December 15, 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___
Informational Report – Performance of Energy Imbalance Market

Dear Secretary Bose:

The California Independent System Operator Corporation (CAISO) hereby submits its December 15 report on the performance of the Energy Imbalance Market for November 1 – November 30, 2014.[1]

The CAISO also respectfully requests a modest extension of no more than seven days after the date of this submission to allow the Department of Market Monitoring additional time to review the CAISO's report and provide its independent assessment. The Commission directed the Department of Market Monitoring to submit independent assessments on the causes and solutions identified by CAISO. Because this first reporting requirement came so quickly after the issuance of the Commission's order, the Department of Market Monitoring requires some additional days to fully review and evaluate the CAISO's report and provide an independent assessment.

Please contact the undersigned with any questions.

Respectfully submitted,

By: */s/ Anna A. McKenna*
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[1] The CAISO submits this report pursuant to *California Independent System Operator Corp.*, 149 FERC ¶ 61,194 (2014).

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Energy Imbalance Market Pricing Waiver Report November 1 - 30, 2014

December 15, 2014

ISO Market Quality and Renewable Integration

I. Introduction

On December 1, 2014, FERC granted the California Independent System Operator Corporation's (CAISO) petition for limited waiver of the pricing parameters in sections 27.4.3.2 and 27.4.3.4 of its tariff for 90 days, as they pertain to the Energy Imbalance Market, effective November 14, 2014, as requested.[1] In addition, FERC directed CAISO to submit informational reports as further described herein. The CAISO will be submitting on a monthly basis the requested reports in Attachments A through E, including reports provided by the CAISO's Department of Market Monitoring and PacifiCorp. This report covers the CAISO's reporting requirements for the time period covering November 1 through November 30, 2014.

For this first report, the CAISO is requesting a modest extension to allow it to submit the Department of Market Monitoring's report within seven days of December 15, 2014. The Commission directed the Department of Market Monitoring to submit independent assessments on the causes and solutions identified by CAISO. Because this first reporting requirement came so quickly after the issuance of the Commission's order, the Department of Market Monitoring requires some additional days to fully review and evaluate the CAISO's report and provide an independent assessment.

II. Background

On November 1, 2014, the CAISO fully activated the Energy Imbalance Market (EIM). The Energy Imbalance Market allows balancing authorities outside of the CAISO balancing authority area to voluntarily take part in the imbalance energy portion of the CAISO locational marginal price-based real-time market. PacifiCorp, the CAISO, and market participants participated in market simulations prior to the start of the Energy Imbalance Market on November 1, including parallel production from October 1 to November 1. However, shortly after go live the CAISO began observing challenges that led to artificially high prices in cases where the market application had to resort to the relaxation of transmission constraints or the power balance constraint in order to clear the market.

On November 13, 2014, the CAISO sought a 90-day waiver of the applicability of section 27.4.3.3 and the second sentence of section 27.4.3.4 of its tariff to permit CAISO to address, without suspending the Energy Imbalance Market, those circumstances produced atypically high prices. Those two sections of the tariff provide that when there is a lack of economic bids to clear the fifteen-minute and five-minute markets, the

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

CAISO's market application will price the shortages (and therefore set locational marginal prices) according to the pricing parameters specified in those sections. Specifically, for the purpose of determining how a transmission constraint or system-energy balance constraint will affect the determination of prices in the market, the pricing parameter for the relaxation of the constraint is $1,000/MWh (the maximum energy bid price specified in tariff section 39.6.1.1).

The waiver addresses three sets of transitional conditions in the Energy Imbalance Market that together have caused the transmission and system energy-balance constraints described in tariff sections 27.4.3.2 and 27.4.3.4 to bind more frequently than expected in the weeks since the Energy Imbalance Market began operation on November 1, causing prices in these intervals to be set by the $1,000/MWh bid cap. Because of these transitional conditions, the high prices are not always indicative of actual physical conditions on the system, and reflect challenges in providing timely and complete data to ensure system visibility under the new procedures, exacerbated by limitations on the resources available to PacifiCorp for use in the Energy Imbalance Market and several forced outages of large Energy Imbalance Market participating resources. The CAISO described[2] the transitional conditions that led to the waiver in its petition filed on November 13, 2014, as follows:

1) All possible operational conditions, including interactions between disturbance events and other conditions on the system, were not fully represented, simulated and tested during these earlier market simulations. It was not until actual operations that these circumstances were experienced and the resulting price excursions became apparent. In some cases data issues arise because of errors made in processing such information, and in such intervals the CAISO will have authority to correct prices. But it in some cases, the pricing excursions may be due to the need to adopt better practices generally and not because of an erroneous data processing issue.

2) Limitations on the resources available to PacifiCorp for use in the Energy Imbalance Market. Several resources had not yet received the necessary metering upgrades due to various outage schedule limitations, which has prevented PacifiCorp from making these resources available in the initial pool of resources participating in the Energy Imbalance Market. The CAISO is processing temporary metering exemptions in accordance with its requirements and participation by some additional resources has improved conditions, but other considerations remain. For instance, some resources are subject to multiple ownership rights and have contractual issues that

[2] *See Petition For Limited Tariff Waiver And Request For Expedited Consideration*, California Independent System Operator Corp., filed November 13, 2014, FERC Docket No. ER15-402.

must be resolved to enable their participation in the Energy Imbalance Market. Additionally, third-party resources in PacifiCorp's balancing authority areas have not yet begun participating in the Energy Imbalance Market, which further limits the pool of available resources.

3) The PacifiCorp East and PacifiCorp West balancing authority areas experienced several forced outages of large Energy Imbalance Market participating resources, which led to short term supply deficiencies in the market. While outages are not necessarily uncommon, these outages quickly exacerbated an already tight supply and contributed to price increases in the associated intervals. In addition, while PacifiCorp operations accounted for the outages by responding to system conditions, these actions have not always been communicated in a timely manner to the market. Without such information, the market results would not necessarily reflect physical conditions on PacifiCorp's system. The addition of more participating resources and enhanced operational procedures should mitigate the impact of such outages.

On December 1, 2014, FERC granted the CAISO its waiver request and also directed monthly reports to FERC on the progress of the issues that led to the need for the waiver. The CAISO provides its reports consistent with the order below and in the attachments to this report.

III. Reports

In the December 1 Order, the Commission directed the CAISO to file detailed informational reports on the performance of Energy Imbalance Market at 30-day intervals during the 90-day waiver period. Consistent with the order, this first of such reports is filed 30 days from the effective date of the tariff waiver, December 15, 2014. The Commission stated that these reports should provide detailed supporting data demonstrating progress towards identifying and eliminating the problems giving rise to the waiver petition. Consistent with the December 1 order, the following reports are included in Attachments A through E as follows:

Attachment A: A quantitative and qualitative description of the market performance (covering both progress and remaining concerns) related to the issues that prompted the CAISO's waiver request that are within the CAISO's control. Includes a description of, and status update regarding, measures being taken or planned to be taken to identify and address the market performance problems related to the issues that prompted the CAISO's waiver request. Identifies any remaining deficiencies in CAISO and PacifiCorp processes, procedures, and tools and any additional market issues

related to these pricing concerns that the CAISO considers necessary to sustain stable market operations, along with the CAISO's plan to address such issues.

Attachment B: A quantitative and qualitative description of the market performance (covering both progress and remaining concerns) related to the issues that prompted the CAISO's waiver request that are within PacifiCorp's control. This section includes a description of, and status update regarding, measures being taken or planned to be taken to identify and address the market performance problems related to the issues that prompted the CAISO's waiver request.

Attachment C: Independent assessments from the Department of Market Monitoring on the causes and solutions identified by the CAISO. For this first report, this will be submitted within seven days of the CAISO's first submission.

Attachment D: An exploration of impacts, if any, on non-EIM pricing nodes, including the Mona trading node. Report on whether EIM pricing is adversely impacting non-EIM pricing nodes. The extent to which non-EIM pricing nodes such as the Mona trading node are impacted by EIM pricing within the PacifiCorp Balancing Authority Areas. Identify any such impacts and describe any actions the CAISO is taking or plans to take to address such impacts.

Attachment E: Description of each relaxation event, and a summary of the magnitude and frequency of such events overall. Data on instances where the $1,000/MWh price would have occurred but for this waiver, including the time of the instance, the duration, the cause, and the affected node(s) and load aggregation points.

ATTACHMENT A

Quantitative and qualitative descriptions of market performance related to the issues that prompted the CAISO's waiver request - CAISO.

