

Public Utility Commission of Texas

**Staff Inquiry into Allegations Made
by Texas Commercial Energy
regarding ERCOT Market Manipulation**

**Project No. 25937, PUC Investigation into Possible
Manipulation of the ERCOT Market**

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Executive Summary¹

In this study, the Public Utility Commission of Texas' Market Oversight Division (MOD) examines some of the allegations made by Texas Commercial Energy (TCE) in its lawsuit against TXU and others regarding alleged market manipulation in the Electric Reliability Council of Texas (ERCOT) power region. The study focuses on TXU more than other entities named in the TCE litigation, because TXU has significantly more generating capacity than any other entity in ERCOT, and because TXU is the primary target in TCE's public discussion of its litigation.

This report presents the findings that MOD believes to be definitive based solely on market data. MOD is continuing to review additional voluminous information apart from the market data. However, the findings in this report are unlikely to be changed by additional analysis and, therefore, warrant publication now.

The results of this study show that TXU has a measurably dominant position in the ERCOT balancing energy market. One question that logically follows from that conclusion is whether the company has abused its position. MOD has found no egregious behavior, but is continuing to investigate whether the company otherwise may be using its balancing energy market dominance inappropriately. Nevertheless, the analysis in this report reveals issues that are in fact more complex – yet no less important – than whether any action taken by TXU was inappropriate. These issues have to do with the design and functioning of a competitive wholesale electricity market as envisioned by the Legislature in the Public Utility Regulatory Act.

Many of the allegations made by TCE lend themselves to analysis against market data, and this report presents the findings of that analysis. While the data are consistent with some of TCE's factual allegations, the data reviewed by MOD also are consistent with TXU's explanations. TXU stated that its actions were part of a general business strategy to:

- replace high-cost power from its least-efficient units with low-cost electricity purchased from other producers, and
- offer the inefficient capacity that it was no longer using for self-generation into the balancing energy market at a price high enough to cover the units' costs if deployed.

The profitability of such a strategy does not depend on market dominance. It therefore would be a reasonable business plan for competitors smaller than TXU. Nevertheless, in reviewing the market data, MOD found that TXU has a uniquely strong influence on ERCOT balancing energy market prices. This influence is due to TXU's relative size in that market, regardless of the company's intent. Consequently, a generally reasonable strategy could have a greater chance of profitability for TXU by virtue of the company's dominance.

¹ MOD gratefully acknowledges the technical assistance provided by ERCOT staff and the assistance of Commission staff in the Legal and Enforcement Division. In addition, MOD appreciates the cooperation that TXU and TCE have shown in providing data and explanations.

In light of these findings, MOD recommends implementing market rules to mitigate the unilateral influence of any dominant supplier, including TXU. Such ex ante, automatically triggered procedures are on a practical level the most effective way to prevent market distortions and to ensure that prices are set by the normal forces of competition.

Prior to the introduction of retail competition and the structural separation of investor-owned utilities in ERCOT in 2002, TXU was a very large, vertically integrated utility in the northern half of Texas. Even though it has divested some of its power plants, TXU remains the largest generator in Texas. In addition, even though TXU's retail market share has declined, it buys more electricity than it sells. Because TXU is such a singularly large participant in the ERCOT market, MOD has been closely examining the company's activities ever since MOD was created more than two years ago. With increasing frequency, TXU occupies such a large supply position in the ERCOT-administered markets that it is guaranteed of being selected in an ERCOT balancing energy auction regardless of offer price. This special position, referred to throughout this report as being a *pivotal supplier*, is of fundamental concern to MOD because it provides a supplier with the potential to harm the competitive process, either intentionally or unintentionally.

This study focuses on the auction-based market for Balancing Energy Service (BES) from May 2002 through August 2003. BES is used by ERCOT to keep generation in balance with load. Purchased and deployed by ERCOT for every 15-minute interval, BES has some of the features of an energy spot market. On November 1, 2002, ERCOT changed its protocols to allow for relaxed balanced schedules, giving market participants more liberal use of energy from the BES market to serve load. In its lawsuit, TCE points to that protocol change as a turning point that led to the market manipulations it alleges. A number of retail electric providers (REPs) – including TCE – began relying more on the BES market for a significant portion of the electricity they supplied to customers; some of these REPs – including TCE – were financially exposed when balancing energy prices increased to \$990 per megawatt-hour (MWh) during the extreme weather event of February 24-25, 2003.

The issues raised in TCE's litigation that are addressed in this report include allegations that TXU and others:

- Offered significant amounts of BES into the market at prices well in excess of marginal cost;
- Reduced scheduled generation, thereby driving the demand – and the clearing price – for BES higher;²

² *Scheduled generation* refers to generation used to meet the company's own obligation to customers, and includes *self-generation* (from resources owned by the company itself) and *purchased power* (from resources owned by others). *BES offers* – energy offered into the balancing energy auctions conducted by ERCOT – are separate from scheduled generation. Unlike scheduled generation, BES is sold only to ERCOT and is not matched to any particular customer load. A generation company's total resource *commitments* comprise its scheduled self-generation, power sold to others, plus its BES offers. On the buying side, *BES purchases* make up the difference between scheduled load and scheduled generation, and are purchased only from ERCOT.

- Reduced the quantity of BES offered into the market, again with the effect of artificially creating supply shortages and driving BES prices higher; and
- Strategically underscheduled generation on February 24 and 25, 2003, thereby exhausting all BES offers and ensuring that a single megawatt priced at \$990/MWh set the BES clearing price (market clearing price of energy or MCPE).³

In the course of examining these allegations, it became evident to MOD that the particular issues raised by TCE had to be examined in the context of a much larger picture. The aspects of this picture that were of greatest concern to MOD had to do with the structure of the market. MOD found that:

- TXU is a pivotal supplier in the ERCOT-wide BES market, and was pivotal more frequently in 2003 (17% of the time) than it was in 2002 (2% of the time).⁴ TXU is especially pivotal in ERCOT's north and west congestion management zones when the flow of power across major transmission lines between zones is constrained.
- Based on the quantity-weighted average price of its BES offers, TXU priced its BES higher in 2003 than it did in 2002. Its weighted average price during the second quarter of 2003, for example, was about 5.5 times higher than a year earlier. However, the quantity of moderately-priced BES in a typical TXU offer did not decrease and in fact increased slightly.⁵ In comparison, the price of natural gas on the New York Mercantile Exchange increased by about 70% during the same period.
- TXU has reduced its scheduled self-generation (i.e. generation from its own fleet that TXU scheduled to serve its load obligations).
- TXU has increased the quantity of BES it has offered into the market, even though other market participants as a whole have reduced the amount they are offering.
- When the MCPE hit \$990 per MWh on February 24, 2003, TXU had reduced the quantity of its BES offers from the previous hour, but had increased the quantity of its scheduled generation. By the time the market saw the price hit \$990, the company was increasing the quantity of its BES offers. Increasing the size of its offer had the effect of pulling the MCPE down from the \$990 level to around \$229 per MWh.⁶

³ *TCE v. TXU, AEP, Reliant, Mirant, APX and ERCOT*, Plaintiff's Original Complaint, pp. 62-64, paragraph 177.

⁴ Figures compare the May through September time periods. A supplier is pivotal if some portion of its offered supply must be procured in order to meet demand. In other words, if the offered supply of all other suppliers is added together, the resulting quantity is less than the demand that must be met. See "The Pivotal Supplier Test" section beginning on page 13.

⁵ Comparing the three-month period through July 2002 with the same period in 2003, adjusting for changes in natural gas prices, and using an implied heat rate benchmark of 15 mmBtu per MWh.

⁶ MOD is also reviewing balancing energy price spikes not cited by TCE to see whether any market participant submitted last-minute changes to its BES offers that may have caused the price spikes. Because

- In another instance cited by TCE – March 6, 2003 – TXU reduced the quantity of its BES offer for a one-hour period at the same time the market observed the MCPE going up. Combined with the company’s pivotal position in the BES market, this had the effect of pushing the MCPE higher and contributed to the \$990 per MWh price seen two hours later. Operational factors may have coincided with the reduction in TXU’s offer quantity, however. The company said fuel supply problems temporarily reduced the generating capacity of one major plant at that time.

Overall, this study shows that TXU has a position in the ERCOT market strong enough to affect the balancing energy MCPE consistently. Indeed, the results of this study show that TXU’s market position is so pivotal that just about anything the company does with respect to BES will affect balancing energy prices, regardless of the reasons behind its decisions. MOD found that the MCPE is higher during the intervals when TXU is a pivotal supplier. However, some of the market changes that cause TXU to be pivotal at any given time – more BES procured by ERCOT, less BES offered by competitors – are the same factors that tend to push the MCPE up naturally and can happen independently of TXU’s actions.

In MOD’s view, the concerns raised by this study are best addressed by ex ante mitigation procedures that would automatically respond whenever TXU (or any other supplier) was pivotal in an ERCOT auction.⁷ Ideally, the mitigation method would put a pivotal supplier on par with all other suppliers who are not pivotal.

How MOD Approached This Study

The Public Utility Regulatory Act (PURA) authorizes the Commission to oversee the development of the Texas wholesale electricity market and empowers the Commission to address anticompetitive conditions and activities. One of the key responsibilities of MOD has been to monitor various activities within ERCOT-administered markets as well as in the bilateral market, and to identify any anticompetitive activities. At any given time, MOD is conducting informal investigations of activities suspected of harming the competitive market or contributing to extreme prices in various markets. The results of these ongoing informal investigations are the bases for deciding whether Commission Staff should initiate an enforcement action at the Commission. Equally important, these informal investigations frequently form the bases for MOD’s policies toward important elements of market design.

MOD has met informally (and separately) with TXU and TCE on various occasions to discuss the effect of relaxed balanced schedules, BES market strategies and other related issues since November 2002. MOD has also analyzed ERCOT market operations data, and at MOD’s request TXU has provided additional detailed data on its balancing energy offers and its bilateral transactions. In addition, TXU has responded to informal

such analysis is computer-intensive and would require additional time, MOD chose not to include it in this report.

⁷ Commission Staff proposed such a mitigation approach in Docket Number 24770, *Report of the Electric Reliability Council of Texas (ERCOT) to the PUCT regarding Implementation of the ERCOT Protocols* (August 20, 2003). See Commission Staff’s Initial Brief (January 25, 2002) and Application of the Competitive Solution Method (October 11, 2002).

questions about the additional data and had earlier meetings with MOD to discuss its market strategy in general.

