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Public Utility Commission of Texas

Memorandum

TO: Chairman Thomas J. Gleeson
Commissioner Kathleen Jackson
Commissioner Courtney K. Hjaltman

FROM: Julia Wagner, PE, Market Analysis Division
John Poole, PE, Infrastructure Division

DATE: April 17, 2025

RE: April 24, 2025 Open Meeting – Agenda Item No. 35
Project No. 55718, *Reliability Plan for the Permian Basin Under PURA § 39.167*
Staff recommendation on the voltage level for the import paths to the Permian Basin

On December 14, 2023, the Commission directed the Electric Reliability Council of Texas (ERCOT) to develop a reliability plan under the Public Utility Regulatory Act (PURA)¹ § 39.166 for the Permian Basin region no later than July 2024. ERCOT filed the Permian Basin Reliability Plan Study (Plan) on July 25, 2024 including cost estimates, with an Addendum filed on September 11, 2024.² The Plan identified two potential sets of import paths: one set consisting of 345 kilovolt (kV) lines and another set that included 765 kV lines. On October 7, 2024, the Commission issued the Order Approving the Reliability Plan for the Permian Basin Region but reserved a decision on which voltage level should be approved for the transmission import paths until no later than May 1, 2025.³

Staff recommends that the Commission approve the three 765 kV import paths identified in Table 7.5 of the Permian Basin Reliability Plan Study. A draft proposed order to select a voltage level is attached.

This memo provides detailed analysis supporting Staff's recommendation.

Public Engagements by ERCOT and the Commission:

ERCOT provided regular updates throughout 2024 on the progress of the study to stakeholders at the monthly meetings of the Regional Planning Group. In addition, ERCOT held three public workshops:

¹ Tex. Util. Code §§ 11.001-66.016.

² ERCOT Permian Basin Reliability Plan Study Report (AIS No. 17) (Jul. 25, 2024); ERCOT Permian Basin Reliability Plan Study – Addendum (AIS No. 42) (Sep. 11, 2024).

³ Order Approving the Reliability Plan for the Permian Basin Region at 4 (Oct. 7, 2024).

June 28, 2024: Permian Basin Reliability Plan Study Workshop, where ERCOT presented the preliminary results of its plan.

September 18, 2024: Extra High Voltage (EHV) 765 kV Vendor Workshop, where invited vendors in the supply chain presented and answered questions.

January 27, 2025: EHV 765 kV Workshop, where ERCOT provided additional analysis and comparison of the 2024 Regional Transmission Plan's (RTP) 345 kV and 765 kV options.

In addition to ERCOT's engagements, Commission Staff solicited three rounds of public feedback. The first round of questions requested feedback on the potential use of EHV in the ERCOT region and received responses on July 29, 2024.⁴ The second round of questions addressed ERCOT's plan and received responses on August 9, 2024.⁵ The third and final round of questions regarded ERCOT's 345 kV and 765 kV 2024 RTP comparison document, and responses were received on February 14, 2025.⁶

The Commission also held three public workshops:

December 12, 2023: The Commission held a public workshop in Midland for the purpose of hearing from operators in the region about the need to expand electrification in the Permian Basin and the unique challenges in the region.

August 22, 2024: Staff led a workshop seeking feedback to specific questions on the Permian Basin Reliability Plan Study.

March 7, 2025: Staff led a workshop to seek feedback from vendors and transmission service providers (TSPs) on the supply chain and to answer consumers' questions on project costs and timelines.

Finally, Staff issued a request for information to TSPs to submit supporting documentation on project timelines and provide current cost information.⁷

Feedback received during these engagements was crucial in helping Staff develop its final recommendations.

Staff Analysis:

Cost and Timeline

It is both important and urgent that the import projects are built in a timely and cost-efficient way. Not only are the import projects a multibillion-dollar investment borne by the ratepayers, but

⁴ *Regional Transmission Reliability Plans*, Project No. 55249, Questions for Stakeholder Comment about Introduction of Extra High Voltage (EHV) Transmission Lines to the ERCOT Region (AIS No. 6) (Jul. 16, 2024).

