Memorandum

To: ISO Board of Governors

From: Eric Hildebrandt, Director, Market Monitoring

Date: December 10**,** 2014

Re: **Market monitoring report**

This memorandum does not require Board action.

EXECUTIVE SUMMARY

The Department of Market Monitoring (DMM) supports Management's recommendation on the two market design issues being presented to the Board.

- **Pricing enhancements.** DMM supports Management's proposed market rule changes to improve price certainty and efficiency of prices cleared through its markets. DMM agrees that these enhancements will strengthen market outcomes and provide more accurate and appropriate price signals.

- **Gas flow penalty cost recovery**. DMM supports Management's decision to defer amending the ISO tariff to allow for gas pipeline penalty recovery until numerous pending policy changes related to gas and electric coordination are resolved. DMM worked closely with the ISO to develop this potential tariff modification in 2012, and will continue to work with the ISO in monitoring changes in the gas industry before reconsidering how, or even whether, natural gas pipeline penalties should be considered for cost recovery in the ISO markets.

The remainder of this memo provides a summary of market performance and trends in 2014 through November.

- Energy market prices have remained highly competitive through the third quarter. The overall combined wholesale cost of energy was just slightly above prices that DMM estimates would result under highly competitive conditions when suppliers bid at or near marginal costs.

- Congestion revenue right revenue has been increasingly inadequate to cover payments to congestion revenue rights holders throughout the year. The ISO has taken steps to address the revenue inadequacy by accounting for more constraints

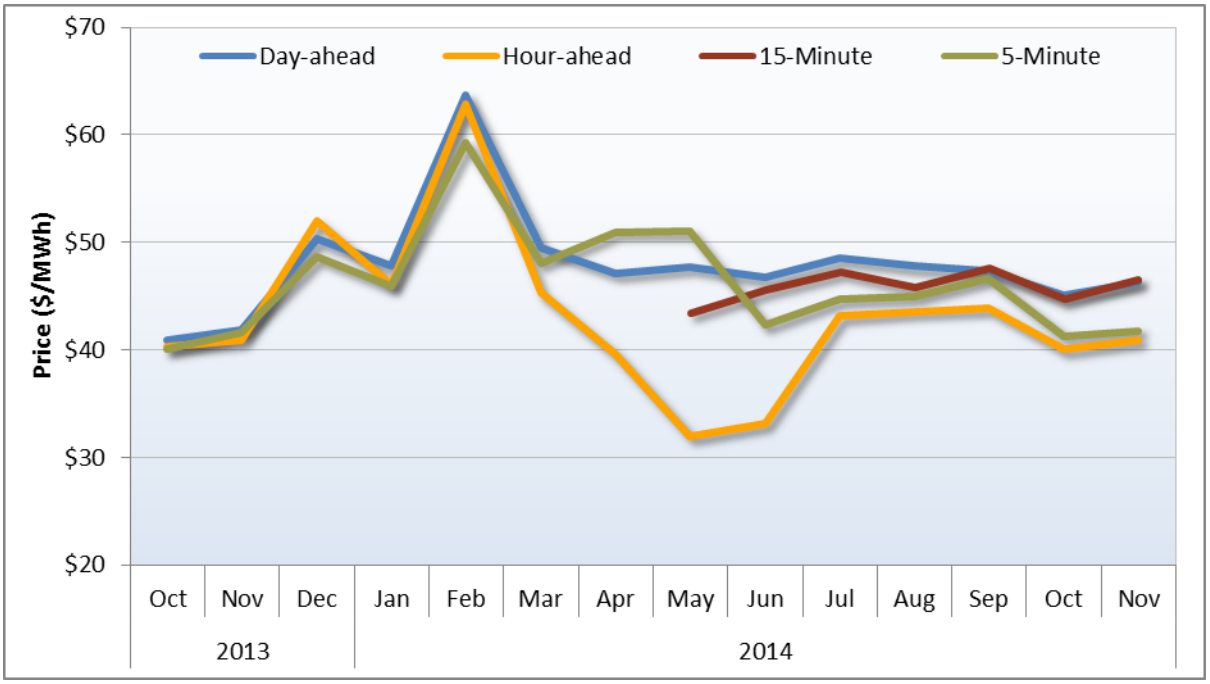
and potential unscheduled energy flows in the congestion revenue rights model in future auctions. As a result, the combined monthly revenue inadequacy in October and November was substantially lower than in previous months.

