2025 RTP Economic Study Results

ERCOT Staff
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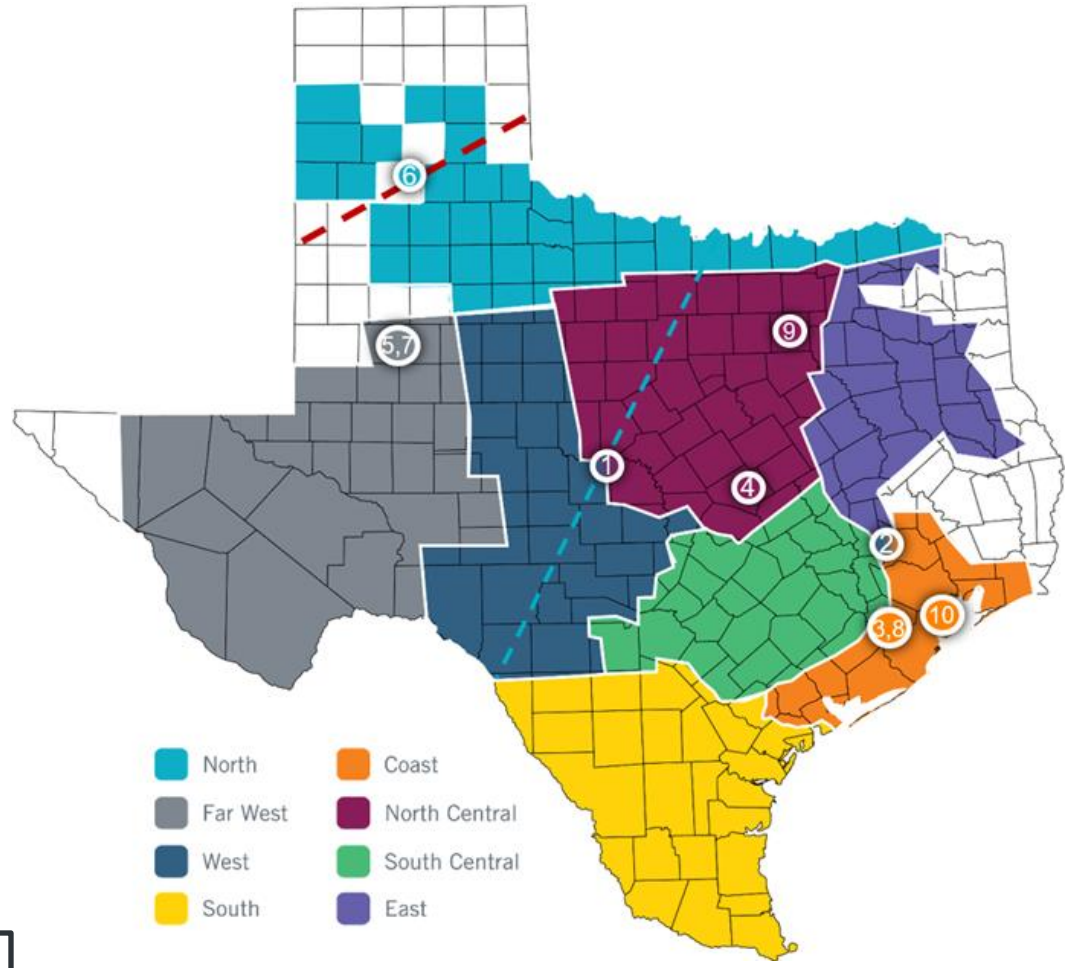
Introduction

- ERCOT created the 2025 RTP economic cases for 2027 and 2030 study years
- Two sets of cases were developed for each study year named as base cases and sensitivity cases
  - Base cases: Large Loads with a signed Interconnection Agreement or an Officer Letter were included and PUCT approved Good Cause Exception applied
  - Sensitivity cases: only Large Loads with a signed Interconnection Agreement were included
- ERCOT evaluated twelve potential economical transmission projects for top congestions observed in the sensitivity cases
- A project is economically viable if it meets either of
  - Production cost savings (PCS) test requirement
  - Congestion cost savings (CCS) test requirement
- Generic cost estimates were used in the project evaluation to identify potential projects that may meet the economic planning criteria while the ultimate determination of the economic viability of the proposed transmission projects should be based on detailed cost estimates provided by the TSPs
- A break-even cost was provided for the project evaluated in this presentation and if the project cost provided by the TSPs is less than or equal to the break-even capital cost, the project is considered as meeting the economic planning criteria

Top Constraints for 2027 and 2030 Sensitivity Cases

Map	Constraint	Congestion Rent (2027 Sensitivity)	Congestion Rent (2030 Sensitivity)
1	West Texas Export interface	$245M	$209M
2	North to Houston interface	$48M	$141M
3	Houdini to WA Parish 345-kV line	$150M	$22M
4	Bell County East Switch to Voss Lake 345-kV line	$106M	-
5	Holly POI to Wett Long Draw 345-kV line	$9M	$48M
6	Panhandle interface	$12M	$45M
7	Farmland to Holly POI 345-kV line	$35M	$13M
8	Elmato POI to Houdini 345-kV line	$33M	$14M
9	Buntin Drive to Simpson Stuart 138-kV line	-	$37M
10	Oasis to Savana POI 345-kV line	$17M	$20M

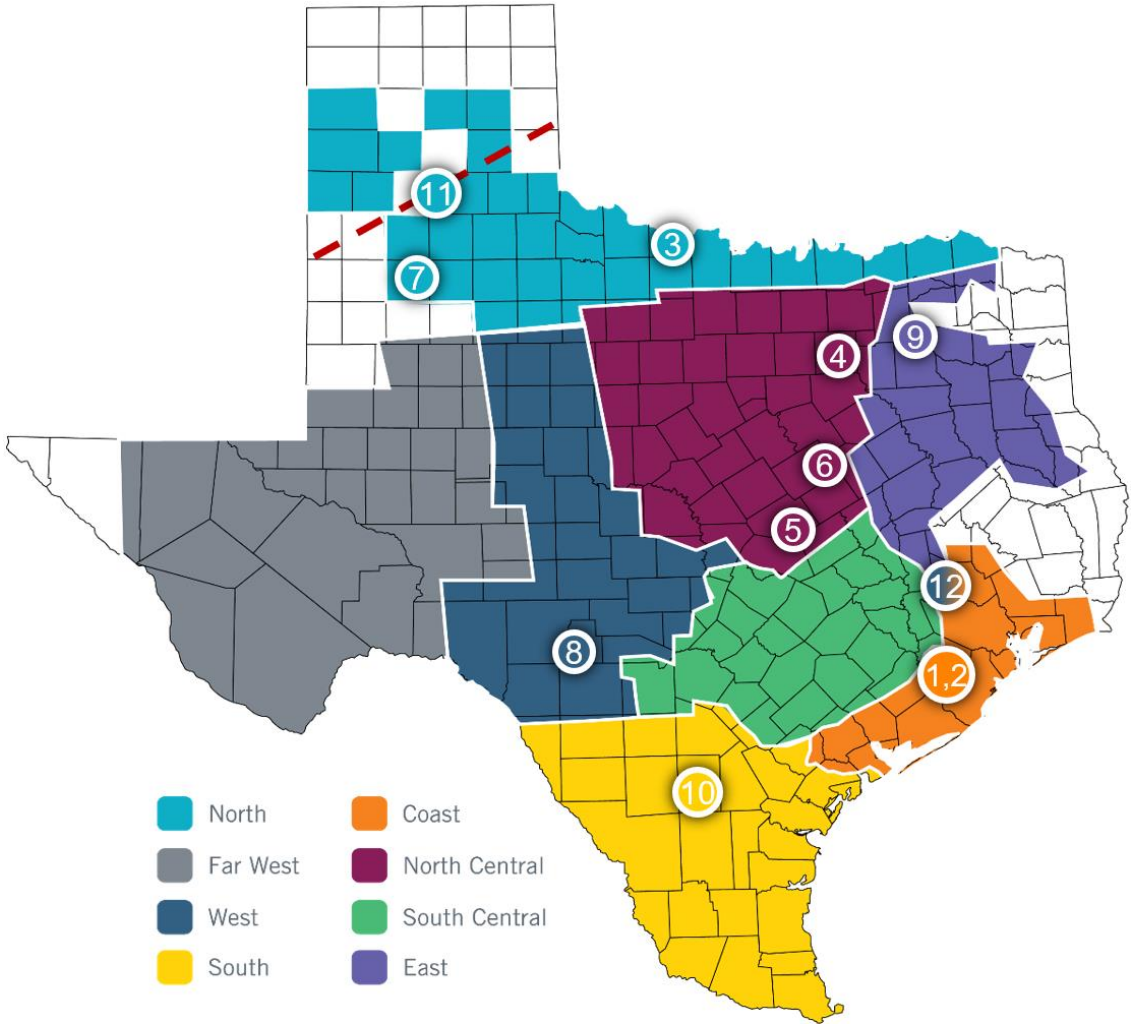
The total congestion rent for the 2027 and 2030 sensitivity case was $1.11 billion and $851 million, respectively.