⁵ Project No. 55718, Questions for Stakeholder Comment Related to ERCOT's Plan (AIS No. 18) (Jul. 30, 2024).

⁶ Project No. 55718, Questions for Stakeholder Comment Related to PUCT's Determination of Extra High Voltage (EHV) in the ERCOT Region (AIS No. 55) (Jan. 31, 2025).

⁷ Project No. 55718, Commission Staff's Request for Information to Transmission Service Providers (AIS Item No.84) (Mar. 21, 2025).

customers in the Permian Basin have been waiting for many years to interconnect with the grid. Therefore, the import paths' estimated costs and project timelines warranted exceptional scrutiny.

To that end, the March 7th workshop focused primarily on cost estimates, equipment supply chains, and project completion timelines. Equipment vendors and transmission builders reported on the status of their equipment supply chains and commented on cost variability and risk factors which could affect one voltage class's equipment over the other. Because load growth is occurring across the country, vendors reported that they are ramping up production and ready to meet demand. Vendors noted that the recent approvals of 765 kV projects in Midcontinent Independent System Operator (MISO), PJM Interconnection LLC (PJM), and Southwest Power Pool (SPP) have already signaled increased demand for 765 kV equipment. In response to this increase, several vendors stated that they and their suppliers are currently expanding production capacity.⁸

At this workshop, TSPs also responded to questions about recent preparations for their respective import paths. As a group, TSPs confirmed that they anticipate having all import paths, regardless of voltage, completed by the end of 2031. Considering that some of the 345 kV import paths and all the 765 kV import paths were given a 2038 reliability need date by ERCOT, the expected completion of all the imports by 2031 indicates that the TSPs have been successfully collaborating and have been proactive in their preparations. In particular, American Electric Power Company, Inc. (AEP) has decades of experience with 765 kV lines and has offered the other TSPs access to its 765 kV standards and guidance based on its operating experience. Staff confirmed that all the TSPs involved in the 765 kV import paths have signed nondisclosure agreements to gain access to this information.

Because the Commission has never approved a Certificate of Convenience and Necessity (CCN) for a 765 kV transmission line before, Staff does not have any construction cost data from which to benchmark the 765 kV cost estimates. Therefore, greater attention was given to the 765 kV cost estimates. In its plan, ERCOT used 345 kV estimates based on TSP-provided project costs, while the 765 kV costs were based on MISO's 2024 Transmission Cost Estimate Guide.⁹ During the workshop, Staff requested vendors and TSPs comment on the quality and reasonableness of the costs in the MISO Guide. While some participants commented that the estimates were higher than they would expect, others commented that the estimates were lower. Overall, there was agreement that using MISO's cost estimates was an appropriate starting point.

ERCOT also requested that TSPs provide updated 345 kV cost estimates and their own 765 kV cost estimates. On March 27, 2025, ERCOT filed updated total costs for each voltage level with the Commission.¹⁰

Commission Staff independently verified the TSPs' public statements made at the workshop by requesting that they confidentially file: (1) updated cost estimate data; (2) commitment letters from

⁸ SPP awarded Southwestern Public Service Company the first ever 765 kV project as part of the ITP 2025 in Texas.

⁹ Transmission Cost Estimation Guide for MTEP24 (May 1, 2024) (available at https://cdn.misoenergy.org/MISO_Transmission_Cost_Estimation_Guide_for_MTEP24337433.pdf).

¹⁰ Project No. 55718, ERCOT Permian Cost Update Letter (AIS No. 86) (Mar. 27, 2025).

vendors for long-lead equipment and engineering and construction services; and (3) construction timeline estimates.

