Filing Receipt

Filing Date - 2025-01-24 03:26:12 PM

Control Number - 55718

Item Number - 54

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January 24, 2025

Public Utility Commission of Texas
Chairman, Thomas J. Gleeson
Commissioner Kathleen Jackson
Commissioner Courtney Hjaltman
1701 N. Congress Avenue
Austin, TX 78711

Re: PUC Project No. 55718, *Reliability Plan for the Permian Basin under PURA § 39.167* – ERCOT's 2024 Regional Transmission Plan 345-kV Plan and Texas 765-kV Strategic Transmission Expansion Plan Comparison

Dear Chairman and Commissioners:

I am pleased to submit for your consideration ERCOT's *2024 Regional Transmission Plan 345-kV Plan and Texas 765-kV Strategic Transmission Expansion Plan Comparison*, attached to this letter as Attachment A. This report details ERCOT's assessment of the relative reliability and economic benefits of constructing a new 765-kV transmission "backbone" rather than simply expanding the existing 345-kV network to meet future system needs. As ERCOT's 2024 Regional Transmission Plan (RTP) concluded, the explosive growth in system demand reported by transmission utilities in the ERCOT Region over the next six years and beyond will require major public investment in the ERCOT transmission system regardless of the voltage level utilized. Texas therefore has a unique opportunity to make a critical decision about whether to continue the historical practice of using 345-kV facilities as the highest voltage on the system or to instead step up to a higher 765-kV voltage to serve the growing demand.

In the attached report, ERCOT offers data and analysis to assist policymakers in making this decision. ERCOT's analysis concludes that the 765-kV option—referred to as the "Texas 765-kV Strategic Transmission Expansion Plan (TX 765-kV STEP)"—would provide significant economic and reliability benefits to the ERCOT System. Specifically, due to the greater efficiency of transmitting power at a higher voltage, the TX 765-kV STEP would provide the following benefits compared with the 345-kV option:

- Reduction of consumer congestion costs by $229 million each year in the long term,
- Reduction of system production costs by $28 million each year in the long term,
- Reduction of energy losses by 560 GWh each year which is equivalent to a 128 MW thermal unit operating at a 50% capacity factor,
- Increase of up to 3,000 MW in power transfer capability, and
- Increase in system West Texas stability limit by 13%.

Both the 345-kV plan and the TX 765-kV STEP options are estimated to require approximately $5 billion per year of transmission project investment over the six-year planning horizon. This investment is compared to an average of over $3 billion per year of transmission projects endorsed for reliability and economic need in the past three years ($3.78 billion was endorsed in 2024). Compared to the 345-kV plan, the TX 765-kV STEP includes 434 more miles of new ROW impact but significantly fewer upgrades to the existing system (815 fewer miles of existing 345-kV upgrades; 427 fewer miles of existing 138-kV upgrades; and 201 fewer miles of 69-to-138-kV conversions). As today's system fully utilizes its current capability, facilitating construction outages for the existing system upgrades will become increasingly more difficult and expensive.

Considering these impacts, ERCOT has estimated the cost of the 345-kV solution to be $30.75 billion and the cost of the TX 765-kV STEP to be $32.99 billion—a difference of $2.24 billion. However, when the estimated additional construction cost (including live "hot" construction) required to minimize construction outages, to maintain system reliability, and to ensure timely completion of certain major upgrades to complete construction of the two options are considered, this cost difference diminishes by $890 million to $1.35 billion. On balance, while the TX 765-STEP option is anticipated to cost approximately 4% more than the 345-kV option, ERCOT believes that the significant economic, reliability, and resiliency long-term benefits associated with the TX 765-kV STEP option present a compelling case for increasing the highest voltage level of the ERCOT system to 765-kV. ERCOT strongly recommends that policymakers consider these advantages and the continuing system benefits they will provide in deciding the appropriate direction on this important question.

ERCOT appreciates the Commission's consideration of the attached report and looks forward to discussing this with the Commission at an upcoming open meeting. Please do not hesitate to contact me if you need any additional information relating to this report.

Respectfully submitted,

/s/ Kristi Hobbs
Kristi Hobbs
Vice President, System Planning &
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2024 Regional Transmission Plan (RTP) 345-kV Plan and Texas 765-kV Strategic Transmission Expansion Plan Comparison

January 2025

Executive Summary

The ERCOT System is experiencing rapid changes, including trends of substantial growth in demand and increasing penetration of Inverter-Based Resources (IBRs). ERCOT's 2024 Regional Transmission Plan (RTP)[1], which includes an analysis of needed transmission improvements for 2026-2030, included an unprecedented amount of economic growth led by a significant increase in large load interconnections (i.e., data centers, hydrogen and hydrogen-related manufacturing, crypto mining, and electrification). The forecasted summer peak demand for 2030 exceeds 150 GW, of which approximately 50 GW is large load growth. This unprecedented load growth coupled with the growing amount of congestion already present in today's system prompted discussions about introducing 765-kV infrastructure to the ERCOT Transmission Grid. The 765-kV addition would enable power to flow more efficiently through long-distance transmission from resource-rich regions to load centers.

In July 2024, ERCOT filed the Permian Basin Reliability Plan Study[2] with the Public Utility Commission of Texas (PUCT). The study presented options for both 345-kV and 765-kV import paths to the Permian Basin area.

The PUCT approved the Permian Basin Reliability Plan in October 2024, but deferred a decision on the voltage level of the import paths. The PUCT is anticipated to make a determination on the voltage level by May 1, 2025. The 2024 RTP developed two transmission plans (345-kV and 765-kV), which built upon both versions of the Permian Basin Reliability Plan to address statewide reliability needs.

To serve both current and future load growth reliably and efficiently, many miles of new transmission build as well as upgrades to existing lines will be required no matter the decision on which voltage level is to be used. This document provides some additional analysis to compare the benefits of the 345-kV plan and the Texas 765-kV Strategic Transmission Expansion Plan (TX 765-kV STEP) to address statewide reliability needs.

Key points of the 2024 RTP 345-kV plan and the Texas 765-kV Strategic Transmission Expansion Plan include:

- The TX 765-kV STEP with the approved Permian Basin Reliability Plan projects includes: 2,468 miles of new 765-kV lines; 649 miles of new 345-kV lines; 1,098 miles of existing 345-kV upgrades; 324 miles of new 138-kV lines, 1,287 miles of existing 138-kV upgrades; 446 miles of existing 69-to-138-kV conversions, and 11.3 GVArs of reactive support devices. The estimated construction cost of the TX 765-kV STEP (including the Permian Basin Reliability projects) is approximately $32.99 billion.
- The 2024 RTP 345-kV plan with the approved Permian Basin Reliability Plan projects includes: 2,673 miles of new 345-kV lines; 1,913 miles of existing 345-kV upgrades; 334 miles of new 138-kV lines, 1,714 miles of existing 138-kV upgrades; 647 miles of existing 69-to-138-kV

[1] https://www.ercot.com/mp/data-products/data-product-details?id=pg7-048-m
[2] https://www.ercot.com/files/docs/2024/07/25/2024-ERCOT-Permian-Basin-Reliability-Plan-Study-Report-and-Addendum.zip

conversions, and 13.4 GVArs of reactive support devices. The estimated construction cost of the 2024 RTP 345-kV Plan (including the Permian Basin Reliability projects) is approximately $30.75 billion.

Table E1: Summary of the Construction Cost Estimates ($Billion)

	345-kV Plan	TX 765-kV STEP
Permian Basin Reliability Plan Projects	12.95	13.77
2024 RTP Projects (beyond Permian Projects)	16.23	17.68
2024 RTP – Reactive Support (Dynamic & Static)	1.58	1.53
Total	**30.75**	**32.99**

- Both the 345-kV plan and the TX 765-kV STEP options are estimated to require approximately $5 billion per year of transmission project investment over the six-year planning horizon compared to an average of over $3 billion per year of transmission projects endorsed in the past three years ($3.78 billion endorsed in 2024). Compared to the 345-kV plan, the TX 765-kV STEP includes 434 more miles of new ROW impact but significantly fewer upgrades to the existing system (815 fewer miles of existing 345-kV upgrades; 427 fewer miles of existing 138-kV upgrades; and 201 fewer miles of 69-to-138-kV conversions). As today's system fully utilizes its current capability, facilitating construction outages for the existing system upgrades will become increasingly more difficult and expensive.

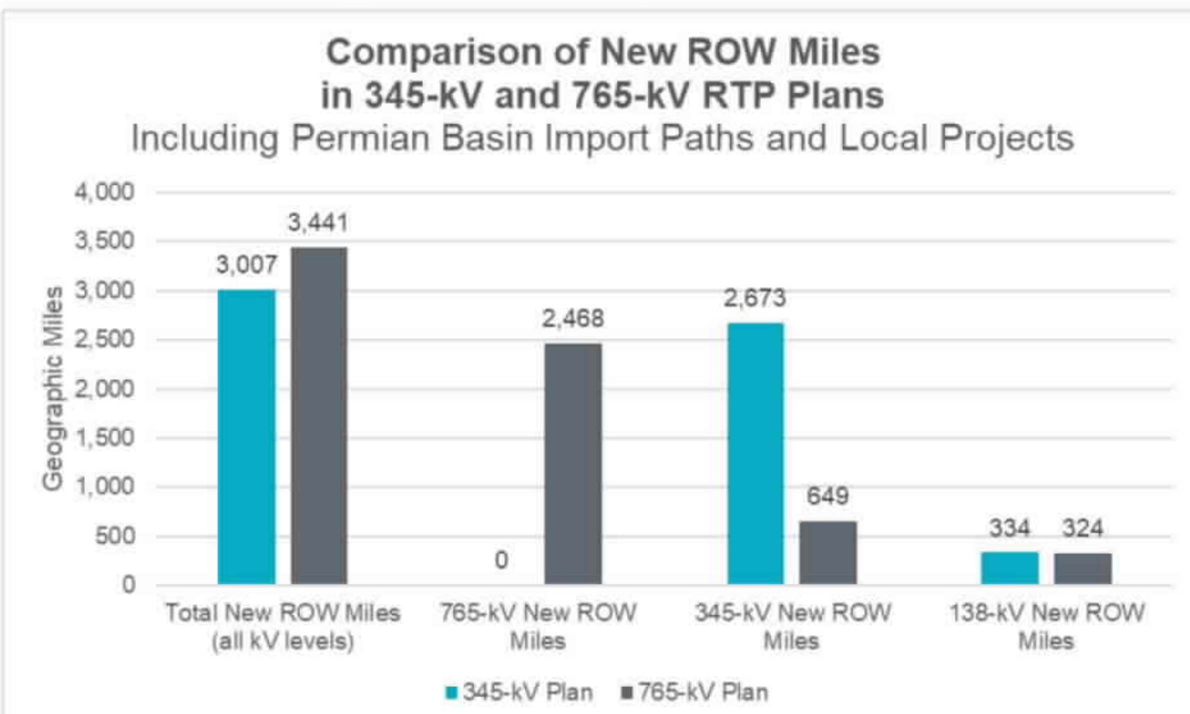

Figure E1: Comparison of New ROW Miles in the 345-kV and 765-kV RTP Plans – Including Permian Basin Projects

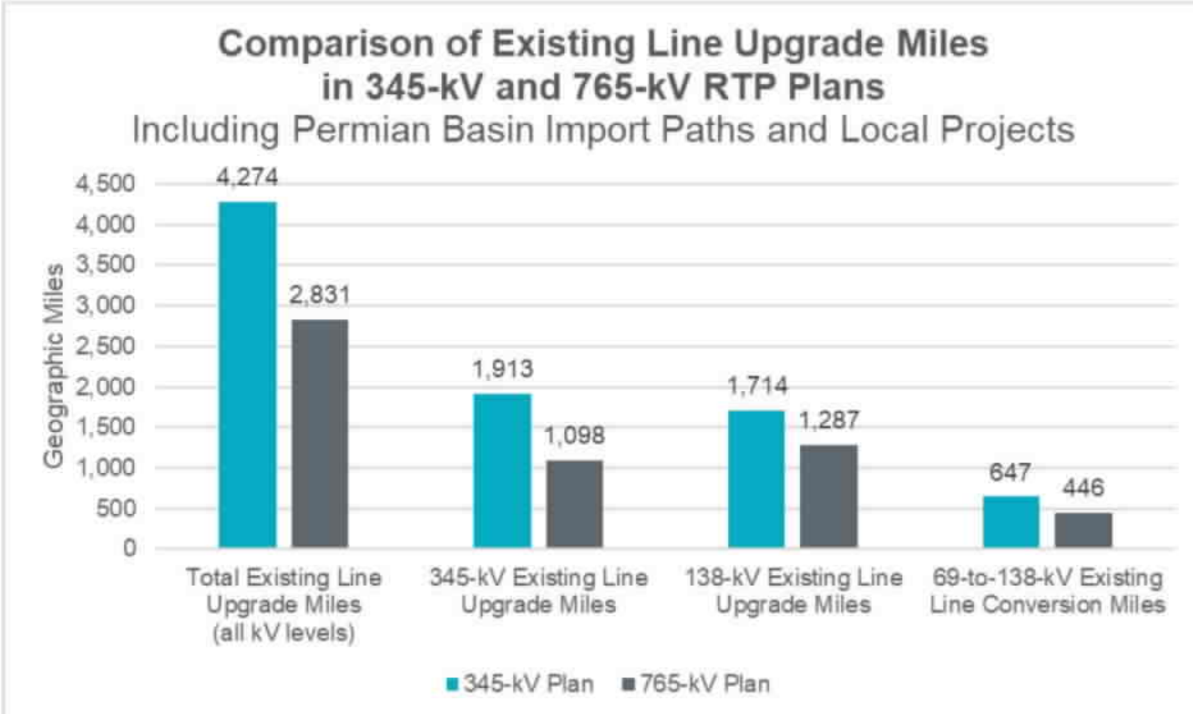

Figure E2: Comparison of Existing Line Upgrade Miles in the 345-kV and 765-kV RTP Plans – Including Permian Basin Projects

- The initial estimated cost of the TX 765-kV STEP is approximately $2.24 billion higher than the 345-kV plan. The cost difference does not account for the additional construction cost (including live "hot" construction) the 345-kV Plan will require to minimize construction outages, to maintain system reliability, and to ensure timely completion of certain major upgrades. The outage-related construction cost for the 345-kV plan (with over 1,400 more existing upgrade miles) is estimated to be $890 million higher than the TX 765-kV STEP. Considering this additional cost would reduce the overall cost difference between the TX 765-kV STEP and the 345-kV Plan to approximately $1.35 billion. Upgrade or rebuild of the existing 345-kV could also have additional new ROW impact and congestion cost related to construction outages for the 345-kV Plan.
- Transmission congestion in the real-time market occurs when uneconomic generators are dispatched to reduce flows over constrained lines. The total congestion rent ERCOT experienced in 2023 was $2.3 billion, and total congestion rent in 2024 was $1.97 billion. The economic analysis performed to evaluate system congestion shows that, in the long-term, the TX 765-kV STEP provides greater economic benefit than the 345-kV plan. Estimated in 2025 dollars, the TX 765-kV STEP reduces annual production cost by approximately $28 million and produces approximately $229 million more savings in consumer energy cost each year compared to the 345-kV plan in the long term.