This attachment includes quantitative and qualitative information for three reporting requirements specified in the Commission's December 1 order. First, section 1 and section 2 provide a quantitative and qualitative description of the market performance (covering both progress and remaining concerns) related to the issues that prompted the CAISO's waiver request that are within the CAISO's control. Second, the tables in section 2 of this attachment provide a descriptions of, and status update regarding, measures being taken or planned to be taken to identify and address the market performance related to the issues that prompted the CAISO's waiver request. Finally, the tables in section 2 of this attachment also report on the measures taken and planned to address the market performance problems, which also identify any remaining deficiencies in processes, procedures, and tools and any additional market issues related to these pricing concerns that the CAISO considers necessary to sustain stable market operations, along with the CAISO's plan to address such issues.[3]

1. Analysis of Impact on Market Performance

In this section the CAISO provides a quantitative and qualitative analysis of the market performance impact of the issues that prompted the CAISO's request for a waiver. Figure 3 and Figure 4 provide daily average price trends in the Energy Imbalance Market organized by market and area. These daily averages reflect all prices in the real-time market, including the price corrected through the price correction process. From November 14 through November 30 the price adjustments pursuant to the waiver are implemented retroactively after the December 1 order was issued. The CAISO has commenced but not completed these retroactive adjustments, which means that prices for this time period may change.

[3] *December 1 Order* at P 25.

Figure 1: Daily average of fifteen-minute market prices in PAC West and PAC East.

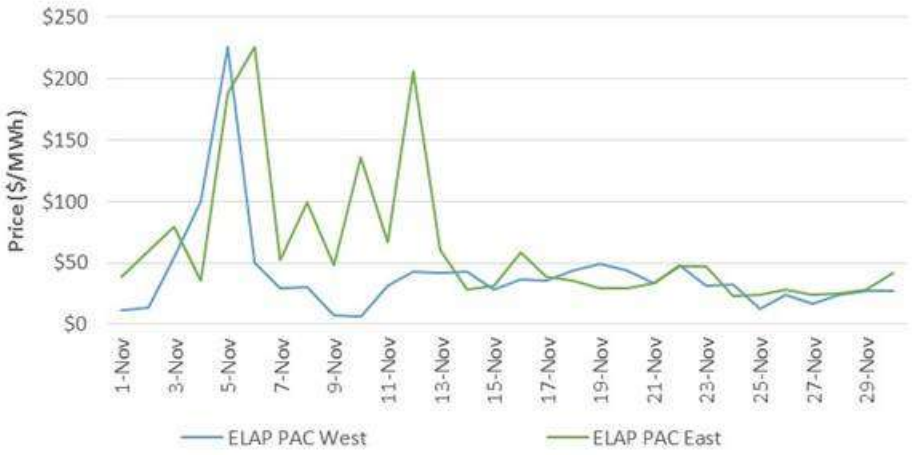


Figure 2: Daily average of five-minute market prices in PAC West and PAC East.

Figure 3 thru 6 report on all market intervals in which the CAISO experienced price excursions, counted by fifteen or five minute market intervals. The data includes pricing for both the PacifiCorp (PAC) West and PacifiCorp East load aggregation points (ELAPs). A fifteen or five minute market interval is counted once if the ELAP price of PAC West area or PAC East area, or both areas exceed $500. The data excludes any price excursions that were already subject to price corrections. Section 35.4 of the CAISO tariff already provides the CAISO authority to correct prices if it detects an invalid market solution or prices due to issues such as data input failure, occurrence of hardware or software failure, or a result that is inconsistent with the CAISO tariff. The CAISO has now completed all the price corrections authorized under its existing tariff authority for the month of November. As described above, the factors that led to the need of the waiver fall outside of the scope of this authority and therefore, this report

only focuses on those intervals that would have been left unadjusted but for the waiver. The report focuses on the ELAP prices because these aggregate prices are representative of pricing in each area -- PAC West and PAC East-- and would reflect short-term imbalance shortage for the aggregate area.

Figures 3 and 4 provide the daily frequency of price excursions in the fifteen- and five-minute markets. For the period of November 1 through November 13, prices were validated through the CAISO's tariff price validation and correction process authority and stand final. For the period of November 14 through November 30 prices are being adjusted per the tariff waiver of this report. This provides a perspective of the final prices that stand unchanged and the volume of prices that may be still adjusted after the December 1 tariff waiver.

Figure 3: Frequency of intervals with ELAP prices exceeding $500 in the fifteen-minute market. PAC West and PAC East.

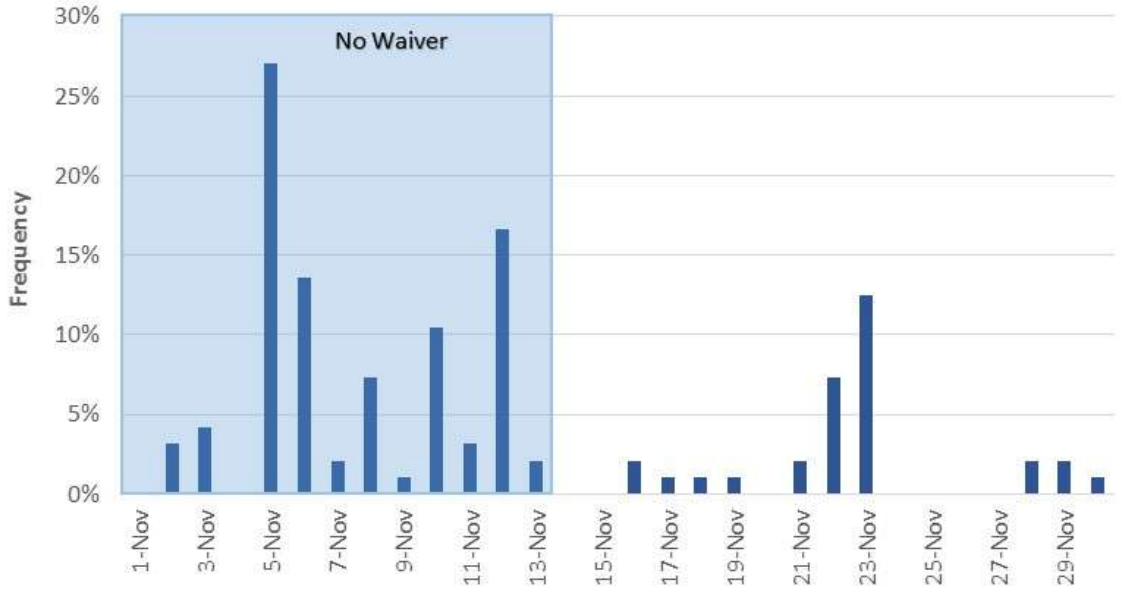


Figure 4: Frequency of intervals with ELAP prices exceeding $500 in the five-minute market. PAC West and PAC East.

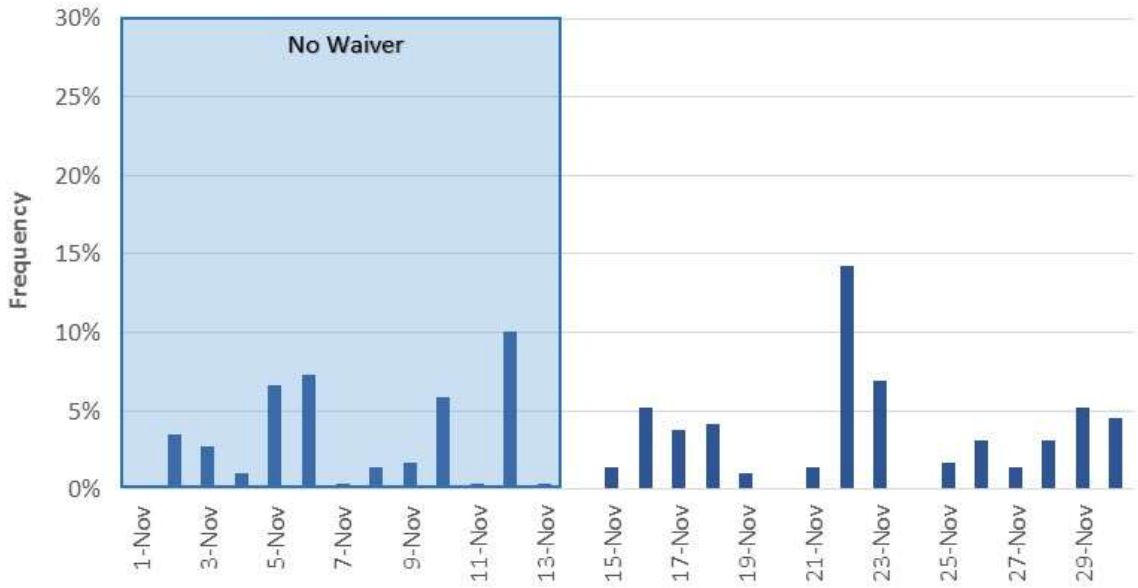


Figure 5 and Figure 6 show the frequency of price excursions for both the fifteen and five-minute market, including the cause for the excursions. In any given market interval, more than one of the illustrated reason may have contributed to the price excursion because there are numerous elements that can impact the market outcome. For example, a given market interval may experience a price excursion due to data alignment, manual dispatches and load changes. For the purpose this report, the CAISO has reviewed each affected market interval and has assigned the interval to a reason category that most afflicted the interval. The categories used in the figures in this section 1, include:

1. *Renewable deviations* for conditions in which wind changes lead to the loss of capacity and for the need to increase generation from other resources.
2. *Load changes* refer to conditions where either the load forecast is adjusted or there is a change in the load bias.
3. *Import/Export changes* is for adjustments and updates to imports and exports as seen by the market.
4. *Resource outage* is for conditions in which an outage results in the loss of capacity available to the market, and for which the market needs to increase generation from other resources. Similar conditions apply for manual dispatches leading to a reduction of available capacity to the market.
5. *Resource data alignment* is for any other condition not captured in the previous five categories. This group accounts for resource deviating from

their dispatch, differences between base schedules and bids or dispatches, and changes between markets.

Figure 5: Reasons for intervals with ELAP prices exceeding $500 in the fifteen-minute market. PAC West and PAC East.

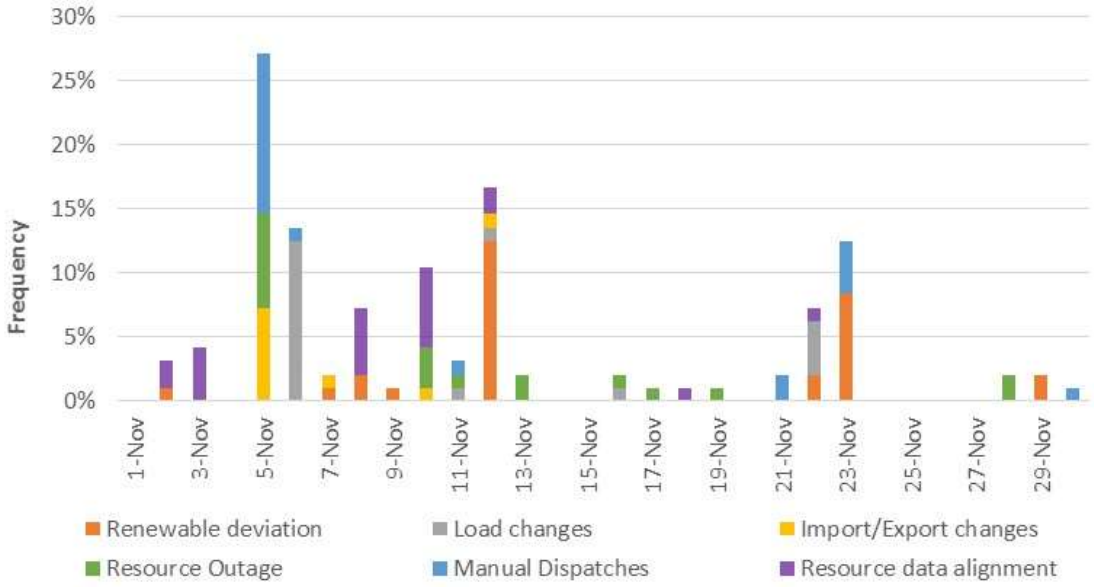
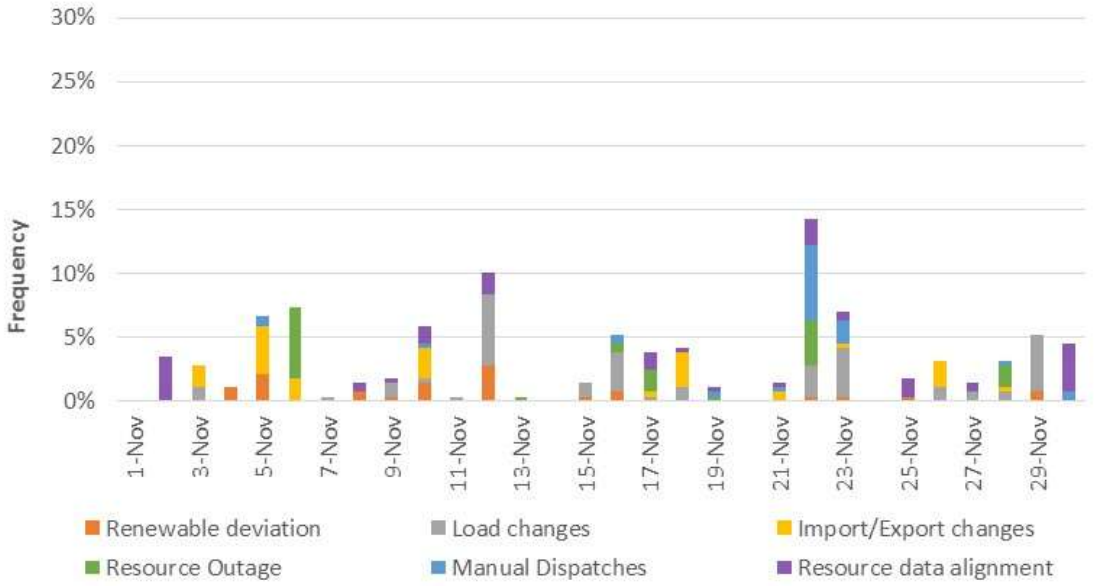


Figure 6: Reasons of ELAP Prices exceeding $500 in the five-minute market. PAC West and PAC East.



The categories used in Figures 5 and 6 are related but not exactly the same as the broader descriptions provided in the tables in section 2 below. In some cases, the descriptions provided in the tables below will create conditions leading to the manifestation of price excursions. For example, in category 1 below includes the issue of timely manner of entering and cancelling outages. This issue also falls in the category of resource data alignment shown in Figure 5 and Figure 6. The descriptions in the tables below link each issue to the relevant category of reasons above to more specifically define the categories of reasons that prompted the need for the December 1 Order tariff waiver.

2. Issues prompting waiver, remedial actions taken, status and outstanding items

Category 1: Outages, derates/rerates management

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Timely entering and cancelling of outages in the market	When resources experience full or partial forced outages, the market must be informed in a timely manner of the outage event and the corresponding measures taken to compensate for the lost megawatt capacity. Delay in informing the market application causes the market application to detect capacity shortages not covered by the unloaded capacity from participating resources. Under such conditions, prompt EIM Entity manual dispatch instructions are needed to increase the generation of available non-participating resources to create room for participating resources to be marginal and to economically set price. When the EIM Entity cancels an outage in a timely manner, it is also important to inform the market that the capacity is available and can be used to clear the Energy Imbalance Market, otherwise the market will perceive that there is capacity shortage to meet the load.	The CAISO provided additional training to the EIM Entity to correct processes and procedures for understanding when and what information is to be correctly entered and canceled in the Outage Management System. The training was provided through verbal and written instructions and guidelines, and clarifications to procedures. Significant progress has been made in the last 30 days. The CAISO continues to monitor and analyze for the timeliness of response to inform the market about any out-of-market manual actions that are taken or are planned to be taken.	This issue may result in instances counted in Figure 5 and 6 as Resource data alignment and Resource outages. As illustrated in those figures, these causal categories have decreased in frequency over time.