Staff has reconciled the TSPs' confidential cost filings with ERCOT's updated total costs filed in Project No. 55718 and is satisfied with the evidence TSPs provided to confirm their committed engagements and that their cost estimates reflect the best available information. The table below reflects the final cost estimates:

ESTIMATED CAPITAL COST COMPARISON TABLE¹¹

	345 kV				765 kV			
\$ (in Millions)	Original TSP (May 2024)	Revised TSP (Mar. 2025)	\$ Change	% Change	Original MISO (May 2024)	New TSP (Mar. 2025)	\$ Change	% Change
Lines & Structures (including ROW)	\$6,773	\$7,144	\$371	5.5%	\$7,656	\$7,772	\$116	1.5%
Substations (including Equip.)	\$921	\$1,133	\$212	23.0%	\$1,404	\$2,342	\$938	66.8%
TOTAL	\$7,694	\$8,277	\$583	7.6%	\$9,060	\$10,114	\$1,054	11.6%

Most of the cost increases for both voltage levels are in their substation estimates. The cost difference of 765 kV over 345 kV rose from 18% (\$9,060/\$7,694) to 22% (\$10,114/\$8,277). For 345kV there are 1,676 new miles and for 765 kV 1,255 there are new miles to be built.

After adoption of the proposed rule contemplated in Project No. 57602, *Permian Basin Reliability Plan Reporting Requirements and Monitor*, the Commission will have an advanced tool available with a new portal where all TSPs will be required to submit their detailed cost data.¹²

Technical Analysis of Benefits

In addition to cost and timeline considerations, Staff outlines below the most compelling technical benefits each voltage offers.

765 kV

One technical characteristic that differentiates 765 kV transmission lines from 345 kV transmission lines is that 765 kV lines are designed to have a lower impedance than 345 kV lines.¹³ Simply put, impedance is resistance to power flow, so having a lower impedance offers several performance improvements. The most impactful of which are listed below.

¹¹ Staff's focus has been to limit its analysis to cost and supply chain issues unique to each voltage—not broader market-wide common risk factors like import tariffs.

¹² *Compliance Reporting Portal Updates*, Project No. 57925 (pending).

¹³ Project No. 55249, AEP Companies' Comments about Extra High Voltage Transmission Lines to the ERCOT Region at 4 (AIS No. 7) (Jul. 26, 2024).

Incremental Transfer Capability – The purpose of the import paths in the Permian Basin Reliability Plan is to transfer power from generation resources outside the region to meet the forecasted 2038 net demand for power inside the region. Both the 345 kV and 765 kV import plans will accomplish this goal. However, ERCOT reported that the system is experiencing unprecedented load growth. A notable characteristic of the new growth is that it is primarily composed of large loads that can be added to the ERCOT system in as little as 6 to 12 months.¹⁴ This quick interconnection timeline, coupled with the load growth trend, could mean the actual load demand in the Permian region over the next several years may exceed the current 2038 load forecast.

In its plan, ERCOT reports that at peak load the 345 kV import plan has an incremental transfer capability of 1,340 megawatts (MW) while the 765 kV import plan has an incremental transfer capability of 2,105 MW.¹⁵ The higher value for the 765 kV transfer indicates it can carry more power, and therefore, serve additional load in the Permian. Because there is uncertainty inherent in forecasting load out as far as 2038, the ability to serve more load could offer a buffer for the 2038 load forecast and may avoid or delay the need to build additional transfer paths in the near future. Therefore, the increased capital cost of installing 765 kV infrastructure could function as a present investment that may save additional infrastructure costs in the future.

Built into this benefit is a fundamental assumption that Texas' electrical needs will continue to grow. This is a sensible assumption because historical data shows that the average annual demand growth in ERCOT has been 2.6% since 2014,¹⁶ and ERCOT's most recent adjusted forecast shows an average annual demand growth of about 9% for the next 6 years.¹⁷ Building for anticipated growth means the current ratepayers will bear the cost to build out extra transmission so future ratepayers may benefit.

In addition to the ability to carry more power, Staff outlines two supplemental benefits associated with the increased incremental transfer capability of the 765 kV plan.

