POTOMAC ECONOMICS

2009 STATE OF THE MARKET REPORT FOR THE ERCOT WHOLESALE ELECTRICITY MARKETS

POTOMAC ECONOMICS, LTD.

Independent Market Monitor for the
ERCOT Wholesale Market

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In the long-term, these enhancements to overall market efficiency should translate into substantial savings for consumers.

B. Review of Market Outcomes

1. Balancing Energy Prices

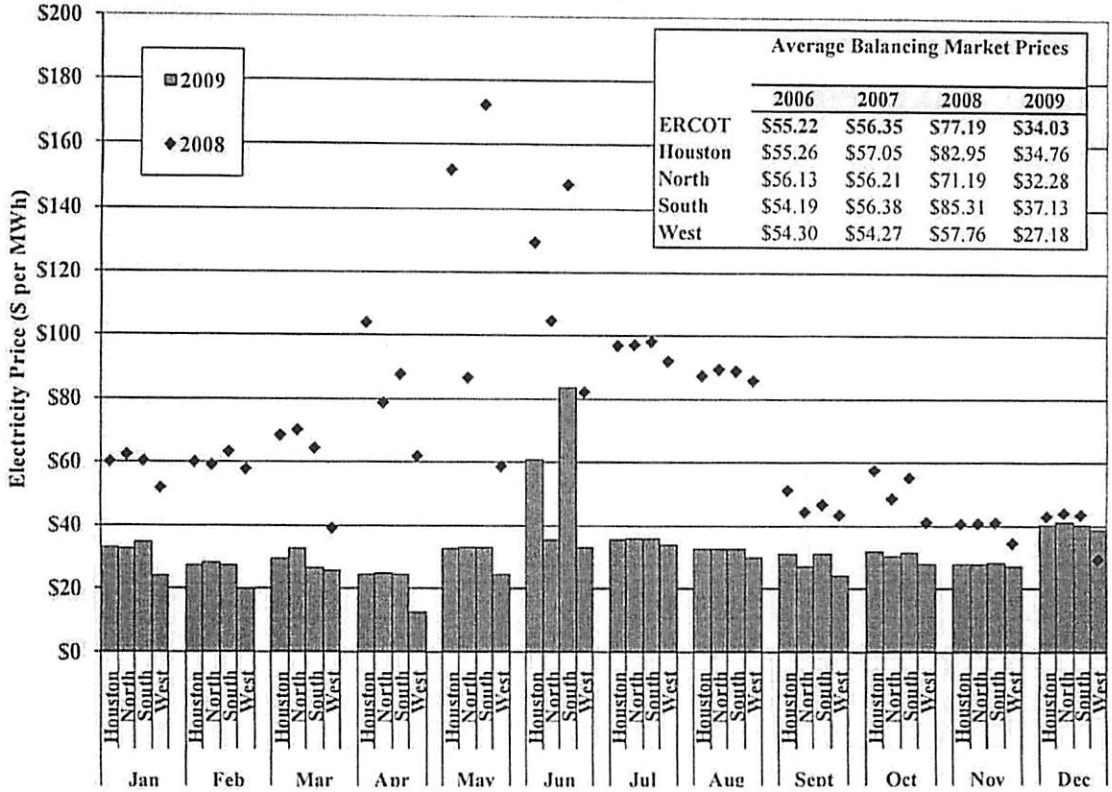
The balancing energy market allows participants to make real-time purchases and sales of energy to supplement their forward bilateral contracts. While on average only a relatively small portion of the electricity produced in ERCOT is cleared through the balancing energy market, its role is critical in the overall wholesale market. The balancing energy market governs real-time dispatch of generation by altering where energy is produced to: a) balance supply and demand; b) manage interzonal congestion, and c) displace higher-cost energy with lower-cost energy given the energy offers of the Qualify Scheduling Entities ("QSEs").

In addition, the balancing energy prices also provide a vital signal of the value of power for market participants entering into forward contracts. Although most power is purchased through forward contracts of varying duration, the spot prices emerging from the balancing energy market should directly affect forward contract prices.

