

Memorandum

To: ISO Board of Governors
From: Eric Hildebrandt, Director, Market Monitoring
Date: November 6, 2014
Re: **Market monitoring report**

This memorandum does not require Board action.

EXECUTIVE SUMMARY

This memo provides a summary of market performance and trends through the summer and early fall months of 2014.

- The ISO market continued to perform efficiently and competitively overall during the summer. Overall prices were consistent with levels that DMM estimates would result under highly competitive and efficient conditions in which available supply was dispatched based on bids at or near marginal operating costs.
- The convergence of prices in the day-ahead and real-time markets also improved in the summer months relative to the spring months, although systematic differences continue to exist in average day-ahead and real-time energy prices.
- System summer loads were at the same level as in 2013 while average hourly loads were up by about 1 percent compared to last year. Record loads were set in the southern parts of the ISO system during this period.
- Hydro-electric generation was down significantly this year as a result of drought conditions. These conditions were offset by a significant increase in solar generation this year compared to last, particularly during peak hours.
- After implementation of the 15-minute market in the spring, the volume of real-time market bids on inter-ties declined substantially for both imports and exports. This trend continued through the summer and into the fall, but has begun to improve with the implementation of 15-minute scheduling in the Bonneville Power Administration (BPA) system in mid-October.
- Congestion revenue right revenue has been increasingly inadequate to cover payments to congestion revenue rights holders throughout the year and most

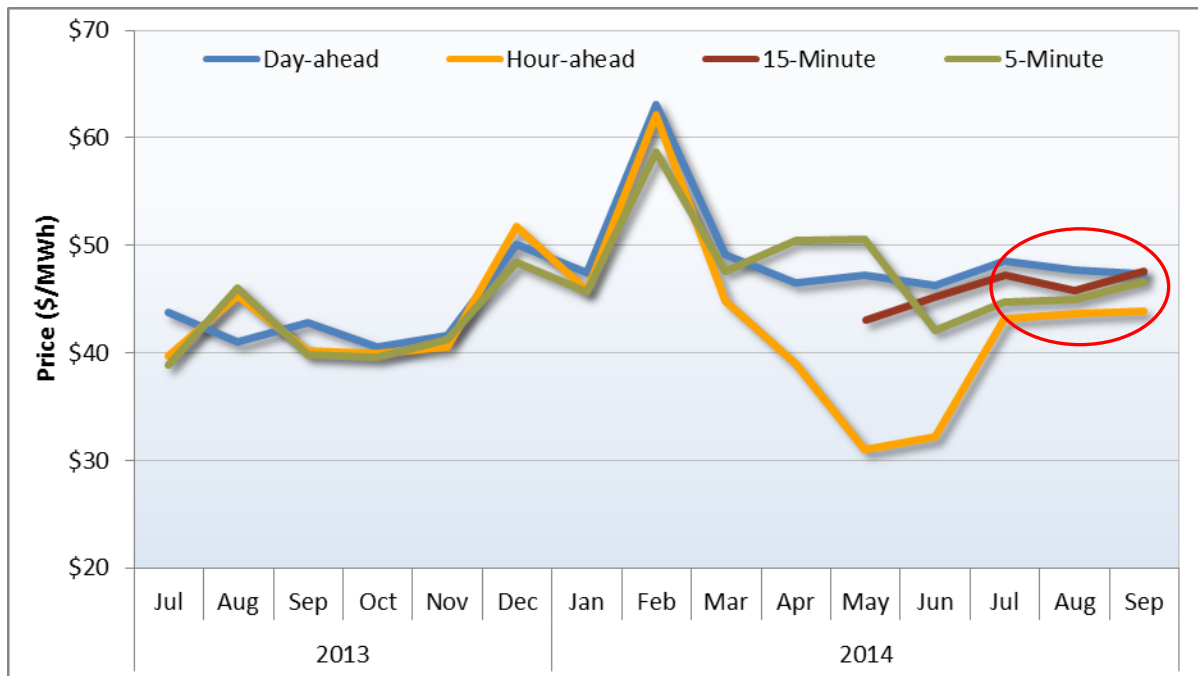
notably during the third quarter. This inadequacy has been the result of multiple factors including differences between the network transmission model used in the congestion revenue rights process and the day-ahead market model. The ISO has taken steps to address the revenue inadequacy by accounting for more constraints in the congestion revenue right model in future auctions.

