

VERSION 1.0

ERCOT PANHANDLE RENEWABLE ENERGY ZONE OUTLOOK – 2017 UPDATE

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1. INTRODUCTION

West Texas has seen unprecedented investment in wind generation and more is expected. From 2015 through early 2016, wind capacity in the Panhandle Renewable Energy Zone (PREZ) nearly doubled. Today the Panhandle region alone has 3,429 MW of operational wind winter capacity, more than most states¹. Another 2,064 MW is on deck, with signed interconnection agreements with ERCOT and is projected to come online by January 2019, according to the December 2016 ERCOT Generator interconnection Status Report.

Panhandle area wind development, related transmission upgrades, interface limit and stability monitoring have been a frequent focus of discussion at ERCOT's monthly Regional Planning Group meetings and topics of interest of a variety of stakeholders in ERCOT.

LCG Consulting ("LCG") published the Panhandle Outlook report in 2016 analyzing the impact of congestion and curtailment on renewables units in the Panhandle region. This document reviewed several scenarios of future wind buildout, given the best available information at that time. At the end of 2016, Sharyland Utilities proposed several expansion options which could increase the transfer capability of the Panhandle interface out of which ERCOT's Regional Transmission Planning (RTP) group has evaluated and added Option 1 (addition of two 175MVA synchronous condensers) to their 2016 RTP Economic Cases.

In this Update, LCG examines some additional possibilities that include Sharyland's expansion Option 1, should it be implemented.

2016 Recap

The original 2016 LCG report examined the impact of ERCOT's plan's for Stage 1 and Stage 2 upgrades and Lubbock Power & Light (LP&L) integration in Panhandle². For the LP&L integration cases, the analysis included transmission upgrade Option 8A, 8B and 40W which were studied by the ERCOT planning group. Both 5,106 MW and 6,522 MW of wind buildout in Panhandle were simulated in UPLAN for all the scenarios for the year 2021.

LCG found that the Stage 1 upgrade without LP&L integration for 2021, the Panhandle curtailment is about 6% and 20% for 5,016 MW and 6,552 MW of wind penetration, respectively. With both Stage 1 and Stage 2 upgrades implemented, wind curtailment is eliminated in the 5,016 MW case and drops below 4% with 6,552 MW wind penetration.

The integration of LP&L with ERCOT will add 594 MW of load and 185 MW of synchronized generation in Panhandle. LCG found these additions improve wind curtailment across

¹ ERCOT Capacity, Demand and reserve Report. December 2016.

² LCG Consulting, May 2016, ERCOT Panhandle Renewable Energy Zone and Lubbock Power and Light Integration.

http://www.energyonline.com/Reports/Files/Panhandle_Excutive_Summary.pdf

Panhandle Interface. For the three LP&L integration options that we studied, the projected curtailment was less than 3% with Stage 1 upgrades and 5,016 MW of wind. However, with wind penetration of 6,552 MW, the curtailment was in the range of between 11% and 14%.

2017 Update

Sharyland has proposed nine expansion options that could increase the Panhandle interface export limit. Out of the nine options proposed, Options 1, 3 and 9 meet ERCOT's economic planning criteria (As outlined in ERCOT's Nodal Protocol Section 3.11.2). ERCOT's Regional Planning Group has evaluated Option 1 and has included it in their 2016 Transmission Expansion Plan (2016RTP Economic Cases).

Sharyland expansion Option 1 ("SU-O1") would introduce two 174 MVA synchronous condensers at the Windmill substation. LCG developed models for the years 2017, 2018 and 2021 to study the impact of SU-01. This report discusses LCG's findings for those study years.

The transmission network for the years 2017, 2018 and 2021 are based on the Summer Peak Power Flow cases published by ERCOT's SSWG group in October 2016. Panhandle wind capacity addition in future years is modeled based on the Generation Interconnection Agreement published December 2016 by ERCOT.

The Panhandle interface operations export limit of 4,273³ MW for 2018 and 2021 is modeled to reflect the completion of Stage 1 Upgrade of Panhandle interface along with the inclusion of approved SU-01. Since the Stage 1 Upgrade is scheduled to be completed and effective starting July 2018, LCG models the interface limit at 3,050 MW for entire study period of 2017 and through June 2018.

³ ERCOT 2016 RTP Economic Case Final input assumptions published November 2016.