Permian Basin Area Improvement Updates – ERCOT

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ERCOT Transmission Planning

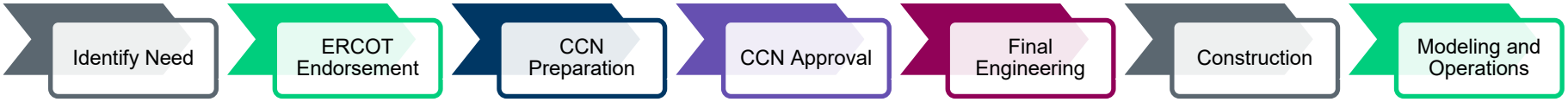
May 17, 2022, RPG Meeting

Introduction

New Load Notification (1-2 years)

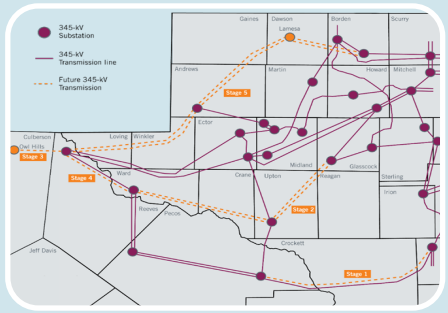
Commitment for New Load

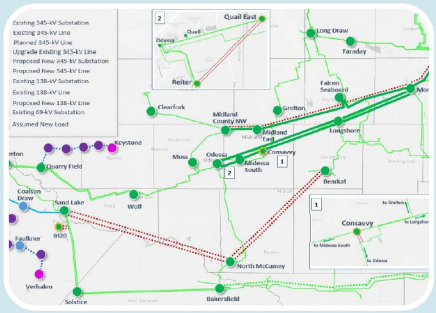
Time to Construct New Transmission (4-6 years)



- Key Efforts by ERCOT and TSPs Since 2019
  - Delaware Basin Load Integration Study in December 2019
  - Permian Basin Load Interconnection Study in December 2021
  - ERCOT's engagement in UT Bureau of Economic Geology (BEG) Tight Oil Resource Assessment (TORA) program since 2020
- Purpose of this presentation is to provide a status update on the ongoing efforts to better meet the needs of the Permian Basin region

Key Special Studies Completed





Improve capability to import power into the area:

Delaware Basin Area Study (Dec 2019)*

Local transmission upgrades to connect loads:

Permian Basin Area Load Interconnection Study (Dec 2021)*

Long lead time

* Reports are available at https://www.ercot.com/gridinfo/planning

- A list of recent approved projects in the Permian Basin area can be found in Appendix

