California Independent
System Operator Corporation

December 18, 2014

The Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Re: California Independent System Operator Corporation
Docket No. ER15-402___
Independent Assessment – Department of Market Monitoring
Performance of Energy Imbalance Market

Dear Secretary Bose:

The Department of Market Monitoring hereby submits its independent assessment on the causes and solutions identified by the California Independent System Operator Corporation in its report on the performance of the Energy Imbalance Market for November 1 – November 30, 2014.[1]

Please contact the undersigned with any questions.

Respectfully submitted,

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[1] The CAISO submits this report pursuant to *California Independent System Operator Corp.*, 149 FERC ¶ 61,194 (2014).

California Independent
System Operator Corporation

California ISO

Report on Energy Imbalance Market Issues and Performance

December 18, 2014

Prepared by: Department of Market Monitoring

Executive Summary

This is the first report by the Department of Market Monitoring (DMM) pursuant to the Commission's December 1, 2014, Order on the ISO's request for a waiver related to pricing in the Energy Imbalance Market (EIM).[1] The Commission's December 1 Order directed the ISO to file informational reports providing detailed supporting data demonstrating progress towards identifying and eliminating the problems giving rise to the waiver petition. The Order indicated that these reports should include independent assessments from the DMM on these causes and the solutions identified by the ISO.

The performance of the EIM improved notably over the first month of operation. The frequency of cases where the amount of supply available through the market software is insufficient to meet projected demand, resulting in a need to relax the constraints in the market software, has dropped substantially. The ISO's December 15 report describes a variety of software and procedural steps that have been taken by the ISO and PacifiCorp to improve EIM performance, along with additional future improvements being pursued to further improve performance of the EIM.[2]

DMM believes many of the underlying problems and solutions identified in the ISO's December 15 report represent major drivers of gradually improved performance of the EIM that has occurred. DMM agrees that it is likely many of these issues can be addressed through additional market experience, along with development and adherence to enhanced procedures, processes and operational tools. If implemented, the additional steps outlined in the report are likely to further improve EIM performance.

The effectiveness of these efforts should be reflected in fewer cases in which the amount of supply available through the market software is insufficient to meet system demand as projected by the market software. Consequently, analysis in this report focuses largely on supply conditions and trends in the EIM that appear to be closely correlated or indicative of EIM market performance. In future reports, DMM will continue to track these conditions and expand its analysis to include other drivers of EIM market performance.

Key observations and findings in this report include the following:

- During most intervals, prices in the EIM have been 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. However, overall average prices have been driven up by high prices at or near the $1,000/MWh cap reflective of relaxation parameters during a relatively small portion of intervals.

- The amount of capacity participating in the EIM increased significantly over the second half of November, and most available capacity from EIM participating resources is being offered into the market. On average, over 85 percent of the nameplate capacity registered to participate in EIM has been bid into the market during peak hours. Most unbid capacity appears to be unavailable due to outages.

- Total capacity offered into the EIM appears to be significantly more than sufficient to meet demand during most hours. Overall, about 45 percent of all bids submitted in the EIM have been dispatched

[1] *California Indep. Sys. Operator Corp.*, 149 FERC ¶ 61,194 (2014) (December 1 Order).

[2] *Energy Imbalance Market Pricing Waiver Report*, ISO Market Quality and Renewable Integration, November 1-30, 2014, December 15, 2014: http://www.caiso.com/Documents/Dec15_2014_EnergyImbalanceMarketPerformanceReport_ER15-402.pdf.

to meet demand. However, the portion of this supply available for dispatch on a 15-minute and 5-minute basis is still sometimes insufficient to meet the demand for imbalance energy as projected by the market software. In many cases, these insufficiencies appear to be largely attributable to the various factors cited in the ISO's December 15 report rather than more fundamental market or system conditions.

- Many periods when power balance constraints are relaxed in the PacifiCorp EIM areas persist for almost one hour or more. During intervals when the power balance constraint is relaxed in the EIM market software, PacifiCorp continues to have responsibility for ensuring reliability in the EIM areas as the EIM market operator. PacifiCorp has assured the ISO and stakeholders that it has continued to ensure all reliability requirements are met during periods of the power balance constraint relaxation through various out-of-market dispatches, purchases from other balancing areas and reserve sharing arrangements.

- Bidding in the EIM has been highly competitive, with bids for most capacity slightly below or 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.

In future reports, DMM will provide estimates of average prices in the PacifiCorp West and PacifiCorp East areas after November 14 if the same pricing parameters used in the ISO real-time market were used for all constraints relaxed in the EIM. DMM believes this will provide a valuable quantitative measure of EIM market performance and progress made as the result of various steps being taken by the ISO and PacifiCorp to improve market performance.

DMM is also developing additional metrics that may provide insights into EIM market performance and progress made as the result of various steps being taken by the ISO and PacifiCorp to improve market performance. These metrics include data on outage reporting, out-of-market dispatches, and load adjustments made by PacifiCorp, and deviations from energy schedules by participating and non-participating resources in the EIM footprint.

1 Background

On November 13, 2014, the ISO requested a 90-day waiver of two tariff provisions for establishing the price of energy in the Energy Imbalance Market (EIM) during intervals when, due to a lack of sufficient supply from capacity bid into the market, the ISO's market software must resort to relaxing transmission or system energy balance constraints in order to reach a market solution.[3] Under these conditions, the waiver would allow prices to be set by the last market bids dispatched as mitigated, rather than based on pricing parameters set at the $1,000/MWh bid cap.

The waiver was requested as a means of mitigating high prices that the ISO believes resulted from a variety of factors which prevented the market software from producing prices reflective of actual supply and demand conditions. The ISO explained that these high prices are not always indicative of actual physical conditions on the system, and instead reflect factors such as (1) challenges in providing timely and complete data to ensure system visibility under the new procedures, (2) limitations on the resources available to PacifiCorp for use in the EIM, and (3) several forced outages of large EIM participating resources.

On December 1, the Federal Energy Regulatory Commission (FERC) issued an order granting the ISO's petition for waiver of these provisions for 90 days, effective November 14, 2014, as requested.[4] The Commission also directed the ISO to file detailed informational reports at 30-day intervals during the 90-day waiver period, providing detailed supporting data demonstrating progress towards identifying and eliminating the problems giving rise to the waiver petition. FERC indicated that these reports should include independent assessments from the Department of Market Monitoring on the causes and the solutions identified by the ISO. The Commission indicated that the first report be filed 30 days from the effective date of the tariff waiver, December 15, 2014.

This report represents DMM's first report pursuant to the Commission's December 1 Order. Given the limited period of time since the December 1 Order was issued and completion of the ISO's first report pursuant to that order, this report provides limited analysis of the issues identified in the ISO's filing and report. Additional analysis and assessments of the specific problems and solutions identified in the ISO's report will be addressed in DMM's future reports pursuant to the December 1 Order.

[3] http://www.caiso.com/Documents/Nov13_2014_PetitionWaiver_EIM_ER15-402.pdf

[4] http://www.caiso.com/Documents/Dec1_2014_OrderGrantingWaiver_EIMPricingParameters_ER15-402.pdf

2 Energy imbalance market prices

During most intervals, prices in the EIM have been 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. However, overall average prices have been driven up by significantly higher prices at or near the $1,000/MWh offer cap during a relatively small portion of intervals. As explained in the ISO's November 13 filing, these high prices are set by administrative prices used in the pricing run of the market software when certain constraints must be relaxed in the scheduling run when available supply to the market software is insufficient to meet projected demand.

The impact of these constraint violations on overall prices is illustrated in Figure 2.1 through Figure 2.4, which show the frequency with which various constraints were relaxed each day along with daily average energy prices in the EIM.[5] For the sake of comparison, the average ISO price is included.[6] The period from November 2 through November 13 is categorized as the "No Waiver" period since pricing results during this period will not be adjusted to remove the penalty prices and limit the price to the last dispatched price. The period from November 14 through November 30 represents the period covered by the tariff waiver, but with partially included retroactive adjustments. The ISO is reprocessing the prices to be consistent with the FERC order; however, there can be a lag between when the adjustments are processed and when they are published to the ISO website.[7]

As show in Figure 2.1 through Figure 2.4, four different constraints were violated in EIM during November:

- The flexible ramping constraint shortages (blue bar) occur when there is insufficient ramping capacity in the 15-minute market to meet the capacity requirement. During this period, this requirement has been set at about 25 to 40 MW. The penalty price for shortages of the flexible ramping constraint is $247. This constraint is enforced in the binding 15-minute market interval but not in the binding 5-minute market interval.
- Transfer limit violations (yellow bar) occur when the transfer limit from one EIM balancing authority area was violated to meet demand in another area. The penalty price for transfer limit violations between balancing authority areas is consistent with the offer cap of $1,000/MWh.

[5] November 1 is excluded from the analysis due to several data related issues experienced on this day. As explained in the ISO's December 15 report, data on power balance constraint violations for November 1 to November 13 in the 15-minute market were not saved so that intervals with power balance violations in this period had to be estimated by the ISO based on market prices. Figures 2.1 and 2.2 and Table 3.1 incorporate these estimates by the ISO. Other analysis in this report are based on data in the archive of ISO market data, and are therefore more reflective of the pattern of power balance constraint relaxations from November 14 to November 30.

[6] The average ISO price is a load weighted average of the four default load aggregation points within the ISO system.

[7] Both the EIM and ISO average prices were taken from OASIS data and represent the most current corrected and adjusted prices when the data was pulled in early December. Not all price corrections consistent with the ISO tariff or price adjustments consistent with the waiver were represented in the data. Thus, any analysis of these pricing results at this time must consider that some of the prices may have been retroactively updated, whereas others may not have been.

