

To: ERCOT Board of Directors
From: Kenan Ögelman, Technical Advisory Committee (TAC) Chair
Date: July 9, 2013
Re: Price Reversal Assignment Update

On July 2, 2013, TAC endorsed forwarding the following report to the ERCOT Board with two abstentions from the Investor Owned Utility and Independent Power Marketer Segments.

Board Assignment

At the May 14, 2013 Board Meeting, in denying the appeal of TAC's rejection of NPRR444, Supplemental Reliability Deployments, the Board directed TAC to do the following: "Report to the Board at the July 13th Board meeting with options for resolution of the potential price reversal that occurs during scarcity conditions under current market rules."

The following TAC report summarizes the market design changes already made, followed by additional issues identified by stakeholders. Next, the report summarizes the concerns of stakeholders that arose during discussions on the remaining "issues". Finally, it concludes with some of the available options that can help address the potential mismatch between pricing and scarcity conditions.

Implemented Market Design Changes to Address Scarcity Pricing

1. Non-Spin Reserve Service (NSRS) Offer Floors: Offer floors were established for Generation Resources providing On-Line Non-Spin capacity (\$120/MWh) and Off-Line Non-Spin capacity (\$180/MWh). [Protocol Section 6.4.3.2, Energy Offer Curve for Non-Spinning Reserve Capacity]
2. Online NSRS Always Available for Security Constrained Economic Dispatch (SCED): Online NSRS was moved into SCED. This eliminated any manual deployment action by ERCOT operators. The NSRS offers are selected in SCED like any other energy offer.
3. Responsive Reserve Service (RRS) and Regulation Up Offer Floors: All energy output from the Generation Resource's capacity reserved to provide Regulation Up or RRS must be offered at the System Wide Offer Cap (SWCAP) – currently \$5,000/MWh [Protocol Section 6.4.3.3, Energy Offer Curve for Responsive Reserve and Regulation Up Capacity].
4. Reliability Unit Commitment (RUC) Offer Floors: When a Generation Resource has been committed by ERCOT as part of a RUC process, all of its energy from its Low Sustained Limit (LSL) to its High Sustained Limit (HSL) is offered at the SWCAP for the Operating Hours in the RUC commitment period. Deployments for local reliability

are then mitigated according to local market power mitigation rules. [Protocol Section 6.4.3.1, Energy Offer Curve for RUC-Committed Resources]

5. Reliability Must Run (RMR) Unit Offer Floors: All energy from LSL to HSL on RMR units must be offered at the SWCAP. [Protocol Section 6.4.3, Energy Offer Curve]
6. Revised Power Balance Penalty Curve (PBPC): The shape of the PBPC was modified in August 2012 to reduce price spikes when ERCOT was leaning on Regulation Up to meet power balance. [Setting the Shadow Price Caps and Power Balance Penalties in Security Constrained Economic Dispatch: Section 4.3, The ERCOT Power Balance Penalty Curve]
7. Changing Local Market Power Mitigation: NPRR520, Real-Time Mitigation Rules and Creation of a Real-Time Constraint Competitiveness Test, was implemented on June 13, 2013 to address SCED over-mitigation issues identified by the IMM. Fewer units are now subject to local market power mitigation allowing their unadjusted Energy Offer Curves to influence the market price when more efficient generation is not available to serve load.
8. 500 MW Transferred from Non-Spinning Reserve Service (NSRS) to RRS: The Protocols obligate ERCOT to determine a methodology for the minimum levels of Ancillary Services required. In April 2012, the methodology was revised to transfer 500 MW of NSRS (which has either a \$120/MWh or \$180/MWh offer floor) to RRS (which has an offer floor at the SWCAP). The intent of the transfer was to have a larger amount of the total reserves provided by online Resources pricing their energy offers at the SWCAP. This approach did not change the total quantity of reserves procured by ERCOT, but shifted 500 MW from NSRS to RRS. [ERCOT Methodologies for Determining Ancillary Service Requirements]

Additional Issues Raised by Stakeholders

The items listed below have been identified by various stakeholders as price formation issues although not all stakeholders are in agreement that all of them need to be addressed. Additionally, stakeholders have been unable to reach a consensus regarding potential design changes related to the issues.

1. Load Resources and Emergency Response Service (ERS): Prices will likely be suppressed during non-price responsive Load Resource deployments such as ERS due to the displacement of demand willing to consume at higher prices.
2. Energy Provided as a Unit Ramps to its Low Sustainable Limit (LSL) and Operates at LSL: Energy Offer Curves exist only for energy provided by a unit above its LSL. As a unit operates at or below its LSL, the energy produced is injected as a price-taker and does not set the locational marginal price. Absent zero to LSL energy, prices will likely

be higher. The sources of the zero to LSL energy are units committed by ERCOT providing: Quick Start Generation Resources, Off-line NSRS, RUC, and RMR service.

