

# Memorandum

**To:** ISO Board of Governors  
**From:** Eric Hildebrandt, Director, Market Monitoring  
**Date:** September 10, 2015  
**Re:** Market Monitoring report

---

*This memorandum does not require Board action.*

## EXECUTIVE SUMMARY

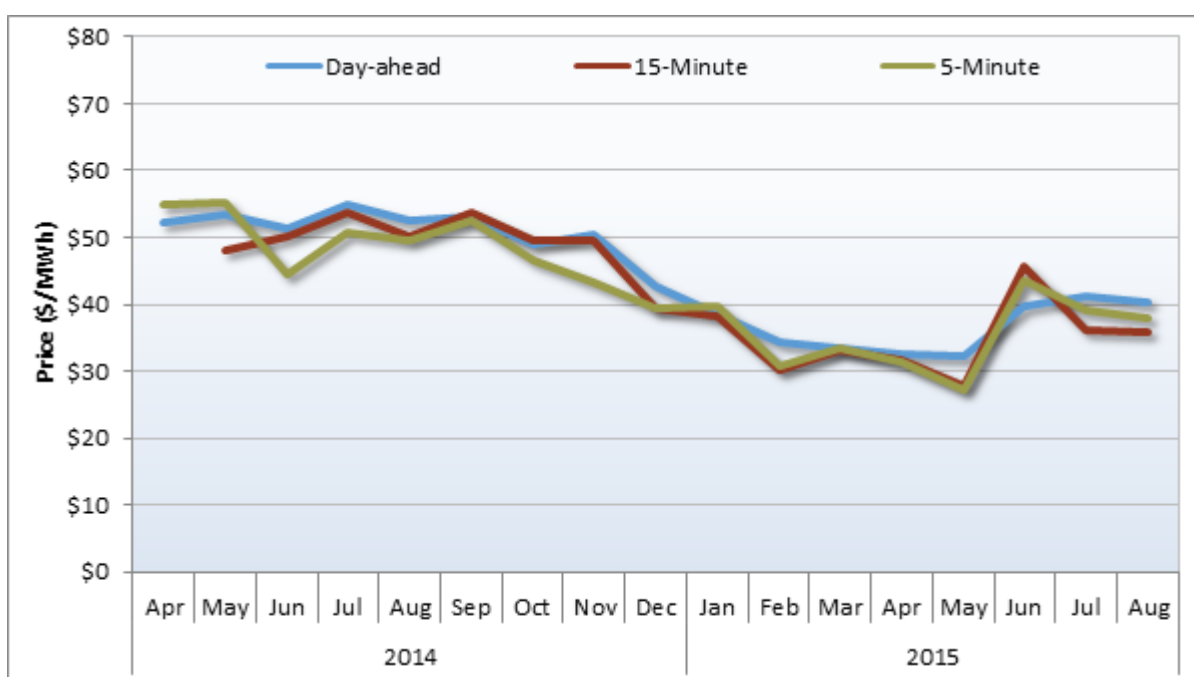
This memo provides an update on recent performance of the ISO and energy imbalance markets by the Department of Market Monitoring (DMM):

- **ISO market performance.** The ISO market has continued to perform efficiently and competitively through August 2015. Average monthly system energy prices in the day-ahead and real-time markets have tracked very closely in 2015, with real-time prices tending to be slightly lower than day-ahead prices. Lower real-time prices have often reflected factors such as lower than forecasted loads, additional generation from thermal units committed after the day-ahead market for reliability reasons, and additional generation from renewable sources during some hours beyond levels included in day-ahead forecasts and schedules.
- **Energy imbalance market.** Performance of the energy imbalance market has continued to improve over the course of 2015. The frequency with which the power balance constraint in the PacifiCorp East and West areas needed to be relaxed has decreased so that prices are highly competitive even without special price discovery provisions in effect to mitigate the impact of constraint relaxation on prices. Since May, prices in the 15-minute market in both PacifiCorp East and PacifiCorp West that would have resulted without price discovery provisions have been about equal to or below bilateral prices that were used to determine balancing energy charges prior to EIM implementation. Since June, prices in the 5-minute market would have also been about equal to or below bilateral prices even without price discovery provisions in effect. Bidding in the EIM has been highly competitive, with bids for most capacity below or slightly above default energy bids used in market power mitigation.

## ISO MARKET PERFORMANCE

The ISO market has continued to perform efficiently and competitively through August 2015. As shown in Figure 1, average monthly system energy prices in the day-ahead and real-time markets have tracked very closely in 2015, with real-time prices tending to be slightly lower than day-ahead prices.<sup>1</sup> Lower real-time prices have often reflected factors such as lower than forecasted loads, additional generation from thermal units committed after the day-ahead market for reliability reasons, and additional generation during some hours from renewable sources beyond levels included in day-ahead forecasts and schedules.