Location for top constraints

Projects Selected for Economic Evaluation

Index	Description
Project 1	Elmato POI to Houdini to WA Parish 345-kV line upgrade
Project 2	Friendswood to Webster and Friendswood to Mustang Bayou 138-kV line upgrades
Project 3	Fisher Road Switch to Short Creek Solar POI 345-kV line and Fisher Road Switch to Wichita Falls 138-kV line upgrade
Project 4	Buntin Drive to Simpson Stuart to Witt Road to Green Road 138-kV line upgrade
Project 5	Bell County East to Voss Lake 345-kV double-circuit line upgrade
Project 6	Four Brothers Switch to Tradinghouse SES to Lake Creek 345-kV line upgrade
Project 7	Mackenzie Substation to Northeast Substation to Dunbar Substation 115-kV line upgrade
Project 8	Carver to Poblano 69-kV to 138-kV line conversion
Project 9	Sulphur Springs Switch to Liberty to Edgewood 138-kV line upgrade
Project 10	Fowlerton area improvement
Project 11	White River to Long Draw 345-kV double-circuit line addition
Project 12	North to Houston import improvement

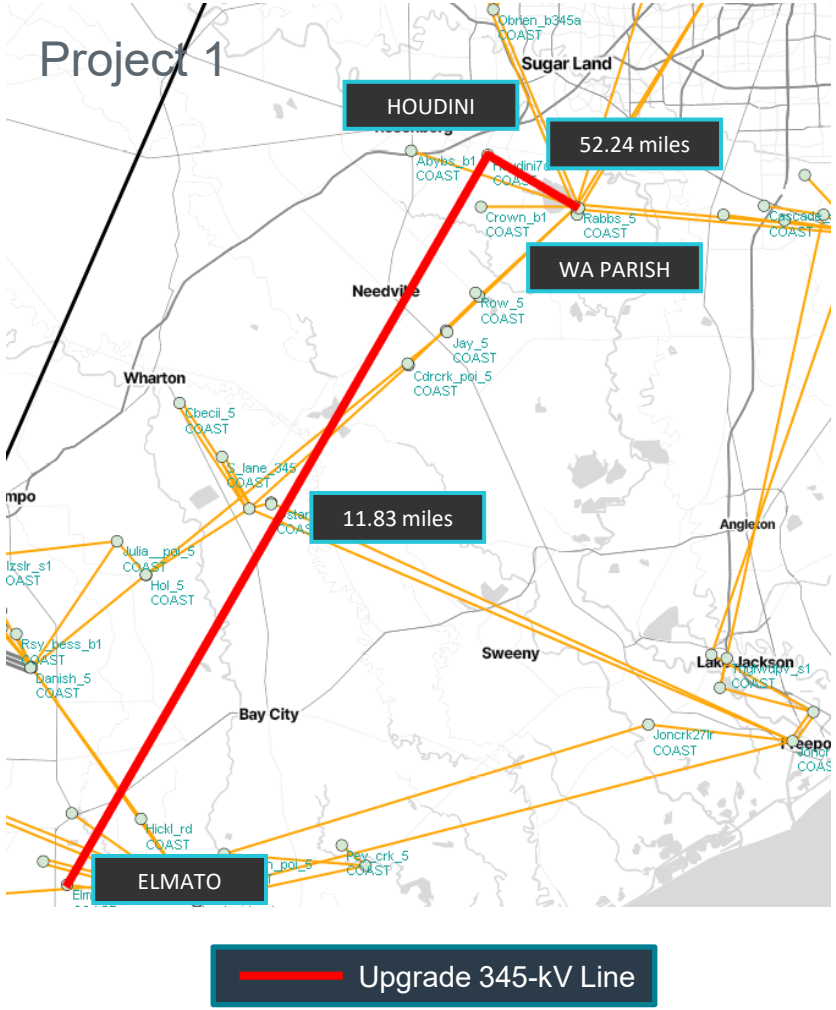


Location for evaluated projects

Project 1: Elmato POI to Houdini to WA Parish 345-kV Line Upgrade

- This project was primarily proposed to improve the Elmato POI to Houdini and Houdini to WA Parish 345-kV line congestion.
  - The congestion rent for Houdini to WA Parish 345-kV line was $150.3M in 2027 and $22M in 2030.
  - The congestion rent for Elmato POI to Houdini 345-kV line was $32.6M in 2027 and $14M in 2030.
  - The lines were congested under the loss of the WA Parish to Wolf and WA Parish to Whaley 345-kV lines.
- Under this project, the Elmato POI to Houdini to WA Parish 345-kV line was upgraded.

	Levelized Savings in 2027 Dollars ($M)	Break-even Capital Cost in 2027 Dollars ($M)
PCS Test	3.9	29.9
CCS Test	-20.9	-

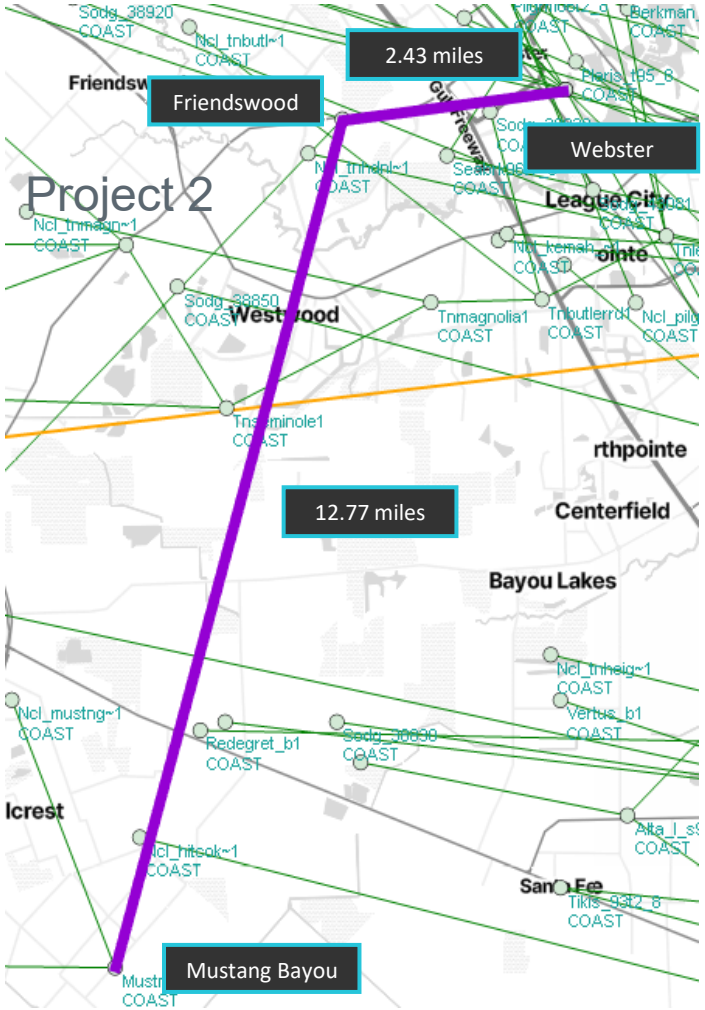


*Geographical routing of lines and substations in the following slides are for illustration only and does not necessarily reflect the real parameters.