As shown in the following figure, ERCOT average balancing energy market prices were 56 percent lower in 2009 than in 2008, with an ERCOT-wide load weighted average price of $34.03 per MWh in 2009 compared to $77.19 per MWh in 2008. April through August experienced the highest balancing energy market price reductions in 2009, averaging 66 percent lower than the prices in the same months in 2008. With the exception of the West Zone in December, the balancing energy prices in 2009 were lower in every month in all zones than in 2008.

The average natural gas price fell 56 percent in 2009, averaging $3.74 per MMBtu in 2009 compared to $8.50 per MMBtu in 2008. Natural gas prices reached a maximum monthly average of $12.37 per MMBtu in July 2008, and reached a minimum monthly average of $2.93 per MMBtu in September 2009. Hence, the changes in energy prices from 2008 to 2009 were largely a result of natural gas price movements.

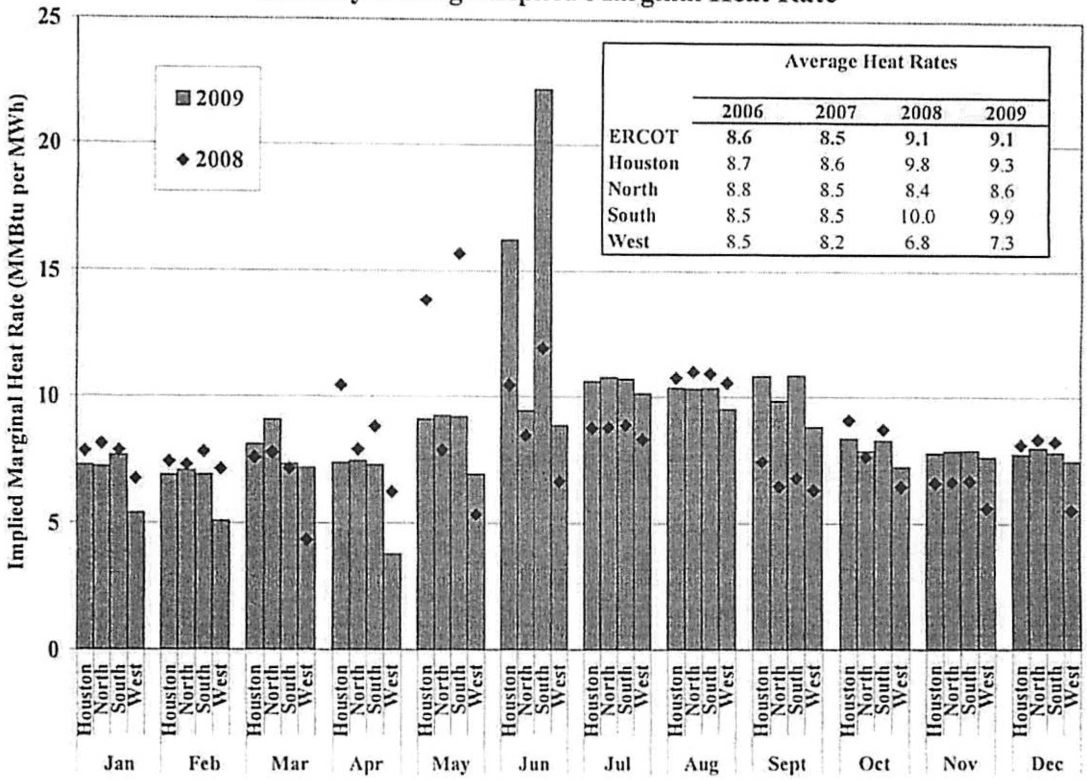
Average Balancing Energy Market Prices



	2006	2007	2008	2009
ERCOT	$55.22	$56.35	$77.19	$34.03
Houston	$55.26	$57.05	$82.95	$34.76
North	$56.13	$56.21	$71.19	$32.28
South	$54.19	$56.38	$85.31	$37.13
West	$54.30	$54.27	$57.76	$27.18

The following figure shows the price duration curves for the ERCOT balancing energy market each year from 2006 to 2009. A price duration curve indicates the number of hours (shown on the horizontal axis) that the price is at or above a certain level (shown on the vertical axis). The prices in this figure are hourly load-weighted average prices for the ERCOT balancing energy market.

