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PUC PROJECT NO. 55718

RELIABILITY PLAN FOR THE	**§**	**PUBLIC UTILITY COMMISSION**
	§	
PERMIAN BASIN UNDER PURA §39.167	**§**	**OF TEXAS**

The Texas Energy Buyers Alliance (TEBA) represents the collective voice of more than 260 companies, representing some of the state's largest employers and energy customers. In total, TEBA members represent more than $20 trillion in market capitalization and hundreds of thousands of employees in Texas. Our organization is focused on helping to shape Texas' electricity market redesign in ways that propel Texas' economy forward, lower power bills for all energy customers, create jobs, spur innovation, strengthen the ERCOT grid, and extend Texas' energy leadership through the energy transition and for generations to come.

Many TEBA companies located their businesses in Texas in part because of its dependable business environment and open energy markets — including low-cost, increasingly clean, reliable power, and the ability to freely choose and procure it without unnecessary regulations or red tape. TEBA members believe reliable, clean, affordable energy is good for business, and that what's good for business is good for Texas.

TEBA, and one of its members investing in Texas, Google, sponsored this analysis from Siemens PTI. Please refer to this initial fact sheet in support of the study.

What the study did: Conduct a Cost Benefit Analysis of a 765-kv and 345-kV transmission system build-out.

Context: Based on building generation resources that are the fastest and cheapest to build, there is a geographic disconnect between where generation is expected to go and where demand is expected to locate, indicating an urgent need for new transmission infrastructure to move the power needed to meet demand growth.

Topline: The study shows that a 765 kV system outperforms the 345 kV option, *even with a conservative load forecast.*

- Both ERCOT and Siemens PTI analyses confirm that a 765-kV system outperforms the 345-kV option even with a conservative load forecast [109 GW system peak by 2034 and 115 GW by 2039].
- Siemens PTI's analysis shows even lower overall costs to consumers across all categories, further strengthening the case for 765-kV development (see table below).
- The 765 kV system avoids hundreds of millions in costs, both by 2034 and 2039.
- Even though the 765 kV system costs slightly more to construct, [$4.27B vs $4.1B], lower production costs, lower consumer energy costs, and dramatically reduced congestion rents, means ***better cost to benefit ratios for 765-kV over 345-kV***, driven by the ability of 765 kV lines to deliver more low-cost energy into high-demand areas.
- The increased demand from the large load forecast is expected to be met from numerous generation types, including thousands of megawatts of new combustion turbines, batteries, solar, and wind.
- Critically, 765-kV provides a better means to manage the geographic disconnect between new generation and new load.

765-kV Outperforms 345-kV Across Key Metrics in Both ERCOT and Siemens PTI's Analyses

		ERCOT RTP Analysis			Siemens PTI Analysis		
Attributes	**Metric**	**765-kV**	**345-kV**	**Difference**	**765-kV**	**345-kV**	**Difference**
Production Cost	2034 (M$)	16,836	16,969	133	15,137	15,508	370
	2039 (M$)	19,059	19,088	28	15,982	16,471	941
Consumer Energy Cost	2034 (M$)	18,279	18,143	-136	13,518	14,323	805
	2039 (M$)	21,914	22,143	229	15,434	16,375	941
Congestion Rent	2034 (M$)	1,444	1,539	94	469	1,386	917
	2039 (M$)	2,089	2,261	172	972	2,318	1,345

Additional conclusions:

- The 765-kV option demonstrates substantially greater improvement in West to East transfer capability compared to the 345-kV option (~1.46 GW higher).
- The 345 kV Transmission Scenario shows greater congestion, particularly affecting the South-Central Region, whereas the 765 kV Transmission Scenario largely addresses congestion affecting that region (by 2039).
- Total renewable energy curtailment drops to about half with 765-kV compared to 345-kV (from 2,990 MWh to 1,568 MWh), contributing to lower production costs and congestion cost savings, which enhances grid efficiency and helps stabilize customer costs.
- In the 2039 765-kV results, the West GTC is no longer expected to be as limiting as it is today.

Siemens PTI

Cost Benefit Analysis of 765-kV Transmission Facilities in ERCOT

Prepared for: Google & TEBA

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Agenda

- Executive Summary
  - Background
  - Key Assumptions
  - Cost Benefit Analysis Results
- Appendix A - Assumptions
  - Load Scenarios
  - Generation
  - Natural Gas
  - Transmission Topology
- Appendix B - PV analysis
- Appendix C - ARR Calculation

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Executive Summary

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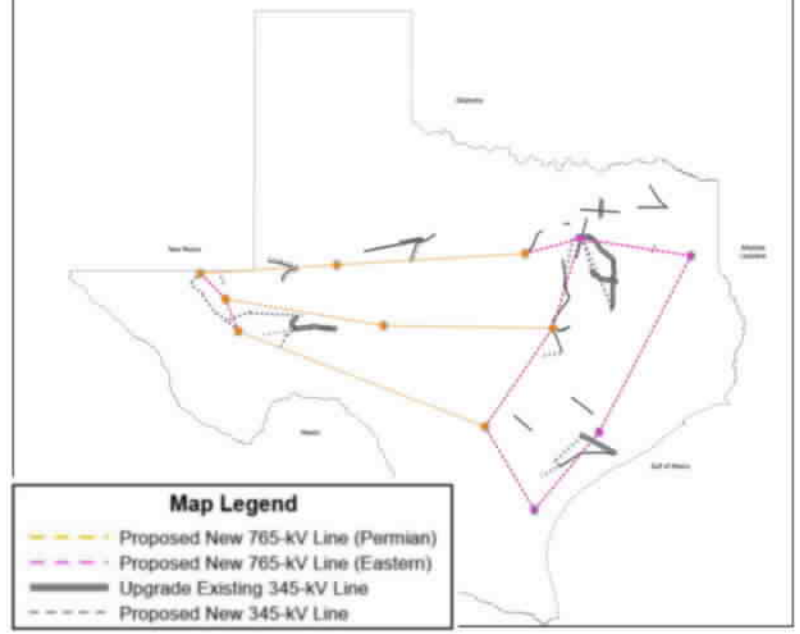
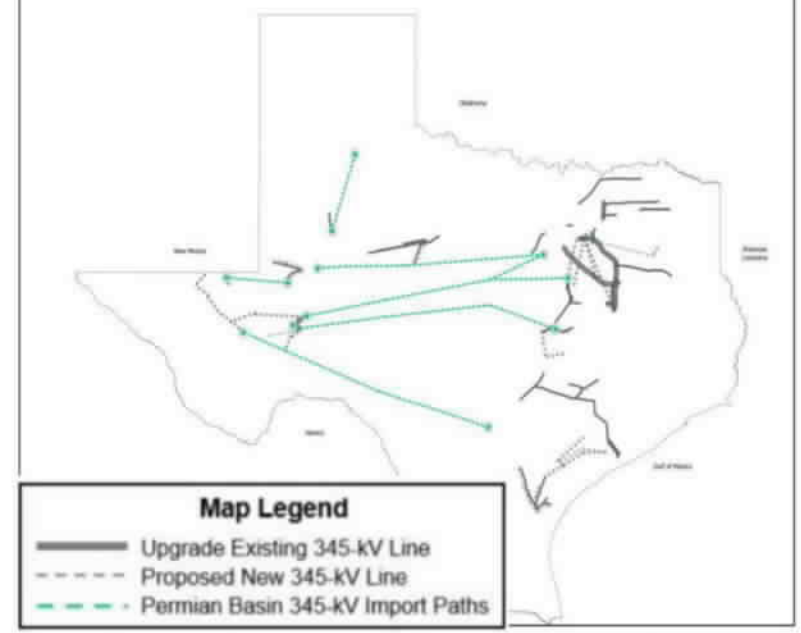
Background: Strategic Planning for a High-Growth Grid

- ERCOT is experiencing unprecedented load growth, with the 2030 summer peak demand projected to exceed 150 GW—driven by approximately 50 GW of large new loads, including:
  - Oil and gas electrification (especially in the Permian Basin)
  - Data centers, AI applications, and Crypto mining,
  - Hydrogen production and related industrial processes.
- In response, Google and the Texas Energy Buyers Alliance (TEBA) have engaged Siemens PTI to conduct a **cost-benefit analysis (CBA) of the potential 765-kV transmission buildout in ERCOT.**

765-kV Core Plan



345-kV Plan



Source: 2024 Regional Transmission Plan (RTP) 345-kV Plan and Texas 765-kV Strategic Transmission Expansion Plan Comparison.pdf

- As part of this study, Siemens PTI is evaluating the benefits of the **765-kV Core Plan**, designed to enhance long-distance power delivery from generation-rich western regions.
- A 345-kV alternative scenario is used as the counterfactual, leveraging the 2024 ERCOT Regional Transmission Plan (RTP) as the basis for comparison.

Study Assumptions

- This study aligns with ERCOT's 2024 Long-Term System Assessment (LTSA) and reflects the following planning scenarios:
- **Current Trends Scenario:** Reflects ERCOT's baseline outlook with moderate economic and demand growth, reflecting historical trends and expected economic expansion.
- **High Large Load Adoption Scenario:** Includes over 70 GW of new load from TSP forecasts, driven by cryptomining, hydrogen, and data centers.

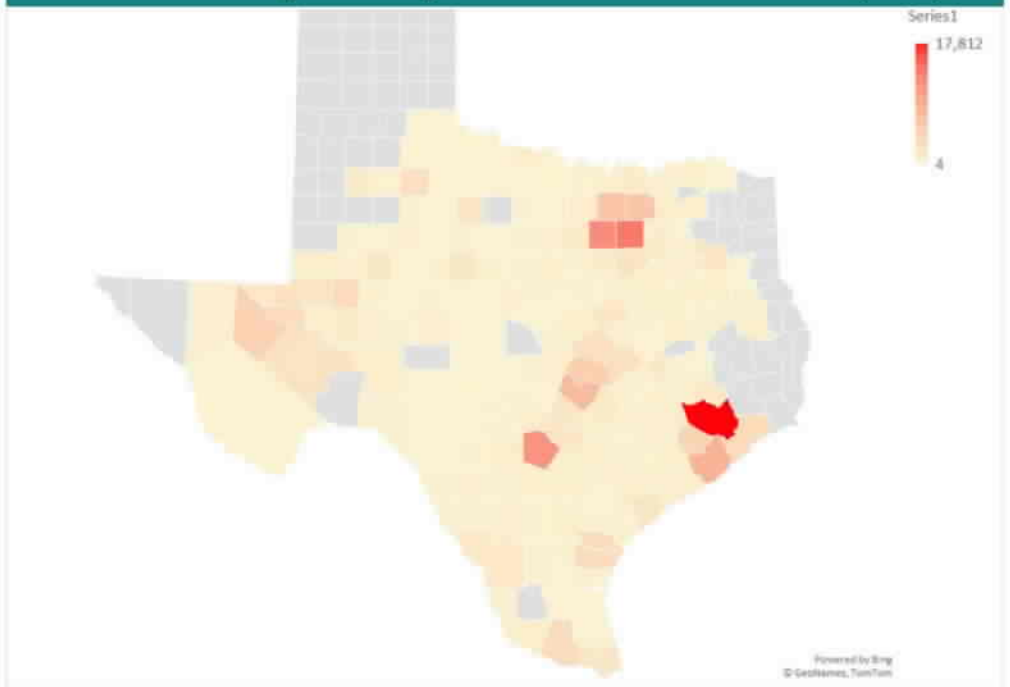
Status: The current analysis focuses on the Current Trends Scenario. The High Large Load Adoption Scenario is under development and expected to be finalized within 3–5 days.

