



2023 RTP Economic Study Results

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Summary

- ERCOT completed the 2023 RTP economic studies and have posted the evaluation results of 20 economically driven transmission projects using both the production cost savings (PCS) test and the generator revenue reduction (GRR) test.
- Preliminary results were presented at [the December 13, 2023 RPG meeting](#).
- ERCOT will continue to evaluate the economic performance of transmission projects in the 2024 RTP economic study.

System Summary of 2025 and 2028 Economic Cases

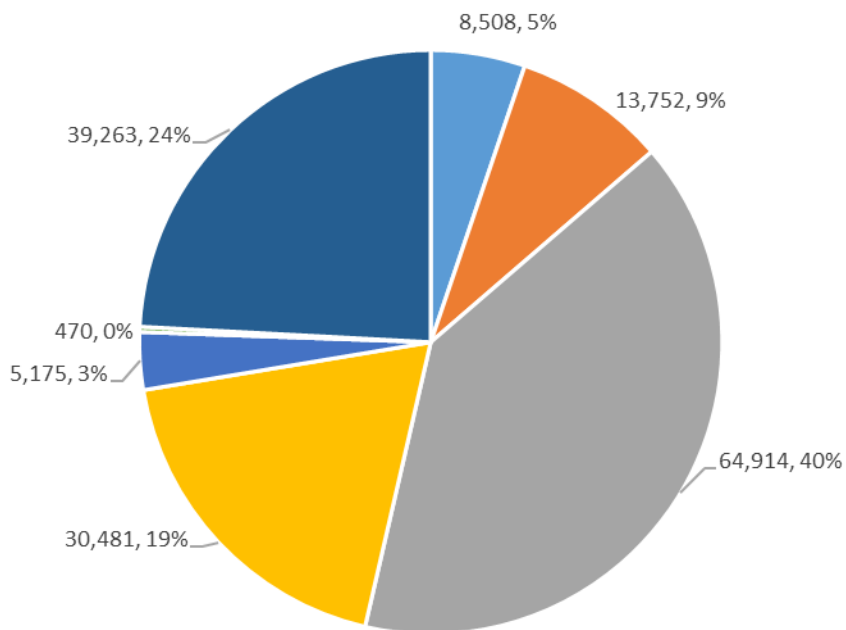
- The 2025 and 2028 economic cases were created based on the 2013 weather conditions.

Description	Unit	2025	2028
Coincident Peak Load	MW	91,251	95,918
Peak Net Load*	MW	73,199	78,935
Minimum Net Load*	MW	5,944	6,257
Annual Served Demand	GWh	525,556	569,969
Annual Storage Charging	GWh	3,218	3,575
Annual Transmission Losses	GWh	13,165	14,347
Annual Generation	GWh	541,939	587,891
Load-Weighted Average LMP	\$/MWh	26.26	26.81

*Hourly Net Load = Hourly Load Forecast – Hourly Wind Output – Hourly Solar Output

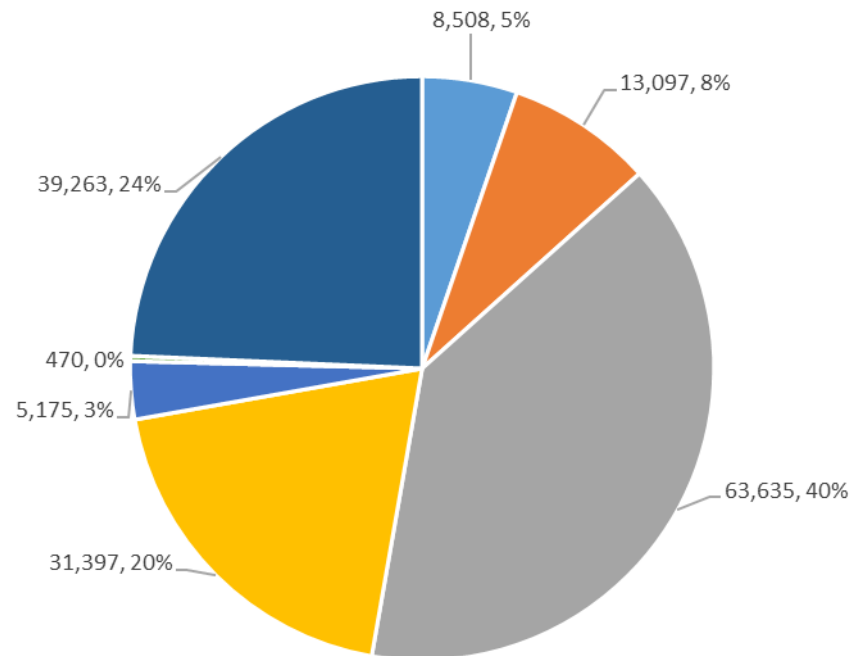
Nameplate Capacity per Fuel Type

Nameplate Capacity -2025 (MW)



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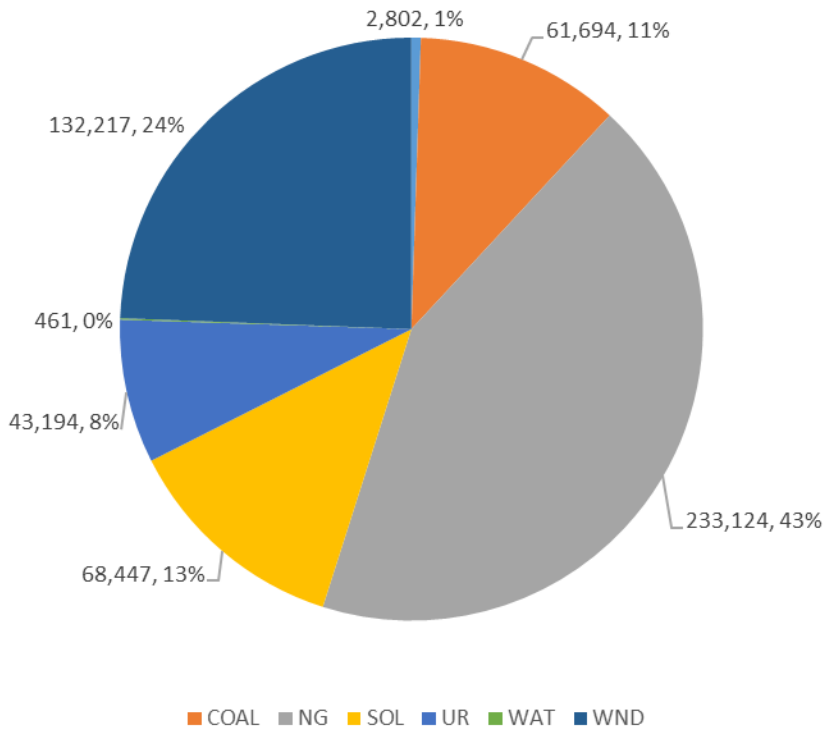
Nameplate Capacity -2028 (MW)



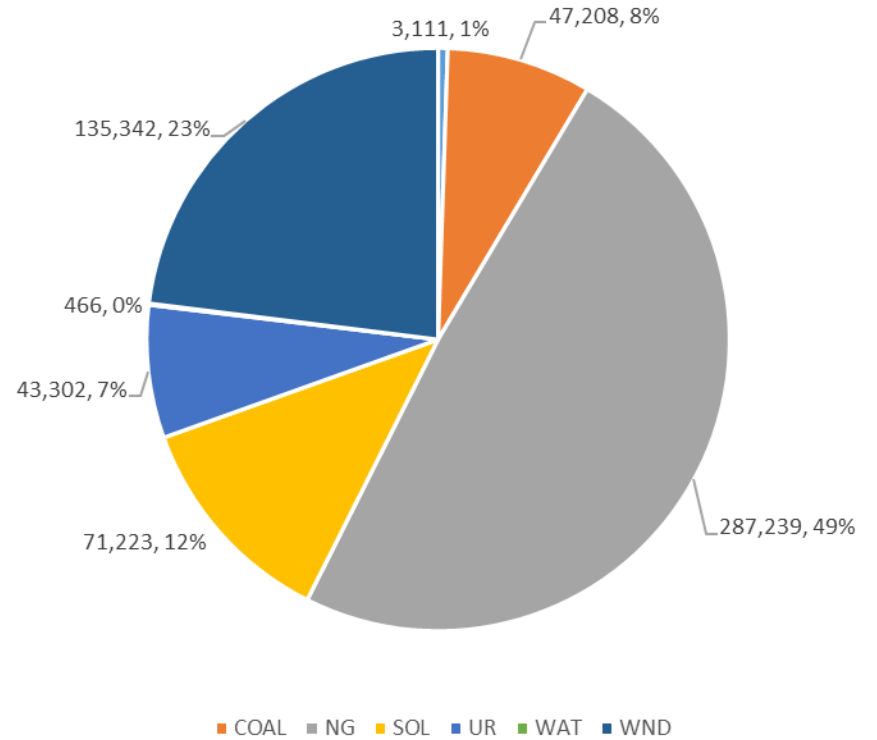
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Energy Production per Fuel Type

Energy Production -2025 (GWh)

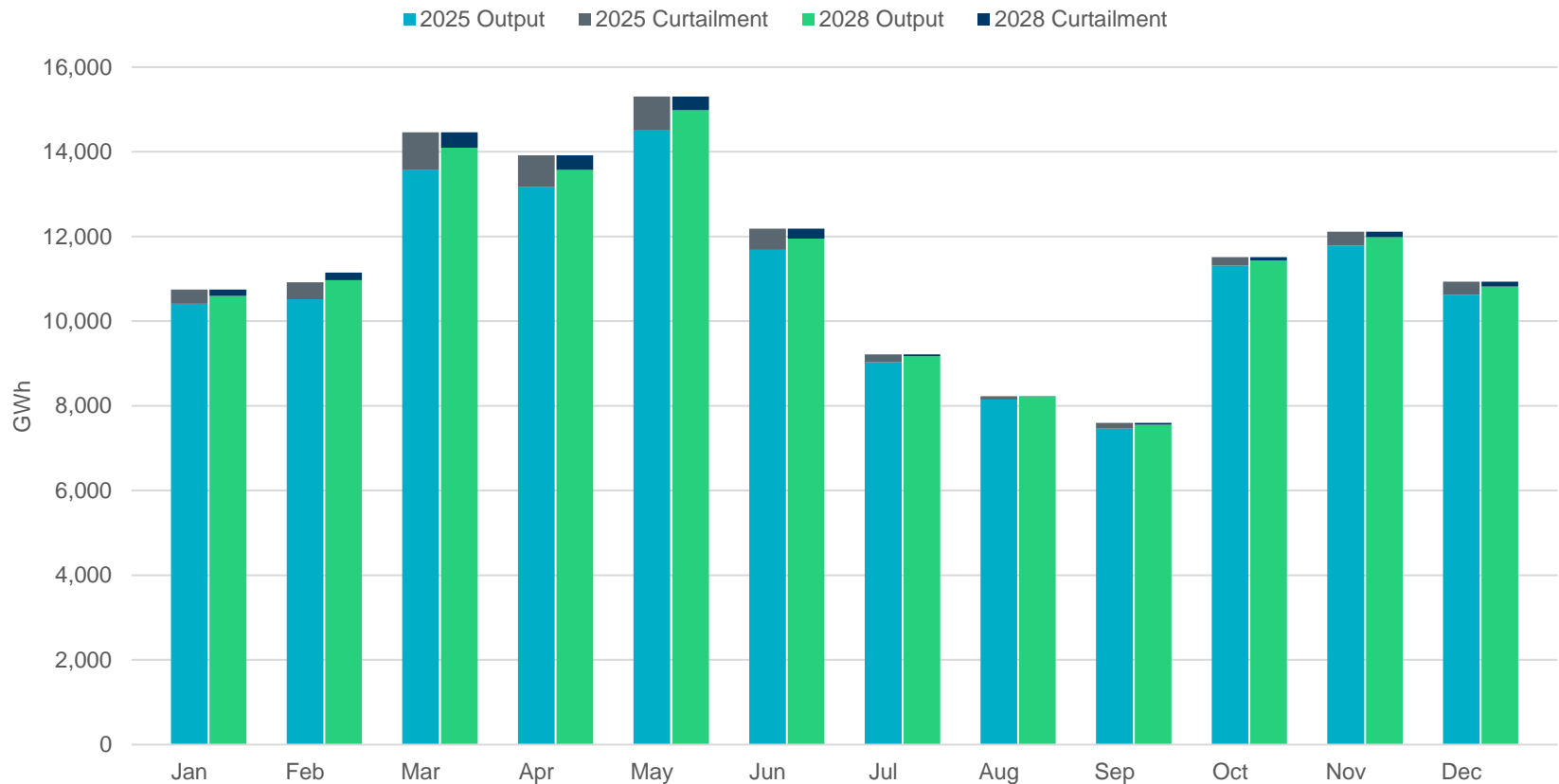


Energy Production -2028 (GWh)