- The 765-kV transmission lines significantly reduce power losses by transmitting electricity at a higher voltage. Power loss calculations showed that the TX 765-kV STEP can reduce annual systemwide transmission losses by about 5% compared to the 345-kV option (about 560 GWh each year, which is approximately equivalent to a 128 MW thermal unit operating at a 50% capacity factor).
- ERCOT conducted a transfer capability analysis to compare the ability to move power across the system without causing thermal overloads or voltage collapse from a steady state perspective. The steady state transfer capability analysis performed for both options indicates that the TX 765-kV STEP provides higher regional transfer capability compared to the 345-kV option, providing a more robust solution for meeting future demand. With the increasing curtailments of existing generation due to Generic Transmission Constraints (GTCs), such as South Texas Import and Export GTCs, or steady-state thermal limits, enhanced transfer capability will be a benefit. Specifically, the TX 765-kV STEP enhances transfer capability by an additional 600 MW to 3,000 MW across various scenarios evaluated in the analysis. This higher transfer capability could also provide a greater range of siting options for both Generation Resources and large loads.
- ERCOT conducted a stability analysis to examine the system's ability to return to normal operating conditions after sudden changes or disturbances (e.g., line trip). The analysis evaluated the potential impact to the West Texas Export and McCamey GTCs. The study results indicate that the TX 765-kV STEP would increase the West Texas Export stability constraint limit from 12.7 GW to 16.2 GW, compared to only 15.8 GW with the 345-kV option. No stability limits were identified for the McCamey area stability constraint with the implementation of both the options. Additionally, the study results showed that bypassing all series capacitors had no impact on stability limits, suggesting that both options make certain series capacitor(s) in the ERCOT grid less critical or unnecessary. The ability to potentially eliminate some or all series capacitors from the system means greater flexibility in siting and interconnecting generators without concerns about potential subsynchronous oscillation (SSO) issues.
- System strength is increasingly important for a grid's ability to mitigate potential instability risks. IBRs in the ERCOT grid have experienced rapid and sustained growth, driving significant transformations in the energy landscape. The performance of IBRs heavily depends on power electronics controls, which are highly complex and fast-acting, making them particularly sensitive in weaker grids dominated by IBRs with limited or no conventional synchronous generation. Recognizing that adding new major transmission infrastructure, such as 765-kV or 345-kV options, can significantly improve system strength, thereby enhancing the grid's ability to support the reliable operation of IBRs and mitigate potential instability risks, ERCOT conducted a system strength analysis to compare the performance of these options. The

results indicate that both options provide comparable improvement in system strength, measured by weighted short-circuit MVA.

- ERCOT performed a sensitivity analysis with a reduced load level (~ 20 GW less overall load) to assess the impact on the need of the 345-kV plan and the TX 765-kV STEP if less than forecasted load materializes. Results showed major portions of the 345-kV plan and the TX 765-kV STEP will still be needed to meet the reduced demand. However, significantly fewer 345-kV upgrades (new and existing) will be needed under both plans. The estimated cost of the 345-kV plan and the TX 765-kV STEP under the sensitivity case including the Permian Basin Reliability Import Path is $20.98 billion and $23.91 billion, respectively.

Table E2: Comparison of the Cost & Benefits

	345-kV Plan	TX 765-kV STEP
New ROW impact	434 fewer miles of ROW	
Existing System Upgrades impact		1,443 fewer miles of existing upgrades
Estimated New Construction Cost (345-kV \$30.75 billion; TX 765-kV STEP \$32.99 billion)	\$2.24 billion less construction cost	
Estimated Additional cost: Live/Hot construction to facilitate existing upgrades		\$890 million less in construction outage related cost
Estimated Consumer Energy Cost Savings (Long-term)		\$229 million more annual Consumer Energy Cost Savings
Estimated Production Cost Savings (Long-term)		\$28 million more annual Production Cost Savings
Estimated System Loss Reduction		560 GWh/year less energy loss
Incremental Transfer Capability		600 to 3,000 MW increase in power transfer capability
West Texas Stability Limit Improvement		13% more improvement
Potential Retirement of Series Capacitors	Comparable/Similar	
Improvement to the Overall System Strength	Comparable/Similar	

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Introduction

The global demand for electricity is growing exponentially, driven by economic growth and population increase, industrial expansion, electrification of transportation, and growth in data centers and cloud computing. Extra High Voltage (EHV) transmission networks, such as a 765-kV system, offer an option to serve this demand more efficiently than lower-voltage networks. Backed by Ohm's Law of physics, these EHV systems offer superior capacity to transfer power on a long distance, reduce losses, and enhance grid stability, making them a cornerstone of modern energy infrastructure.

While other regions have utilized higher voltages for many decades, the current highest voltage in the ERCOT system is 345-kV. To operate a future transmission system able to move large amount of power from remote generation sites to load centers, ERCOT evaluated the merits of transmission projects at 765-kV compared to the 345-kV option.

Section 1.1 addresses ERCOT's steady state studies. The ERCOT 2024 Regional Transmission Plan (RTP) included two plans: a 345-kV and a 765-kV plan, which expanded on the Permian Basin Reliability Plan 345-kV and 765-kV import path options to address statewide reliability needs. The study results indicated the Texas 765-kV Strategic Transmission Expansion Plan (TX 765-kV STEP) requires 434 miles of additional new ROW but significantly fewer upgrades and approximately 1400 fewer existing upgrade miles compared to the 345-kV plan.

Section 1.1.4 provides steady-state transfer capability analysis, comparing the power transfer capabilities of the 345-kV and 765-kV transmission options within the ERCOT grid. The study examined eight critical source-sink combinations to assess the benefits of each option in supporting growing demand and integrating new generation.

ERCOT performed a dynamic stability study and presented findings in Section 1.2.1. The study evaluates the effectiveness of each EHV option in addressing stability constraints in critical areas, including the West Texas Export and McCamey areas. Additionally, it examines the potential impact of each option on existing series capacitors, highlighting the inherent stability benefit provided by these options.

New transmission infrastructure additions, such as 765-kV or 345-kV, can significantly improve system strength, thereby enhancing the grid's ability to support the reliable operation of IBRs while mitigating potential instability risks. To quantify these benefits, ERCOT conducted a system strength analysis, as detailed in Section 1.2.2. IBRs, which have driven significant transformations in the energy landscape, rely heavily on power electronics controls that are highly complex and fast-acting. These controls are particularly sensitive in weaker grids dominated by IBRs with limited or no conventional synchronous generation. The analysis evaluates the performance of the 345-kV and 765-kV options in strengthening the system, as measured by the weighted short-circuit MVA (WSCMVA) metric.

Section 1.3 describes ERCOT's economic studies. ERCOT performed a chronological 8760-hour production cost simulation analysis to compare the economic benefits between the 345-kV and 765-

kV plans. The economic analysis aims to capture the production cost savings and the consumer energy cost reduction resulting from the buildout of the 345-kV and 765-kV plans.

Section 1.4 covers the system power losses for both scenarios. ERCOT evaluated the power losses savings resulting from the 765-kV plan compared to 345-kV. A power grid operated at the higher voltage level can reduce power losses, especially when transferring large amounts of power over a long distance.

ERCOT Engineering Studies

To test the operation of a future EHV transmission system capable of moving large amounts of power from remote generation sites to load centers, ERCOT has evaluated the merits of transmission projects at 765-kV compared to the 345-kV option. Analysis to demonstrate the reliability and economics of 345-kV and the 765-kV backbone added to the existing grid (steady state studies to assert operating conditions, transient stability studies to assert the dynamic response of the grid to dynamic disturbances and economic studies to compare multiple transmission options under targeted grid performance goals) are described below.

1.1. Steady State Studies

1.1.1. Regional Transmission Plan (RTP)

In the 2024 RTP, ERCOT began by developing a holistic 765-kV plan for potential future demand growth and then identified the critical components (core plan) needed by 2030. After establishing the core plan, ERCOT developed a 765-kV plan in parallel with the regular 345-kV plan to address the reliability issues identified in the analysis. The RTP 765-kV plan was created using the 2030 summer peak case, which also served as the start case for the 345-kV plan. The start case for the 765-kV plan incorporated all local projects needed by 2030 in the Permian Basin Reliability Plan, along with the three Permian Basin 765-kV import paths. Analyses were performed under the N-1 contingency conditions, prior outage of a generator or 345/138-kV transformer followed by N-1 contingency conditions, and maintenance outages at the 300-kV and above voltage level. Figure 1.1.1.1 below illustrates the core 765-kV plan.

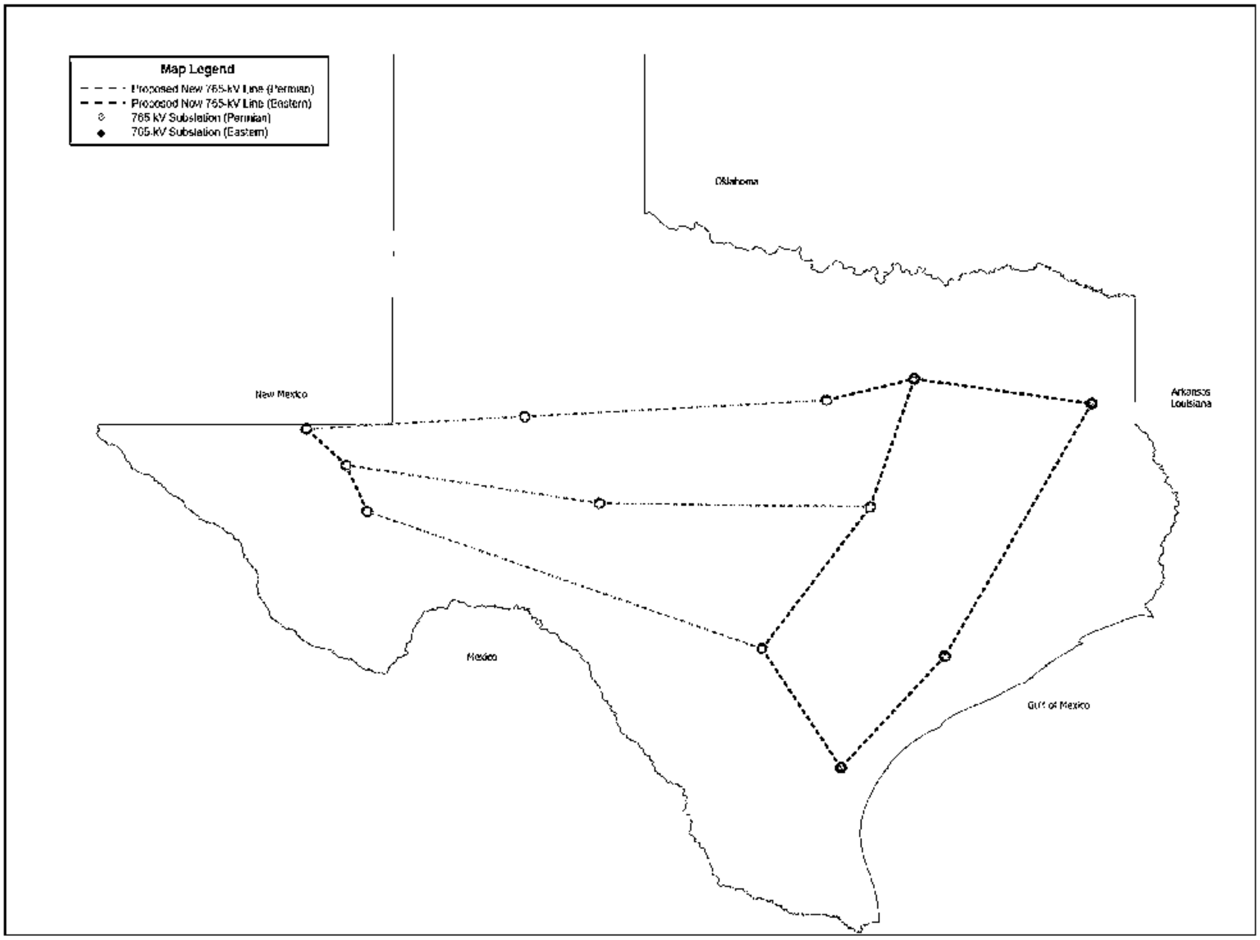

Figure 1.1.1.1: The 765-kV Core Plan needed in 2030

Comparisons between the 345-kV and 765-kV plans are provided below in Figures 1.1.1.2 to 1.1.1.5. Geographic locations for proposed new lines in Figures 1.1.1.1 to 1.1.1.5 are meant to demonstrate general electrical point-to-point connections. Specific routing of any new transmission infrastructure is determined by the Public Utility Commission as part of the CCN process with Transmission Service Providers.

