

Memorandum

To: ISO Board of Governors
From: Eric Hildebrandt, Director, Market Monitoring
Date: August 24, 2016
Re: Department of Market Monitoring update

This memorandum does not require Board action.

EXECUTIVE SUMMARY

This memo summarizes key findings and recommendations of the Department of Market Monitoring (DMM) provided in DMM's *Quarterly Report on Market Issues and Performance* for second quarter of 2016.¹

MARKET PERFORMANCE

- Prices in the ISO market remained low in April and May before increasing in June due to higher gas prices and loads. Prices remain highly competitive, closely tracking the marginal cost of generation needed to meet demand.
- As shown in Figure 1, average prices in different hours of the day continue to reflect net system load after accounting for generation from renewable energy resources. Prices in the day-ahead market were slightly higher than 15-minute market prices for most of the quarter. Prices in the 5-minute market prices were significantly higher during several peak load hours in the quarter because of tight supply conditions of upward ramping energy.
- Despite a significant increase in energy from hydro, solar and wind resources, the frequency of negative prices has remained about the same during the second quarter compared to 2015, as shown in Figure 2. The frequency of 5-minute prices at or below the -\$150/MWh bid floor dropped from about 1 percent last year to about 0.1 percent this year. This reflects a significant decrease in the 5-minute intervals when the supply of negatively priced real-time bids to decrease generation was exhausted and some resources needed to be curtailed.

¹ <http://www.caiso.com/Documents/2016SecondQuarterReportMarketIssuesandPerformance.pdf>

Figure 1. Average hourly system marginal energy prices (April – June)