Monthly Average Implied Marginal Heat Rate

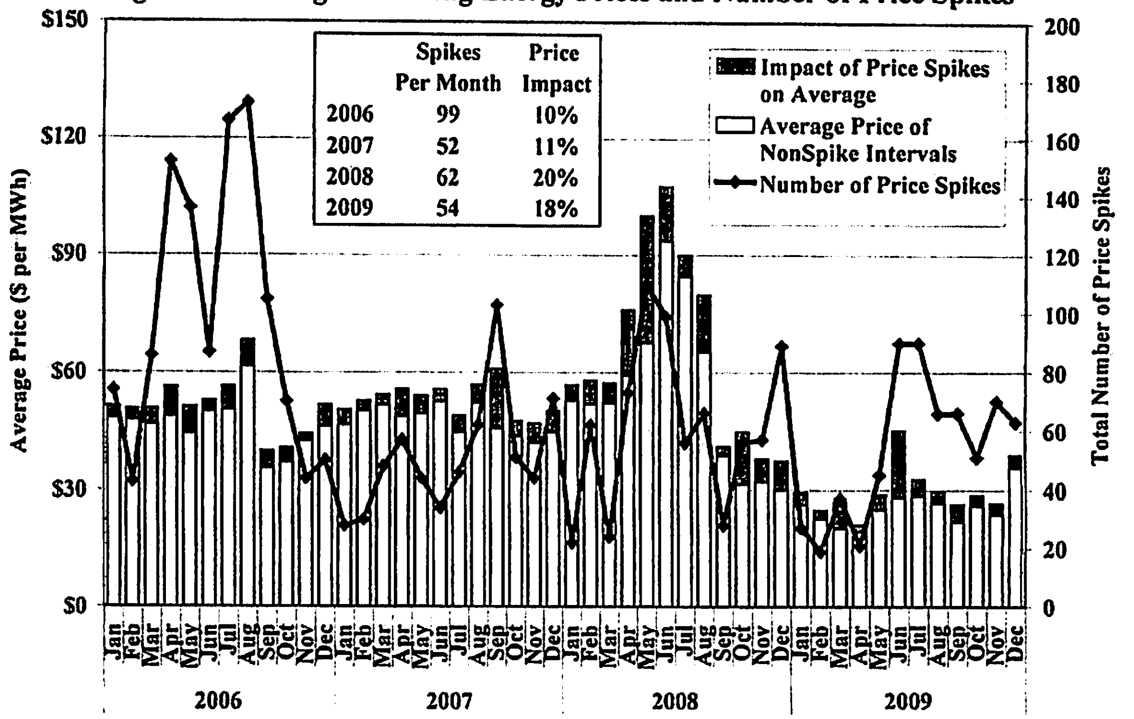


Adjusted for gas price influence, the above figure shows that average implied heat rate for all hours of the year was comparable in 2009 to 2008.[2] The average implied heat rate was significantly higher in 2008 than in 2009 during the months of April and May due to significant zonal congestion on the North to South and North to Houston interfaces that materialized in these months in 2008. Similarly, the magnitude of zonal congestion on the North to South interface increased significantly in late June 2009, causing the implied heat rate in June to be significantly higher in 2009 than in 2008. The implied heat rate in July was higher in 2009 than in 2008, primarily because of a stretch of extremely high temperatures and load levels, including the setting of a new record peak demand of 63,400 MW on July 13, 2009. Finally, the implied heat rate in September was much lower in 2008 than in 2009 because of the landfall of Hurricane Ike in September 2008 that resulted in widespread and prolonged loss of load in the Houston area.

2 The *Implied Marginal Heat Rate* equals the *Balancing Energy Market Price* divided by the *Natural Gas Price.*

(a level that should exceed the marginal costs of virtually all of the on-line generators in ERCOT).