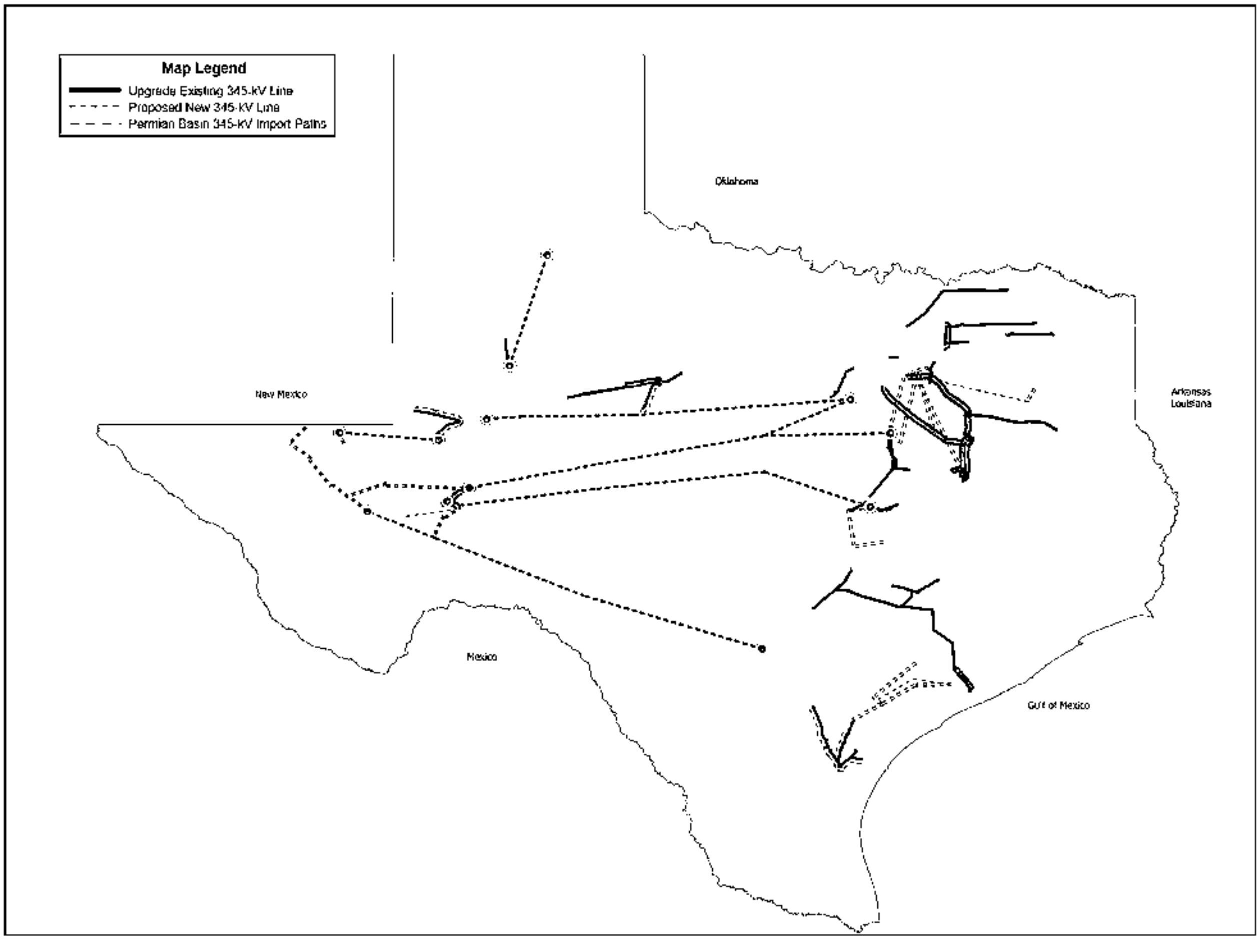

Figure 1.1.1.2: 345-kV New Lines and Upgrades Needed with the 345-kV Plan – Including Permian Basin Import Paths and Local Projects

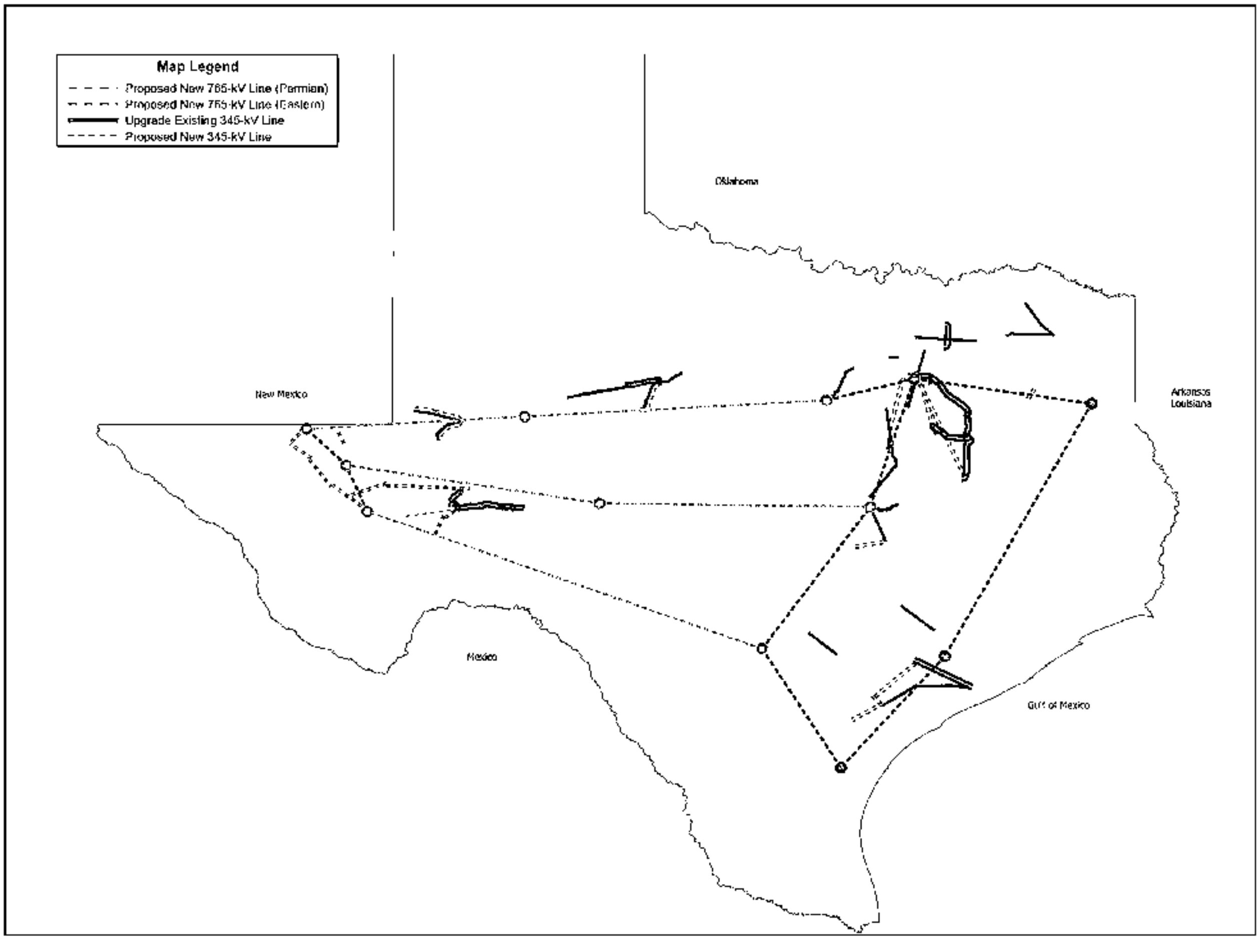

Figure 1.1.1.3: 345-kV New Lines and Upgrades Needed with the 765-kV Plan – Including Permian Basin Import Paths and Local Projects

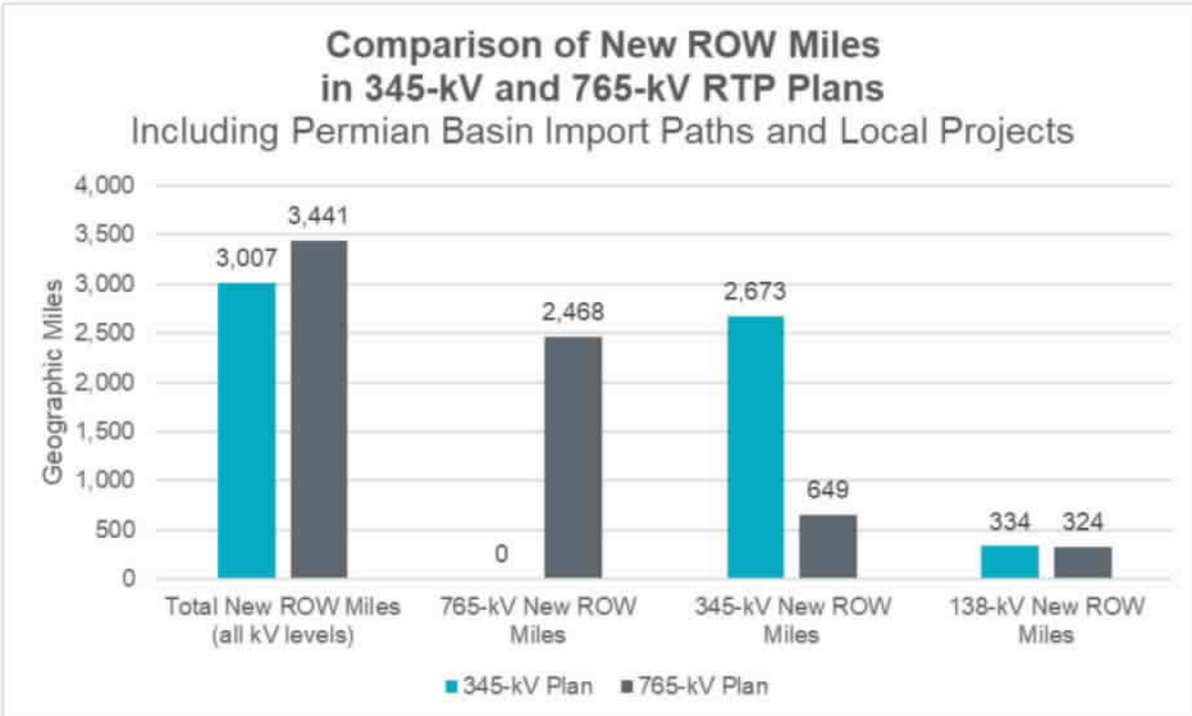

Figure 1.1.1.4: Comparison of New ROW Miles in the 345-kV and 765-kV RTP Plans – Including Permian Basin Projects