Project 2: Friendswood to Webster and Friendswood to Mustang Bayou 138-kV Line Upgrade

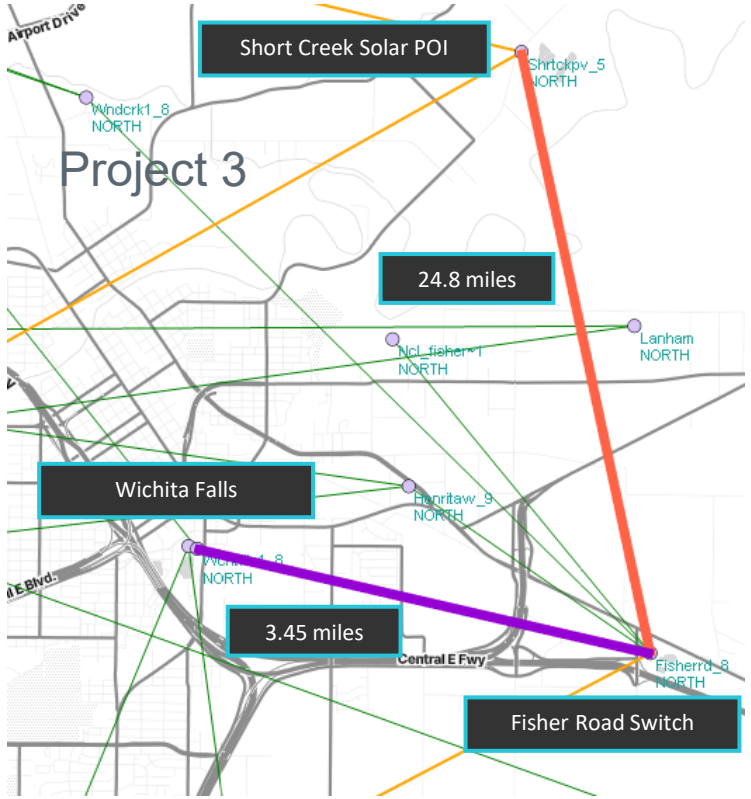
- This project was primarily proposed to improve the Friendswood to Webster 138-kV line congestion.
  - The congestion rent for Friendswood to Webster 138-KV line was $17M in 2030.
  - The Friendswood to Webster 138-KV line was congested under the loss of the Meadow to Oasis 345-kV line.
- Under this project, Friendswood to Webster and Friendswood to Mustang Bayou 138-kV lines were upgraded.

	Levelized Savings in 2027 Dollars ($M)	Break-even Capital Cost in 2027 Dollars ($M)
PCS Test	0.9	6.7
CCS Test	7.3	57.5



Project 3: Fisher Road Switch to Short Creek Solar POI 345-kV Line and Fisher Road Switch to Wichita Falls 138-kV Line Upgrade

- This project was primarily proposed to improve the Fisher Road Switch – Short Creek Solar POI 345-kV line congestion.
  - The congestion rent for Fisher Road Switch to Short Creek Solar POI 345-kV line was $30M in 2030.
  - The Fisher Road Switch to Short Creek Solar POI 345-kV line was congested under the loss of Bowman Switch to Byrd Road Switch 345-kV line and the Bowman Switch to Riley 345-kV line.
- Under this project, the Fisher Road Switch to Short Creek Solar POI 345-kV line and the Fisher Road Switch to Wichita Falls 138-kV line were upgraded.



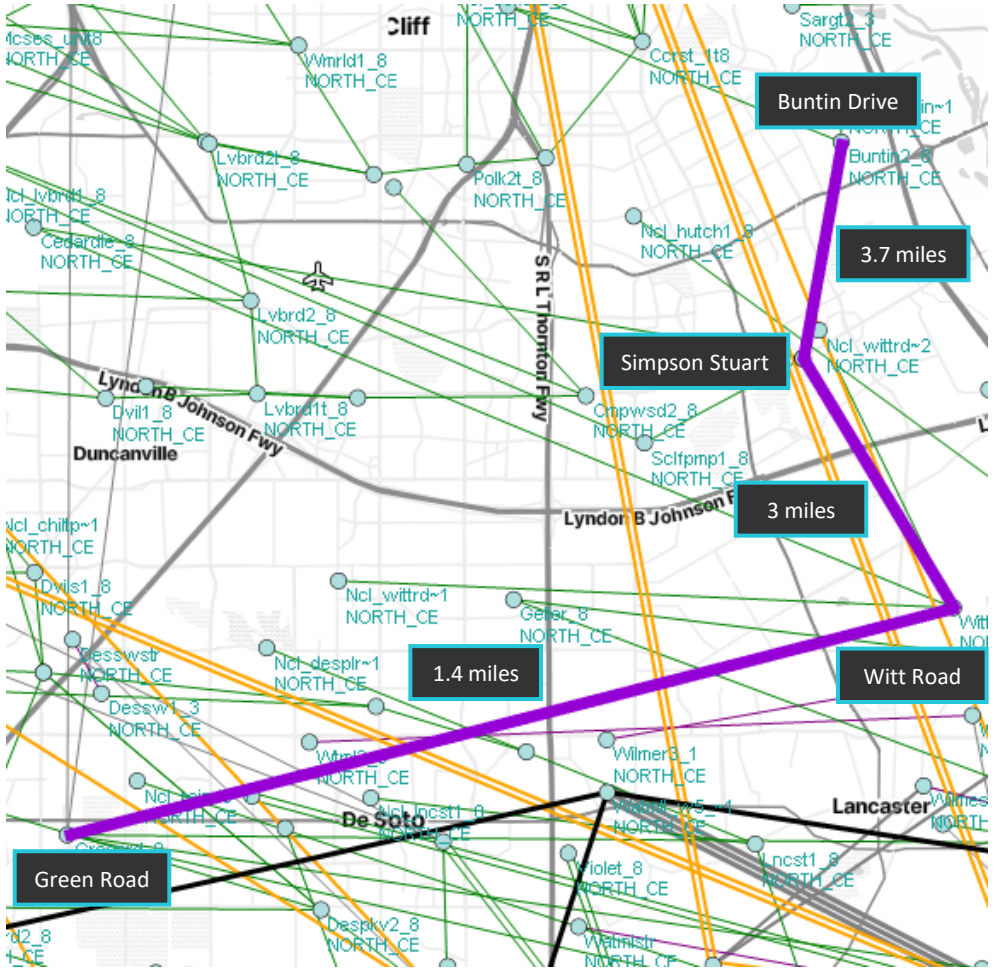
	Levelized Savings in 2027 Dollars ($M)	Break-even Capital Cost in 2027 Dollars ($M)
PCS Test	1.0	7.8
CCS Test	24.7	194.3

Project 4: Buntin Drive to Simpson Stuart to Witt Road to Green Road 138-kV Line Upgrade

- This project was primarily proposed to improve the Buntin Drive to Simpson Stuart 138-kV line congestion.
  - The congestion rent for Buntin Drive to Simpson Stuart 138-kV line was $37.4M in 2030.
  - The Buntin Drive to Simpson Stuart 138-kV line was congested under the loss of the West Levee Switch to Green Road and Sargent Road to Green Road 138-kV lines.

- Though the 2024 RTP did not identify the reliability need for this upgrade (2024-NC73) once the 765-kV Strategic Transmission Expansion Plan (STEP) infrastructure is in place, the 2025 RTP economic analysis showed sufficient economic benefits based on the generic cost estimates.