Flexibility – ERCOT cannot know precisely where future load and generation will site in Texas. The extra transfer capability allows ERCOT to better manage the uncertainty surrounding load and generation siting decisions. Also, the 765 kV transmission infrastructure may have a longer in-service life than many of the interconnecting load and generation resources. The 765 kV system would provide the flexibility for power flows to shift due to changes in the location and nature of future load and generation, which in turn may prevent the need for additional transmission investment to accommodate such changes.

¹⁴ ERCOT Regional Transmission Plan – Public (available at <https://www.ercot.com/mp/data-products/data-product-details?id=pg7-048-m>).

¹⁵ Project No. 55718, ERCOT Permian Basin Reliability Plan Study Report at x, Table E.1.

¹⁶ ERCOT Yearly Peak Demand (available at <https://www.ercot.com/static-assets/data/news/content/a-peak-demand/records-yearly-archive.htm>).

¹⁷ April 7, 2025 ERCOT Board of Directors Meeting, Presentation “8.1 Long-Term Load Forecast Update (2025–2031) and Methodology Changes,” at Slide 11 (Apr. 7, 2025) (available at <https://www.ercot.com/files/docs/2025/04/07/8.1-Long-Term-Load-Forecast-Update-2025-2031-and-Methodology-Changes.pdf>).

Fewer Right of Way (ROW) Miles – Because the 765 kV import plan allows greater transfer capability, ERCOT was able to design the 765 kV plan using only three paths, totaling approximately 1,255 miles of ROW, compared to five 345 kV paths, totaling approximately 1,676 miles of ROW.¹⁸ The fewer number of paths and ROW miles is a benefit because it results in fewer impacted landowners and ecological habitats.

Fewer Line Losses – The lower impedance design of high voltage lines also enables the 765 kV lines to operate with fewer line losses than the 345 kV lines. ERCOT modeled peak system conditions and measured the overall system losses. ERCOT reported that the 345 kV plan had a 3.0% loss while the 765 kV plan had a 2.7% loss.¹⁹ Based on peak conditions, the difference in overall system loss values represents approximately 327 MW. There are notable reliability and economic benefits in having those megawatts available to serve load when the system is at peak and experiencing scarcity pricing.

Reduced Congestion – Because the 765 kV paths will have lower impedance than the underlying voltage system, the 765 kV paths will carry a higher proportion of the import power to the Permian region compared to the 345 kV paths. ERCOT is constantly managing congestion on the grid, so shifting bulk power transfer to 765 kV may help reduce congestion on the lower voltage lines.

Lastly, the 765 kV import paths in the Permian Basin could additionally serve as the foundation for a looped, networked statewide plan, if the Commission deems the expansion of 765 kV worthwhile.

345 kV

Staff recognizes the value of the TSPs' extensive building and operating experience with a 345 kV system in the ERCOT region. Below, staff shares several of these benefits.

Equipment Vendors – Because 345 kV infrastructure is common throughout the country, there is a large equipment market to serve it. Therefore, in times of high demand or supply chain disruption, TSPs would have a variety of options from which to source 345 kV equipment. A greater number of 345 kV manufacturers should result in enhanced competition among producers, which may lower equipment prices and promote price stability. Finally, the TSPs involved in the 345 kV import plan have already built 345 kV facilities in the ERCOT region, so they likely have existing relationships and contracts in place with certain equipment vendors.

Design Standards and Construction Experience – TSPs who have previously built 345 kV facilities have existing design standards and have experience building in the ERCOT region. They also can draw from an existing well of knowledge when issues arise during construction. Such prior knowledge could help them anticipate and address construction problems more efficiently, thus minimizing delays.

Operating Experience – TSPs' many years of operating experience with 345 kV means they have knowledge of how to navigate the varied conditions their systems experience. For instance, they

¹⁸ Project No. 55718, ERCOT Permian Basin Reliability Plan Study Report at x, Table E.1.