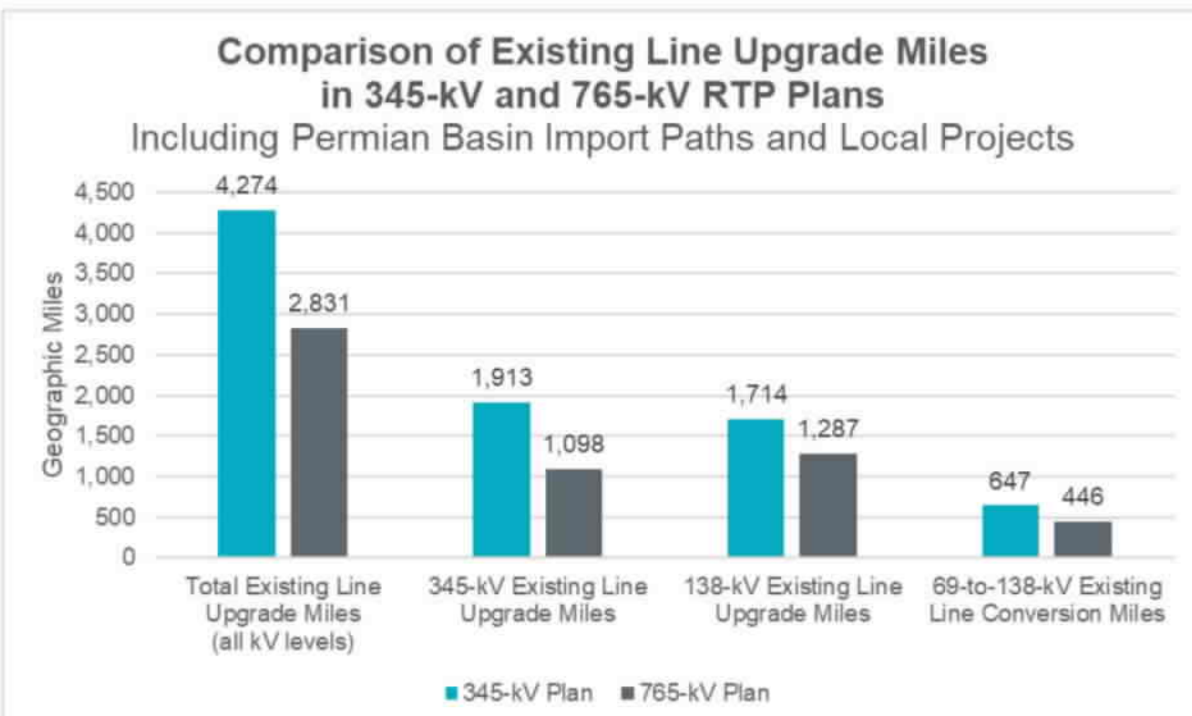

Figure 1.1.1.5: Comparison of Existing Line Upgrade Miles in the 345-kV and 765-kV RTP Plans – Including Permian Basin Projects

1.1.2. Cost Comparison

To perform the cost comparison between the 345-kV and 765-kV plans, generic cost estimates were used. The Midcontinent Independent System Operator (MISO) approved in Dec. 2024 the Tranche 2.1 portfolio to expand its transmission network including 1800 miles of new 765-kV transmission projects. There is currently one 765 kV, 64 miles, transmission line in operation within the MISO footprint since 2018. ERCOT used MISO's Transmission Cost Estimation Guide to develop cost estimates for 765-kV equipment for both the 2024 RTP and the Permian Basin Reliability Plan Study. The cost estimates for the Permian import paths come directly from the Permian Basin Reliability Plan Study report. However, routing changes could potentially change costs.

A cost estimate of $4.2M/mi was used for 345-kV lines. This is the average cost for new 345-kV double-circuits provided by Transmission Service Providers (TSPs) in the Permian Basin study. While locations outside of the Permian Basin could potentially impact the cost estimate, that would be determined in subsequent TSP discussions. Additionally, upgrades and second-circuit additions to existing single circuits had cost estimates close to the new line cost estimate. Therefore, the single amount was used for all 345-kV line work. $2.5M/mi was used as the cost estimate for 138-kV line work, for both upgrades and 69-to-138-kV conversions.

Tables 1.1.2.1-1.1.2.4 below summarize cost comparisons of the 345-kV and 765-kV plans.

Table 1.1.2.1 Summary of Construction Cost Estimates ($Billion)

	345-kV Plan	765-kV Plan
Permian Basin – Import Paths	7.69	9.06
Permian Basin – Incremental Local Upgrades	1.23	0.69
Permian Basin – Common Local Upgrades	4.02	4.02
RTP – 765-kV New Lines, Substations, and Transformers	0	8.09
RTP – 345-kV New Lines and Upgrades	10.31	5.35
RTP – 138-kV New Lines and Upgrades	4.04	3.01
RTP – 69-to-138-kV Line Conversions	1.04	0.54
RTP – Dynamic Reactive Support	1.44	1.44
RTP – Static Reactive Support	0.14	0.09
RTP – New 345/138-kV Substations	0.12	0.10
RTP – New 345/138-kV Transformers	0.72	0.60
Total	**30.75**	**32.99**

Given the large number of 345-kV upgrades that are needed in both plans, but particularly in the 345-kV plan, the impact of construction outages to complete work should be considered. Many of the 345-kV upgrades needed are densely clustered, which will make granting outages extremely difficult and could extend the construction time. In this situation, live "hot" reconductoring work will also be needed, which results in increased costs.

To capture this additional cost, an alternative cost comparison was performed. It was assumed half of the 345-kV upgrades would need to be performed live and would result in a 50% cost increase to the original upgrade cost. Including live reconductoring, the 345-kV plan total cost estimate increases by $1.8B and the 765-kV plan total cost estimate increases by $910M. This reduces the difference between the two total cost estimates of the two plans by $890M. Tables 1.1.2.3 and 1.1.2.4 show this alternative cost comparison.

Table 1.1.2.3 Summary of the Total Cost Estimates – with Live Reconductoring ($Billion)

	345-kV Plan	765-kV Plan
Permian Basin – Import Paths	7.69	9.06
Permian Basin – Incremental Local Upgrades	1.23	0.69
Permian Basin – Common Local Upgrades	4.02	4.02
RTP – 765-kV New Lines, Substations, and Transformers	0	8.09
RTP – 345-kV New Lines and Upgrades **(with Live Reconductoring)**	**12.11**	**6.26**
RTP – 138-kV New Lines and Upgrades	4.04	3.01
RTP – 69-to-138-kV Line Conversions	1.04	0.54
RTP – Dynamic Reactive Support	1.44	1.44
RTP – Static Reactive Support	0.14	0.09
RTP – New 345/138-kV Substations	0.12	0.10
RTP – New 345/138-kV Transformers	0.72	0.60
Total	**32.55**	**33.90**

1.1.3. Sensitivity Analysis

To review need based on varying demand levels, an additional RTP analysis was performed with the TSP officer letter's demand reduced to 50% of the maximum value. Table 1.1.3.1 shows the adjusted load levels.

Table 1.1.3.1 RTP Sensitivity Analysis – Adjusted Load

Officer Letter Load – Full (MW)	Officer Letter Load – Reduced (MW)	Total Contract Load (MW)	Total System Load (MW)
31,197	15,599	20,868	129,168

Figures 1.1.3.1 and 1.1.3.2 show the needed 345-kV upgrades in the 345-kV and 765-kV plans under the reduced load conditions (~ 20 GW less overall load) in the sensitivity analysis. The results indicated major portions of the 345-kV Plan and the TX 765-kV STEP Plans will still be needed to meet the reduced demand. However, significantly less 345-kV upgrades (new and existing) will be needed under both plans.

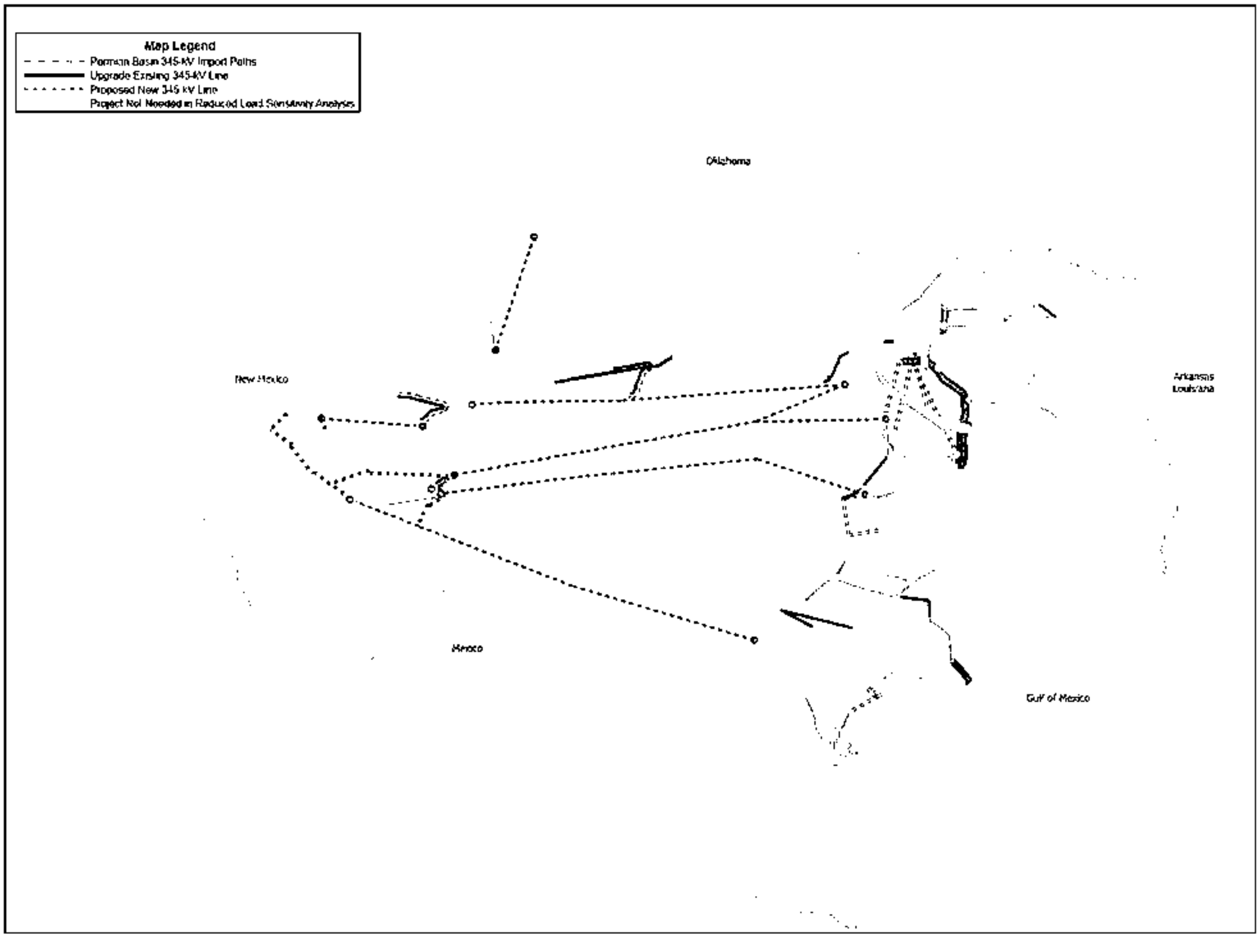

Figure 1.1.3.1: 345-kV Upgrades Needed with the 345-kV Plan under Reduced Load Conditions – Including Permian Basin Projects

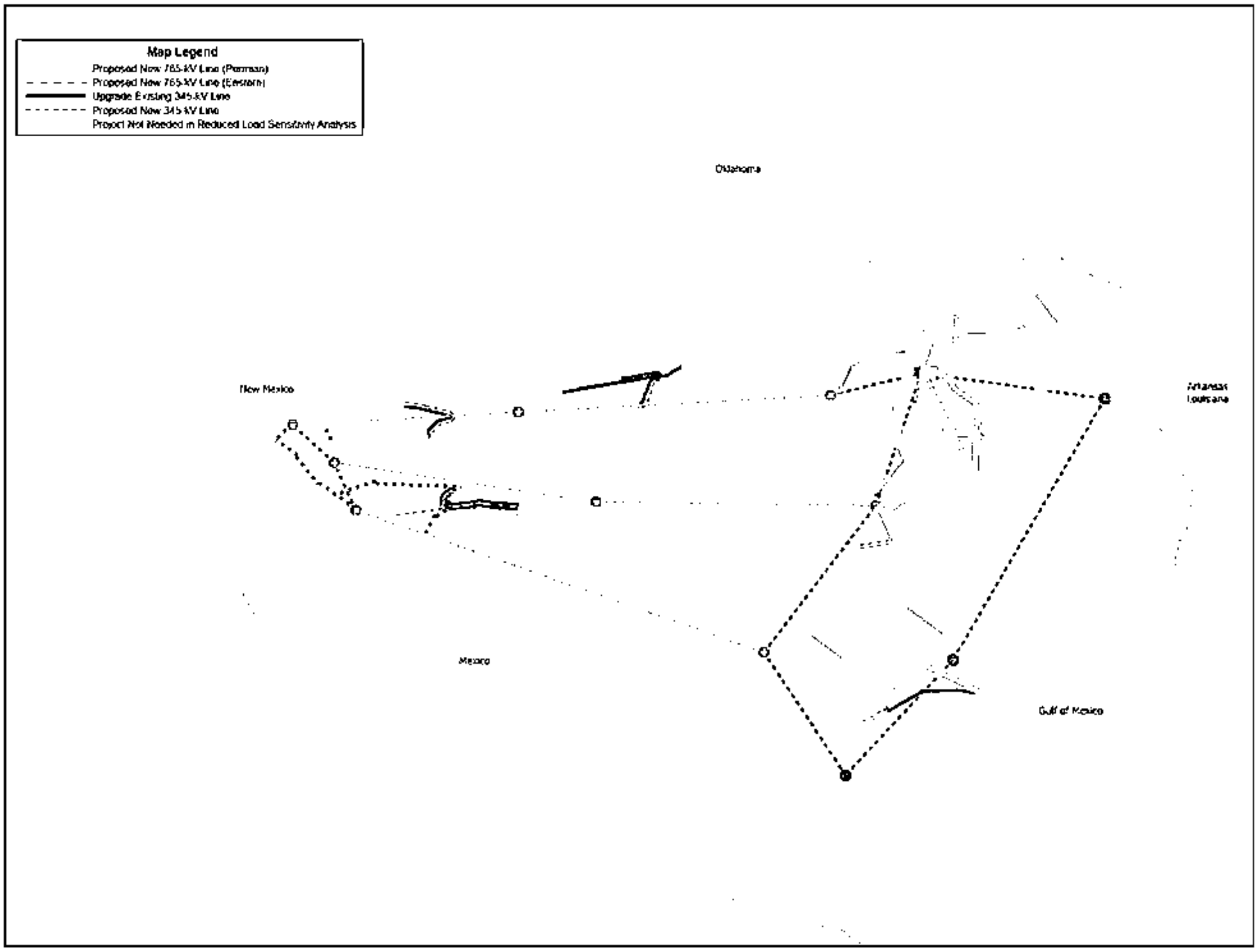

Figure 1.1.3.2: 345-kV Upgrades Needed with the 765-kV Plan under Reduced Load Conditions – Including Permian Basin Projects

Comparisons between the 345-kV and 765-kV plans under the reduced load conditions are provided below in Figures 1.1.3.3 and 1.1.3.4.

