McCullough Research

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To: McCullough Research Clients

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Subject: 2011 ERCOT Blackouts and Emergencies

Already this year ERCOT has experienced two major load-resource imbalances, which resulted in rolling outages on February 2 and a Level 1 Emergency Alert on June 27. According to ERCOT's press release on February 2, ERCOT "began experiencing numerous forced outages of generation due to the cold weather. As of 9 am, more than 7,000 MW of capacity was still out…."[1] A later press release on the same day said, "The rolling outages began at 5:30am and were suspended at 2:14pm."[2] According to ERCOT's press release on June 27, "ERCOT entered an Energy Emergency Alert Level 1 at 3:30 pm when reserves dropped below 2,300 MW due to the unexpected loss of about 2000 MW generation and high temperatures."[3]

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[1] ERCOT press release, February 2, 2011: Power Emergency Update – 9:59am.
[2] ERCOT press release, February 2, 2011: Rotating Outages Discontinued; Conservation Still Needed – 2:14pm.
[3] ERCOT press release, June 27, 2011: ERCOT Expects High Demand, Additional Capacity Tuesday.

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The temperatures experienced on both February 2 and June 27 are within the extremes Texas has experienced in the past three years.[4] Given that ERCOT changed its market model in 2010, it appears likely that the weather is not to blame for ERCOT's failure to maintain normal service while possessing a high reserve margin.

The following graph plots the maximum and minimum monthly temperatures for Dallas in 2010 and 2011. The minimum temperature of 14°F experienced on February 2, 2011 was the same temperature experienced on January 9, 2010, yet ERCOT reported no outages on January 9.


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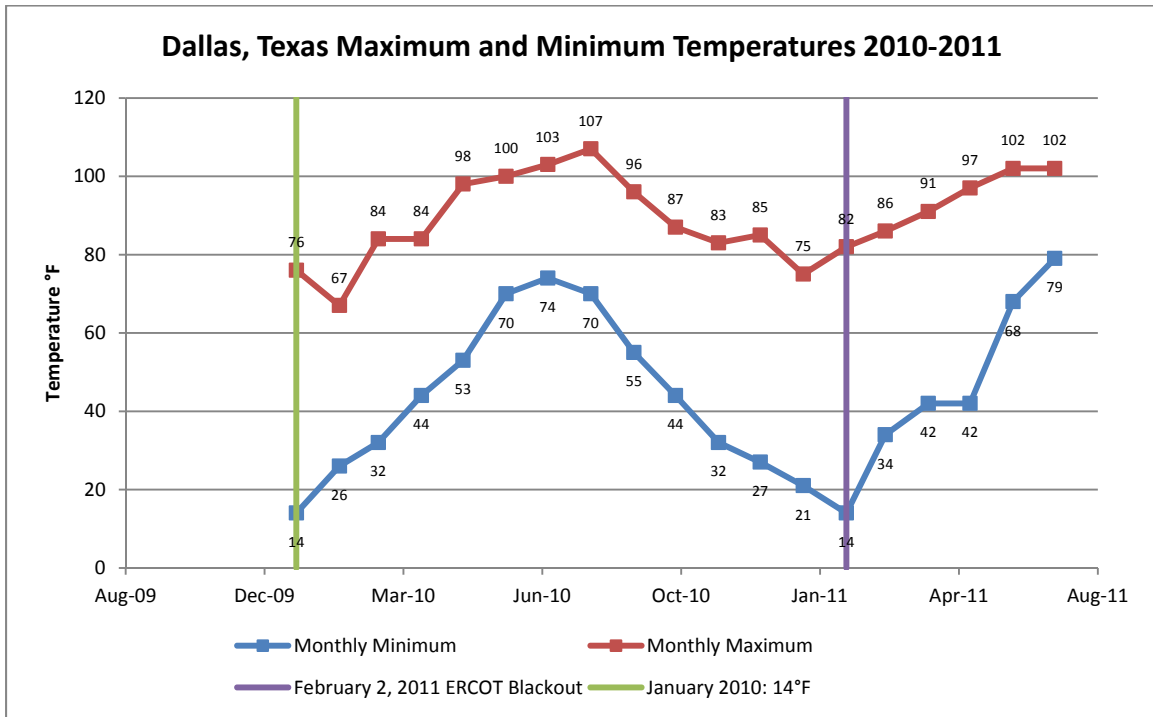
[4] All temperature data is taken from the Love Field weather station, World Meteorological Organization (WMO) ID Number 72258. This station was selected due to its proximity to Dallas, the most populous city experiencing high temperatures, and the available historical data.