MOD has conducted an aggregated overview of TXU's bilateral contract activity since January 2002, but it would be premature to state any conclusions based on the preliminary analysis. Nevertheless, MOD will continue to examine the data in greater detail to see if there are any issues affecting specific subsets of wholesale customers or types of transactions.

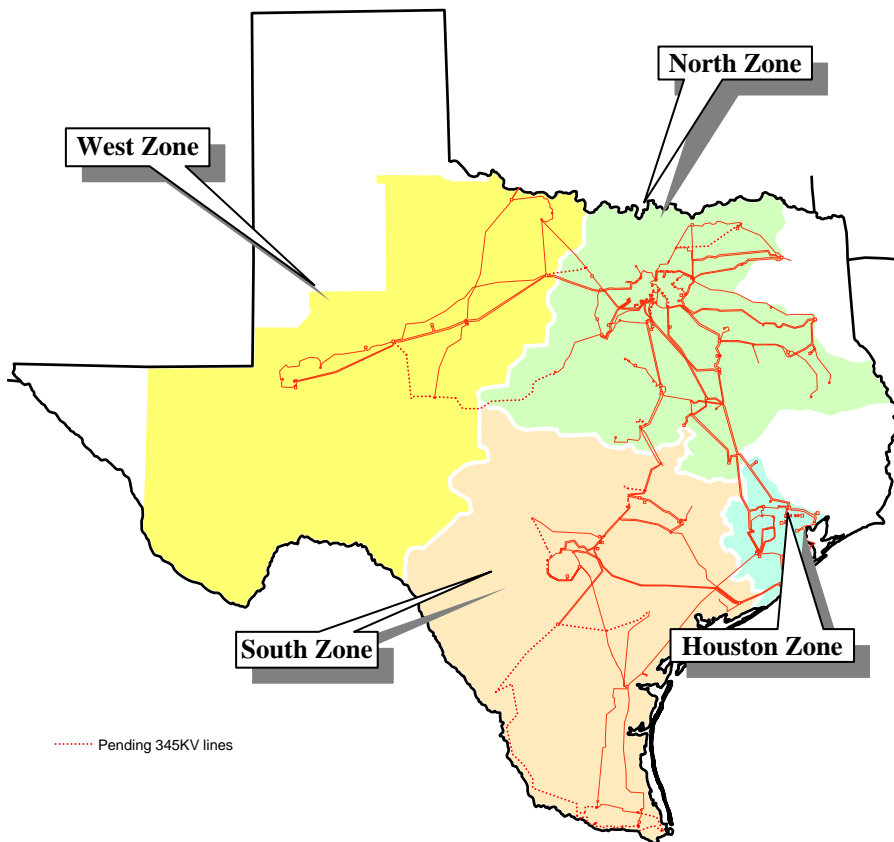
The ERCOT electricity market, like any other electricity market, is very dynamic and complex. As such, there will always be the possibility of subtle strategies enabled by a pivotal market position that can take inappropriate advantage of the ERCOT market. MOD will continue to monitor the behavior of all ERCOT market participants, and will continue to devote special attention to TXU because of its pivotal position in the ERCOT market.

Balancing Energy Service Market Trends

BES is used to keep actual generation in balance with actual load, and is the closest thing to an energy spot auction in ERCOT. Suppliers, through their qualified scheduling entities (QSEs), submit offers up to one hour in advance of the hour for which ERCOT buys the energy, with the hour divided into four 15-minute settlement intervals. All selected offers are paid the market clearing price for energy (MCPE). The MCPE, which is calculated every 15 minutes, is based on the offers submitted for that hour. ERCOT buys two kinds of balancing energy: Up-BES, when a generator produces more electricity; and Down-BES, when a generator reduces output.⁸

When there is no congestion between congestion management zones, the entire ERCOT power region is treated as a single BES market, making the competitive field large. If the main lines between congestion management zones are constrained, however, separate BES auctions are conducted for each zone. Interzonal congestion often results in incumbent suppliers being pivotal in their corresponding zones, because these suppliers' generation capacity tends to be concentrated in their incumbent zones. (Figure 1 shows the zonal boundaries for 2003.) TXU has the most capacity in the North Zone and West

Figure 1: ERCOT Congestion Management Zones (2003) and 345 kV Network



⁸ At times, ERCOT will buy Up-BES and Down-BES at the same time in order to achieve a limited form of least-cost dispatch.

Zone, while Texas Genco has the most capacity in the Houston Zone. The South Zone's largest generators are AEP, City Public Service of San Antonio and Austin Energy.⁹

TXU's power generation, retail, and scheduling operations are conducted separately under different subsidiaries. The QSE, TXU Portfolio Services, buys power from TXU's generating subsidiary and from independent generators. The generating resources in the QSE's portfolio are sold to TXU's retail subsidiaries and to non-TXU wholesale customers.

Up until November 1, 2002, QSEs were required to submit schedules in which generation matched projected load, in order to minimize the need for BES. Mismatches between scheduled generation and actual real-time load were (and still are) offset with BES. ERCOT relaxed the balanced schedule requirement on November 1, 2002, however. This change liberalized the use of BES as a replacement for self-generated power and power purchased through bilateral contract. A QSE can schedule less generation than its forecasted load and use Up-BES to serve the amount of load not covered by scheduled generation.¹⁰ ERCOT purchases the necessary balancing energy on the QSE's behalf at the MCPE, and charges the QSE for the purchase. Up-BES deployments increased after relaxed balanced schedules took effect.

A comparison of the BES market in 2002 and 2003 shows these major changes:¹¹

BES clearing prices were about 50% higher in 2003 than in 2002. The average North Zone MCPE for the third quarter of 2002 was \$26.68/MWh, compared to \$39.32/MWh for the same period in 2003. Figure 2 shows how the MCPE has changed over time. The quarter-to-quarter change in the MCPE was about the same as the quarter-to-quarter change in average natural gas prices.¹²

BES clearing prices relative to the bilateral day-ahead market were unchanged. The day-ahead ERCOT power price index published by *Megawatt Daily* is another indicator of current market prices. Normally the day-ahead prices are close to the MCPE, except that the MCPE is more volatile. This is because the MCPE is set close to real-time and therefore reflects system changes not reflected in the prices set in the previous day. There was no major divergence

⁹ It should be noted that installed generation market share does not directly translate into market position in the BES market. Many suppliers use their generation capacity to self-supply and supply generation through bilateral contracts. TXU, through its subsidiaries, is both a very large generation owner and a very large retail electric provider. Consequently, it has the ability to increase its purchases from other suppliers and correspondingly increase the amount of its own generation capacity that it offers into the ERCOT BES market. As discussed in this study, TXU has in fact done so.

¹⁰ A QSE can also schedule more generation than its forecasted load.

¹¹ In this study, most comparisons are between the third quarter of 2002 and the third quarter of 2003, unless otherwise specified. The third quarter is when ERCOT load is the highest, and when balancing energy demand is highest. Comparisons that include the first quarter of 2003 have been avoided due to the market distortions caused by the February 2003 extreme weather event. Charts are used to depict the complete time period.

¹² Natural gas is the predominant fuel source in the ERCOT electricity market, and the marginal supply is always from natural gas-fired generation. Consequently, clearing prices in the BES market are directly affected by natural gas prices. Of course, changes in electricity supply and demand also directly affect BES clearing prices.

between the MCPE and the day-ahead market prices, aside from price spikes in the MCPE. Figure 3 shows the mathematical difference between the two prices.

The amount of Up-BES offered into the market in 2003 was somewhat less than what was offered in 2002. The average amount of Up-BES offered in an hourly stack during the third quarter of 2003 was 6,347 MW, a drop of 10% from the same period in 2002. However, the same period-to-period comparison shows that:

- TXU offered 12% more Up-BES for the third quarter of this year, and
- All other generators offered 25% less Up-BES.

More Up-BES was deployed in 2003 than in 2002. The average hourly deployment of Up-BES ERCOT-wide, shown in Figure 5, was 1,104 MW in the third quarter of 2003, up 22% from 906 MW for the same period in 2002.

In short, more Up-BES has been purchased by ERCOT, and prices are higher. At the same time, supplies offered into the auction have decreased, which would normally push prices higher.

Implied Up-BES revenues for TXU were up significantly through July 2003 compared to a year earlier, as shown in Figure 7. At the same time, the higher Up-BES revenues were counterbalanced by higher load imbalance charges, which are incurred when a QSE relies more heavily on the BES market to serve its obligations. TXU increased its BES purchases by more than 60% between the three-month period ending July 2002 and the same period in 2003.

With this background, the next section looks specifically at TXU’s position in the ERCOT BES market, and how the trends described in this section have affected the company’s market position.