MARKET PERFORMANCE

The ISO market continued to perform efficiently and competitively overall during the summer. Overall average prices in the day-ahead and real-time markets were approximately equal to levels that DMM estimates would result under highly competitive and efficient conditions in which available supply was dispatched based on bids at or near marginal operating costs.

The convergence of prices in the day-ahead and real-time markets also improved in the summer months relative to the spring months, as shown in Figure 1. Most notably, hour-ahead prices (yellow line) increased in the summer months compared to the spring months.

Figure 1 Comparison of system energy prices



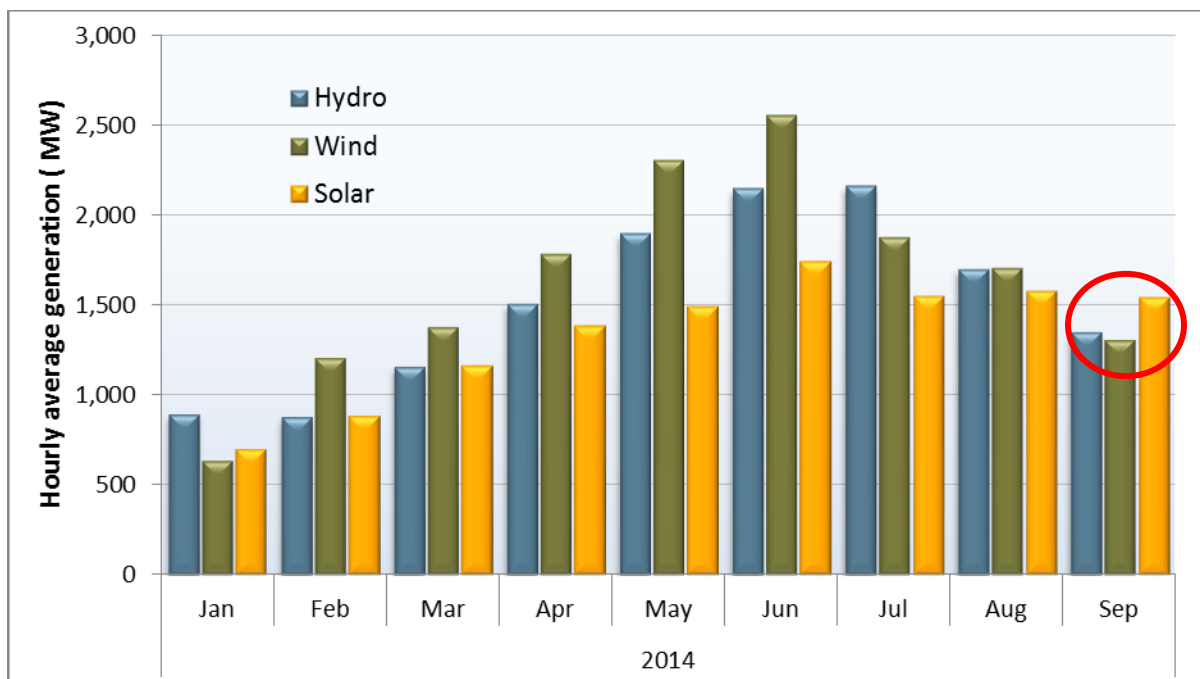
However, price differences remained relative to price differences last summer. For example, 5-minute real-time dispatch prices (green line) were about \$2.40/MWh lower than day-ahead prices (blue line) in the third quarter of this year compared to around \$1.90/MWh in the third quarter of 2013. Average 15-minute prices (red line) were almost \$1/MWh lower than day-ahead prices in the third quarter, compared to almost \$3.30/MWh lower in May and June.

Summer loads in 2014 were similar to the summer loads in 2013. Overall, average hourly load during the third quarter was around 30,600 MW, about 1 percent higher than the same period in 2013. On September 15, the ISO system peak load reached 45,090 MW, which is almost the same as last year's summer peak load of 45,097 MW.

However, while total load was comparable to last year, record loads were set in the southern areas of the system in mid-September. San Diego Gas and Electric set two record loads, one on September 15 and again on September 16, reaching 4,895 MW. Southern California Edison had near record loads during the same period.