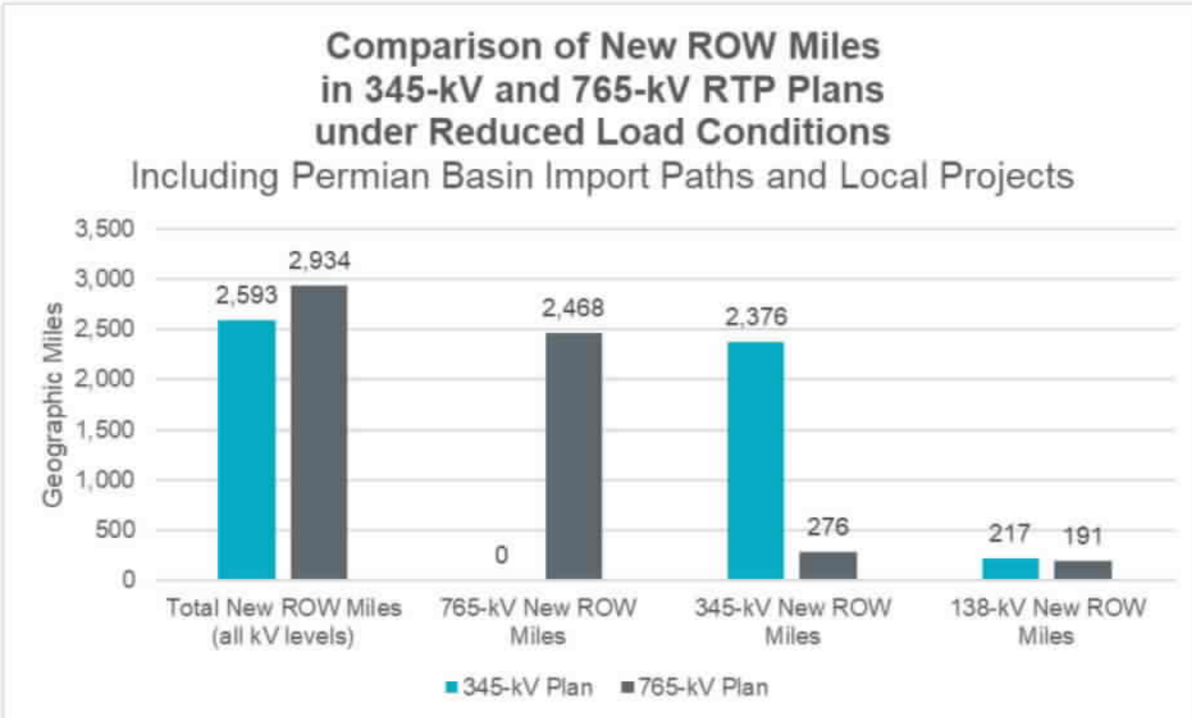

Figure 1.1.3.3: Comparison of New ROW Miles in the 345-kV and 765-kV RTP Plans under Reduced Load Conditions – Including Permian Basin Projects

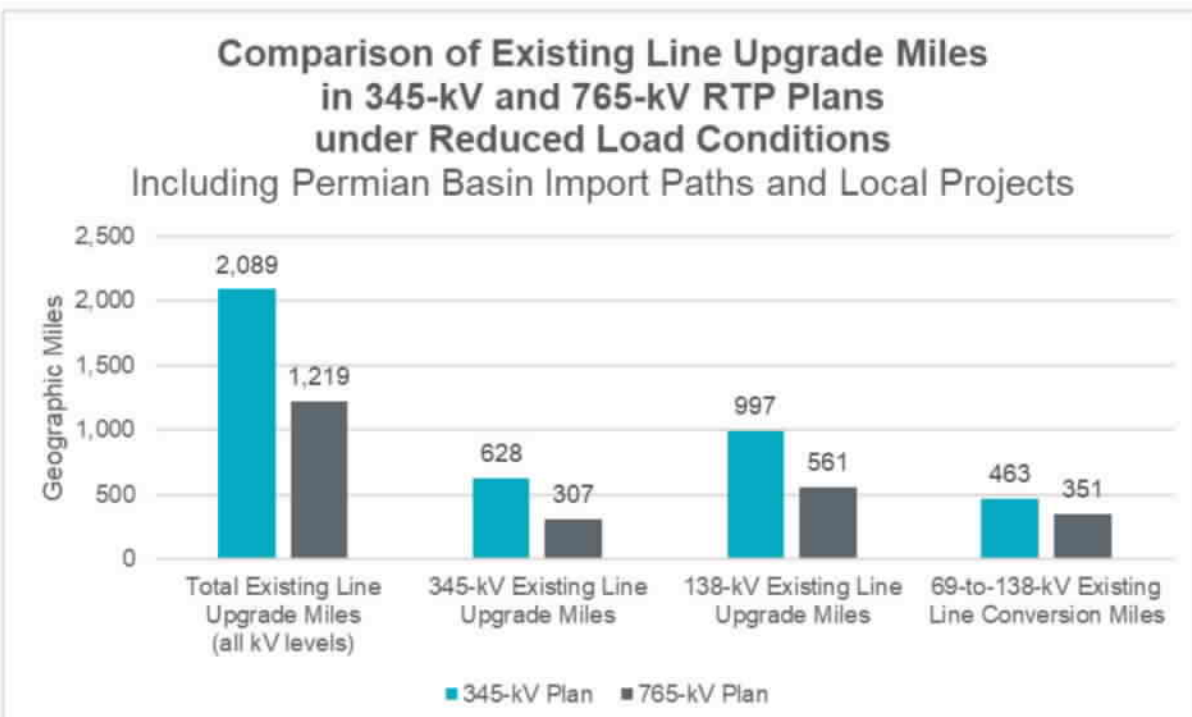

Figure 1.1.3.4: Comparison of Existing Line Upgrade Miles in the 345-kV and 765-kV RTP Plans under Reduced Load Conditions – Including Permian Basin Projects

Tables 1.1.3.5-1.1.3.6 below summarize cost comparisons of the 345-kV and 765-kV plans under the reduced load conditions.

Table 1.1.3.5 Summary of the Construction Cost Estimates – Reduced Load Conditions ($Billion)

	345-kV Plan	765-kV Plan
Permian Basin – Import Paths	7.69	9.06
Permian Basin – Incremental Local Upgrades	1.23	0.69
Permian Basin – Common Local Upgrades	4.02	4.02
RTP – 765-kV New Lines, Substations, and Transformers	0	8.09
RTP – 345-kV New Lines and Upgrades	3.67	0.45
RTP – 138-kV New Lines and Upgrades	1.96	0.86
RTP – 69-to-138-kV Line Conversions	0.58	0.30
RTP – Dynamic Reactive Support	1.26	0.18
RTP – Static Reactive Support	0.07	0.03
RTP – New 345/138-kV Substations	0.06	0.04
RTP – New 345/138-kV Transformers	0.44	0.18
Total	**20.98**	**23.91**

Table 1.1.3.6 Summary of the Total Cost Estimates – Reduced Load Conditions – with Live Reconductoring ($Billion)

	345-kV Plan	765-kV Plan
Permian Basin – Import Paths	7.69	9.06
Permian Basin – Incremental Local Upgrades	1.23	0.69
Permian Basin – Common Local Upgrades	4.02	4.02
RTP – 765-kV New Lines, Substations, and Transformers	0	8.09
RTP – 345-kV New Lines and Upgrades **(with Live Reconductoring)**	**4.12**	**0.53**
RTP – 138-kV New Lines and Upgrades	1.96	0.86
RTP – 69-to-138-kV Line Conversions	0.58	0.30
RTP – Dynamic Reactive Support	1.26	0.18
RTP – Static Reactive Support	0.07	0.03
RTP – New 345/138-kV Substations	0.06	0.04
RTP – New 345/138-kV Transformers	0.44	0.18
Total	**21.43**	**23.99**

1.1.4. Steady-State Transfer Capability Analysis

Steady-state transfer capability analysis aims to evaluate and compare the steady-state power transfer capabilities between the two transmission options—345-kV and TX 765-kV STEP within the ERCOT grid. By quantifying the steady-state transfer limit of each plan, the analysis seeks to identify the benefits associated with each option to support increasing load demand, enhance system reliability, and accommodate the growth of potential generation integration.

The analysis utilized two specific cases, both derived from the 2024 RTP 2030 Summer Peak Final Secure Case:

- Case 1: 2024 RTP 2030 Summer Peak Final – 345-kV option
- Case 2: 2024 RTP 2030 Summer Peak Final – TX 765-kV STEP

The study evaluated transfer capabilities across eight scenarios, representing critical source-sink combinations within ERCOT:

- West/Far West (WFW) to Dallas/Fort Worth (DFW)
- WFW to Houston
- WFW to South Central
- WFW to South
- Dallas-Fort Worth (DFW) to Houston
- Houston to DFW
- DFW to Corpus area (Corpus = Nueces and Refugio Counties)
- Houston to Corpus area (Corpus = Nueces and Refugio Counties)

The study, conducted using Transmission Adequacy & Reliability Assessment (TARA) software, tested all North American Electric Reliability Corporation (NERC) Category P1 and P7 contingencies for transmission facilities at 138-kV and above. The analysis focused on identifying thermal constraints and voltage collapse across the ERCOT grid, excluding 69-kV facilities. The key findings of the study results include:

- Key Observations
  - Both the 345-kV and 765-kV options result in notable enhancements to steady-state transfer capability compared to existing configurations.
  - TX 765-kV STEP demonstrates substantially greater improvements in transfer capability compared to the 345-kV option, providing a more robust solution for meeting future demand.
- General Observations: Transfers from WFW to Major Load Centers
  - TX 765-kV STEP consistently outperforms the 345-kV option for transfers originating from WFW to major load centers, except for DFW. Both options provide similar performance for transfers to DFW.
  - For transfers from WFW to major load centers (excluding DFW), TX 765-kV STEP offers an additional 600 to 3,000 MW of transfer capability over the 345-kV alternative.
- General Observations: DFW to/from Houston Transfer Scenario
  - Transfers from DFW to Houston see a marked improvement in transfer capability with TX 765-kV STEP compared to the 345-kV option. TX 765-kV STEP offers an additional 750 MW of transfer capability over the 345-kV alternative.
  - In contrast, transfers from Houston to DFW exhibit similar performance for both 345-kV and 765-kV options.
- General Observations: DFW to Corpus and Houston to Corpus Transfer Scenarios

  - No significant differences were observed between the 345-kV and 765-kV options for transfers from DFW to Corpus or Houston to Corpus, indicating similar performance levels for these scenarios.

A summary of the transfer capability analysis can be found in Table 1.1.4.1 below.

Table 1.1.4.1 Transfer Capability Analysis

Scenarios	Incremental Transfer Capability	
	345-kV Plan (MW)	765-kV Plan (MW)
WFW to DFW	3,450	3,450
WFW to Houston	3,750	6,750
WFW to South Central	1,050	1,650
WFW to South	550	1,650
DFW to Houston	3,000	3,750
Houston to DFW	1,725	1,725
DFW to Corpus	350	350
Houston to Corpus	350	350

1.2. Dynamic Stability Studies

This section assesses the impact of the 765-kV and 345-kV options on system stability and overall system strength in the ERCOT grid. It summarizes the results of stability studies that evaluate the effectiveness of the options in alleviating existing system constraints and presents the findings from a system strength analysis comparing the relative benefits of each option.

1.2.1. Impact Analysis of EHV Options on System Stability

The 765-kV and 345-kV options are designed to strengthen the system by reducing overall system impedances and facilitating improved power transfer from various generation sources to customers through new additional EHV transmission paths. This enhancement supports a more reliable and efficient power supply, increasing the availability of Generation Resources to meet demand.

To evaluate the potential impact of the 765-kV and 345-kV options, ERCOT conducted a stability study focused on the existing West Texas Export and McCamey stability constraints, which currently limit generation exports from these regions.

ERCOT used the Dynamics Working Group (DWG)-approved 2027 High Renewable Minimum Load (HRML) case as a baseline and updated it to include Regional Planning Group (RPG)-approved synchronous condensers and 35 additional generators in the North, North Central, West, and Far West weather zones that satisfied the ERCOT Planning Guide Section 6.9(1) requirements as of February 2024. Using this updated case, ERCOT performed stability analysis by testing critical NERC Category P1 and P7 contingencies associated with the interfaces of the West Texas Export and McCamey area stability constraints, as well as the new EHV transmission paths running from the West Texas region toward the major load centers.