**Figure 1. Average monthly system energy prices (January – August 2015)**



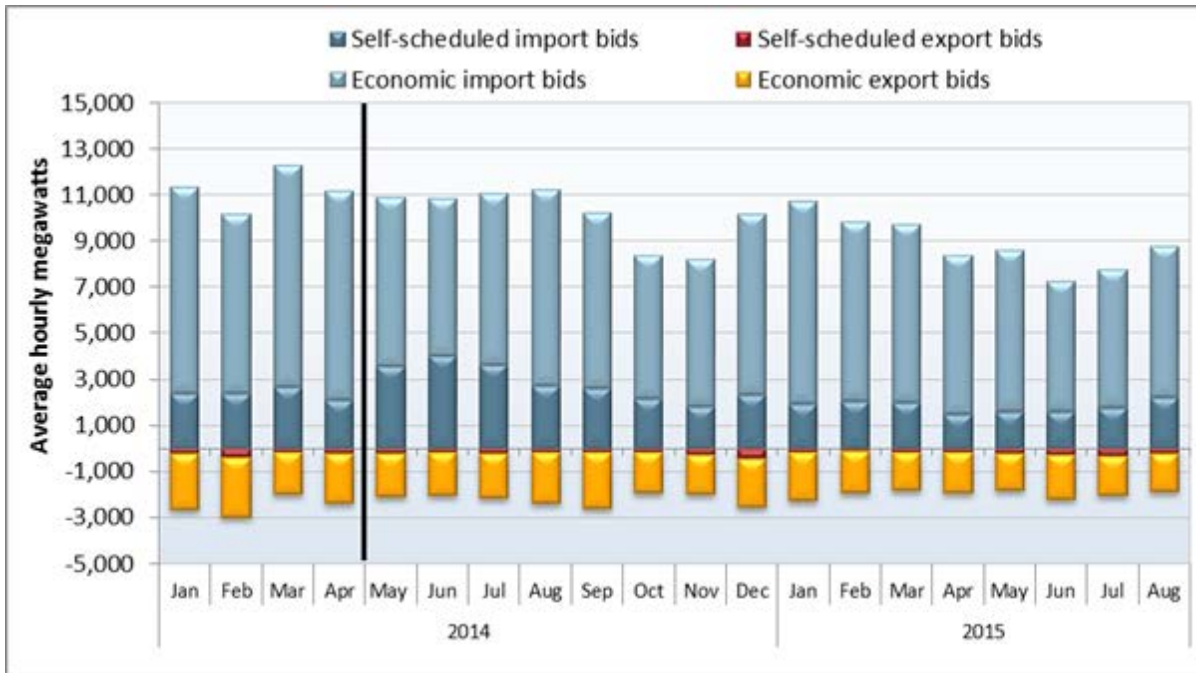
### ***Intertie scheduling and bidding***

Implementation of 15-minute scheduling on interties in May 2014 continues to have a significant impact on the volume and the of import and export bids, particularly in the real-time energy market.

Figure 2 shows the volumes of self-scheduling and bidding in the day-ahead market since January 2014. As shown in Figure 2, the volume of self-schedules imports in the day-ahead market increased during the first three months after implementation of 15-minute scheduling on interties, but then dropped back down to levels occurring prior to May 2014.

<sup>1</sup> System energy prices exclude the differences in locational margin prices (LMPs) at different points within the ISO system due to congestion.