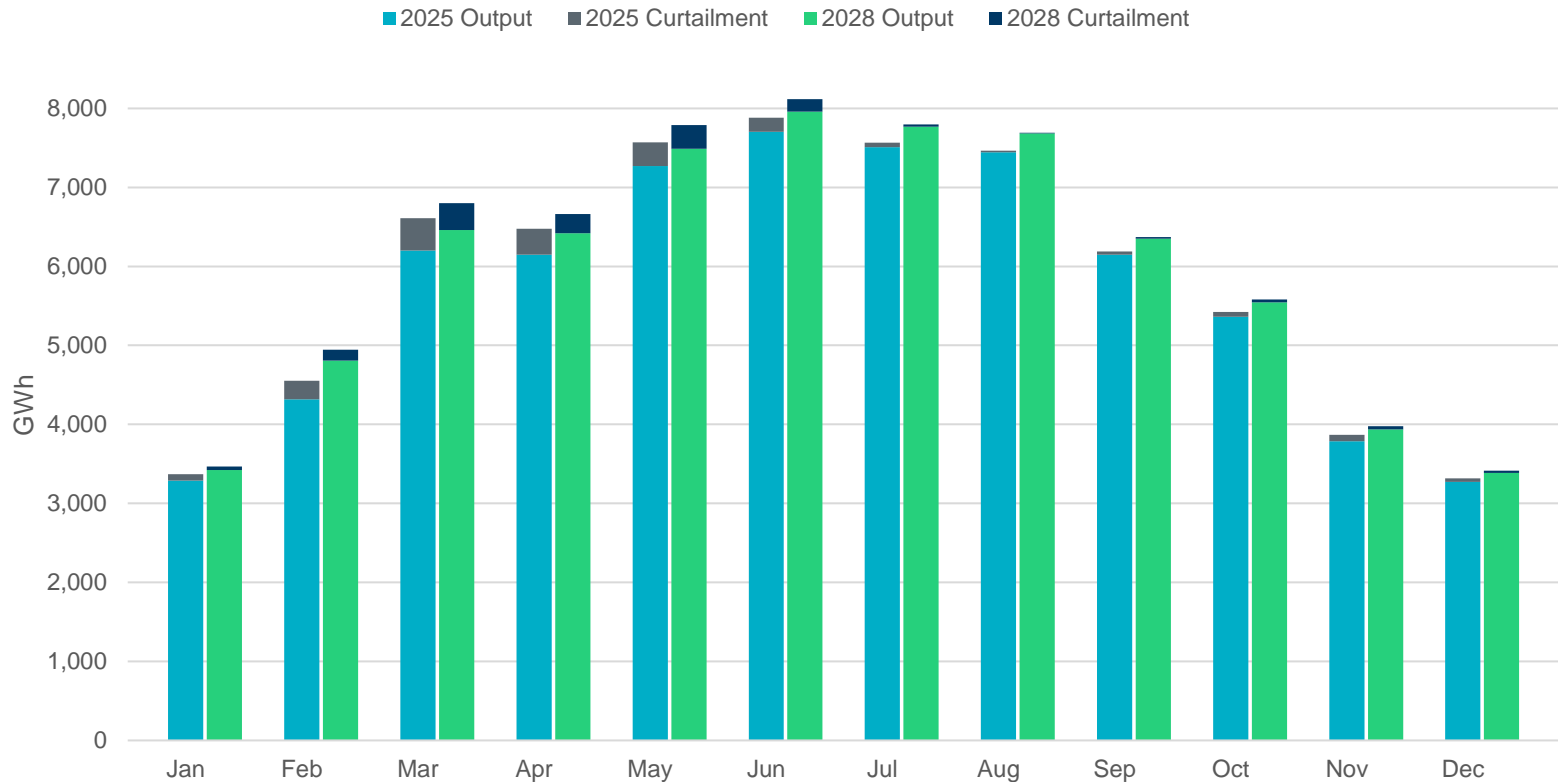
Wind Monthly Energy Production and Curtailment

- In the 2025 case, wind generation resources produced 132,217 GWh of energy with 4,922 GWh (3.72%) of curtailment, while in the 2028 case, wind generation resources produced 135,342 GWh of energy with 2,023 GWh (1.49%) of curtailment.



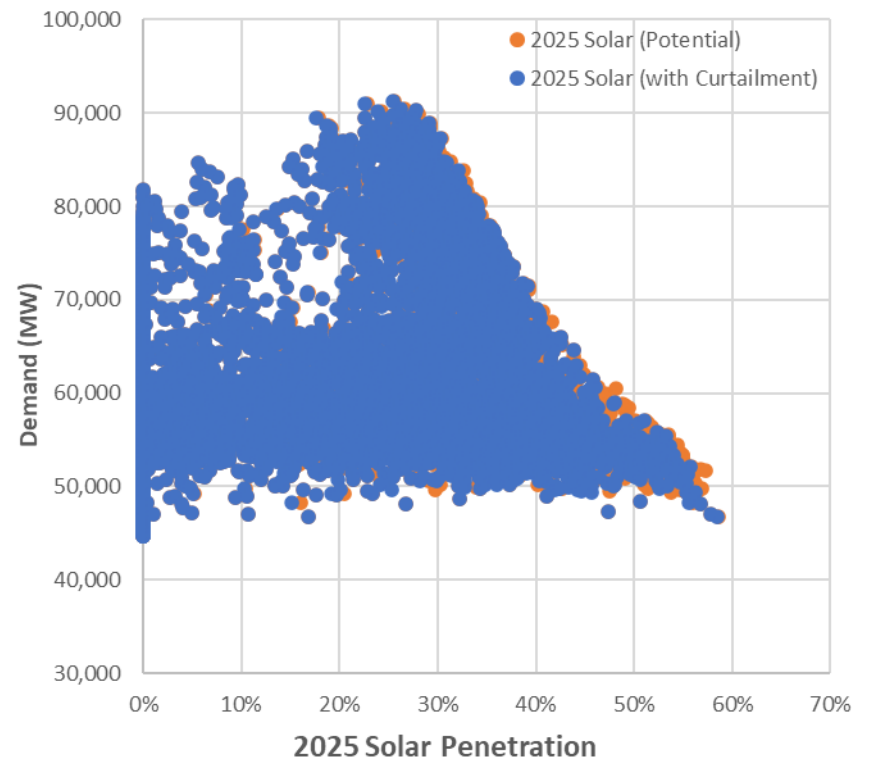
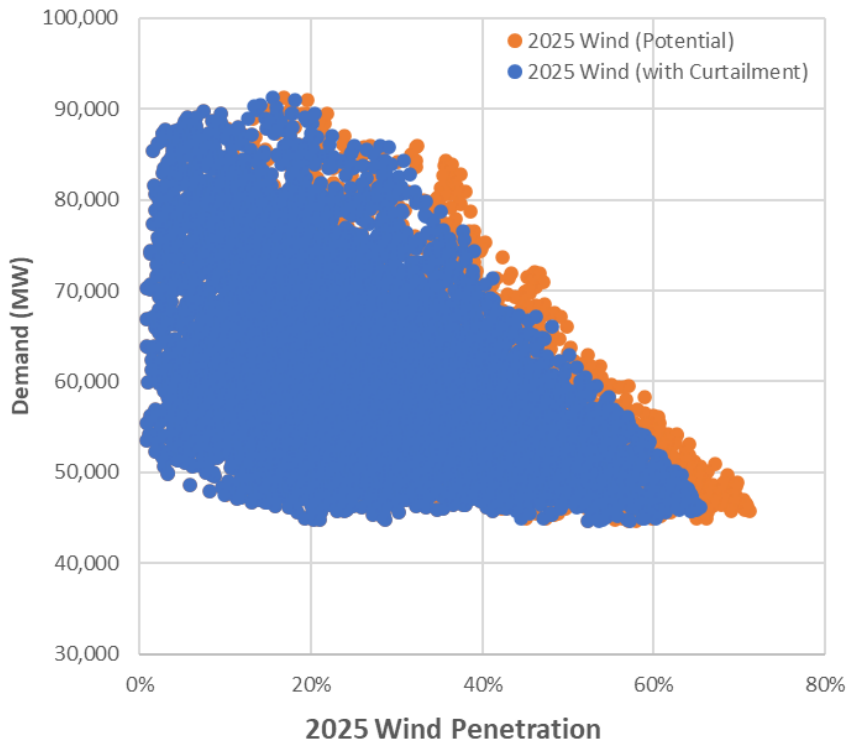
Solar Monthly Energy Production and Curtailment

- In the 2025 case, solar generation resources produced 68,447 GWh of energy with 1,836 GWh (2.68%) of curtailment, while in the 2028 case, solar generation resources produced 71,223 GWh of energy with 1,382 GWh (1.94%) of curtailment.