	Levelized Savings in 2027 Dollars ($M)	Break-even Capital Cost in 2027 Dollars ($M)
PCS Test	1.3	9.8
CCS Test	68.6	540.3



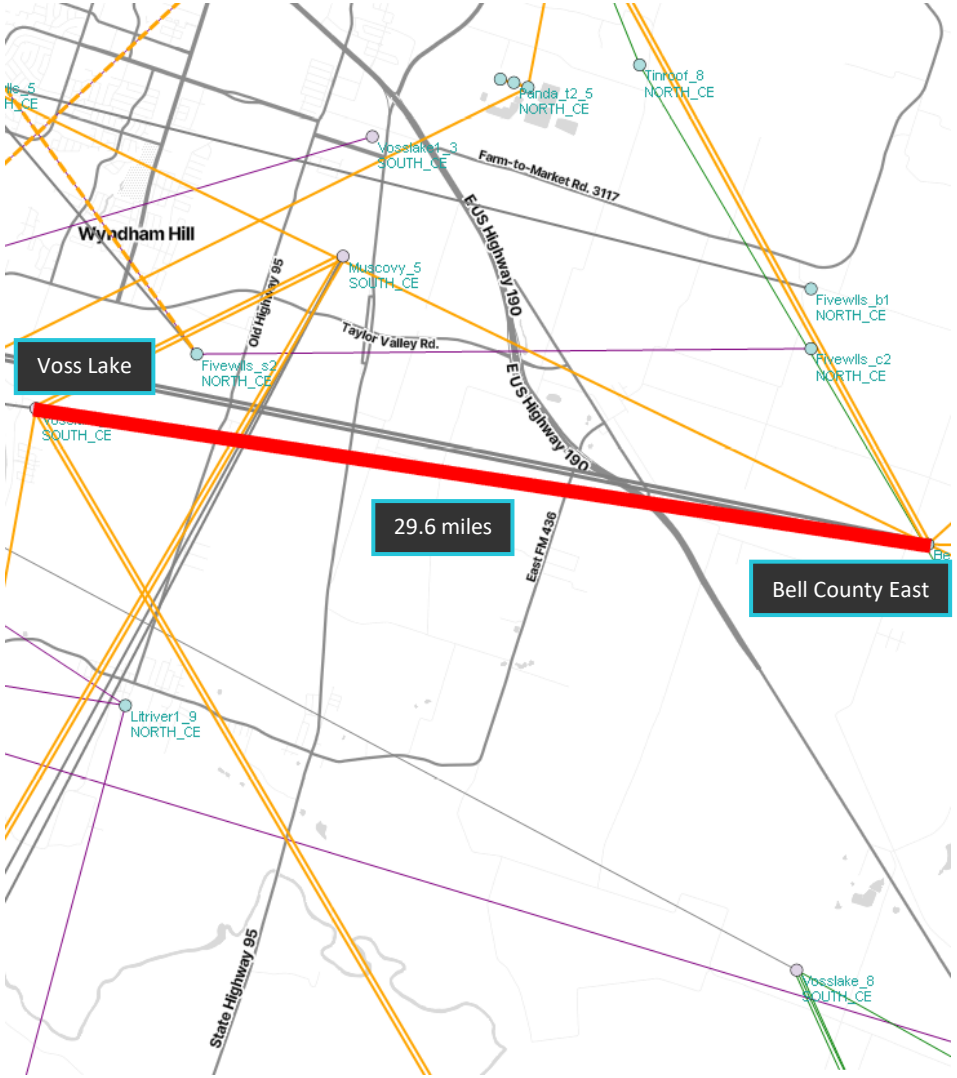
Project 5: Bell County East to Voss Lake 345-kV Double-Circuit Line Upgrade

- The 2024 RTP reliability analysis includes an upgrade of the Bell County East to Voss Lake 345-kV double-circuit line starting in 2029 (2024-SC28). Since the 2025 RTP economic cases were based on the final 2024 RTP reliability cases, the line was not congested in the 2030 economic case.

- This project was primarily proposed to improve the Bell County East to Voss Lake 345-kV double-circuit line congestion.
  - The congestion rent was $117.7M in 2027.
  - It was congested under the loss of the Hutto Switch to Salado Switch 345-kV double-circuit line.

- The 2025 RTP reliability analysis results also showed that this project may be needed as early as 2027 (2024-SC28).

- The project resulted in $40.5M production cost saving in 2027 and consumer energy costs decreased by $29.4M in 2027. The results indicated that the project could produce significant economic savings besides its reliability benefits.

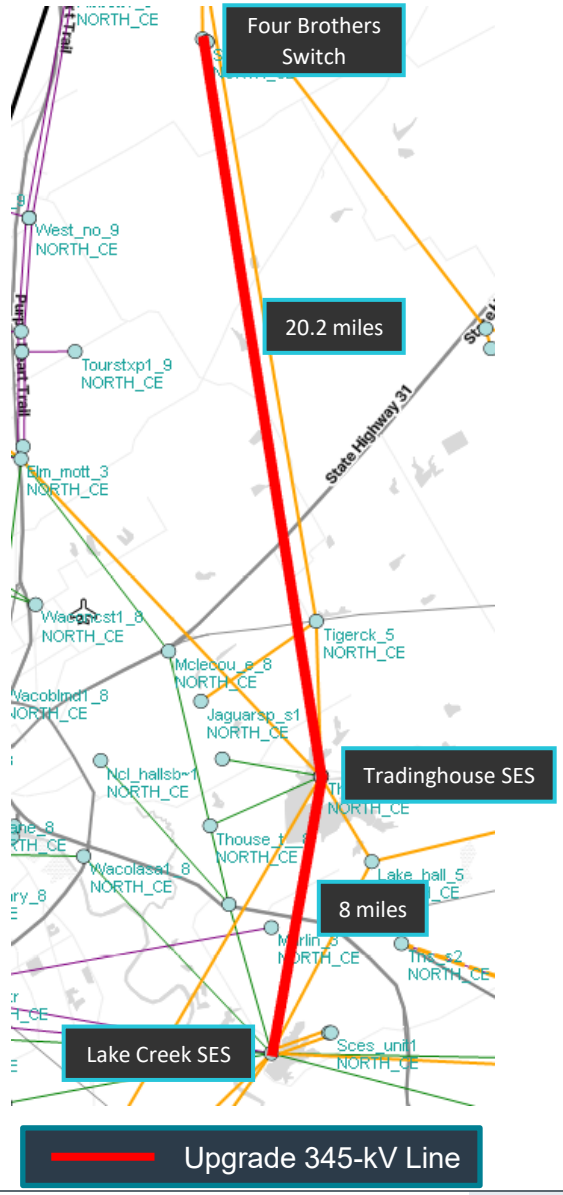


Project 6: Four Brothers Switch to Tradinghouse SES to Lake Creek 345-kV Line Upgrade

- This project was primarily proposed to improve the Four Brothers Switch to Tradinghouse SES 345-kV line congestion.
  - The congestion rent for Four Brothers Switch to Tradinghouse SES 345-kV line was $37.4M in 2030.
  - The Four Brothers Switch to Tradinghouse SES 345-kV line was congested under the loss of the Venus Switch to Fort Smith Switch 345-kV and Miller Road to Forbes Solar 345-kV lines.

- Under this project, the Four Brothers Switch to Tradinghouse SES to Lake Creek 345-kV line was upgraded.

	Levelized Savings in 2027 Dollars ($M)	Break-even Capital Cost in 2027 Dollars ($M)
PCS Test	4.9	37.9
CCS Test	3.5	27.7



Project 7: Mackenzie Substation to Northeast Substation to Dunbar Substation 115-kV Line Upgrade

- The 2024 RTP reliability analysis includes an upgrade of the Mackenzie Substation to Northeast Substation 115-kV line starting in 2028 (2024-N08). Since the 2025 RTP economic cases were based on the final 2024 RTP reliability cases, the line was not congested in the 2030 economic case.