Furthermore, ERCOT conducted a sensitivity analysis to assess potential impact of bypassing all existing series compensation devices in cases with the 765-kV and 345-kV options. The ERCOT system currently has 18 series capacitors installed in the transmission network, primarily to enhance power transfer capability and provide voltage support by reducing the impedance of 345-kV lines between generation sources and major load centers. While series capacitors improve power transfer, they also introduce a risk of subsynchronous oscillation (SSO), an abnormal energy interaction at frequencies lower than the operating frequency (60 Hz). SSO can cause significant damage to generator shafts, series capacitors, and other system elements, potentially resulting in equipment trips or cascading outages. The risk of SSO increases as more Generation Resources are located near series capacitors.

Key findings of the dynamic stability studies include:

- The 765-kV and 345-kV options are expected to significantly improve the West Texas Export and McCamey area stability limits under the tested critical N-1 conditions.
- Improvements in West Texas Export stability constraints under N-1 conditions:
    - The stability limit in the study base case is estimated at 12.7 GW.
    - The 345-kV option increases the limit to 15.8 GW, representing an improvement of 24.4%.
    - TX 765-kV STEP raises the limit to 16.2 GW, reflecting an improvement of 27.6%.
    - Both the 765-kV and 345-kV options were also tested with all series capacitors bypassed, and no impact was found on the estimated stability limit.
- Improvements in McCamey Area Stability constraints under N-1 conditions:
    - No stability issues were identified in the McCamey area in the study base case which assumed approximately 6.4 GW of generation within the McCamey area. This is primarily due to the RPG-approved projects such as addition of the new Bearkat-North McCamey-Sand Lake 345-kV double-circuit transmission line (expected in-service year: 2026) and the new synchronous condensers at Bakersfield (expected in-service year: 2027).
    - Both the 765-kV and 345-kV options were tested with all series capacitors bypassed, and no stability issues were identified in the McCamey area.
- Study results showed that bypassing all series capacitors had no impact on stability limits which suggests that the either 345-kV or 765-kV infrastructure options makes series capacitor(s) less critical. The inherent characteristics of EHV systems effectively address the objectives for which series capacitors were originally installed—such as improved power transfer and voltage support—without introducing the additional complexity and risk associated with series capacitors. As a result, series capacitors become largely redundant in the presence of robust EHV infrastructure. Therefore, it can be concluded that some of the existing series capacitor(s) related to the West Texas interface may become less critical or unnecessary with the introduction of new EHV transmission infrastructure.
- Note that the stability limits presented above are estimated values for future system conditions. The West Texas Export and McCamey Generic Transmission Constraints

(GTCs) will continue to be reviewed and updated as part of future Quarterly Stability Assessments (QSAs).

Figure 1.2.1.1 shows plots illustrating examples of stable and unstable responses, one with the EHV option and the other without it.

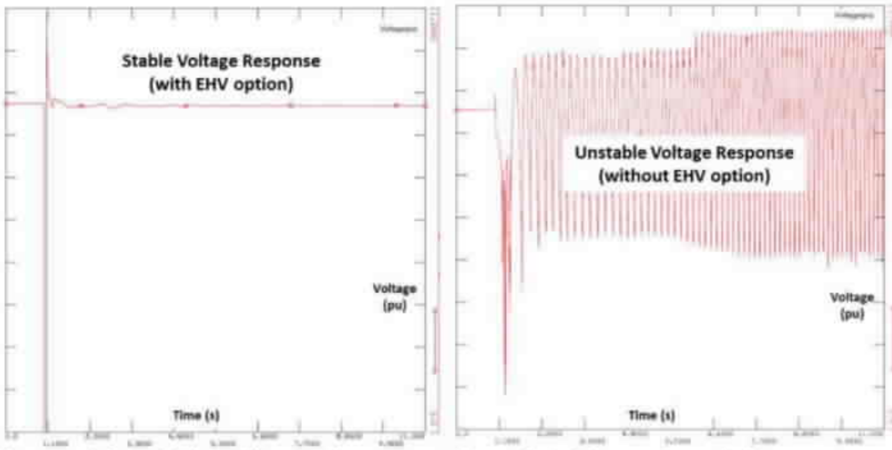

Figure 1.2.1.1 Plots illustrating examples of stable and unstable responses

1.2.2. System Strength Analysis of EHV Options in the ERCOT Grid

Inverter-based resources (IBRs) in the ERCOT grid, including solar, wind, and energy storage, have experienced rapid and sustained growth, driving significant transformations in the energy landscape. The performance of these resources heavily depends on power electronics controls and system strength. Due to the highly complex and fast-acting nature of IBR controls, their responses are exceptionally sensitive. This sensitivity becomes particularly critical in weaker systems, where IBRs dominate, and conventional synchronous generation is limited or absent. As a result, such systems are more susceptible to instability issues.

Improving system strength is essential to mitigating these risks. Transmission upgrades, such as 345-kV and 765-kV options, can enhance system strength by reducing overall system impedances. ERCOT conducted a system strength analysis to compare relative benefits of the two options. System strength is commonly measured by short-circuit current (or MVA), and ERCOT employed a weighted short-circuit MVA (WSCMVA) metric in this study, as outlined in the formula below:

$$WSCMVA = \frac{\sum_{k=1}^{n} SCMVA_k * P_{GK}}{\sum_{k=1}^{n} P_{GK}}$$

where:

$SCMVA_k$: short-circuit MVA at the POI of the k-th IBR

PG_K: the capacity (MW) of the k-th IBR

The system strength analysis was conducted using the same option cases that were employed in evaluating the impact of options on system stability. The analysis concluded that both options offer similar overall system strength and benefits. The results are detailed in the table below.

Table 1.2.2.1 System Strength Comparison

Options	WSCMVA (MVA)
345-kV Plan	6,264
TX 765-kV STEP	6,289

1.3. Economic Study

To qualitatively compare the economic benefits between 345-kV and 765-kV plans, an economic analysis was performed using two study year cases, i.e., 2034 and 2039. The 2034 and 2039 economic cases for the Current Trends scenario from the 2024 Long-Term System Assessment (LTSA) were used as the base cases of this economic analysis. At the time when the economic study cases were created, the large loads substantiated by officer letters from the TSPs were not available. Moreover, the reliability projects (345-kV or 765-kV plan) needed to reliably supply such a significant amount of large load additions had not been developed. As a result, the large loads substantiated by officer letters from TSPs were not included in the economic base cases. As reflected in Table 1.3.1 below, the peak demand was 106,581 MW and 113,349 MW respectively for 2034 and 2039.

Table 1.3.1 Load Demand and Annual Energy of Base Cases

	Peak Demand (MW)	Annual Energy (GWh)
2034 Base Case	106,581	648,138
2039 Base Case	113,349	693,213

The 345-kV and 765-kV plans were added separately to the base cases to simulate the incremental impact of the proposed transmission addition. Anticipated responses from price responsive load under system scarcity conditions were modeled in the simulation. TX 765-kV STEP demonstrated more consistent benefits through the years evaluated compared with the 345-kV plan in both the production cost savings and system-wide consumer energy cost reduction as shown in Tables 1.3.2 and 1.3.3. Key findings from the economic analysis are summarized as follows and monetary numbers are in 2025 dollars:

- For year 2034, both the 345-kV and 765-kV options showed savings in production cost and consumer energy cost while the 765-kV plan had $133 million more production cost savings but $136 million less savings in system-wide consumer energy cost compared with the 345-kV plan. The 765-kV plan also had $94 million less congestion rent than the 345-kV plan.
- For year 2039, while the 765-kV plan continued to show savings in both production cost and consumer energy cost, the 345-kV plan showed an increase in the consumer energy

cost. The 765-kV plan had $28 million more production cost savings and approximately $229 million more system-wide consumer energy cost reduction than the 345-kV plan. The 765-kV plan also had $172 million less congestion rent than the 345-kV plan.

Table 1.3.2 Economic Study Results for 2034

Year	Project Description	Production Cost (M$)	Consumer Energy Cost (M$)	Congestion Rent (M$)
2034	Base Case	17,139	18,342	1,873
2034	345-kV Plan	16,969	18,143	1,539
2034	765-kV Plan	16,836	18,279	1,444
2034	Incremental Benefit (765-kV Plan vs 345-kV Plan)	133	-136	94

Table 1.3.3 Economic Study Results for 2039

Year	Project Description	Production Cost (M$)	Consumer Energy Cost (M$)	Congestion Rent (M$)
2039	Base Case	19,462	22,070	2,545
2039	345-kV Plan	19,088	22,143	2,261
2039	765-kV Plan	19,059	21,914	2,089
2039	Incremental Benefit (765-kV Plan vs 345-kV Plan)	28	229	172

The economic study showed that the TX 765-kV STEP can produce more economic benefits in the long-term planning horizon. When considering which option is more cost effective, it should be noted that the future conditions can differ from the study scenarios assumed and economic benefits other than production cost savings and system-wide consumer energy cost reductions are not quantified here.

1.4. Power Losses Reduction Study

The 765-kV transmission lines significantly reduce power losses by transmitting electricity at a higher voltage, which results in a lower current for the same power transfer, thereby minimizing the resistive losses in the power lines due to the relationship between current and heat generation ($P = I^2 \cdot R$). ERCOT performed the AC power flow analysis for three snapshots (Peak, Off-Peak, and Light Load conditions) and compared the resulting power losses as a percentage of the total load demand between 345-kV and 765-kV plan. As reflected in Table 1.4.1 below, the study shows that TX 765-kV STEP resulted in the most savings in power losses (7.58%) for Light Load condition and the least savings (0.83%) for Off-Peak Load condition while the change in power losses was modest for Peak Load condition (4.72%).

Table 1.4.1 AC Power Losses Comparison for Peak, Off-Peak and Light Load Conditions

Losses (% of Load)	345-kV	765-kV	Difference with respect to 345-kV Power Losses[3]
Peak Load	1.97%	1.88%	4.72%
Off-Peak Load	1.62%	1.61%	0.83%
Light Load	1.61%	1.49%	7.58%

The power loss reduction resulting from 765-kV was estimated for both study years (2034 and 2039). The 8760-hour load duration curve was sorted for each of two years from the highest to the lowest. For the top 10% load duration curve, 1.97% and 1.88% transmission losses were assumed respectively for 345-kV and 765-kV plan. For the middle 60% to 90% of load duration curve, 1.62% and 1.61% transmission losses were assumed respectively for 345-kV and 765-kV plan. For the bottom 60% load duration curve, 1.61% and 1.49% transmission losses were assumed respectively for 345-kV and 765-kV plan. The comparison of the total transmission losses for both years between 345-kV and 765-kV is shown in Table 1.4.2. It shows that the 765-kV can reduce the annual transmission losses by about 5% compared to the 345-kV option, which ranged from 540 GWh in 2034 to 577 GWh in 2039.

Table 1.4.2 Power Losses Comparison for 2034 and 2039

Project Description	Transmission Losses in 2034 (GWh)	Transmission Losses in 2039 (GWh)
345-kV Plan	10,764	11,518
765-kV Plan	10,224	10,941
Power Loss Saving in GWh	540	577
Power Loss Saving in %	5.02%	5.01%

[3] Calculated as the difference between the power losses for 345-kV and 765-kV plans normalized by the 345-kV power losses, e.g., 4.72%=(1.97%-1.88%)/1.91%.

1.5. TX 765-kV STEP Potential Future Expansion

The TX 765-kV STEP core plan was determined based on the 2024 RTP reliability needs for 2030. As the system continues to evolve, the core plan could be expanded to serve more of the ERCOT system as need materializes. A potential expansion example is shown below in Figure 1.5.1. This option could expand the 765-kV system into the Panhandle and Valley areas or add additional east-to-central pathways. Any potential future expansion options would be further evaluated as system needs evolve.