Figure 2.1 Frequency of constraint relaxation and average daily prices
PacifiCorp East - 15-minute market

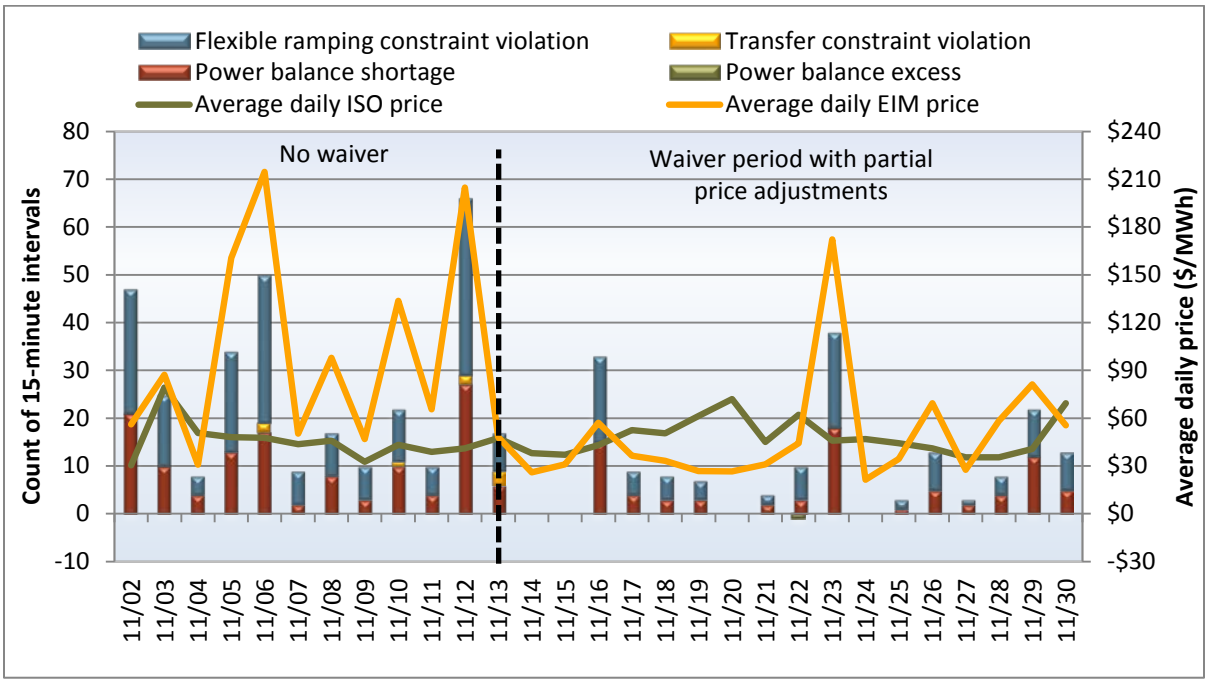


Figure 2.2 Frequency of constraint relaxation and average daily prices
PacifiCorp West - 15-minute market

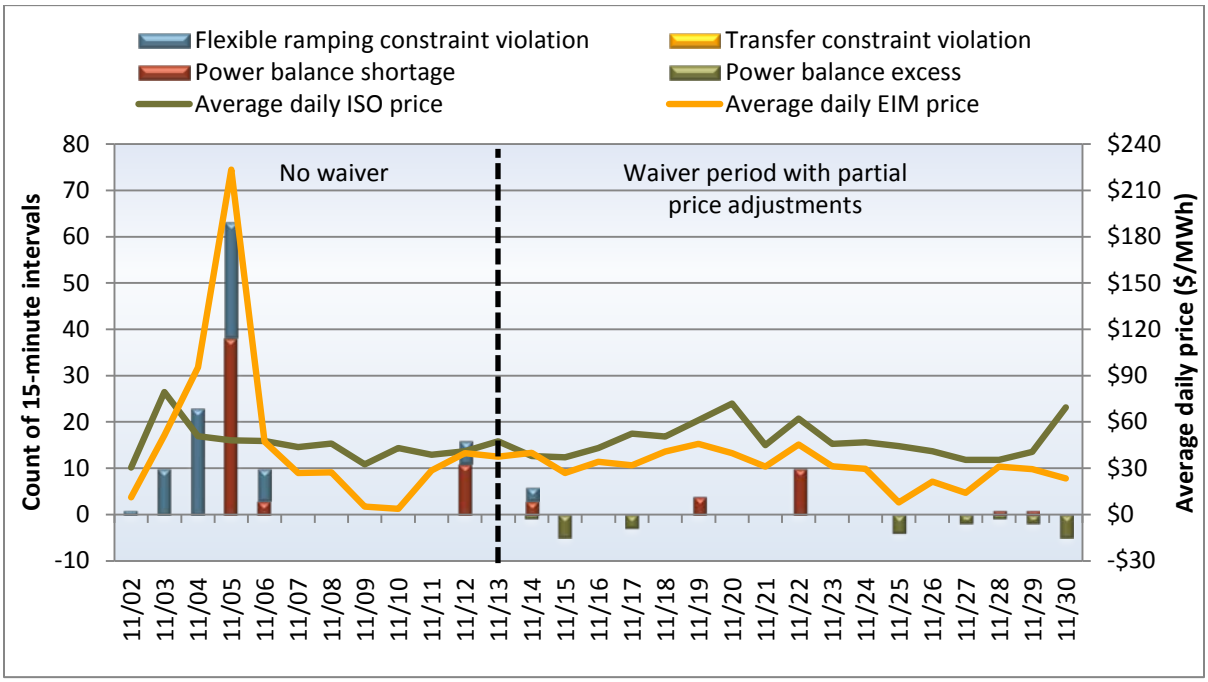


Figure 2.3 Frequency of constraint relaxation and average daily prices
PacifiCorp East - 5-minute market

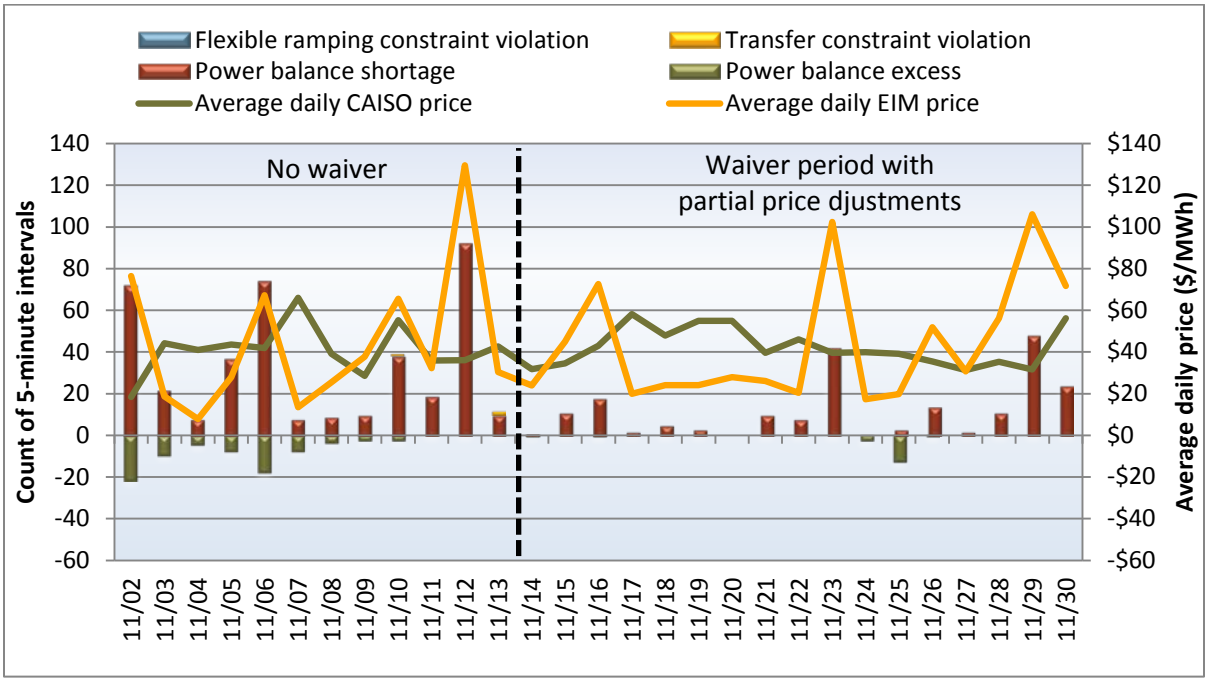
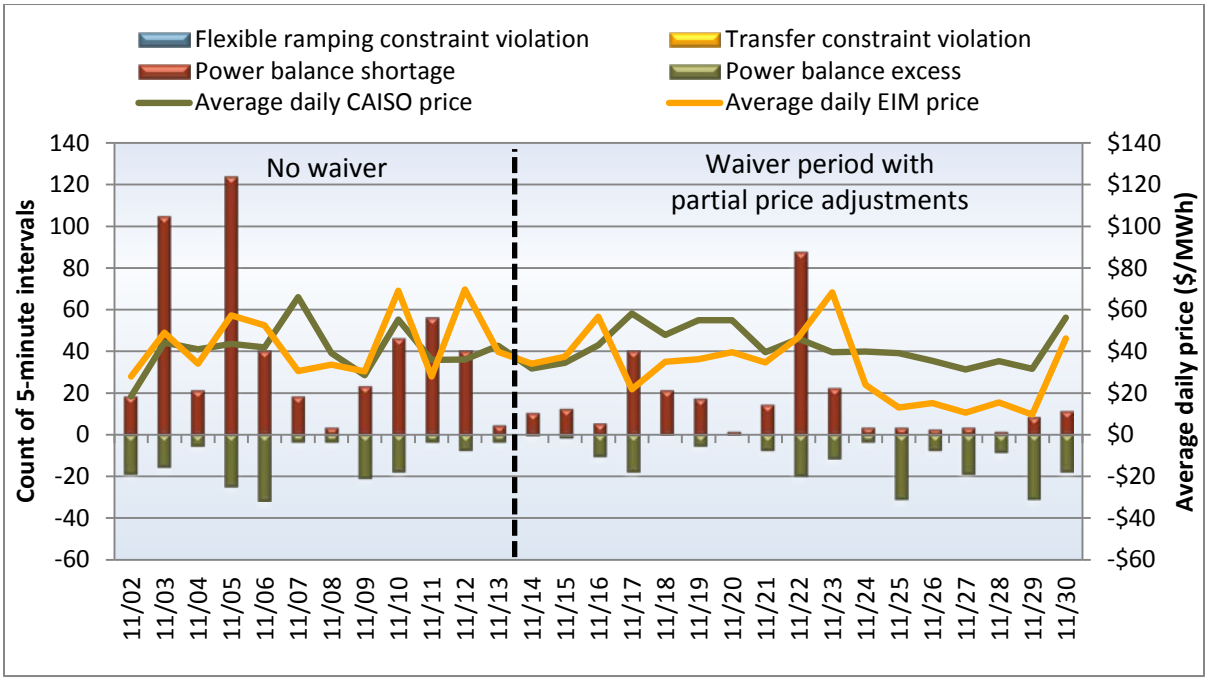


Figure 2.4 Frequency of constraint relaxationand average daily prices
PacifiCorp West - 5-minute market



- Power balance constraint shortages (red bar) occur when the power balance constraint that matches generation and load is relaxed when load exceeds available generation. The penalty price for shortages related to the power balance constraint is consistent with the offer cap of $1,000/MWh.

