

# Memorandum

**To:** ISO Board of Governors  
**From:** Eric Hildebrandt, Director, Market Monitoring  
**Date:** May 11, 2011  
**Re:** **Market Monitoring Report**

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*This memorandum does not require Board action.*

## EXECUTIVE SUMMARY

Each year the Department of Market Monitoring publishes an annual report on the performance of markets administered by the California Independent System Operator Corporation. This memo provides a brief summary of the ISO's market performance in 2010. A complete copy of the report was provided to the Board in late April. This memo also provides an update on market performance in the first four months of 2011, which includes the three months following implementation of convergence bidding in February 2011.

## ANNUAL REPORT

In 2010, the nodal market design continued to effectively facilitate efficient and competitive market performance.

- Despite a significant increase in the price of natural gas, total wholesale electric prices rose only about 5 percent. This represents a 7 percent decrease in electricity prices after adjusting for higher natural gas prices.
- About 98 percent of system load was scheduled in the day-ahead energy market, which continued to be highly efficient and competitive. Day-ahead prices continued to be approximately equal to prices we estimate would result under perfectly competitive conditions.
- Price spikes in the 5-minute real-time market increased and drove average real-time prices well above day-ahead and hour-ahead market prices during many months. However, the impact of these prices on total wholesale costs was limited because of the high level of day-ahead scheduling.

- Ancillary service costs dropped slightly to less than 1 percent of total energy costs.
- Bid cost recovery payments were less than 1 percent of total energy costs in 2010, which is approximately equal to the level of these costs in 2009.
- Out-of-market unit commitments and energy dispatches to meet constraints not reflected in the market software decreased substantially. This was achieved by efforts to improve the accuracy of market models and to incorporate additional constraints in these models to represent more complex reliability requirements.
- Over 1,500 MW of new gas-fired generation came online in 2010, along with about 500 MW of renewable generation.
- Capacity made available through the state's resource adequacy program continues to meet reliability planning requirements and virtually all operational needs.

Several important aspects of market performance have not improved or have shown signs of worsening toward the end of 2010.

- The frequency and magnitude of real-time price spikes increased starting in spring 2010. In most cases, these price spikes lasted for only a few 5-minute intervals. These price spikes generally reflect short-term modeling and forecasting limitations, rather than fundamental underlying supply and demand conditions.
- Prices in the hour-ahead market have been systematically lower than prices in the day-ahead and real-time markets. This has led to significant reductions in net imports in the hour-ahead market. In most cases, the ISO has needed to re-purchase this energy in the real-time market at higher prices.

This pattern of selling low in the hour-ahead market and buying high in real-time creates substantial revenue imbalances that are allocated to load-serving entities. In 2010, we estimate these costs totaled at least \$81 million or almost 1 percent of total day-ahead and real-time energy costs.

Since 2009, DMM has expressed concern that these trends are attributable to systematic differences in the inputs and models used in the different markets and may persist unless specifically addressed through enhanced modeling and operational practices. DMM also noted that if systematic price differences continue to occur after implementation of convergence bidding in February 2011, this may create substantial additional revenue imbalances that must be allocated to load-serving entities. These price trends may be further exacerbated by the April 2011 increase in the bid cap from \$750 to \$1,000/MWh.

The ISO is developing and implementing software and modeling enhancements aimed at addressing the fundamental causes of real-time price spikes and price divergence. In addition to these enhancements, DMM has recommended that the ISO more aggressively address this problem by developing and implementing operating practices and procedures specifically designed to result in better convergence of hour-ahead and real-time prices. Addressing the

underlying causes of real-time price spikes and price divergence in these markets should be one of the ISO's highest priorities in 2011.

## **2011 MARKET PERFORMANCE**

During the first four months of 2011, average prices in the hour-ahead have continued to be significantly lower than prices in the 5-minute real-time market. Figure 1 shows average monthly prices in the day-ahead, hour-ahead and real-time markets for the PG&E area. Figure 2 highlights the degree to which real-time prices have tended to exceed hour-ahead prices during peak and off-peak hours since January.

As shown in Figure 2, the consistency of prices in the real-time and hour-ahead has improved since mid-April. This recent trend coincides with implementation of several software modifications and implementation of enhanced procedures for manual adjustments made in the hour-ahead market to promote better convergence of hour-ahead and real-time prices.

The systematic and predictable difference in hour-ahead and real-time prices has continued to create substantial revenue imbalances that are allocated to load-serving entities through real-time energy imbalance charges. In the first four months of 2011, these revenue imbalance charges have averaged over \$15 million per month. This represents a 50 percent increase from an average of about \$10 million per month in 2010.