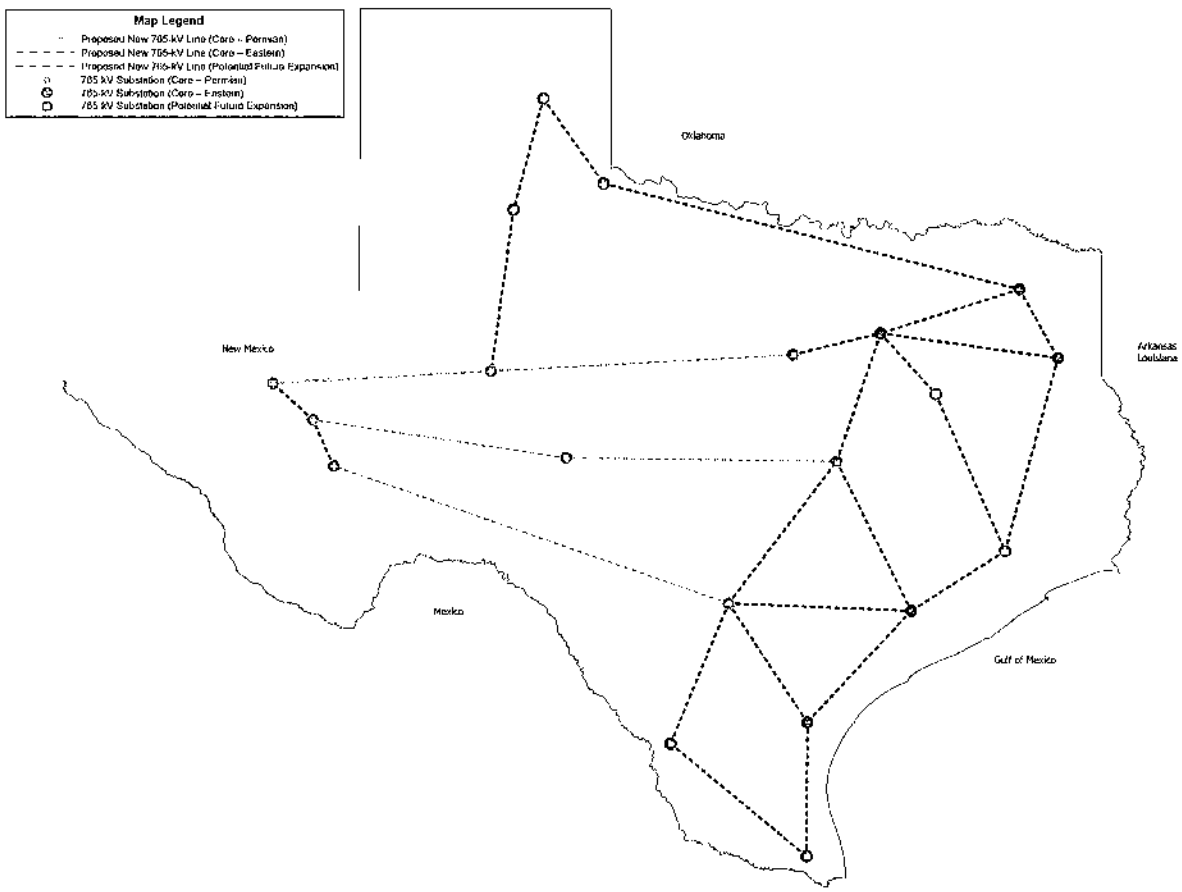

Figure 1.5.1: TX 765-kV STEP Potential Future Expansion

1.6. Conclusions

Integrating a new 765-kV transmission network into the ERCOT System would represent a strategic transformative step in power infrastructure, enabling efficient, reliable, and sustainable electricity delivery for both current and future demand.

The comparison between the 345-kV and 765-kV plans highlights the benefits and cost effectiveness of the TX 765-kV STEP. To serve both current and future load growth reliably and efficiently, many miles of new transmission build as well as upgrades to existing lines will be required no matter the decision on which voltage level is to be used. While the TX 765-kV STEP has 434 more miles of new ROW impact, it significantly reduces the need to upgrade, rebuild, or add 345-kV, 138-kV, and 69-kV infrastructure, with approximately 1400 miles fewer existing upgrades compared to the 345-kV plan. The overall cost of the 765-kV plan is comparable with the 345-kV plan based on generic cost estimates.

The evaluation highlights that both the 345-kV and 765-kV transmission options provide significant advantages across key areas, including steady-state transfer capability, dynamic stability, and system strength. Among the two, the 765-kV option demonstrates superior performance, making it a more robust and forward-thinking solution for meeting future challenges for the ERCOT grid. By implementing the TX 765-kV STEP, the ERCOT grid would benefit from enhanced reliability, resilience, and readiness for an evolving energy landscape.

In terms of steady-state transfer capability, both transmission options deliver substantial improvements across eight critical source-sink combinations. However, the 765-kV option stands out by providing an additional 600 MW to 3,000 MW of transfer capacity in various scenarios, particularly for transfers from West/Far West Texas to major load centers. This advantage makes TX 765-kV STEP better suited to address growing energy demands and improve grid efficiency.

When considering dynamic stability, both options significantly enhance stability limits under critical N-1 conditions, with the 765-kV option providing markedly better results than the 345-kV option in alleviating stability constraints related to the West Texas Export. Additionally, the analysis reveals that bypassing series capacitors does not impact stability, suggesting that the new infrastructure could render some existing series capacitors unnecessary, reducing SSO risk. Overall, the findings underscore the positive role of transmission infrastructure in enhancing grid stability and reducing reliance on technologies like series capacitors.

For system strength, analysis shows that both options provide similar improvement in system strength, measured by weighted short-circuit MVA. These upgrades are expected to mitigate instability risks by reducing system impedance and strengthening regions with limited synchronous generation.

The economic analysis shows more promising results for the 765-kV plan in the long term. ERCOT's analysis concludes that the TX 765-kV STEP can reduce annual production costs by approximately $28 million and produce approximately $229 million more savings in consumer energy cost each year compared to the 345-kV plan.

The power losses study shows the TX 765-kV STEP can reduce the annual transmission losses by about 5% compared to the 345-kV option (about 560 GWh each year) in the long-term studies.

Table 1.6.1 Comparison of the Cost & Benefits

	345-kV Plan	TX 765-kV STEP
New ROW impact	434 fewer miles of ROW	
Existing System Upgrades impact		1,443 fewer miles of existing upgrades
Estimated New Construction Cost (345-kV $30.75 billion; TX 765-kV STEP $32.99 billion)	$2.24 billion less construction cost	
Estimated Additional cost: Live/Hot construction to facilitate existing upgrades		$890 million less in construction outage related cost
Estimated Consumer Energy Cost Savings (Long-term)		$229 million more annual Consumer Energy Cost Savings
Estimated Production Cost Savings (Long-term)		$28 million more annual Production Cost Savings
Estimated System Loss Reduction		560 GWh/year less energy loss
Incremental Transfer Capability		600 to 3,000 MW increase in power transfer capability
West Texas Stability Limit Improvement		13% more improvement
Potential Retirement of Series Capacitors	Comparable/Similar	
Improvement to the Overall System Strength	Comparable/Similar	

Appendix

Appendix A.1

Comparisons between the 345-kV and 765-kV plans are provided below in Figures A1.1 to A1.5 and Tables A1.1, A1.2, and A1.3.

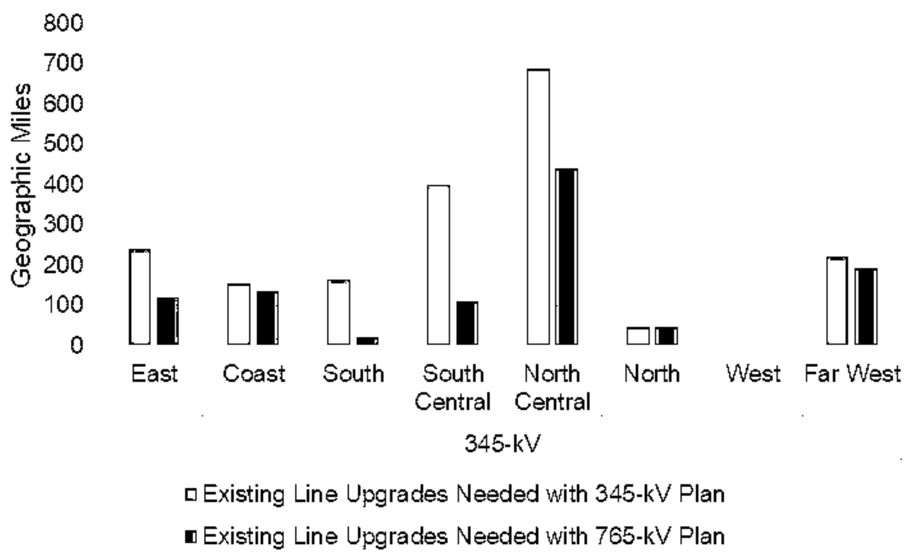

Figure A1.1: Comparison of Upgrades to Existing 345-kV Transmission lines between 345-kV and 765-kV Plans – Including Permian Basin Local Projects

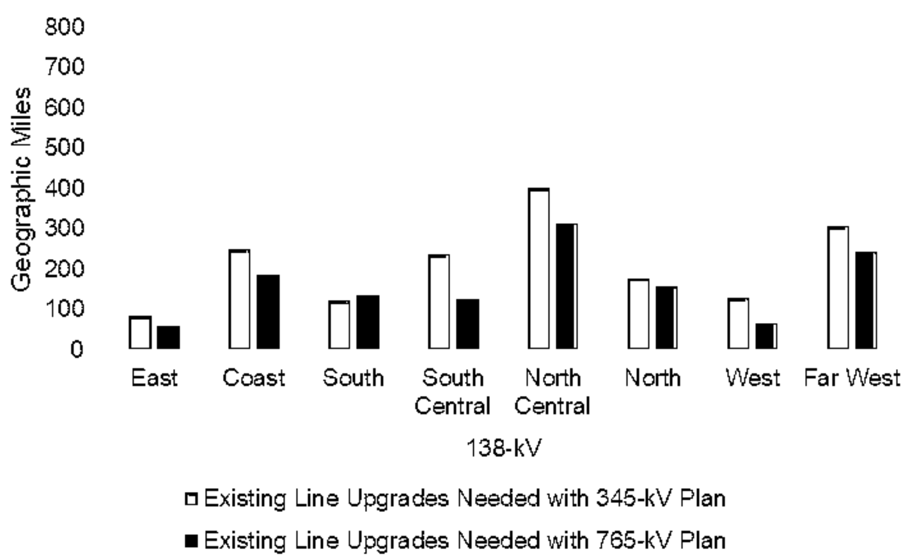

Figure A1.2: Comparison of Upgrades to Existing 138-kV Transmission Lines between 345-kV and 765-kV Plans – Including Permian Basin Local Projects

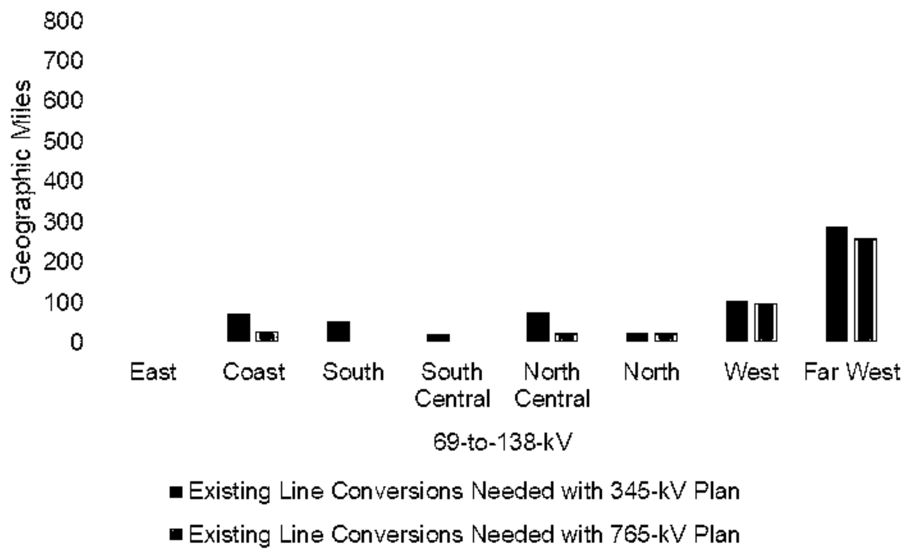

Figure A1.3: Comparison of 69-to-138-kV Conversions of Existing Transmission Lines between 345-kV and 765-kV Plans – Including Permian Basin Local Projects

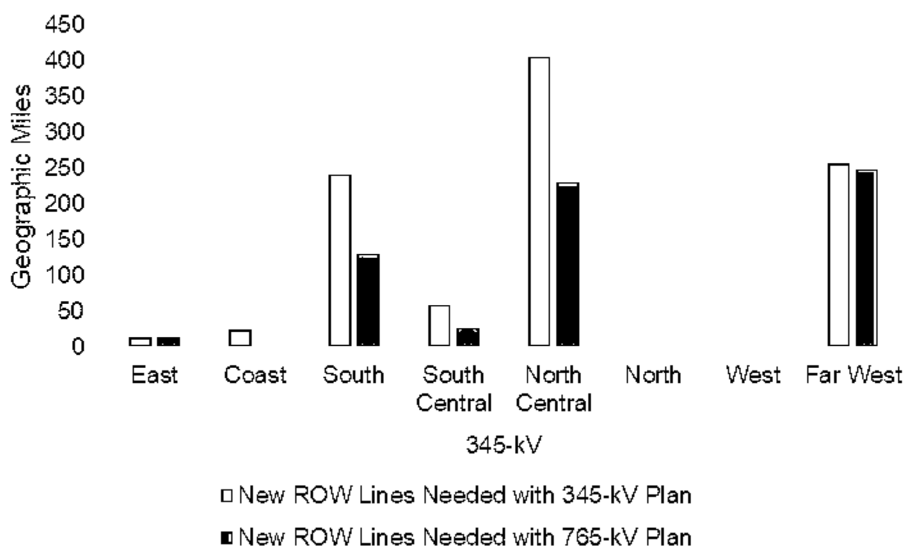

Figure A1.4: Comparison of New 345-kV ROW in Addition to Import Paths between 345-kV and 765-kV Plans – Including Permian Basin Local Projects