Figure 2: North Zone MCPE Trend (10-Day Moving Average)

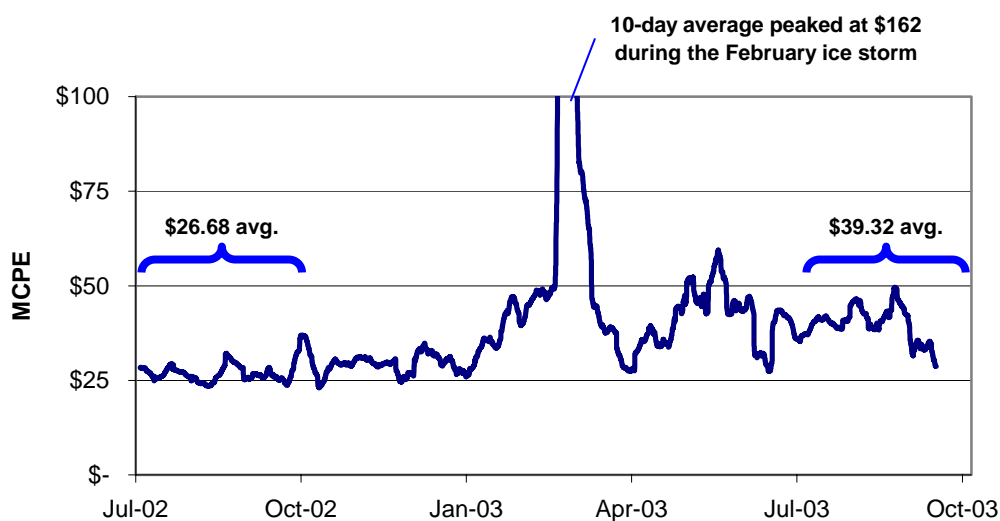
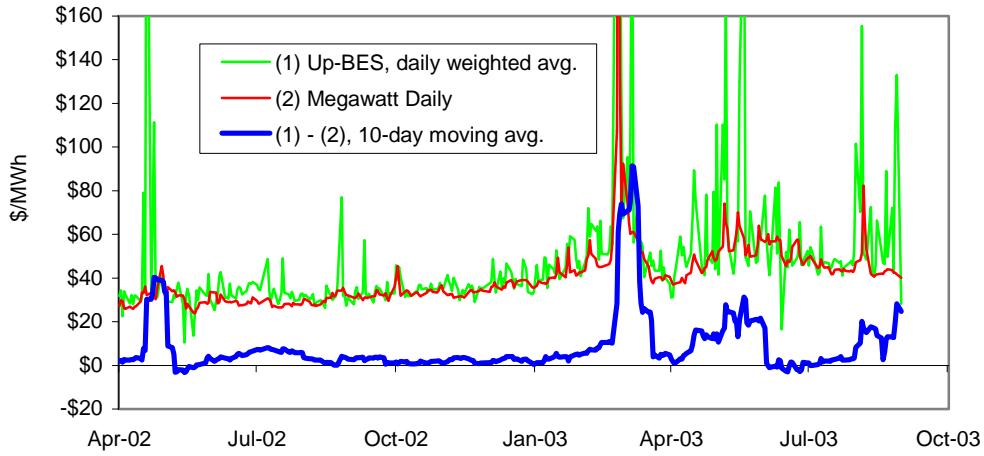


Figure 3: Up Balancing Energy Prices Compared to Day-Ahead Contract Prices



Note: Prices reflect 16-hour peak period from 6:00 a.m. to 10:00 p.m.

Figure 4: Volume of Up-BES Offers

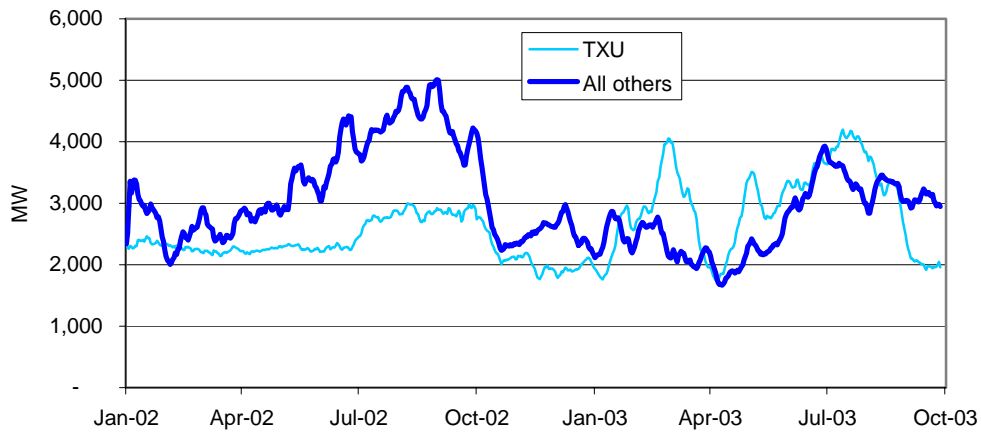
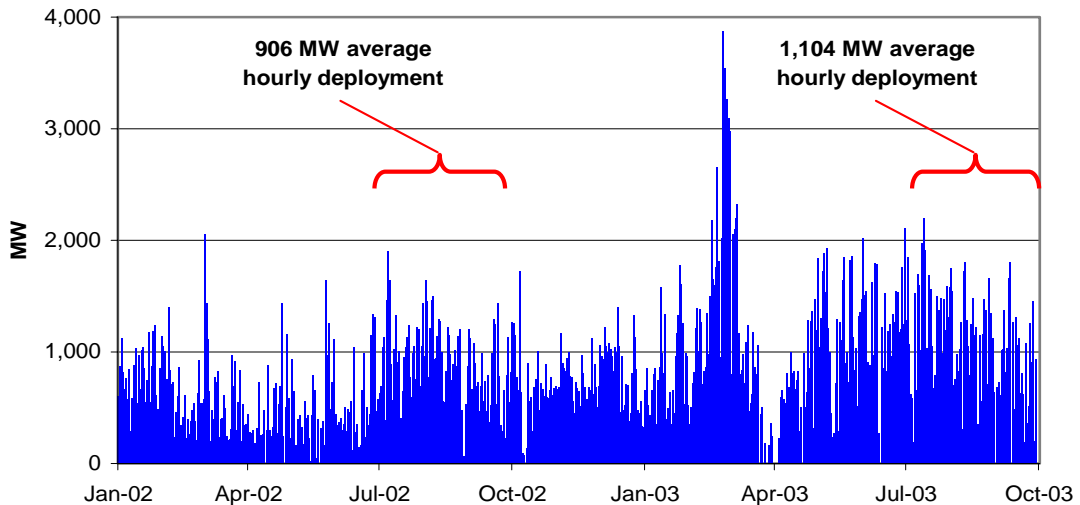


Figure 5: ERCOT-Wide Deployment of Up-BES



Note: This figure includes only intervals with more Up-BES deployments than Down-BES deployments.

Figure 6: TXU's Monthly Load Imbalance Charges and Credits

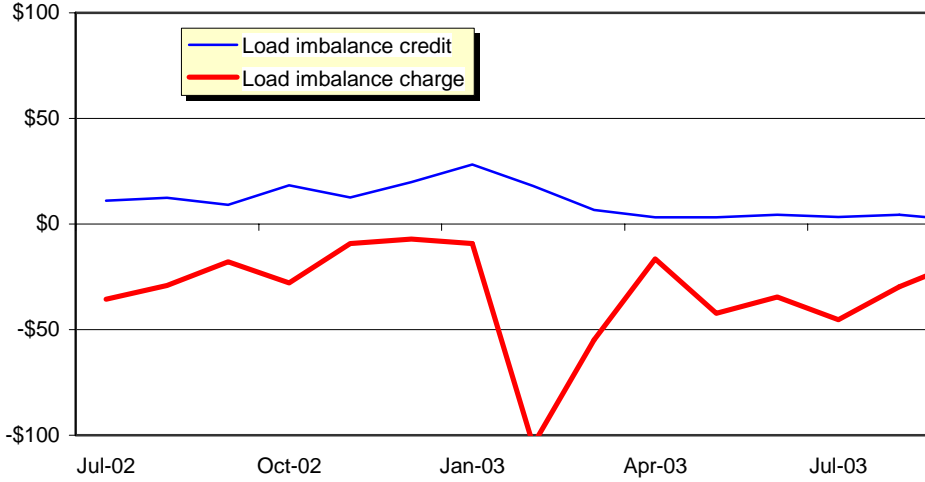
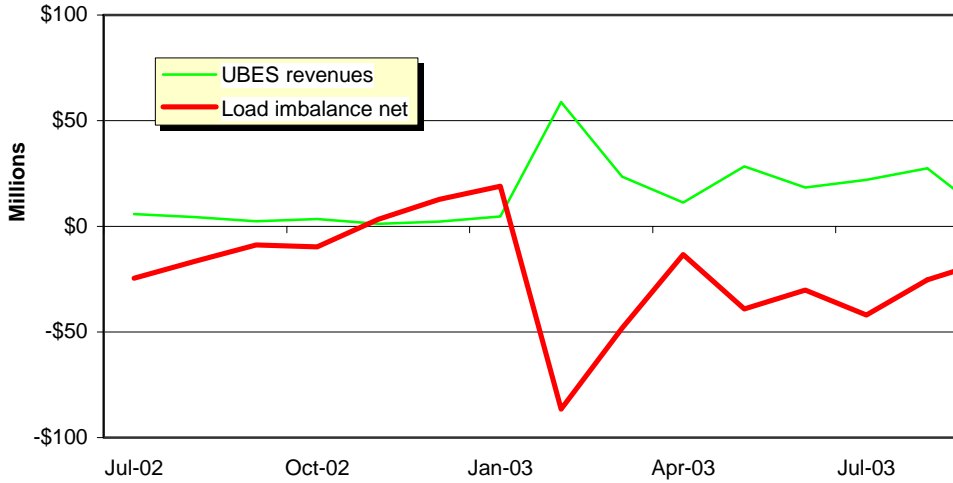


Figure 7: TXU's Monthly Up-BES Revenues and Net Load Imbalance Costs

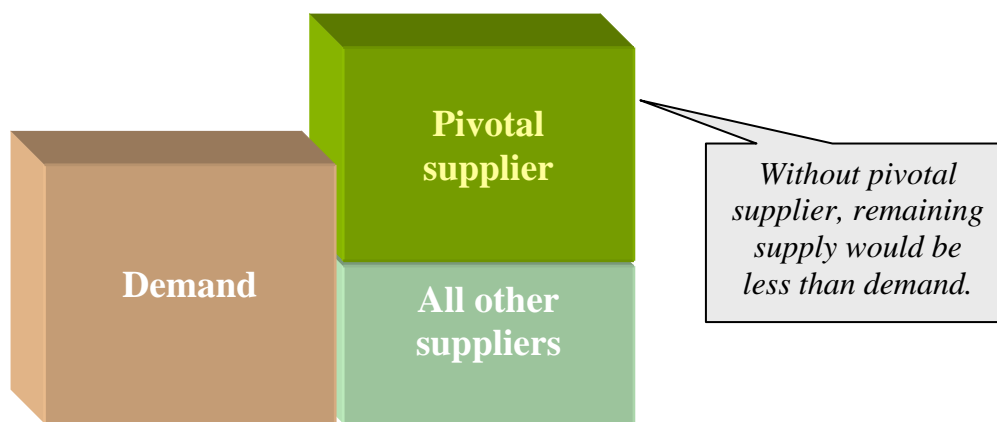


Note: Up-BES revenues were calculated by multiplying TXU's Up-BES deployments by the MCPE.