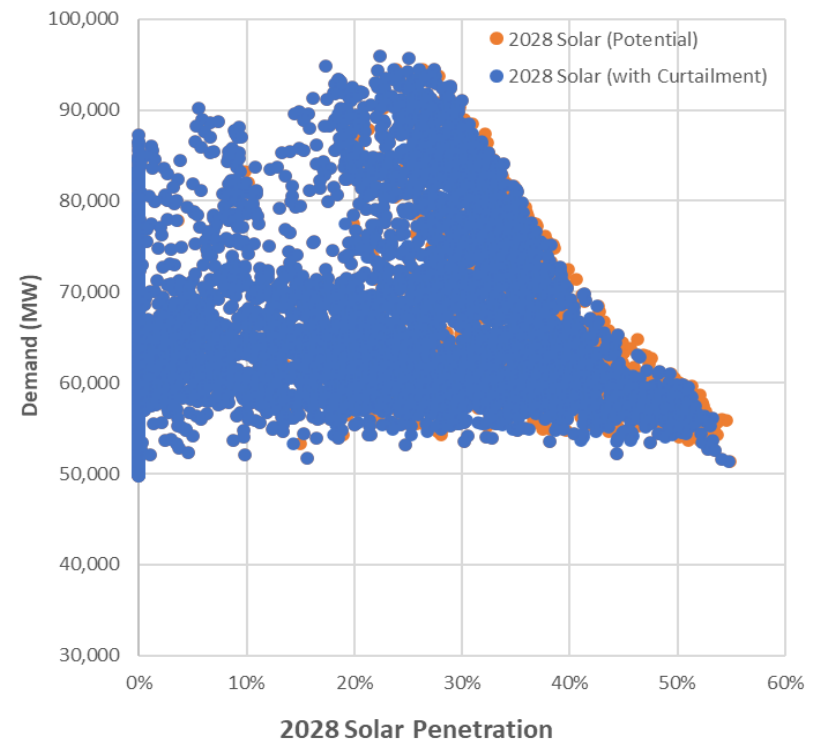
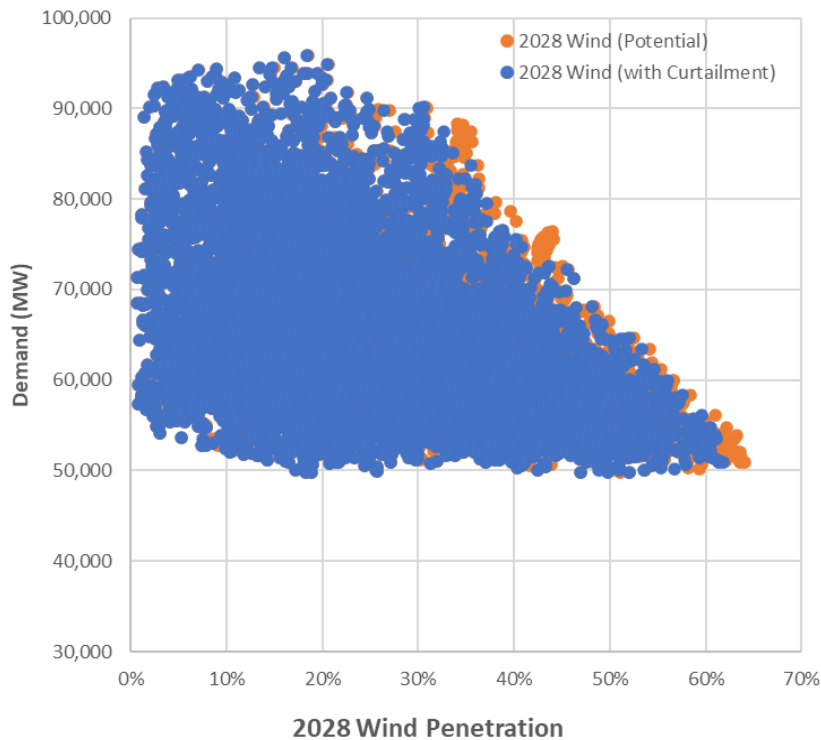
Renewable Penetration – 2025

- The highest renewable penetration level in the 2025 case was 88.1% (HE 12, May 3rd, 2025), with 26.2 GW of solar generation and 17.7 GW of wind generation, coincident with a load of 49.8 GW.



Renewable Penetration – 2028

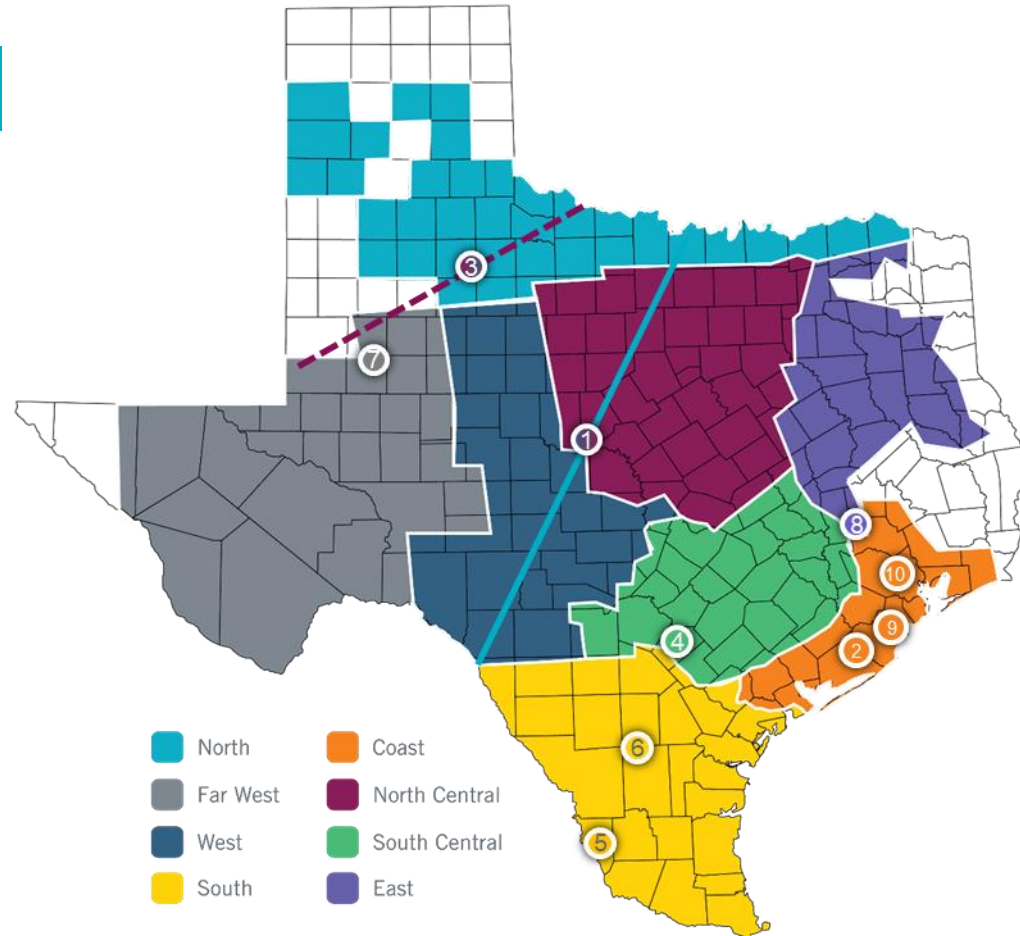
- The highest renewable penetration level in the 2028 case (HE 13, March 5th, 2028) was 88.9%, with 26.8 GW of solar generation and 24.3 GW of wind generation, coincident with a load of 57.4 GW.



Top Congested Constraints from 2025 and 2028 Study Years

- The total congestion rent for 2025 and 2028 is \$752M and \$560M, respectively.

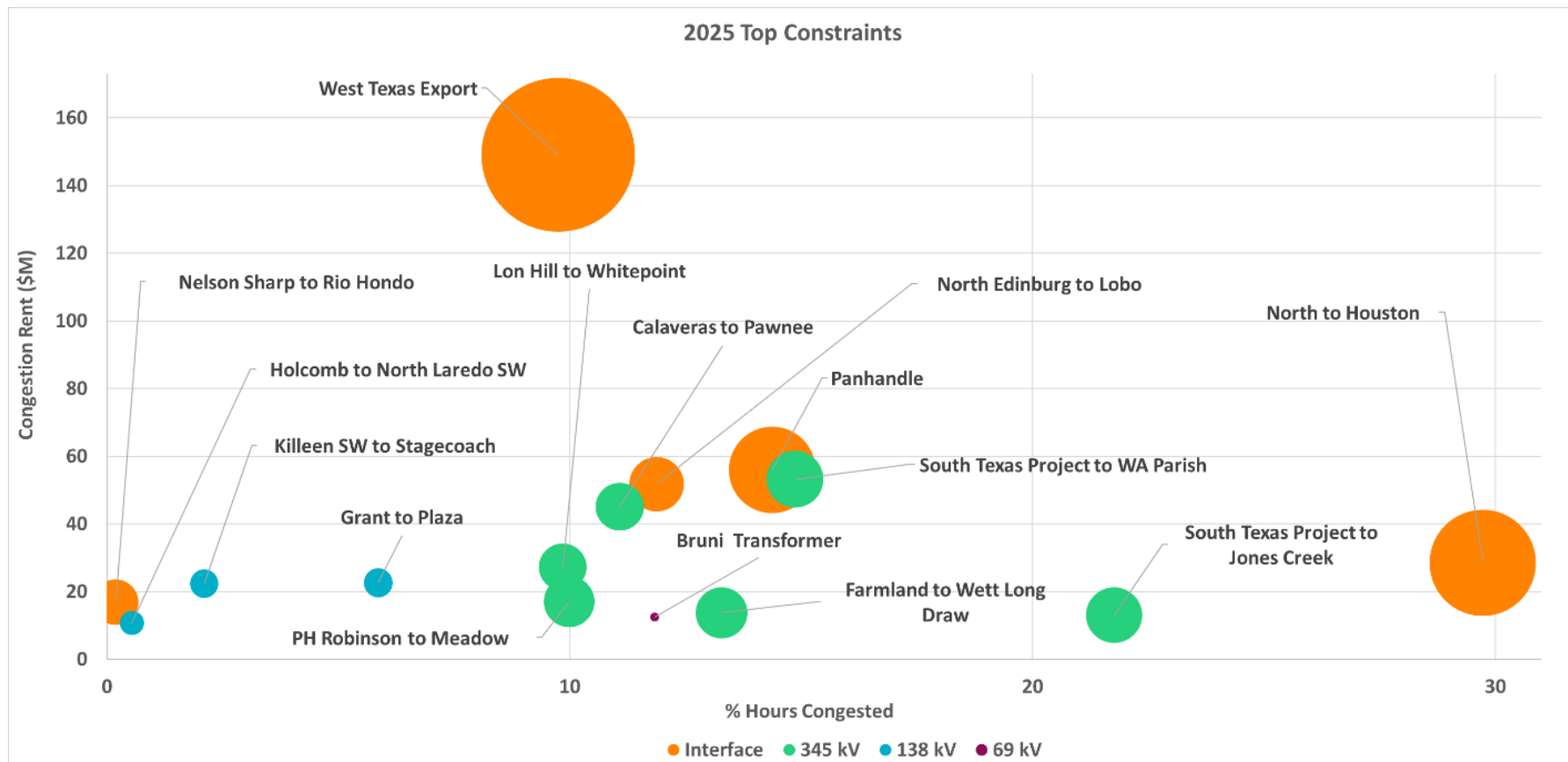
Index	Constraint	Congestion Rent* (M\$)	
		2025	2028
1	West Texas Export Interface	149M	66M
2	South Texas Project to WA Parish 345-kV Line	53M	85M
3	Panhandle Interface	56M	56M
4	Calaveras to Pawnee Switching Station 345-kV Line	45M	26M
5	North Edinburg to Lobo Interface	52M	N/A
6	Lon Hill to Whitepoint 345-kV Line	27M	17M
7	Farmland to Wett Long Draw 345-kV Line	14M	29M
8	North to Houston Interface	29M	7M
9	South Texas Project to Jones Creek 345-kV Line	13M	17M
10	Grant to Plaza 138-kV Line	23M	6M



*Congestion rent indicates areas of the system where economic transmission projects may be beneficial. It is not an indication of whether a project to reduce specific congestion would or would not meet the ERCOT economic planning criteria.