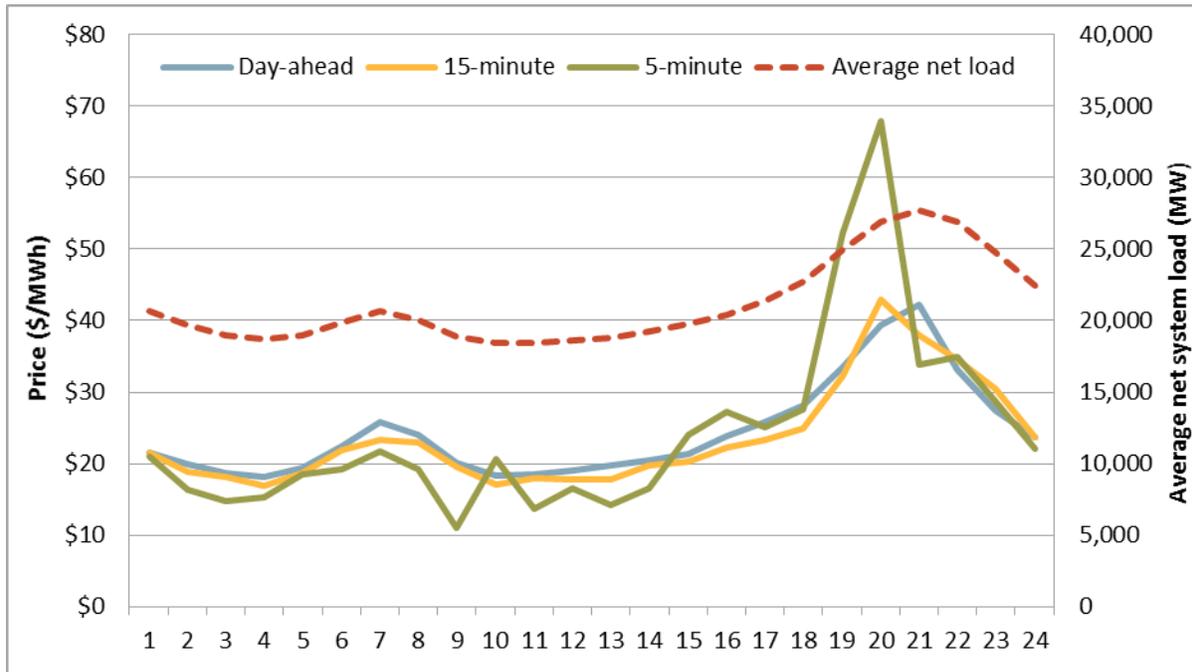
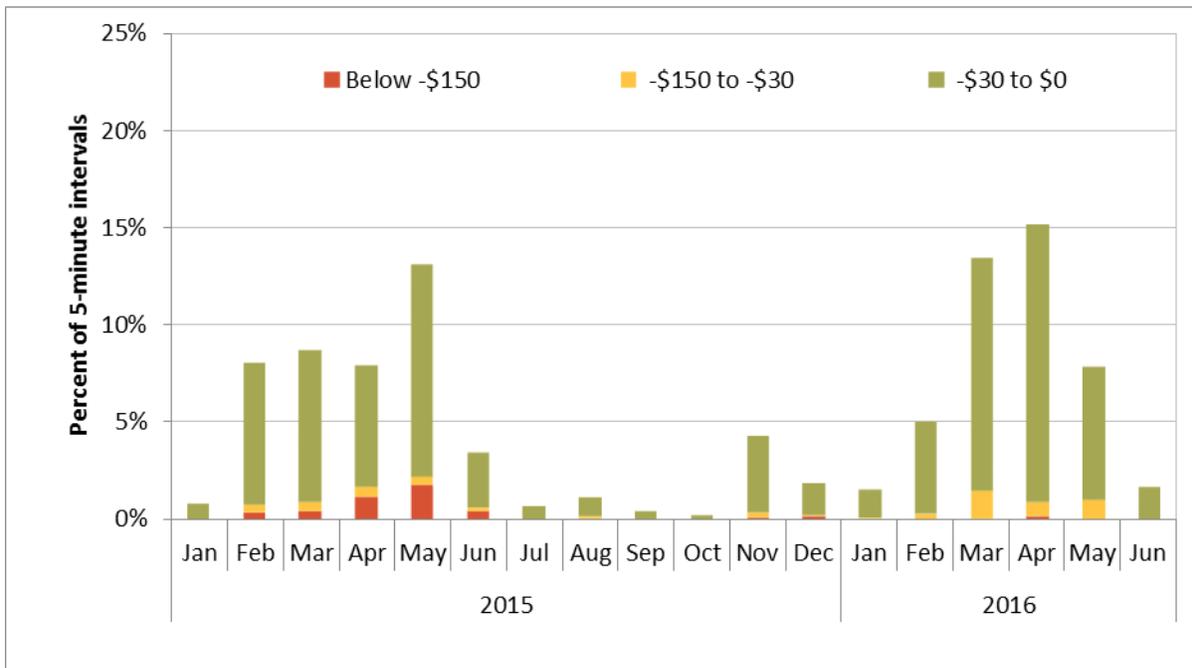


Figure 2. Frequency of negative 5-minute prices by month (ISO LAP areas)



- During the first half of 2016, total solar and wind increased by over 30 percent from last year. However, the portion of output from these resources that was non-economically curtailed (due to lack of bids to reduce generation) dropped from about .06 percent to only .02 percent of total output. DMM attributes this trend to an increase in bidding flexibility of renewable resources combined with increased transfer capacity in the energy imbalance market (EIM) between the ISO and other EIM areas.
- The addition of NV Energy into EIM in December 2015 added significant transfer capacity between the EIM areas and the ISO. With the new transfer capacity, very little congestion has been observed between the ISO, PacifiCorp East and NV Energy areas. As a result, real-time prices have become much more uniform between the ISO and EIM areas.
- The ISO and PacifiCorp East continued to be net exporters in the EIM during the second quarter, while NV Energy and PacifiCorp West tended to be net importers. However, the direction and volume of transfers between the ISO and different EIM areas fluctuated more in the second quarter based on actual real-time conditions in different areas.
- The ISO decreased regulation requirements in the day-ahead and real-time markets to historical levels, observed prior to February 2016, starting on June 10. As a result, regulation prices reverted back to lower levels, and the procurement costs decreased to \$80,000 per day compared to \$400,000 per day or more, when requirements were higher.

