Morningstar ERCOT Model Backtesting for 2019
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Matthew Hong
Director of Research, Power and Gas
+1 312 244-7649
matthew.hong@morningstar.com

Morningstar Load Forecasting

Over the past year and a half, Morningstar has worked diligently to improve our forecast short-term load in ERCOT. One of the principles in the team's effort is a forecast solution that maintains a high level of transparency to enhance interpretation. With the current version of the model now running multiple times a day, we ran a comprehensive backtest of 2019. This piece reviews the backtest results.

2019 Load Forecast Results

The load forecast backtesting shows considerable improvement in the model's accuracy compared with previous versions. Plotting the ERCOT RTO forecast mean-absolute percent error, or MAPE, across three forecasting time frames shows a yearly average ranging between 4.1% and 4.6% (Exhibit 1). The yearly average MAPEs for the 24-hour, 48-hour, and 168-hour forecast were 4.1%, 4.3%, and 4.6%, respectively.

Exhibit 1 ERCOT Systemwide Forecast MAPE (Percent)
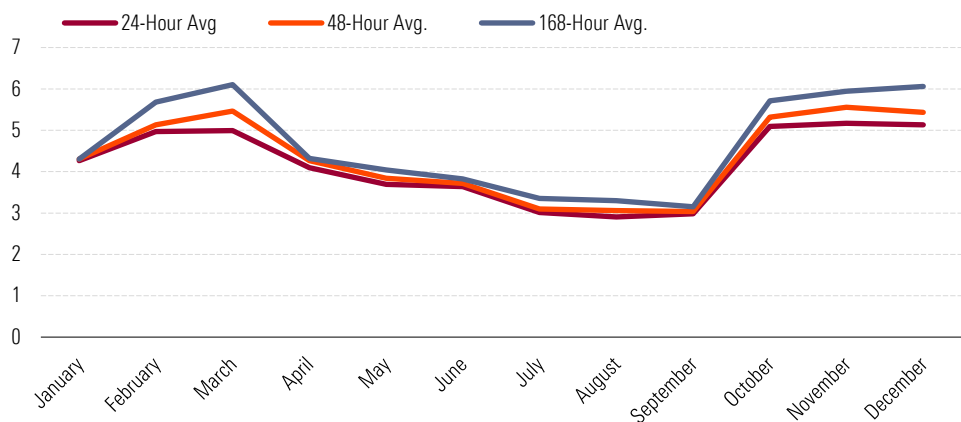

Source: U.S. Department of Energy.

Taking a deeper look at the ISO-wide results, we observe significantly lower MAPEs in the summer months. The period between May and September showed an average MAPE of 3.25% in the 24-hour forecast, compared with an average MAPE of 4.8% during the rest of the year. Within ERCOT the Coastal region had the best performance over the high demand months (May-September), with an average MAPE of 2.5%. The model had the hardest time forecasting load in the West over the same period,

which generated an average MAPE of 4.7%. The build out of industrial load in West Texas, primarily from the oil and natural gas sector, is likely not being accounted for in a sufficient manner in this case. Variables to account for this build out and its subsequent impact on regional load will be incorporated in the next model release.

2019 Day-Ahead Price Forecast

The model performed reasonably well in predicting more volatile day-ahead pricing, showing an error rate between January and July of 23% in the 24-hour forecast. The period between May and July performed exceptionally well, with backtesting showing a 21% MAPE in the 24-hour forecast. The day-ahead forecast between August and October showed an average MAPE of 39.9%, which was the result of historically high pricing in those months. For example, the day-ahead price at Houston Hub settled at $126.63 /MWh in the day-ahead market in August. Our forecast for Houston Hub moved up to $46.75/MW around the clock but didn't capture the extremes that materialized that month.

Exhibit 2 Day-Ahead Price Forecast MAPE
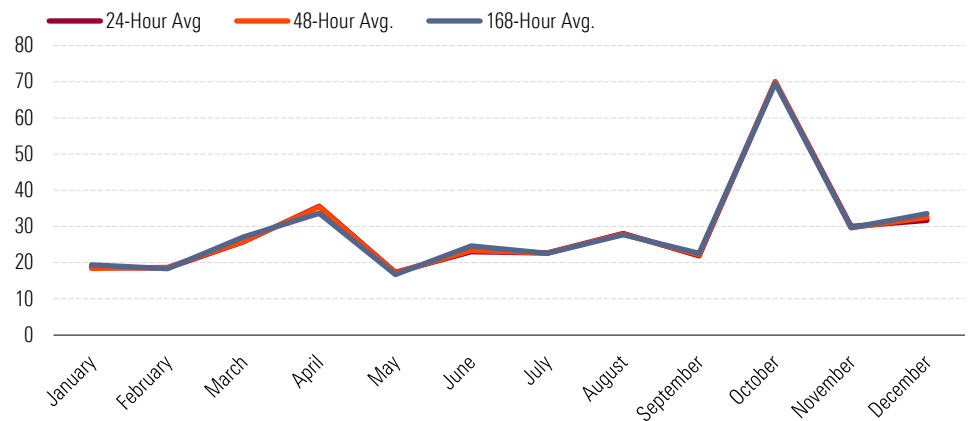
Source: Energy Information Administration, PointLogic Energy

Looking slightly deeper into our August forecasts, the largest misses came on days when several hours settled well above $1,000 /MW, accounting for the higher MAPE. While some of the evening ramp hour misses were significant, the model was able to capture a directional move, forecasting prices in the $500-$600/MW range. Additional work will be done in the coming months to capture a larger proportion of these directional moves.

Conclusion

While the team continues to find ways to improve the model's output for both load and day-ahead price, we believe the progress to date forms a robust framework that can be continually improved going forward. The current model version is generating forecasts daily, and more detailed information on the methodology and backtesting results are available upon request as well as trial subscriptions to the

intraday output. We are looking for additional partners willing to contribute insight and feedback, so if you interested please reach out to matthew.hong@morningstar.com. M

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For More Information

+1 800 546-9646 North America
+44 20 3194 1455 Europe
commoditydata-sales@morningstar.com

M⌀RNINGSTAR®

22 West Washington Street
Chicago, IL 60602 USA