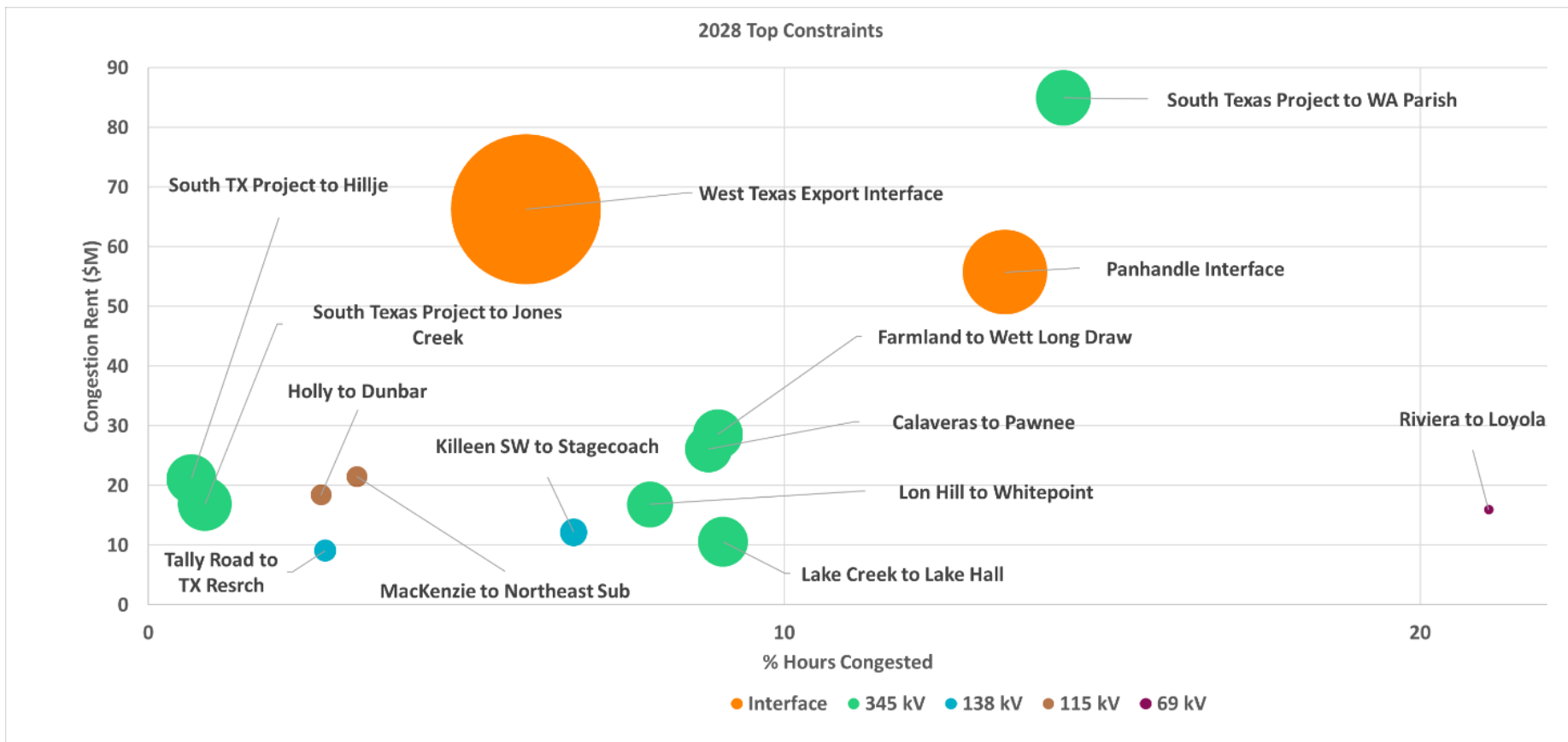
Top Constraints – 2025

- For the 2025 case, the top congested elements are five interfaces, six 345-kV elements, three 138-kV elements and one 69-kV element.



Top Constraints – 2028

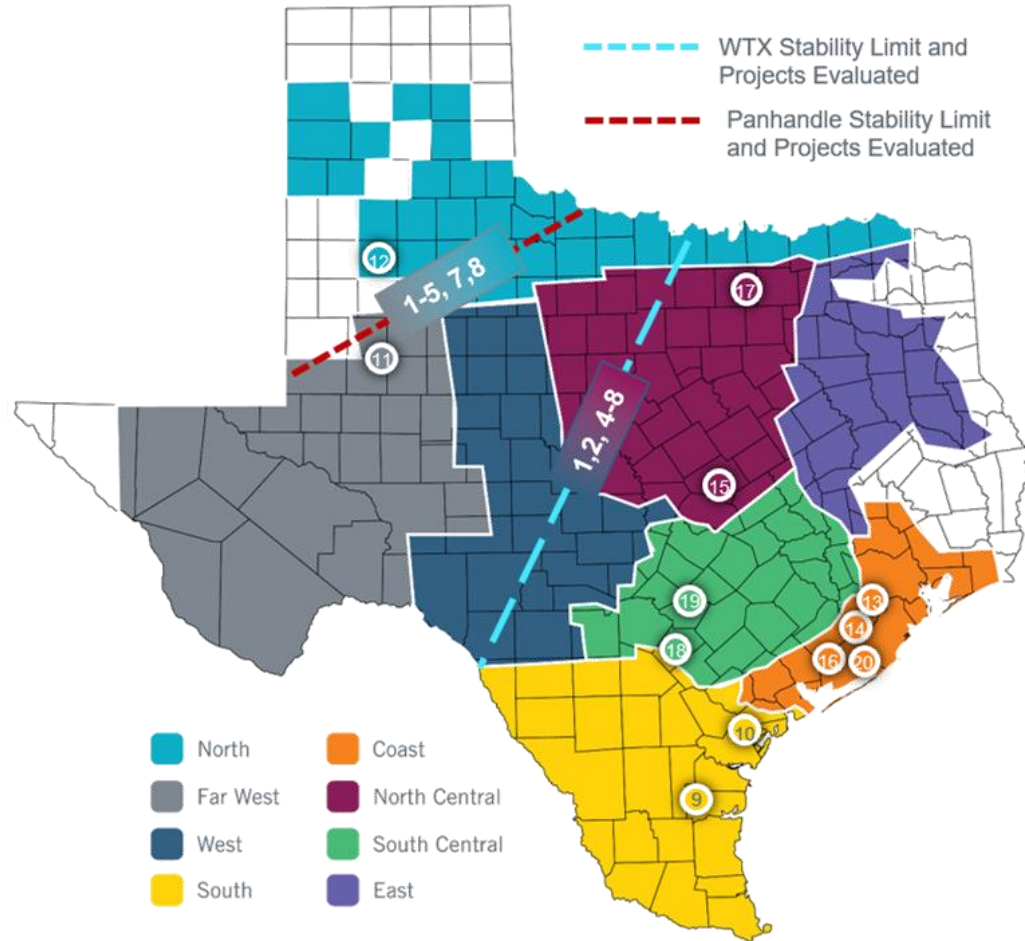
- For the 2028 case, the top congested elements are two interfaces, seven 345-kV elements, two 138-kV elements, two 115-kV elements and two 69-kV elements*.



*Trumbull Transformer with 43% of congested hours and \$7.3M congestion rent is not illustrated in the graph.

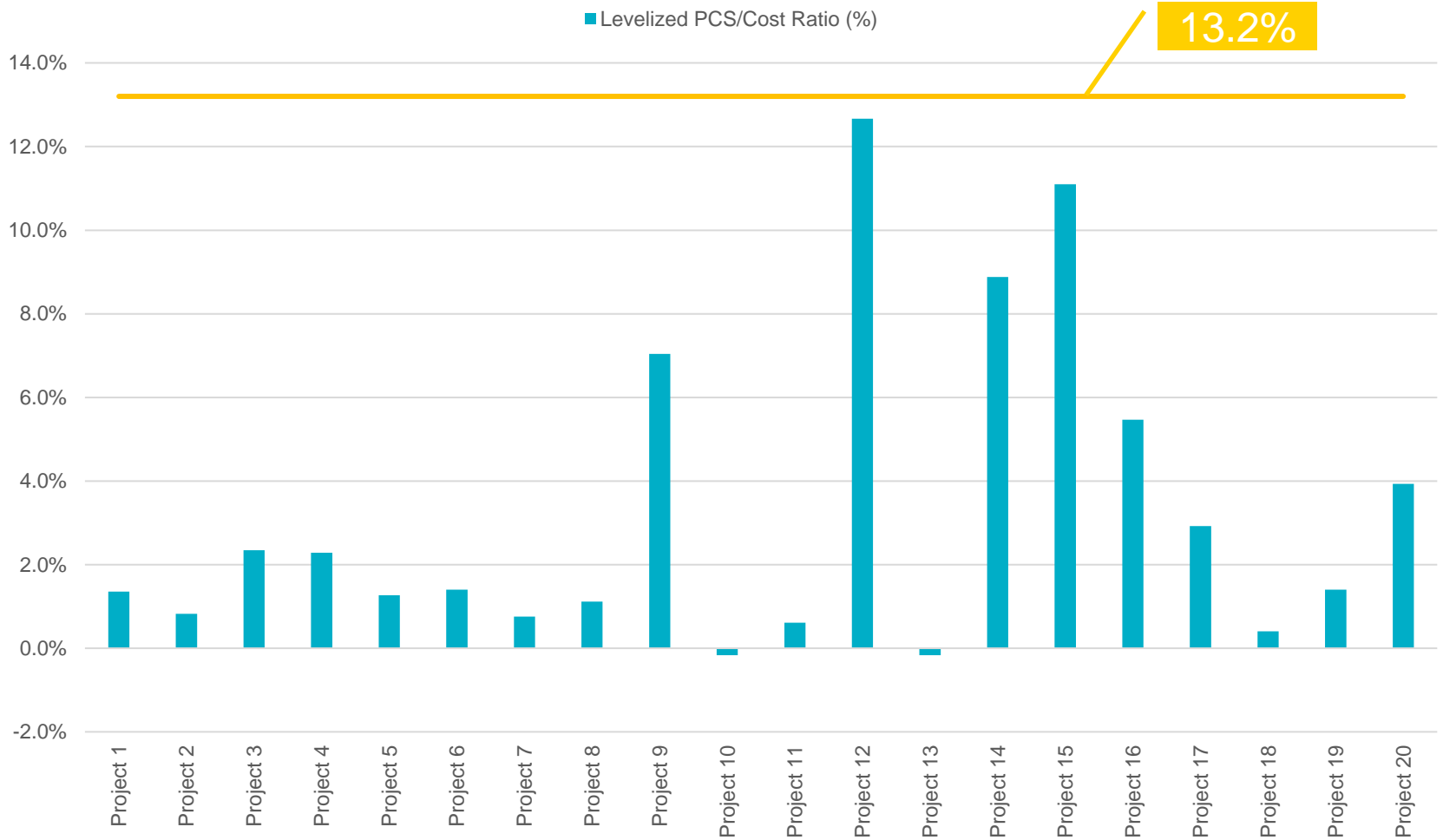
Projects Selected for Evaluation

Index	Description
Project 1	4 AC lines proposed by Long -Term West Texas Export Study Report (LTWTX)*
Project 2	3 AC lines plus Tesla to King 1500 MW HVDC proposed by LTWTX*
Project 3	New White River to Long Draw and Black Water to Dermott double-circuit 345-kV lines
Project 4	New Tesla to Graham-Royse double-circuit 345-kV line
Project 5	New Tesla to King 1500 MW HVDC
Project 6	New Brown to Bell County East Switch double-circuit 345-kV line
Project 7	New Tesla to Marion 1500 MW HVDC
Project 8	New Tesla to WA Parish 1500 MW HVDC
Project 9	Loyola to Driscoll 69-kV area upgrades
Project 10	Lon Hill to Angstrom 345-kV line upgrade
Project 11	Farmland to Wett Long Draw 345-kV line upgrade
Project 12	Lubbock Area 115-kV line upgrades
Project 13	WA Parish to Obrien 345-kV line upgrade
Project 14	New South Texas Project to Bailey to Ph Robinson 345-kV lines
Project 15	Killeen Area 138-kV line upgrades
Project 16	South Texas Project to Hillje 345-kV double circuit line upgrade
Project 17	Lewisville to Dunham 345-kV line upgrade
Project 18	San Miguel to Marion 345-kV double-circuit line upgrade
Project 19	South to Central Texas reliability project
Project 20	Coast Area 345-kV line upgrades and additions



*Full description of the projects can be found in Appendix P of the 2023 Regional Transmission Plan report.