Input	Scenario	Source	2034	2039
Load	Current Trends	LTSA	109-GW	115-GW
	High Large Load Adoption	LTSA Mapping: RPG (155-GW modeled)	144-GW	186-GW (31-GW unmapped: allocate ¼ to CNP, ¾ Oncor/AEP)
Capacity Additions	Current Trends	LTSA	57.9-GW	87.7-GW
	High Large Load Adoption	LTSA Mapping: RPG (246-GW modeled)	197-GW	285-GW (39-GW unmapped: allocate to strong 345-kV buses)
Natural Gas Price	All Scenarios	HH: EIA 2023 AEO Basis: Siemens PTI	$3.67/MMBTU (2024)	$4.15/MMBTU (2024)
Transmission Topology	All Scenarios	RTP Cases	345-kV RTP (2038) 765-kV RTP STEP Case (2030)	345-kV RTP (2038) 765-kV RTP STEP Case (2030)

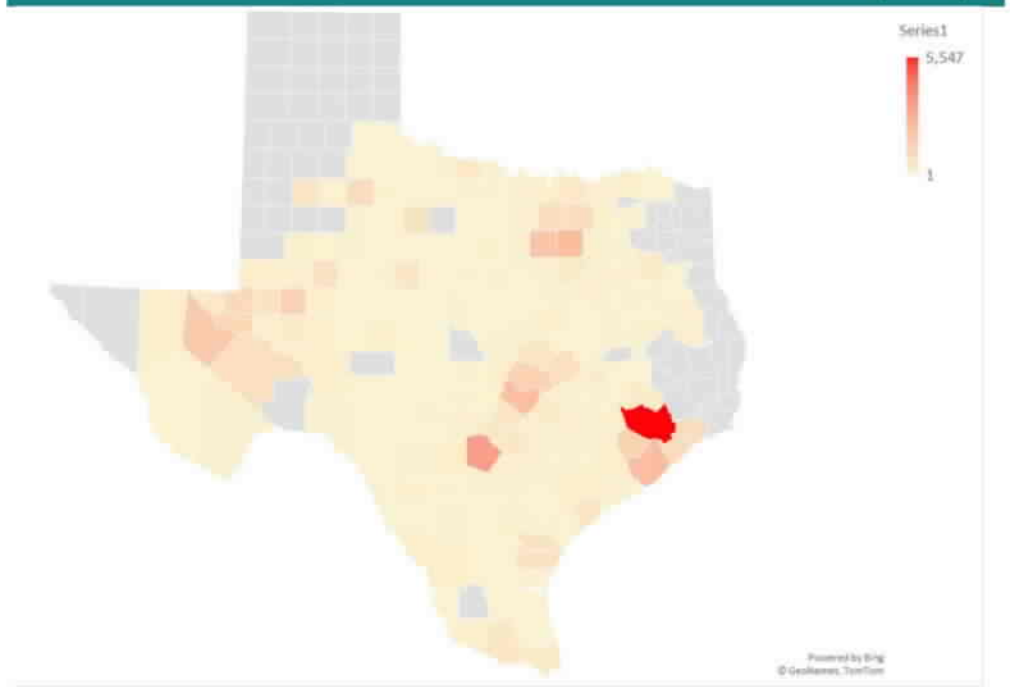
LTSA – Long-Term System Assessment (2024)
RTP – Regional Transmission Plan (2024)
RPG – Regional Planning Group

Regional Concentration of ERCOT Load and Growth

Peak Load by County – Current Trends 2039 (MW)



Peak Load Growth 2026-2039 – Current Trends (MW)

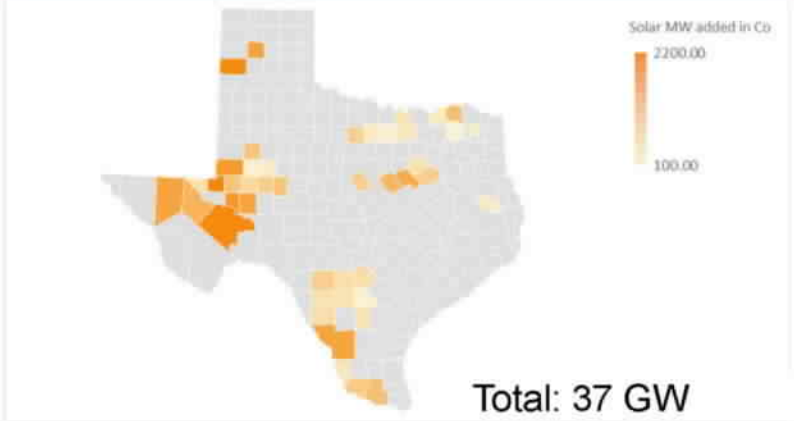


Key Insights:

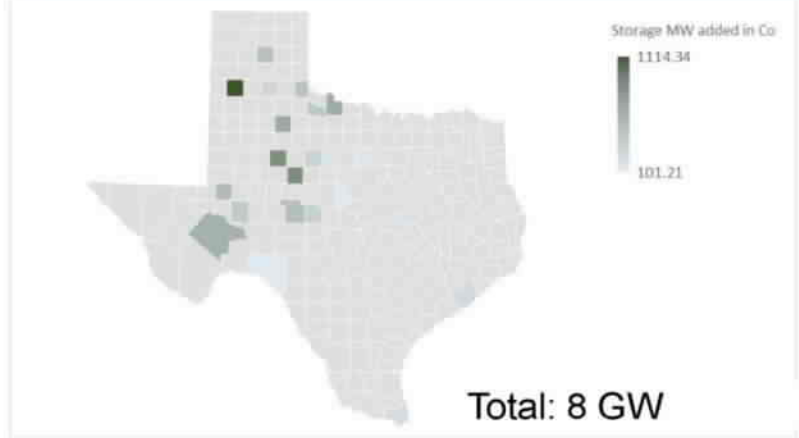
- By 2039, ONCOR, CNP, and AEP collectively account for 67% of ERCOT's peak load.
- North Central (Dallas), South Central (Austin/San Antonio), and Coast (Houston) regions contribute **52% of the total peak load** in 2039.
- Between 2026 and 2034, **63% of peak load growth** occurs in these three regions, while the **Permian Basin (Far West/West) accounts for approximately 13%.**

Current Trends Capacity Additions by 2039 – Key Trends

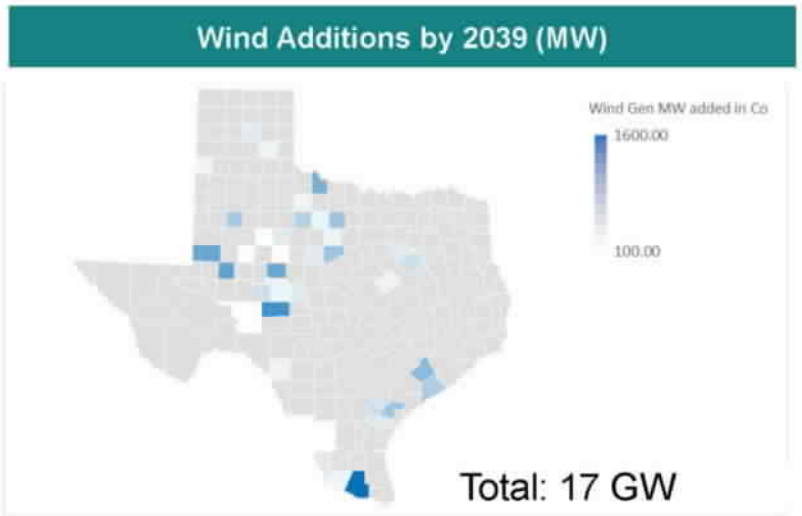
Solar Additions by 2039 (MW)



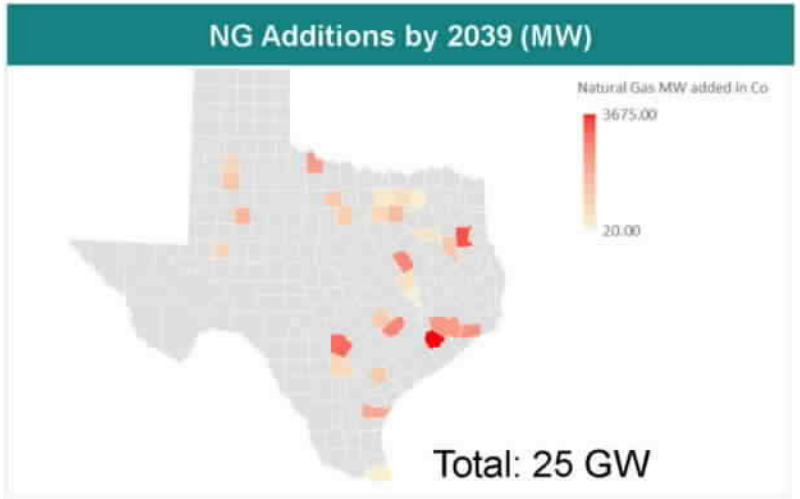
Storage Additions by 2039 (MW)



Wind Additions by 2039 (MW)



NG Additions by 2039 (MW)



Key Insights:

- Over 70% of new capacity by 2039 will come from renewables, with solar leading the growth.
- Solar and wind are being developed where resource conditions are strongest — primarily in West and North Texas.
- Major load growth is occurring in the North Central (Dallas), South Central (Austin/San Antonio), and Coast (Houston) regions (63% of peak load growth).
- **This geographic disconnect between generation and demand underscores the urgent need for new transmission infrastructure.**