Implementation of convergence bidding in February 2011 has had the effect of increasing this revenue imbalance by increasing the volume of transactions settled at the hour-ahead and real-time prices. Participants can place virtual bids in the day-ahead market in a manner that allows them to profit from the predictable and systematic difference between the hour-ahead and real-time prices. This is done by placing virtual supply bids for imports combined with an equal quantity of virtual demand bids at locations within the ISO.<sup>1</sup>

These offsetting virtual supply and demand bids have been highly profitable and increase cost that must be recovered from the energy imbalance charge. As shown in Figure 3, since implementation of convergence bidding the volume of virtual supply imports that were offset by virtual demand bids inside the ISO has grown from an average of about 500 MW per hour to about 2,400 MW per hour. Offsetting virtual supply and demand bids submitted by the same participant now account for about 85 percent of the total volume of virtual import bids offset by virtual demand bids within the ISO. Most of the \$26 million in net revenues through April 23 that have been paid out to participants from virtual bidding are derived from this bidding strategy.

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<sup>1</sup> The virtual supply bids at the interties are settled based on the difference in the day-ahead and hour-ahead prices. The virtual demand bids internal to the ISO are settled based on the difference of the day-ahead and real-time prices. Thus, the net effect of this bidding strategy is that the participant receives the difference in the hour-ahead and real-time prices.

