



Elk River PV SCED Analysis

Energi.X Analytics, LLC



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1 Executive Summary

This report presents the results of a congestion and curtailment study for a solar PV project connected to a North Hub node within the Electric Reliability Council of Texas (ERCOT). The project is a **400MW** Standalone solar project connecting to **the Clear Crossing – Willow Creek 345kV line**. The study uses a developer provided production hourly profile that accounts to a **27.9% Net Capacity factor (NCF)**. The project is model under a PTC tax credit scenario. The study assesses the project's impact under various scenarios for the years 2027, 2030, and 2033. Each scenario utilizes a set of future generation buildout assumptions which are listed below.

Table 1-1: Future Generation Buildout Assumptions

Scenario	Year	Wind	Solar (MW)	Storage (MW)	Total (MW)
1	2027 Base Case	7,459	14,763	7,016	29,238
2	2030 Base Case	2,835	7,242	0	10,077
3	2033 Base Case	0	7,332	0	7,332
		10,294	29,337	7,016	46,647

The study modeled an additional buildout of **46.5GW** as listed in the table above beyond the already operational generators in ERCOT.

The key findings from the analysis are summarized below:

1.1 Production Weighted Nodal Basis

The production-weighted basis is calculated by taking the average difference between the nodal solar production prices and the reference hub prices, weighted by the amount of solar energy produced at each time interval. This method ensures that the value of solar energy reflects both the temporal patterns of production and the market conditions at the hub. It helps analyze risk from a LMP price separation with reference to a transaction at a regional Hub (North HUB). The project node experiences a 12.29% basis discount in 2027 reducing to a 9.97% discount in 2033 with respect to ERCOT North Hub. Basis is mainly attributed to the West Texas Generic Transmission Constraint (GTC) that is the single most transmission constraint contributing to the nodal price discount.

Table 1-2: Production Weighted Delivered Average LMP Summary (\$/MWh)

<u>Scenario</u>	<u>Nodal LMP</u>	<u>North Hub</u>	<u>Nodal Basis to North Hub</u>	<u>Basis Discount to North Hub</u>
2027 Base Case	21.06	24.01	-2.95	-12.29%
2030 Base Case	24.03	27.86	-3.83	-13.75%
2033 Base Case	26.90	29.88	-2.98	-9.97%

1.2 Total Curtailment

Energy curtailment refers to the reduction in the output of renewable energy sources like solar or wind when their generation exceeds demand or when there are limitations in the transmission system. In the ERCOT grid, several types of curtailment can affect renewable project curtailment.

1.2.1 Economic Curtailment

Economic curtailment happens when the cost of producing energy exceeds the market price. In a scenario where the supply of electricity from solar projects is high, and demand is low, market prices can drop significantly, most often going negative. To avoid financial losses, solar operators might voluntarily reduce production.

1.2.2 Reliability Curtailment

System reliability curtailment is implemented to ensure the overall stability and reliability of the grid. During periods of low demand and high solar generation, grid operators might curtail solar power to maintain the balance between supply and demand and ensure that the frequency and voltage levels stay within acceptable ranges.

1.2.3 Miscellaneous Curtailment

This includes any plant level outage curtailment like main Power transformer, Generation tie line along with inverter outages.

Table 1-3: Total Annual Curtailment

Scenario	SCED(MWh)	SCED (P50%)	Reliability(%)	Misc*(%)	Total(%)
2025 Base Case	1,637	0.17%	0.05%	0.40%	0.62%
2030 Base Case	2,746	0.28%	0.05%	0.30%	0.63%
2033 Base Case	4,987	0.36%	0.05%	0.30%	0.71%

The project experiences minimum annual curtailment across all buckets averaging less than 0.75% per year.

2 Conclusion

The results of the study show a project location that has a shape weighted price discount between **9-13% to North Hub** including minimal total annual curtailment. The project location looks advantageous for a solar PV project of scale and does not see a significant impact from transmission congestion outside of the set of lines making up the West Texas GTC.