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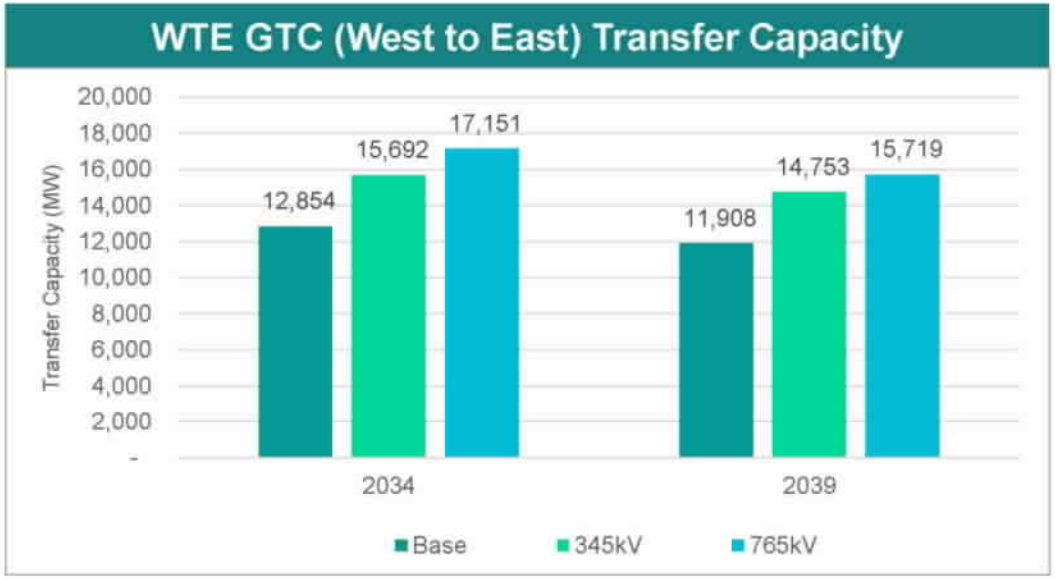
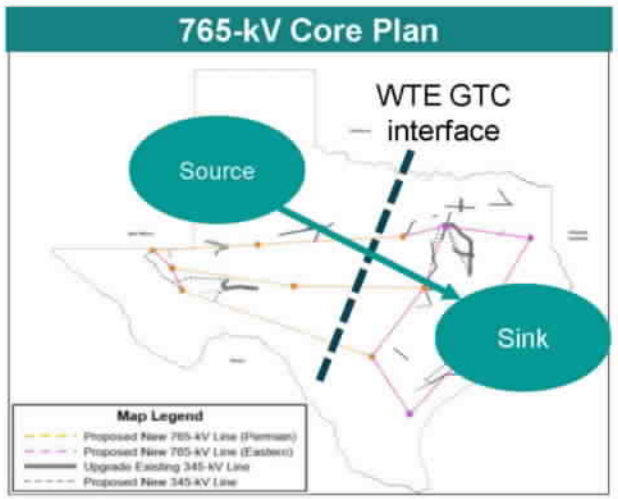
Steady-State Voltage Stability (PV Analysis): Enabling Low-Cost Power Transfer from West to East

- A Steady State Voltage Stability Analysis (PV analysis) was performed to analyze the WTE transfer capacity for all cases.
- For the study year 2034, results show an improvement of 2.8 GW (**22.1%**) in WTE GTC transfer capacity for 345-kV option and 4.3 GW (**33.4%**) for 765-kV core plan.
- The 765-kV option demonstrates substantially greater improvement in transfer capability compared to the 345-kV option **(~1.46 GW** higher).
- The results of year 2039 shows similar trends when using same topology but with higher load level modeled.



Study Year	Transfer Capacity (MW)			Delta (%) Compared to Base		Delta (MW) Compared to Base	
	Base	345kV	765kV	345kV	765kV	345kV	765kV
2034	12,854	15,692	17,151	22.1%	33.4%	2,838	4,297
2039	11,908	14,753	15,719	23.9%	32.0%	2,845	3,810



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765-kV Transmission Reduces ERCOT's Wind Curtailment from 7.4% to 3.1% in 2039 and Solar Curtailment from 6.2% to 4.2%

- Total energy curtailment (Solar + Wind) drops to about half with 765-kV compared to 345-kV (from 2,990 MWh to 1,568 MWh).
- ERCOT South sees the most important improvement, followed by North, but benefits extend across all zones.
- Wind curtailment alone decreases by 63%, contributing to lower production and congestion costs.
- Reduced curtailment enhances grid efficiency, supports renewables integration, and helps stabilize customer costs.
- The 2034 results show identical trend.

Current Trends - 2039		Wind		Solar	
Region	Metric	765-kV	345-kV	765-kV	345-kV
ERCOT-Houston	Curtailment (%)	1.0%	0.0%	0.2%	0.1%
ERCOT-North	Curtailment (%)	1.4%	1.9%	1.1%	3.7%
ERCOT-South	Curtailment (%)	4.8%	14.8%	4.1%	6.6%
ERCOT-West	Curtailment (%)	3.0%	6.0%	8.2%	9.2%
Total	**Curtailment (%)**	**3.1%**	**7.4%**	**4.2%**	**6.2%**
	Curtailed Energy (MWh)	**752**	**1,779**	**817**	**1,211**

Current Trends - 2034		Wind		Solar	
Region	Metric	765-kV	345-kV	765-kV	345-kV
ERCOT-Houston	Curtailment (%)	1.9%	0%	0.8%	0.1%
ERCOT-North	Curtailment (%)	1.4%	0.8%	0.7%	2.5%
ERCOT-South	Curtailment (%)	3.9%	13.7%	4.00%	6.9%
ERCOT-West	Curtailment (%)	2.6%	5.6%	7.9%	7.1%
Total	**Curtailment (%)**	**2.6%**	**7.1%**	**3.9%**	**5.3%**
	Curtailed Energy (MWh)	**579**	**1,552**	**665**	**901**

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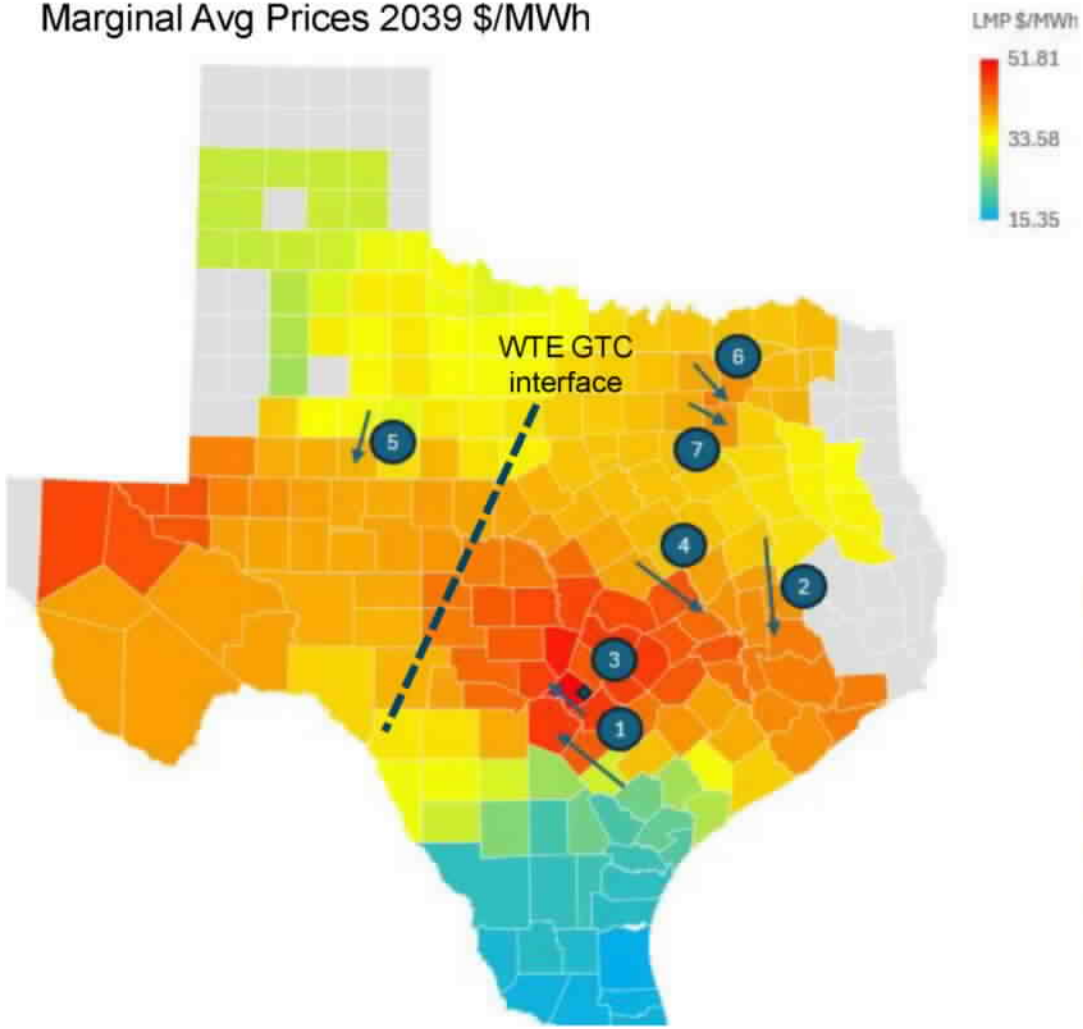
The 345 kV Transmission Scenario shows important Congestion particularly affecting the South-Central Region (2039 results)

Marginal Avg Prices 2039 $/MWh



- **South Central emerges as the congestion hotspot:** 4 of the 6 most congested lines in the 345-kV scenario affect this region.
- **The average LMPs also reflect this**. The lowest LMPs are in the south zone and facility #1 in the list (the most congested) and facility #3 constrain the transfer.
- The lower LMPs and associated generation the north and panhandle also limited to reach the load due to transmission constraints.
- The WT-GTC appears also to be binding

	345-kV Top Congested Branches - Current Trends 2039				
	From Bus	To Bus	From Zone	To Zone	Congestion
1	5400 [SPRUCE] 345kV	5725 [PAWNEESW5] 345kV	SOUTH_CE	SOUTH_CE	$ 546.28
2	3390 [JEWETT_S5] 345kV	44645 [SNGLTN__B345] 345kV	EAST	EAST	$ 171.27
3	7770 [L_BERGHE5] 345kV	345/138 kV transformer	SOUTH_CE	SOUTH_CE	$ 167.62
4	3687 [BELL_E_5] 345kV	13429 [SAND_TXU_5] 345kV	NORTH_CE	SOUTH_CE	$ 163.35
5	10049 [RANGER_5] 345kV	11048 [TONKAWAW_5] 345kV	NORTH_CE	WEST	$ 153.66
6	1685 [FARMVLSW_5] 345kV	2461 [ROYSE_N5] 345kV	NORTH_CE	NORTH_CE	$ 118.31
7	2432 [TRICRN1_5] 345kV	2437 [FRNY1_5] 345kV	NORTH_CE	NORTH_CE	$ 114.48
	Total Congestion top 20 facilities 345 kV Case				**$ 2,142.89**