**Figure 2. Average day-ahead import/export self-schedules and bids**

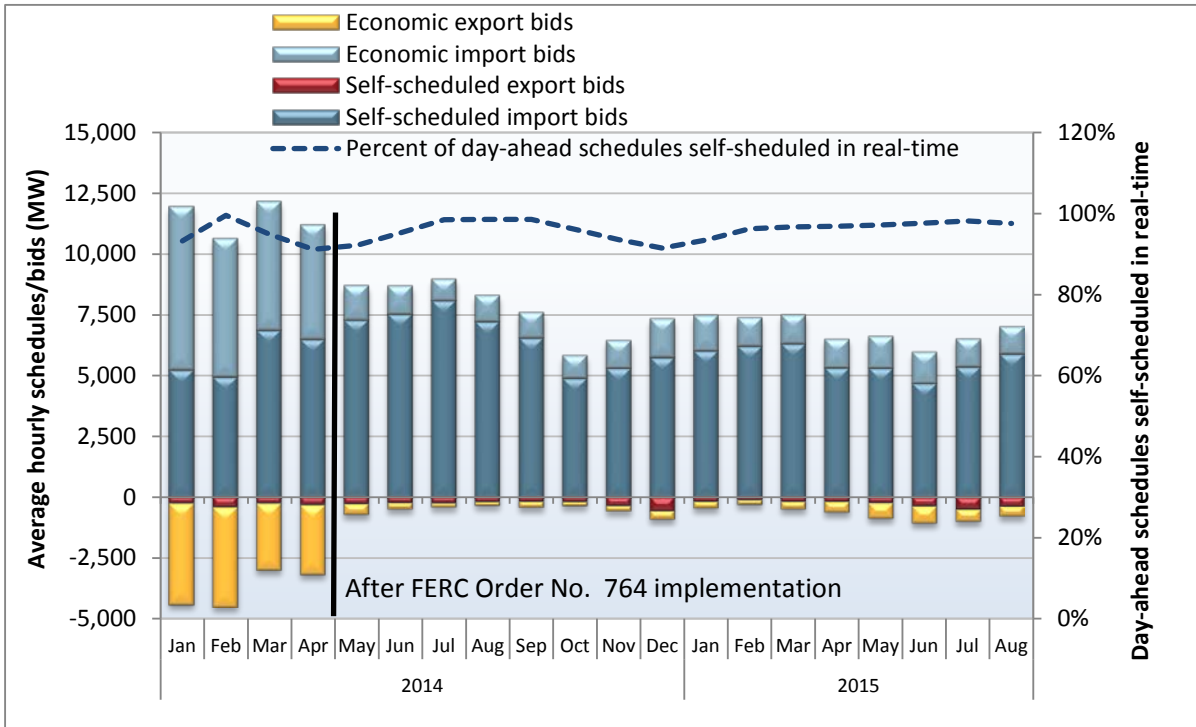


In 2015, only about one-third of imports scheduled in the day-ahead market have self-scheduled – which is about equal to the portion of self-scheduled imports prior to market changes made in May 2014. Thus, most imports in day-ahead market continue to result from economic (or price sensitive) bids.

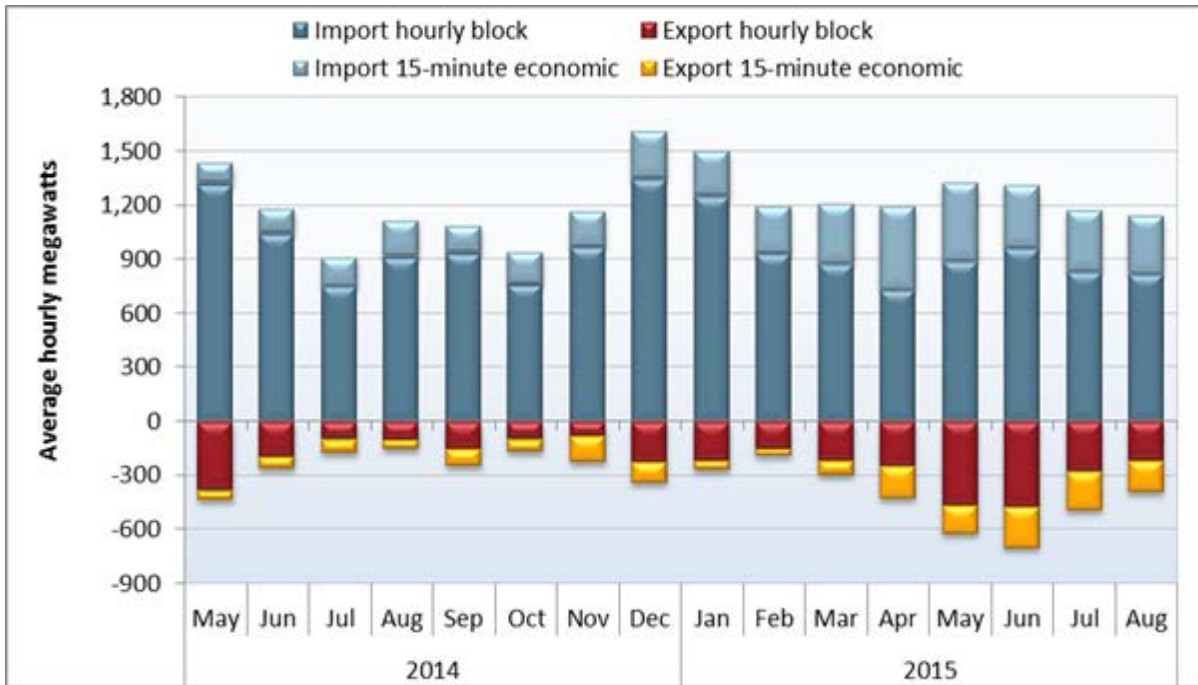
As shown in Figure 3, the amount of import and export bids into the real-time market dropped significantly after 15-minute scheduling on interties was implemented in May 2014. In addition, the volume of imports that are self-scheduled in real time continues to be very high both before and after implementation of 15-minute scheduling, with the volume of self-scheduled imports continuing to equal about 98 percent of the volume of imports scheduled in the day-ahead market. This means that there is a limited volume of price sensitive bids that can be dispatched in real time to either decrease imports scheduled in the day-ahead market or increase exports in real time.