- DMM recently completed a detailed analysis of the potential causes of real-time imbalance energy offset (RTIEO), with particular emphasis on the months following implementation of FERC Order No. 764. This analysis suggests that recent large causes of RTIEO are unrelated to FERC Order No. 764 market changes. Furthermore, we estimate that most RTIEO in summer 2014 does not represent uplift that is ultimately paid by load serving entities since these entities received a credit for most of these costs through different settlement charges.

ENERGY MARKET PRICES

Energy market prices have remained highly competitive throughout 2014. As shown in Figure 1, average prices have been relatively stable since the summer months, reflecting stable gas prices over this period. The overall combined wholesale cost of energy through the third quarter was just slightly above prices that DMM estimates would result under highly competitive conditions when suppliers bid at or near marginal costs.

Figure 1. Average monthly system energy prices



Average prices in the day-ahead and 15-minute markets, in which most energy is settled, have tracked closely since September, as shown in Figure 1 (red and blue lines). Prices in the 5-minute market for real-time energy dispatched within the ISO system (green line) have tended to be lower than prices in the day-ahead and 15-minute markets since the new 15-minute market was implemented in May. Hour-ahead prices have also been consistently lower than prices in other markets since April (yellow line). Hour-ahead prices are no longer used for settlement of inter-tie transactions, but are still used in the scheduling of significant quantities of imports and exports.

CONGESTION REVENUE RIGHTS REVENUE INADEQUACY

Congestion revenue rights revenue inadequacy has occurred throughout much of the year but has stabilized in the first two months of the fourth quarter. Revenue inadequacy occurs when congestion collected in the day-ahead market is insufficient to pay the outstanding set of congestion revenue rights. Any revenue inadequacy is allocated to entities based on their scheduled load and exports.

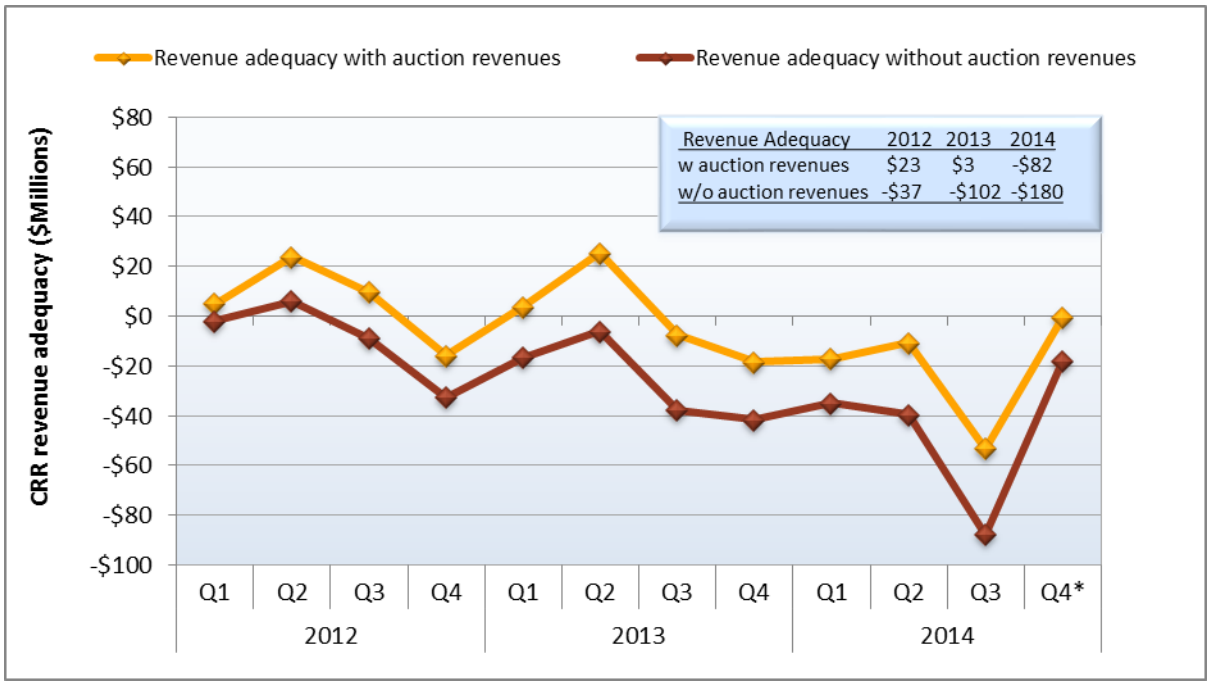
Congestion revenue rights revenue inadequacy increased by around $1 million in the fourth quarter for a total of about $82 million in revenue shortfalls in 2014 after auction revenues are included (see Figure 2). Revenue shortfalls before accounting for auction revenues reached around $180 million in the first 11 months of 2014. The largest revenue inadequacy in the past several quarters occurred in the third quarter of 2014.