The next graph showing the maximum temperature from 2009-2011 indicates the days in June when temperatures reached 102°F or greater. The high temperature of 102°F on June 27, 2011 was 1 degree less than the recorded temperature of 103°F on June 27 and 28, 2009, yet the temperatures on the two latter days did not cause generation loss, and ERCOT did not declare any Energy Emergencies. The peak demand on June 27, 2011 set a new record (62,762 MW) for demand in the month of June.
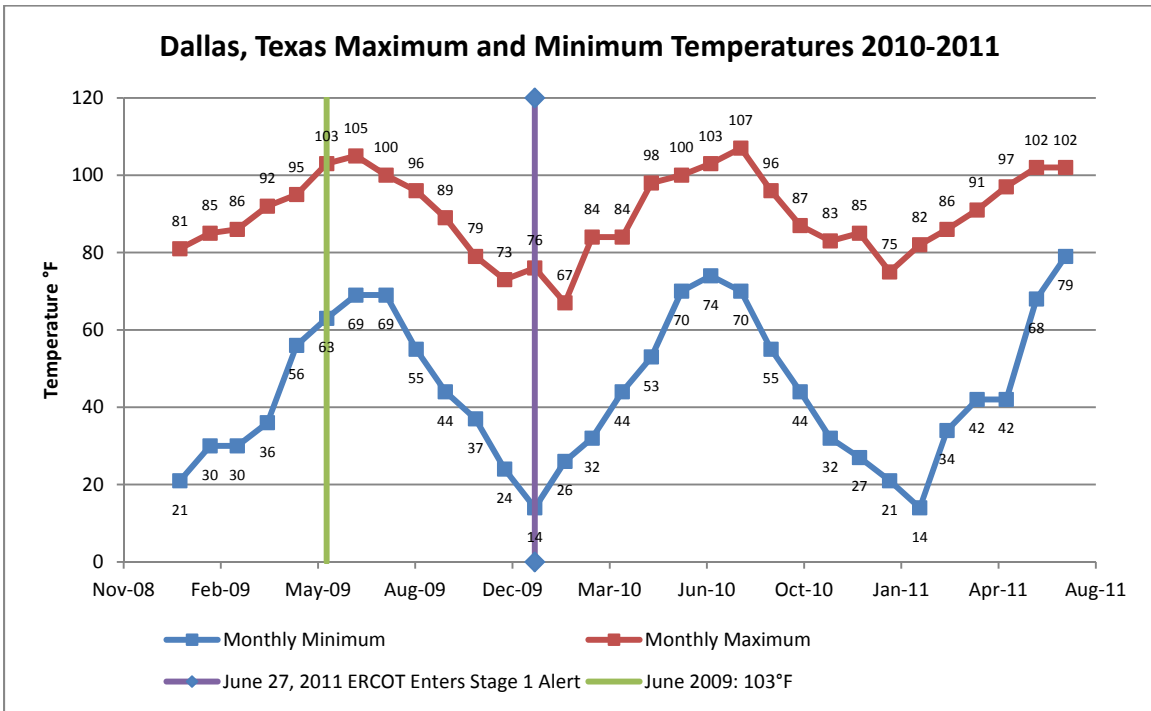
In the North American Electric Reliability Corporation (NERC) 2011 Summer Reliability Assessment, ERCOT was forecasted to have a 9,265 MW, a 14.3% reserve margin.[5] The assessment also reports that ERCOT had 74,229 MW of anticipated

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[5] North American Electric Reliability Corporation 2011 Summer Reliability Assessment, May 2011, pages 39–40.

capacity resources, and a total internal demand of 64,964 MW. If roughly 2,000 MW of generation was offline due to weather and the Level 1 Emergency Alert occurred at the point that the reserve margin reached 2,300 MW, where were the other 4,965 MW of anticipated capacity resources? Does it mean that roughly 6.7% of the total anticipated capacity resources, or 53.6% of the reserve margin, was unavailable on June 27, 2011?

The press release on May 31, 2011 explains that ERCOT anticipated exceeding demand by 17.5% over the summer, and forecasted that 73,175 MW of resources were available.[6] By any estimate ERCOT has a healthy and reasonable reserve margin, of which a large amount was apparently unavailable on June 27, 2011.