2. Base schedule and Bid submission for resources undergoing outages	The timing in which the EIM Entity reports the outage is very important. If the outage occurred before T-75 (*i.e.*, seventy five minutes before the operating hour) and is expected to last during the operating hour T, then both the economic bid and base schedule submission should be adjusted to account for the outage. Otherwise, the assumptions and data used by the market application for the balance test and look-ahead fifteen-minute market are not consistent with real system conditions, which results in less capacity available to the Energy Imbalance Market than what was computed before the start of the operating hour, and high prices are imminent due to limited unloaded economic capacity that is offered in the market.	The CAISO provided the EIM Entity additional market operator training, discussions, clarifications to guide the EIM Entity to follow best practices, and procedures for actions that must be taken depending on the timeframe of the outage: before T-75', before T-40', and after T-40'. The CAISO has provided more information about derates and outages and by enhancing the EIM Entity user interface displays to include greater awareness of the effective resource limits and any disqualified capacity due to derates or full outages. Significant progress has been made in the last 30 days. The CAISO continues to monitor and analyze for timely responses to inform the market about any out-of-market manual actions that are taken or are planned to be taken by the EIM Entity.	This issue may result in instances counted in Figure 5 and 6 as Resource data alignment and Resource outages.
3. Outages of partial or full multi-stage generating resource configurations	Multi-stage generating resources have multiple configurations that must be carefully managed in the real-time market. The configuration characteristics are registered in the master file and are	The CAISO provided the EIM Entity additional training on data modeling and base scheduling and definition of multi-stage generating resource parameters.	This issue may result in instances counted in Figure 5 and 6 as Resource data alignment and Resource outages

	observed and honored by the market application. These include physical registered characteristics such as transition time, minimum up time, and minimum down time and minimum load (Pmin) and maximum output (Pmax) megawatts (MWs) as well as any overlapping MW regions between configurations. If a configuration is out of service, a timely input of the outage is needed to inform the market that the corresponding economic bid or base schedule is not available and another configuration should be used. If the information is not promptly entered or bids don't exist on other configurations then the market has no way to move the resource to other configurations and the whole MW of the plant is lost in the market and price excursions will occur.	The CAISO has seen a lot of improvement in this area but due to the complexity of multi-stage generating resource data modeling there is still room for improvement.	

Category 2: Manual Dispatch

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Timely input of manual dispatch	Since many units are not participating in the market, manual dispatch and other out-of-market actions taken on these units must be recorded by the EIM Entity in the market to inform the market about the availability of these resources and their	The manual dispatch is entered directly in the market tool by the EIM Entity and any software limitations were discussed and explained in detail by the market operator. A review of the process	This issue may result in instances counted in Figure 5 and 6 as Resource data alignment and Manual Dispatches

	movements to respond to events like contingency or outages of other units. Without this timely information, the market can only assume that the participating resources will respond to these various events, which will result in depleting the unloaded capacity of the participating resources and their capability to set economic prices.	and the interaction between the EIM Entity and the EIM Participating Resource Scheduling Coordinator that represents PacifiCorp Energy was conducted to explain and clarify the role of each group in this process and how to achieve a coordinated and timely response.	
2. Flexible ramping sufficiency test	The CAISO performs the flexible ramping sufficiency test on the base schedules, the last test being at 40 minutes before the start of each operating hour. When the EIM Entity fails the test based on the economic bid-in capacity that is being offered to the market, the market application will constrain the failed balancing area and limit it from increasing its import from other balancing areas to prevent the leaning concern. This means that the failed balancing area enters the operating hour depending on its resources and any additional manual changes to available non-participating resources set points or purchases of interchanges within the hour. Any delay in performing the manual dispatches or the additional interchange purchases leaves the market exposed for price excursions due to insufficient bid-in flex capacity.	The CAISO has discussed this issue with the EIM Entity and has clarified the market impact. The CAISO also is considering whether it is necessary to make available a user interface display of the results of the flexible ramping sufficiency test to the balancing group of PacifiCorp similar to the display/report available to grid operation.	This issue may reduce the flexibility of the market to absorb system condition changes and data updates and, consequently, leave the market more susceptible to price excursions by any of the reasons provided in Figures 5 and 6.

Category 3: Wind forecast accuracy

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Accuracy of PacifiCorp wind resources forecast	The variable energy resource (VER) forecast, which is mainly wind forecast for the PacifiCorp balancing authority areas, is crucial because it sets the maximum economic megawatt range that the market is allowed to dispatch these resources. The accuracy of the short term VER forecast benefits immensely from the accurate telemetry of the output of the VER resources. The forecast of the wind resources was deviating significantly from the output of the resources even for the next 5-min forecast over a period of many days. This resulted in significant deviations in calculated energy imbalance and sometimes resulted in overgeneration, or undergeneration conditions compared to the hourly base schedule values of these wind resources for the corresponding operating hour. Lastly, in cases where wind resources are participating and being dispatched, the short-term forecast, which is a persistent forecast, may not be accounting for the dispatch instruction.	The CAISO provided an additional unit deviation display as part of the EIM Entity user interface. This display provides the grid operator information in a fast and flexible manner with respect to any differences between any combination of telemetry, state estimation, base schedule, and cleared target operating points. This display helped not only to quickly identify which wind resource is deviating but also the amount of deviation per resource and on aggregate basis per balancing area. PacifiCorp is diligently working with its wind forecast service provider to enhance the forecast quality of the wind resources megawatt output and accounting for participating wind resources that are dispatched based on submitted bids.	This issue may result in instances counted in Figure 5 and 6 as Renewable deviation

Category 4: Interchange schedule variation

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Interchange information within the hour	Interchange information is an essential part of meeting energy imbalance for each balancing authority area. Considering the forward look-ahead time horizon of the fifteen-minute market for almost two hours, and one hour for the five-minute real-time dispatch market, timely information about the interchange schedules is essential. The delay to inform the market application about these interchanges during resources outage times or steep load ramping conditions tightens the market conditions, leading to fake price excursions that sometimes show in the financially binding fifteen-min market interval which is calculated 37.5 minutes ahead of time before the T-20 minutes cut off time for the tags to be submitted and approved for any extra or within the hour interchanges.	Review of the fifteen-minute and five-minute market timelines, and impact of lack of market information about any planned purchase or sale of interchanges before or within the hour was discussed with the EIM Entity, and the pricing impact was clarified. Information was incorporated in business procedures that are used to train PacifiCorp personnel. The CAISO also discussed with the EIM Entity the need to submit planned interchange base schedules for multiple hours in the horizon to provide the short term unit commitment, which has a four and half hours look-ahead horizon, with good projection of the forward hours to enable good market decisions.	This issue may result in instances counted in Figure 5 and 6 as Import/Export changes

Category 5: Load forecast variation

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Load forecast biasing	EIM Entity grid operators have the capability to bias the load forecast for reliability purposes to account for any non-modeled issues causing discrepancy between forecast load and actual load. The setting of the bias is somewhat subjective based on the grid operator's judgment of system operational and reliability needs. This biasing if not done in a coordinated fashion with market operations can create price excursions especially when there is limited flexible ramp capacity available to accommodate small marginal overshoot or undershoot of the bias values. Due to the limited pool of participating resources, the PacifiCorp grid operator will necessarily need to pay extra attention to the bias values to prevent unintended overshoot or undershoot.	The logic for the load bias to maintain reliability was extensively discussed, documented, and used during PacifiCorp grid operator training. The impact of these actions on prices was also discussed and, as explained, the price is a situational awareness signal to indicate the issue of meeting load or balancing the system. The issue of grid operator adjustment for correcting the area control error (ACE) was also discussed in detail and the challenges of operating under market structure and non-market structure was clarified and included in the training material.	This issue may result in instances counted in Figure 5 and 6 as Load changes

Category 6: Resources not following dispatch

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Resources not following dispatch signal	On occasion resources were not closely following the market dispatch signal. This was either because the plant was unavailable and an outage ticket was not	The CAISO provided an additional unit deviation display as part of the EIM Entity grid operator user interface. This display provides the	This issue may result in instances counted in Figure 5 and 6 as Resource data alignment

	entered on-time for the market to consider the outage, or because of some lag time when the plant was not set on automatic generator control to be dispatched directly from market signal. In any of these cases, the deviation from the market dispatch and the lack of the manual instructions to inform the market application when the resource cannot operate to the target operating point, resulted in market conditions that are not reflective of actual system conditions, causing price excursions. In some cases when the plant is dragging its response to the market signal it was necessary for the EIM Entity to make direct phone calls to the plant to start moving up or down to the plant's designated market dispatch signal.	operator, with a fast and flexible depiction of any differences between any combination of telemetry, state estimation, base schedule, and cleared target operating point. This display helped to quickly identify which wind resource is deviating and the amount of deviation per resource and on aggregate basis per balancing authority area. When a resource was observed to be dragging its dispatch, a direct call to the plant was enough to expedite the response if the plant was available or resulted in submission of outage ticket or manual dispatch instruction if the plant had any temporary physical limitations.	