The Pivotal Supplier Test

The *pivotal supplier test* gauges how often a single supplier is essential for demand to be fully met.¹³ As Figure 8 illustrates, if a pivotal supplier were removed from the market, the total remaining supply would not be enough to meet total demand. Consequently, a pivotal supplier has the *potential* to command any price it desires, because the market has no choice but to take at least some of its offer.¹⁴ The presence of a pivotal supplier is especially problematic if demand does not vary with price, which is the case in the BES market. Lack of price responsiveness means that the market is incapable of reducing its demand if a pivotal supplier decides to increase prices unilaterally.

Figure 8: Pivotal Supplier Test



The pivotal supplier test is a snapshot of a market's competitiveness at a given moment. It serves as a diagnostic tool to isolate potential market issues. Infrequent occurrences of a supplier being pivotal that can be traced to specific system shocks or unusual transitory events (the February 2003 extreme weather event in ERCOT, for example) are of less concern than persistent, predictable occurrences by a single supplier.

MOD conducted a pivotal supplier analysis of the ERCOT BES market for the period beginning May 1, 2002 up to September 24, 2003. The analysis separately examined intervals with no zonal congestion to determine whether a supplier was pivotal ERCOT-wide, and intervals with between-zone congestion to determine whether someone was pivotal within a given zone. About 87% of all operating intervals from May 1, 2002 through September 24, 2003 had no interzonal congestion.

The analysis of the ERCOT BES market found that:

¹³ FERC's proposed Supply Margin Assessment test is based on the pivotal supplier concept.

¹⁴ A supplier may have difficulty knowing in advance whether it will be pivotal for a specific interval, because it does not know in advance how much balancing energy ERCOT will need. Being pivotal depends on the amount of energy the supplier offers relative to offers by all other suppliers, and on the amount of energy deployed by ERCOT.

- **ERCOT-wide, TXU was pivotal 10% of the time.** By comparison, Texas Genco, the second largest generator in ERCOT behind TXU, was pivotal only 0.3% of the time ERCOT-wide, making it a distant second on the pivotal supplier scale across all of ERCOT.
- **In the North Zone, TXU was pivotal 72% of the time** when there was zonal congestion. The company was also pivotal in the West Zone 52% of the time when there was zonal congestion. By comparison:

Texas Genco was pivotal 36% of the time in the Houston Zone;

AEP was pivotal 23% of the time in the South Zone;

Texas Genco was pivotal 7% of the time in the South Zone¹⁵; and

Austin Energy was pivotal 4% of the time in the South Zone.

TXU was pivotal more frequently during peak hours, and especially during the 5-hour period from 1 p.m. to 6 p.m. Figure 9 illustrates the times during the day that TXU was pivotal most frequently. The time that TXU tends to be pivotal when there is interzonal congestion is also when demand for balancing energy is the highest.

The data also show that TXU was pivotal in 2003 more frequently than it was in 2002. Figure 10 shows how often TXU was pivotal each month from May 2002 through September 2003. From May 2003 through September 2003, TXU was pivotal when there was no interzonal congestion about 17% of the time, compared with 2% for the same period in 2002.

The fact that TXU is frequently a pivotal supplier means that it is frequently capable of controlling the MCPE. To find out whether TXU's position is correlated to price outcomes in the BES market, MOD used a statistical regression analysis to test whether the MCPE was measurably higher or lower during the times that TXU was a pivotal supplier. The analysis took the following factors into account:

- Natural gas prices,
- Time of day,
- Tendency of the MCPE to be close to what it was an hour earlier, regardless of other factors,¹⁶
- Whether ERCOT needed more Up-BES than Down-BES,¹⁷
- TXU's quantity-weighted average offer price,
- TXU's offer price range, and

¹⁵ Texas Genco schedules resources for City Public Service of San Antonio (CPS) under a joint operating agreement. CPS is the second-largest generation resource owner in the South Zone. In addition, the South Texas Project nuclear plant, in which both Genco and CPS own large shares, is located in the South Zone.

¹⁶ This is formally referred to in statistics as autocorrelation.

¹⁷ When ERCOT buys Up-BES, it pays for more generation to be delivered to the system. When ERCOT buys Down-BES, it pays for generation to be reduced. The MCPE tends to be much lower (and sometimes negative) when ERCOT buys more Down-BES than Up-BES. Consequently, to include intervals that were net Down-BES would exaggerate the price difference between TXU-pivotal intervals and intervals when TXU was not pivotal. Net Down-BES intervals were, therefore, excluded from the regression analysis.

- Whether or not TXU was a pivotal supplier.

The analysis, summarized in Table 1, showed a strong correlation between the MCPE and the times that TXU was pivotal.¹⁸ All else being equal, the MCPE was higher when TXU was pivotal. Natural gas prices, which were around \$5 per MMBtu during the 2003 study period, or \$1 more than a year ago, explain some of the increase, but not all of it. The regression results show that TXU’s “pivotalness” was correlated to the MCPE three to five times as strongly as the effect of a \$1 change in natural gas prices.

One must be cautious about interpreting the results of the statistical analysis. It does not say that TXU intentionally used its market position to cause higher prices. It does, however, demonstrate the link between TXU’s pivotal position and prices. As Figure 8 illustrates, the quantity offered by one supplier, the quantity offered by all other suppliers, and demand are the three variables that determine whether a supplier is pivotal. A large yet non-pivotal supplier may become pivotal when demand goes up or when the quantity offered by all other suppliers goes down, *either of which will cause the MCPE to increase in a normal competitive market, and both of which happened from 2002 to 2003.*

Statistically confirming the link between TXU’s pivotal position and the MCPE suggests that a change in the company’s BES strategy will have an effect on prices, regardless of the reason behind the change and regardless of whether the company explicitly intended to take advantage of its market position. To test this effect more directly, MOD conducted a statistical analysis of how the MCPE changed as TXU changed the quantity and price of its BES offer, controlling for the factors that one would expect to influence the MCPE naturally (natural gas prices, time of day, season, and the amount of Up-BES deployed). Table 2 shows the specifications of the regression model along with the results.

The analysis shows clearly and with a high degree of confidence that the MCPE goes up:

- when TXU reduces the quantity of its BES offer, and
- when TXU increases its offer prices.

Neither of the other two largest generation owners had as significant an effect on the MCPE as did TXU. When the same regression model was run using BES offer data from Texas Genco and AEP, the second- and third-largest owners of generation capacity in ERCOT, the MCPE was not affected by changes in either company’s offer quantity to any statistically significant extent. Changes in AEP’s pricing had no statistically significant correspondence with the MCPE. On the other hand, when Genco’s BES pricing went down the MCPE tended to go up.¹⁹

The statistical analysis suggests that the MPCE increases by \$12 to \$19 when TXU decreases its offer by 1,000 MW, under conditions of no zonal congestion when all ERCOT is treated as a single BES market.

¹⁸ The standard rule-of-thumb for statistical significance is whether a variable’s t-statistic is greater than 2 or less than -2. The t-statistic for the variable *pivotal* was 23.23.

¹⁹ Unlike the case with TXU or AEP, the model using Genco’s data showed no significant effect from the price of natural gas.

In order to find out whether TXU took specific actions that directly exacerbated any price increase, it is necessary to examine what TXU was doing when it was pivotal and to determine whether the company's actions were consistent with strategies that take advantage of such a position. The next section examines TXU's generation scheduling and its effect on the amount of BES purchased by ERCOT.

Figure 9: Hourly Distribution of TXU's Pivotal Market Position (No Interzonal Congestion)

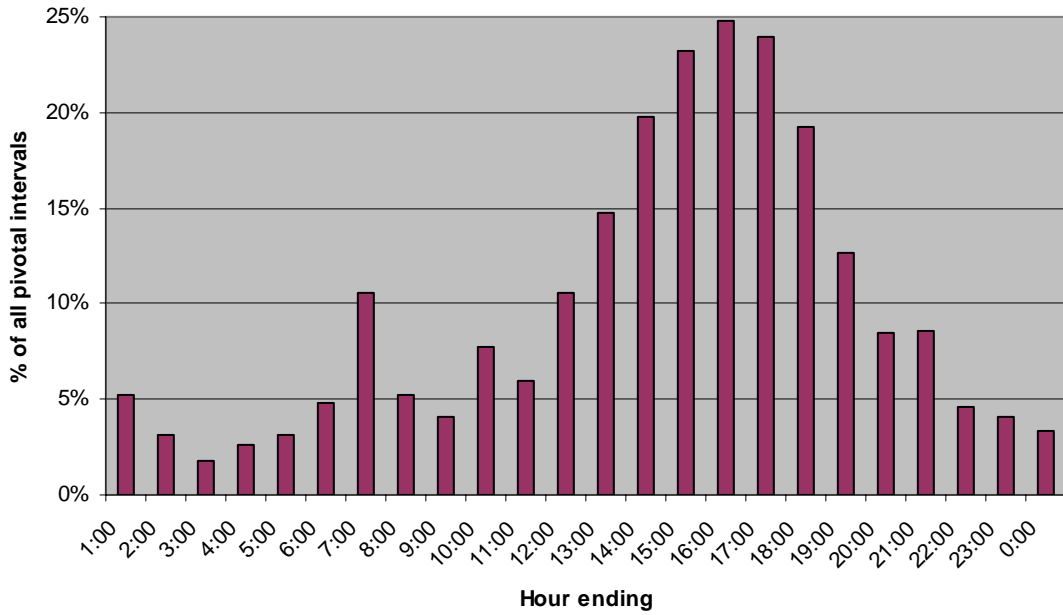


Figure 10: Monthly Distribution of TXU's Pivotal Market Position (No Interzonal Congestion)

