



WHITE PAPER

Lubbock Load Not Enough to Fill the Sails of Panhandle Wind

By Himali Parmar and Rakesh Maurya



Shareables

- Wind development in the Texas Panhandle continues to be strong despite low natural gas prices and a saturated renewable energy credit market.
- Recommended transmission options to integrate Lubbock Power & Light into the ERCOT system reduce the risk of negative pricing for future wind development.
- ICF still expects additional transmission expansion in the Panhandle to support the surge in wind project demand.

Executive Summary

Despite strong headwinds from record low natural gas prices and a saturated renewable energy credit market, the Texas Panhandle continues to attract wind investments. Incentives in the form of federal production tax credits, along with some of the highest quality wind sites, have attracted investors to this region. With no local demand, these wind farms rely on transmission lines to export their supply to load centers. Since 2008, ERCOT has proactively attempted to keep up with the interest in wind through the ambitious Competitive Renewable Energy Zone (CREZ) transmission expansion and more recently through the Panhandle Renewable Energy Zone (PREZ) assessments. Transmission options recommended by the PREZ analyses and approved by the Public Utility Commission of Texas are expected to increase transmission access to the Panhandle wind. Recent news that Lubbock Power & Light (“LP&L” or “Lubbock”) will integrate into the ERCOT system is also a positive development. LP&L provides much-needed local demand to the Panhandle wind, and the transmission reinforcements to integrate LP&L into ERCOT will further improve the Panhandle wind farm’s transmission access to the rest of ERCOT. Despite these positive developments, the Panhandle is projected to experience significant negative pricing unless additional transmission is built.

Evolution of the Panhandle Grid

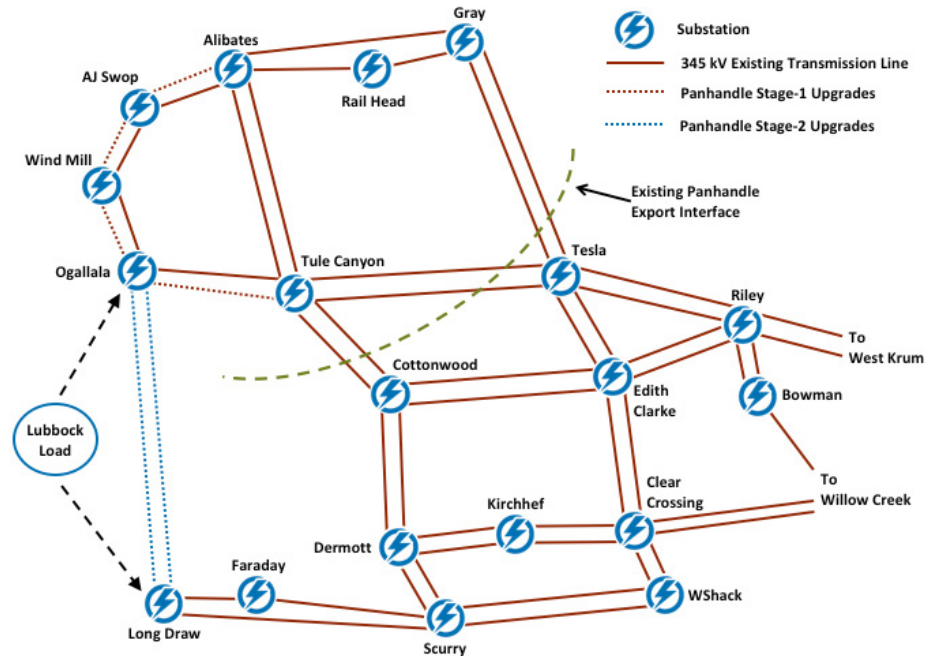
Panhandle wind development started after ERCOT’s multibillion dollar CREZ transmission expansion. CREZ included a set of 345 kV transmission lines that connected the Panhandle region to the rest of ERCOT. At the start of CREZ construction in 2008, ERCOT queue had no generation units with interconnection agreements for the proposed Panhandle substations. Moving forward eight years, the region has added 2,459 MW of wind capacity. As of May 2016, the interconnection queue has more than 11,000 MW of proposed wind projects in the Panhandle region (more than 40 percent of the total across ERCOT). Approximately 25 percent (~2,600 MW) of this capacity meets ERCOT’s firm capacity criteria.¹ According to ERCOT’s recent planning reports, power exports from the Panhandle are currently limited to approximately 2,711 MW.² This interface limit is inclusive of a 10 percent de-rate for reliability

¹ According to Section 6.9 of the ERCOT Planning Guide, any plant that meets all three of the following criteria are included in ERCOT’s transmission planning models and are assumed firm: (i) sufficient financial guarantees; (ii) water rights; and (iii) air permits.

² ERCOT Item 8: Panhandle Regional Planning Group Project, December 8, 2015.