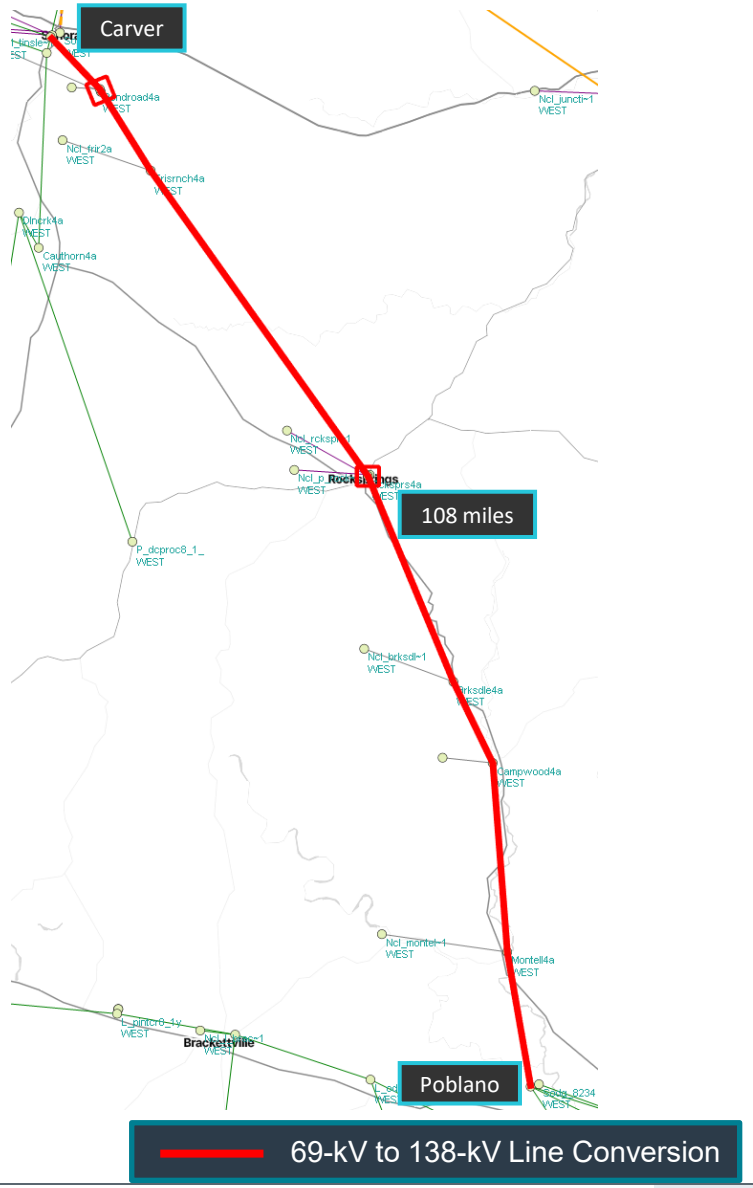
- This project was primarily proposed to improve the Mackenzie Substation to Northeast Substation 115-kV line congestion.
  - The congestion rent was $31.2M in 2027.
  - It was congested under the loss of the Blackwater Draw Switch to Double Mountain Switch 345-kV line.

- The 2025 RTP reliability analysis also identified the need to upgrade the Mackenzie Substation to Northeast Substation 115-kV line (2025-N05).

- The project resulted in $34.1M production cost saving in 2027 and consumer energy costs increased by $12.7M in 2027.
  - The results indicated that the project may produce significant production cost savings besides its reliability benefits.

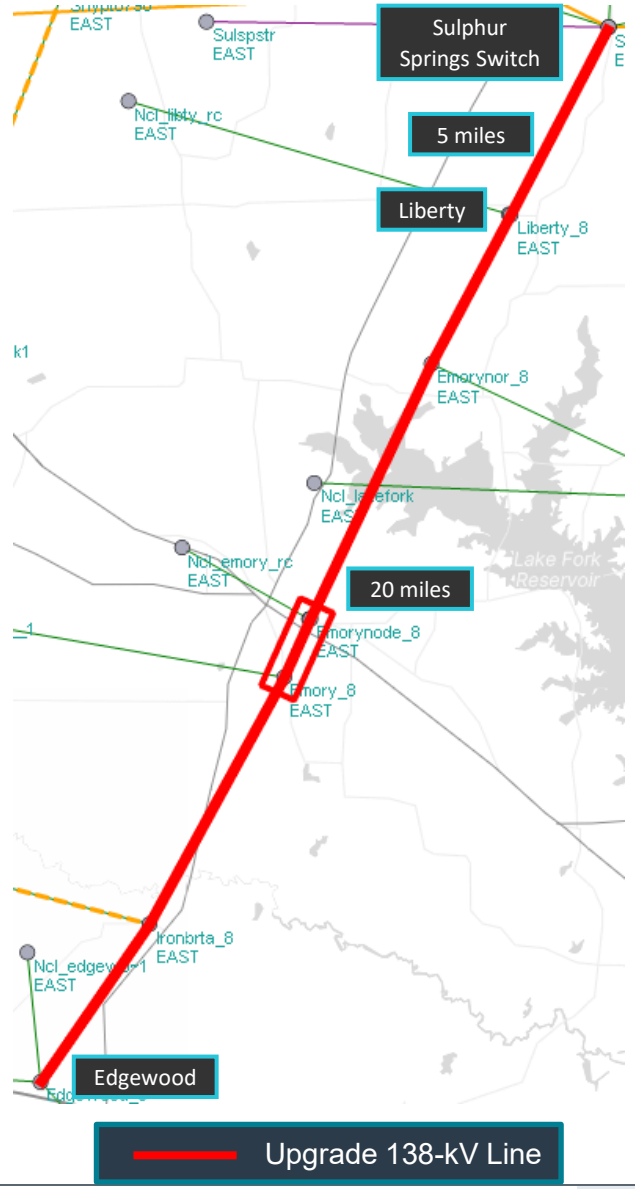
Project 8: Carver to Poblano 69-kV to 138-kV Line Conversion

- This project was primarily proposed to improve the Barksdale to Campwood 69-kV line congestion.
  - The congestion rent for the Barksdale to Campwood 69-kV line was $16M in 2027.
  - It was congested under the loss of the Kendall to Edison 345-kV double-circuit line.
- Under this project, the 69-kV path from Carver to Poblano was converted to 138-kV.
  - The planned Tier 4 project is projected to be in-service in December 2028. The 2025 RTP reliability analysis also showed that the need for this Tier 4 project (2025-W03) could be as early as in 2027.
- The project resulted in $28.9M production cost saving in 2027 and consumer energy costs increased by $10.8M in 2027.
  - The results indicated that the project may produce significant production cost savings besides its reliability benefits.



Project 9: Sulphur Springs Switch to Liberty to Edgewood 138-kV Line Upgrade

- This project was primarily proposed to improve the Sulphur Springs to Liberty 138-kV line congestion.
  - The congestion rent for the Sulphur Springs to Liberty 138-kV line was $3.8M and $13.6M in 2027 and 2030, respectively.
  - The Sulphur Springs to Liberty 138-kV line was congested under the loss of the Sulphur Springs Switch to Cartwheel POI 345-kV line, the Pineforest POI to Allen Switch 345-kV line, and the Monticello transformer.
- Under this project, the Sulphur Springs Switch to Liberty to Edgewood 138-kV line was upgraded.
- The project resulted in $19.4M production cost saving in 2027 and $2.8M in 2030. Consumer energy costs increased by $10.7M in 2027 and decreased by $6.5M in 2030.
  - The study results also showed that the factors driving the economic benefits, due to this project, may not continue in the long run as the production cost savings in 2030 were much less compared to those in 2027.