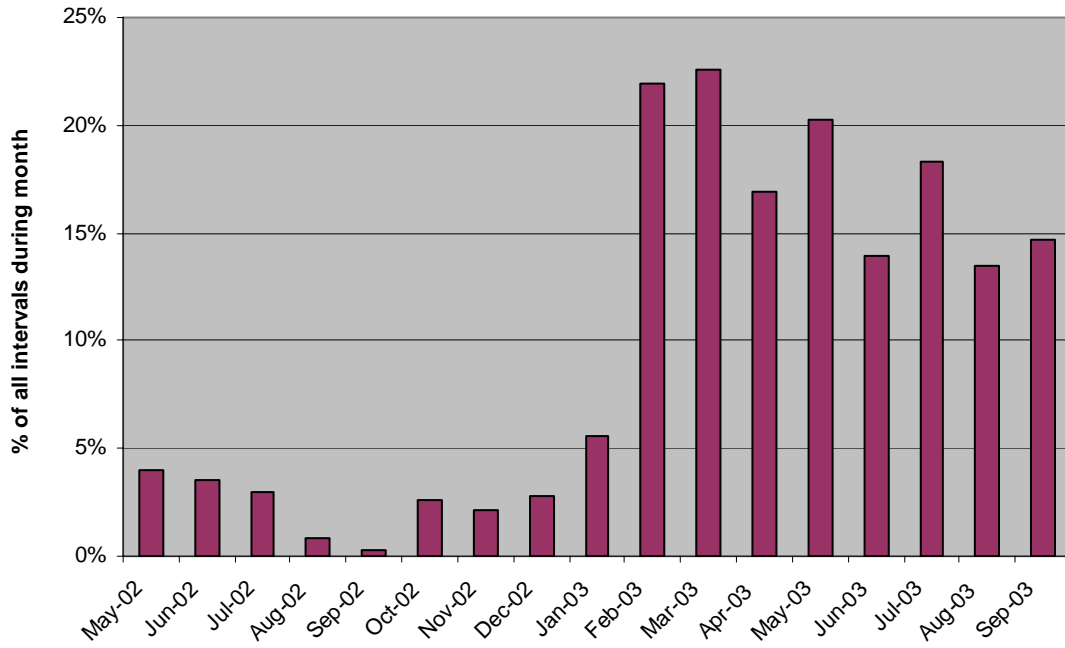


Table 1: Relationship between MCPE and Times TXU Was Pivotal

Regression model: $\ln(\text{MCPE}) = \beta_0 + \beta_1 \text{pivotal} + \beta_2 \text{gas} + \beta_3 \ln(\text{MCPE}_{h-1}) + \beta_4 \text{peak} + \beta_5 \ln(\text{average bid}) + \beta_6 \ln(\text{bid range})$

where

pivotal is a binary variable designating whether TXU was pivotal for that interval,

peak is a binary variable designating the hours of 6 a.m. to 10 p.m.,

gas is the price of natural gas at the Houston Ship Channel,

MCPE_{h-1} is the MCPE one hour earlier,

average bid is the quantity-weighted average bid price for TXU's offer, and

bid range is the difference between the maximum and minimum bid prices in TXU's offer.

Some variables have been transformed into logarithmic values (ln).

(intervals from July 1, 2002 through December 31, 2002)

Adjusted R² : 0.65

Observations: 1,655

	<u>Coefficients</u>	<u>t-statistic</u>
<i>pivotal</i>	0.34	13.77
<i>peak</i>	0.12	14.59
<i>gas</i>	0.07	9.83
<i>MCPE_{h-1}</i>	0.31	24.79
<i>average bid</i>	0.40	11.56
<i>bid range</i>	(0.14)	(9.01)
<i>(intercept)</i>	1.19	15.57

(intervals from April 1, 2003 through August 28, 2003)

Adjusted R² : .63

Observations: 1307

	<u>Coefficients</u>	<u>t-statistic</u>
<i>pivotal</i>	0.28	14.34
<i>peak</i>	0.09	5.92
<i>gas</i>	0.08	6.01
<i>MCPE_{h-1}</i>	0.44	26.20
<i>average bid</i>	0.13	4.04
<i>bid range</i>	(0.08)	(4.15)
<i>(intercept)</i>	1.37	10.53

Note: The analysis tested numerous variations of the model. Other variables tested included 10-day moving average offer price, maximum offer price, net Up-BES deployed, and a time variable designating the hours 13:00 to 18:00. Because of the market distortions caused by the February 2003 extreme weather event, running the model on a single data set from July 1, 2002 through August 2003 was rejected in favor of running the model on two separate data sets for 2002 and 2003.

The adjusted R² indicates how well the regression model as a whole explains changes in the MCPE; a model has a better fit with the data the closer the adjusted R² is to 1.0. The t-statistic indicates how strongly a specific variable correlates to changes in the MCPE; values greater than 2.0 or less than -2.0 indicate statistical significance. Negative coefficients and t-statistics below -2.0 indicate a significant inverse relationship – as the variable increases or decreases, the MCPE changes in the opposite direction.

Table 2: Correlation between MCPE and TXU Offers

Regression model:
$$\ln(\text{MCPE}) = \beta_0 + \beta_1 \text{TXU MW} + \beta_2 \text{TXU price} + \beta_3 \text{UBES MW} + \beta_4 \text{UBES/BES} + \beta_5 \text{summer} + \beta_6 \text{peak} + \beta_7 \text{gas} + \beta_8 \ln(\text{MCPE}_{h-1})$$

where

TXU MW is the amount of Up-BES offered by TXU,
TXU price is the average price of TXU's BES offer, weighted by quantity,
UBES MW is the amount of Up-BES deployed by ERCOT,
UBES/BES is the proportion of Up-BES to total BES deployments,
summer is a binary variable designating the months of June through September,
peak is a binary variable designating the hours of 6 a.m. to 10 p.m.,
gas is the price of natural gas at the Houston Ship Channel, and
MCPE_{h-1} is the MCPE one hour earlier.

Some variables have been transformed into logarithmic values (ln).

Adjusted R² : 0.64
 Observations*: 1,641

	<u>Coefficients</u>	<u>t-statistic</u>
<i>TXU MW</i>	(0.0001)	(10.99)
<i>TXU price</i>	0.208	5.83
<i>UBES MW</i>	0.0003	24.61
<i>UBES/BES</i>	4.847	10.72
<i>summer</i>	(0.179)	(8.50)
<i>peak</i>	0.081	4.78
<i>gas</i>	0.250	5.91
<i>MCPE_{h-1}</i>	0.312	16.55
<i>(intercept)</i>	(3.413)	(7.48)

*Observations included only intervals in which Up-BES constituted more than 95% of BES deployments.

Economic Withholding

“Economic withholding” refers to the practice of setting the price of an offered commodity higher than it would be if it were priced competitively. The result is that it artificially reduces the supply that *is* priced competitively, so that the same demand has to be served with quantities further up the portion of the supply curve that is priced near marginal cost. When demand is greater than all the remaining competitively priced supply, the market is forced to buy some of the offer that is priced non-competitively. A pivotal supplier is structurally capable of using economic withholding to drive prices above the levels that would be charged in a competitive market.

One of TCE’s main allegations in its litigation is that TXU offered over-priced generation into the BES market. “Over-priced,” of course, depends on the benchmarks applied,²⁰ but in any case the data show that for the three month period ending in July:

- TXU increased its average offer price between 2002 and 2003;
- The increase in TXU’s average offer price was greater than can be explained by fuel prices alone; and
- The quantity of Up-BES offered by TXU was larger, although the low- to moderate-priced portion of the offer was about the same.

TXU’s offer prices for BES during the second quarter were higher in 2003 than in 2002. For 2002, the weighted average of each hourly offer submitted by TXU was \$26.02. After the February 2003 extreme weather event, however, TXU’s weighted average offer price stabilized at the \$80 level in late March and early April, but then increased to around \$200 by mid-June. For the second quarter of 2003, the company’s volume-weighted average offer price was \$157, about five and a half times its average for the same quarter in 2002. Not only did the average price increase, so too did the volatility with which its offer prices changed from one period to the next. Figure 11 plots the weighted average price of each hourly BES offer submitted by TXU.²¹

By comparison, the price of natural gas rose by about 70% between the second quarter of 2003 and a year earlier, and by about 50% from the third quarter of 2002 to the third quarter of 2003. The 50-day average price of natural gas on the New York Mercantile Exchange was \$3.24 by the end of September 2002, and was \$4.82 by the end of September 2003. Average monthly prices for the third quarter increased by about 54% between 2002 and 2003.²²

The total quantity of Up-BES offered by the company in the North Zone for the three month period ending July 2003 increased 71% over the same period in 2002. At the

²⁰ More formally, “over-priced” can mean priced above what would normally result from a competitive market (a market-wide benchmark), or priced in excess of the unit’s cost (an individual conduct benchmark). This report does not address which type of benchmark is appropriate.

²¹ Each hourly offer consists of a quantity of energy, and the price at which that quantity is being offered. The weighted average price for the hourly offer consists of each price weighted by the quantity being offered at that price.

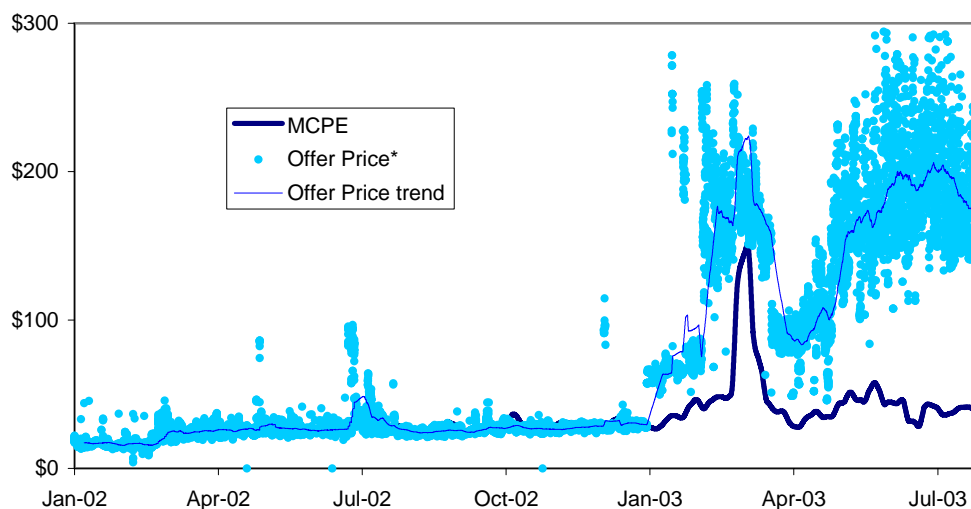
²² Based on 25-day averages at the end of each month as reported by the New York Mercantile Exchange for natural gas delivered at Louisiana’s Henry Hub.

same time, however, the amount of moderately priced Up-BES offered by TXU increased. Specifically, the quantity TXU offered at \$83 or below for the three months ending July 2003 was 34% greater than the quantity it offered at \$50 or below during the same period in 2002. (Using a constant heat rate of 15 mmBtu per MWh, an energy price of \$50 at Summer 2002 fuel prices is comparable to an energy price of \$83 at Summer 2003 fuel prices.)