- Power balance constraint excess (green bar) occurs when the power balance constraint that matches generation and load is relaxed because generation exceeds load. The penalty price for excess generation related to the power balance constraint is consistent with the offer floor of -$150/MWh. The figures show the count of intervals where power balance excess occurred in terms of a negative number, since these violations reduce overall prices.

Two sets of average daily prices are compared in Figure 2.1 through Figure 2.4:

- The average daily EIM price (gold line) represents the current prices in the corresponding EIM balancing authority area as posted on the ISO OASIS website.[8] The prices include any processed price corrections or price adjustments as of December 11.

- The average daily CAISO price (green line) represents the load weighted average of the default load aggregation prices in the CAISO balancing authority area.[9] These prices include any processed price corrections or price adjustments as of December 11.

Key observations shown in Figure 2.1 through Figure 2.4 include the following:

- Prior to the effectiveness of the waiver on November 14, average daily prices in the PacifiCorp West and PacifiCorp East areas for energy in the 15-minute and 5-minute markets tended to be notably lower than ISO prices except on days when EIM prices were driven up by violations of the power balance or flexible ramping constraints.

- After November 14, violations of these constraints have trended downward in the PacifiCorp West and PacifiCorp East areas in both the 15-minute and 5-minute markets. The impact of these constraint violations during this period is not fully reflected in prices in part due to application of the waiver provisions during parts of this period.

- In the 15-minute market, flexible ramping constraint shortages are the most prevalent source of shortages in both areas.[10]

- Transfer limit violations have only affected a handful of intervals in both the 15-minute and 5-minute markets. In addition, transfer constraint violations only affected prices in the PacifiCorp East area.

[8] Each interval price was averaged over the day to create a daily price.

[9] There are currently four DLAP prices including PG&E, SCE, SDG&E and VEA. The prices in these areas were load weighted and averaged together to create an average CAISO balancing authority area price for each interval. These interval level prices were averaged together to create a daily price.

[10] This is partly attributable to the fact that the ISO did not correctly save data on power balance constraint related shortages in the 15-minute market during the first half of the month, though we have attempted to adjust for this data limitation in some of our figures.

In future reports, DMM will provide estimates of average prices in the PacifiCorp West and PacifiCorp East areas after November 14 if the same pricing parameters used in the ISO real-time market were used for all constraints relaxed in the EIM. DMM believes this will provide a valuable quantitative measure of EIM market performance and progress made as the result of various steps being taken by the ISO and PacifiCorp to improve market performance.

3 Market software constraint violations

This section provides additional information on the frequency, timing and duration of various constraint violations in the EIM during November 2014.

Figure 3.1 through Figure 3.4 show the frequency of various constraint violations by operating hour in PacifiCorp East and PacifiCorp West in the 15-minute and 5-minute markets during November 2014. These charts also include the average total load (green line) in the PacifiCorp areas in each hour.

In PacifiCorp East, the frequency of violations is not highly correlated with hours of high ramping requirements or loads, with a large portion of constraint violations occurring during off-peak hours (see Figure 3.1 and Figure 3.2). This suggests that constraint violations in PacifiCorp East are not primarily driven by load ramping requirements, and are driven more by a variety of other factors such as those cited in the ISO's December 15 report. As discussed in later sections of this report, this pattern may also reflect the fact that the margin of extra capacity that is available within a 15-minute ramping period from units that are online and bid in the market is lowest during off-peak hours in PacifiCorp East.

In PacifiCorp West, the frequency of violations in the 15-minute market is lower and more highly correlated with hours of high loads or ramping requirements than in PacifiCorp East (Figure 3.3). The frequency of power balance constraint violations in PacifiCorp West in the 5-minute market is slightly higher than in PacifiCorp East, but is much more highly correlated with hours of high loads or ramping requirements (Figure 3.4 and Figure 3.2, respectively).

When comparing the total count of violations in these figures, it should be noted that each violation in Figure 3.1 and Figure 3.3 represents one 15-minute market interval, while each violation in Figure 3.2 and Figure 3.4 represents one 5-minute interval.

Table 3.1 below summarizes the percentage of total intervals in each area in which the power balance constraint was relaxed for shortages of upward generation in the 15-minute and 5-minute markets. As shown below, power balance constraint relaxations in the 15-minute market occur at a much higher frequency in PacifiCorp East, while power balance constraint violations in the 5-minute market occur at a slightly higher frequency in PacifiCorp West. Power balance constraint relaxations in both PacifiCorp areas have dropped substantially after the first two weeks of EIM operation in both the 15-minute and 5-minute markets.[11]

Table 3.1 Percent of intervals with power balance constraint relaxations – November 2014

	15-minute market		5-minute market	
	Nov 2-13	Nov 14-30	Nov 2-13	Nov 14-30
PacifiCorp East	11%	5%	12%	4%
PacifiCorp West	5%	1%	15%	6%

[11] As noted in footnote 5, Table 3.1 incorporates estimates of power balance constraint relaxations in the 15-minute market made by the ISO based on market prices for the period from November 2 to November 13 because of data limitations.

Figure 3.1 Constraint relaxation by operating hour (November 2014)
PacifiCorp East - 15-minute market

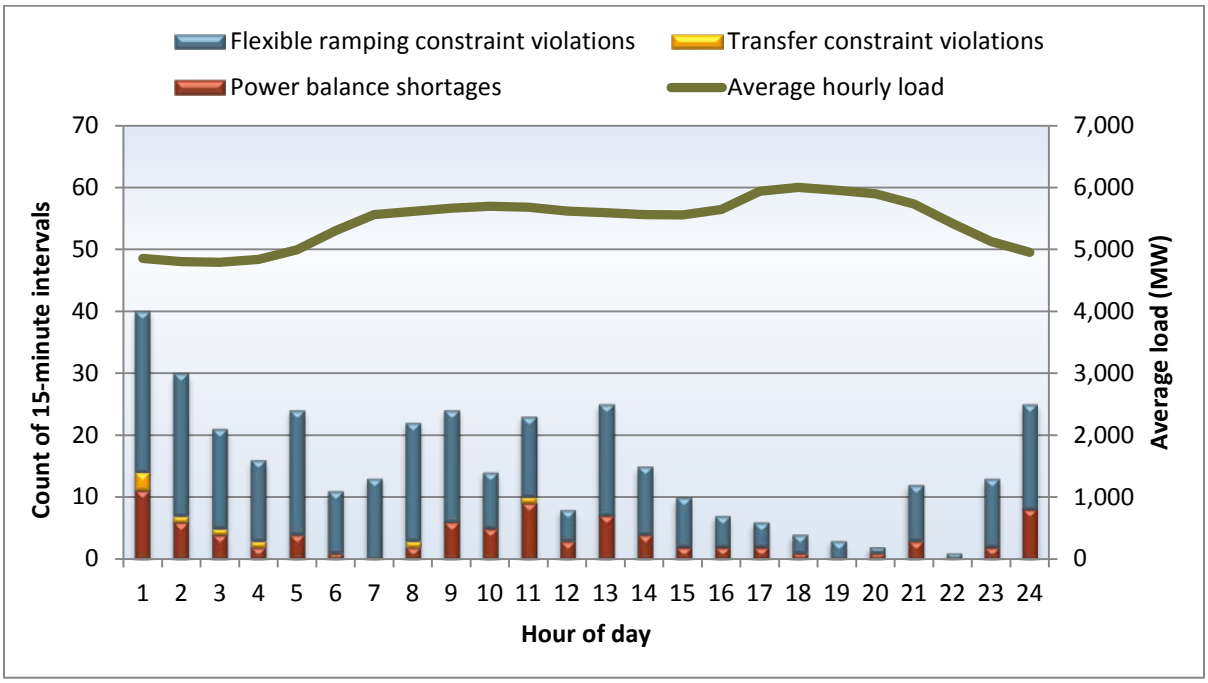


Figure 3.2 Constraint relaxationby operating hour (November 2014)
PacifiCorp East - 5-minute market