To and From buses do not indicate flow direction

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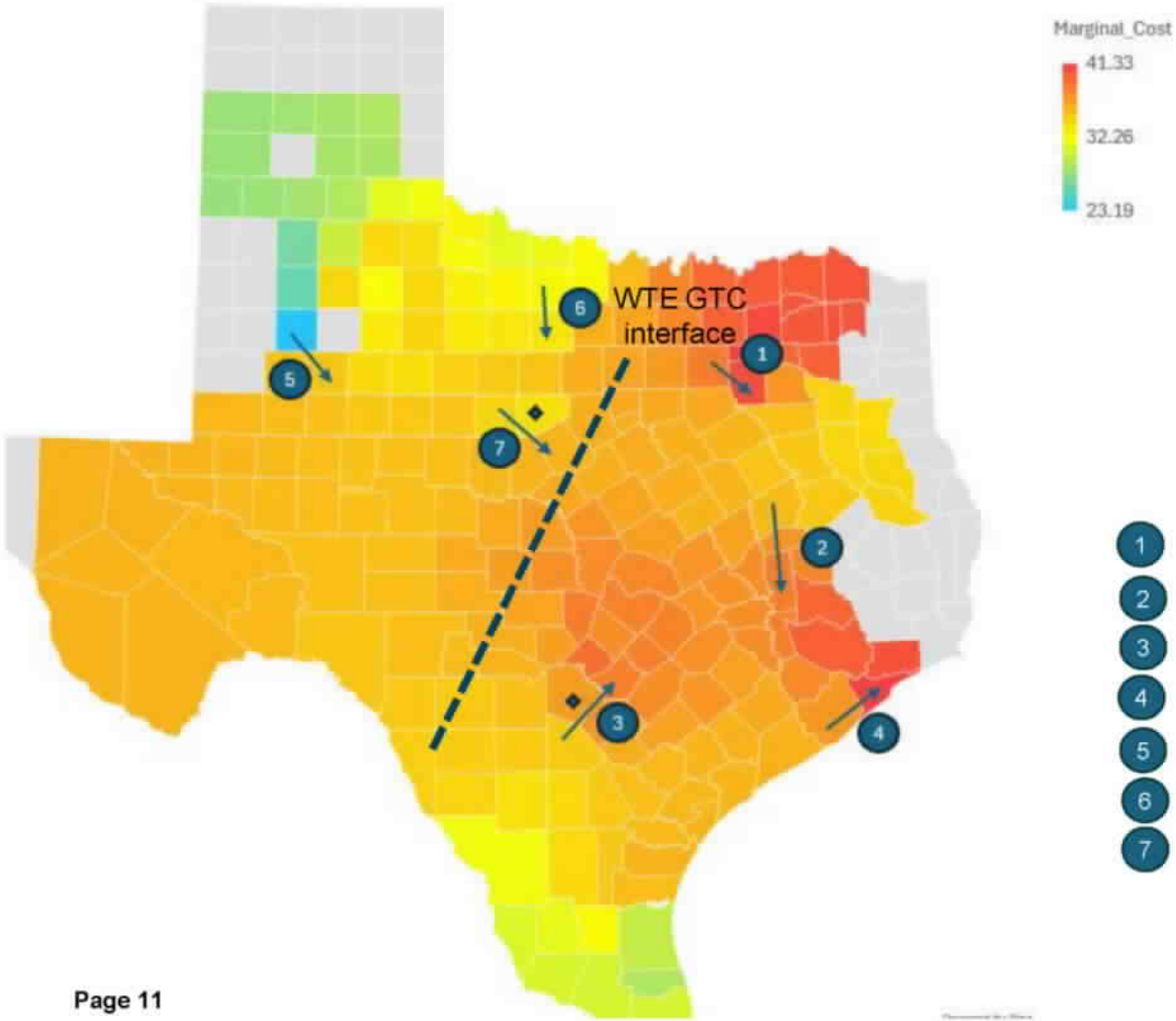
The 765 kV Transmission Scenario largely addresses the congestion affecting the South-Central Region (2039 results)

Marginal Avg Prices 2039 $/MWh



- The 765 kV option, diminishes system-wide congestion, especially in the South-Central Zone, mitigating the major transmission bottlenecks.
- **Again, the average LMPs also reflect this**. The LMPs are in a narrower range reflecting lower congestion.
- With 765 kV Option the Texas Panhandle shows similar levels of constraint as the south zone and the identified constraints reflect this.
- The WT-GTC appears be only weakly binding
- The 2034 results show the same trend

	765 kV Top Congested Branches - Current Trends 2039				
	From Bus	to Bus	From Zone	To Zone	Congestion
1	2432 [TRICRN1_5] 345kV	2437 [FRNY1_5] 345kV	NORTH_CE	NORTH_CE	$ 146.02
2	3390 [JEWETT_S5] 345kV	44645 [SNGLTN__B345] 345kV	EAST	EAST	$ 120.47
3	5056 [CAGNON_5] 345kV	5211 [HILLCTY_5] 345kV	SOUTH_CE	SOUTH_CE	$ 117.88
4	42000 [P_H_R__B345] 345kV	43030 [MEADOW_B345] 345kV	COAST	COAST	$ 114.40
5	23924 [FARMLAND_5] 345kV	888856 [HOLLY_POI] 345kV	FAR_WEST	SOUTH_CE	$ 110.98
6	1430 [GRHAMSES1_] 345kV	17002 [GARVEYRD_5] 345kV	NORTH_CE	NORTH	$ 64.12
7	68010 [ROMNEY1_W] 345kV	68020 [ROMNEY1_E] 345kV	NORTH_CE	NORTH_CE	$ 57.73
	Total Congestion top 20 facilities 345 kV Case				**$ 926.82**

To and From buses do not indicate flow direction

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CBA Highlights Strong Economic and System Value of 765-kV Transmission System

- **Affordability:** 765-kV infrastructure delivers lower production costs, lower consumer energy costs, and dramatically reduced congestion rents driven by the ability of 765 kV lines to deliver more low-cost energy into high-demand areas.
- **Sustainability:** Greater access to renewable energy under 765-kV reduces reliance on fossil fuels and curtailment, with potential for meaningful emissions reductions.
- **Reliability:** TBD

			Current Trends		
	Attributes	**Metric**	**765-kV**	**345-kV**	**CBA (Δ/ΔARR)***
Affordability	Production Cost	2034 (M$)	15,137	15,508	2.1
		2039 (M$)	15,982	16,471	2.8
	Consumer Energy Cost	2034 (M$)	13,518	14,323	4.6
		2039 (M$)	15,434	16,375	5.4
	Congestion Rent	2034 (M$)	469	1,386	5.0
		2039 (M$)	972	2,318	7.7
	Generator Revenue	2034 (M$)	22,486	23,353	5.3
		2039 (M$)	25,251	26,280	5.9
Sustainability	Emissions	Total from 2034-2039 (millions tCO_2)	774	801	NA
Reliability	Resource Adequacy	Expected Unserved Energy	TBD	TBD	NA
	Resilience	Low Probability High Impact Event	TBD	TBD	NA

$$\mathrm{CBA}_{\mathrm{metric}} = \frac{\mathrm{Value}_{345} - \mathrm{Value}_{765}}{\mathrm{ARR}_{765} - \mathrm{ARR}_{345}}$$

*ARR: Annual Revenue Requirements or annualized cost for capital investments. More detail in Appendix C.

765-kV Outperforms 345-kV Across Key Metrics in Both ERCOT and Siemens PTI's Analyses

- Both ERCOT and Siemens PTI analyses confirm that a 765-kV system outperforms the 345-kV option even under the Current Trends Scenario, which represents a conservative load forecast.
- Siemens PTI's analysis shows even greater cost savings across all categories, further strengthening the case for 765-kV development.

		ERCOT RTP Analysis			Siemens PTI Analysis		
Attributes	**Metric**	**765-kV**	**345-kV**	**Difference**	**765-kV**	**345-kV**	**Difference**
Production Cost	2034 (M$)	16,836	16,969	133	15,137	15,508	370
	2039 (M$)	19,059	19,088	28	15,982	16,471	941
Consumer Energy Cost	2034 (M$)	18,279	18,143	-136	13,518	14,323	805
	2039 (M$)	21,914	22,143	229	15,434	16,375	941
Congestion Rent	2034 (M$)	1,444	1,539	94	469	1,386	917
	2039 (M$)	2,089	2,261	172	972	2,318	1,345

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Appendix A - Assumptions

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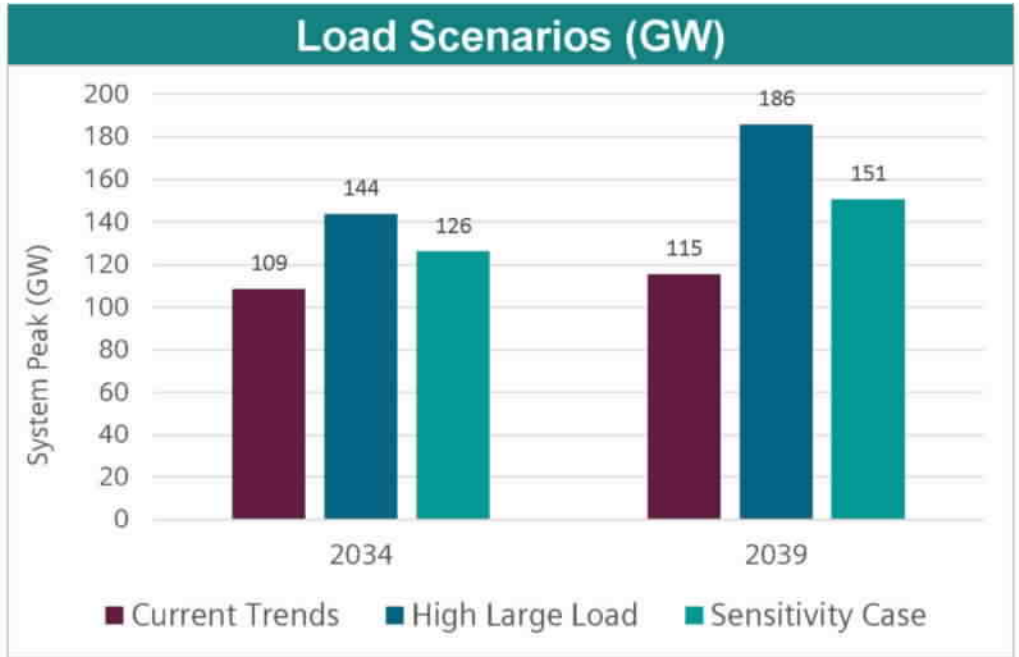
Assumptions Summary