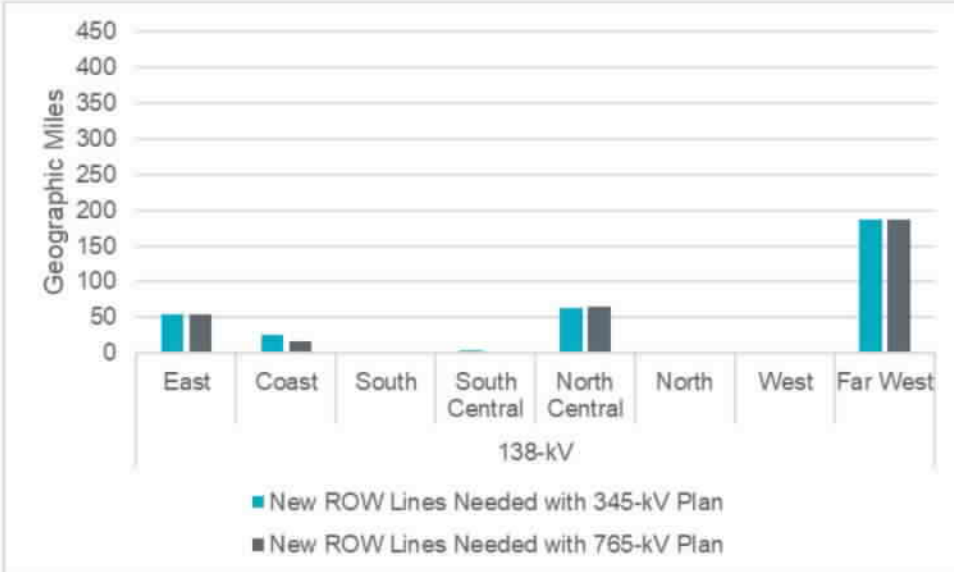

Figure A1.5: Comparison of New 138-kV ROW between 345-kV and 765-kV Plans – Including Permian Basin Local Projects

Table A1.1 Comparison of 345-kV Line Needs in Addition to Import Paths – Including Permian Basin Projects

	345-kV Existing Line Upgrade Miles		**345-kV New ROW Miles**	
	345-kV Plan	765-kV Plan	345-kV Plan	765-kV Plan
East	239	120	13	13
Coast	154	134	25	2
Southern	164	21	241	129
South Central	400	110	58	26
North Central	689	440	404	230
North	46	46	0	0
West	0	0	0	0
Far West	221	194	256	248
TOTALS	**1,913**	**1,065**	**997**	**648**
		-848		**-349**
	765-kV Plan upgrades 848 fewer 345-kV existing line miles		**765-kV Plan adds 349 fewer 345-kV new ROW miles**	

Table A1.2 Comparison of 138-kV Line Needs – Including Permian Basin Projects

	138-kV Existing Line Upgrade Miles		138-kV New ROW Miles	
	345-kV Plan	765-kV Plan	345-kV Plan	765-kV Plan
East	83	59	55	55
Coast	249	185	26	16
Southern	123	136	1	1
South Central	239	127	4	0
North Central	404	313	63	66
North	179	158	0	0
West	129	64	0	0
Far West	308	245	186	186
TOTALS	**1,714**	**1,287**	**335**	**324**
		-427		**-11**
	765-kV Plan upgrades 427 fewer 138-kV existing line miles		**765-kV Plan adds 11 fewer 138-kV new ROW miles**	

Table A1.3 Comparison of 69-to-138-kV Line Conversion Needs – Including Permian Basin Projects

	Existing 69-to-138-kV Line Conversion Miles		69-kV New ROW Miles	
	345-kV Plan	765-kV Plan	345-kV Plan	765-kV Plan
East	0	0	0	0
Coast	74	31	0	0
Southern	53	0	0	0
South Central	22	0	0	0
North Central	78	26	0	0
North	26	26	0	0
West	105	100	0	0
Far West	289	263	0	0
TOTALS	**647**	**446**	**0**	**0**
		-201		**0**
	765-kV Plan converts 201 fewer 69-kV existing line miles to 138-kV		**No new ROW miles added**	

Appendix A.2

Comparisons between the 345-kV and 765-kV plans under the reduced load conditions are provided below in Figures A2.1 to A2.5 and Tables A2.1, A2.2, and A2.3.

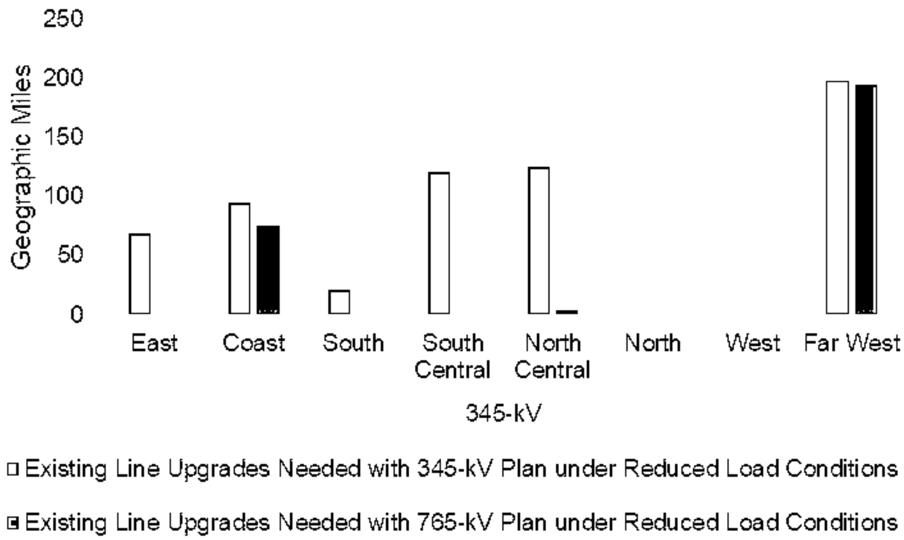

Figure A2.1: Comparison of Upgrades to Existing 345-kV Transmission Lines between 345-kV and 765-kV Plans under Reduced Load Conditions – Including Permian Basin Local Projects

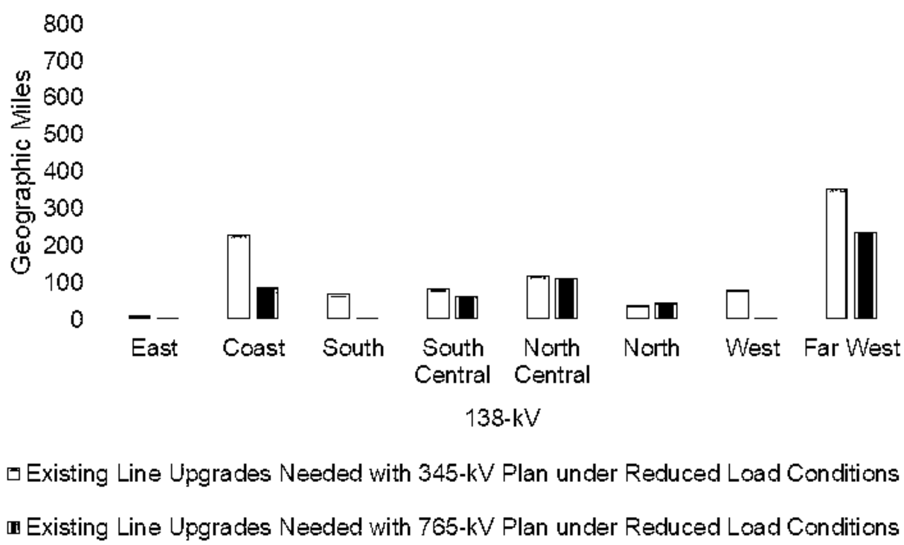

Figure A2.2: Comparison of Upgrades to Existing 138-kV Transmission Lines between 345-kV and 765-kV Plans under Reduced Load Conditions – Including Permian Basin Local Projects

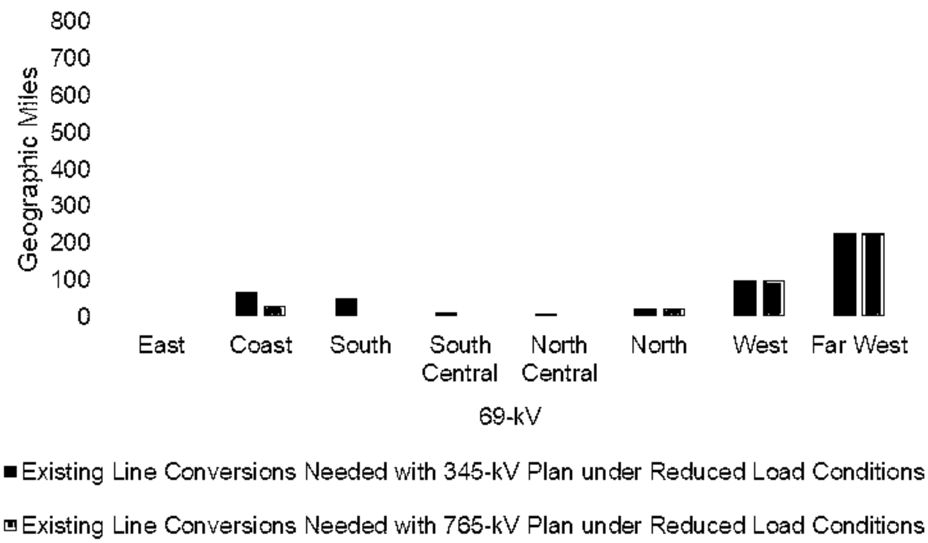

Figure A2.3: Comparison of 69-to-138-kV Conversions of Existing Transmission Lines between 345-kV and 765-kV Plans under Reduced Load Conditions – Including Permian Basin Local Projects

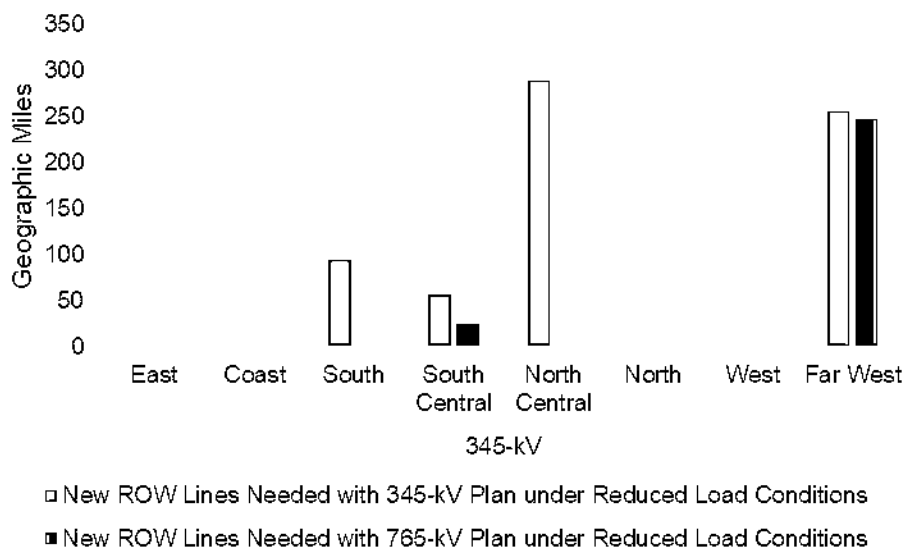

Figure A2.4: Comparison of New 345-kV ROW in addition to Import Paths between 345-kV and 765-kV Plans under Reduced Load Conditions – Including Permian Basin Local Projects

Figure A2.5: Comparison of New 138-kV ROW between 345-kV and 765-kV Plans under Reduced Load Conditions – Including Permian Basin Local Projects

Table A2.1 Comparison of 345-kV Line Needs on top of Import Paths under Reduced Load Conditions – Including Permian Basin Projects

	345-kV Existing Line Upgrade Miles		345-kV New ROW Miles	
	345-kV Plan	765-kV Plan	345-kV Plan	765-kV Plan
East	69	0	0	0
Coast	95	75	2	2
Southern	21	0	94	0
South Central	121	0	58	26
North Central	125	4	290	0
North	0	0	0	0
West	0	0	0	0
Far West	198	194	256	248
TOTALS	**629**	**273**	**700**	**276**
		-356		**-424**
	765-kV Plan upgrades 356 fewer 345-kV existing line miles		**765-kV Plan adds 424 fewer 345-kV new ROW miles**	

Table A2.2 Comparison of 138-kV Line Needs under Reduced Load Conditions – Including Permian Basin Projects

	138-kV Existing Line Upgrade Miles		138-kV New ROW Miles	
	345-kV Plan	765-kV Plan	345-kV Plan	765-kV Plan
East	11	4	0	0
Coast	231	87	26	0
Southern	72	6	1	0
South Central	87	64	0	0
North Central	121	111	5	5
North	40	48	0	0
West	81	5	0	0
Far West	355	236	186	186
TOTALS	**998**	**561**	**218**	**191**
		-437		**-27**
	765-kV Plan upgrades 437 fewer 138-kV existing line miles		**765-kV Plan adds 27 fewer 138-kV new ROW miles**	

Table A2.3 Comparison of 69-to-138-kV Line Conversion Needs Under Reduced Load Conditions – Including Permian Basin Projects

	Existing 69-to-138-kV Line Conversion Miles		69-kV New ROW Miles	
	345-kV Plan	765-kV Plan	345-kV Plan	765-kV Plan
East	0	0	0	0
Coast	68	31	0	0
Southern	53	0	0	0
South Central	15	0	0	0
North Central	11	5	0	0
North	26	26	0	0
West	100	100	0	0
Far West	230	230	0	0
TOTALS	**503**	**392**	**0**	**0**
		111		**0**
	765-kV Plan converts 111 fewer 69-kV existing line miles to 138-kV		**No new ROW miles added**	