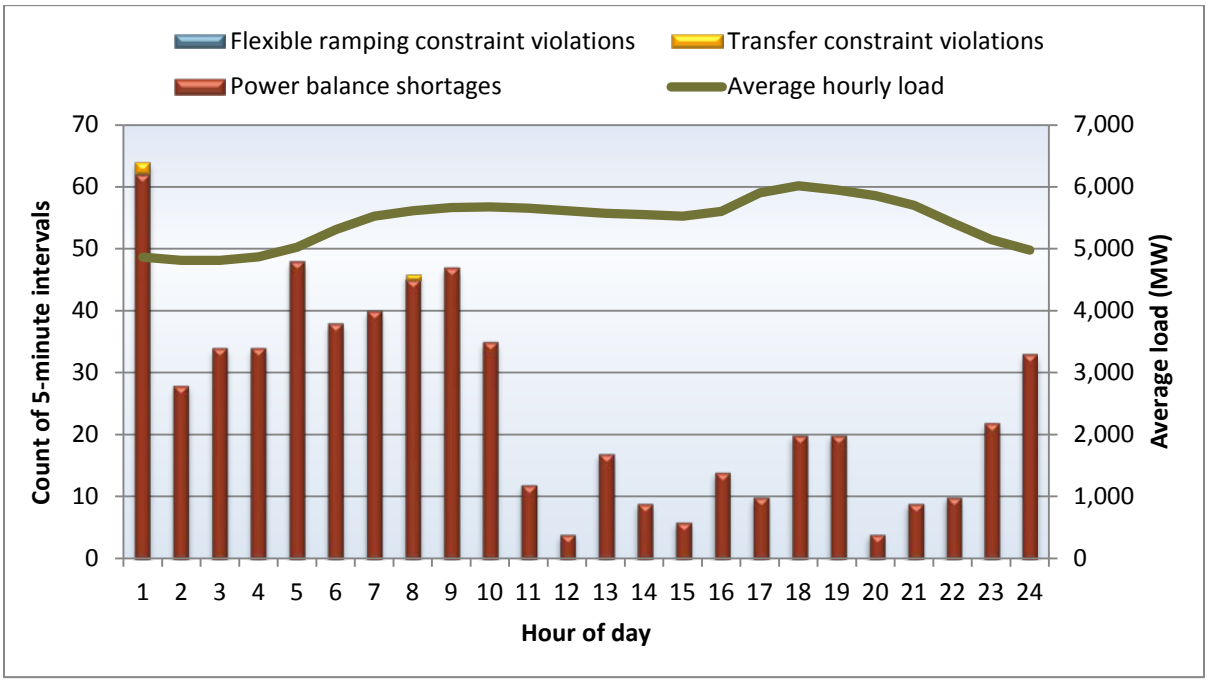


Figure 3.3 Constraint relaxationby operating hour (November 2014)
PacifiCorp West - 15-minute market

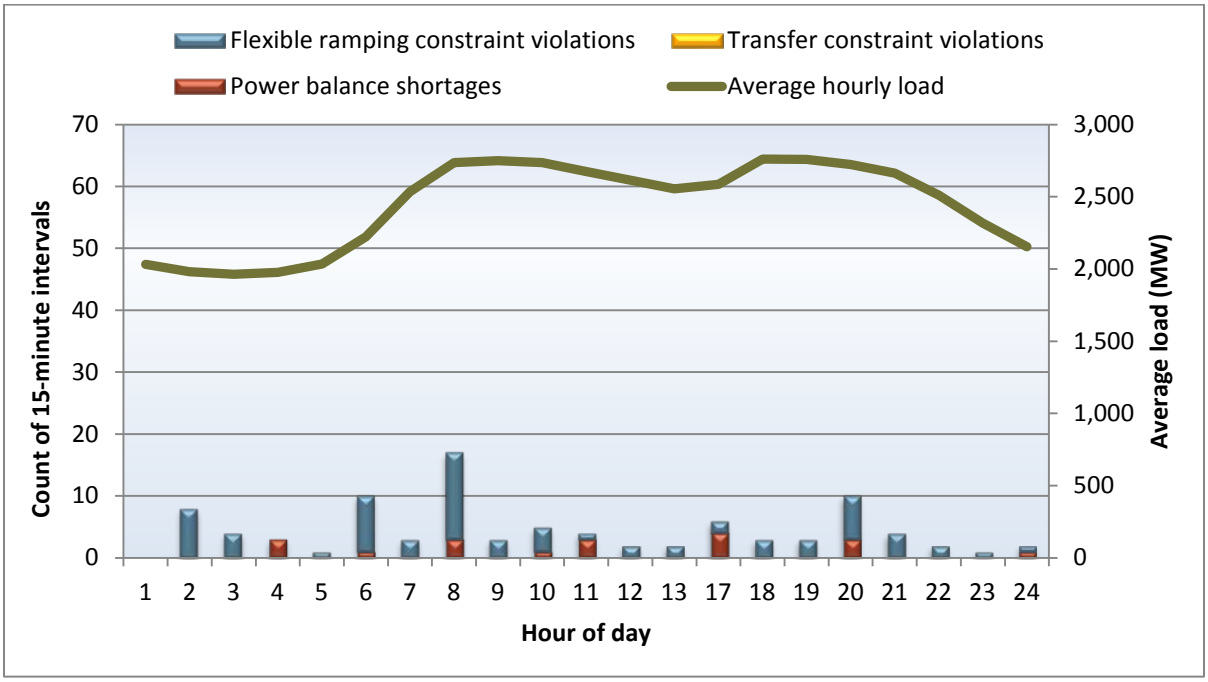
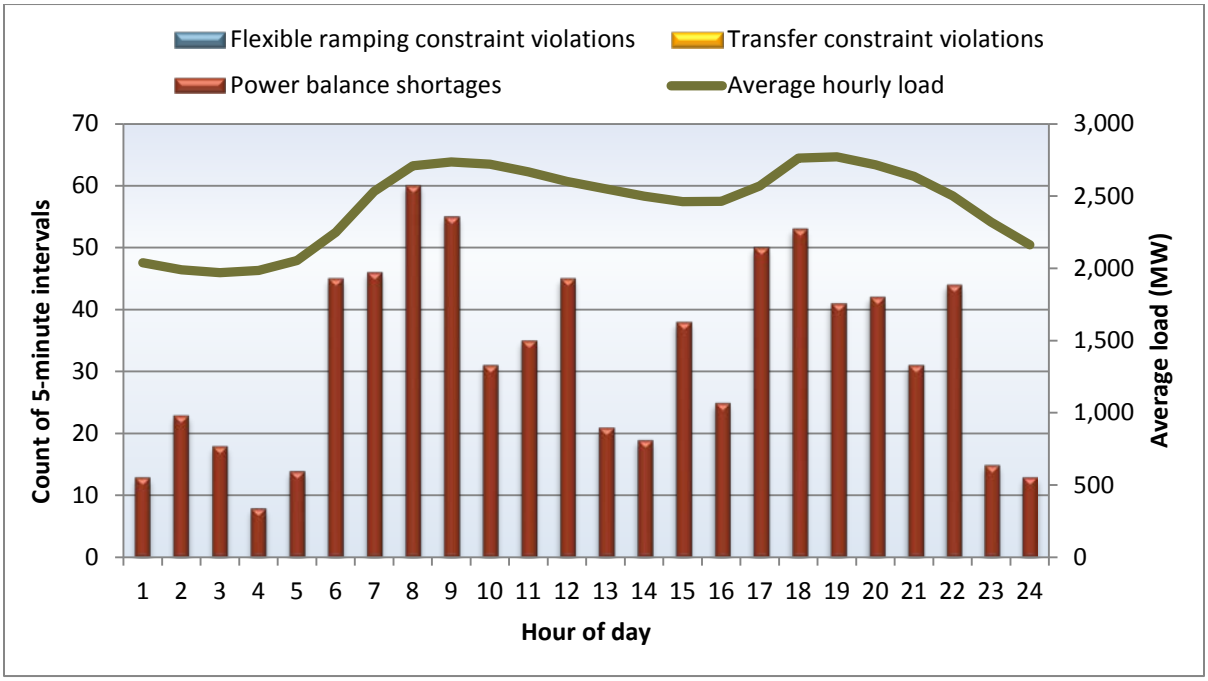


Figure 3.4 Constraint relaxation by operating hour (November 2014)
PacifiCorp West - 5-minute market



The duration of power balance constraint relaxations during shortage conditions in both PacifiCorp areas is significantly longer than in the ISO. Figure 3.5 through Figure 3.8 show the duration of power balance constraint shortage relaxations in PacifiCorp East and West in the 15-minute and 5-minute market. Many power balance constraint relaxations in these areas persist for almost one hour or more. In the ISO, most power balance relaxations persist for only one to three 5-minute intervals. The longer duration of relaxations in the PacifiCorp areas is consistent with the longer timeframe of the impact or time needed for the market system to recover from many of the factors cited in the ISO's December 15 report.

Regardless of whether the power balance constraint is relaxed in the EIM market software, PacifiCorp continues to have responsibility for ensuring reliability in the EIM areas as the EIM entity, which retains all of its responsibilities as a balancing authority area. PacifiCorp has numerous options for ensuring that sufficient supply is available to maintain system reliability.

- As the EIM entity, PacifiCorp can issue manual dispatches to available participating and non-participating generating resources in its balancing authority areas.
- PacifiCorp's merchant organization, which performs delegated balancing functions for the EIM entity, has the option to make intra-hour interchange purchases.
- In addition, PacifiCorp's grid operations group has the option of calling for emergency interchange purchases when needed.
- PacifiCorp also participates in the Northwest Power Pool reserve sharing group. This allows PacifiCorp to obtain reserves from other balancing authority areas directly without delay when qualifying large unit outages occur.
- Finally, to the extent the CAISO's load forecast for PacifiCorp's balancing authority areas is inaccurate resulting in a failed energy balancing test, the correct action for the EIM entity to take is to conform (i.e., adjust) the load rather than take other actions.

PacifiCorp has assured the ISO and stakeholders that it has continued to ensure all reliability requirements are met during all times, including periods of power balance constraint relaxation, through various out-of-market dispatches and purchases.