Figure 6: Average Balancing Energy Prices and Number of Price Spikes



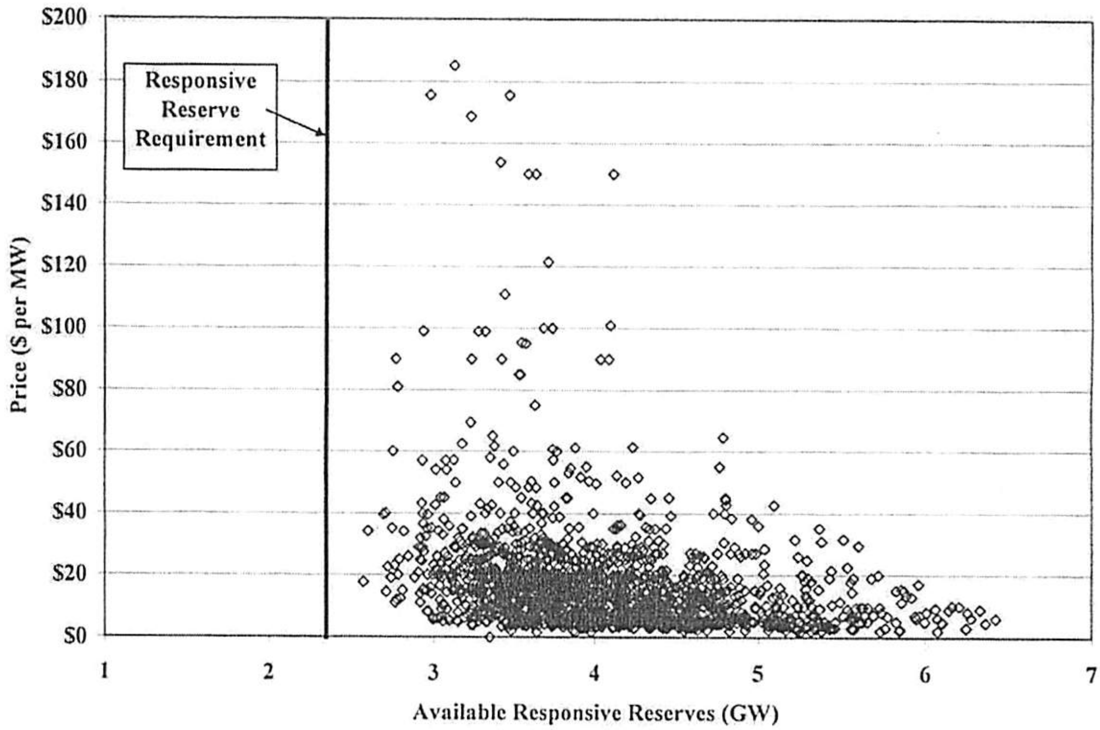
The number of price spike intervals was 62 per month during 2008. The number decreased in 2009 to 54 per month. The highest frequency of price spikes occurred in June and July during 2008, caused by significant transmission congestion that ERCOT was inefficiently attempting to resolve by using zonal congestion management techniques.[11] The high number of price spikes during June 2009 was also the result of zonal congestion management actions, although for reasons different than in 2008, as discussed in Section III. Other months with a higher frequency of price spikes in 2009 – particularly in the months after May 2009 – can be attributed to the more frequent deployment of off-line, quick start gas turbines in the balancing energy market as a result of the implementation of PRR 776 in May 2009, as discussed in Section II. Off-line, quick start gas turbines typically have a marginal cost that is greater than the 18 MMBtu per MWh threshold used in Figure 6.

11 *See* 2008 ERCOT SOM Report, at 81-87.

relatively large in some hours, one can gauge the efficiency of the ERCOT reserves market by evaluating the prices in these hours.

