
ERCOT Trending Topics

TOPIC: RELIABILITY PLAN FOR THE PERMIAN BASIN REGION Updated July 25, 2024

Reliability Needs Analysis
Load Forecast
High-Voltage Transmission

In this ERCOT Trending Topic, we explain what the Permian Basin Reliability Plan is, why there is a need for more transmission in the Permian Basin region, and how ERCOT is planning to meet the reliability needs for this region.



FACTS:

What is the reliability plan for the Permian Basin region?

Recent legislation ([House Bill 5066](#)) required the Public Utility Commission of Texas (PUCT) to direct ERCOT to develop a reliability plan identifying the transmission facilities needed to serve existing and future demand in the Permian Basin region. On December 14, 2023, the PUCT issued an order directing ERCOT to develop the Permian Basin Reliability Plan and to file it with the PUCT by July 2024. ERCOT evaluated the transmission facilities needed to serve the Permian Basin region based on 2030 and 2038 load forecasts provided by the Transmission and Distribution Service Providers (TDSPs) and filed the Permian Basin Reliability Plan on July 25, 2024.

What is the reliability needs analysis?

ERCOT conducts planning assessments to examine the need for proposed transmission projects based on ERCOT planning criteria and North American Electric Reliability Corporation (NERC) reliability standards. ERCOT's analysis will identify the local transmission projects to interconnect and serve the projected load in the Permian Basin region as well as amount of additional transmission capacity needed to import power to meet the forecasted demand in the Permian Basin region and will propose specific transmission projects.

Why is new transmission needed in the Permian Basin?

The Permian Basin region is continuing to experience tremendous load growth with increased oil and gas activity and the addition of large industrial and data facilities. TDSPs have provided studies and other reference information supporting a forecasted

peak demand of oil and gas load of 11,964 MW (1) in 2030, 14,705 MW in 2038, and an additional 11,695 MW of non-oil and gas load in the Permian Basin region in 2030. ERCOT will evaluate these load levels in this study. Primarily due to the significant projected loads in the Permian Basin region and the lack of sufficient local conventional generation to reliably serve demand around the clock, significant transmission lines will be needed to interconnect and import power to serve the forecasted load. Transmission is relatively sparse in the Delaware Basin subregion of the Permian, where oil and gas demand is shifting.

This significant growth in the total forecasted load would make the Permian Basin region in West Texas comparable (from an electricity demand perspective) to that of the ERCOT Gulf Coast (Houston, Galveston, Victoria) and North Central (Dallas-Fort Worth, Waco, Mineral Wells) weather zones.

ERCOT previously performed ad-hoc transmission studies in 2019 ([Delaware Basin Load Integration Study](#)) and 2021 ([Permian Basin Load Interconnection Study](#)). Based on the transmission needs identified in those and other ERCOT studies, ERCOT has endorsed about \$5.7 billion of transmission projects in the Permian Basin region since 2014. This Permian Basin study conducted in 2024 considered load forecasts for 2030 and 2038. The table below highlights the loads historically studied as well as the load forecasts for the region considered in the Permian Basin Reliability Plan.

Permian Basin Region Load Comparison (MW)

	2019 Delaware Basin Study (2024 Case)	2021 Permian Basin Study (2030 Case)	2023 RTP Study (2029 Case)	Permian Basin Reliability Plan (2030 Case)	Permian Basin Reliability Plan (2038 Case)
Permian Basin Total Load	9,771	10,527	16,577	23,659	26,400
Permian Basin Oil & Gas Load*	9,771	10,527	12,341	11,964	14,705
Additional Non-Oil & Gas Load	0	0	4,236	11,695	11,695

*Including residential/commercial load

What is the cost to implement the Permian Basin Reliability Plan?

With the increased oil and gas loads in the Permian Basin region and number of large loads projected to move to Texas, there is a need for substantial new transmission infrastructure to serve the forecasted load growth. To ensure the reliability needs of this forecasted load growth can be met, Transmission Service Providers (TSPs) will have to invest in local upgrades to the Permian Basin region as well as construct multiple paths to

import power into the region. ERCOT developed a reliability plan and obtained cost estimates from the respective TSPs responsible for building transmission as well as referencing publicly available data sources.

With the forecasted load growth across the entire state coupled with the evolution of generation types and locations, ERCOT expanded its study process to consider extra-high voltage (EHV) transmission lines. ERCOT is considering new EHV transmission lines (765 kV single circuit or 500 kV double circuit) as an alternative to only adding new 345 kV transmission lines in the 2024 Permian Basin Reliability Plan Study as well as its ERCOT-wide Regional Transmission Plan. These new EHV transmission lines would reliably and efficiently facilitate large power transfers across the system.