Input	Scenario	Source	2034	2039
Load	Current Trends	LTSA	109-GW	115-GW
	High Large Load Adoption	LTSA Mapping: RPG (155-GW modeled)	144-GW	186-GW (31-GW unmapped: allocate ¼ to CNP, ¾ Oncor/AEP)
	Sensitivity Case	RTP Mapping: RPG (155-GW modeled)	126-GW	151-GW
Capacity Additions	Current Trends	LTSA	57.9-GW	87.7-GW
	High Large Load Adoption	LTSA Mapping: RPG (246-GW modeled)	197-GW	285-GW (39-GW unmapped: allocate to strong 345-kV buses)
	Sensitivity Case	Mapping: RPG (246-GW modeled)	TBD	TBD
Natural Gas Price	All Scenarios	HH: EIA 2023 AEO Basis: Siemens PTI	$3.67/MMBTU (2024)	$4.15/MMBTU (2024)
Transmission Topology	All Scenarios	RTP Cases	345-kV RTP (2030) 765-kV RTP STEP Case (2030)	345-kV RTP (2038) 765-kV RTP STEP Case (2030)

LTSA – Long-Term System Assessment (2024)
RTP – Regional Transmission Plan (2024)
RPG – Regional Planning Group

Load Scenarios

- Load Scenarios:
  - **Current Trends:** Represents ERCOT's moderate growth scenario from the LTSA, reflecting historical trends and expected economic expansion.
  - **High Large Load Adoption:** Assumes significant load growth beyond historical trends, incorporating TSP-submitted forecasts based on interconnection requests, industrial expansion, and economic growth. This scenario includes large flat demand (66 GW) and price-responsive load (4 GW LFL).
  - **Sensitivity Case:** A conservative alternative where only 50% of the projected load growth from TSPs is included in ERCOT's planning studies. This approach balances uncertainty in load materialization and prevents overestimating infrastructure needs.



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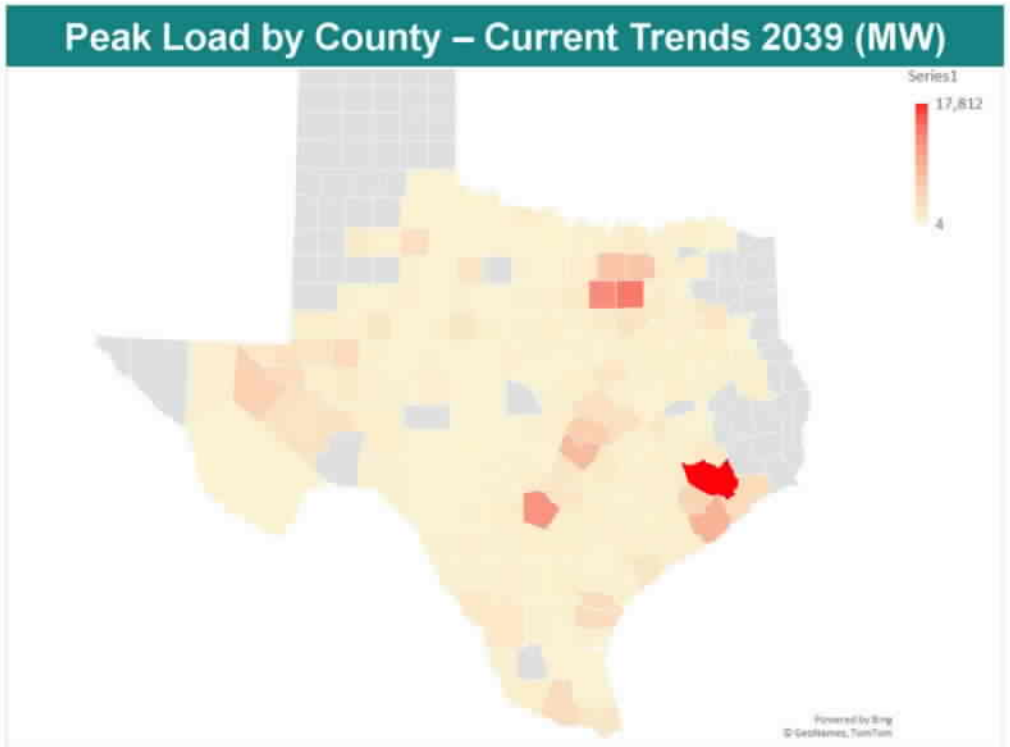
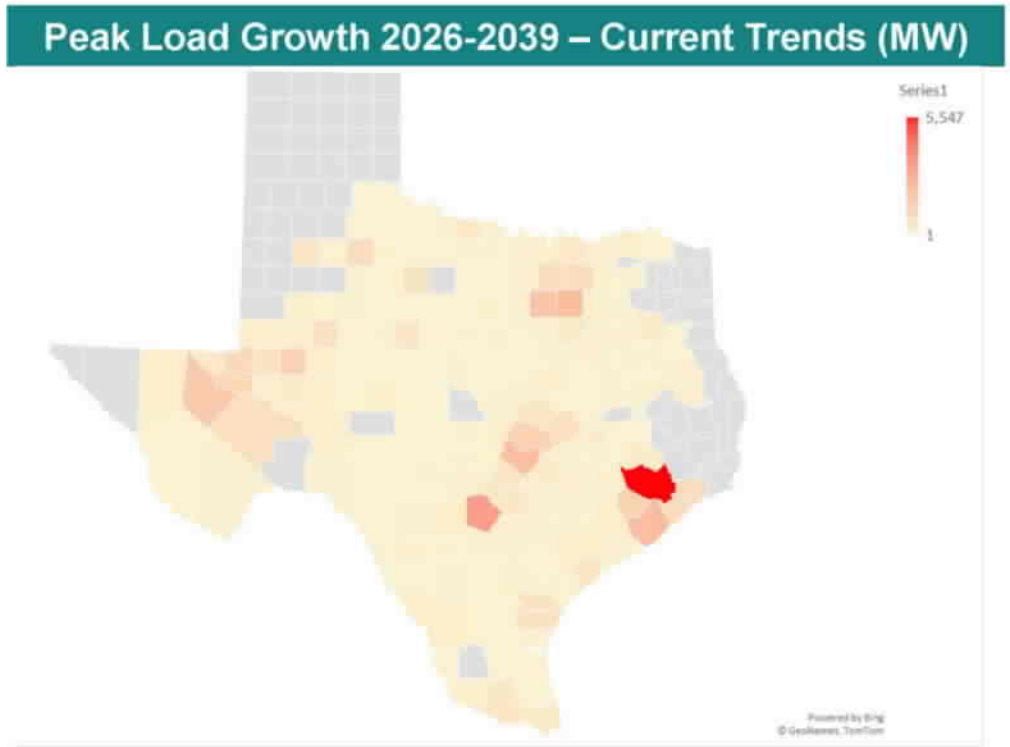
Load Distribution to the Nodal Level

Load Distribution:

- **Current Trends:** Detailed data at an hourly and nodal level allocations for 2034 and 2039 based on ERCOT's LTSA projections.
- **High Large Load Adoption:** Includes no detailed nodal allocation data, therefore we will use the RPG case to allocate to the nodal level, up to 155 GW.
    - Since CNP shows no growth in the Current Trends scenario, the necessary unmapped additional load in 2039 will be allocated as follows:
        - CNP: ¼ of the additional load
        - Oncor/AEP: ¾ of the additional load
- **Sensitivity Case:** Adjusts the 2034 and 2039 load distribution using the same allocation methodology as the High Large Load Adoption scenario.

Regional Concentration of ERCOT Load and Growth





Key Insights:

- By 2039, ONCOR, CNP, and AEP collectively account for 67% of ERCOT's peak load.
- North Central (Dallas), South Central (Austin/San Antonio), and Coast (Houston) regions contribute **52% of the total peak load** in 2039.
- Between 2026 and 2034, **63% of peak load growth** occurs in these three regions, while the **Permian Basin (Far West/West) accounts for approximately 13%.**

New Capacity Additions

Capacity Additions:

- New large load additions in the High Large Load Adoption scenario are expected to be primarily supplied by wind and solar, with solar additions projected to be 4x higher than in the Current Trends outlook.
- The largest capacity increase is expected from combustion turbines (CTs) to mitigate intermittency and support the 24/7 energy demands of large loads
- Mapping:
  - **Current Trends:** ERCOT provides capacity additions and mapping for Current Trends (2034 and 2039).
  - **High Large Load Adoption:** ERCOT's LTSA outlines total capacity additions, but Siemens PTI must perform mapping. As a starting point, Siemens will use the RPG case mappings (246 GW), which allocate capacity to strong 345-kV buses.
  - **Sensitivity Case:** TBD

New Capacity by 2034 (MW)		
Technology	**Current Trends**	**High Large Load**
Battery	9,748	23,095
Combined Cycle	9,747	17,328
CT & IC	6,162	52,140
Solar	19,951	84,056
Wind	12,300	20,400
Total	**57,908**	**197,019**

New Capacity by 2039 (MW)		
Technology	**Current Trends**	**High Large Load**
Battery	17,514	26,911
Combined Cycle	15,162	28,158
CT & IC	9,951	83,187
Solar	28,800	125,368
Wind	16,300	22,200
Total	**87,727**	**285,824**

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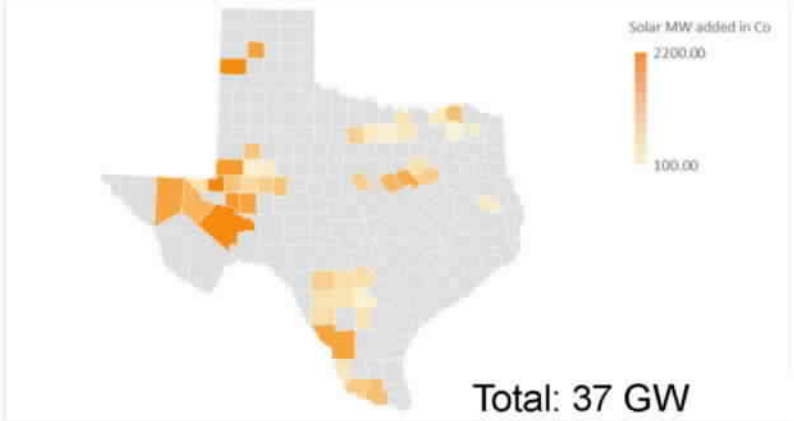
New Capacity Additions Mapping