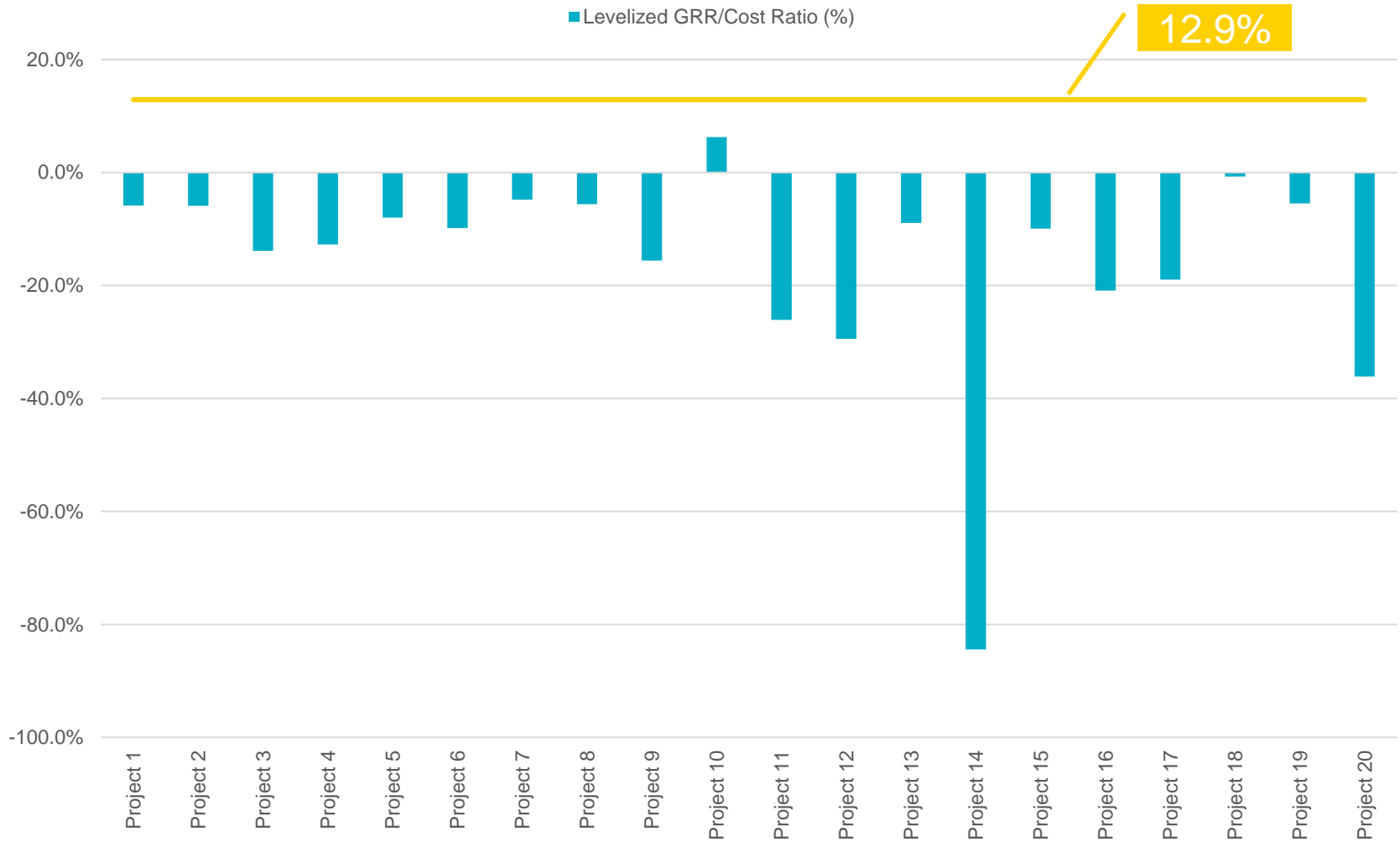
Levelized PCS/Cost Ratio (%) Based on Generic Cost Estimate



*Break-even Capital Cost, if applicable, was also provided in Appendix P of the 2023 Regional Transmission Plan report.



Levelized GRR/Cost Ratio (%) Based on Generic Cost Estimate



Questions

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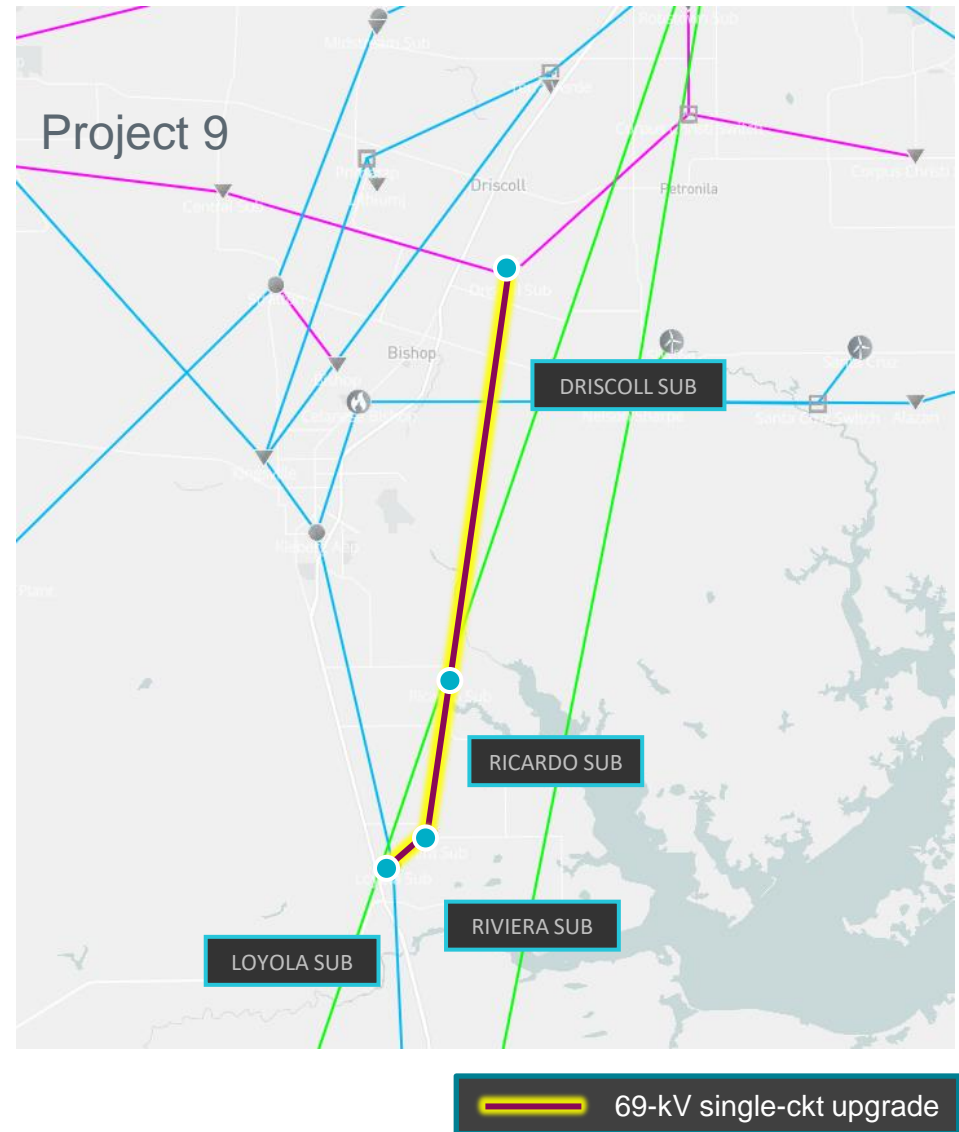
West Texas Export Interface and Panhandle Interface

- The West Texas (WTX) Export interface and Panhandle interface among the top congested elements observed for both the 2025 and 2028 study years.
- Projects 1-8 evaluated to relieve the congestions
 - Significant production cost savings (PCS) achieved
 - Due to their large capital cost of these projects, they failed to pass the PCS test
 - Details presented at [the December 13, 2023 RPG meeting](#)

Index	Adj. PCS in 2028 (\$M)	Levelized PCS in 2025 Dollars (\$M)	Break-even Capital Cost in 2025 Dollars (\$M) - PCS	Adj. GRR in 2028 (M\$)	Levelized GRR in 2025 Dollars (\$M)	Break-even Capital Cost in 2025 Dollars (\$M) - GRR
Project 1	39.7	37.4	283.3	-171.3	-161.4	N/A
Project 2	45.7	43.1	326.3	-327.3	-308.4	N/A
Project 3	13.0	12.3	93.1	-77.4	-72.9	N/A
Project 4	16.7	15.8	119.5	-93.3	-88.0	N/A
Project 5	40.6	38.2	289.6	-255.2	-240.5	N/A
Project 6	8.9	8.4	63.5	-62.7	-59.1	N/A
Project 7	21.5	20.3	153.7	-136.3	-128.5	N/A
Project 8	37.2	35.0	265.5	-186.5	-175.7	N/A

Project 9: Loyola to Driscoll 69-kV Area Upgrades

- This project is primarily proposed to improve the Loyola Sub to Riviera Sub 69-kV line congestion.
- The project results in **\$0.6M** production cost saving in 2025 and **\$7M** in 2028.
- Generation revenue is decreased by **\$0.4M** in study year 2025 and increased by **\$17.4M** in study year 2028.
- The benefit to cost ratio is less than the first-year revenue requirement with an estimated capital cost of \$50M.