Figure 3.5 Duration of consecutive power balance constraint relaxations PacifiCorp East - 15-minute market

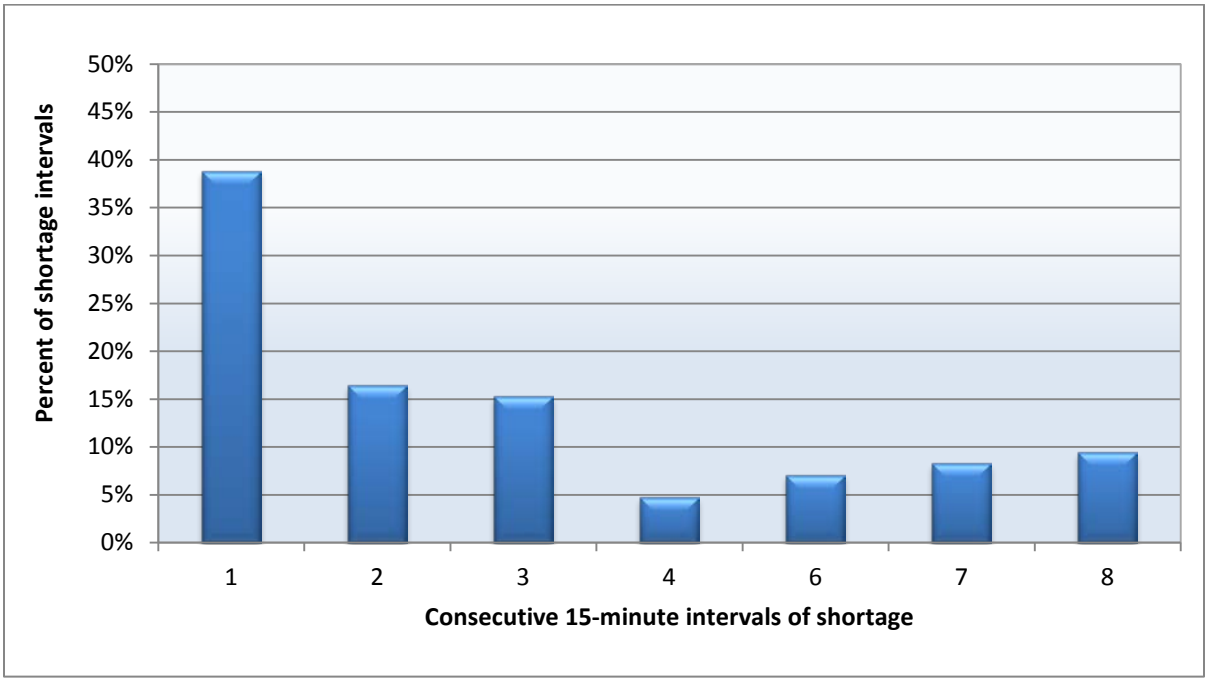


Figure 3.6 Duration of consecutive power balance constraint relaxations PacifiCorp East - 5-minute market

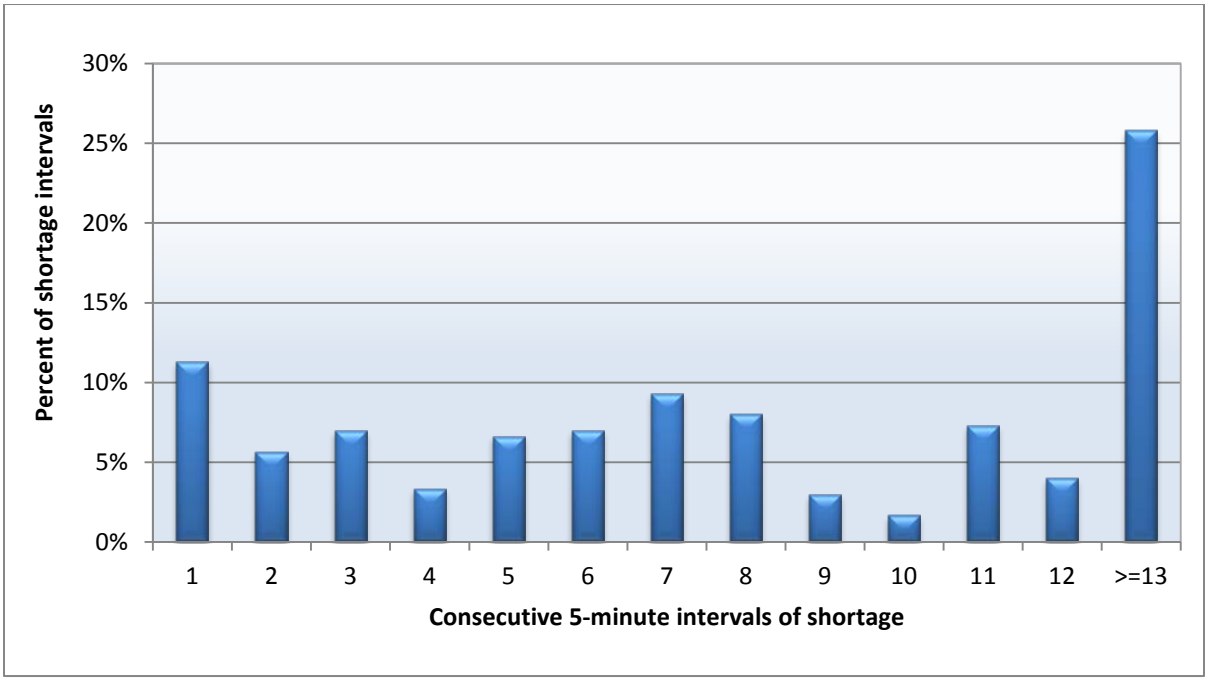


Figure 3.7 Duration of consecutive power balance constraint relaxations PacifiCorp West - 15-minute market

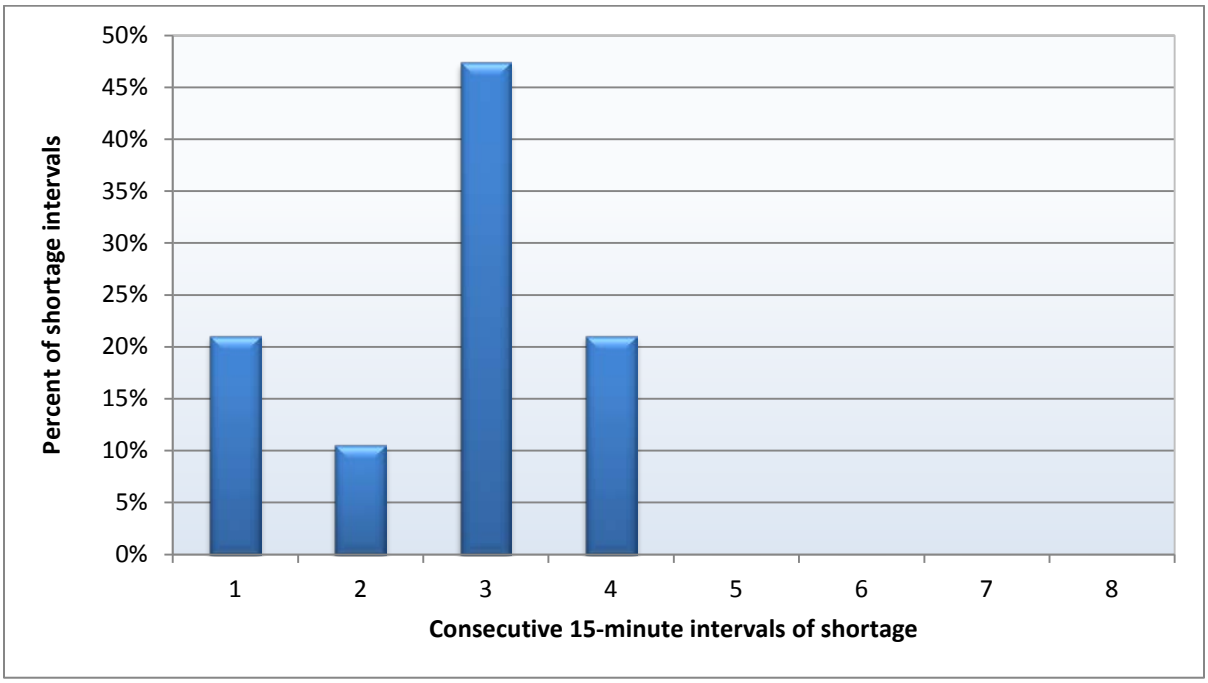
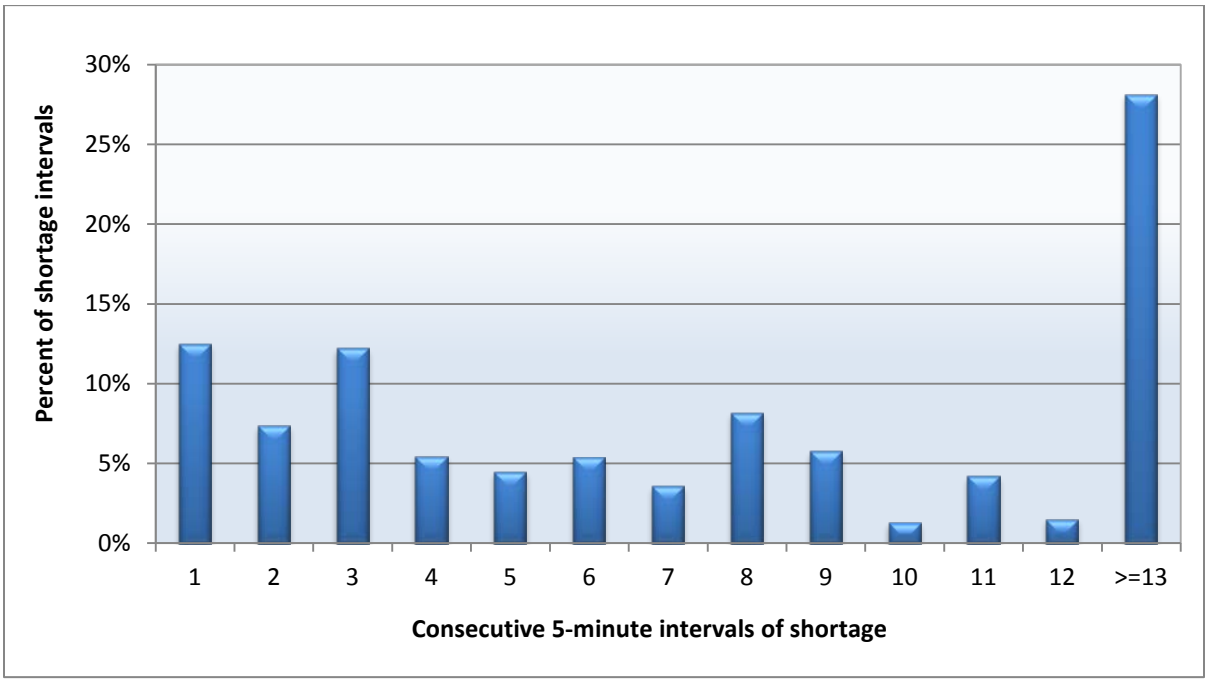