While this overall trend has continued in 2015, real-time economic bidding, particularly of exports, has increased since May. However, as shown in Figure 4, the volume of 15-minute dispatchable bids on interties continues to be relatively low. Of the economic intertie bids in the real-time market, only about one-third of import and export bids are available for dispatch on a 15-minute basis. The remaining bids are for fixed hourly blocks. Also, the volume of 15-minute dispatchable bids continued to be submitted by a small number of scheduling coordinators on just three interties (Malin, Palo Verde and Rancho Seco).

**Figure 3. Average real-time import/export self-schedules and bids**



**Figure 4. Price-sensitive real-time import/export bids**



DMM is working with the ISO to better understand the factors driving these scheduling and bidding trends and to identify ways to increase economic price-sensitive bids in real time that can be dispatched to increase or decrease net imports in response to system conditions, including periods of excess or negatively priced energy within the ISO.

### ***Energy imbalance market***

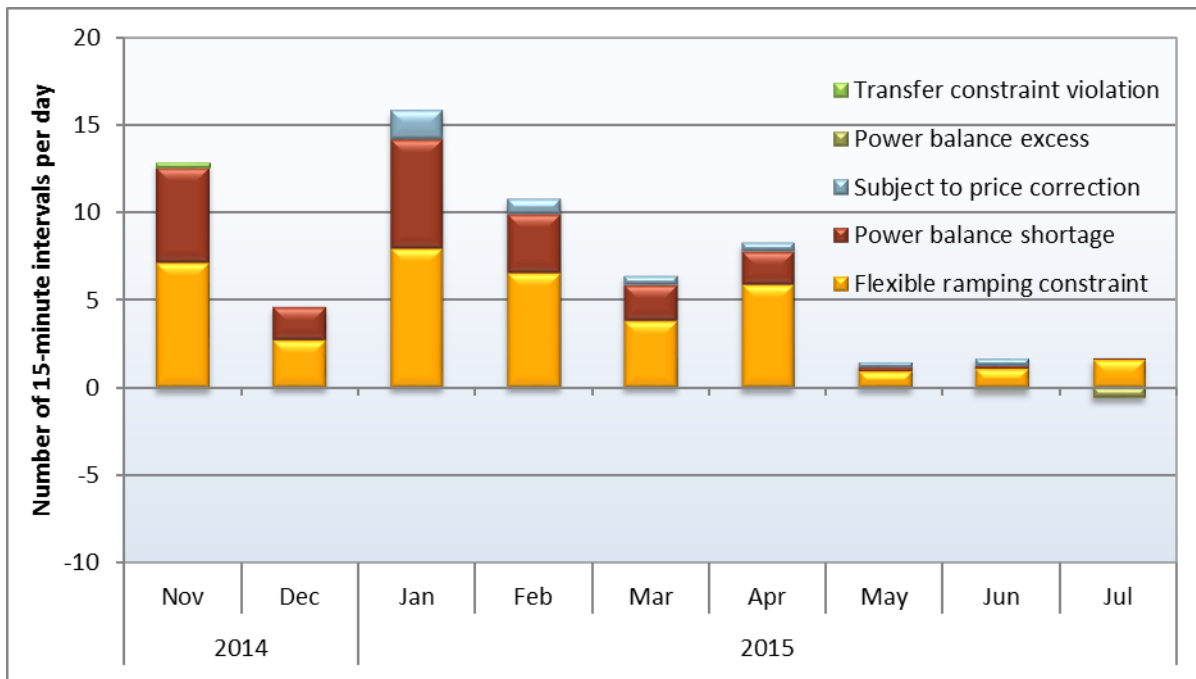
Performance of the energy imbalance market has continued to improve over the course of 2015. During most intervals, prices in the EIM have continued to be highly competitive and have been set by bids closely reflective of the marginal operating cost of the highest cost resource dispatched to balance loads and generation. During a relatively small portion of intervals, energy or flexible ramping constraints have still had to be relaxed for the market software to balance modeled supply and demand.

Figure 5 and Figure 7 show the frequency that constraints have been relaxed in the 15-minute market by month in the PacifiCorp East and West areas, respectively. Figure 6 and Figure 8 show the monthly average 15-minute prices in these areas *with* and *without* the special price discovery mechanism being applied to mitigate prices during intervals when the energy imbalance constraint needed to be relaxed. These figures also include monthly average bilateral market prices that were used to determine balancing energy charges prior to EIM implementation in these areas.

