Cost recovery of gas-fired peakers in ERCOT under different regulatory schemes

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In the context of ERCOT's Protocol Revision Request (PRR) 650, we studied the implications for cost recovery for a hypothetical gas-fired peaker if certain changes to the Market Clearing Price of Energy (MCPE) setting process were implemented to appropriately account for Non-Spinning Reserve (NSR) deployments in Balancing Energy Services (BES) prices in ERCOT. We relied on MCPEs adjusted for the impact of PRR 650 (provided by TXU) for the last twelve months to conduct this analysis. Using the algorithms in the Peaker Entry Test (PET) model (modified to use 15-minute interval prices) and previously developed assumptions on variable and fixed costs for a hypothetical gas-fired peaker in ERCOT, we calculated the annual net margin (ANM) for three different MCPE scenarios for a 12-month timeframe starting June 1, 2005 and ending May 31, 2006. Using actual MCPEs as reported by ERCOT, the ANM for a hypothetical peaker totals $52,950 per MW or 61% of the break-even level necessary to adequately remunerate a hypothetical peaker. When we take into consideration the PRR 650 proposed method for adjusting MCPEs for NSR deployments, a hypothetical peaker's ANM increases to $60,911 per MW or 70% of the target remuneration level (taking into account other adjustments that would have occurred, such as the application of the Modified Competitive Solution Method (MCSM) to BES prices). When taking into account the probable removal of MCSM combined with the adjustment to MCPEs for NSR deployments, the ANM climbs even closer to the target break-even level for a hypothetical peaker ($71,145 per MW, or only 18% below the break-even level).

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1 Peaker Entry Test and Annual Net Margin of a representative peaker

A gas-fired peaker's full cost recovery requires covering its fixed costs, including fixed O&M, and its return on capital, in addition to its variable costs of operation. The Annual Net Margin (ANM), a building block of the Peaker Entry Test (PET), which was designed by London Economics International LLC (LEI) for determining the need for market power mitigation, measures the aggregated difference between the market revenues and the short run marginal costs of a hypothetical peaker. In addition to analyzing market power issues, the PET (through the comparison of the estimated ANM and the hypothetical peaker's break-even fixed costs) can be a useful tool for analyzing whether a hypothetical peaker is commercially viable under prevailing (or anticipated) market rules and market conditions.

The short run marginal costs of the hypothetical peaker are calculated by multiplying its assumed heat rate by the spot market gas price and adding other marginal costs, including reasonable variable O&M costs and estimated start-up costs. Although we have recommended a two-year rolling average hourly model (using weighted bilateral and BES prices) for market power analysis, we have modified the PET model to look at (only) BES prices and 15-minute trading intervals and to use the one-year sample data for the current analysis of commercial viability. Therefore, in this analysis, for any trading interval when the BES price exceeds the short-run marginal costs of the hypothetical peaker, the profit margin is tracked and summed on a rolling basis. The ANM is the sum of all positive 15-minute profit margins over the sample one-year period.[1]

1.1 The data and the time frame

The measure for the spot market gas price is the daily closing value of the Houston Ship Channel gas price index as reported by Bloomberg. The daily fluctuations in the index are omitted and the closing price is assumed for the whole 24 hours of the day. For weekends and holidays, the last working day's closing price is used.

Moreover, due to data availability, instead of the preferred weighted average of BES and bilateral prices, we have focused on the 15-minute MCPEs for BES as reported by ERCOT. We have used an ERCOT-wide price, averaging across zones during periods of congestion. In order to model the implications of PRR 650, we have substituted adjusted MCPEs (with and without the effect of MCSM) for those periods where NSR deployments took place. TXU provided us with those adjusted MCPEs.

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[1] Ideally, for purposes of market power analysis, we would advocate that the difference between the market price and the short run marginal costs are tracked and summed over a rolling 24-month period. In this case, however, we calculate the ANM over a one-year period, starting on June 1, 2005 and ending on May 31, 2006, due to data availability. At this time, TXU has back-cast adjusted MCPEs for a 12-month period only.

2 The results

Three cases were analyzed: (1) status quo (using actual MCPEs as reported by ERCOT); (2) adjusted MCPEs for NSR deployments with MCSM (based on the methodology contained in PRR 650); and (3) adjusted MCPEs for NSR deployments without MCSM (based on PRR 650). Our analysis covered the June 1, 2005 to May 31, 2006 timeframe. For every 15-minute trading interval during this 12-month period, we summed the positive difference between the MCPE and the hypothetical peaker's short run marginal costs. The target annual revenue (TANR), which is the break-even level for the hypothetical peaker covering its fixed costs, is $86,533 per MW per year, as developed for our previous presentations of the PET.

2.1 The operating profiles and descriptive statistics

The load factor for the hypothetical peaker over the sample timeframe increases only by 0.30% following the adjustments to the MCPE for NSR deployments (the inclusion or exclusion of MCSM has no effect on the load factor, since it is triggered at high prices when the representative gas-fired peaker is already running). Average MCPEs over our 12-month sample period increase from $61.18/MWh to the neighborhood of $70/MWh when we factor in the adjustments for NSR deployments. The average effect of MCSM on MCPEs across the year is relatively low, at $1.17/MWh. However, MCSM's impact is more substantial in terms of profitability for a hypothetical peaker. The removal of MCSM increases the hypothetical peaker's ANM by approximately $10,000 per MW per year. Figure 1, below, presents the descriptive statistics in all three cases.

Figure 1. Descriptive statistics and peaker operating profiles

	MCPE as reported by ERCOT	Adjusted MCPE with MCSM	Adjusted MCPE without MCSM
Implied load factor for hypothetical peaker	9.08%	9.38%	9.38%
Average MCPE throughout the year ($/MWh)	$61.18	$69.15	$70.32
Average MCPE while the peaker is running ($/MWh)	$175.22	$182.80	$195.26
Average marginal cost of the peaker throughout the year ($/MWh)	$105.73	$105.73	$105.73
Average marginal cost while the peaker is running ($/MWh)	$105.73	$108.65	$108.65
Average observed heat rate throughout the year	12,864	12,864	12,864
Average observed heat rate while the peaker is running	12,864	12,839	12,839
ANM, June 2005 - May 2006 ($/MW)	**$52,950**	**$60,911**	**$71,145**
ANM as percentage of TANR	**61%**	**70%**	**82%**

2.2 Cost recovery under different market rules

Figure 2, below, shows how fast the ANM is accumulated over the course of the year for all three cases. As expected, the pace of ANM growth varies seasonally, with the highest rate of increase occurring during the summer months as compared to the winter months.

The difference between the ANM under the status quo (MCPE as reported by ERCOT) and the ANM when MCPE is adjusted and the MCSM is lifted is significant, and helps to narrow the gap between market outcomes and the target annual net revenue for a hypothetical peaker. However, even with the modification for NSR deployments included in PRR 650, a hypothetical peaker would under-recover its target annual revenues by 18% in this sample period. The annualized fixed O&M costs and the debt repayment and carrying charges of a representative peaker are covered within four months or sooner (keep in mind that the first four months in the sample time frame are June to September, which are peak demand periods and therefore have relatively high seasonal prices). Nevertheless, the levelized return on equity component of the TANR for a hypothetical peaker cannot be fully covered.

Figure 2. Annual Net Margin for three cases versus TANR for a hypothetical peaker ($/MW)