Figure 3.8 Duration of consecutive power balance constraint relaxations PacifiCorp West - 5-minute market



4 Resource schedules, bids and dispatches

This section provides a summary of the amount of capacity being scheduled, bid and dispatched in the EIM. As shown in this section, the amount of capacity bid into the EIM generally exceeds the amount of energy dispatched from EIM resources by a substantial margin. During hours when EIM model constraint relaxations have occurred, the amount of excess available supply bid into the EIM that is available is often extremely low. Other times, model constraint violations have occurred when substantial supply has been offered in the EIM. As explained in the ISO's December 15 report, this can result from the combination of a variety of factors that can cause the amount of supply and demand in the EIM market model to deviate substantially from actual system conditions.

Figure 4.1 and Figure 4.2 show the average amount of capacity scheduled, bid and dispatched in PacifiCorp East and PacifiCorp West in the 15-minute market during November 2014 by operating hour.

- The black lines represents the average of total capacity participating in EIM over the month of November in PacifiCorp East (4,425 MW) and PacifiCorp West (2,164 MW).[12]
- The darker blue area represents the average base schedules for all of the capacity from participating EIM resources by operating hour during November 2014.
- The lighter blue area shows the average amount of capacity above each resource's base schedule that was bid-in and dispatched in the EIM.
- The green area shows DMM's estimate of the amount of undispatched bids available within a 15-minute ramp beyond the level at which units were actually dispatched in the 15-minute market.
- The yellow area shows DMM's estimate of the additional amount of undispatched bids available beyond a 15-minute ramping horizon.

This analysis differentiates the estimated level of bid-in capacity available on a 15-minute horizon (shown in green) from capacity that is bid-in but only available on a longer time-frame (shown in yellow), since much of the capacity shown in yellow may not be available for dispatch in response to many of the factors driving constraint violations in the EIM. For example, the yellow area in Figure 4.1 and Figure 4.2 includes capacity that is bid into the EIM from multi-stage generating units that would only be available if the resource is transitioned to another configuration. The availability of this capacity can often be significantly restricted due to minimum operating times, minimum down times and transition times for different configurations.

These data do not yet include outages reported to the ISO. In most cases, it appears that units known to be on outage prior to the deadline for bid submission are not bid into the EIM. In some cases, however, bids may be submitted for units subsequently subject to outages or outages that may not have been reported to the ISO, so that these data may somewhat overestimate the actual amount of bids available to the EIM market software.

[12] The total capacity participating in EIM in PacifiCorp East and PacifiCorp West during each day in November 2014 is provided in Figure 4.5 and Figure 4.6, respectively.

Figure 4.1 Average schedules, bids and dispatches by operating hour (November)
PacifiCorp East - 15-minute market

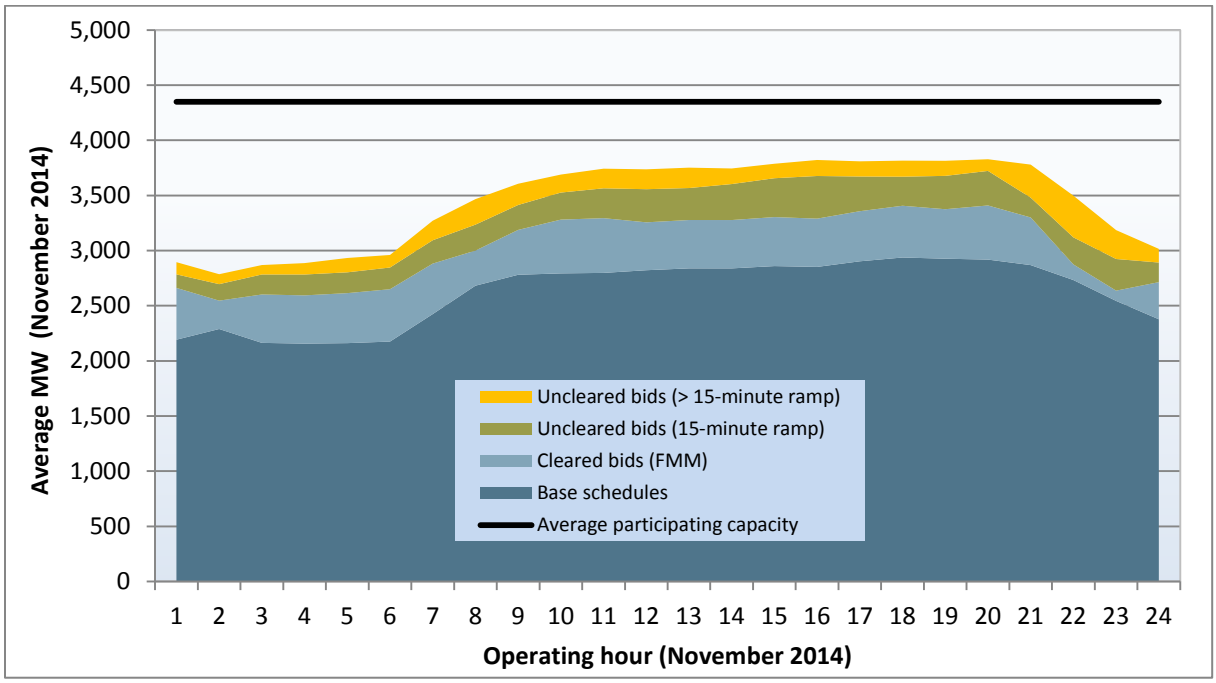


Figure 4.2 Average schedules, bids and dispatches by operating hour (November)
PacifiCorp West - 15-minute market

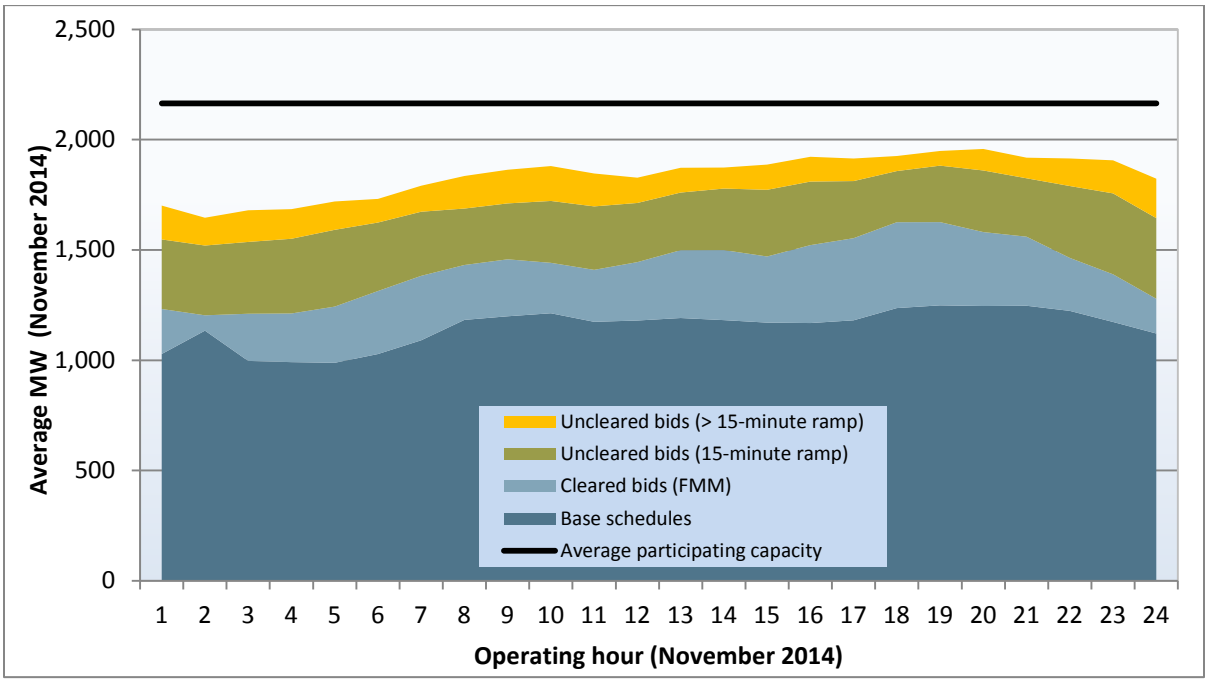


Table 4.1 provides a numerical summary of several metrics derived from the data underlying Figure 4.1 and Figure 4.2. As shown by this analysis, the amount of capacity bid into the EIM generally exceeds the amount of energy dispatched by a substantial margin.