Category 7: Network Model discrepancy

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Industrial load base schedules	PacifiCorp has industrial load as part of the conforming load and market load forecast. This created a discrepancy whenever these industrial loads are operating or called upon to curtail. The market is not aware of these non-participating	CAISO and PacifiCorp went through a series of meetings and identified these resources. An action plan was developed to add these non-participating resources to the network model used in the market	This issue may result in instances counted in Figure 5 and 6 as load changes and resource data alignment

	resources that exist in the PacifiCorp energy management system, but not in the market, creating the need to manually bias load to maintain consistency between market model and PacifiCorp's energy management system (EMS) model.	application. These resources are also taken out of the conforming load calculations and PacifiCorp will be submitting average hourly base schedules for these resources like any other non-participating resources.	
2. Distributed energy resources modeling	Distributed energy resources are currently included in the market load forecast as conforming load. These resources have both load and generation components, which net to positive or negative net injection at the load bus. When generating the market sees more load than what the PacifiCorp's EMS is seeing and price excursions occur because of the lack of base schedules for these resources.	CAISO and PacifiCorp went through series of meetings and identified the gross impact of these resources. Action plan was developed to add them to the market network model. These resources are also taken out of the conforming load calculations and PacifiCorp will be submitting average hourly base schedule for them like any other non-participating resources.	This issue may result in instances counted in Figure 5 and 6 as load changes and resource data alignment
3. Telemetry quality issues (net versus gross accounting)	The EIM Entity is sending telemetry values for all PacifiCorp registered resources in the master file. When the quality of the telemetry values is not good, the state estimator solution quality is negatively impacted, which in turn affects the quality of the market solution and the dispatch operating targets of these resources. During the first few weeks of operation the CAISO found that some resources have telemetry measurement that is net of its	The CAISO and PacifiCorp identified all these resources and telemetry issues. Some workarounds are now in place to adjust or correct the sign of the measurement or resolve the gross versus net telemetry measurement, as well as to resolve the zero telemetry for some of the non-participating resources. Much progress was achieved in this area	This issue may result in instances counted in Figure 5 and 6 resource data alignment

	auxiliary loads and others have gross telemetry measurements that do not include the auxiliary load. In addition, certain wind resources and other small non-participating resources did not have telemetry. When these discrepancies are combined together they tend to impact the market solution and prices.	and improvements are underway.	

Category 8: Market model discrepancy

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Energy during startup and shutdown	For multi-stage generating resources, the energy of these resources during the startup and shutdown periods when their output is below the PMin is accounted for in energy management system and automatic generation control (AGC). But the market does not account for this energy because it is below the PMin of the resource. This created discrepancy in the base schedule balance test, and the imbalance calculations between market and actual conditions as seen by AGC, which led to performing some load bias during the startup and shutdown of these resources subjecting the market to price excursions.	CAISO is working with PacifiCorp on defining some parameters to best model the startup and shutdown profile of multi-stage generating resources and their ramping time. The CAISO is also looking into adding startup and shutdown profile features to the fifteen-minute market to help model the impact of the energy from such resources during startup and shutdown.	This issue may result in instances counted in Figure 5 and 6 resource data alignment

Category 9: EIM Transfer Limits

Issue	Description	Remedial Action and Status	Frequency and Market Impact
1. Static and dynamic transfer limit restrictions on California-Oregon Intertie (COI)	The Energy Imbalance Market is designed to have the EIM transfer capacity fully re-optimized in both the fifteen-minute and five-minute market. With respect to the COI, the added restriction of the dynamic five-minute limit which is an incremental limit around the fifteen-minute solution creates at times price excursions. The five-minute dynamic limit constrains the market application from re-optimizing the fifteen-minute EIM transfers decisions between PacifiCorp and CAISO beyond the amount allowed by the five-minute incremental dynamic limit, which can be restrictive especially during the on-peak hours.	PacifiCorp is engaged in ongoing discussions with the Bonneville Power Administration (BPA) to understand the nature and allocation of the dynamic transfer capability on COI. BPA is in the process of conducting a detailed dynamic transfer capability study, which is ongoing work. Any additional five-minute capability will help the five-minute market re-optimize the fifteen-minute decisions that are based on system conditions and information available at approximately 30 minutes prior to the five-minute market.	
2. Five-minute rate-of-change constraints	The rate-of-change constraints are five-minute flow limit constraints that limit the amount of five-minute movement of PAC West balancing authority area participating resources around the corresponding resources' fifteen-minute schedules due to their flow impact on certain paths and flowgates internal to BPA's balancing authority area. This	PacifiCorp is engaged in discussions with BPA to understand the nature and basis behind the five-minute flowgate limits. BPA is reviewing the five-minute limits which are based on historical movement of PacifiCorp West resources before EIM. Any additional five-minute capability	

	restriction on the resources' five-minute movements or the corresponding rate-of-change constraint has created at times price excursions on the impacted resources when the corresponding path or flowgate five-minute limit constraint is binding.	will help the five-minute market re-optimize the fifteen-minute market decisions that are based on system conditions and information available approximately 30 minutes prior to the five-minute market. The CAISO is considering discussing the modeling of these constraints to determine if the current model matches the BPA study assumptions that resulted in setting up the five-minute rate-of-change constraint limits.	

ATTACHMENT B

Quantitative and qualitative descriptions of market performance related to the issues that prompted the CAISO's waiver request - PacifiCorp.

REPORT PROVIDED BY PACIFICORP

Description of, and status update regarding, measures being taken or planned to be taken to identify and address the market performance problems related to the issues that prompted CAISO's waiver request.

In addition to the measures undertaken by the CAISO to address the identified market performance issues described in Attachment A, PacifiCorp has implemented additional measures to address performance of the EIM appropriate for it to undertake as an EIM Entity.

First, PacifiCorp led efforts to coordinate with the CAISO to significantly increase the pool of resources available to participate in the EIM since November 1, 2014. PacifiCorp Energy has received certification, and addressed outstanding metering and contractual issues, for the following PacifiCorp EIM Participating Resources: Huntington Unit 2 (450 MW), Naughton Unit 3 (330 MW), Jim Bridger Units 1-4 (2,147 MW), Gadsby Unit 3 (105 MW), and Gadsby Units 4-6 (120 MW). In the aggregate, PacifiCorp has recently enabled EIM participation for over 3,150 MW of additional resources. PacifiCorp anticipates continuing to add participating resources by addressing remaining metering and contractual issues (the latter due to shared facilities), as scheduled generator outages permit. In addition, PacifiCorp continues to work with other transmission customers who may be interested in participating in the EIM with resources. This effort includes responding to information requests, providing customers with appropriate contacts or resources at the CAISO, and processing applications and certifications pursuant to PacifiCorp's OATT processes, if requested. At this time, PacifiCorp has not certified any third-party transmission customers for participation in the EIM and is not at liberty to disclose the identity of any transmission customers that have made inquiries related to EIM participation, but is nevertheless hopeful that these efforts will result in additional EIM participation.

Second, PacifiCorp has developed and implemented additional tools and displays to provide its Grid Operations personnel with increased visibility and situational awareness

regarding available regulation on a 5- and 15-minute basis which are the critical time intervals for the EIM. Grid Operations' "BAA Ops Tool" features the following new displays which allow grid operators to monitor generator availability, capacity, and ramp capacity: Bid Overview – Generators Price and Ramps, Bid Overview – Generators Start-ups, and Bid Overview – Generators Self Schedules. Further, the display in PacifiCorp's Base Schedule Aggregation Portal ("BSAP") BAA Balance Viewer now features "generation only" and "interchange only" values – in addition to the Aggregated Base Schedule, Demand Forecast, and the difference between the two items – and specifically identifies CRAG and Mona schedules (to address the two interties between PacifiCorp and the CAISO). PacifiCorp's Grid Operations and Commercial and Trading business units also developed additional generation displays that show available generation capacity for all PacifiCorp EIM Participating Resources, and continues to develop similar tools to display aggregated and disaggregated generation values, generation deviations, and interchange deviations, which are expected to be deployed by the end of the first quarter in 2015.

Third, PacifiCorp has (i) provided training on outage entry, including training provided by CAISO personnel, and (ii) required the provision of daily spreadsheets from PacifiCorp EIM Participating Resources that describe any operational issues and the resources' ambient conditions. PacifiCorp continues to coordinate with its outage vendor and the CAISO to improve functionality between its COMPASS outage management system and WebOMS, and also continues to develop a reference guide for outage management as part of this effort, which is expected to be completed by December 31, 2014.

Finally, to ensure that PacifiCorp EIM Participating Resources are following their respective Dispatch Instructions, PacifiCorp has configured real-time generation deviation displays to monitor any deviations between plant output and Dispatch Operating Points issued by the Market Operator. PacifiCorp continues to develop a display to incorporate Fifteen Minute Market and Real-Time Dispatch prices in addition to Transmission Customer Base Schedules, Dispatch Operating Points, and plant output, to track primary settlement statement components and to display for Grid Operations' situational awareness overview, which is expected to be completed by December 31, 2014.

Identification of any remaining deficiencies in CAISO and PacifiCorp processes, procedures, and tools and any additional market issues related to these pricing concerns that CAISO considers necessary to sustain stable market operations, along with CAISO's plan to address such issues.