Revenue shortfalls before accounting for auction revenues reached $18 million and were around $1 million when accounting for auction revenues during the first two months of the fourth quarter, as shown in Figure 2. This improvement in revenue inadequacy mainly resulted from improvements in ISO modeling and an overall decrease in day-ahead congestion in October and November. Specifically, the ISO has taken steps to address the revenue inadequacy by accounting for more constraints and potential unscheduled energy flows in the congestion revenue rights model in recent auctions. This will essentially limit the amount of congestion revenue rights that are auctioned off and help ensure that the volume of congestion rights does not exceed the actual amount of transmission in the available in the day-ahead market.

Auction revenues lowered the shortfall to around $82 million. The ISO has never had a yearly shortfall in revenue adequacy when accounting for auction revenues since implementation of the nodal market in 2009.

Figure 2 Congestion revenue rights revenue inadequacy

Fourth quarter results include October and November only.



REAL-TIME IMBALANCE ENERGY OFFSET CHARGES

In 2014, the ISO implemented several measures designed to reduce real-time offset costs. In May, the ISO implemented a 15-minute real-time market, which was expected to eliminate a source of offset costs. These costs resulted from differences in how hourly intertie imbalance energy is settled at hourly prices while other real-time imbalance energy is settled 5-minute real-time prices. In addition, the ISO took steps to reduce real-time offset costs by improving the consistency between day-ahead and real-time modeled conditions.

Despite implementation of a variety of measures to reduce real-time offset costs, the ISO observed a trend of increasing real-time offset costs during the first two quarters of 2014. As a result, the ISO assigned a cross-functional team to perform a detailed review of real-time offset costs to identify the root cause of the unexpected increase of offset costs. DMM participated in this team and performed an independent review the RTIEO costs.[1] Both of these efforts identified issues unrelated to load or supply imbalance causing the RTIEO costs to be inflated.

[1] Review of Real-Time Imbalance Energy Offset, prepared ty Department of Market Monitoring, November 10, 2014: http://www.caiso.com/Documents/ReviewofReal-TimeImbalanceEnergyOffset-DMMWhitePaper.pdf.

DMM completed a detailed analysis of the potential causes of real-time imbalance energy offset (RTIEO), with particular emphasis on the months following implementation of FERC Order No. 764. This analysis indicated that recent large causes of RTIEO are unrelated to FERC Order No. 764 market changes. Furthermore, we estimate that most RTIEO in summer 2014 does not represent uplift that is ultimately paid by load serving entities since these entities received a credit for most of these costs through different settlement charges.