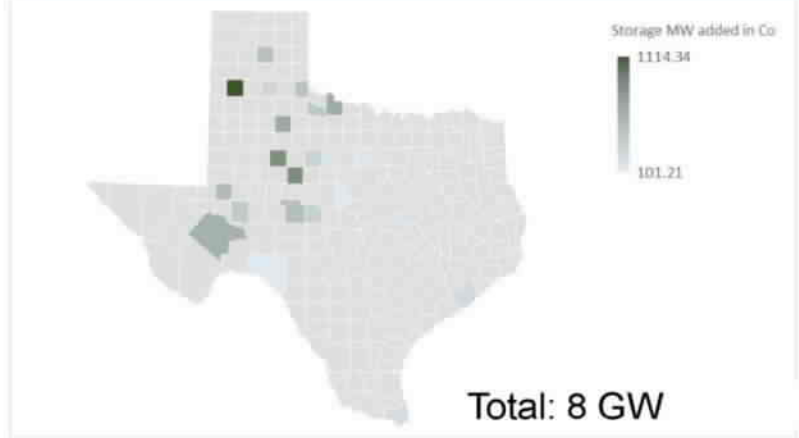
- Mapping:
  - **Current Trends:** ERCOT provides capacity additions and mapping for Current Trends (2034 and 2039).
  - **High Large Load Adoption:** ERCOT's LTSA outlines total capacity additions, but Siemens PTI must perform mapping. As a starting point, Siemens will use the RPG case mappings (246 GW), which allocate capacity to strong 345-kV buses.
  - **Sensitivity Case:** TBD

Current Trends Capacity Additions by 2039 – Key Trends

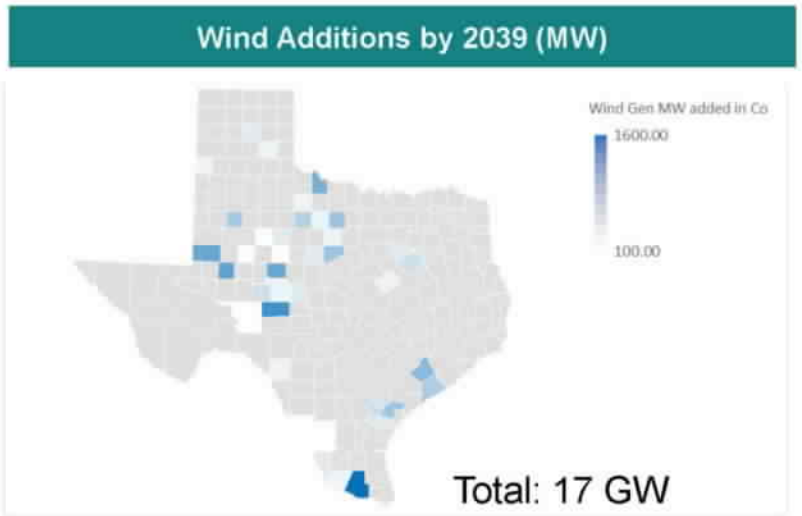
Solar Additions by 2039 (MW)



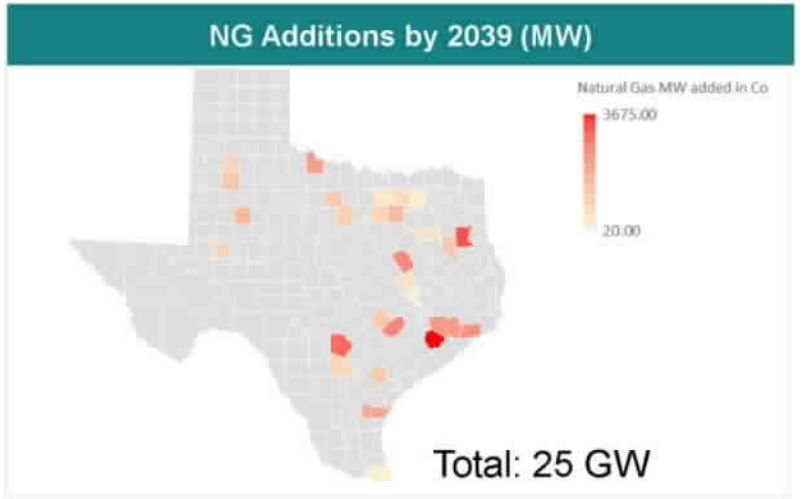
Storage Additions by 2039 (MW)



Wind Additions by 2039 (MW)



NG Additions by 2039 (MW)



Key Insights:

- Over 70% of new capacity by 2039 will come from renewables, with solar leading the growth.
- Solar and wind are being developed where resource conditions are strongest — primarily in West and North Texas.
- Major load growth is occurring in the Central and Coast.
- This geographic disconnect between generation and demand underscores the urgent need for new transmission infrastructure.

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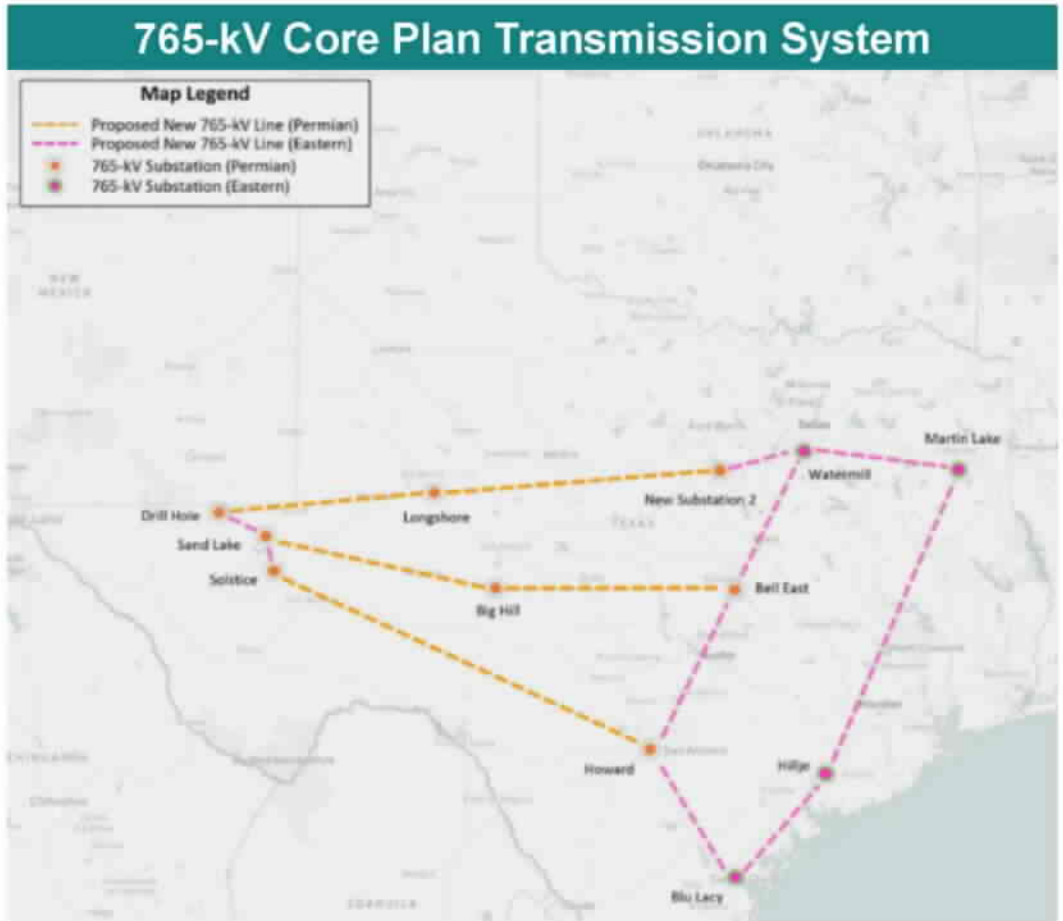
765-kV Topology

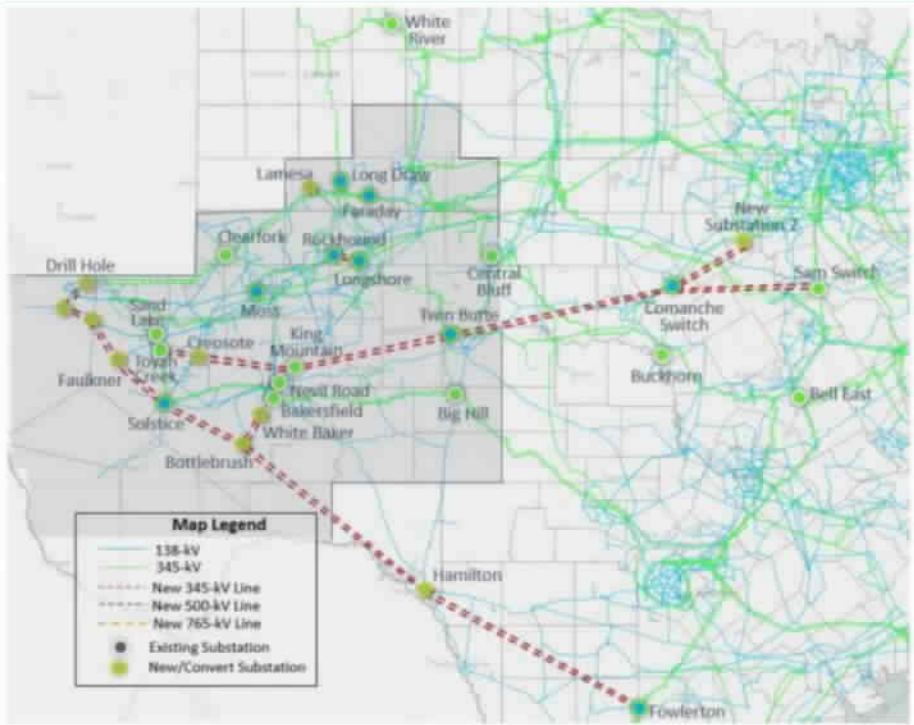
- Siemens PTI will use the 765-kV Core Plan based on 2030 Case as depicted in ERCOT's 2024 RTP.