ERCOT is clearly mindful of the possible adverse effects of high temperatures on generation. At the board of directors' meeting on May 17, ERCOT's President and CEO, H.B. Doggett, noted that "ERCOT is planning to survey all generation owners on two hot weather scenarios: 1) 10 days of 105 degree temperatures across Texas in late August; 2) 10 days of 110 degree highs; Staff plans to prepare an analysis based on the survey…."[7]

The December 2010 changes to the ERCOT market model included the creation of a Day-Ahead Energy Auction Market. The objective was to increase efficiency and ease of access, and ultimately to decrease costs. Since the implementation of this new model, there has been a significant increase in the average price of electricity. Electricity prices, however, are inexorably linked to fuel prices, and are thus subject to changes in other markets. We can account for these changes by calculating the implic-

[6] ERCOT press release, May 31, 2011: ERCOT Expects Adequate Power Supplies For Summer (Update).
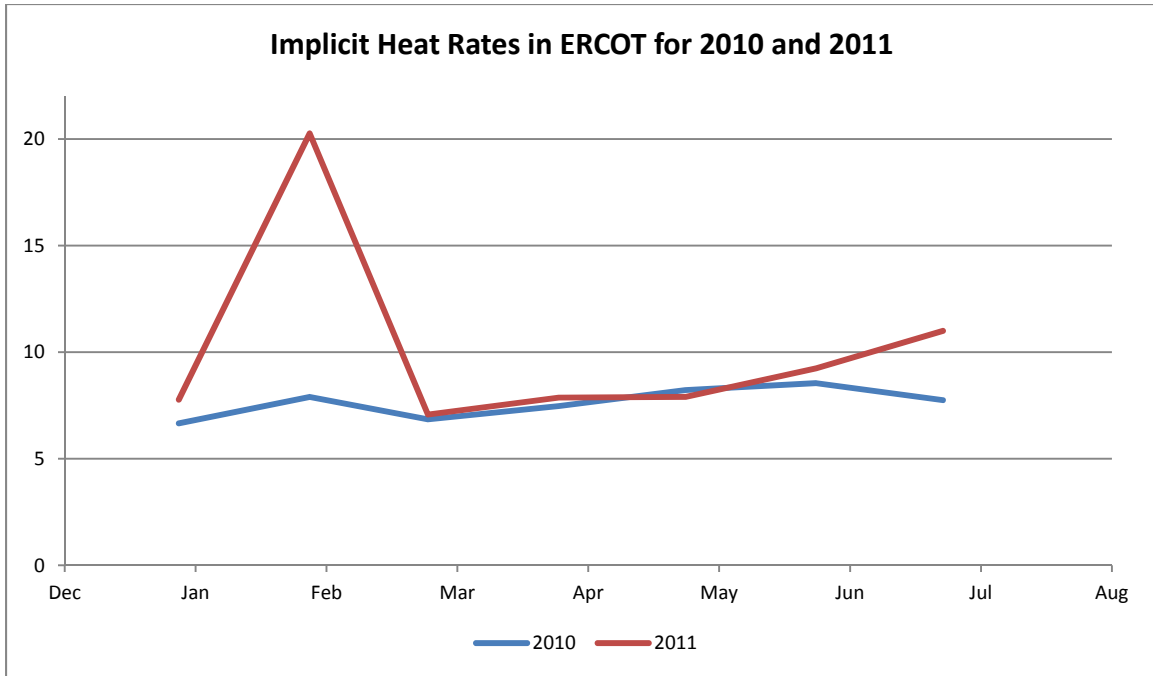[7] Presentation, CEO Update May 17, 2011, Trip Doggett, President & CEO.

it heat rate, which is the price of electricity divided by the price of fuel.[8] The graph below compares the implicit heat rates for 2010 and 2011.

Implicit Heat Rates in ERCOT for 2010 and 2011

The 2011 implicit heat rate is consistently higher than in 2010, and experiences greater volatility. Clearly the changes to ERCOT's market model have not increased efficiency or decreased prices. Without fully understanding these mechanisms and their potential effects on the market as a whole, it is difficult to determine whether the emergencies on February 2 and June 27, 2011 were due to artificially-created scarcity compounded by ERCOT's lack of market transparency. What is clear is that the weather is not the reason for ERCOT's inability to operate reliably while simultaneously possessing high reserve margins.

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[8] The Henry Hub spot price was used as the fuel price in the implicit heat rate calculation, http://www.eia.gov/dnav/ng/ng_pri_fut_s1_d.htm.