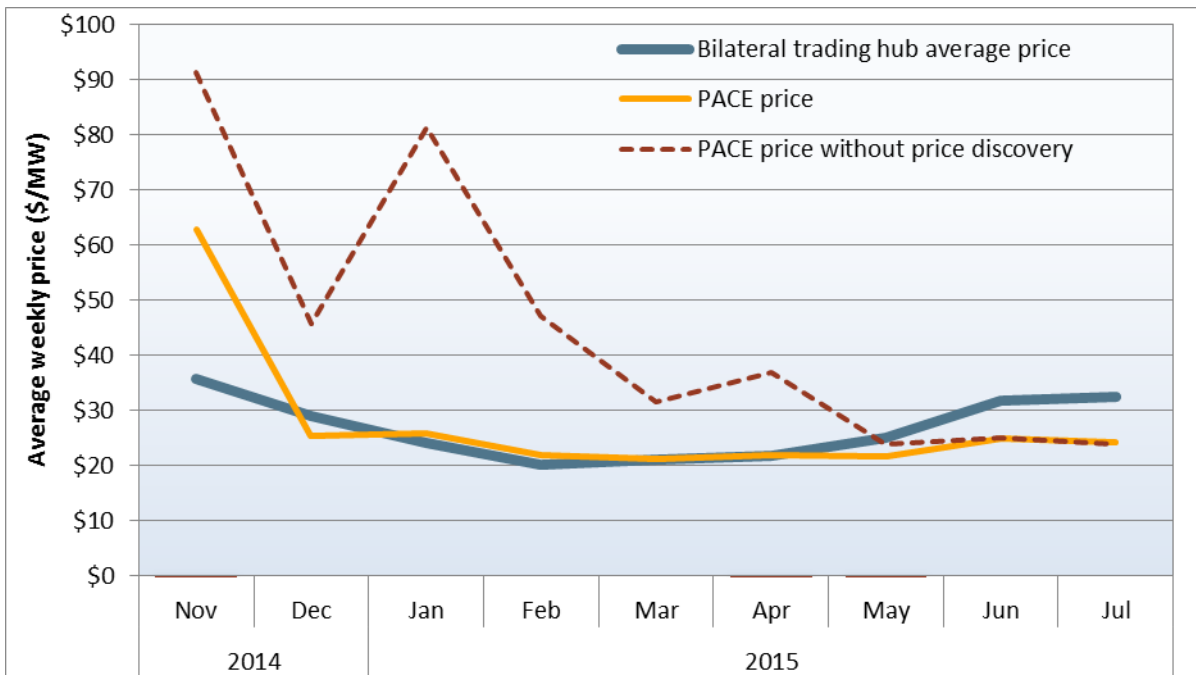
As shown in these figures, the price discovery provisions approved under the Commission's December 1, 2014 order have effectively mitigated the impact of constraint relaxation on energy imbalance market prices. Prices in the 15-minute market that would have resulted without these special price discovery provisions have dropped substantially over the first seven months of the energy imbalance market. Since May, prices in both PacifiCorp East and PacifiCorp West that would have resulted without price discovery provisions in effect have been about equal to or below bilateral prices that were used to determine balancing energy charges prior to EIM implementation.

Figure 9 and Figure 10 show average monthly prices in the 5-minute market *with* and *without* the special price discovery mechanism in PacifiCorp East and PacifiCorp West, respectively. The frequency of power balance constraint relaxation in the 5-minute market tends to be higher due to the more constrained supply conditions that exist on a 5-minute basis. However, June monthly average prices in the 5-minute market would have been about equal to or below bilateral prices even without price discovery provisions in both PacifiCorp areas.