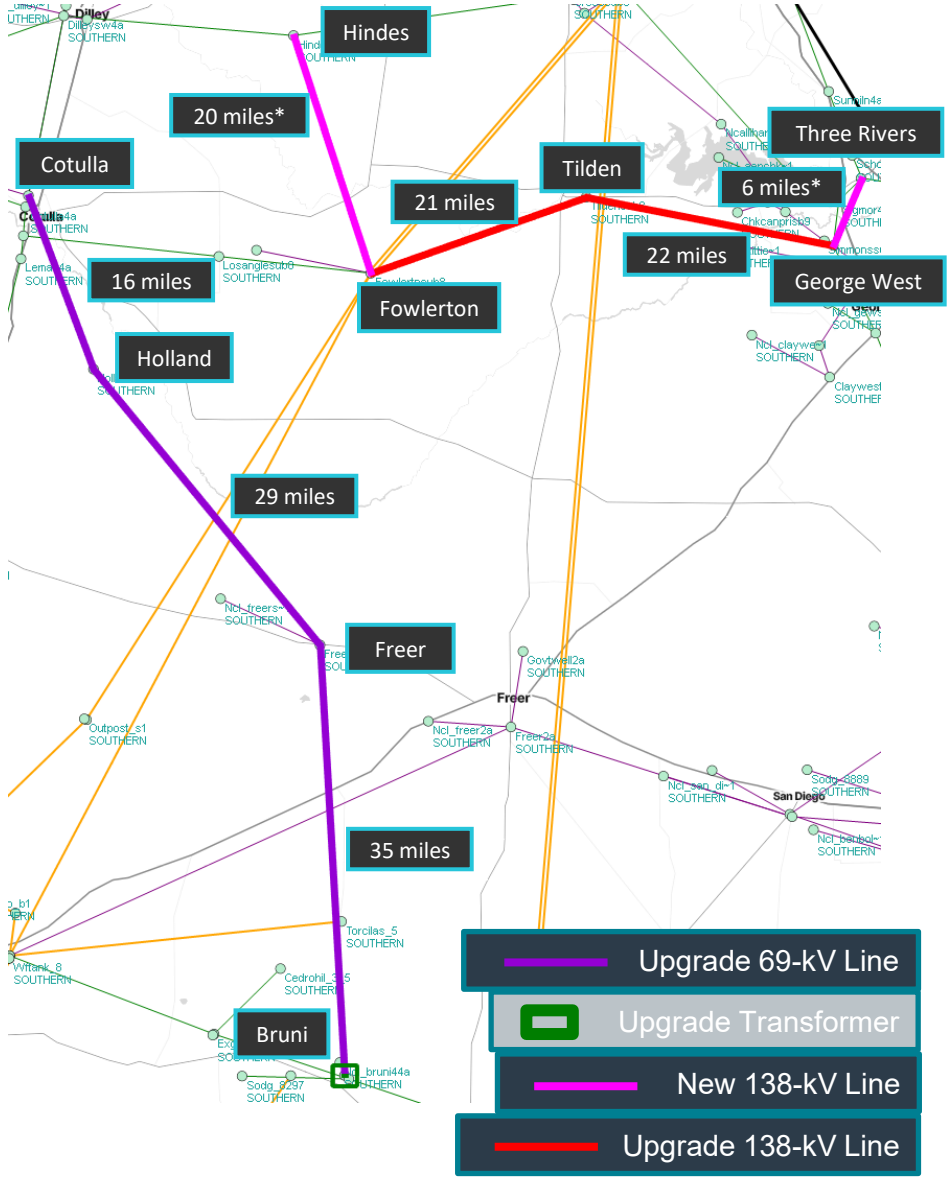
Project 10: Fowlerton Area Improvement

- This project was primarily proposed to improve the Fowlerton Area congestion.
  - The congestion rent for the Tilden to Fowlerton 138-kV line was $16.7M and $15.5 in 2027 and 2030, respectively. The congestion rent for the Bruni Sub 138/69-kV transformer was $10.8M and $9.1 in 2027 and 2030, respectively.
  - The Tilden to Fowlerton 138-kV line was congested under the loss of the Fowlerton to San Miguel 345-kV double-circuit line. The Bruni Sub 138/69-kV transformer was congested under the loss of the Lobo to Laquinta 138-kV line.

- This project upgraded the Fowlerton to Tilden to George West 138-kV line, the Bruni 138/69-kV transformer, the Bruni to Freer to Holland to Cotulla 69-kV lines; and added new 138-kV lines from George West to Three Rivers and from Fowlerton to Hindes.

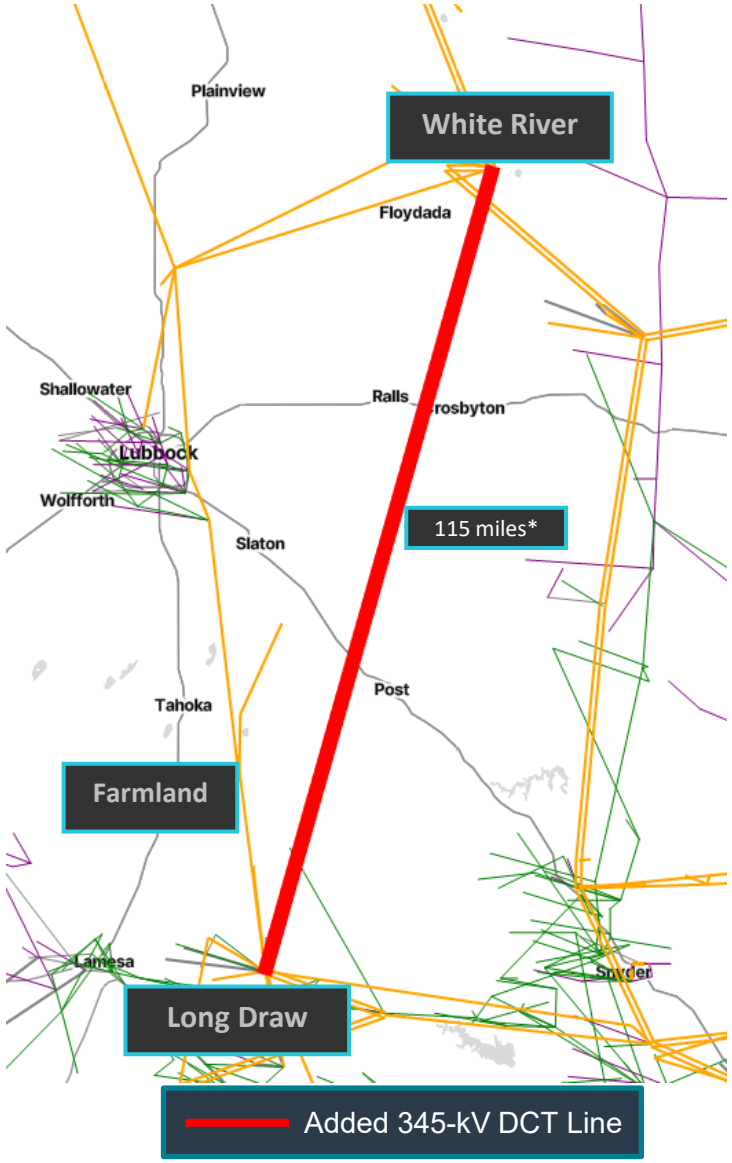
	Levelized Savings in 2027 Dollars ($M)	Break-even Capital Cost in 2027 Dollars ($M)
PCS Test	6.4	49.2
CCS Test	26.6	209.5

*Line length for new lines are including 20% adder.



Project 11: White River to Long Draw 345-kV Double Circuit Line Addition

- Panhandle interface remained one of the top congested paths for both the 2027 and 2030 study years with a congestion rent of $11.9M and $45.5M for 2027 and 2030 study years, respectively.
- One of the key paths delivering energy from Panhandle to West Texas, the Farmland to Long Draw 345-kV line, was also heavily congested.
- This project was tested in the 2030 study year.
  - It added a new 345-kV double-circuit line between White River to Long Draw with an estimated 115 miles in length

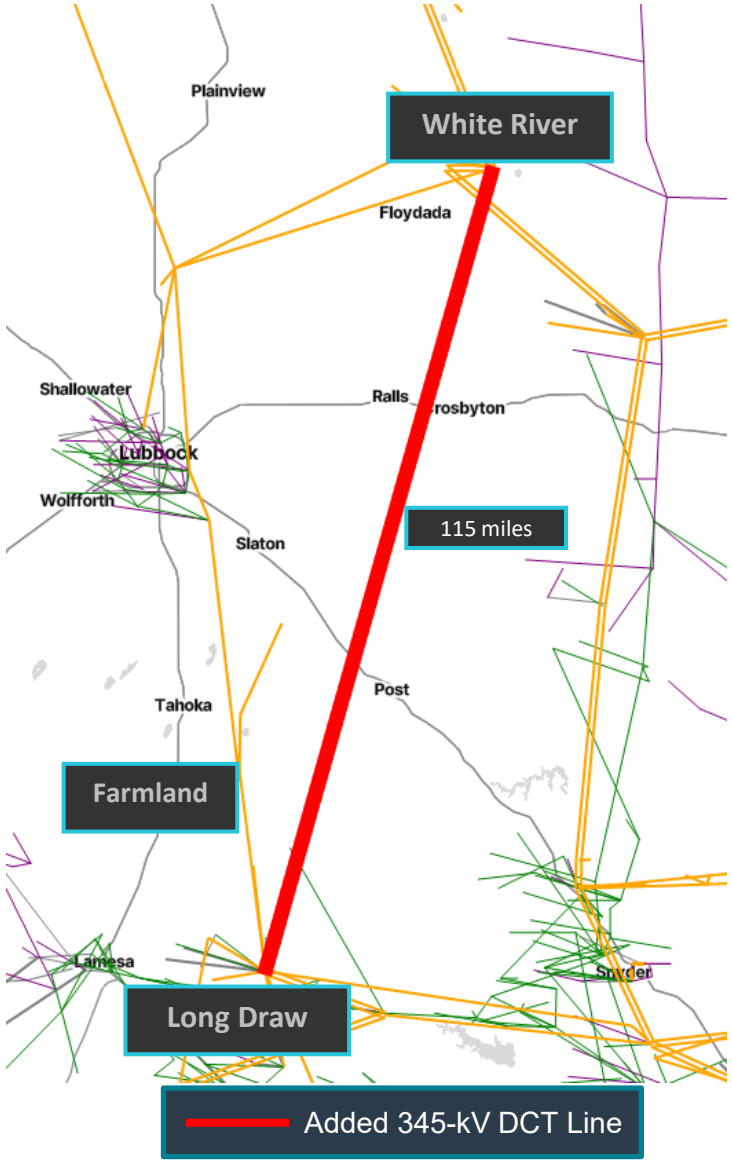


	Levelized Savings in 2027 Dollars ($M)	Break-even Capital Cost in 2027 Dollars ($M)
PCS Test	26.4	203.2
CCS Test	24.9	196

*Line length for new lines are including 20% adder.