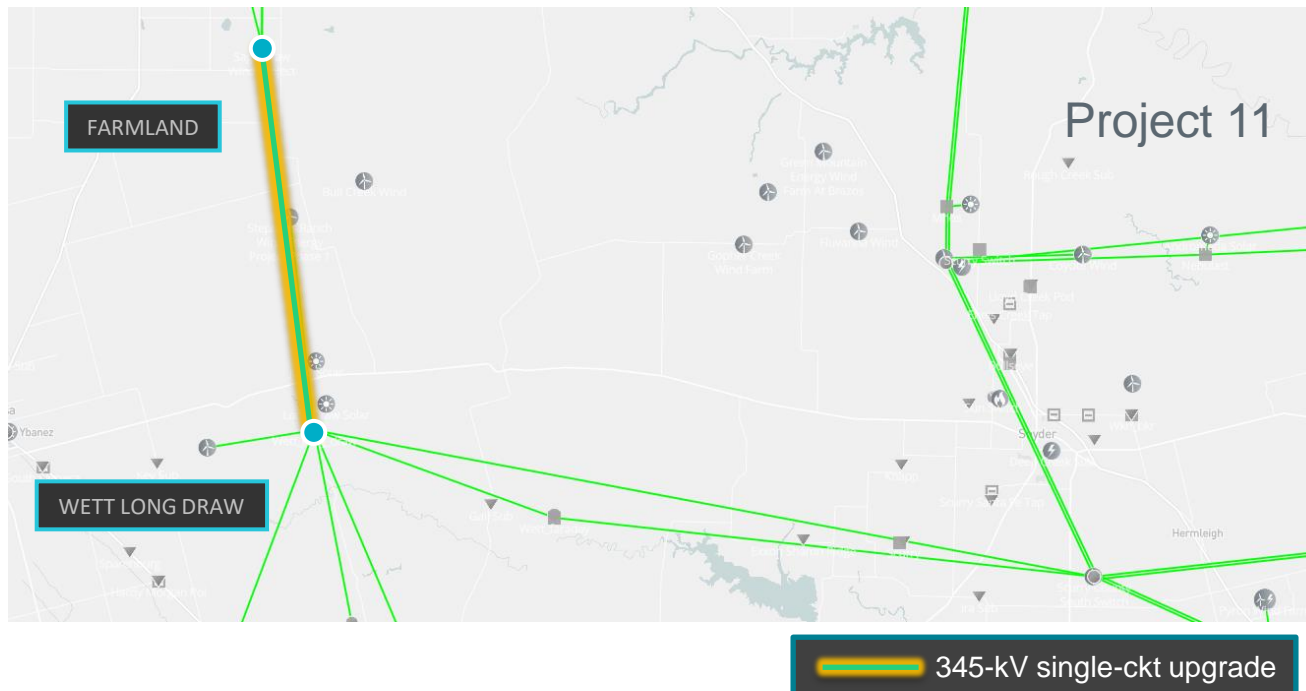
Project 10: Lon Hill – Angstrom 345-kV Area Upgrade

- This project is primarily proposed to improve the Lon Hill to Whitepoint 345-kV line congestion.
- The project results in **\$1M** production cost increase in 2025 and **\$0.8M** savings in 2028.
- Generation revenue is decreased by **\$7M** in study year 2025 and by **\$0.4M** in study year 2028.
- The benefit to cost ratio is less than the first-year revenue requirement with an estimated capital cost of \$58M.



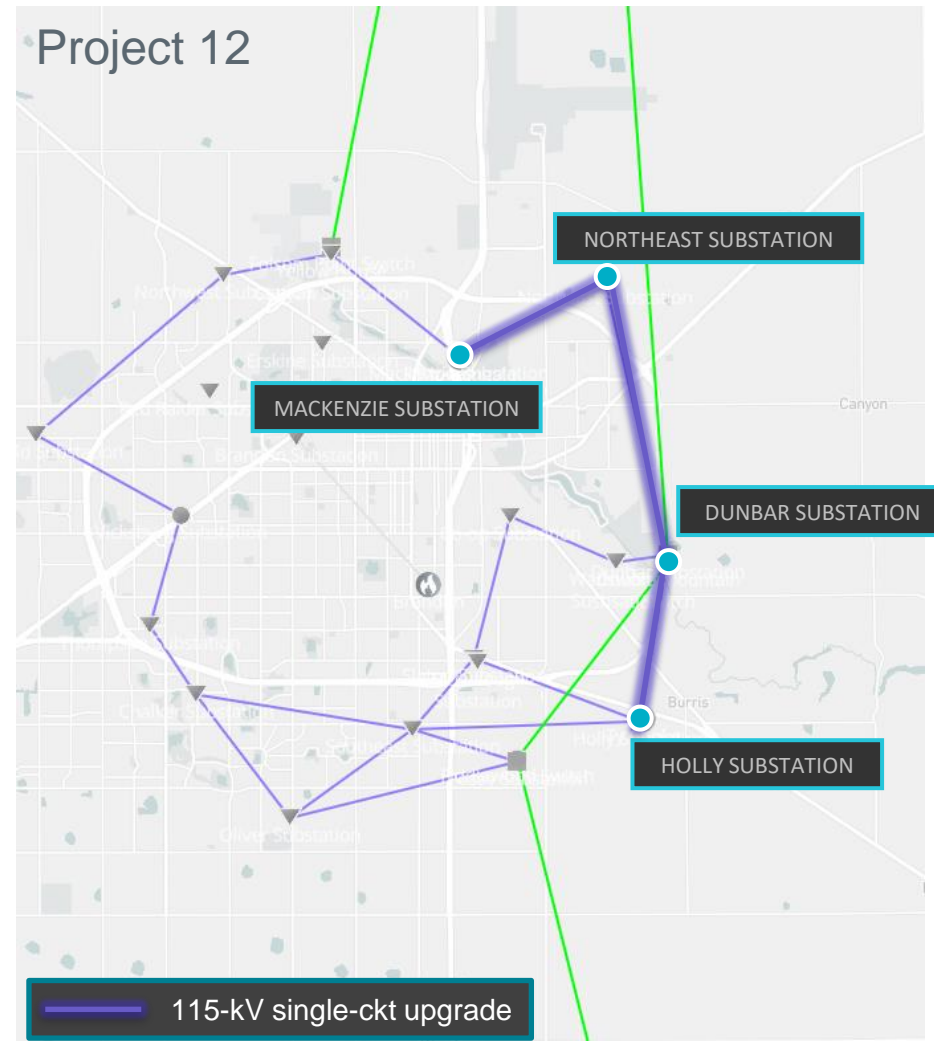
Project 11: Farmland – Wett Long Draw 345-kV Line Upgrade

- This project is aimed to improve Farmland to Wett Long Draw 345-kV line congestion.
- The project results in **\$0.2M** production cost savings in 2028.
- Generation revenue is increased by **\$9.5M** in study year 2028.
- The benefit to cost ratio is less than the first-year revenue requirement based on the generic capital cost estimate (\$34M).



Project 12: Lubbock Area 115-kV Line Upgrades

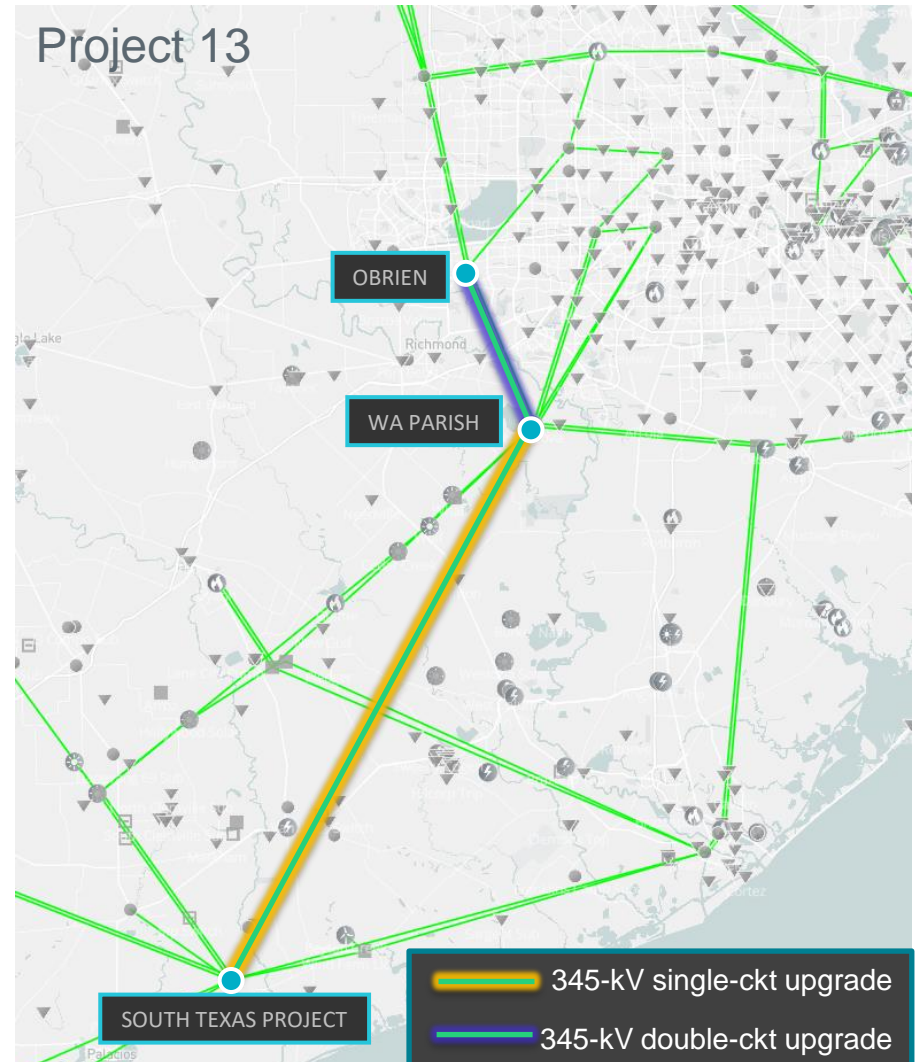
- This project is proposed to improve Dunbar to Holly congestion and Mackenzie to Northeast 115-kV line congestion.
- The project results in **\$4.3M** production cost increase in 2025 and **\$9.4M** savings in 2028.
- Generation revenue is increased by **\$3.8M** in study year 2025 and by **\$7.1M** in study year 2028.
- The benefit to cost ratio is less than the first-year revenue requirement based on the generic capital cost estimate (\$18M).