Consequently, while TXU has indeed increased its average Up-BES offer price significantly, *within* that average the amount of moderately priced energy has not decreased and has even increased slightly. The average has increased because TXU has added high-priced energy to its offer, not because it has taken moderately priced energy out of the market.

As discussed in the previous section, MOD looked more formally at the relationship between TXU’s offer price and the MCPE through a statistical regression. (See Table 1 and Table 2 above.) Unlike the analysis of simple averages detailed above, the regression analysis was able to detect moment-to-moment changes in the MCPE and in TXU’s BES offers and could measure the extent to which they were mathematically correlated. The results clearly showed that the MCPE went up when TXU’s offer prices went up, but the effect was strongest when TXU’s offers were the most consistent and showed the least variance. The wider the range between the high and low prices in TXU’s offer, the less influence the company’s average offer price had on the MCPE.²³

Figure 11: TXU Offer Price for Up Balancing Energy



*Each point represents the average price for Up Balancing Energy Service contained in an hourly offer by TXU (the average is weighted by the quantity offered at a specified price). The trend line represents the average of these hourly weighted averages for all hours over a moving 10-day period.

²³ In the various regression models tested, the variable for TXU’s average offer price had no statistically significant effect on the MCPE when the offer range variable was excluded. When the latter was included, both variables were statistically significant.

Physical Withholding: Scheduling

Physical withholding refers to generation that is not offered into the market at all even though the plants are physically capable of operating economically.

Reducing scheduled generation to serve load obligations would tend to increase the need for BES (all else being equal). This is one of the main allegations made by TCE in its litigation. Given its size as a wholesale supplier of generation, TXU could cause a significant increase in BES deployments – and prices – if it were to reduce its scheduled generation without increasing the quantity of its BES offers (assuming its load obligation had not changed appreciably).

To examine whether there was any evidence of systematic physical withholding by TXU, MOD focused on relaxed balanced schedules and examined two questions. First, did TXU increase ERCOT's need for BES by reducing its generation schedules after the implementation of relaxed balanced schedules on November 1, 2002? Second, to the extent that TXU's scheduled generation decreased after November 1, 2002, was there a similar increase in the amount of BES it offered into the ERCOT auction?

MOD first looked for widespread changes. The aggregated data show that TXU's total generation commitments (scheduled generation plus balancing energy offers) were down somewhat in 2003. Specifically, between the third quarters of 2002 and 2003:

- TXU's *scheduled generation* fell by 6%;
- TXU's *BES offers* increased by 12%;
- TXU's *total generation* made available to serve ERCOT commitments fell 2%.

Consequently, the mix between scheduled energy and BES offers also changed somewhat; scheduled generation made up 88% of TXU's resource commitment from June through September of 2002, but that share fell to 82% for the corresponding 2003 peak season. Figure 12 and Figure 13 track the changes in TXU's resource commitments from May 2002 through September 2003.

The change in resource commitment mix was in a direction that tended to increase the frequency with which TXU was pivotal, however. As discussed in the section "Balancing Energy Service Market Trends," increasing the demand for BES will tend to make a large supplier pivotal, strengthening its effect on the MCPE.

On the other hand, the change reflected in the data is consistent with a change in business strategy that was described to MOD by TXU. The company stated that, in early 2003, its energy portfolio management subsidiary (which sells power to TXU's retail subsidiaries and other wholesale customers) began to replace high-cost power from inefficient units owned by TXU's generation subsidiary with lower-cost BES or bilaterally purchased power. The company said that at the same time, it began to offer the high-cost units in the BES market at offer prices that were intended to recover the units' cash operating costs under intermittent operation.

On the retail side, the amount of energy delivered to customers by TXU's REPs fell from the third quarter of 2002 to the same period in 2003. In this light, some reduction in scheduled generation would be expected.

Figure 12: TXU Generation Resource Commitment

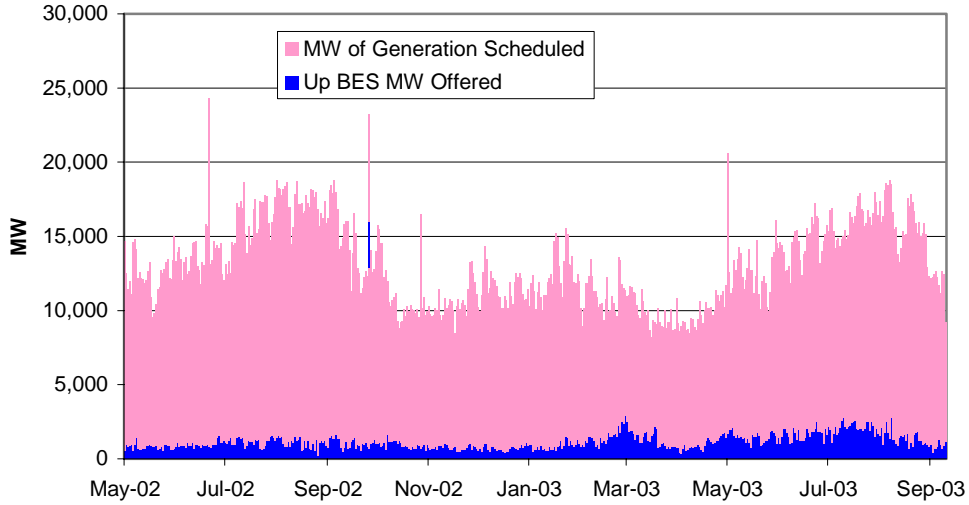
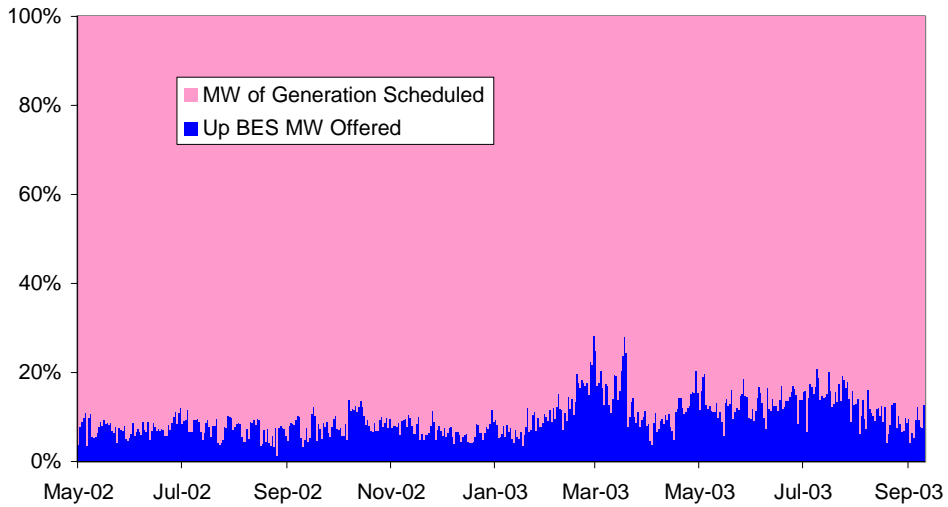


Figure 13: Mix of TXU's Generation Resource Commitment



Physical Withholding: Offer Reductions

Anticompetitive behavior may manifest as various “hit-and-run” strategies that involve immediate and brief exploitation of real-time market events. This type of strategy might not involve any systematic change in market behavior and might not reveal itself in any time series analysis. For example, if the MCPE observed in real time were to increase \$100 over what it was an hour ago, a pivotal supplier could respond with a last-minute offer change that could squeeze supply even more and keep the MCPE high – or drive it even higher. Therefore, MOD also examined the question:

At times during the day when the MCPE began to trend upward, did TXU subsequently reduce the quantity of its balancing energy offers?

The original petition in TCE’s lawsuit makes specific allegations with respect to the February 24-25, 2003 extreme weather event and March 6, 2003. The MCPE spiked to \$990/MWh or higher on these days, and TCE alleges that TXU caused the increase by reducing the quantities of its BES offer.

The critical moments on February 24, 2003 were at 16:54 and 17:50. When the market saw the MCPE increase at 16:45 by almost \$100 from the previous hour, TXU slightly increased its BES offer. If this were the only information available, one could not reasonably anticipate a resulting increase in the MCPE. By the time the market actually saw the MCPE spike to \$990 per MWh at 17:45, the company was already increasing the quantity of its Up-BES offers for the 19:00-20:00 hour, the nearest operating hour for which it could adjust its offer. The increase was not enough to pull the MCPE down for the first three 15-minute intervals of that hour, but the MCPE fell to \$229 for the last interval. By then, TXU had increased its Up-BES offer quantity even more, which helped keep the MCPE below \$229 for the rest of the evening. Table 3 shows the timing of the changes TXU made to its BES offers prior to and during the time the MCPE hit \$990 that day.

The MCPE first hit \$990 at 17:45. The quantity of TXU’s final BES offer for that hour was 850 MW less than its final offer for the previous hour. The MCPE had not changed significantly at the time TXU submitted its final bid at 15:58, suggesting that the change

Table 3: Changes to TXU’s BES Offers Prior to February 24, 2003 Price Spike

Time of action	Real-time MCPE	For planning hour ending	Initial offer of (MW)	Was changed to (MW)	Resulting MCPE for planning hour			
					:15	:30	:45	:00
14:59	\$194	17:00	3,650	5,800	\$150	\$288	\$290	\$295
15:58	\$196	18:00	3,650	4,950	\$297	\$298	\$299	\$990
16:54	\$295	19:00	3,650	3,675	\$990	\$990	\$990	\$990
17:50	\$990	20:00	3,650	3,801	\$990	\$990	\$990	\$229
18:26	\$990	21:00	3,650	4,000	\$149	\$119	\$132	\$140
19:37	\$990	22:00	3,650	4,250	\$147	\$142	\$131	\$131

Note: all planning times are for the end of the hour or the end of the operating interval.