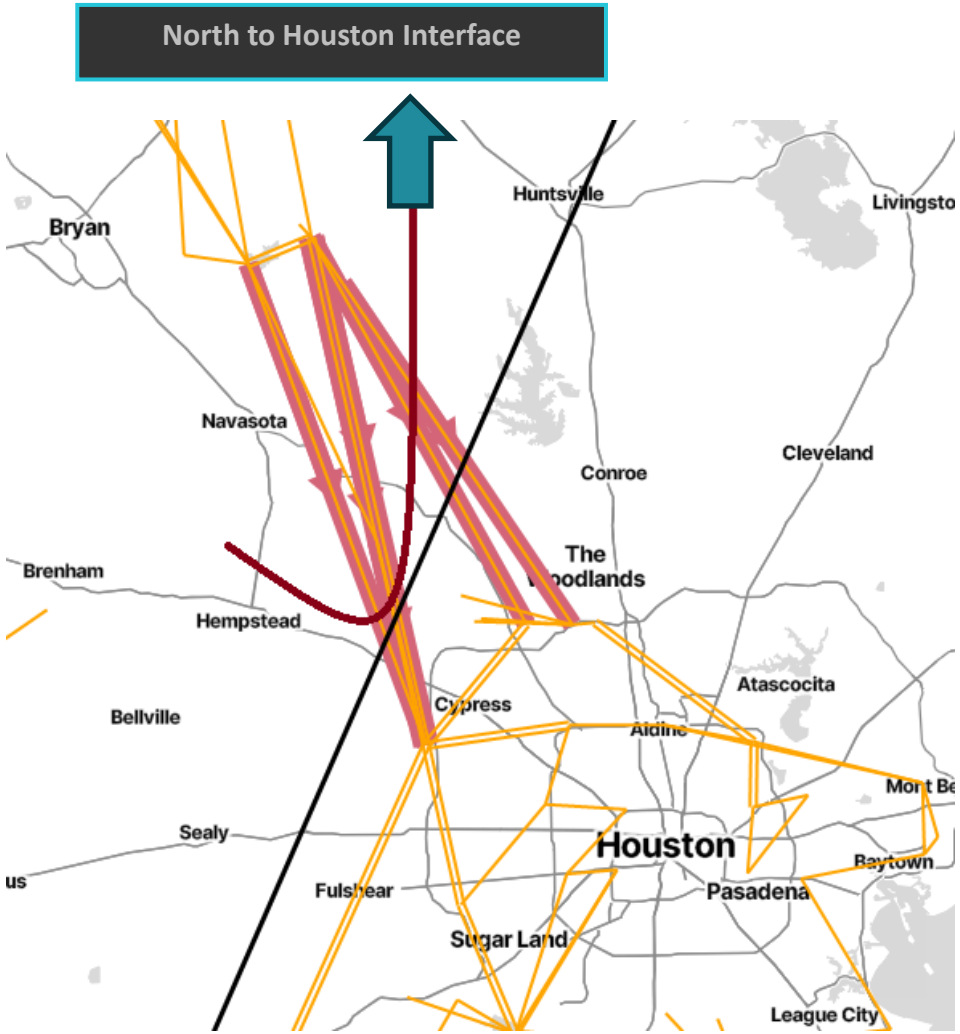
Project 11: White River to Long Draw 345-kV Double Circuit Line Addition

- The project reduced congestion rent on
  - The Panhandle interface by $39 million (85% reduction)
  - The Holly POI to Long Draw 345-kV line by $45 million (90% reduction)
  - The Farmland to Holly POI 345-kV line by $10 million (91% reduction)
  - System-wide by $78 million
- It added $30 million congestion rent to the West Texas Export (WTX) interface since part of the additional energy coming from the Panhandle passes through the WTX interface to reach the demand centers.



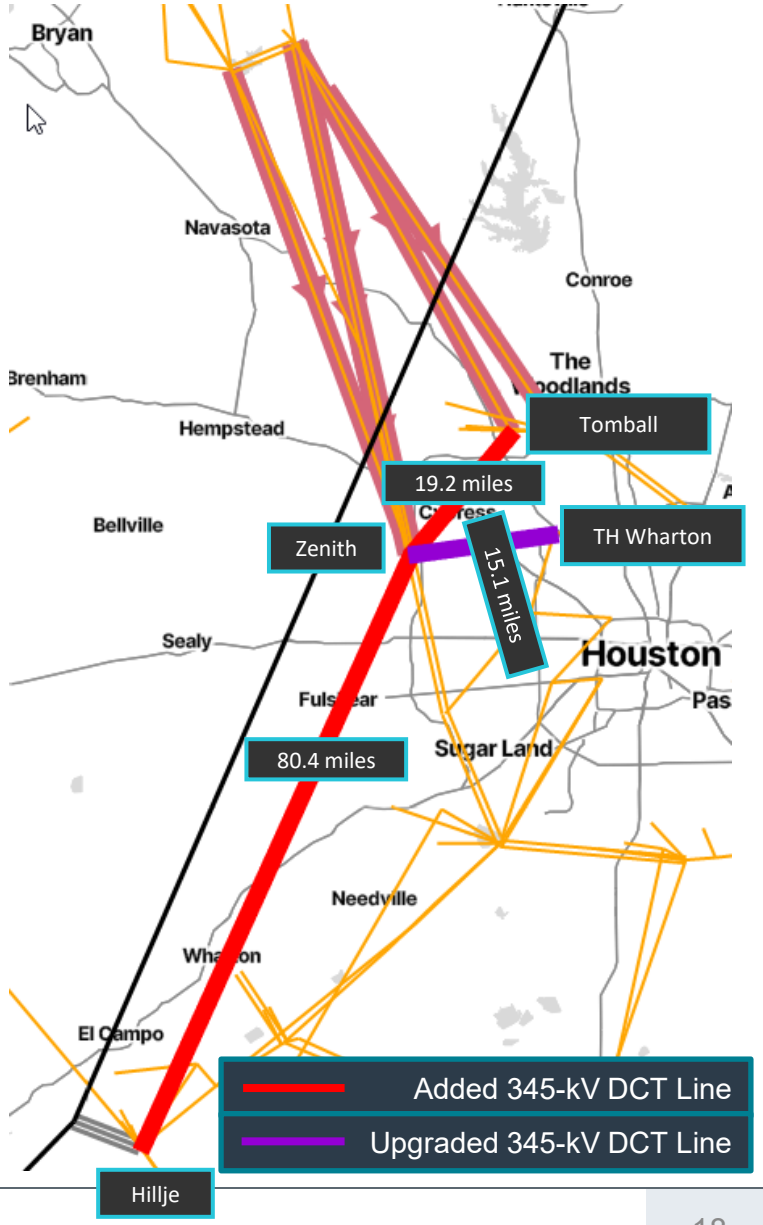
Project 12: North to Houston Import Improvement

- The North to Houston interface congestion rent was $47.9 million for 2027 and $140.6 million for 2030.
- VSAT analysis was performed on various options to improve the North to Houston interface limit and decrease the congestion on this path.
- Two shortlisted options are presented for 2025 RTP economic analysis.



Project 12: North to Houston Import Improvement Option a

- This option includes
  - A new 345-kV double-circuit line from Tomball to Zenith
  - A new 345-kV double-circuit line from Zenith to Hillje
  - Upgrade of the existing Zenith to TH Wharton 345-kV line
- This project decreased the congestion rent on the North to Houston interface by $50.5 million (36%), for the 2030 study year.