ERCOT studied various transmission options to serve longer term needs in the Permian Basin Reliability Plan for PUCT consideration. For each transmission voltage of import path, regardless of the selected option, there are a set of common projects needed to serve the load. The total cost estimate for common local transmission upgrades needed in 2030 and 2038 is approximately \$4.02 billion. Additional import path options and associated incremental local transmission upgrades were also considered.

The tables below summarize cost estimates for common local upgrades, import paths, incremental local upgrades associated with each import path option, and total upgrades for 2030 and 2038.

Summary of Cost Estimates (\$Billion) for 2030*

	2030 345-kV Option
Common Local Upgrades	4.02
Import Paths	3.99
Incremental Local Upgrades	1.03
Total	9.04

*2030 Import paths and Incremental Local Upgrades are subset of 2038 345-kV Option

Summary of Cost Estimates (\$Billion) for 2038

	2038		
	345-kV Option	500-kV Option	765-KV Option
Common Local Upgrades	4.02	4.02	4.02
Import Paths	7.69	10.61	9.06
Incremental Local Upgrades	1.23	0.69	0.69
Total	12.95	15.32	13.77

The short-term costs will be weighed against longer term benefits to support continued growth in Texas.

What are the benefits of higher voltage transmission?

For long-distance transmission (longer than 100 miles), one 765-kV line on a 200-foot-wide ROW can carry the same amount of energy as five 345-kV lines each needing its own 150-foot-wide ROWs, requiring a combined width of 750 feet.

Some of the benefits of higher voltage transmission include:

- Increased transfer capability to load centers to support continued economic development
- Increased outage coordination capacity for both Generation Resource and Transmission equipment
- Reduced ROW impacts to consumers due to fewer new lines being needed
- Reduced line losses while increasing ability to move power over long distances
- Potential to retire existing series compensation devices reducing stability risks for Generation Resources
- Additional flexibility to mitigate Generation Resource siting uncertainty
- Potential exit strategy for some current major [Generic Transmission Constraints](#) (GTCs) resulting in more generation available to customers

Import Paths Comparison of 345-kV and EHV (500-kV and 765-kV) Options in 2038

	345-kV	500-kV	765-kV
Meets ERCOT and NERC Reliability Criteria	Yes	Yes	Yes
Incremental Transfer Capability* (MW)	1,340	1,712	2,105
Improves Operational Flexibility	Yes	Yes	Yes
Transmission Losses under System Peak Condition	3.0%	2.8%	2.7%
Number of Import Paths Required	5	4	3
New ROW** Required for Import Paths (Miles)	1,676	1,370	1,255
Average Transmission Line Cost*** (\$Million/Miles)	4.04	6.86	6.10
Total Cost Estimate (\$Billion)	12.95	15.32	13.77

* Incremental transfer capability under N-1 contingency conditions.

** A routing adder of 20% to the straight distance between two end points was assumed.

*** For 345-kV import path option, the average cost based on the TSPs cost estimates for 345-kV import paths was used. MISO 2024 Transmission Cost Estimation Guide was referenced for the EHV options (500-kV or 765-kV).

What is ERCOT's role in the planning process?

ERCOT supervises and exercises comprehensive independent authority over the planning of transmission projects for the ERCOT System as outlined in the Public Utility Regulatory Act (PURA) and PUCT Substantive Rules. Under PUCT rules, ERCOT's role is to oversee the transmission planning process and to conduct studies to identify transmission projects that are needed to serve customer demand reliably and economically. The PUCT reviews and approves applications from TSPs for new transmission lines and determines the routing of the lines. TSPs build, own, operate, and maintain the transmission lines and related equipment.

What was the stakeholder process and timeline for the filing of this most recent plan?

ERCOT began working with the TSPs and the ERCOT Regional Planning Group (RPG) in December 2023. The RPG is a ERCOT stakeholder forum that provides input on issues related to planning the ERCOT System for reliable and efficient operation, including its evaluation of transmission needs and potential solutions. The RPG is open to all Market Participants, including consumers, TDSPs, and PUCT staff. ERCOT provided monthly status updates to the PUCT and RPG on the Permian Basin Reliability Plan and at the June 28, 2024, Permian Basin Reliability Plan Study Workshop, where ERCOT discussed the preliminary results of this study.

What's next?

ERCOT filed the [Permian Basin Reliability Plan with the PUCT](#), for further review and consideration. If the plan is approved, the PUCT will need to determine which TSPs are responsible for constructing the transmission infrastructure identified in the plan. Once that determination has been made, TSPs can then file the necessary applications for certificates of convenience and necessity (CCN) for approval with the PUCT. To learn more about the Permian Basin Reliability Plan, click [here](#).

(1) 1 MW of electricity is enough to serve about 250 residential customers during ERCOT peak hours.