Table 4: Changes to TXU's BES Offers Prior to March 6, 2003 Price Spike*

<i>Time of action</i>	<i>Real-time MCPE*</i>	<i>For planning hour ending</i>	<i>Initial offer of (MW)</i>	<i>Was changed to (MW)</i>	<i>Resulting MCPE for planning hour*</i>			
					<i>:15</i>	<i>:30</i>	<i>:45</i>	<i>:00</i>
02:52	\$87	05:00	2,300	same	\$95	\$95	\$156	\$164
03:55	\$94	06:00	2,200	same	\$254	\$254	\$260	\$250
04:29	\$95	07:00	1,800	same	\$259	\$248	\$249	\$276
06:00	\$250	08:00	2,000	1,300	\$990	\$990	\$990	\$990
06:57	\$276	09:00	2,000	2,300	\$299	\$299	\$299	\$299
07:57	\$990	10:00	2,000	3,000	\$999	\$212	\$226	\$233

Note: all planning times are for the end of the hour or the end of the operating interval.

*Data are for North Zone only. **Bold face** designates intervals with interzonal congestion and the times that each zone had a different MCPE.

was due to operational factors rather than immediate changes in the MCPE. The reduction clearly helped to cause the price spike by the time the operating hour arrived, but so did reductions by other suppliers.

The critical moment during the March 6, 2003 price spike was 06:00. The MCPE in the North Zone had been increasing for an hour and a half, from \$95 per MWh for the interval ending 04:30 to \$250 per MWh for the interval ending 06:00. This change was a signal that ERCOT needed to deploy nearly all available Up-BES. At that time, TXU cut by 700 MW the volume of Up-BES it offered into the market for the operating hour ending 08:00, the nearest hour for which it could adjust its offer. The offer stack contracted, resulting in ERCOT having to take the last and highest-priced offer and the MCPE rising to \$990. Table 4 shows the timing of last-minute changes in TXU's offer for Up-BES in the North Zone just before the price spike.

TXU said that fuel supply issues that morning required switching some units from natural gas to oil, which reduced the units' generating capacity. The company also said that greater than usual changes in real-time load made it necessary to take capacity out of the BES market and make it available to serve scheduled load. At 06:15, ERCOT instructed TXU to limit a 1,858-MW plant to 1,500 MW for the rest of the morning, although this instruction came 15 minutes after TXU had reduced its BES offer.

Over the next two operating hours, TXU increased the quantity of its Up-BES offers – a move which, given the company's size in the market, was bound to cause the MCPE to fall significantly. As Table 4 shows, however, the MCPE observed by the market at the time TXU increased its offer quantity was not much higher than it was an hour earlier when the company decreased its offer. In other words, TXU demonstrated two different responses to virtually the same back-to-back price signals. Together, the two responses are nominally consistent with TXU's explanation of events: that fuel supply problems resulted in a temporary decrease in the company's total available capacity, problems which seem to have been alleviated to some degree by 06:57.

With respect to allegations of physical withholding by TXU on the dates cited by TCE, MOD draws the following conclusions.

- *TXU constituted a large share of the BES offer stack.* While it is not clear that the company knew that technically it was a pivotal supplier, it did know how much BES it was offering into the market, generally how much had been offered by all other suppliers three days earlier, and how much ERCOT deployed the day before.
- *TXU could have deduced that the quantity and pricing of its BES offer would have a significant effect on the MCPE.* This is a logical consequence of knowing its own market position, and knowing that the MCPE was rising.
- *The market could see the MCPE begin to increase on March 6, 2003 hours before the MCPE spiked to \$990.* The market also knew that the MCPE was high on February 24, 2003, but as discussed in the next section, this knowledge was in the context of a chaotic market characterized by fuel curtailments, unplanned outages, and other widespread operational problems.
- *TXU did not know that the MCPE was going to hit \$990 at the time it changed its BES offers on February 24, 2003.* While the company could have deduced that reducing its offer would have pushed the MCPE higher, it did not have enough information (specifically, the balance between supply and demand and the likelihood of ERCOT exhausting the stack) to know that the offer stack would be completely exhausted and the MCPE would rise to \$990. Indeed, there were a number of intervals after the extreme weather event during which no offer was priced more than \$500 (because the hockey stick offer was withdrawn for a short period of time).
- *During both events, at the time the \$990 per MWh MCPE was actually observed by the market, TXU increased the quantity of its BES offers.* Such an action normally results in eliminating the impact of a hockey stick offer and causes the MCPE to fall.

For the purposes of this report, these conclusions are limited to the price spikes discussed in the TCE litigation. In addition, any conclusion about the behavior of any market participant during the February 24-25, 2003 extreme weather event must be tempered by the fact that operations were physically difficult during those days. MOD is continuing to examine other intervals (particularly those in which the MCPE spiked in the absence of similar system problems) to see if there was any indication of physical withholding.

The Extreme Weather Event of February 24-25, 2003

MOD released a detailed analysis of the February 24-25, 2003 extreme weather event on May 19, 2003.²⁴ In that report, MOD concluded that the main factors pushing the MCPE to \$990/MWh were:

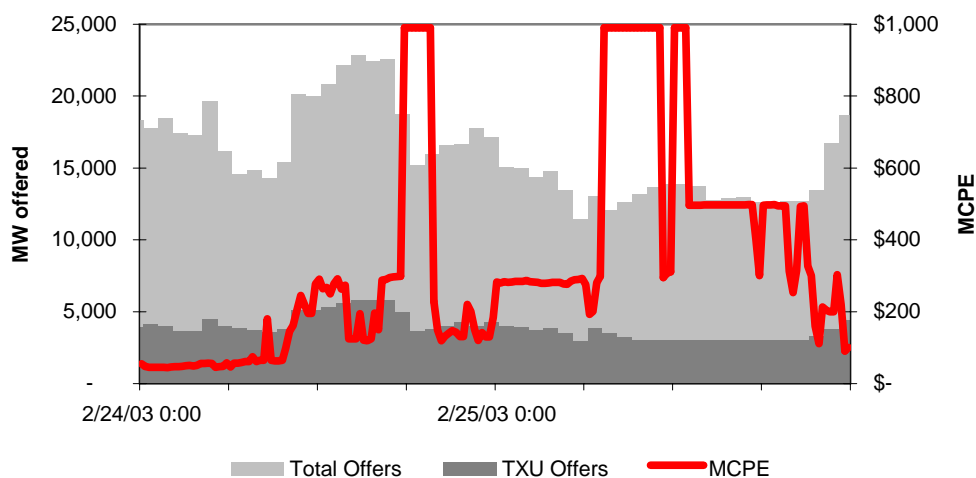
- The inability of generators to procure sufficient natural gas on February 24;
- The failure of many QSEs to provide ERCOT with timely updates on the status of specific generating units; and
- “Hockey stick” bidding by one QSE.

TXU was not the entity that engaged in hockey stick bidding, and in fact did not price any of its balancing energy offers above \$300 for February 24. TCE alleges, however, that TXU used its market position to shrink the balancing energy offer stack and thereby force the MCPE to \$990 even though TXU did not itself place the \$990 offer.

During the interval that the February 24 price spike began, TXU indeed reduced the amount of energy it offered into the Up-BES market. But TXU was not alone: while TXU reduced its offer by 15% from the previous hour, all other market participants reduced their offers by 18%. Many suppliers interviewed by MOD in the preparation of the May 19 report said that the main reason they reduced generation was gas curtailments and skyrocketing spot prices for natural gas.

Pursuant to Commission order, ERCOT has implemented a price safeguard mechanism that would have mitigated the effect of the hockey stick offer had the mechanism been in place during the February extreme weather event.²⁵

Figure 14: BES Offers during the February 24-25, 2003 Extreme Weather Event



²⁴ Public Utility Commission of Texas, Market Oversight Division, “Market and Reliability Issues Related to the Extreme Weather Event on February 24-26, 2003,” report filed in Project Number 25937, May 19, 2003.

²⁵ Docket Number 24770, *Report of the Electric Reliability Council of Texas (ERCOT) to the PUCT regarding Implementation of the ERCOT Protocols, Order* (August 20, 2003).

Bilateral Transactions

A preliminary analysis of TXU's bilateral transactions shows that the company has been a net buyer of purchased power, and increased its 2003 net purchases by about 27% over 2002. At this point, MOD has found no evidence of widespread, egregious price gouging in the bilateral energy market by TXU. MOD is conducting further analysis to determine if there are any issues affecting specific subsets of wholesale customers or types of transactions.

Conclusions and Options

TXU's relative size in the ERCOT market causes the company to have an abnormally strong unilateral influence on BES auction prices, regardless of the reasons behind its market behavior. An appropriate remedy would involve a mitigation procedure that would automatically respond whenever TXU (or any other supplier) was pivotal in an ERCOT auction. Ideally, the mitigation procedure would put a pivotal supplier on par with all other suppliers who are not pivotal.

One of TCE's allegations is that TXU offered balancing energy into the market at prices much higher than marginal cost. In fact, TXU's BES offers were priced higher in 2003 than they were in 2002 (based on comparisons up through July 2003), but the change was consistent with the company's stated strategy of using cheaper purchased power and switching its high-cost capacity to the BES market. Whether TXU's offer prices are justified is one question, but a more basic economic policy problem is that the market tends to respond to *any* TXU strategy to a measurably unique degree regardless of the reasons behind the strategy. Anyone else employing the same BES strategy runs a far greater risk of pricing themselves out of the market.

In MOD's view, appropriate action would address the problem of TXU (or any other supplier) being a pivotal supplier. Market clearing prices should be determined by competitive forces, and if the auction has a supplier who is pivotal – and therefore immune from competition – a mitigation procedure should eliminate that supplier's ability to control the market-clearing outcome.

The Commission has launched a major re-design of the ERCOT power market. While the new market design – Texas Nodal – is expected to result in more efficient pricing and direct assignment of congestion costs, the problem of pivotal suppliers is likely to persist unless it is explicitly addressed through mitigation. A major component of the Texas Nodal design effort is pricing safeguards and market mitigation, which will deal with issues similar to those discussed in this report.²⁶

Types of Remedies

The options which follow are intended to show the range of policy options that may be taken to address the pivotal supplier problem. They range from comprehensive (addressing the pivotal supplier problem as well as related market problems) to an acceptance of the status quo. Implementation issues have been set aside. The purpose of the following list, which is by no means exhaustive, is simply to clarify the kind of remedy suggested by this analysis.