The market performed well this summer even though hydro-electric generation was down significantly compared to last year. The average hourly generation from hydro-electric resources decreased by 34 percent to 1,500 MW in the first nine months of 2014, compared to 2,300 MW for the same period in 2013. During this summer, hydro-electric generation was 1,730 MW compared to 2,350 MW last summer.

Figure 2 Hourly average renewable generation by month



The decrease in hydro-electric generation this year was offset largely by increased solar generation. In the first nine months of 2014, average hourly solar generation was up by 130 percent to 1,300 MW compared 600 MW in 2013. During this summer, solar generation averaged 1,560 MW compared to 775 MW last summer. Wind generation this year has been very similar to last year, averaging about 1,650 MW per hour.

In September, solar generation, for the first time, outpaced both hydro and wind production (see Figure 2) in the same month. In total, the ISO has about 5,500 MW of solar resources connected to the grid compared to about 5,500 MW of nameplate wind capacity and 12,000 MW of hydro-electric capacity.

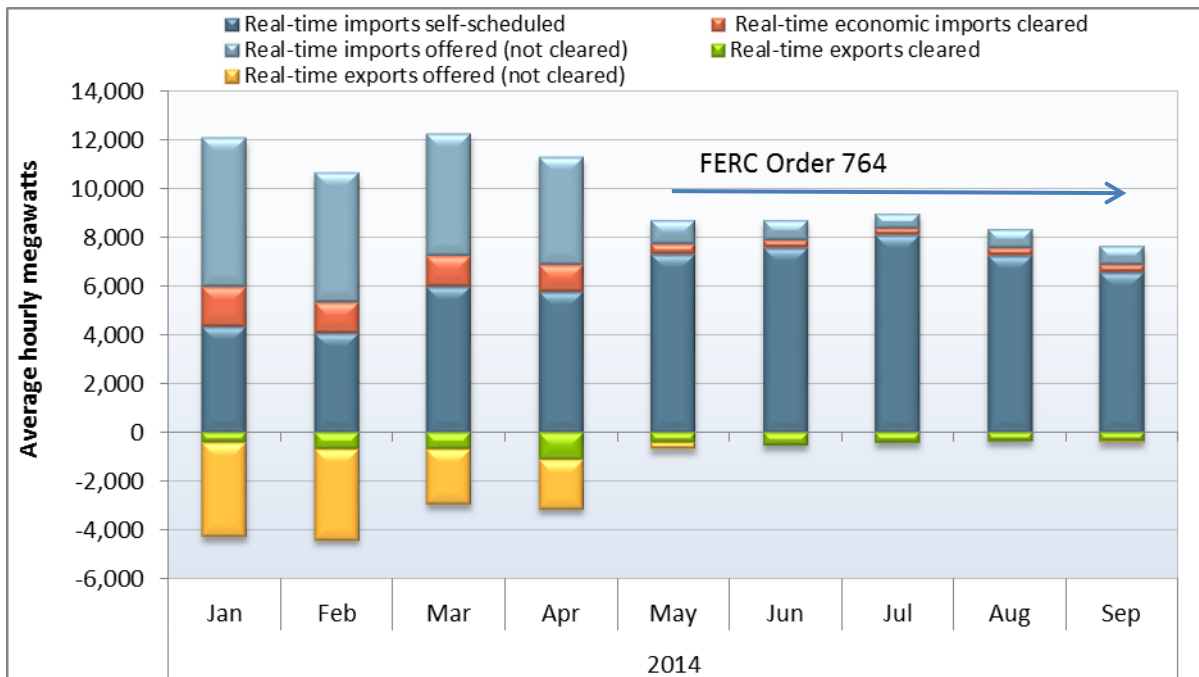
NEW 15-MINUTE MARKET

After implementation of FERC Order 764 and the new 15-minute market, there was a considerable decrease in the amount of import and export bids in the real-time market. This trend continued through the summer and into the fall. However, the overall level of cleared imports and exports has not changed significantly since implementation of the 15-minute market.

Figure 3 shows that the volume of economic imports that cleared the real-time market (red) and that did not clear the real-time market (light blue) both declined beginning in May, and have remained low through the third quarter. Moreover, self-scheduled imports (dark blue) increased in May and have averaged about 87 percent (7,300 MW) of all imports offered in the real-time market through September, compared to about 44 percent (5,000 MW) in the four months before implementation of the 15-minute market.