¹⁹ *Id.*

already know how to control voltage under light load, and they know how to provide the proper level of reactive support in a variety of conditions. Finally, they have real-time experience managing an array of actual contingencies instead of pre-defined contingencies which are required to be modeled to assess reliability needs.

Benchmarking Costs – The Commission has extensive construction data on double circuit 345 kV facilities built by TSPs in the ERCOT region. These data allow the forthcoming CCN time and cost estimates to be benchmarked against recent, similar projects.

Staff Conclusions and Recommendation:

Staff recognizes that the import path voltage level decision before the Commission is both substantial and consequential.

Staff conducted its own evaluation of the available reports and data, reviewed and considered all stakeholder feedback, and engaged in conversations with subject matter experts to reveal and assess as many of the “unknowns” as possible.

Furthermore, as mentioned in the Cost and Timeline section above, Staff vetted the cost estimates provided by TSPs and confirmed that TSPs have diligently collaborated and have established relationships with vendors and builders to complete their import projects by 2031, regardless of voltage.

After careful deliberation, Staff recommends that the Commission approve the 765 kV Permian Basin import paths. The long-term benefits associated with the 765 kV import paths justify the additional 22% estimated capital cost premium. 765 kV technology may be new to Texas, but it is not a new technology. Additionally, the TSPs confirmed that they have taken advantage of AEP’s offer to review its 765 kV standards and guidance, which adequately mitigates Staff’s concerns about TSP’s lack of experience with 765 kV infrastructure.

Staff is convinced that the Commission has a unique opportunity to timely address ERCOT’s current and expected rapid load growth by deploying an extra high voltage transmission network at a reasonable economic cost. This decision balances forecast uncertainty, cost, and reliability with establishing a forward-thinking policy decision that ably prepares the ERCOT region for the future.

PROJECT NO. 55718

**RELIABILITY PLAN FOR THE
PERMIAN BASIN REGION UNDER
PURA § 39.167**

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**PUBLIC UTILITY COMMISSION

OF TEXAS**

**PROPOSED SECOND ORDER APPROVING THE RELIABILITY PLAN
FOR THE PERMIAN BASIN REGION**

Section 39.167 of Public Utility Regulatory Act (PURA)¹ required the Commission to direct ERCOT to develop a reliability plan under PURA § 39.166 for the Permian Basin region. ERCOT filed the Permian Basin Reliability Plan Study on July 25, 2024 (Permian Basin Reliability Plan) with an addendum on September 11, 2024 (Reliability Plan Addendum).² On October 7, 2024, the Commission issued the Order Approving the Reliability Plan for the Permian Basin Region, but reserved a decision on which voltage level should be approved for the transmission import paths until no later than May 1, 2025.³

The Commission approves the three 765-kilovolt (kV) import paths identified in Table 7.5 of the Permian Basin Reliability Plan. The Commission's prior authorization to prepare certificate of convenience and necessity applications for the 345-kV import paths identified in Table 1 of the Reliability Plan Addendum expires the date of this Order. [The Commission approves the five 345-kilovolt (kV) import paths identified in Table 1 of the Reliability Plan Addendum. The Commission's prior authorization to prepare certificate of convenience and necessity applications for the 765-kV import paths identified in Table 7.5 of the Permian Basin Reliability Plan expires the date of this Order.]

¹ Tex. Util. Code §§ 11.001-66.1016.

² ERCOT Permian Basin Reliability Plan Study Report (Jul. 25, 2024); ERCOT Permian Basin Reliability Plan Study – Addendum (Sept. 11, 2024).

³ Order Approving the Reliability Plan for the Permian Basin Region at 4 (October 7, 2024).

Signed at Austin, Texas the _____ day of _____ 2025.

PUBLIC UTILITY COMMISSION OF TEXAS

THOMAS J. GLEESON, CHAIRMAN

KATHLEEN JACKSON, COMMISSIONER

COURTNEY K. HJALTMAN, COMMISSIONER