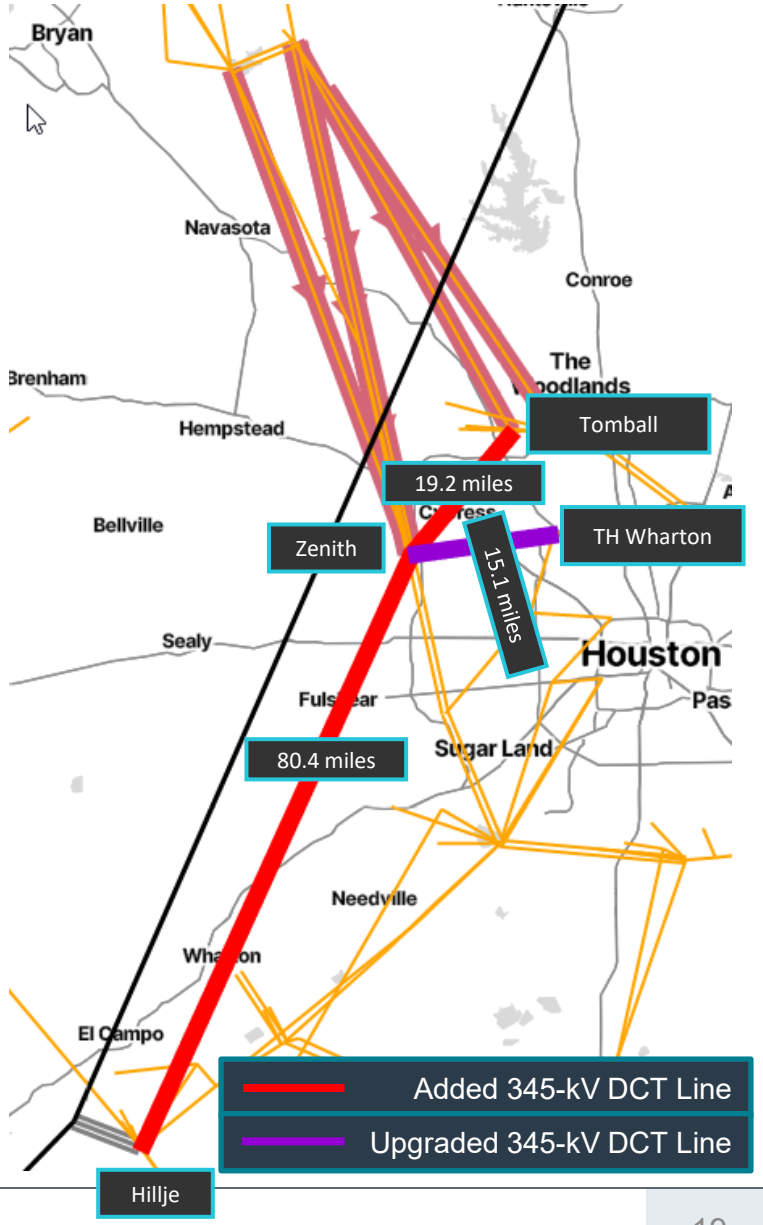


	Levelized Savings in 2027 Dollars ($M)	Break-even Capital Cost in 2027 Dollars ($M)
PCS Test	15.1	115.9
CCS Test	-77	-

Project 12: North to Houston Import Improvement Option b

- This option includes
  - Option a
  - Two 100 MVAr capacitors
- The addition of capacitor banks further improved the VSAT limit
- This project decreased the congestion rent on the North to Houston interface by $54 million (38%), for the 2030 study year.

	Levelized Savings in 2027 Dollars ($M)	Break-even Capital Cost in 2027 Dollars ($M)
PCS Test	17.5	134.9
CCS Test	-87.9	-



Economic Analysis Results for the 2025 RTP Economic Project Evaluation

Index	Description	Levelized Production Cost Savings ($M)	Levelized Consumer Energy Cost Reduction ($M)
Project 1	Elmato POI to Houdini to WA Parish 345-kV line upgrade	3.9	-20.9
Project 2	Friendswood to Webster and Friendswood to Mustang Bayou 138-kV line upgrade	0.9	7.3
Project 3	Fisher Road Switch to Short Creek Solar POI 345-kV line and Fisher Road Switch to Wichita Falls 138-kV line upgrade	1.0	24.7
Project 4	Buntin Drive to Simpson Stuart to Witt Road to Green Road 138-kV line upgrade	1.3	68.6
Project 5	Bell County East to Voss Lake 345-kV double-circuit line upgrade	-	-
Project 6	Four Brothers Switch to Tradinghouse SES to Lake Creek 345-kV line upgrade	4.9	3.5
Project 7	Mackenzie Substation to Northeast Substation to Dunbar Substation 115-kV line upgrade	-	-
Project 8	Carver to Poblano 69-kV to 138-kV line conversion	-	-
Project 9	Sulphur Springs Switch to Liberty to Edgewood 138-kV line upgrade	-	-2.2
Project 10	Fowlerton area improvement (1)	6.4	26.6
Project 11	White River to Long Draw 345-kV double-circuit line addition	26.4	24.9
Project 12. a	North to Houston import improvement option a (2)	15.1	-77
Project 12. b	North to Houston import improvement option b (3)	17.5	-87.9

(1) Upgrade of the Fowlerton to Tilden to George West 138-kV line, the Bruni 138/69-kV transformer, the Bruni to Freer to Holland to Cotulla 69-kV line and addition of new 138-kV lines from George West to Three Rivers and from Fowlerton to Hindes
(2) Addition of 345-kV double-circuit lines from Zenith to Tomball and Zenith to Hillje as well as upgrading the 345-kV line from Zenith to TH Wharton
(3) Option a plus 2x100 MVAr capacitor banks

Break-even Capital Cost for the 2025 RTP Economic Project Evaluation

Index	Description	PCS Test Break-Even Capital Cost ($M)	CCS Test Break-Even Capital Cost ($M)
Project 1	Elmato POI to Houdini to WA Parish 345-kV line upgrade	29.9	-
Project 2	Friendswood to Webster and Friendswood to Mustang Bayou 138-kV line upgrade	6.7	57.5
Project 3	Fisher Road Switch to Short Creek Solar POI 345-kV line and Fisher Road Switch to Wichita Falls 138-kV line upgrade	7.8	194.3
Project 4	Buntin Drive to Simpson Stuart to Witt Road to Green Road 138-kV line upgrade	9.8	540.3
Project 5	Bell County East to Voss Lake 345-kV double-circuit line upgrade	-	-
Project 6	Four Brothers Switch to Tradinghouse SES to Lake Creek 345-kV line upgrade	37.9	27.7
Project 7	Mackenzie Substation to Northeast Substation to Dunbar Substation 115-kV line upgrade	-	-
Project 8	Carver to Poblano 69-kV to 138-kV line conversion	-	-
Project 9	Sulphur Springs Switch to Liberty to Edgewood 138-kV line upgrade	-	-
Project 10	Fowlerton area improvement	49.2	209.5
Project 11	White River to Long Draw 345-kV double-circuit line addition	203.2	196
Project 12. a	North to Houston import improvement option a	115.9	-
Project 12. b	North to Houston import improvement option b	134.9	-

Conclusions

- Based on the generic cost estimates, the following projects can potentially meet the economic planning criteria*
  - Friendswood to Webster and Friendswood to Mustang Bayou 138-kV line upgrades (project 2)
  - Fisher Road Switch to Short Creek Solar POI 345-kV line and Fisher Road Switch to Wichita Falls 138-kV line upgrade (project 3)
  - Buntin Drive to Simpson Stuart to Witt Road to Green Road 138-kV line upgrade (project 4)
- Accelerating the in-service date (2028) of the Tier 4 project, Carver to Poblano 69-kV to 138-kV line conversion (project 8), to 2027, provided significant economic benefits
- Two 2025 RTP reliability projects were tested and produced significant economic savings
  - Project 5: Bell County East to Voss Lake 345-kV double-circuit line upgrade (2024-SC28)
  - Project 7: Mackenzie Substation to Northeast Substation to Dunbar Substation 115-kV line upgrade (2025-N08)

*the ultimate determination of the economic viability of the proposed transmission projects should be based on detailed cost estimates provided by the TSPs

Questions

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