

2017 ERCOT ELECTRICITY MARKET OUTLOOK

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EXECUTIVE SUMMARY

Texas continues to experience an unprecedented transformation in its energy industry. The state saw record wind energy production in 2016. ERCOT endorsed six prime transmission projects with an estimated cost of over \$250 million in 2016 in connection to oil and gas load growth. More than \$1.3 billion was spent in transmission improvements that were energized to provide power into Lower Rio Grande valley area and serve record-high summer-time demands in 2016. New import and export capabilities are on the horizon, such as through integration of Lubbock Power & Light and the possible Southern Cross transmission project.

These conditions intensify the challenge to model the system, especially considering unknowns in transmission development, intermittent resources, and a greater focus on ancillary services. At the same time, and for the same reasons, getting a good picture of 2017 and beyond is increasingly important to all ERCOT stakeholders.

LCG Consulting has completed a comprehensive hourly simulation of the ERCOT market for 2017 to help stakeholders grapple with uncertainties in future ERCOT operations. The simulation discussed in this report relies on the expected demand growth, changes in the makeup of active generation capacity, transmission infrastructure and market operation. It outlines future operation of the ERCOT nodal market, including Locational Marginal Prices (LMPs), load zone prices, hub prices and expected congestion. LCG is able to customize the report to expand on details from this market study, such as individual generator performance, hourly LMPs, Congestion Revenue Rights (CRRs), and other information of interest to market participants.

All nodal market simulations were performed using LCG Consulting's (LCG) proprietary UPLAN network power model (NPM) and PLATO-ERCOT data model. UPLAN simulations provide a realistic projection of future physical and financial operations in any electricity market and have been used extensively to model ERCOT. Given the pace of development in ERCOT, simulation of the ERCOT nodal market requires detailed, hourly, node-specific information about generation, transmission, and loads, as well as the economic and engineering parameters. Generator engineering and economic parameters are continuously and meticulously verified and updated in LCG's PLATO-ERCOT database. Generation expansion and retirement assumptions were based on ERCOT publications. ERCOT publications and other public and private data sources provided electricity demand, transmission network topology including transmission upgrades, list of contingencies analyzed, list of monitored elements, interface definitions and limits.

Some key findings from the ERCOT 2017 simulation include:

- In contrast to recent years, lowest prices are expected in the West zone. This is due to transmission upgrades and new wind capacity in the area along with a reduction in oil and gas exploration.
- Panhandle interface congestion is expected to be a significant factor in the ERCOT market in 2017, especially during the final months of the year when new capacity comes online.
- Wind curtailment is expected to remain low in 2017, maintaining average curtailment of 0.5% in all months through November. A large uptick in curtailment is expected in December as a large amount of capacity is scheduled to come online during that month.
- Wind generation is expected to continue to increase its share of overall generation reaching 19.6% in 2017.
- Electricity generation in ERCOT is expected to continue to be supplied primarily from fossil fuels in 2017.

1. INTRODUCTION

Texas energy industry and ERCOT market continue to undergo unprecedented transformation. With the record amount of wind production in 2016, ERCOT remains to be one of the primary markets for wind power generation. Over \$1.3 billion was spent for upgrading transmission system in 2016 that provided power into the Lower Rio Grande Valley area. Six prime projects were reviews and endorsed by ERCOT to address oil and gas load growth in ERCOT with an estimated project cost of over \$250 million. ERCOT's Far West Texas project is pending completion in 2017 with an estimated cost of \$430 million. Several potential import and export capabilities such as the integration of Lubbock Power & Light and Southern Cross transmission project are on the horizon.

These conditions intensify the challenge to model the system, especially considering unknowns in transmission development, intermittent resources, and a greater focus on ancillary services. At the same time, and for the same reasons, getting a good picture of 2017 and beyond is increasingly important to all ERCOT stakeholders.

Financial and physical operations of the entire grid under the ERCOT nodal market protocols were simulated to forecast the future operation of the ERCOT nodal market. This report summarizes the modeling methodology, input assumptions, and results of hourly nodal network simulations of the 2017 ERCOT nodal market performed by LCG Consulting (LCG). More detailed input assumption data and output results can be considered upon request.

1.1 METHODOLOGY AND ASSUMPTIONS

The nodal market simulations for this study were performed using LCG's proprietary UPLAN Network Power Model (NPM) and PLATO-ERCOT data model utilizing hourly dispatch method. UPLAN NPM is a full network model designed for electricity market simulation. It replicates the engineering protocols and market procedures of a system operator. It also captures the commercial activities, such as bidding,

trading, hedging, and contracting, of all players in a deregulated nodal power market. The model performs coordinated marginal (opportunity) cost-based energy and ancillary service procurement, congestion management, full-fledged contingency analysis with Security Constrained Unit Commitment (SCUC) and Security Constrained Economic Dispatch (SCED) replicating those used by the ERCOT ISO. The model prepares a rolling, hourly unit commitment and hourly dispatch while integrating generators' economic and operating characteristics, the 2016 SSWG summer network for 2017 published in October 2016, and ERCOT standard planning contingencies. Generation expansion and retirement assumptions were based on ERCOT publications. In addition, ERCOT publications and other public and private data sources provided electricity demand and transmission network topology assumptions including transmission upgrades, list of contingencies analyzed, list of monitored elements, interface definitions and limits.

LCG's 2017 ERCOT annual peak load and energy demand forecasts were derived from the ERCOT 50-50 load forecast published in January of 2017, while the hourly load shapes use the 2016 RTP Economic Case load profiles, published September 2016. Monthly peak loads were modified based on ERCOT Long-Term Daily Forecast published January 2017. Electricity market modeling incorporated over 800 generators, including existing facilities – based on the ERCOT Capacity Demand and Reserves report – and future units that have a Standard Generation Interconnection Agreement – based on ERCOT Monthly System Planning reports and LCG assumptions. LCG Consulting produces proprietary natural gas price forecasts, as well as sub-bituminous and lignite coal prices, based upon data from EIA's Annual Energy Outlook. The study used the 16SSWG Summer Peak Power Flow Case for 2017 published October 2016 by ERCOT SSWG group for the transmission network. Transmission upgrades for the entire year was added based on the Transmission Project Information Tracking (TPIT) file, published October 2016.

If you are interested in receiving the full report, please contact us at Julie.chien@energyonline.com.



LCG CONSULTING

4962 El Camino Real, Suite 112

Los Altos, CA 94022

Tel: 650-962-9670

www.EnergyOnline.com

Email: Info@energyonline.com