Figure 1. Average monthly prices (January – April 2011)

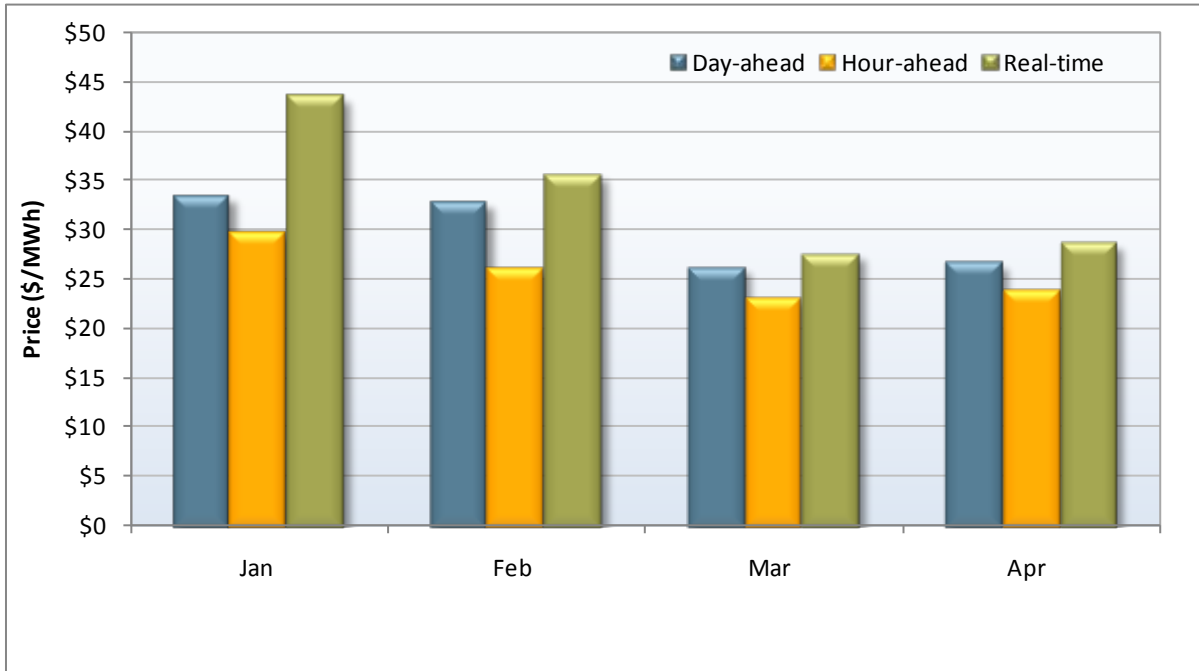
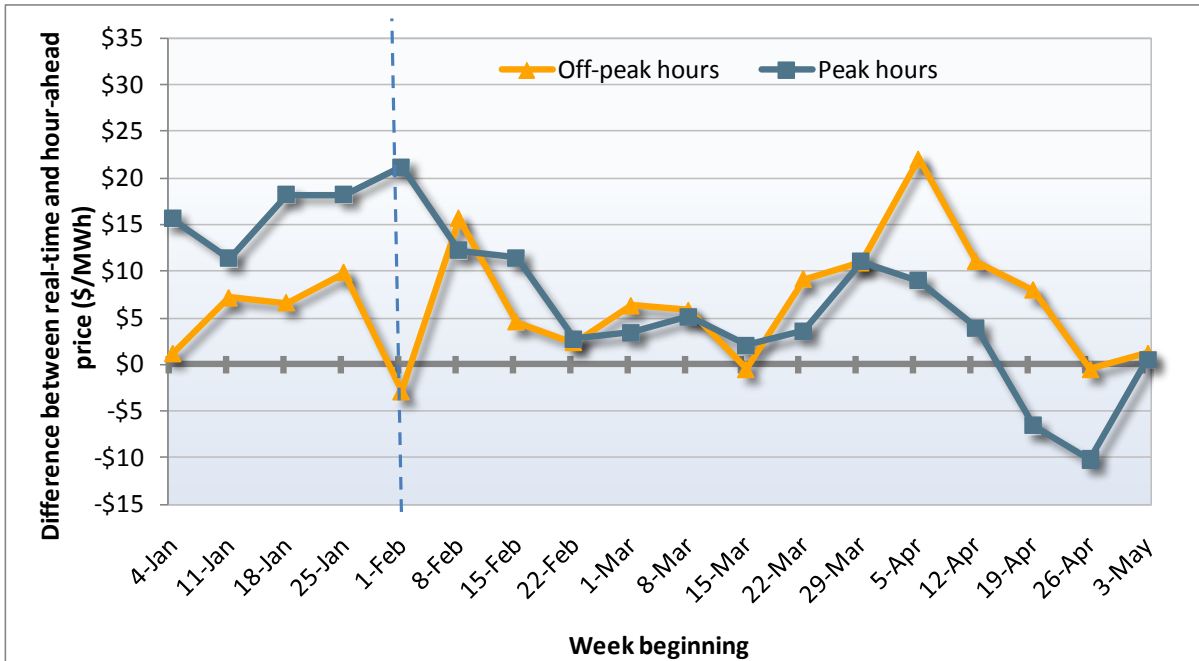
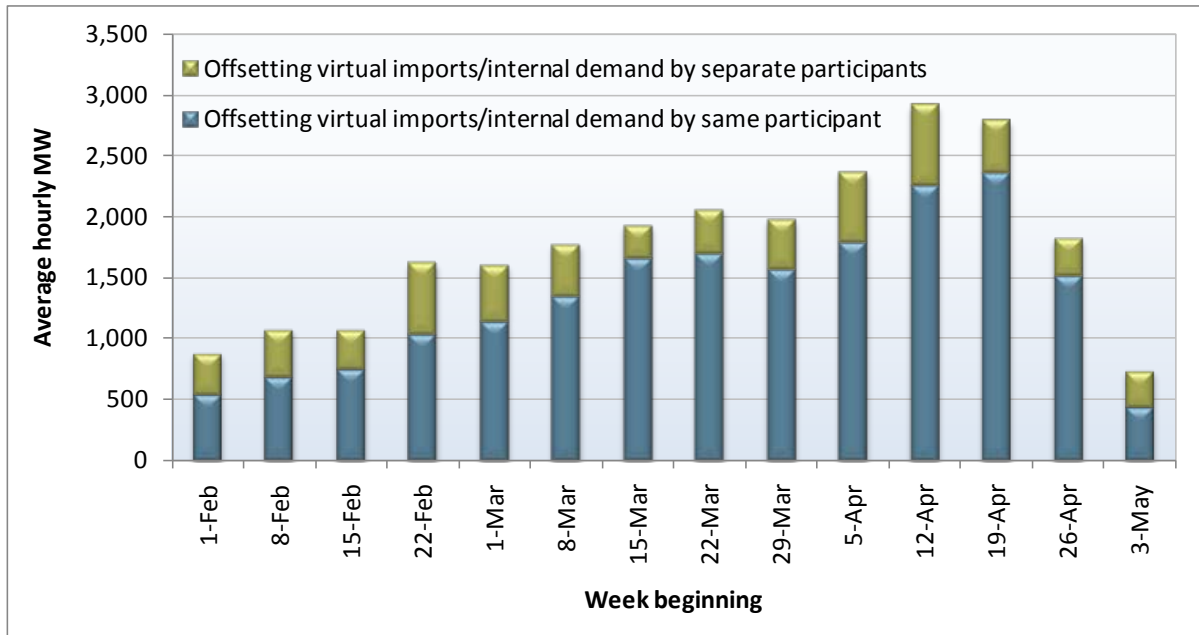


Figure 2. Difference in weekly average real-time and hour-ahead prices



**Figure 3. Average hourly virtual imports offset by virtual demand within ISO**



In theory, large volumes of convergence bids that are systematically profitable should help price convergence. However, these off-setting virtual supply and demand bids appear to be having little or no impact on improving convergence of hour-ahead and real-time prices. This is because the difference in hour-ahead and real-time prices appears to continue to be driven primarily by forecasting and modeling issues in these markets that cannot be solved through convergence bidding.

The ISO is proposing to address this issue through a settlement rule that would essentially eliminate the ability of individual participants to profit from this type of off-setting virtual supply and demand bids.<sup>2</sup> DMM initially suggested this option to the ISO as a short-term remedy that could be implemented quickly to reduce the imbalance energy costs being incurred due to this pattern of virtual bidding. However, DMM views this approach as a short-term mitigation measure and not a solution to the fundamental problem of the systematic divergence of hour-ahead and real-time prices. As noted in our annual report and prior quarterly reports, DMM has expressed concern that these trends are attributable to systematic differences in the inputs and models used in the different markets and may persist unless specifically addressed through enhanced modeling and operational practices.

<sup>2</sup> <http://www.caiso.com/2b6d/2b6dbe2125320.pdf>