Stakeholder Concerns

Stakeholders have examined many solutions to these remaining items, but have been unable to coalesce around a solution. The following are the general stakeholder concerns and positions that have contributed to a lack of consensus:

1. Some stakeholders do not believe these remaining items are significant enough to warrant further market changes, while others believe these items can improve the market's design and price formation.
2. Some stakeholders believe that we should first evaluate the impact of the market design changes that have recently been implemented and then take further steps if required. For example, a review should be conducted after NPRR520 is fully implemented and the resulting price impact is observed.
3. Some stakeholders are willing to agree to pure pricing solutions without "make-whole payments." These pricing solutions could be either administrative (i.e., price or offer floors during deployments), or could be achieved through a third SCED run.
4. Some stakeholders oppose measures to address pricing unless a "make-whole payment" is also provided. These stakeholders are concerned with the risks created by administratively setting high prices, but then limiting generation to levels below that which they would have provided at the administrative price, based on the Energy Offer Curves they submitted. This scenario can cause generators' Base Points to be disconnected from market prices, interfering with their ability to use physical generation to fulfill their hedges.

The same stakeholders believe a market-wide uplift is appropriate because out of merit actions taken by the ISO operator to maintain reliability are un-hedgeable and result in Resources being forced off their offer curves due to no fault of their own. They further believe that the basic principle of making Resources whole for out of merit actions by the ISO that negatively affect prices was established in the Zonal market design and should be considered on a limited basis in Nodal as well. There is little distinction between this principle and that of administrative pricing adjustments to negate price reversals.

5. Some stakeholders are primarily opposed to the proposed methods for allocating any make-whole payment, if one is adopted. These stakeholders are concerned that the proposals for allocating the costs associated with the make-whole payments inappropriately shift risk and do not follow cost-causation.

Consequently, TAC has been unable to make a recommendation on the remaining issues.

Available Options

Stakeholders have considered or are considering many options. There are also some new ideas that are in the process of being brought forward for stakeholder consideration.

Before the Public Utility Commission (PUC) of Texas

Operating Reserve Demand Curve (ORDC). Implementing this option in the manner described in ERCOT's whitepaper may resolve the issue associated with Loads providing RRS, but unless the price adder is adjusted to consider ERS and the injection of capacity from ERCOT-committed units, it will not resolve the other price issues identified above.

Currently in the Stakeholder Process

Determine that the Status Quo is Optimal. The stakeholders may determine that no consensus can be reached, or that the status quo is preferable to options for addressing these issues, due to the concerns addressed above.

Evaluate the Impacts of NPRR520. This NPRR significantly changed local market power mitigation, and some stakeholders believe that no additional changes will be needed. This NPRR did not address the price impacts of Loads providing RRS or ERS or the injection of LSL energy from ERCOT-committed resources.

Loads in SCED. If ERS Resources and Load Resources can set prices, price reversals during deployment of these Resources would no longer be an issue. Loads in SCED will not address the injection of LSL energy from ERCOT-committed resources.

Administratively Set Prices to Prevent Price Reversal. This approach administratively sets prices during Load Resource and ERS deployments to prevent price reversal, but would not include an additional SCED run, make-whole payments or related uplifts. This is the concept pursued by NPRR508, Setting of Real-Time LMPs During EEA ERS/Load Resource Deployment. This would not address the injection of LSL energy from ERCOT-committed resources.

Rerun SCED, Change Prices, Pay Uplift and Assign Costs on a Load Ratio Share. This option re-runs SCED to set prices as if energy from Load Resources, ERS, and zero-LSL did not exist. This requires a third SCED run to modify price. It is coupled with paying a make-whole to generation and assigning such costs on a Load-Ratio-Share basis. This is the methodology that was proposed in NPRR444.

Rerun SCED, Change Prices, Pay Uplift and Assign Costs on a Different Basis: This is the same as the option above (NPRR444), but with a different allocation methodology than Load-Ratio-Share.

Rerun SCED, Change Prices, but No Make-Whole or Uplift: This option would re-run SCED to set prices as if energy from Load Resources, ERS, and zero-LSL did not exist. This requires a third SCED run to modify price. It would not include make-whole payments to generation.

Administrative Pricing Curve: A curve that would set the market price administratively for NSRS at a price different than the current offer floors. This proposal would not involve make-whole payments or the associated uplift allocation issues. This is the methodology that was proposed in NPRR544, Energy Offer Curve Requirements for Generation Resources Assigned Non-Spin Responsibility. It would not address the price impacts of Loads providing RRS or ERS or the injection of LSL energy from ERCOT-committed resources.