Table 4.1 Summary of average schedules, bids and dispatches for EIM participating capacity (November 2014)

	Percent of capacity scheduled	Percent of capacity scheduled+bid	Percent of bids dispatched	Undispatched bids as percent of total scheduled+cleared MW
PacifiCorp East				
Peak	60%	85%	48%	14%
Off-peak	61%	68%	53%	12%
PacifiCorp West				
Peak	53%	87%	44%	26%
Off-peak	53%	80%	29%	38%

As shown in Table 4.1, in PacifiCorp East:

- An average of about 60 percent of participating capacity is scheduled to operate to meet base schedules during both peak and off-peak hours.
- During peak hours, about 25 percent of participating capacity was also bid into the EIM, so that a total of about 85 percent of participating capacity was scheduled or bid into the EIM. The remaining 15 percent of participating capacity not bid into EIM during these peak hours represents capacity that was on outage or not bid into the market for other reasons.
- During off-peak hours, the total amount of capacity above base schedules bid into the EIM is significantly lower, so that an average of about 68 percent of participating capacity in PacifiCorp East was scheduled or bid into the EIM. During these off-peak hours, some units are cycled off-line during off-peak hours, and are not bid into the market since they are unavailable due to minimum down times.
- On average about half of the capacity bid into the EIM above base schedules was dispatched in the EIM during both peak and off-peak hours. The amount of undispatched bids offered in EIM averaged 14 percent and 12 percent of the total amount of energy scheduled and dispatched in the EIM from participating capacity during peak and off-peak hours, respectively.

As shown in Table 4.1, in PacifiCorp West:

- An average of about 53 percent of participating capacity is scheduled to operate to meet base schedules during both peak and off-peak hours.

- During peak hours, an average of about 35 percent of participating capacity was also bid into the EIM, so that a total of about 87 percent of participating capacity was scheduled or bid into the EIM on average.

- During off-peak hours, the amount of participating capacity scheduled or bid into the EIM averaged about 80 percent.

- On average about 44 percent of the capacity bid into the EIM above base schedules was dispatched in the EIM during both peak hours, with an average of about 29 percent being dispatched during off-peak hours.

- The amount of undispatched bids offered in PacifiCorp West averaged 26 percent and 38 percent of the total amount of energy scheduled and dispatched from capacity participating in EIM during peak and off-peak hours, respectively.

Although the amount of capacity bid into the EIM generally exceeds the amount of energy dispatched from EIM resources by a substantial margin, as explained in the ISO's December 15 report, a variety of factors can cause the amount of supply and demand in the EIM market model to deviate substantially from actual system conditions. For instance, imbalance energy requirements can be overestimated due to load biasing, forecast errors, and failure to cancel unit outages or report out-of-market dispatches. Imbalance energy supply from EIM resources can be limited by sudden unit outages, scheduling errors and unit limitations entered in the EIM market systems.

As noted above, one metric developed by DMM to assess supply conditions in the EIM is the estimated level of bid-in capacity available on a 15-minute horizon. Figure 4.3 and Figure 4.4 provide histograms summarizing DMM's estimate of the amount of undispatched 15-minute ramping capacity bid into the market that DMM estimates remained during different intervals (blue bars). These figures also show the percentage of power balance violations and flexible ramping constraint violations that occurred when different levels of undispatched bids were available within the next 15 minutes in the EIM market.

As illustrated in Figure 4.3 and Figure 4.4, during intervals when violations of EIM model constraints have occurred, the amount of excess available supply bid into the EIM available on a 15-minute horizon is often extremely low. Other times, model constraint violations have occurred when substantial supply appears to have been offered in the EIM. This can result from the combination of a variety of factors which can cause the amount of supply and demand in the EIM market model to deviate substantially from actual system conditions, as explained in the ISO's December 15 report.

The ISO's December 15 report also notes that the ISO and PacifiCorp are taking steps to increase the total capacity participating in the EIM, as well as the amount of this capacity that is available to be dispatched up by the EIM software on a short time frame. Figure 4.5 and Figure 4.6 show how the amount of capacity participating in EIM increased over the month of November, along with several statistical measures of the amount of bids available within 15 minutes during each 15-minute interval of each day over this period (average, 5^{th} lowest percentile, and minimum).

As shown in Figure 4.5, within PacifiCorp East:

- The capacity of resources participating in EIM increased from 3,727 MW to 4,729 MW during November.

- The average amount of bids available within 15 minutes trended upward over this time period.

Figure 4.3 Undispatched 15-minute ramping capacity during intervals with constraint violations PacifiCorp East - 15-minute market

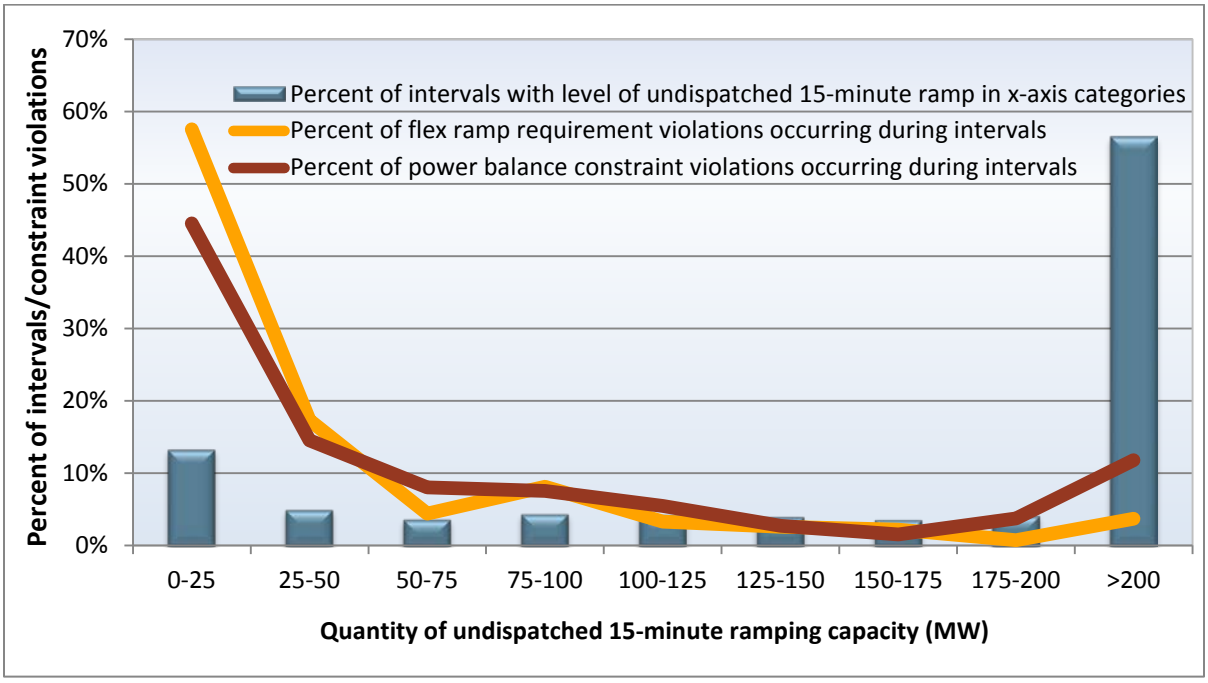


Figure 4.4 Undispatched 15-minute ramping capacity during intervals with constraint violations PacifiCorp West - 15-minute market

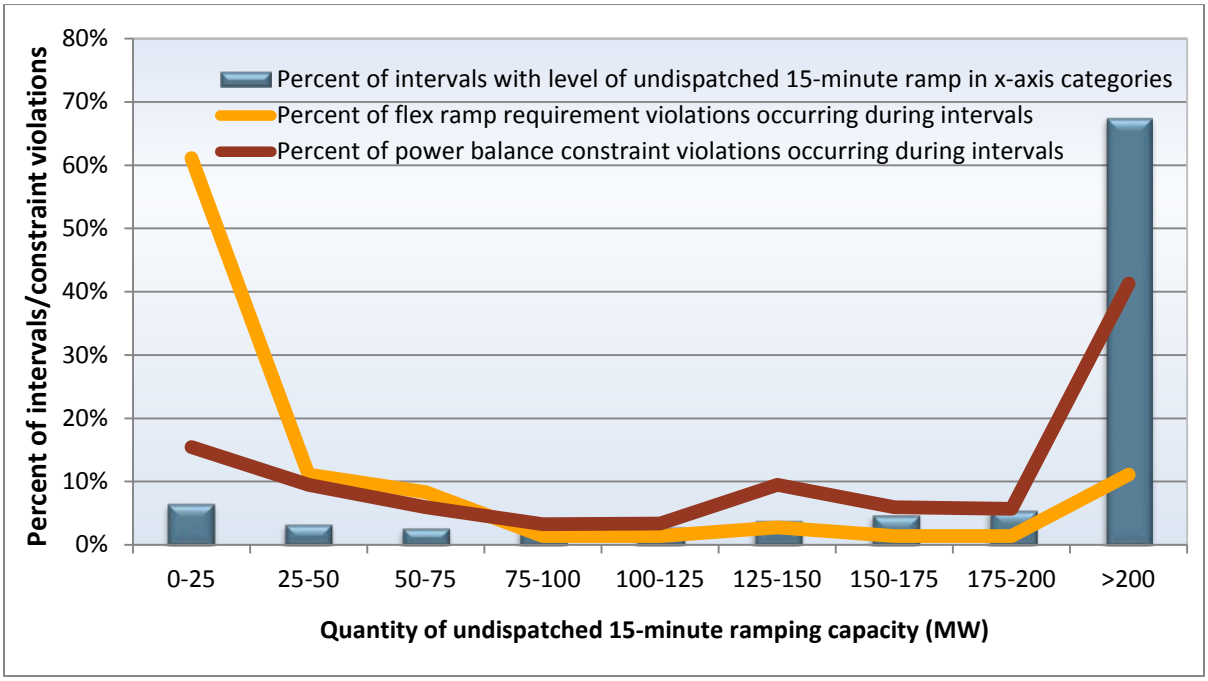


Figure 4.5 Undispatched bids from participating capacity available within 15-minute ramp PacifiCorp East - November 2014