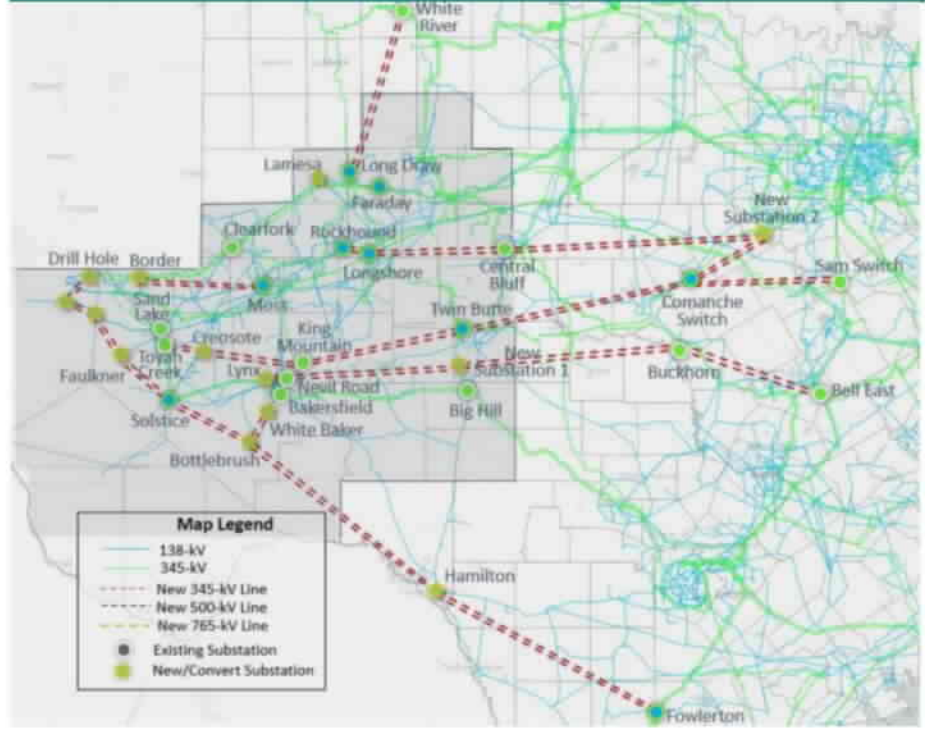
345-kV Topology

- Alternative Solution: 345-kV transmission reinforcements depicted below and obtained from recent ERCOT analyses (Permian Basin Reliability Plan Study, from Jul 2024, and the 2024 Regional Transmission Plan, from Dec 2024).
- The 2034 Case will be based on RTP plan for 2030 and 2039 will be based on 2038 Case.

345-kV Permian Basin Upgrades 2034

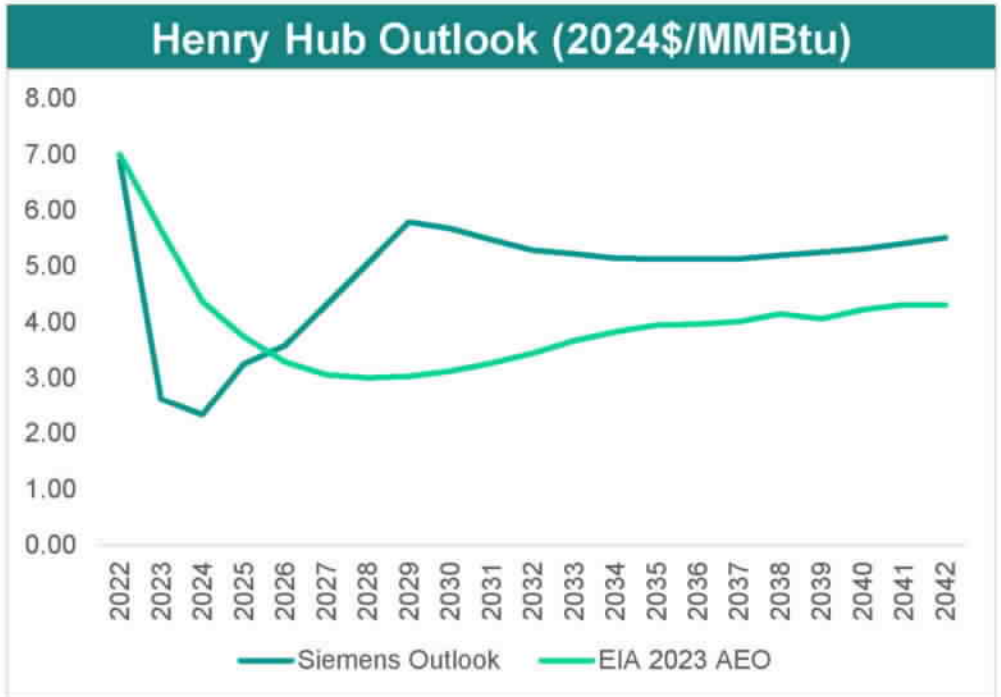


345-kV Permian Basin Upgrades 2039



Natural Gas Forecast

- As reported in their 2024 LTSA, ERCOT utilized the gas price outlook from the latest EIA Annual Energy Outlook (AEO)*
- Due to the fast-changing nature of the electric industry right now, EIA has decided to skip the 2024 AEO to focus on incorporating large changes within their modeling (such as new emerging technologies, etc.)
- Due to this, the latest available AEO was released in March 2023.
- Siemens PTI produces and regularly updates our gas outlooks via a fundamentals-based industry standard model, GPCM. which also incorporates recent forwards as of October 2024.
- **After careful consideration, we have collectively decided to use the EIA 2023 AEO, despite its outdated nature, as it remains more conservative and aligns with ERCOT's RTP study.**



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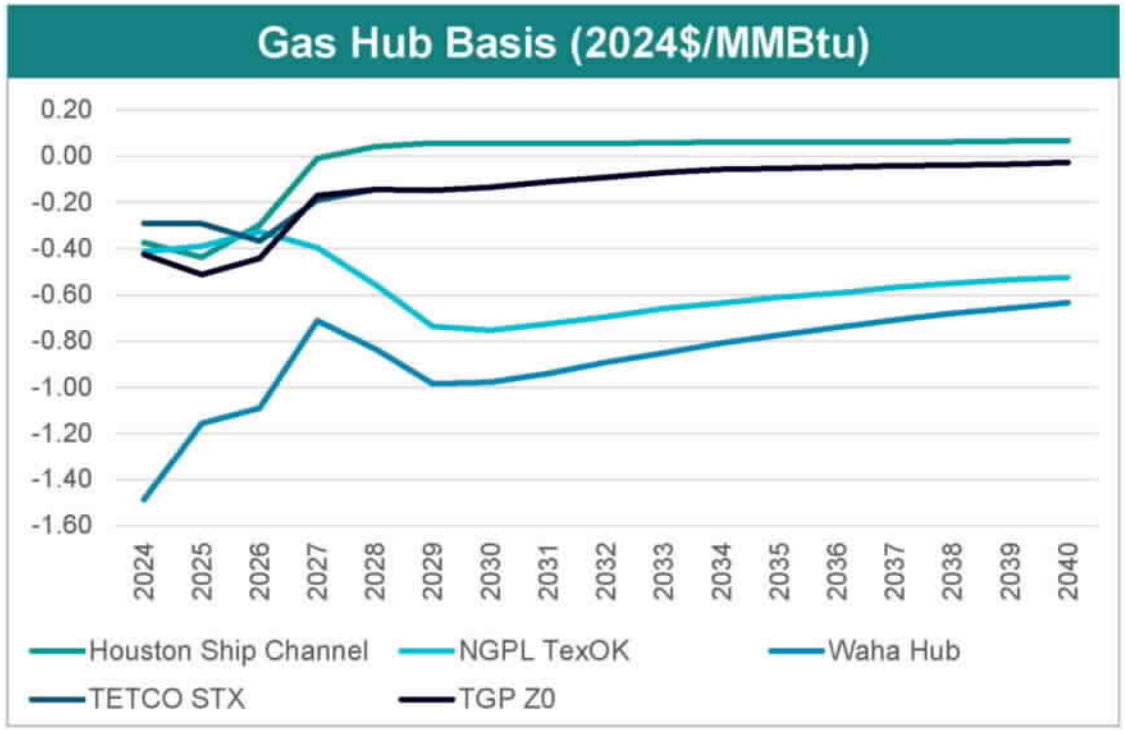
Natural Gas Basis

WAHA Hub Basis Insights

- WAHA hub often shows more volatility due to infrastructure constraints and pipeline bottlenecks in West Texas
- WAHA prices historically trade at a discount to Henry Hub due to transportation costs and regional supply imbalances.

Waha Future Expectations

- Anticipated to benefit from infrastructure upgrades, which are expected to reduce the differential with Henry Hub
- Various projects are expected to alleviate bottlenecks including:
  - Matternhorn Express Pipeline (operational as of late 2024)
  - Blackcomb Pipeline (expected 2026)
  - Hugh Brinson Pipeline (approved Q4 2024, operations expected 2026)



Note: Historical prices from Jan 2019 to September 2024. Reference case prices were developed using NYMEX forwards (Forwards are an average of 10/2/2024, 10/9/2024, and 10/16/2024). Forwards were used until March 2026 with hybrid of forwards and fundamentals until September 2027 and pure fundamentals thereafter.

Currently, less than 10% of the total gas capacity in ERCOT is utilizing the WAHA price point.