Beginning in mid-October, BPA has begun to support 15-minute scheduling. With the implementation of this process, there has been an increase in 15-minute transactions in the ISO market. DMM will track and report on how this change affects the ISO market going forward.

Figure 3 Intertie imports and exports offered and cleared in the real-time market



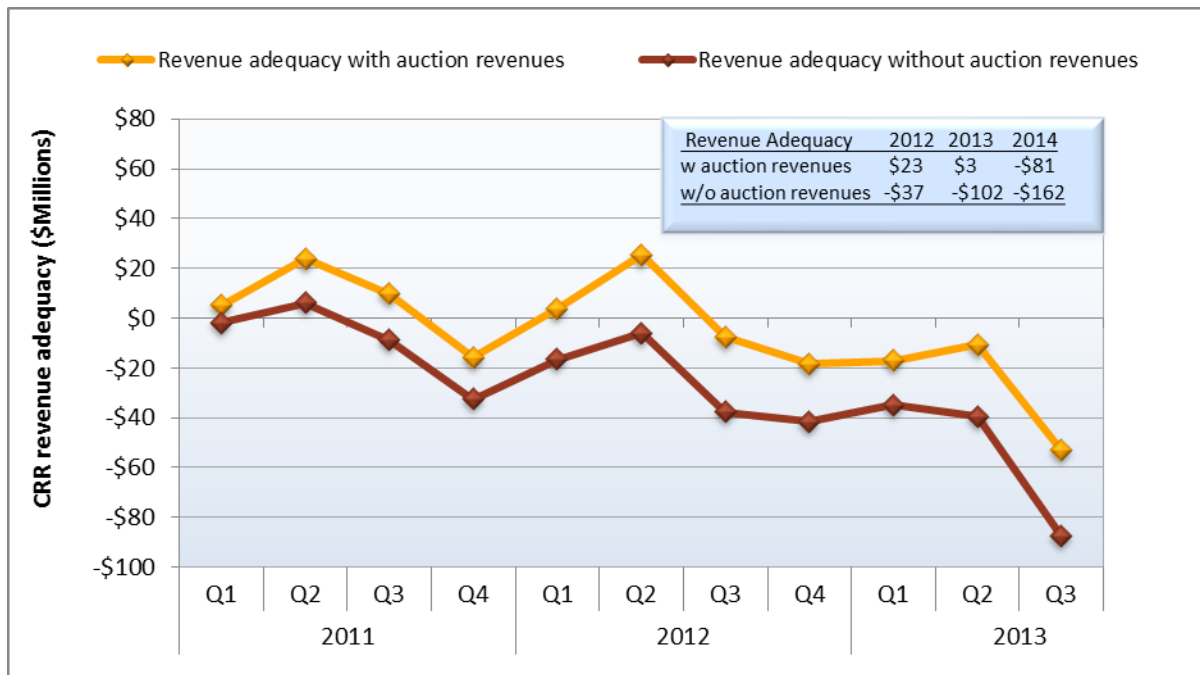
CONGESTION REVENUE RIGHTS REVENUE INADEQUACY

Congestion revenue right revenue inadequacy has occurred throughout the year and increased notably during the third 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 right revenue inadequacy increased by over \$50 million in the third quarter for a total of about \$81 million in revenue shortfalls in 2014 after auction revenues are included (see Figure 4). Revenue shortfalls before accounting for auction revenues reached around \$162 million in the first nine 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 \$88 million and were over \$50 million when accounting for auction revenues during this quarter, as shown in Figure 4. Auction revenues lowered the shortfall to around \$81 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 4 Substantial decreases in congestion revenue rights revenue adequacy



Internal constraints played the major role in the revenue shortfalls in the third quarter. More than half of the revenue shortfalls resulted from the differences between the network transmission model used in the congestion revenue rights process and the day-ahead market model on three constraints. Revenue inadequacy that occurred on these three constraints was mainly due to unexpected or non-modeled outages and unsettled flows in the day-ahead market.

The ISO has taken steps to address the revenue inadequacy by accounting for more constraints in the congestion revenue right model in future auctions. This will essentially limit the amount of congestion revenue rights that are auctioned off going forward.