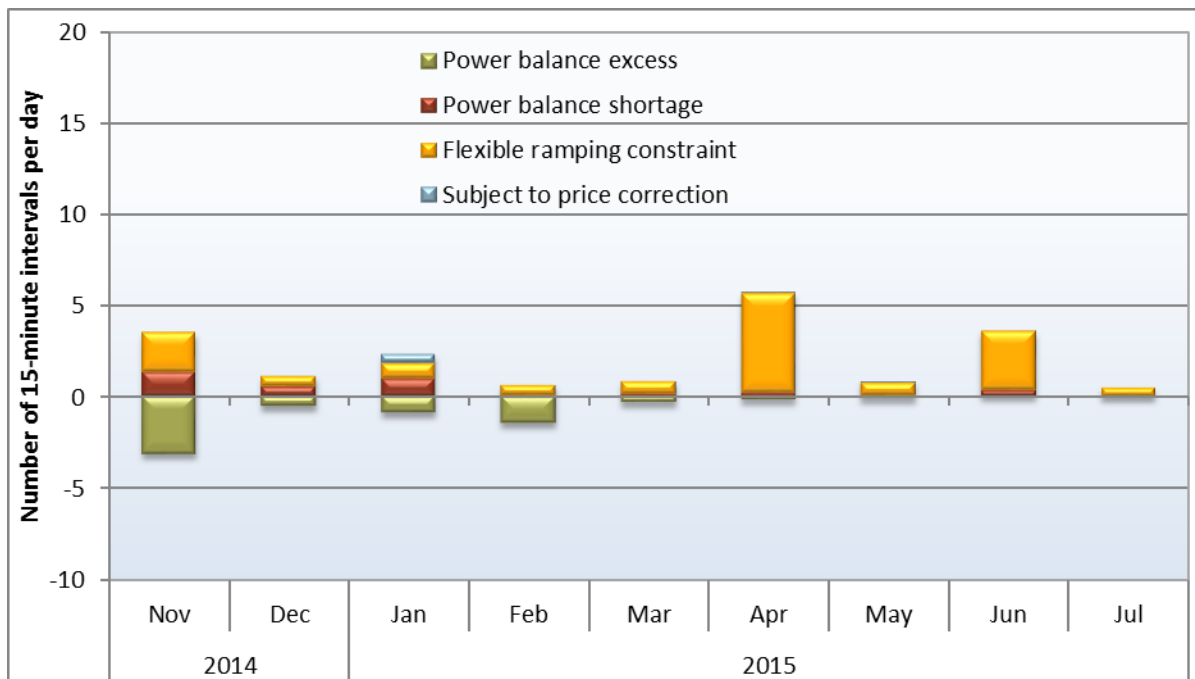
**Figure 5. Frequency of constraint relaxation (PacifiCorp East – 15 minute market)**



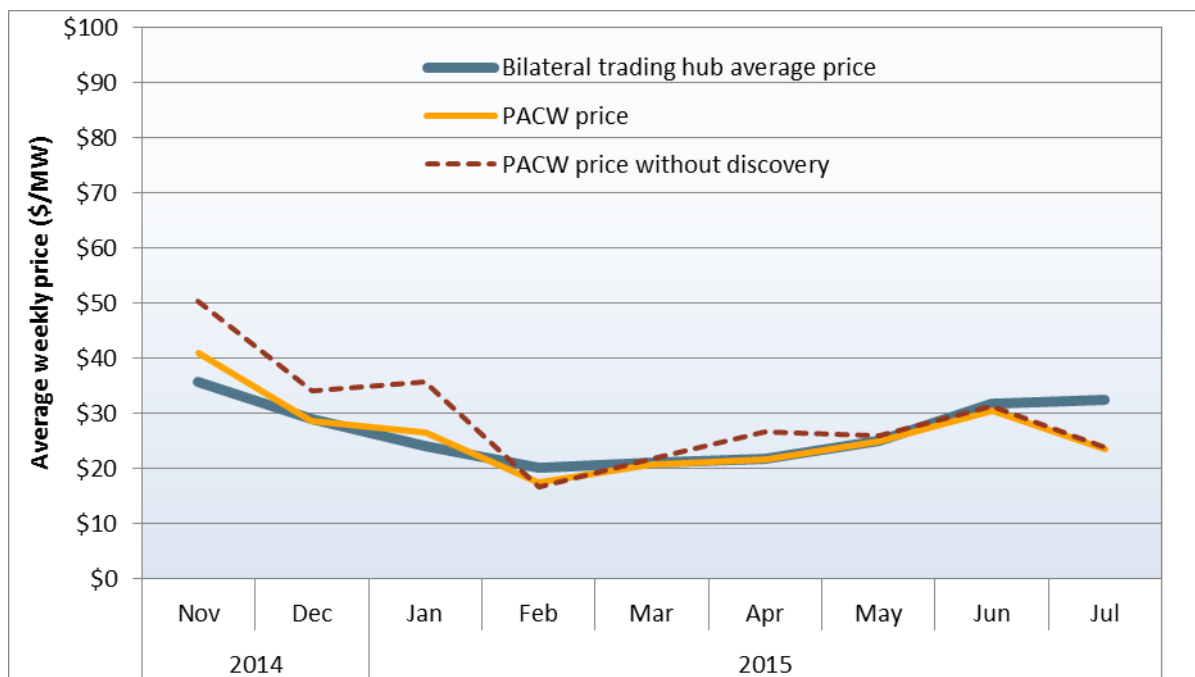
**Figure 6. Average monthly prices (PacifiCorp East - 15-minute market)**