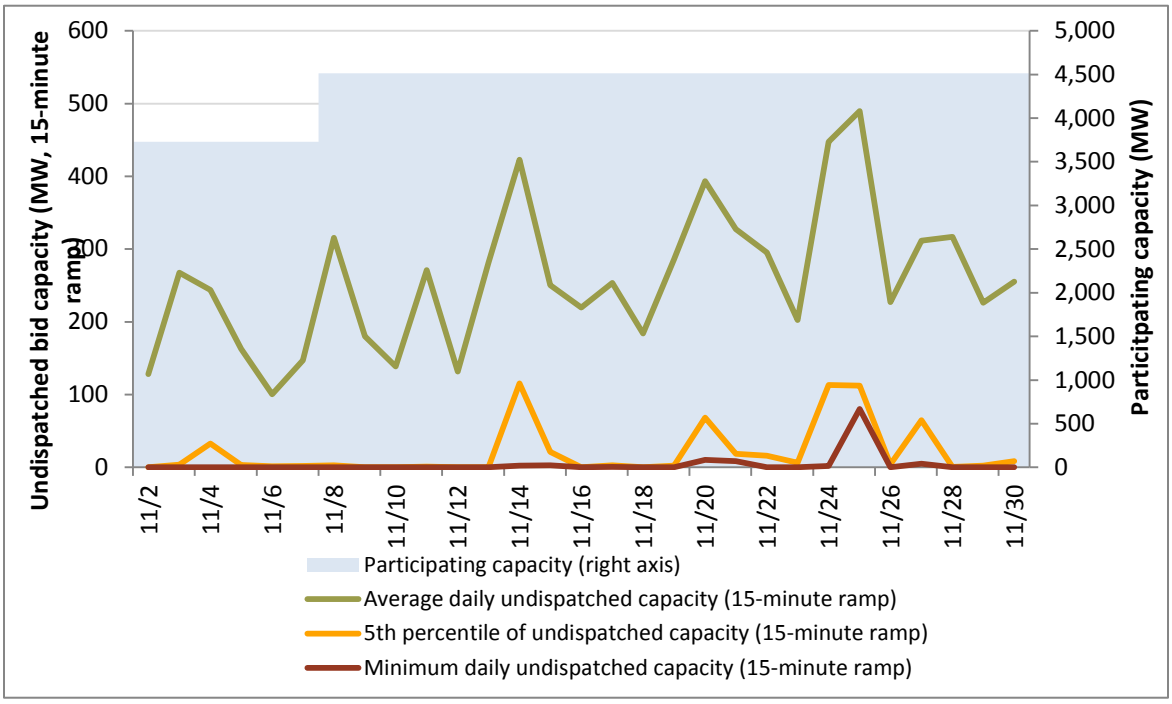
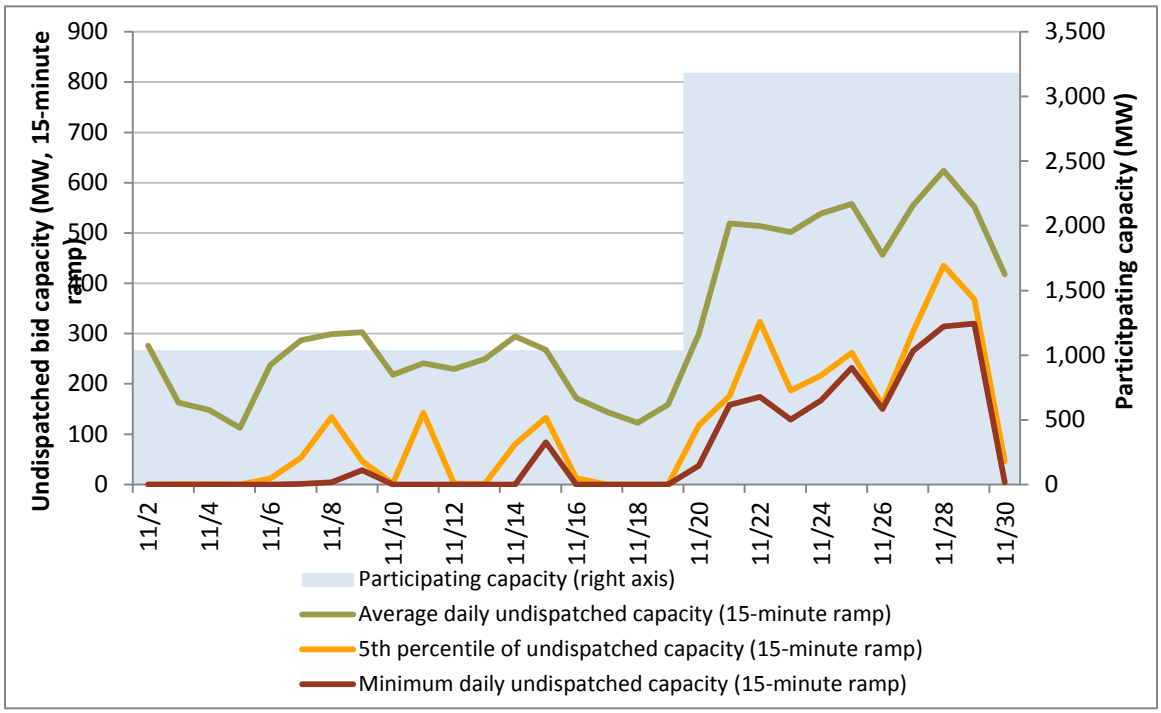


Figure 4.6 Undispatched bids from participating capacity available within 15-minute ramp PacifiCorp West - November 2014



As shown inFigure 4.6, within PacifiCorp West:

- The capacity of resources participating in EIM increased from 1,038 MW to 3,171 MW during November.
- The average amount of bids available within 15 minutes increased significantly as about 2,100 MW of additional resources began participating in the EIM in the third week of November.
- Following the addition of this additional capacity, the minimum amount of undispatched bids available within 15 minutes has not dropped below a range of 100 MW to 200 MW.

5 Market bidding and mitigation

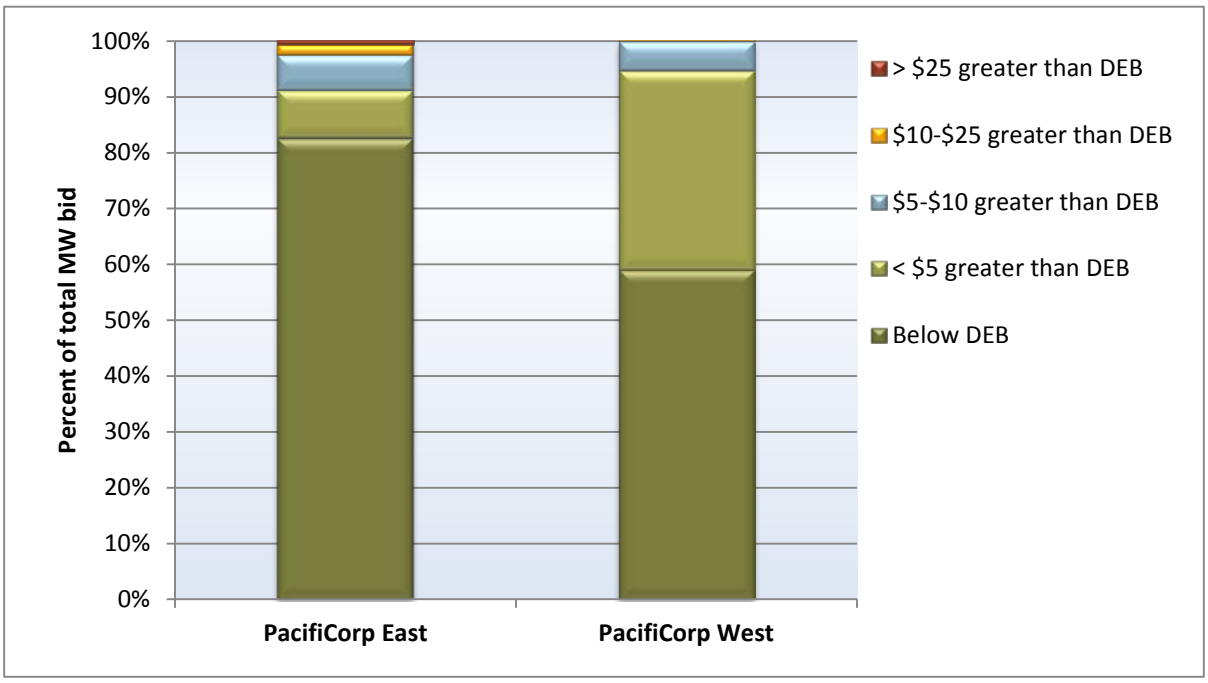
Bidding in the EIM has been highly competitive, with bids for most capacity slightly below or above default energy bids (DEBs) used in market power mitigation. Thus, when relatively high EIM prices have occurred, these prices reflect penalty prices for software constraints rather than bid prices. In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

Figure 5.1 summarizes a comparison of bid prices in PacifiCorp East and PacifiCorp West for thermal and hydro units compared to default energy bids used in market power mitigation. 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.

In PacifiCorp East, about 59 percent of bids have been lower than the default energy bids, with another 36 percent of bids being not more than $5/MW above default energy bids. The remaining percent of bids have been no more than $10/MW above default energy bids.

In PacifiCorp West, about 83 percent of bids have been lower than the default energy bids, with another 9 percent of bids being not more than $5/MW above default energy bids. Only about 1 percent of bids have exceeded default energy bids by $25/MW or more.

Figure 5.1 Comparison of market bids compared to default energy bids (November 2014)



CERTIFICATE OF SERVICE

I hereby certify that I have served the foregoing document upon the parties listed on the official service list in the captioned proceedings, in accordance with the requirements of Rule 2010 of the Commission's Rules of Practice and Procedure (18 C.F.R. § 385.2010).

Dated at Folsom, California this 18th day of December, 2014.

/s/ Sarah Garcia

Sarah Garcia