/2020_West_Texas_Export_report_final.pdf
  - The stability issue is related to large power transfer from West Texas to load centers and dynamic VAR deficiency along the transfer path due to exponentially increasing reactive losses under high transfers
  - The stability issue is not related to only specific sub-areas in West Texas or specific generation types in West Texas
  - Similar stability issue observed in all of the five operational conditions studied

# West Texas Export GTC – Results Summary

- The 16-345kV GTC (WESTEX GTC) interface and associated system intact GTL (11.66 GW) was the most effective way to maximize the West Texas area generation under the studied operating condition compared to the other GTC/GTL interface alternatives
- The other GTC/GTLs alternatives would generally be more conservative than the level of transfer that would be allowed from each area compared to the WESTEX GTC
- The WESTEX GTC is also effective to manage the prior outage system conditions and the associated GTL
- The WESTEX System Operating Limit (SOL) is determined to be an Interconnection Reliability Operating Limit (IROL)

# WESTEX compared to W_TO_C




## West Texas Export Interface

- 16*345kV lines
- Riley – Krum West Switch DCKT 345 kV
- Jacksboro – Willow Creek Switch and Jacksboro – Henderson Ranch Switch DCKT 345 kV
- Graham SES – Parker Switch DCKT 345 kV
- Clear Crossing – Willow Creek Switch DCKT 345 kV
- West Shackelford Station – Sam Switch and West Shackelford Station – Navarro DCKT 345 kV
- Brown Switch – Killeen Switch DCKT 345 kV
- Big Hill – Kendall DCKT 345 kV
- Jacksboro – Krum West Switch SCKT 345 kV
- Comanche Switch (ONCOR) – Comanche Peak SES SCKT 345 kV

- WESTEX replaced the West to Central GTC

# West Texas Export GTLs

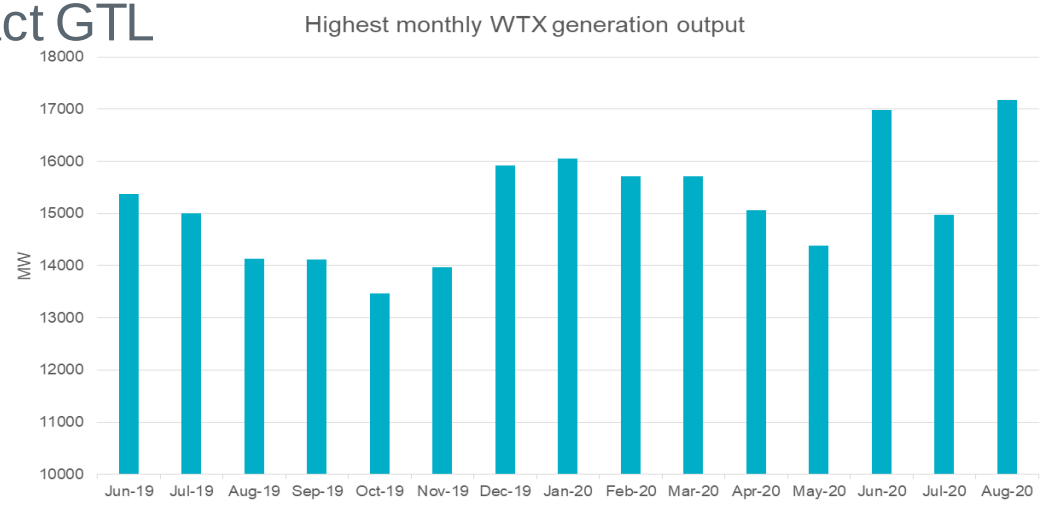
- WESTEX Interface – 16 345kV lines

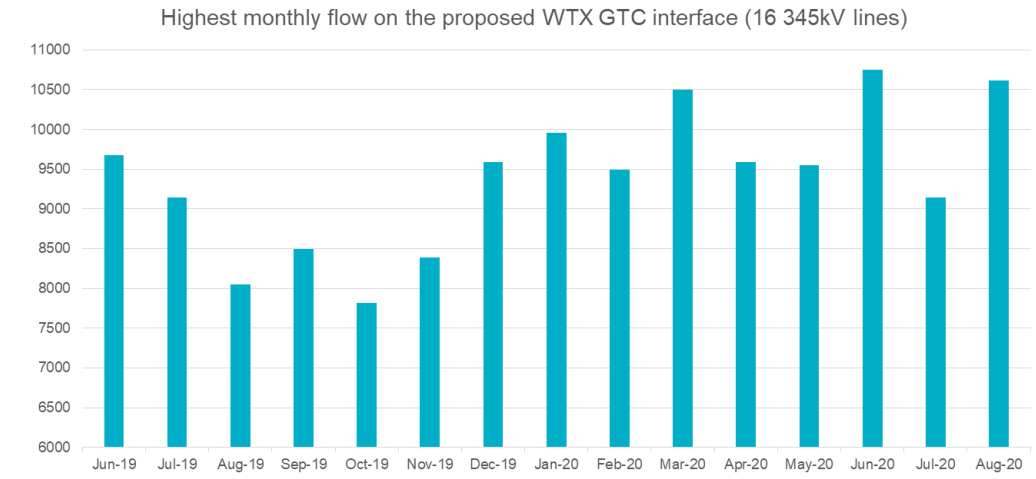
| Prior Outage | System Operating Limit (GW) * |
|---|---|
| None | 11.66 |
| Riley – West Krum DCKT 345 kV | 10.62 |
| Jacksboro – Willow Creek and<br>Jacksboro – Henderson DCKT 345 kV | 11.24 |
| Graham Ses – Parker Switch DCKT 345 kV | 10.84 |
| Clear Crossing – Willow Creek DCKT 345 kV | 10.33 |
| West Shackelford – Sam Switch and<br>West Shackelford – Navarro DCKT 345 kV | 10.45 |
| Brown Switch – Killeen Switch DCKT 345 kV | 10.54 |
| Big Hill – Kendall DCKT 345 kV | 10.00 |
| Jacksboro – West Krum SCKT 345 kV | 11.46 |
| Comanche – ComanchePK SCKT 345 kV | 11.18 |