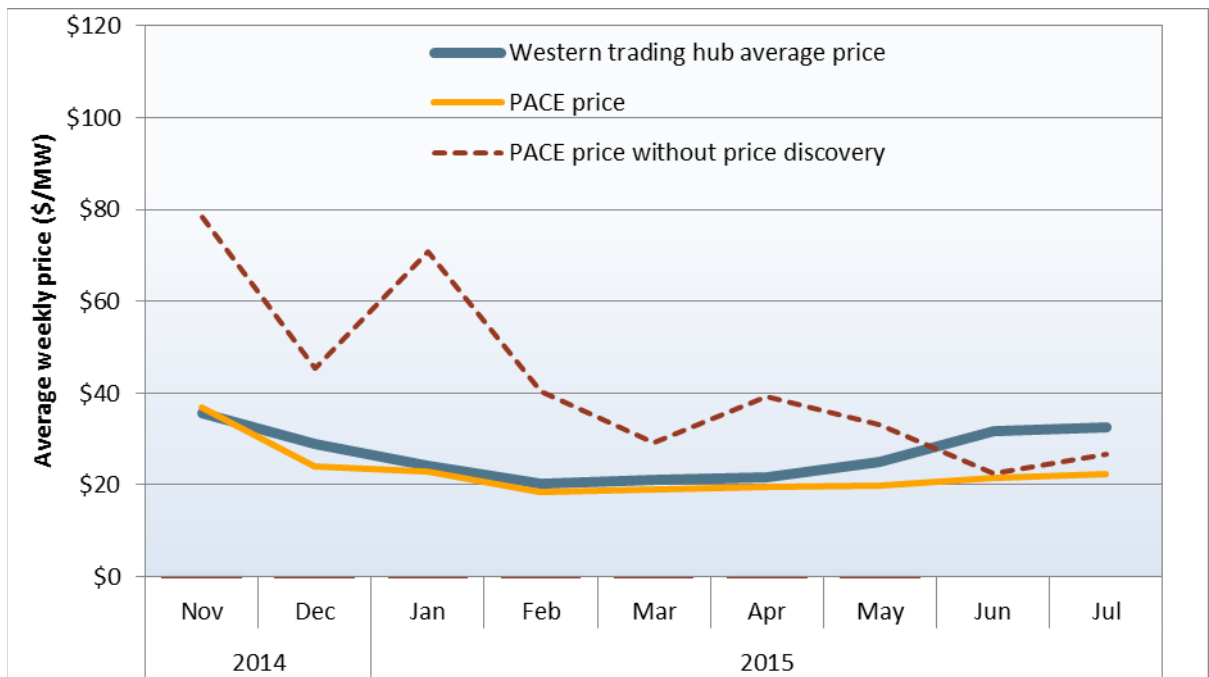
**Figure 7. Frequency of constraint relaxation (PacifiCorp West – 15 minute market)**



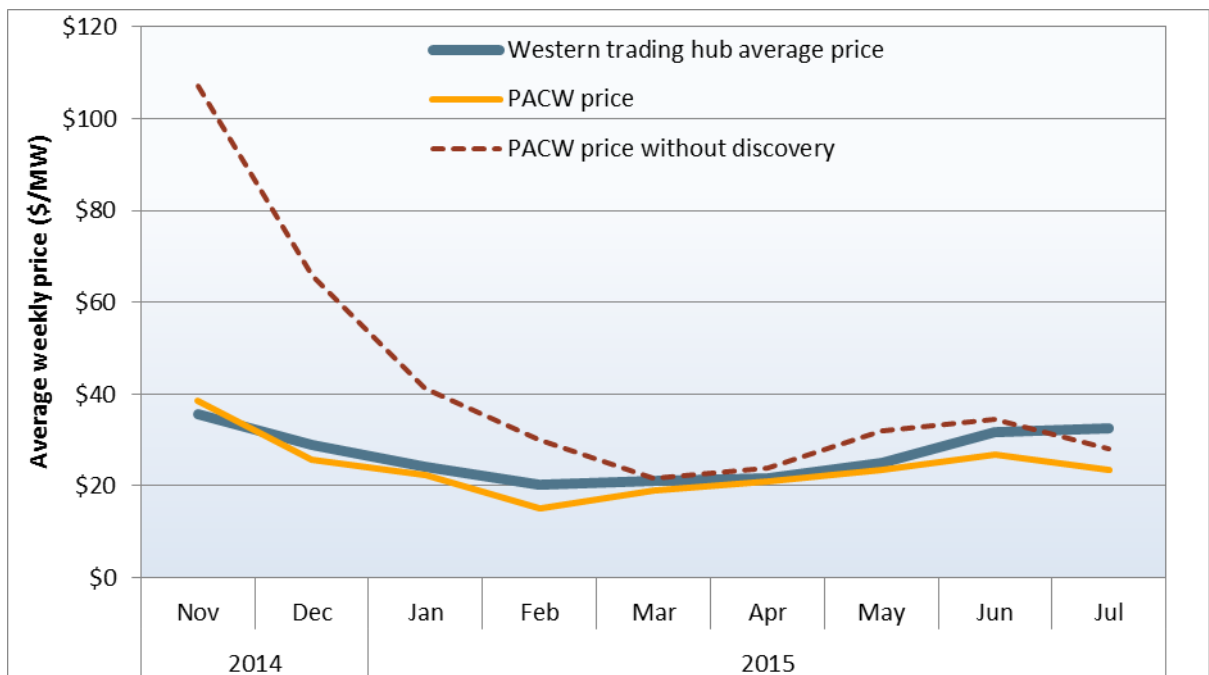
**Figure 8. Average monthly prices (PacifiCorp West – 15-minute market)**