ERCOT's Engagement with UT BEG TORA

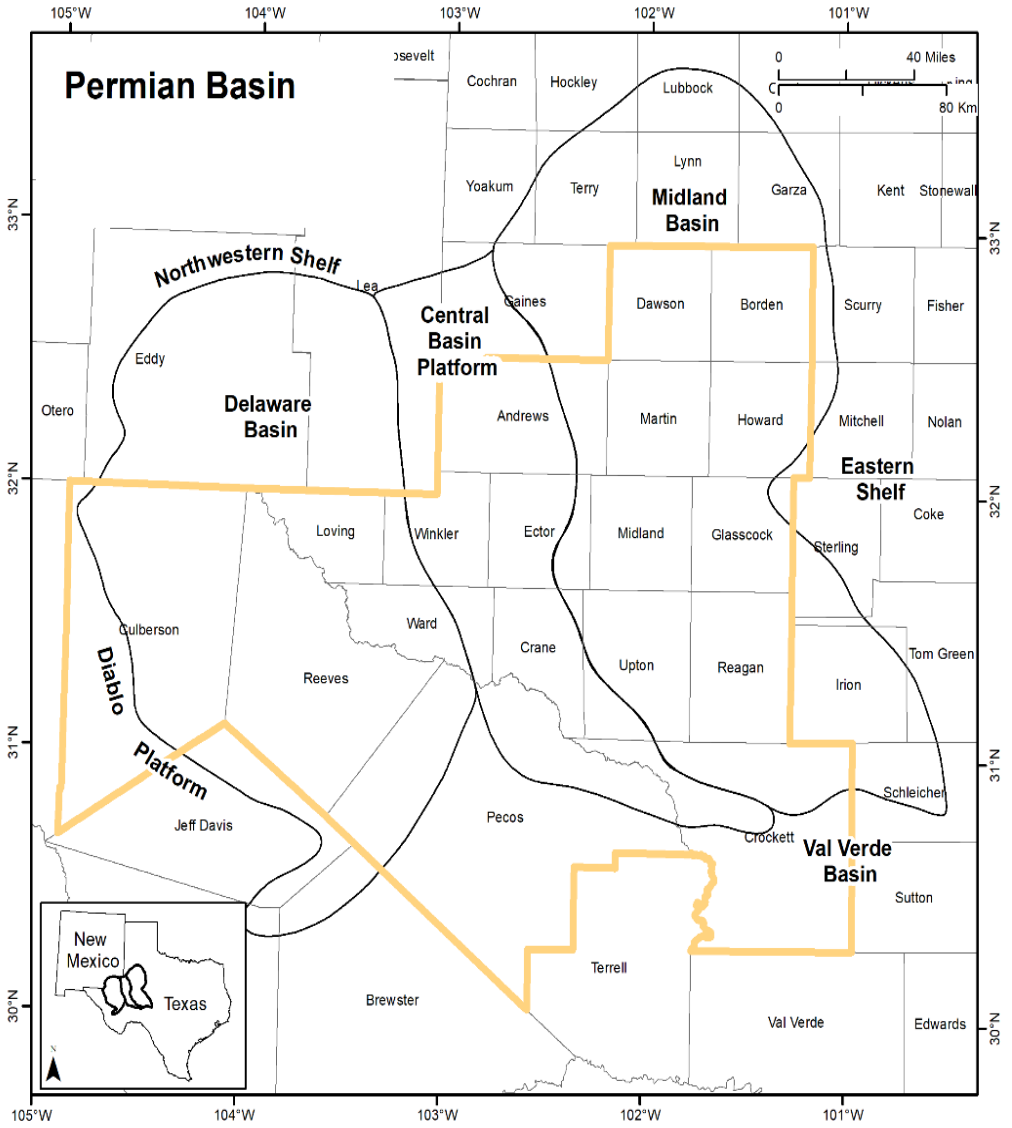
- At the Dec 2020 RPG meeting, ERCOT informed the stakeholders of its engagement in UT Bureau of Economic Geology (BEG) Tight Oil Resource Assessment (TORA)

- Purposes
  - To better understand key factors for electricity demand forecast associated with oil and gas activities within Permian Basin
  - To develop a tool that may allow ERCOT to use the UT BEG work to produce an electric load forecast associated with oil and gas activities within Permian Basin

The Tight Oil Resource Assessment (TORA) program is recognized as the premier entity researching U.S. unconventional resource plays and their production capabilities, developing a basin-wide and granular-scale understanding of key factors controlling current and future developments.
(https://www.beg.utexas.edu/tora)