Project 13: WA Parish to Obrien 345-kV Line Upgrade

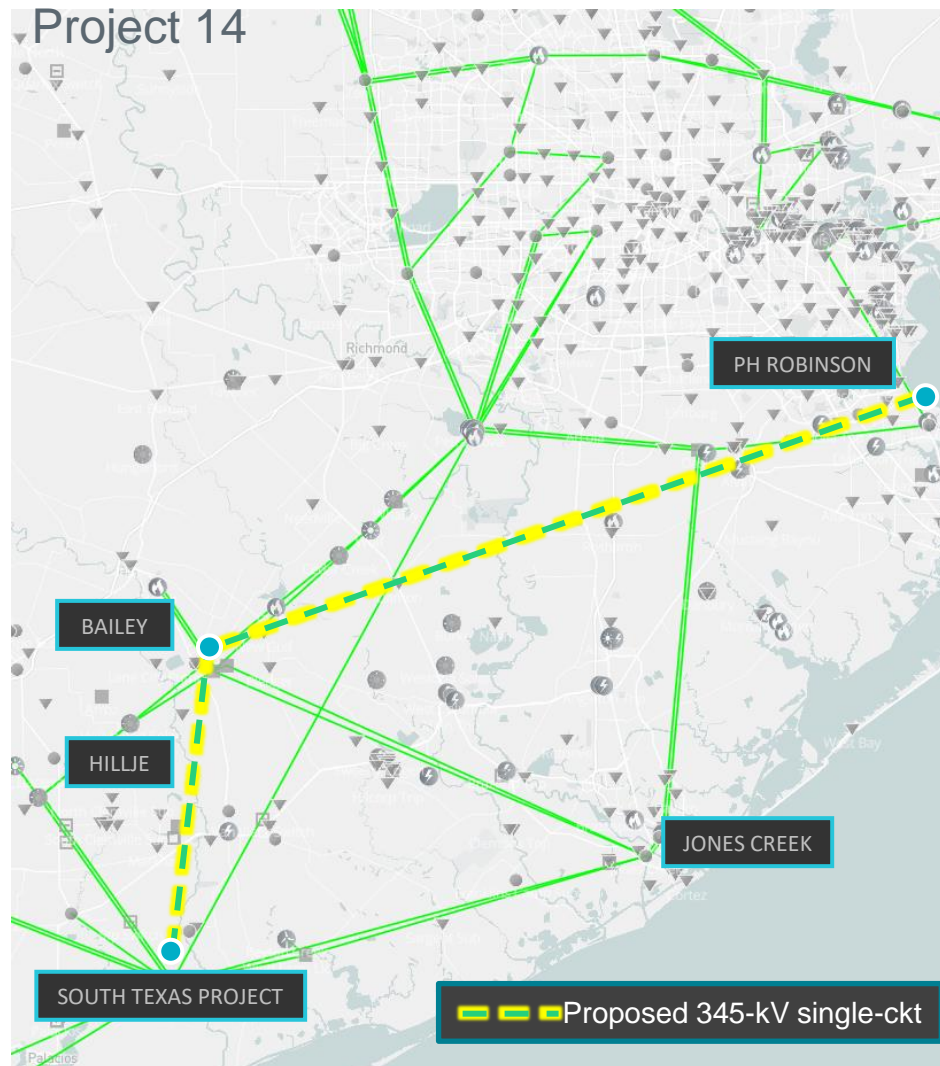
- This project* is proposed to improve South Texas Project to WA Parish congestion.
- The economic addition part results in **\$0.1M** production cost increase in 2028.
- Generation revenue is increased by **\$6.4M** in study year 2028.
- The project has an estimated capital cost of \$68M.

*The upgrade of the South Texas Project to WA Parish 345-kV line (placeholder reliability project) and the WA Parish to Obrien 345-kV line (economic addition) was tested in the 2028 economic case.



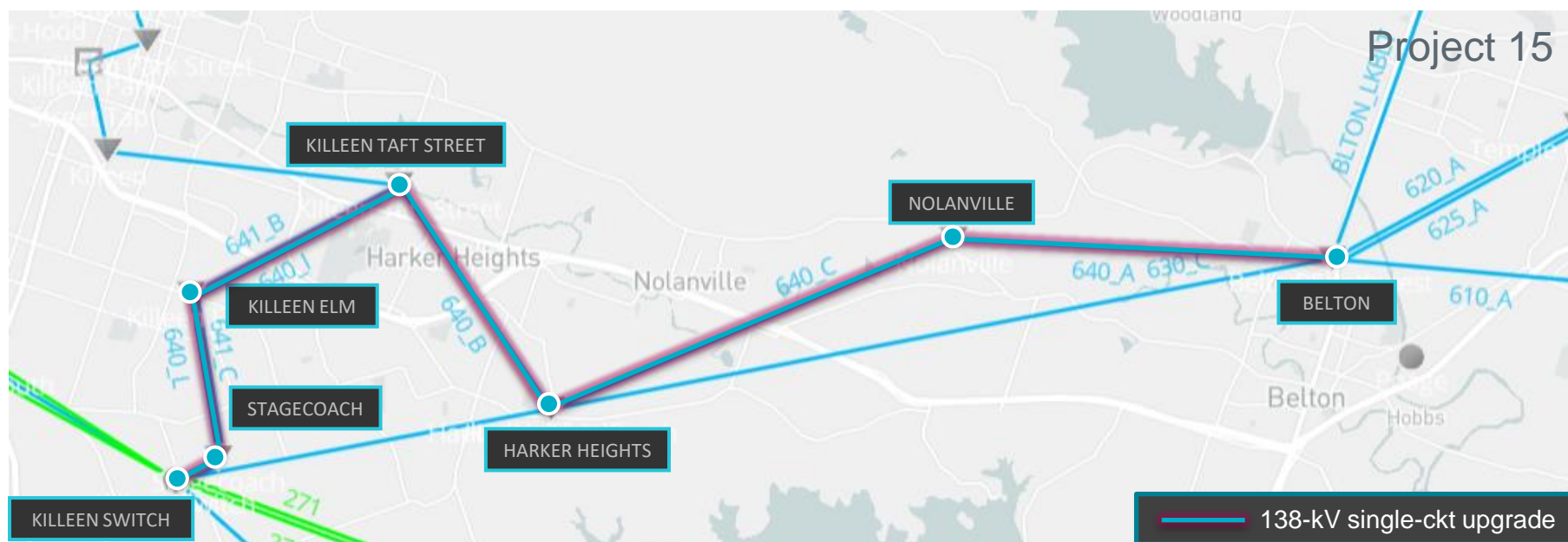
Project 14: South Texas Project – Bailey and Bailey – PH Robinson 345-kV Lines

- The project is proposed to improve the South Texas Project to Hillje and the South Texas Project to Jones Creek congestions.
- The project results in **\$20.6M** production cost savings in 2028.
- Generation revenue is increased by **\$196.1M** in study year 2028.
- The benefit to cost ratio is less than the first-year revenue requirement based on the generic capital cost estimate (\$219M).



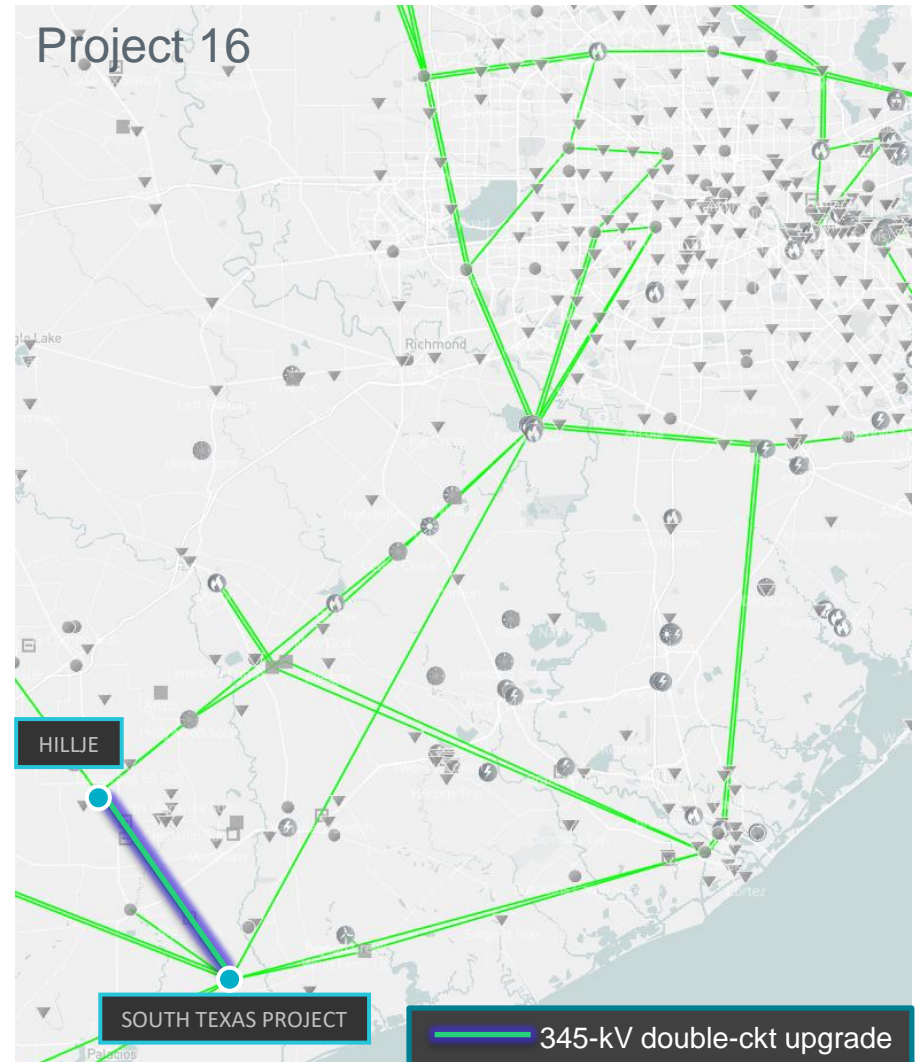
Project 15: Killeen Area 138-kV Line Upgrades

- This project is proposed to improve the Killeen Switch to Stagecoach 138-kV line congestion.
- The project results in **\$3.1M** production cost saving in 2025 and **\$3.1M** savings in 2028.
- Generation revenue is decreased by **\$0.5M** in study year 2025 and increased by **\$6.2M** in study year 2028.
- The benefit to cost ratio is less than the first-year revenue requirement based on the generic capital cost estimate (\$26M).



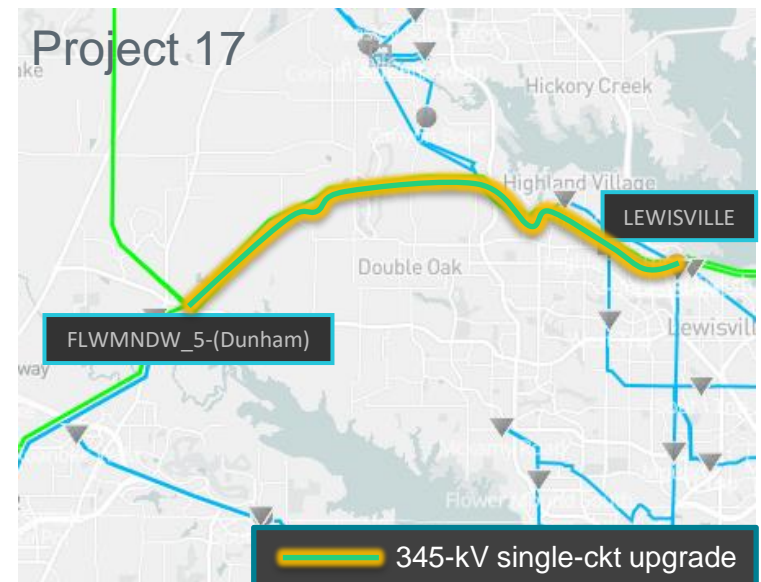
Project 16: South Texas Project to Hillje 345-kV Double-Circuit Line Upgrade

- This project is proposed to improve the South Texas Project to Hillje congestion.
- The project results in **\$4.5M** production cost savings in 2028.
- Generation revenue is increased by **\$17.2M** in study year 2028.
- The benefit to cost ratio is less than the first-year revenue requirement based on the generic capital cost estimate (\$78M).



