July 2018

ANALYSIS OF RESOURCE ADEQUACY IN ERCOT—SUMMER 2018



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1. INTRODUCTION

LCG Consulting performed analysis of the 2018 summer season (July through September) using market simulations with LCG's UPLAN Network Power Model. Resource adequacy analysis for the region is especially important during extreme summer loading conditions.

The ERCOT landscape is rapidly evolving, with significant transmission changes and unprecedented growth of renewables. This summer the network is under particular scrutiny as the reserves have tightened because of recent retirements

For this report, LCG built scenarios examining "strained network conditions" that include high generation outages, low wind and high load forecasts. These sensitivity cases were assessed for resource adequacy to see if peak demand is served. This report further illuminates which strained conditions might shift in the outlook for energy prices, Operating Reserve Demand Curve (ORDC), Peaker Net Margin (PNM), and congestion.

- Scenario 1 or Base Case: Forecasted Season Peak Load (50/50 forecast)
- Scenario 2: High Gen Outages
- Scenario 3: Low Wind
- Scenario 4: High Load

For each of these scenarios, LCG used its UPLAN hourly model to simulate the summer season of 2018. UPLAN's model accurately captures the operation of the ERCOT system. Scenario 1 assumes typical use of reserve capacity conditions while the three other scenarios represent extreme cases.

2. DEFINITION OF SCENARIOS AND ASSUMPTIONS

Scenario 1 or Base Case: 50/50 Load

In this base case, the peak demand forecast is 73,195 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 the nodal Load Distribution Factors (LDFs) published with ERCOT's Steady State Working Group (SSWG) network for 2018. The total resource capacity is 78,777 MW, using 75% of rated capacity for solar resources, 59% of coastal installed wind capacity, 14% of non-coastal installed wind capacity, and current seasonal maximum limits of all other units. Figure 1 shows the installed capacity by fuel type and Figure 2 shows the installed capacity by load zone. From this resource capacity, we assume 3,155 MW to be on forced outages and on maintenance for July through September weekdays based on IIR Outages Report (as of 06/19/2018). That leaves 2,427 MW of capacity available for operating reserve.

Scenario 2: High Gen Outages

This scenario assumes additional generating capacity of 2,097 MW to be on outage. With these excess outages, total use of reserve capacity is 5,252 MW and the capacity available for operating reserve falls to 330 MW. Other parameters remain the same as in Scenario 1.

Scenario 3: Low Wind

In this scenario, the wind output is adjusted 1,695 MW downward. Considering this reduction in wind output level, the capacity available for operating reserve is 732 MW. Other parameters remain the same as in Scenario 1.

Scenario 3: High Load

In this scenario, the load adjustment is based on ERCOT's 90th percentile forecast and assumes the peak load of 76,899 MW. After this load adjustment, total use of reserve capacity is 6,859 MW and the capacity available for operating reserve is -1,277 MW. Other assumptions are the same as in Scenario 1.

	50/50 Load Base Case	High Outages Scenario 2	Low Wind Scenario 3	High Load Scenario 4
Seasonal Load Adjustment	-	-	-	3,704
Maintenance Outages	262	262	262	262
Thermal Forced Outages	2,893	2,893	2,893	2,893
Additional Thermal Forced Outages	-	2,097	-	-
Low Wind Output Adjustment	-	_	1,695	-
Total Uses of Reserve Capacity	3,155	5,252	4,850	6,859
Capacity Available for Operating Reserves	2,427	330	732	(1,277)

Table 1 – Range of Potential Risks – Summer 2018 UPLAN Scenario Assumptions (IVIW









3. SCENARIO MODELING AND METHODOLOGY

The nodal market simulations were performed using LCG's proprietary UPLAN Network Power Model (NPM) and PLATO-ERCOT data model at the hourly dispatch level. UPLAN authentically replicates the engineering protocols and market procedures of a system operator. Technical details on this sophisticated model are available in the Appendix of the report.

For this study, UPLAN integrates the SSWG power flow network for Summer 2018 with planned upgrades and ERCOT standard contingencies. Transmission upgrades for summer season were added based on the Transmission Project Information Tracking (TPIT) file, published in February 2018, and based on inputs from Day Ahead Market and Congestion Revenue Rights networks. Generation expansion and retirement assumptions rely on ERCOT publications. In addition, ERCOT publications and other public and private data sources provide 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 50/50 forecast published in June 2018, 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 summer quarter outlook, please contact us at julie.chien@energyonline.com