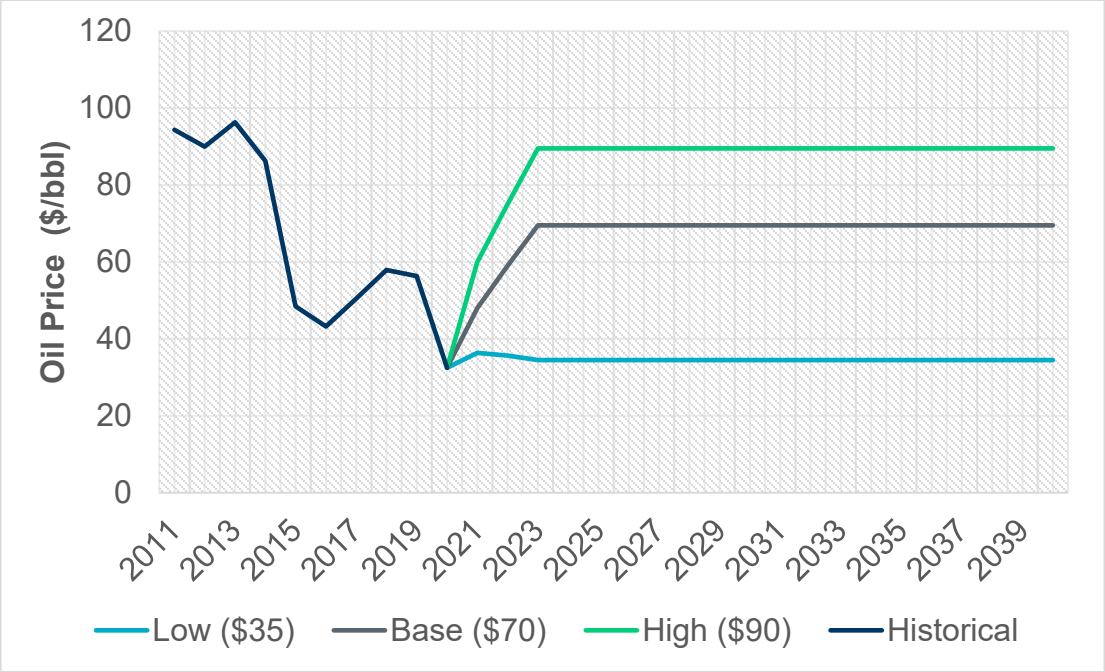
High Level Study Scope - UT BEG TORA

- Eighteen productive counties in Permian Basin were studied
  - Andrews, Crane, Ector, Culberson, Loving, Pecos, Reeves, Ward, Winkler, Borden, Dawson, Crockett, Glasscock, Howard, Martin, Midland, Reagan, Upton
- Geology and resource data, upstream and midstream activity data, historical load data, and technical interviews with subject matter experts



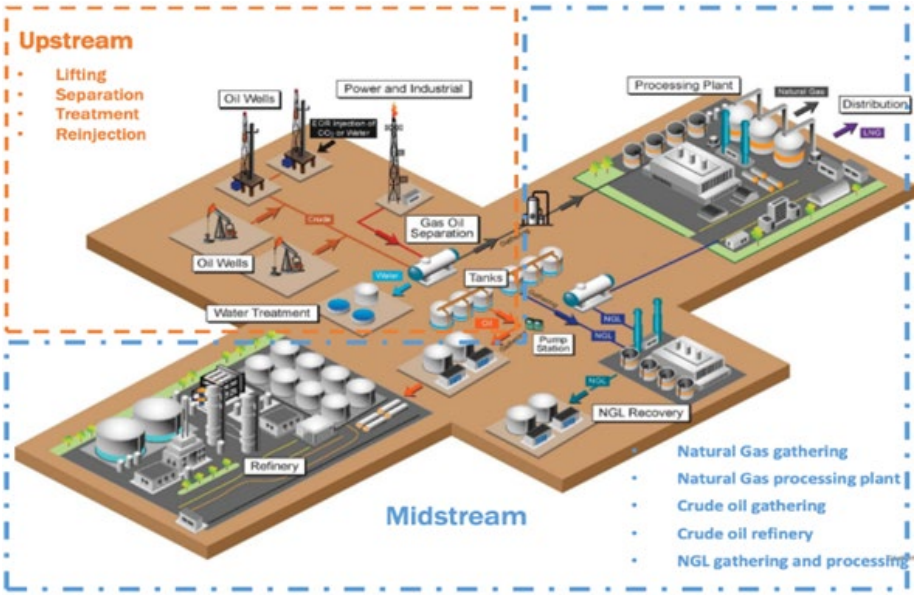
High Level Study Scope - UT BEG TORA (continued)

- Load forecasts related to oil and gas activities were developed for three price scenarios ($35/bbl, $70/bbl, $90/bbl) up to year 2035, based on forecasted production, operational practice trends, and infrastructures