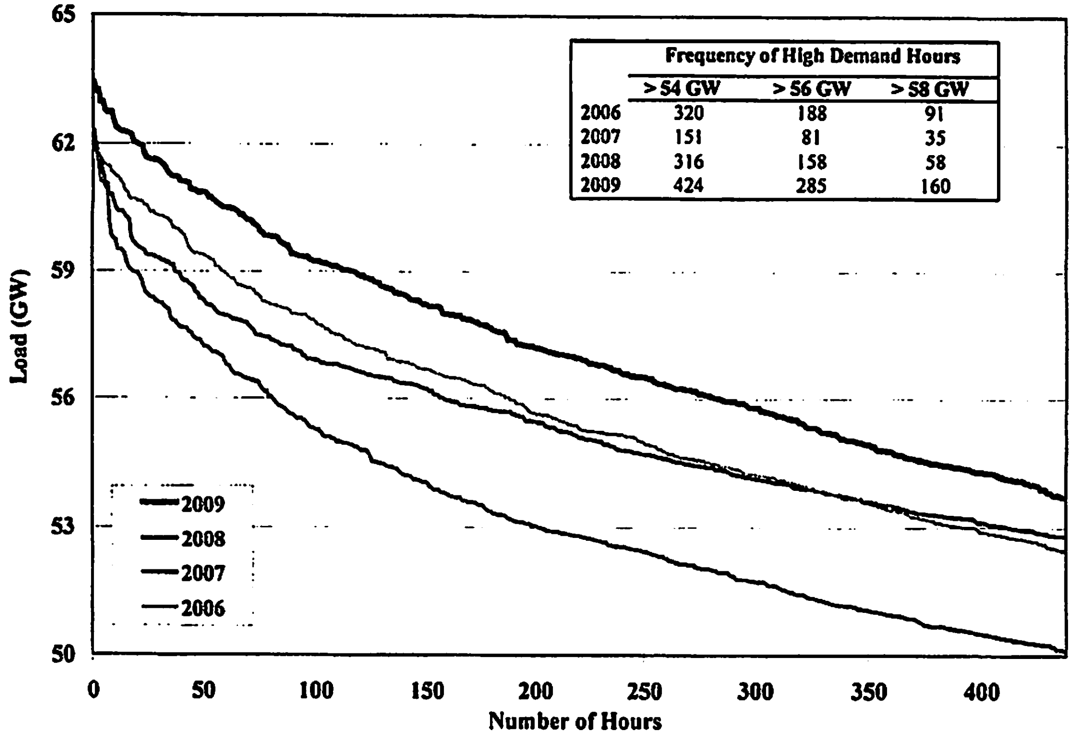
Figure 26 plots the hourly real-time responsive reserves capability against the responsive reserves prices during the peak afternoon hours of 2 PM to 6 PM. The capability calculated for this analysis reflects the actual energy output of each generating unit and the actual dispatch point for LaaRs. Hence, units producing energy at their maximum capability will have no available responsive reserves capability and, consistent with ERCOT rules, the responsive reserve that can be provided by each generating unit is limited to 20 percent of the unit's maximum capability. The figure also shows the responsive reserves requirement of 2,300 MW in 2009 to show the amount of the surplus in each hour.

Figure 26: Hourly Responsive Reserves Capability vs. Market Clearing Price Afternoon Peak Hours



In a well functioning-market for responsive reserves, we would expect excess capacity to be negatively correlated with the clearing prices. The data in this figure indicate only a weak negative correlation. Particularly surprising is the frequency with which price exceeds $20 per MW when the responsive reserve capability is more than 2,000 MW higher than the requirement.

Figure 29: ERCOT Load Duration Curve – Top 5% of Hours



This figure also shows that the peak load in each year is significantly greater than the load at the 95th percentile of hourly load. From 2006 to 2009, the peak load value averaged 19.7 percent greater than the load at the 95th percentile. These load characteristics imply that a substantial amount of capacity – over 10 GW – is needed to supply energy in less than 5 percent of the hours. Additionally, another 8 GW of capacity is required to meet the ERCOT planning reserve requirement of expected peak demand plus 12.5 percent. These factors serve to emphasize the importance of efficient energy pricing during peak demand conditions and other times of system stress that send accurate economic signals for the investment in and retention of the resources required to meet these real-time system demands as well as achieving long-term resource adequacy requirements.

Increasing levels of wind resource in ERCOT also has important implications for the net load duration curve faced by the non-wind fleet of resources. Net load is defined as the system load minus wind production. Figure 30 shows the net load duration curves for 2007 through 2009, with projected values for 2015 based on ERCOT data from its Competitive Renewable Energy Zones assessment.