In addition to the continued work of PacifiCorp described above, PacifiCorp has taken (and continues to take) additional steps to improve its processes and tools to address

identified market performance issues. PacifiCorp Grid Operations has drafted and posted "best practices" procedure documents – and continues to update such documents in real-time as needed (including to reflect additional PacifiCorp EIM Participating Resources) – to aid in personnel's implementation of critical EIM Entity tasks. In addition to the activities described above, PacifiCorp and the CAISO have developed a series of training modules for PacifiCorp generation and grid operators, which are anticipated to be delivered by the end of January 2015. Such trainings are designed to enhance operator actions, decision making, and understanding of market operations on an ongoing basis.

ATTACHMENT C

Independent assessments from the Department of Market Monitoring on the causes and solutions identified by the CAISO.

This report part of the report will be submitted to the Commission within seven days of December 15, 2014.

ATTACHMENT D:

This attachment provides an exploration of impacts, if any, on non-Energy Imbalance Market pricing nodes, including the Mona trading node.[4] This attachment identifies any such impacts and describes any actions the CAISO is taking or plans to take to address such impacts.

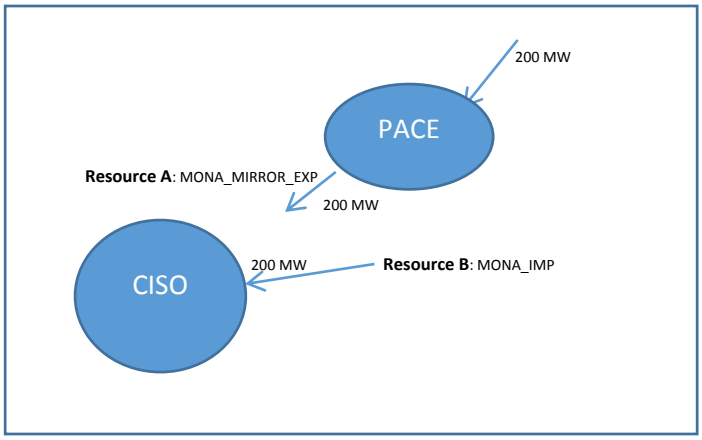
The implementation of the Full Network Model Expansion on October 15 increased the accuracy of the transmission grid modeling from neighboring balancing authority areas, and also allowed for better representation of unscheduled flows effects into the CAISO system. In addition, the implementation of the Energy imbalance Market on November 1, 2014, further enables the CAISO to co-optimize resources across the various areas of the Energy Imbalance Market. Both of these initiatives required that the CAISO also change the way in which the scheduling points are defined so that it can associate the scheduling points with external interties.

With regards to the CRAG and Mona scheduling points, the CAISO had to account for the fact that schedules can be submitted at the locations for purposes of CAISO only transactions or Energy Imbalance Market only transactions. The Crag location is the scheduling point for the Cascade intertie; the Mona location serves as a scheduling point for various southern interties, such as IPPUTAH and Adelanto interties. Prior to the implementation of the full network model, these two scheduling points were modeled with the standard radial link and were considered part of the CAISO balancing authority area. With the implementation of the full network model expansion, this definition changed and with the implementation of the Energy Imbalance Market, the prices at these locations changed notably as the CAISO began accounting for Energy Imbalance Market related congestion.

CRAG and Mona scheduling points are physically located inside PacifiCorp Balancing Authority Areas instead of the CAISO Balancing Authority Area. Mona is located inside PAC East, and CRAG is located inside PAC West. However, these locations continue to serve as scheduling points for imports and exports transacted with the CAISO balancing authority area. This situation requires special treatment for balancing and pricing calculations and leads to a special prices posted on OASIS. The pricing at these locations is based on the following rules to implement the special treatment of CAISO scheduling points CRAG/Mona Interchanges into the balance and price calculations of CAISO and PAC East/PAC West balancing authority areas.

[4] *See December 1 Order* at P 25.

Figure 7: Illustration of Mona Pricing



Assume that Resource A is Mona_Mirror_Exp, Resource B is Mona_IMP. Both of these resources are defined in Master file to have the same scheduling point and intertie definitions (ISO-PACE). The following rules apply:

Resource A,		
BAA	Balance	Price
CISO	**Don't** include MW	Not applicable
PACE	**Include** MW	**Resource LMP**= Price@SP
Resource B,		
CISO	**Include** MW	**Adj_Price@SP=** Price@SP – EIM_PACE – EIM_PACE_PACW – GHG + ∑ MONA ITCs **Resource LMP**= **Adj_**Price@SP SP-TIE Price shall use the **Adj_**Price@SP for the SP price calculations.
PACE	**Don't** include MW	Not applicable

The same above treatment shall be applied to CRAG scheduling point and mirror resource. The Figure above illustrates how an import at Mona scheduling point is mirrored by an export from the PACE balancing authority area with equal megawatt value. The reason for this mirroring is to allow the accounting for the import and associated offsetting export for each balancing authority area separately while the supporting resource(s) for the transaction is modeled at the physical location within PACE balancing authority area or as a separate import to PACE balancing authority area from another balancing authority area.

The table above illustrates that the pricing at Mona for CAISO balancing authority area is adjusted to not include effects of Energy Imbalance Market transfer constraints, GHG pricing, and other constraints pertaining to the EIM area.

The CAISO detected that the pricing at CRAG and Mona over the first few days of implementation were subject to a software defect that resulted in the CAISO pricing to include some of the LMP components pertaining to the mirror resource. The CAISO fixed this issue on November 5, 2014 and has not detected it since.

Currently, the prices at these scheduling points, as posted on OASIS, reflect all the congestion effects from either CAISO or PAC balancing authority areas. However, for CAISO imports and exports, the actual price used for settling the respective schedules at each of these locations as scheduling points for imports and export to and from CAISO balancing authority area, only accounts for the congestion arising from CAISO balancing authority area. The prices posted on OASIS do not reflect that, but the prices provided through the California Market Results Interface (CMRI) application and used for settlements for resources transacting at these scheduling points will reflect only the applicable CAISO BAA congestion.

For example, consider the case of a sample market interval, November 26, hour ending 11 interval 4 for the fifteen-minute market. The shadow price of the IPPUTAH ITC is -$183.29, the Energy Imbalance Market transfer for PAC East is $6.8 and the Energy Imbalance Market transfer for PAC East and PAC West is -$11.88. The system energy price is $35.38 and the greenhouse gas price is $0. The price posted on OASIS for the marginal congestion component at MONA_3_N501 is -$188.37. The congestion component posted on OASIS accounts for all the congestion associated with this location, both from the CAISO and PAC balancing authority areas. This published congestion component is thus calculated as -$183.29 (IPPUTAH ITC)-$11.88(PACW_PACE) +$6.8 (PACE) =-$188.37.

On the other hand, for intertie awards using the Mona point as a scheduling point to transact in the CAISO Balancing Authority Area, the prices posted in CMRI and used for settlements reflect accordingly only the congestion share of -$183.29 arising from IPPUTAH ITC. This price still adheres to the typical congestion calculation used prior to the implementation of the full network expansion and Energy Imbalance Market.

The current data structure used in the OASIS application only supports the display of one entry for the marginal congestion component, and given the nature of the congestion associated with these two scheduling points, either marginal congestion component combination will reflect partial information. Currently the display of the full congestion components -- CAISO and PAC -- does not apply to CAISO schedules. If the entry displayed only the CAISO congestion share, it will still be partial because it will be missing now the congestion portion associated with PAC. The CAISO is working on an enhanced OASIS display that will publish the congestion component breakdown. In this case there will be an entry for the congestion share associated with PAC of -$11.88+$6.8 and another entry with the congestion share associated with CAISO tie of -

$183.29. The CAISO expect that this display will be available in January 2015 and will provide the clarity and minimize the concerns about the pricing for these two locations.

ATTACHMENT E

In this attachment, the CAISO reports on each relaxation event, and a summary of the magnitude and frequency of such events overall.[5] This report provides data on instances where the $1,000/MWh price would have occurred but for the Commission's December 1 Order waiver, including the time of the instance, the duration, the cause, and the affected node(s) and load aggregation points.

The relaxation events affect numerous market intervals as the CAISO real-time markets contain many fifteen and five minute intervals. The information is provided in summary level because the data is significant and detail specific reporting of such events would not be as meaningful. The report focuses on the ELAP prices because these aggregate prices are representative of pricing in each area --West and East-- and would reflect short-term imbalance shortage for the aggregate area.