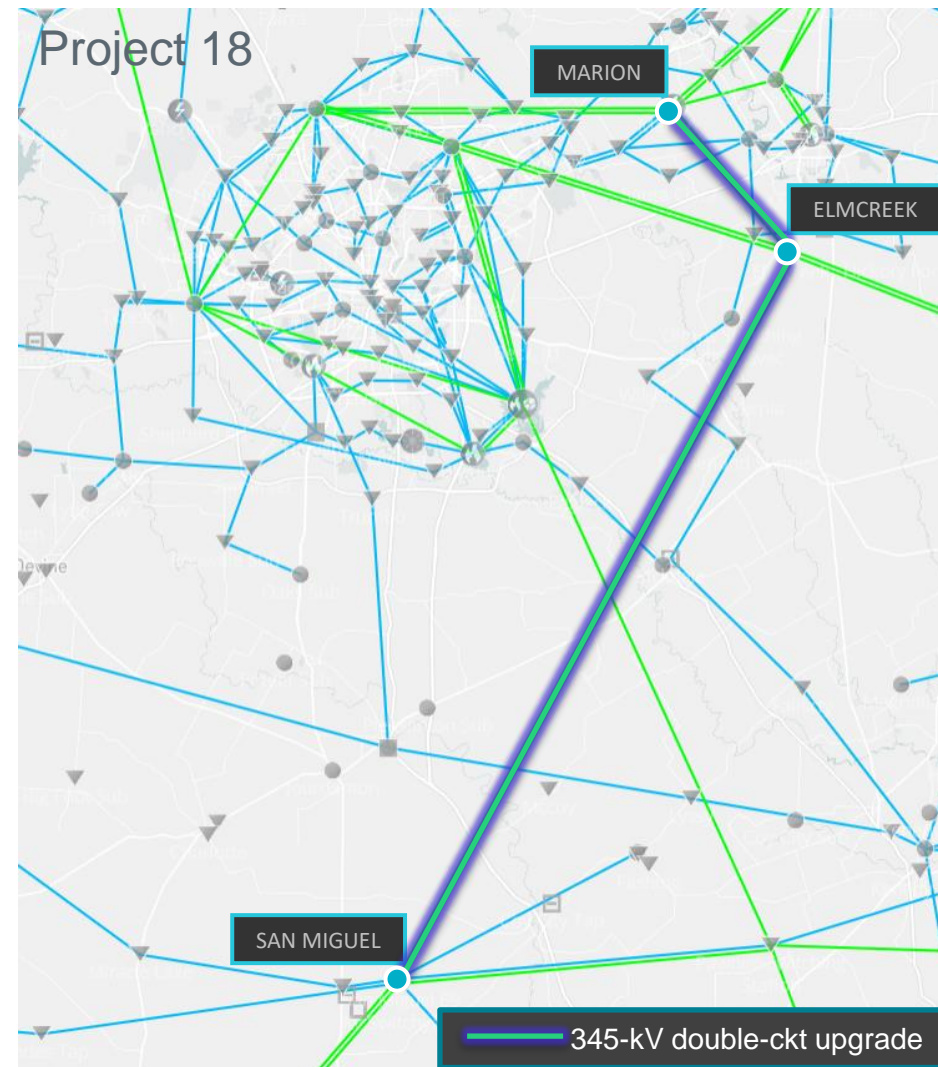
Project 17: Lewisville to Dunham 345-kV Line Upgrade

- This project is proposed to improve the congestion on one circuit of the Lewisville Switch to Dunham 345-kV line.
- The project results in **\$0.2M** production cost savings in 2025 and **\$0.9M** in 2028.
- Generation revenue is increased by **\$7.7M** in study year 2025 and decrease by **\$0.9M** in study year 2028.
- The benefit to cost ratio is less than the first-year revenue requirement based on the generic capital cost estimate (\$18M).



Project 18: San Miguel to Marion 345-kV Double-Circuit Line Upgrade

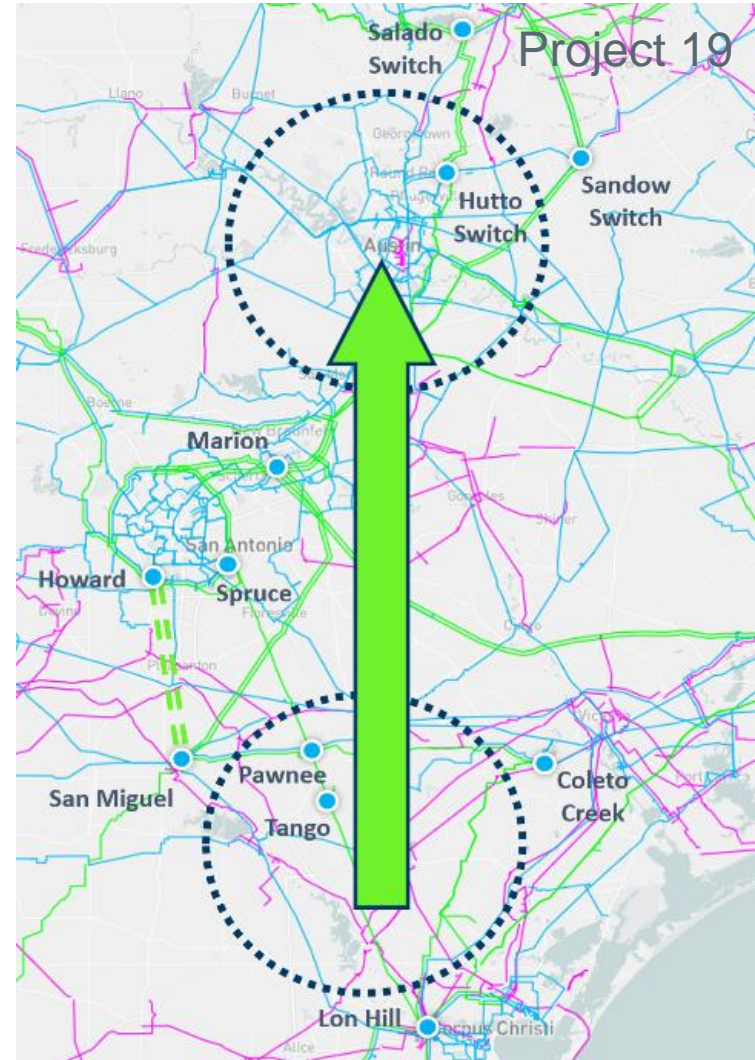
- The “Brazos San Miguel to Marion 345-KV Project”* RPG project was evaluated in the 2028 economic case.
- The project results in **\$1.1M** production cost savings in 2028.
- Generation revenue is increased by **\$2M** in study year 2028.
- The benefit to cost ratio is less than the first-year revenue requirement based on the generic capital cost estimate (\$259M).



* The RPG project has an expected in-service date of 2027

Project 19: South to Central Texas Reliability Project

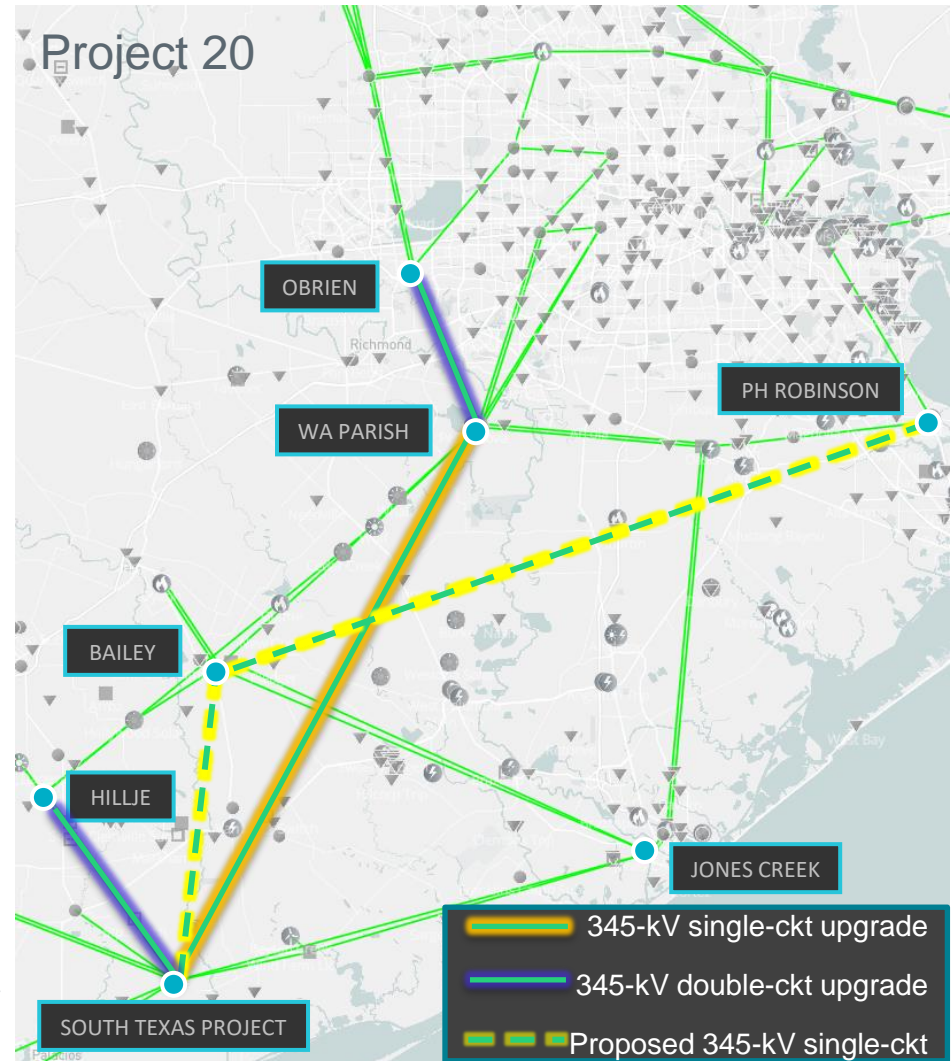
- This project* was proposed as a placeholder reliability project in the 2023 RTP reliability study for the study year 2029. It was tested to help relieve the congestion on the Calaveras to Pawnee 345-kV line in 2028.
- The project results in **\$15.2M** production cost savings in 2028.
- Generation revenue is increased by **\$59.6M** in study year 2028.
- The benefit to cost ratio is less than the first-year revenue requirement based on the generic capital cost estimate (\$1,026M)



*The project details can be found in Appendix F.

Project 20: Coast Area 345-kV Line Upgrades and Additions

- This project* is proposed to improve the congestions on three 345-kV lines in the Coast Weather Zone, i.e., South Texas Project (STP) to Hillje, STP to Jones Creek and STP to WA Parish.
- The project results in **\$15.2M** production cost savings in 2028.
- Generation revenue is increased by **\$139.6M** in study year 2028.
- The benefit to cost ratio is less than the first-year revenue requirement based on the generic capital cost estimate (\$364M).



*This project is a combination of project 12, 14 and 16 and South Texas Project to WA Parish 345-kV line upgrade is a placeholder reliability project.