Available balancing capacity

The ISO implemented the available balancing capacity mechanism in EIM on March 23, 2016. This enhancement allows the EIM market software to account for capacity that an EIM entity has available for reliable system operations but is not bid into EIM. The available balancing capacity mechanism enables system software to deploy such capacity through the EIM, and prevents market infeasibilities that may arise without the availability of this capacity.²

In the second quarter of 2016, the frequency of hours in which available balancing capacity was offered varied widely for different EIM areas. When available, balancing capacity offered in an EIM area typically ranged from 50 to 100 MW, and was

² *Order Accepting Compliance Filing – Available Balancing Capacity*, ER15-861-006, Dec 17, 2015: http://www.caiso.com/Documents/Dec17_2015_OrderAcceptingComplianceFiling_AvailableBalancingCapacity_ER15-861-006.pdf.

dispatched during a relatively small portion of intervals. Because the balancing capacity was dispatched infrequently, it had a very limited effect on market performance.³

RECOMMENDATIONS

DMM's recent quarterly report also provides an update on a variety of recommendations DMM has made to the ISO in 2016.

Energy imbalance market

In FERC's November 19, 2015 order, the Commission found that the market power analyses of the expanded EIM footprint by PacifiCorp and NV Energy failed to demonstrate a lack of market power in EIM. The Commission therefore imposed a requirement that all resources offered by PacifiCorp and NV Energy in the EIM be offered at or below each unit's *default energy bids*. These cost-based bids are developed for use in the ISO's automated market power mitigation procedures. Since this order was issued, DMM has been working with the ISO to address a variety of concerns about the market power mitigation expressed by the Commission in that order.

Structural market power

In July, DMM completed its third report on the structural market competitiveness in the PacifiCorp balancing authority areas.⁴ This report provided analysis showing that the frequency of potential structural market power in the PacifiCorp areas had dramatically reduced with the additional transfer capacity between the EIM areas and the ISO that became available when NV Energy joined the energy imbalance market. This structural competitiveness mitigates the potential for the exercise of market power through both economic and physical withholding during most intervals.

Enhanced market power mitigation procedures

During the limited number of intervals when competitive supply from the ISO into the EIM is constrained by congestion on EIM transfer constraints, the ISO's automated real-time market power mitigation procedures are designed to mitigate the potential exercise of market power. DMM has recommended that the ISO implement enhancements to automated market power mitigation procedures to ensure that bid mitigation is triggered in the real-time market when congestion occurs on structurally uncompetitive constraints. The ISO is implementing these enhancements in the 15-minute market in

³ FERC's December 17, 2015 Order requires that the ISO submit quarterly reports on the available balancing capacity mechanism performance. DMM plans to review the ISO's analysis and provide feedback as necessary in future quarterly reports.

⁴ *Report on Structural Competitiveness of Energy Imbalance Market*, Department of Market Monitoring, July 7, 2016: http://www.caiso.com/Documents/Jul8_2016_DepartmentMarketMonitoring_EIM_StructuralMarketPowerInformationalReport_ER14-1386.pdf Bid mitigation procedures.

2016 and has filed with FERC for approval to implement enhancements in the 5-minute market in 2017.

Enhanced outage reporting

To enhance DMM's ability to monitor capacity not offered in the EIM, DMM has requested that the ISO and EIM entities develop a set of more descriptive categories that can be entered in the ISO's outage management system to indicate the reason for unit outages or de-rates. DMM has specifically noted that while virtually all outages are logged as being for "Plant Trouble" or "Plant Maintenance," in many cases outages or de-rates appear to be due to reasons other than physical outages. DMM has recommended that the ISO and EIM entities (1) review the various reasons that outages and de-rates are being submitted, (2) clarify rules concerning use of outages and de-rates for these reasons, and (3) develop reporting codes and procedures to more accurately log the actual reasons for outages and de-rates. This recommendation remains under consideration by the ISO.