The information provided in Figures 8-11 is for instances of relaxation that resulted in prices in the neighborhood of the penalty-based price $1000/MWh. However, there are two cases in which there maybe the need to relax certain constraints but prices attained under such events were not based on the $1000/MWh penalty prices. On Case One, the EIM Entity fails the flexible ramping sufficiency test. As specified in section 29.34(n) of the CAISO tariff and section 10.3.2.1 of the Business Practice Manual for the Energy Imbalance Market, if the EIM Entity balancing authority area fails the sufficient ramp test, or is deemed to have failed the test because it failed the capacity (resource plan) test, CAISO will restrict additional EIM Transfer imports into that EIM Entity balancing authority area during the hour starting at T beyond the optimal solution for T-7.5 minutes. The CAISO will enforce the individual EIM Entity balancing authority area flexible ramp requirement in the isolated EIM Entity balancing authority area and will not include that balancing authority area to area group constraints. Also, for the duration of the restricted interval, the market clearing price in the affected EIM Entity balancing authority area will be based on the last economic bid cleared in the applicable fifteen-minute or five-minute interval in the EIM Entity balancing authority area. Therefore, for some intervals, there may be a need to relax the power balance constraint, for example, but the pricing is set pursuant to the procedure described above and not pursuant to the December 1 Order waiver pricing.[6]

[5] *December 1 Order*, at P 26.

[6] The price discovery mechanism under the procedure descried in Section 10.3.2.1 of the BPM for Energy Imbalance Market is, however, essentially the same price discovery procedure used under the December 1 Order waiver.

In Case Two, the CAISO has identified intervals that although there was constraint relaxation, for whatever reason, the price was not determined by the penalty prices for relaxation. The CAISO is still investigating those unusual market outcomes.

Figures 8 through 11 do not reflect the intervals affected by the issues in Case One and Two described above and instead only focus on the intervals that are the subject of the waiver provided in the December 1 Order. Figures 12 through 15 below, however, provide all of the instances in which there was infeasibility observed, distinguished by the various categories discussed above.

The data in this report does not include those cases in which there was infeasibility for over supply conditions as these cases are not reflected in the waiver requested in this proceeding. The penalty prices specified in sections 27.4.3.2 and 27.4.3.4 only pertain to infeasibility cases in which there is under-supply. The penalty prices for the over-supply conditions are specified in section 6.6.5 of the BPM for Market Operations.

Figure 8 and Figure 9 show the summary of instances where power balance constraint relaxations occurred in the fifteen- and five-minute market in the PAC West and East area, respectively. The reported events are also aggregated on a daily basis and depicted with an infeasibility range with the vertical line in blue. The end of the vertical blue line represents the minimum and maximum value of power balance relaxation in each day. The average magnitude of the infeasibility is shown by the red marker on the blue vertical lines. Figure 10 and

Figure 11 provide similar information but for the five-minute market.

Figure 8: Magnitude of power infeasibility in PAC West. Fifteen-minute market.

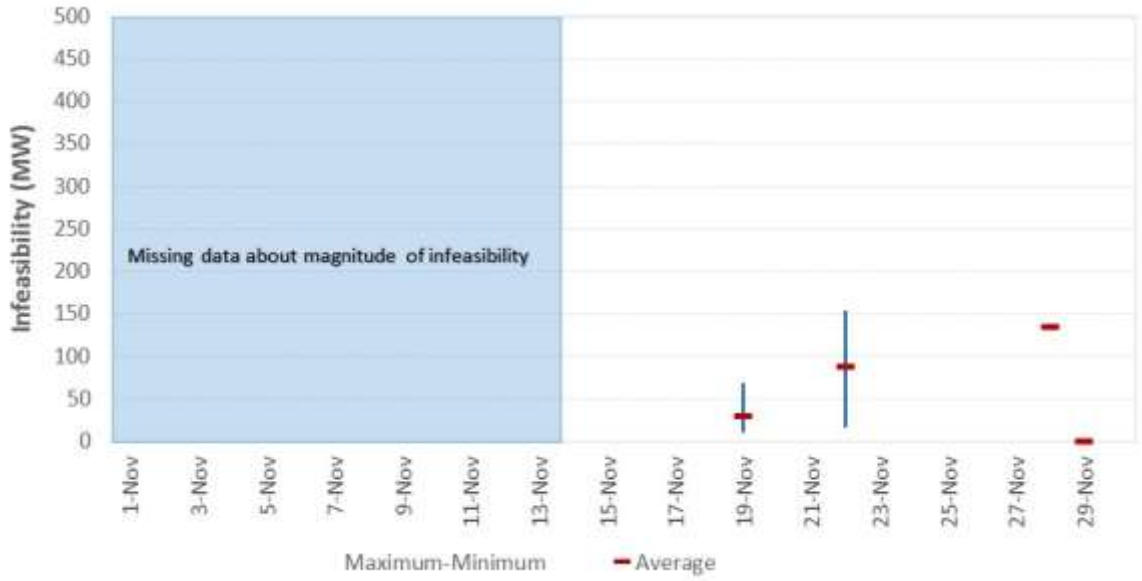


Figure 9: Magnitude of power infeasibility in PAC East. Fifteen-minute market.

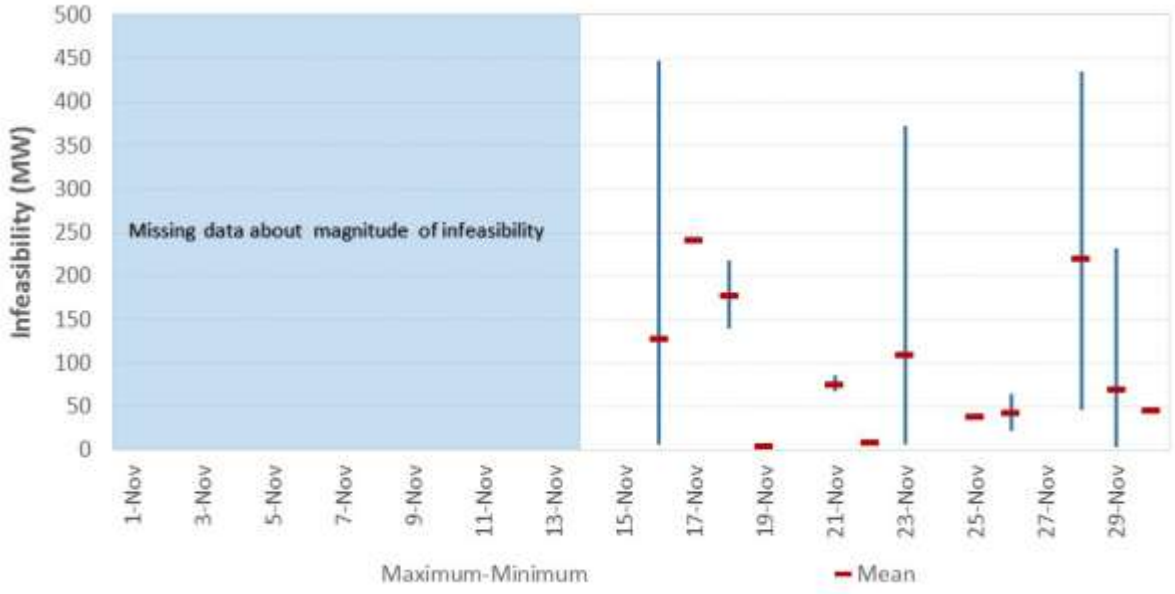


Figure 10: Magnitude of power infeasibility in PAC West. Five-minute market.