Transmission Topology of Texas Panhandle Region



Source: ICF and ERCOT

margins. Review of ERCOT’s real-time constraints reveals that the transfer limit was as high as 3,000 MW in some hours. The average transfer limit for the first five months of 2016 is 2,590 MW, while the lowest transfer limit during the same period was 1,853 MW.

Where a Lot May Not Be Enough

Through the initial PREZ reports released in April 2014 and December 2015, ERCOT has attempted to stay lockstep with the pace of wind activity but has ultimately fallen short.

In the April 2014 study, ERCOT released a road map that included system upgrade needs and the associated triggers in terms of wind generation capacity in the Panhandle. In Stage 1, synchronous condensers and double circuiting of the existing panhandle transmission loop were proposed as the most viable options at a 3,000 MW wind level. The trigger for Stage 2 upgrades was set at 6,500 MW of wind and includes a new 345 kV double circuit line from Ogallala to Long Draw and additional reactive power support.

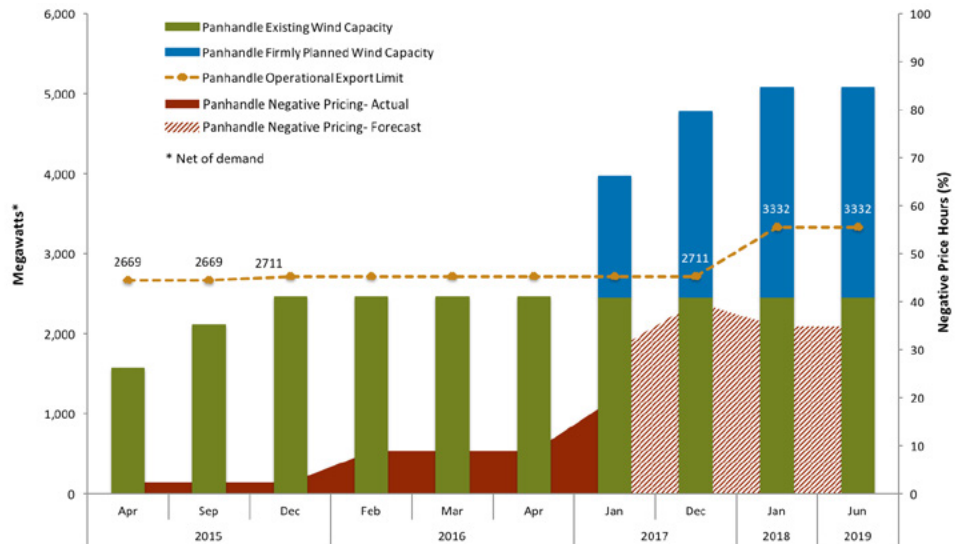
In December 2015, the ERCOT board endorsed the Stage 1 upgrades. These upgrades are expected to provide approximately a 600³ MW increase in export capability (from the current export limit of 2,711 MW) and are expected to be in service by 2018. In its ruling, the board also made clear that “energizing the second circuit completes the CREZ project and no further transmission projects could be authorized under the CREZ order.”

³ After factoring 10 percent de-rate for reliability margins.



The Panhandle has 2,459 MW of existing wind. In the five months after the extension of the production tax credit in December 2015, firm⁴ wind capacity in the region has increased by 600 MW to approximately 2,600 MW. By 2018, approximately 5,100⁵ MW of wind is expected to be operational in the Panhandle. At this level, the wind capacity is too much for the 3,332 MW export limit but far below the 6,500 MW trigger for the Stage 2 upgrades.

Outlook for Panhandle with Approved Stage 1 Transmission Upgrades



Source: ICF and ERCOT

The Panhandle is already experiencing an uptick in negative pricing. The Panhandle witnessed approximately 250 hours of negative prices in 2015⁶; the same number of hours has been seen in just the first five months of 2016. ICF estimates negative prices in the Panhandle to increase to approximately 20 percent of hours by the end of 2016 (from the current three percent of annual hours) and increasing to 40 percent by the end of 2017 with 4,700 MW of Panhandle wind. With Stage 1 upgrades, expected to be fully energized by 2018/2019, the negative pricing hours are expected to decline to approximately 35 percent with 5,100 MW of total wind. More instances of negative pricing could lead to higher curtailment of wind output.

Welcome Lubbock

LP&L's announcement to join ERCOT somewhat reduces the Panhandle's reliance on transmission. LP&L plans to migrate approximately 500 MW of peak demand and three power plants with a total installed capacity of 130 MW to ERCOT in June 2019. LP&L load is currently served by a combination of local supply and a power contract with Xcel Energy, which expires in May 2019. LP&L undertook a request for proposal process to find a solution for long-term power in 2015. After extensive study and review, the LP&L Electric Utility Board and the Lubbock City Council determined that entry to the ERCOT market was in the best long-term interest of the LP&L ratepayers.