Enforcement of internal constraints

The Commission's order also directed that the ISO and EIM entities facilitate the ISO's enforcement of all internal transmission constraints in the PacifiCorp and NV Energy balancing authority areas. DMM's review indicates that by the second quarter of 2016 a significant number of constraints within EIM areas were being enforced. However, a significant number of constraints that had been incorporated in the network model were also not being enforced. Consequently, DMM requested that the ISO and EIM entities further review this issue and provide a report to FERC identifying constraints that are not modeled or enforced, along with an explanation of the reasons some constraints were not enforced. The ISO has indicated a report to FERC on this issue is forthcoming.

DMM's review also indicates that one factor that may be contributing to the lack of congestion within the PacifiCorp area is that some scheduling limits associated with transmission contracts (between PacifiCorp and non-PacifiCorp entities owning transmission within the PacifiCorp balancing area) are not incorporated in the full network model. DMM has recommended that the ISO and EIM entities assess whether these transmission contract limits can be directly enforced by the EIM market software. This could allow more efficient re-dispatch of different resources to meet scheduling limits and avoid the need for EIM participants to not offer or limit generation in the EIM market in an effort to avoid exceeding scheduling limits.

Congestion revenue rights

DMM's recent quarterly report also provides an update on analysis and recommendations on congestion revenue rights provided in DMM's 2015 Annual Report.

- As discussed in DMM's 2015 Annual Report, since 2012 electric ratepayers who ultimately pay for the cost of transmission managed by the ISO received an average of about \$130 million less per year in revenues from the congestion revenue rights auction compared to the congestion payments received by entities purchasing these congestion revenue rights.⁵
- Through the first half of 2016, revenues from the congestion revenue rights auction have been \$27 million less than congestion payments made to non-load serving entities purchasing these congestion revenue rights. This represents \$.63 in auction revenues paid to transmission ratepayers for every dollar paid out to auctioned rights, down from \$.72 in the first half of 2015.
- Most of these congestion payments are paid to purely financial entities that purchase congestion revenue rights but are not engaged in serving any load or managing any generation in the ISO market. DMM believes this trend warrants reassessing the component of standard electricity market design under which ISOs auction off excess transmission capacity remaining after allocating congestion revenue rights to load serving entities.

DMM recommends that the ISO begin assessing this issue, and is prepared to work with the ISO and stakeholders to further develop and assess options to address this issue. In response to DMM's recommendation on this issue at the June 2016 Board meeting, ISO Management indicated the ISO would consider scheduling an initiative on this issue as part of the ISO's next stakeholder initiative catalog process in the fall of 2016.

DMM's quarterly report outlines a potential approach for addressing this issue by modifying the congestion rights *auction* into an actual *market* for congestion revenue rights based on bids submitted by entities willing to buy or sell congestion revenue rights. With this approach, generators could still seek to purchase hedges for locational price differences. Financial entities or other participants could participate and submit bids reflecting a willingness to sell a hedge for locational price differences to other auction participants. Bids to buy congestion revenue rights would only be cleared if there were sufficient bids from entities willing to sell transmission revenue rights (i.e. to assume the obligation to pay congestion charges to entities purchasing these rights).

⁵ 2015 Annual Report on Market Issues and Performance, May 2016, pp.14-15, 182-188, 225-226.
<http://www.caiso.com/Documents/2015AnnualReportonMarketIssuesandPerformance.pdf>

DMM believes this type of congestion revenue rights market would be more equitable for customers of load serving entities, and would produce more efficient prices that reflect the willingness of participants to buy or sell congestion revenue rights at the market clearing price. This approach would also address concerns expressed by Calpine at the June 2016 Board meeting by continuing to provide a market in which generators could seek to purchase a hedge for any locational price differences to which they may be exposed through their bilateral contracts.