*Aggregate tie line power flow across sixteen 345 kV lines (measured at receiving end)

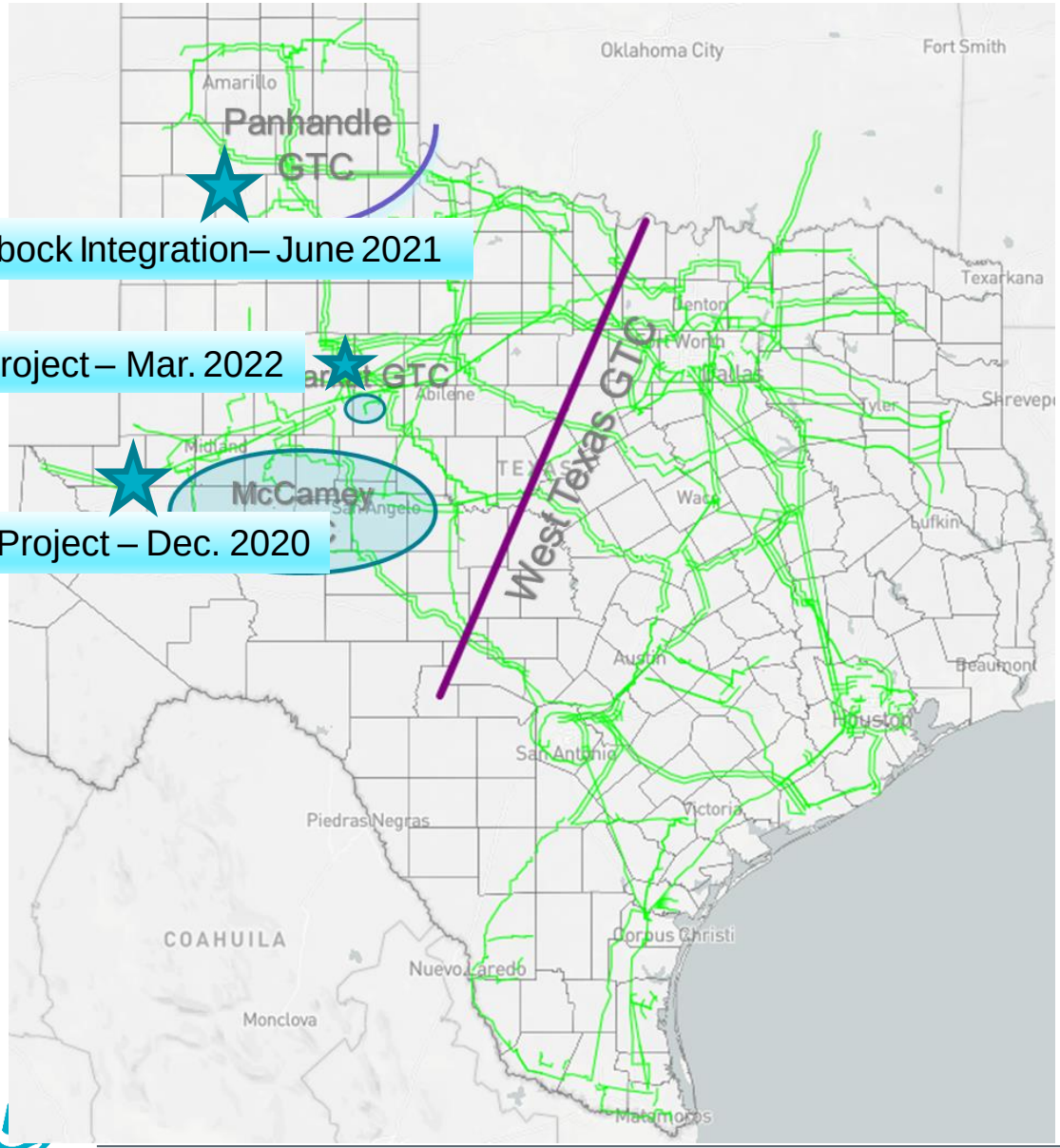
# West Texas Historical Export

- Historical data of highest monthly West Texas generation output and Interface flow has been lower than the proposed West Texas Export system intact GTL



# Future projects influencing the West Texas GTC



# Moving Forward

- West Texas Export GTC definitions are subject to future change with additional installed capacity and QSA Studies
- The efficacy of the West Texas Export GTC may be reduced when the Far West Project, the Lubbock Integration and/or Bearkat project is complete, resulting in the need to use a different GTC or set of GTCs to manage the overall West Texas export instability
- Alternative GTC interfaces mentioned above may be more efficient once online TSAT is available to take advantage of actual system conditions that could reduce necessary level of conservatism in the limits for each interface and will be revisited at that time – online TSAT tentative time June 2021

# Questions ?