Key Findings

- Continued increase in oil and gas development is expected within Permian Basin, particularly in Delaware Basin followed by Midland Basin
- There is general trend to switch from on-site generation to grid power to lower emission, based on the technical interviews
- Future electricity demand associated with oil and gas may vary depending on market price, level of electrification, and regulation of emission



Key Findings (continued)

- Results of MW Forecasts in Each Scenario

Scenario (Assumed oil price and level of electrification)	Approximate Average MW Forecast in 2035 (Only oil and gas industrial load in 18 counties including existing load)
Scenario 1 ($35/bbl, 10% electrification)	~ 3,750
Scenario 2 ($70/bbl, 30% electrification)	~ 5,682
Scenario 3 ($90/bbl, 58% electrification)	~ 8,951

Key Findings (continued)

- Results of MW Forecasts @ 97% Electrification

Sensitivity Analysis (Assumed oil price and level of electrification)	Approximate Average MW Forecast in 2035 (only oil and gas industrial load in 18 counties including existing load)
Scenario 1 ($35 oil, 97% electrification)	~ 8,164
Scenario 2 ($70 oil, 97% electrification)	~ 9,618
Scenario 3 ($90 oil, 97% electrification)	~ 11,520

Comparison of UT BEG TORA vs IHS Markit

Estimated Average MW Load Forecast for Year 2030 (18 Counties, 97% Electrification, Only Oil and Gas Industrial Load)	
IHS Markit Study	**UT BEG TORA**
~7,081 MW* @65/bbl	~ 7,933 MW** @ $70/bbl

* IHS Markit Study

- Approximately 7,081 MW (year 2030) estimated as annual average MW load forecast related to oil and gas industrial load for 18 counties based on the following assumptions in the IHS Markit Study Report
  - ✓ IHS assumed 97% as the level of electrification @ $65/bbl oil in 2030
  - ✓ 10,180 MW = Total Peak Load Forecast by 2030 (Industrial + Commercial + Residential)
  - ✓ According to the IHS Markit report, 86% of the total peak load forecast is the peak load associated oil and gas Industrial loads in 24 counties
  - ✓ Peak load factor at each county (~85% in average)

** UT BEG TORA

- Approximately 7,933 MW (year 2030, 97% electrification at $70/bbl) estimated as the annual average MW load forecast for oil and gas industrial load

Conclusion

- Continued increase in oil and gas development is expected within Permian Basin, particularly in Delaware Basin
- Future electricity demand associated with oil and gas may vary depending on market price, level of electrification, and regulation (e.g., emission)
- Both UT BEG TORA and IHS Markit produced similar electricity demand forecasts related to oil and gas development using similar key assumptions
- Based on this review, ERCOT believes that the load forecast from the IHS Markit study is reasonable for transmission planning studies of the Permian Basin area

Next Steps

- ERCOT will continue to work with relevant TSPs to accommodate the load associated with oil and gas activities in Permian Basin
- The Stage 2 upgrade (i.e., new Bearkat-N McCamey-Sand Lake double-circuit 345-kV line) is in RPG Review
- The UT BEG TORA Study report will be posted and available in the following ERCOT website in Q2, 2022
  - https://www.ercot.com/gridinfo/planning

Questions?

Stakeholder Comments Also Welcomed to Sun Wook Kang:

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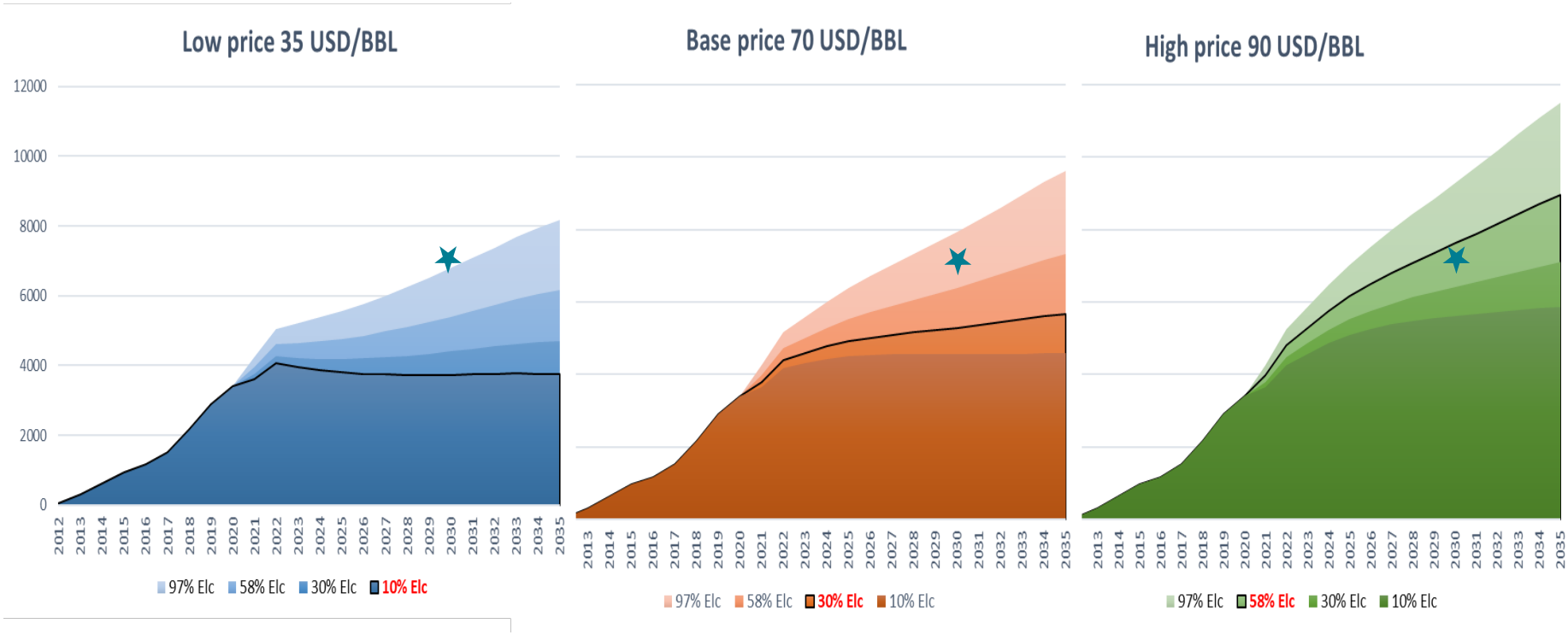
Appendix: Sensitivity of Load on Electrification Level and Price



★ : *Average annual oli/gas industrial load for year 2030 estimated based on IHS Markit Study (assumed 97% Electrification @ $65/bbl)*

Appendix: Data and Information – UT BEG TORA

- Industry operators, research/scholars, and consulting companies
- Energy Information Agency (EIA)
- Texas Commission of Environmental Quality (TCEQ)
- Environmental Protection Agency (EPA) Flight Data
- IHS Upstream Database
- Texas Railroad Commission
- Bureau of Economic Analysis (BEA)
- ERCOT, TORA
- RBAC GPCM
- Water Midstream Data

Appendix: Projects within Permian Basin (Approved by RPG Since 2020)

- Quarry Field 345 kV Switch Project
- Horseshoe Springs Switch – Riverton Switch 138 kV Second Circuit
- Tall City – Telephone Road 138 kV Line Rebuild Project
- Bakersfield to Big Hill 345-kV Second Circuit Addition Project (Stage 1 Upgrade)
- Midland East Area Project
- Flat Iron – Barr Ranch – Pegasus South 138 kV Line Project
- Andrews North – Mustang – Paul Davis Tap 138 kV Line Section
- Barrilla Junction 69 kV loop Rebuild and Conversion Project
- Consavvy 345/138 kV Switch Project
- Lenorah Area 345/138 kV Project