March 2017

ANALYSIS OF RESOURCE ADEQUACY IN ERCOT—SPRING 2017

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1. INTRODUCTION

LCG Consulting (LCG) has been following the rapid changes in the ERCOT landscape, including the unprecedented growth of renewables and transmission upgrades. Earlier this year LCG released a first quarter study looking at how the ERCOT grid can cope with strained network conditions.

This report extends that analysis to the 2017 spring season (March through May) using market simulations with LCG's UPLAN Network Power Model. Weather is a key factor in considering resource adequacy for the region, and spring is a season that sees significant maintenance work before more extreme summer loading conditions.

For this report, LCG built scenarios examining "strained network conditions" that reflect historical load conditions, extreme weather forecasts and historical average of generation outages during the past years. These several sensitivity cases were assessed for resource adequacy to see if peak demand is served. This report further illuminates what strained conditions might shift in the outlook for energy prices, Operating Reserve Demand Curve (ORDC), Peaker Net Margin (PNM), and congestion.

1. Scenario 1 or Base Case: Forecasted Season Peak Load (50/50 forecast)
2. Scenario 2: High Gen Outages
3. Scenario 3: High Gen Outages/High Load (90/10 forecast)

For each of these scenarios, LCG used its UPLAN sub-hourly (5-min interval) model to simulate the second quarter of 2017. UPLAN's five-minute interval simulation accurately captures the operation of the ERCOT system, including the sub-hourly ramping constraints of thermal units, of particular interest under the stress cases. Scenario 1 assumes typical use of reserve capacity conditions while the two other scenarios represent extreme cases.

2. DEFINITION OF SCENARIOS AND ASSUMPTIONS

Scenario 1 or Base Case: 50/50 Load

This scenario is the Base Case for the 2017 spring season. The peak demand forecast is 58,956 MW, reflecting normal weather conditions, based on ERCOT 50/50 demand forecast, which assumes 50% probability of being under or over achieved by the actual peak. LCG distributed this load across ERCOT proportional to nodal Load Distribution Factors (LDFs) published with ERCOT's Steady State Working Group (SSWG) network for 2017. The total resource capacity is 84,325 MW, using 47% of rated capacity for solar resources, 68% of coastal installed wind capacity, 29% of non-coastal installed wind capacity (per ERCOT Nodal Protocols Section 3.2.6.2.2), and current seasonal maximum limits of all other units. From this resource capacity, we assume 11% to be on forced outages and on maintenance during May weekdays based on historical average. That leaves 19% of capacity available for operating reserve.

Scenario 2: High Gen Outages

This scenario reflects extreme generation outages on the peak maintenance season electricity supply. Incremental outages are based on historical average of forced and planned maintenance outages for April weekdays (hours ending 3 pm – 8 pm and starting from August 2010). With these excess outages, total use of reserve capacity is 21% and the capacity available for operating reserve is 9%. Other parameters remain the same as in Scenario 1.

Scenario 3: High Gen Outages / High Load (90/10 forecast)

In this scenario, the load adjustment is based on ERCOT 90/10 demand forecast by weather zone for 2017, which assumes a 10% probability of being exceeded by the actual peak. After this load adjustment, total use of reserve capacity is 27% and the capacity available for operating reserve is 5%. Other assumptions are the same as in Scenario 2.

Table 1 – Base Case Capacity and Demand Assumptions – Spring 2017 (MW)

Operational Resources (Thermal and Hydro), MW	69,358
Switchable Capacity Total, MW	3,820
less Switchable Capacity Unavailable to ERCOT, MW	(663)
Mothball Resources, MW	0
Private Use Network Capacity Contribution, MW	3,787
Non-Coastal Wind Resources Capacity Contribution, MW	4,319
Coastal Wind Resources Capacity Contribution, MW	1,393
Solar Utility-Scale, Peak Average Capacity Contribution, MW	172
RMR Resources under Contract, MW	0
Non-Synchronous Ties Capacity Contribution, MW	249
Planned Thermal Resources with Signed IA, Air Permits and Water Rights, MW	933
Planned Non-Coastal Wind, MW	467
Planned Coastal Wind, MW	239
Planned Solar Utility-Scale with signed IA, MW	251
Total Resources, MW	84,325
Peak Demand, MW (Base Case)	58,956
Reserve Capacity, MW	25,369

Table 2 – Range of Potential Risks – Spring 2017 (MW) UPLAN Scenario Assumptions

	50/50 Load (Base Case)	High Outages (Scenario 2)	High Outages / High Load (Scenario 3)
Seasonal Average Load Adjustment	-	-	6%
Typical May Maintenance Outages	3%	3%	3%
Typical May Forced Outages	9%	10%	10%
Incremental Unit Outages to Reflect April Peak Maintenance Season	6%	9%	9%
Total Uses of Reserve Capacity	17%	21%	27%
Capacity Available for Operating Reserves	13%	9%	5%

3. SCENARIO MODELING AND METHODOLOGY

The nodal market simulations for this study were performed using LCG's proprietary UPLAN Network Power Model (NPM) and PLATO-ERCOT data model at the five-minute dispatch level. It authentically replicates the engineering protocols and market procedures of a system operator. More detail on this sophisticated model is available in the Appendix of the report. For this study, UPLAN integrates the SSWG network published in October 2016, and ERCOT standard and planning contingencies. Transmission upgrades for spring season were added based on the Transmission Project Information Tracking (TPIT) file, published in October 2016, and based on inputs from Day Ahead Market and Congestion Revenue Rights networks. 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 list of monitored elements, interface definitions and limits. Further overview on the UPLAN NPM and PLATO-ERCOT data model can be found in Appendix 1 and Appendix 2, respectively.

In the sensitivity cases, the generation outages and the load increase were distributed between available generating units and load points for each scenario. Monthly peak loads were modified based on ERCOT Long-Term Daily Forecast (50/50 forecast) published in February 2017, 90th Percentile Summer Non-Coincident Peak by Weather Zone (90/10) published in December 2016, while the hourly load shapes use the 2016 RTP Economic Case load profiles published in September 2016.

4. SIMULATION RESULTS

If you are interested in receiving the full spring quarter outlook, please contact us at julie.chien@energyonline.com