⁴ Sourced from the ERCOT GIS Report, May 2016. This capacity is firm according to Section 6.9 of the ERCOT Planning Guide.

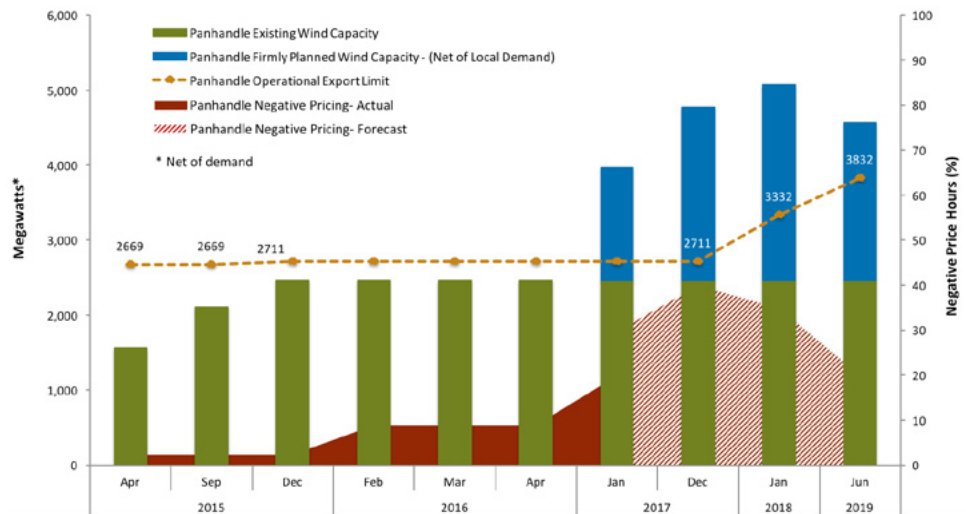
⁵ Includes 2,459 MW of existing and 2,600 of firm wind capacity.

⁶ In real-time market.



On June 9, 2016, ERCOT released its findings of a study to identify the most cost-effective set of new transmission facilities that would be required to integrate the LP&L load and transmission network with the ERCOT system. In selecting the preferred among 40 options (4ow), ERCOT's report cited that the "primary reason for the annual production cost savings observed with option was an increase in the export capability from the Panhandle region, which could facilitate greater use of wind generation in that area." The report also states that the preferred option would create an electrically similar path through a series of intermediate substations and is consistent with ERCOT's Stage 2 transmission plans. The recommended Option 4ow involves a single-circuit 345 kV transmission line from Ogallala to Long Draw, whereas Stage 2 indicated double circuit. The recommended option increases the Panhandle export limit to 3,821 MW.⁷

Outlook for Panhandle with Lubbock Integration



Source: ICF and ERCOT

After factoring 500 MW of local demand and incremental 489 MW (above Stage 1 upgrade) export limit by 2019, negative prices are expected to be only 20 percent compared to 35 percent without LP&L integration.

Conclusion

The approved Stage 1 transmission upgrades fall short of the projected wind output. According to ICF estimates, in spite of Stage 1 upgrades, the Panhandle could experience negative pricing for up to approximately 35 percent of the hours in 2018. Lubbock is a significant positive development for the Panhandle wind; its integration not only provides a local market for the Panhandle wind but also approximately 500 MW of incremental transfer capability. As such, the proposed integration is expected to reduce negative pricing by approximately 50 percent by 2019. The Lubbock upgrades are still pending Public Utility Commission of Texas approval. Also, the exact timing of these transmission upgrades is still uncertain. Upgrades could be in place by summer 2019 to coincide with the schedule

⁷ After factoring 10 percent de-rate for reliability margins.



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of the proposed migration. Panhandle wind needs local load, and Lubbock load needs cost-effective generation options. The proposed integration provides mutual benefits. It is a great union for the Lubbock load, given the easy access to Panhandle wind. The Panhandle wind farm, on the other hand, gets local demand and improved transmission access, but it needs more; ERCOT may need to reconsider the Panhandle roadmap and the trigger for full Stage 2 upgrades. Absent additional transmission expansion, negative pricing would still be significant.

About the Authors



Himali Parmar performs analysis in generation, transmission, and ancillary services valuation; transmission studies; and utility restructuring. Her expertise includes forecasting transmission congestion and losses and their effect on locational power prices and plant dispatch in the U.S. power markets.

After earning a master's degree in Electrical Engineering from University of Wisconsin, she was an intern with the American Transmission Company. She did load flow and contingency analysis to develop short-and long-term transmission system plans for the transmission planning group. While a student at University of Wisconsin, Ms. Parmar was a teaching assistant for undergraduate courses in the Electrical Engineering Department.



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