Comprehensive Remedy: Competitive Solution Method

Commission Staff has already proposed in an earlier proceeding one method for mitigating the influence of pivotal suppliers. The Competitive Solution Method (CSM)

²⁶ Project No. 27917, *Rulemaking on Pricing Safeguards for ERCOT-Operated Wholesale Markets*. This rulemaking is intended to include ways to address the need for a permanent remedy under the new Texas Nodal market design to address concerns like those raised in this report.

proposed in Docket Number 24770 contains a pivotal supplier test and a method for adjusting the market clearing price if set by a pivotal supplier.²⁷ As an interim solution, the Commission adopted a limited version of CSM to address the problem of hockey-stick bidding during times of certain extreme market conditions.

Under CSM, a two-part competitive sufficiency test is conducted for each operating interval. First, was the market clearing price set by a supplier who was not pivotal? Second, were the total offers from all suppliers at least 115% of what ERCOT needed for that interval? If either test fails, then two mitigation procedures are triggered.

The first mitigation procedure would be to post an “indicative” clearing price – what the market clearing price (MCP) would be if there were no more offers and there were no further mitigation. The market would then be extended for one hour and suppliers invited to submit additional offers. A new MCP would be calculated, and if the competitive sufficiency test were satisfied, the new price would stand. This measure would apply to markets conducted in the day-ahead. It would not apply to the BES market, because there is insufficient time to extend the market.

If, on the other hand, the extended market still fails the competitive sufficiency test, an MCP limit would be calculated by:

- Removing all pivotal suppliers from the offer stack;
- Removing the most expensive 5% of the quantity remaining in the non-pivotal offer stack; and
- Multiplying the remaining highest price by 1.5.

The MCP would be set equal to the lower of the MCP limit or the original MCP. All quantities offered at a price at or below the MCP would be paid the MCP. ERCOT would obtain any remaining needed quantities through non-market procurement, and the quantities procured through this procedure would be paid the higher of the MCP or verifiable cost.

This procedure would mitigate the influence of pivotal suppliers when the resulting clearing price would otherwise tend to be high. In other words, the main purpose of CSM is to provide a safeguard against high prices that are due to the extraordinary influence of a pivotal supplier or opportunistic behavior during a general shortage of supply. The last-stage price mitigation eliminates pivotal suppliers from the market clearing price calculation completely.

The Commission adopted a limited version of CSM in Docket No. 24770 for the purpose of addressing the problem of hockey stick bidding in the BES market. It applies when all available Up-BES is deployed and there is no interzonal congestion, in which case all suppliers are pivotal. The MCPE limit is determined by taking out the most expensive

²⁷ Commission Staff proposed such a mitigation approach in Docket Number 24770, *Report of the Electric Reliability Council of Texas (ERCOT) to the PUCT regarding Implementation of the ERCOT Protocols*. See Commission Staff’s Initial Brief (January 25, 2002) and Application of the Competitive Solution Method (October 11, 2002).

5% of the original bid stack and multiplying the highest remaining price by 1.5. Quantities above the resulting MCP are paid their offer prices.²⁸

Narrow Remedy: Pivotal Supplier Mitigation

The following method is a variant of CSM limited narrowly to the pivotal supplier problem. If any supplier were pivotal (such as QSE A in Figure 15, for example), ERCOT would shrink each pivotal supplier's offer to the size of the largest non-pivotal offer for the purpose of calculating the MCP. The quantity subtracted from a pivotal supplier's offer would be set aside in a price-taking pool.

Figure 15: Division of Pivotal Supplier QSE A's Offer Quantity

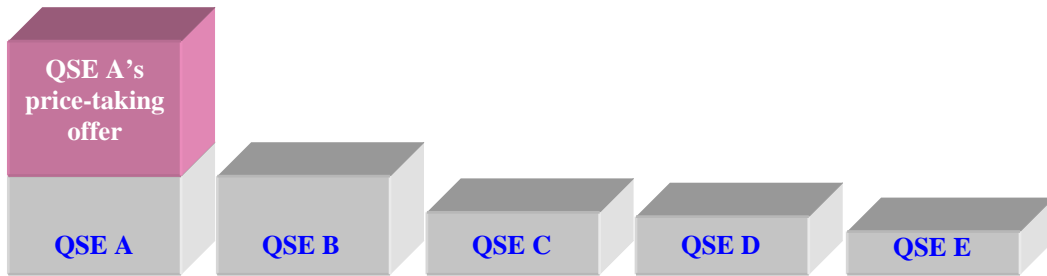
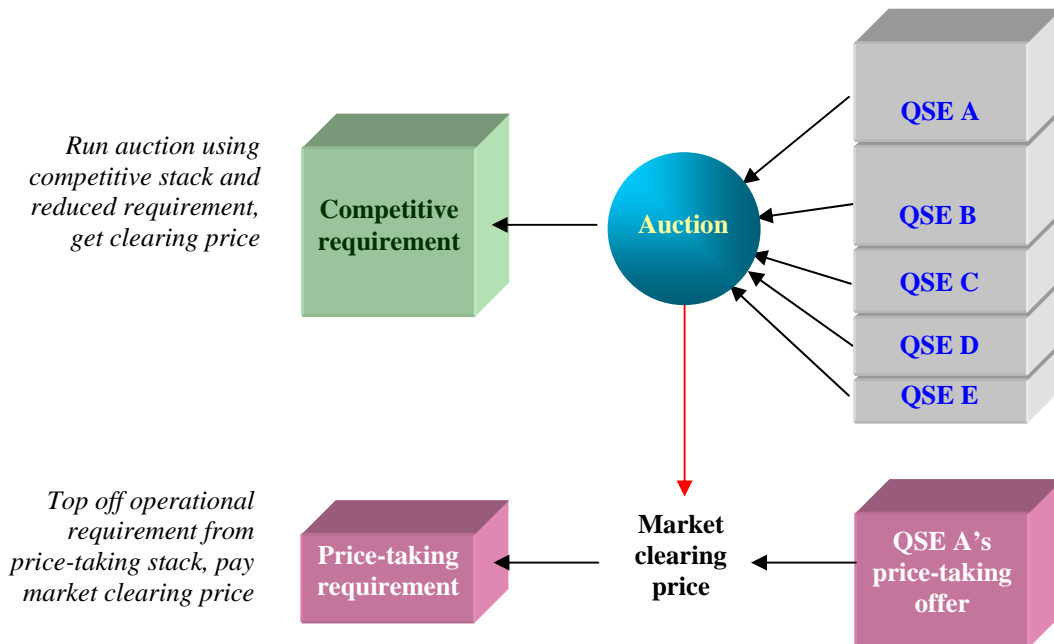


Figure 16: Two-Part Selection



²⁸ In Docket No. 24770, the Commission also extended indefinitely the \$1,000 generator balancing energy offer cap, and extended the offer cap to all resource offers for all ancillary services competitively procured by ERCOT in day-ahead or day-of markets.

For the purpose of calculating the market clearing price, the amount of capacity or balancing energy required by ERCOT would be mathematically reduced.²⁹ ERCOT would then apply the reduced requirement to the competitive offer stack (all non-pivotal offers plus the pivotal suppliers' reduced offers) and obtain the MCP. All quantities selected in the competitive auction would be procured or deployed at the resulting MCP. The difference between the actual operating requirement and the mathematically reduced requirement would be procured or deployed from the pool of price-taking offers, and would be paid the MCP.

Figure 16 illustrates how ERCOT's requirement would be divided between the competitive auction and the price-taking selection. For example, say the total offer stack was 2,000 MW, and QSE A accounted for 1,000 MW of that total. If ERCOT required 1,100 MW, then QSE A would be pivotal. If QSE B were the largest non-pivotal supplier and its offer were 500 MW, then QSE A's competitive offer would be proportionally reduced to the size of QSE B's. QSE A's remaining 500 MW would be set aside and not used in determining the MCP. The auction to determine the MCP would be run using all other offers and 500 MW of QSE A's original offer, with ERCOT's requirement mathematically reduced. The MCP would come from this auction and would be used to pay whatever was used from the price-taking offer pool.

A major difference between this variation of CSM and the one adopted to address hockey stick bidding is that its sole purpose is to address the pivotal supplier problem. The mitigated MCP would always replace the original MCP, thus the resulting mitigated price could increase or decrease. This method would curb a pivotal supplier's ability to pressure competing generators by offering a large quantity priced below marginal cost, and in this case the adjusted MCP could increase to a level that was more indicative of a competitive market. Pivotal supplier mitigation would reduce the MCP in those cases when a pivotal supplier was attempting to raise prices above competitive levels.

Some variations of the above-mentioned method may be applied. For example, as a policy decision, pivotal bidders may be prevented from setting market price. Under such condition, offers by pivotal suppliers would be treated as price takers. However, there would need to be a process to pay the pivotal suppliers verifiable costs if their costs were above the MCPs.

Other ISOs: Cost plus 10%

In other ISOs, most notably PJM, the pivotal supplier remedy is simpler. If a supplier is persistently pivotal, its offers are capped at the variable cost of the generating units plus a 10% adder, similar to the payments that ERCOT pays generators with local market power for out of merit order (OOM) service.

However, this approach is used in markets with central unit commitment and unit-specific auctions. Applying it to the current ERCOT market design, where offers are made on a portfolio basis and are not unit-specific, could be highly problematic. It may be more practical under Texas Nodal, which will include unit-specific auctions.

²⁹ If applied to a system with locational marginal pricing, the maximum operating limit of each line would be reduced by the same factor as demand.

Status Quo

All of the above remedies would cost something: revisions to the market clearing price engines (software) and determining unit costs being the two of the more readily quantifiable items. As a policy matter, the Commission would have to determine whether the advantages of mitigating the pivotal supplier problem outweigh the cost of the chosen remedy.

A significant unmeasurable element complicates the cost-benefit picture: when a market has a persistently pivotal supplier, the health and competitiveness of the market is to a large extent dependent on the good graces of the pivotal supplier. If the pivotal supplier's market behavior is circumspect, then it may be cheaper to tolerate the status quo. The policy question, then, is whether the threat of an enforcement action, in addition to other factors, is sufficient for the pivotal supplier not to abuse its position, such that ex ante mitigation measures are unnecessary.

Final Note

MOD will continue to look at market data and additional information in greater detail and in the context of new developments in the market. The ERCOT electricity market, like any other electricity market, is very dynamic and complex. As such, there will always be the possibility of subtle strategies enabled by a pivotal market position that can take advantage of ERCOT market complexities. MOD will continue to monitor the behavior of all ERCOT market participants, and will continue to devote special attention to TXU because of its pivotal position in the market.