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Appendix B – PV Analysis

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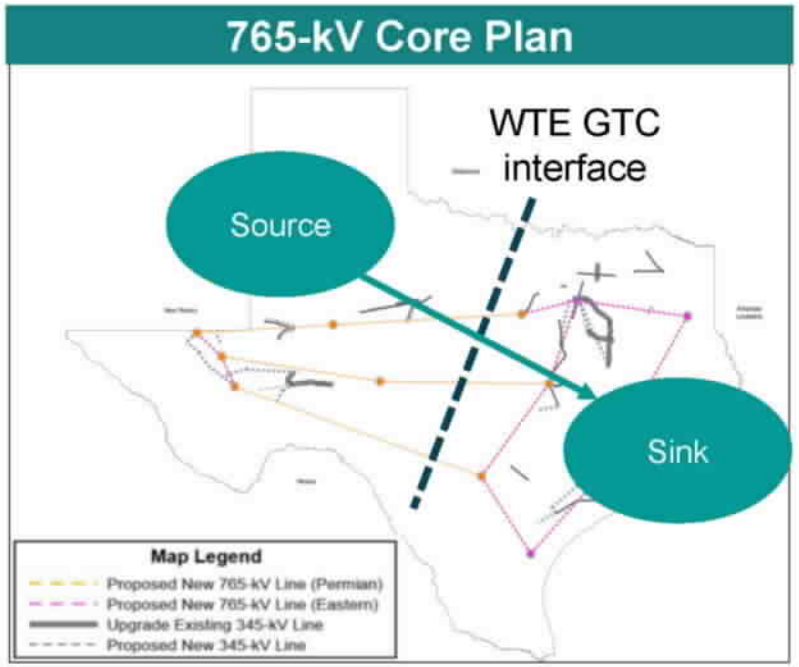
PV Analysis Conclusions

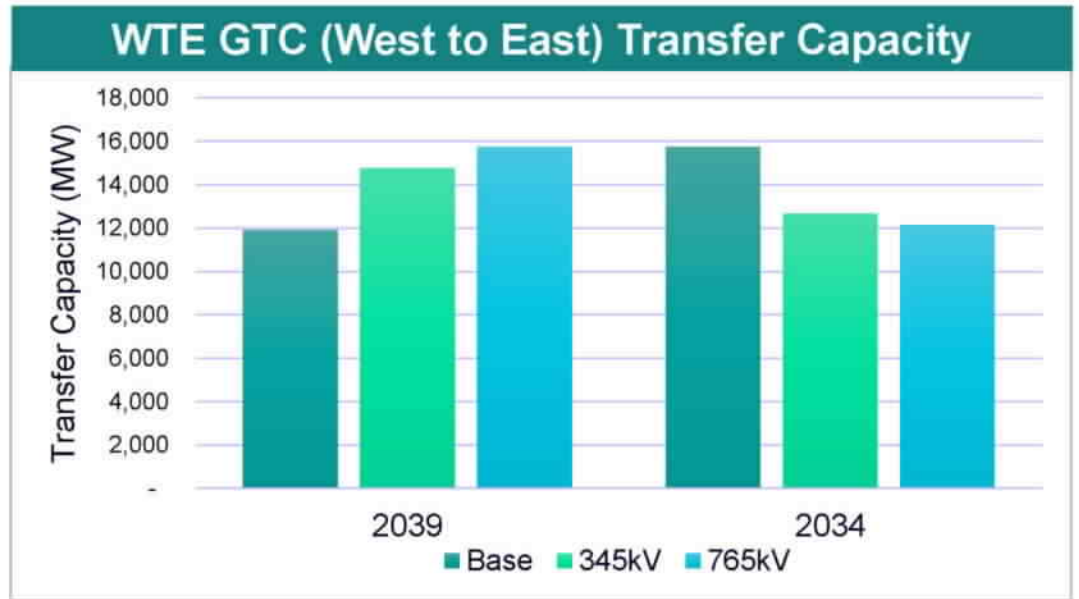
Methodology:

- Cases were adjusted based on ERCOT 2030 RTP cases to have a reasonable west to east flow in the WTE GTC interface:
  - ALL ERCOT coal and CT units were turned off
  - Partial East/Coastal CC units were turned off/ dispatched down
  - ERCOT loads were scaled down from 155 GW (in RTP cases) to 115 GW which aligns with 2039 current trend



Key Insights:

- For the study year 2039, results show an improvement of 2.8 GW (***23.9%)*** in WTE GTC transfer capacity for 345-kV option and 3.8 GW (***32%***) for 765-kV core plan.
- The 765-kV option demonstrates substantially greater improvement in transfer capability compared to the 345-kV option (***~1GW*** higher).
- The results of year 2034 shows similar trends when using same topology but with lower load level modeled.



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Appendix C - Economic Results

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Annual Revenue Requirements

- To evaluate the CBA of each transmission system (765-kV and 345-kV), we calculated the Annual Revenue Requirement (ARR) associated with each buildout.
- ARR provides a standardized annualized cost for capital investments,.
- We used the Capital Charge Rate (CCR) approach to annualize total capital costs.
- The CCR converts up-front capital costs into an equivalent annual cost.
- The total ARR includes:
  - Cost of capital (debt & equity)
  - Asset life (amortization schedule)
  - Depreciation schedule
  - Income taxes (federal & state)
  - Property taxes
  - Insurance
  - Fixed O&M

Annual Revenue Requirement	
765-kV ARR	4.278 B/year
365-kV ARR	4.102 B/year

Financial Assumptions		
Useful Life	40	years
Cost of Equity	13.0	%
Cost of Debt	7.3	%
Equity	40	%
Debt	60	%
Depreciation Annual Rate	2.50	%
WACC (Nominal After Tax)	8.66	%
Insurance and Admin	0.70	%
Tax Rate	21.0	%
Property Taxes	0.7	%
Capital Charge Rate (CCR)	12.6	%

Economic Assumptions		
CAPEX 765-kV	33.9	Billion
CAPEX 345-kV	32.55	Billion
765-kV Miles	2468	Miles
345-kV Miles	2673	Miles
Annual FOM (765-kV)	$8,000	Mile-year
Annual FOM (345-kV)	$5,000	Mile-year

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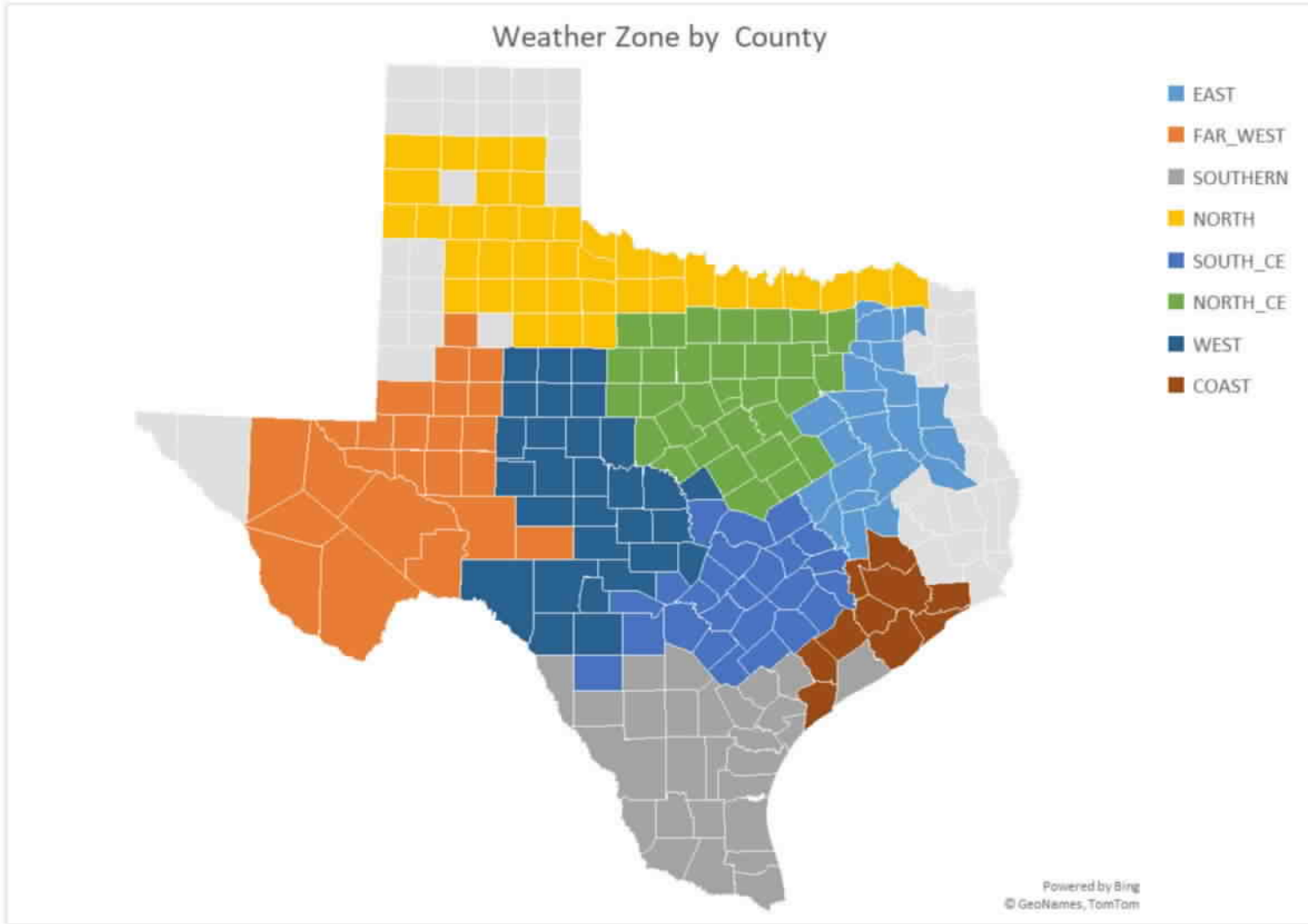
For further information:
https://www.siemens.com/us/en/products/energy/grid-software/pti-consulting.html

Weather Zone by County



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Study Assumptions Overview - Emphasizing High Load Outlook for Future Planning

- The assumptions of the study mimics the Current Trends and the High Large Load Adoption scenario from the 2024 LTSA
- **Current Trends Scenario:** Reflects ERCOT's baseline outlook with moderate economic and demand growth, reflecting historical trends and expected economic expansion.
- **High Large Load Adoption Scenario:** Includes over 70 GW of new load from TSP forecasts, driven by cryptomining, hydrogen, and data centers.

Input	Scenario	Source	2034	2039
Load	Current Trends	LTSA	109-GW	115-GW
	High Large Load Adoption	LTSA Mapping: RPG (155-GW modeled)	144-GW	186-GW (31-GW unmapped: allocate ¼ to CNP, ¾ Oncor/AEP)
	Sensitivity Case	RTP Mapping: RPG (155-GW modeled)	126-GW	151-GW
Capacity Additions	Current Trends	LTSA	57.9-GW	87.7-GW
	High Large Load Adoption	LTSA Mapping: RPG (246-GW modeled)	197-GW	285-GW (39-GW unmapped: allocate to strong 345-kV buses)
	Sensitivity Case	Mapping: RPG (246-GW modeled)	TBD	TBD
Natural Gas Price	All Scenarios	HH: EIA 2023 AEO Basis: Siemens PTI	$3.67/MMBTU (2024)	$4.15/MMBTU (2024)
Transmission Topology	All Scenarios	RTP Cases	345-kV RTP (2038) 765-kV RTP STEP Case (2030)	345-kV RTP (2038) 765-kV RTP STEP Case (2030)

LTSA – Long-Term System Assessment (2024)
RTP – Regional Transmission Plan (2024)
RPG – Regional Planning Group