**Figure 9. Average monthly prices (PacifiCorp East – 5-minute market)**



**Figure 10. Average monthly prices (PacifiCorp West – 5-minute market)**

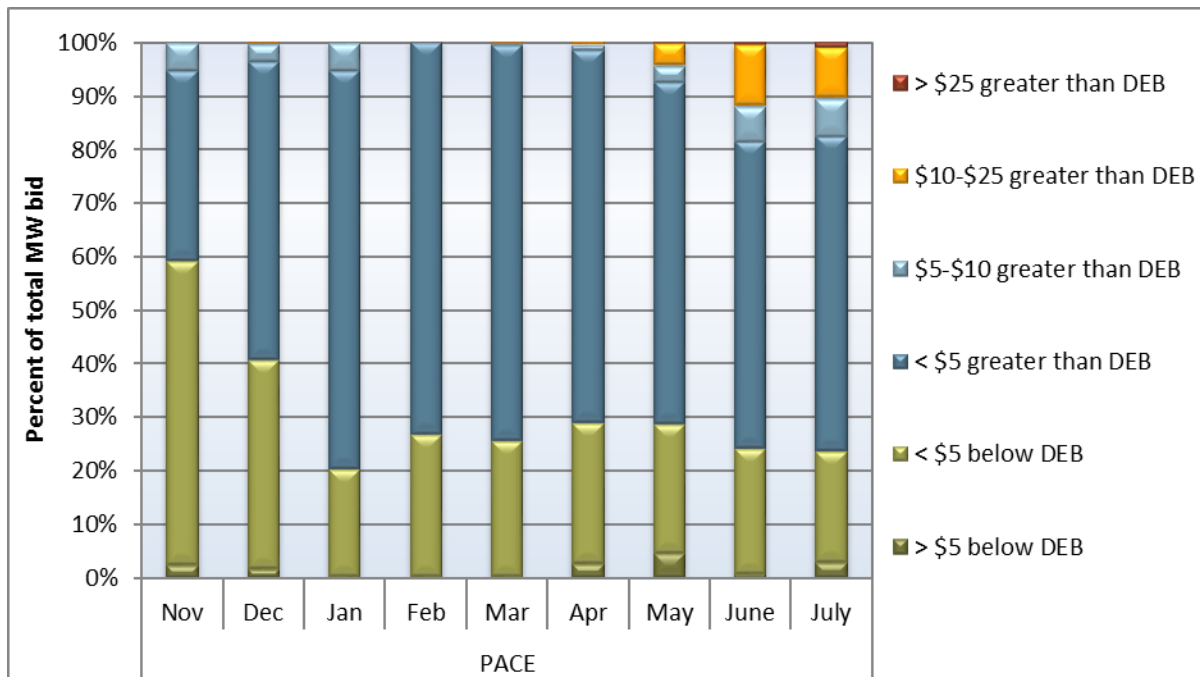




Bidding in the EIM has been highly competitive, with bids for most capacity below or slightly above default energy bids used in market power mitigation. Thus, when relatively high EIM prices have occurred, these prices reflect penalty prices for software constraints rather than bid prices. In addition, when bids are mitigated due to market power mitigation provisions, these procedures generally result in modest reductions in bid prices.

Figure 11 summarizes a comparison of bid prices in PacifiCorp East for thermal and hydro units compared to default energy bids used in market power mitigation. Figure 12 shows the same information for PacifiCorp West. These default energy bids are based on the marginal operating costs of thermal resources or opportunity cost for hydro resources with limited energy and energy storage capabilities.

**Figure 11. Comparison of market bids to default energy bids  
PacifiCorp East**



**Figure 12 Comparison of market bids to default energy bids  
PacifiCorp West**