Figure 3 summarizes how DMM's analysis categorized the $45 million of RTIEO that accrued between May and August 2014 in terms of four major causes. Most of these charges fall under two categories:

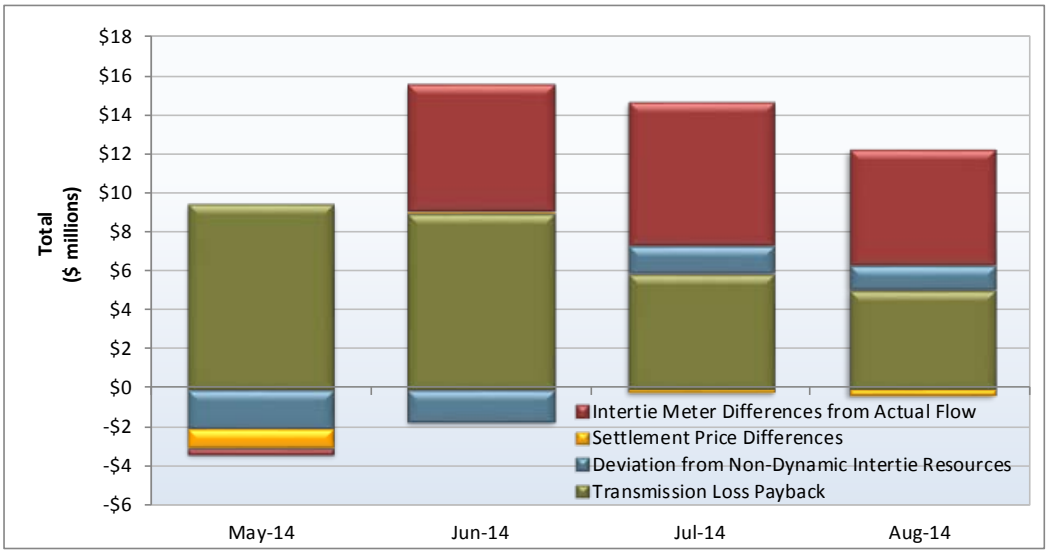
- About $29 million of the $45 million of RTIEO over this period was attributed to transmission loss paybacks (green bars). The ISO previously credited most of this to load serving entities through a separate settlement process. Only the portion not previously credited to load serving entities (approximately $10 million) represents uplift.[2]
- Approximately $19 million of RTIEO over this time period was caused by actual power flow exceeding the reported metered power flow into CAISO over a small number of interties (red bars). This $19 million of RTIEO was previously paid as a credit to load through the unaccounted for energy settlement mechanism and therefore does not represent uplift. These differences between reported and actual flows were determined to be a result of an incorrect source of metering data on an intertie. These charges will be corrected, resulting in a credit to the real-time imbalance energy offset costs and a reversal of the existing credit to unaccounted for energy.

Other causes of RTIEO, such as differences in settlement prices for metered generation and metered load were small (yellow bar). Uninstructed deviation by non-dynamic intertie schedules also made a negligible contribution over the period (blue bar). While these two potential causes of RTIEO would represent true uplift to load serving entities, these other causes contributed to slight reductions in RTIEO charges overall.

In addition, after implementation of FERC Order No. 764, it was discovered that the hourly weighted average price used for settling load imbalances had a weighting error. The error inflated the real-time imbalance energy offset cost by approximately $11 million from May 2014 to September 2014. The weighting issue was resolved starting October 1, 2014 and will be corrected for the May to September 2014 period via the normal resettlement process starting February 2015.

[2] About $10 million of this amount was due to an accelerated transmission loss payback arrangement with Arizona Public Service (APS). This amount has not been credited to load and therefore represents uplift. This arrangement with APS is scheduled through April 2015. For additional detail see: http://www.caiso.com/Documents/AcceleratedTransmissionLossesReturn_ArizonaPublicService.htm

Figure 3. Major causes of RTIEO: May – August 2014



The energy component of real-time revenue imbalance is an important indicator of potential inefficiencies in the overall market design. However, as was the case over the summer of 2014, RTIEO may not reflect the energy component of real-time revenue imbalance.To obtain an accurate representation of real-time revenue imbalance, other market settlements must be considered along with RTIEO. Going forward, a more accurate representation of real-time energy revenue imbalances could be provided by developing a revised metric that accounts for these other market settlements or restructuring the current system of market settlements.