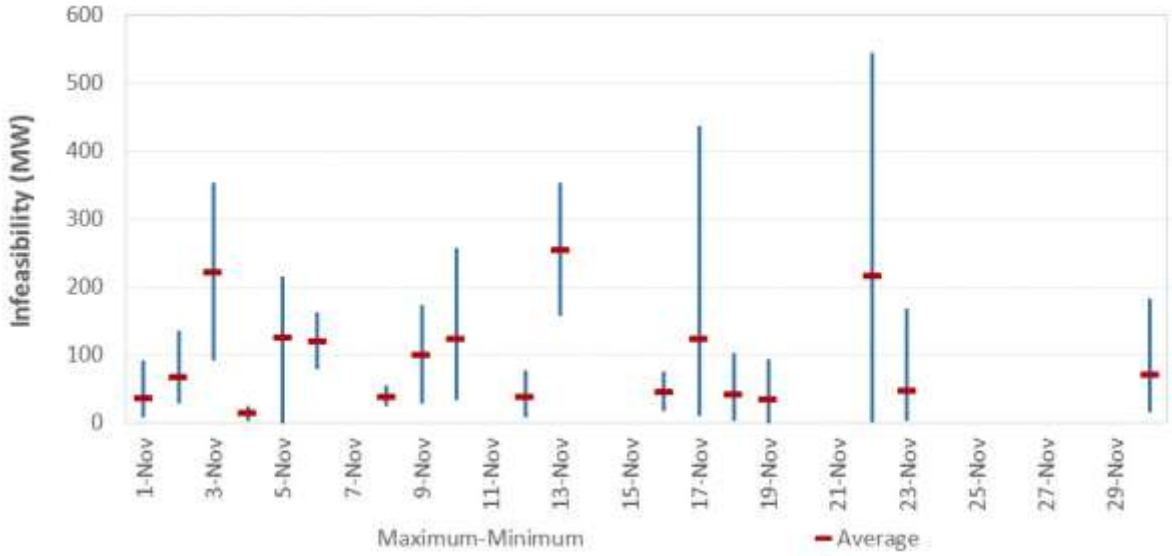
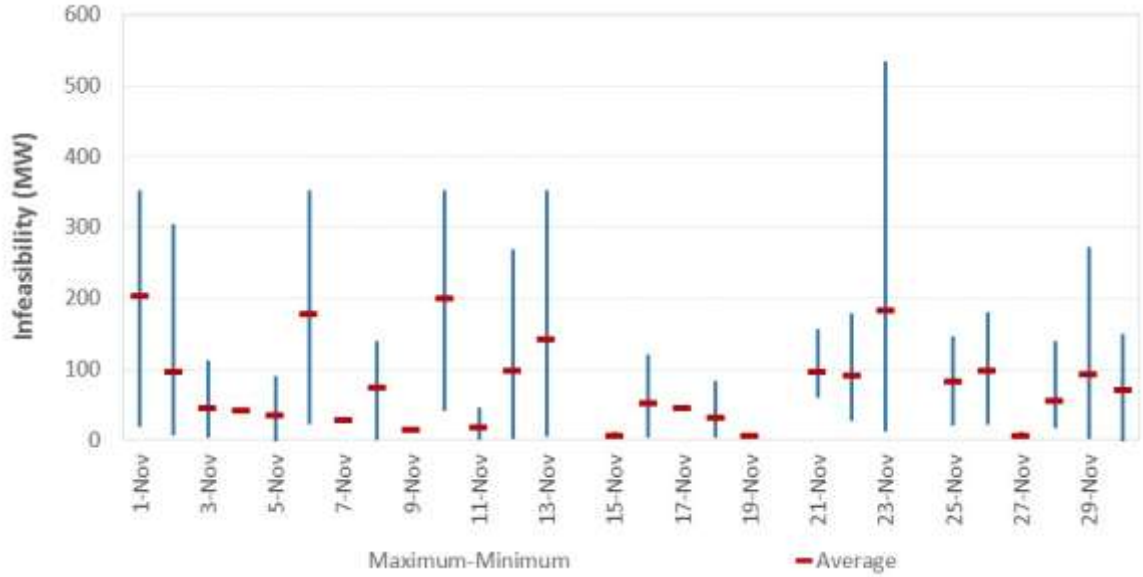


Figure 11: Magnitude of power infeasibility in PAC East. Five-minute market.



For the fifteen-minute market, the magnitude of infeasibility was not preserved in the data system for the period of November 1 through November 13, which impedes to identify the cases with infeasibility and quantify their magnitude. However, such instances are identified by analyzing the cases where prices reached the relaxation-based levels of $1000. Figure 12 through Figure 15 show the frequency of the fifteen- and five-minute markets with infeasibilities, grouped by PAC West and East.

Figure 12: Frequency of fifteen-minute intervals with power infeasibility in PAC West.

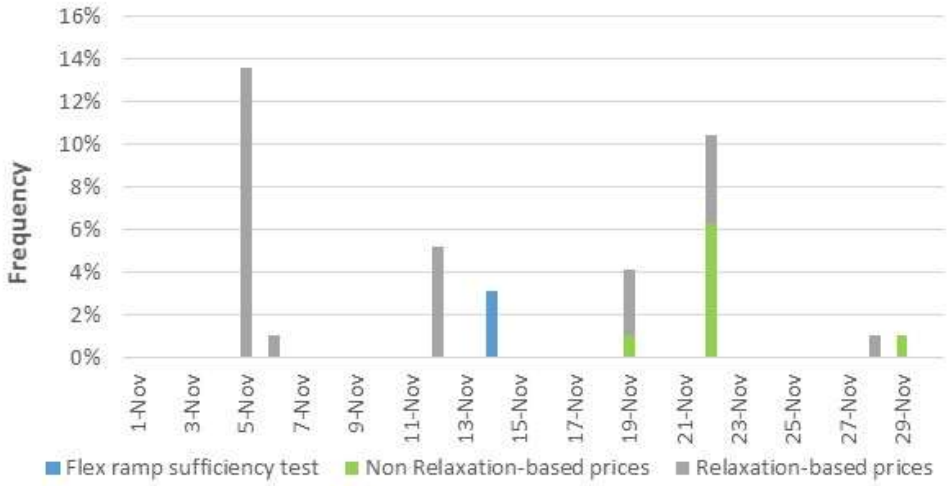


Figure 13: Frequency of fifteen-minute intervals with power infeasibility in PAC East.

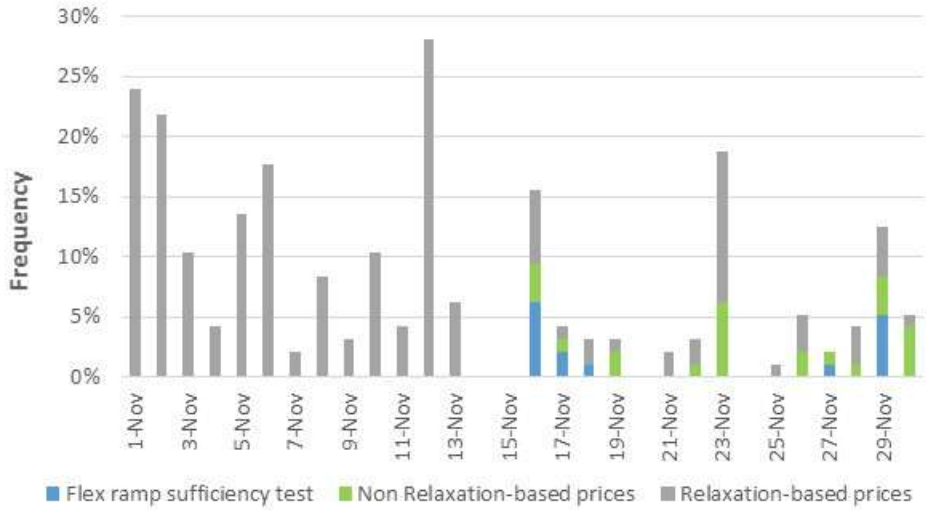


Figure 14: Frequency of five-minute intervals with power balance infeasibility in PAC West.

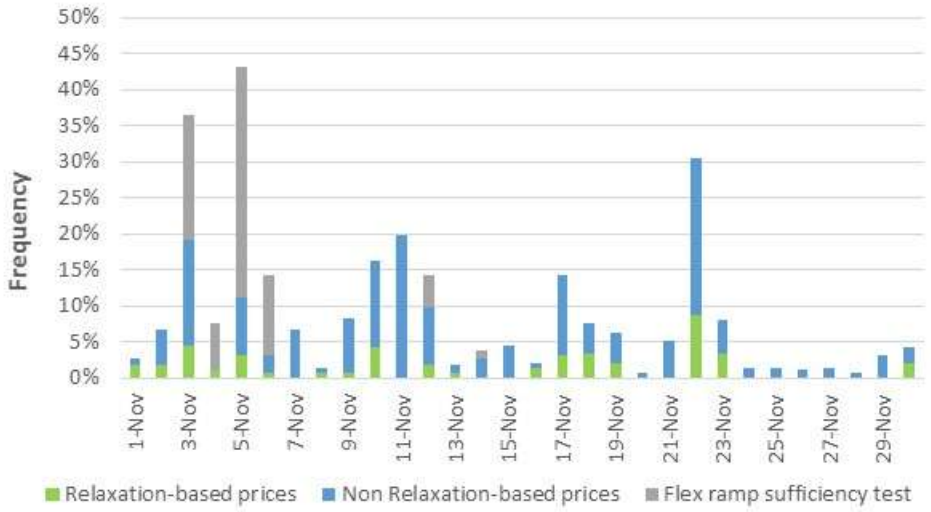
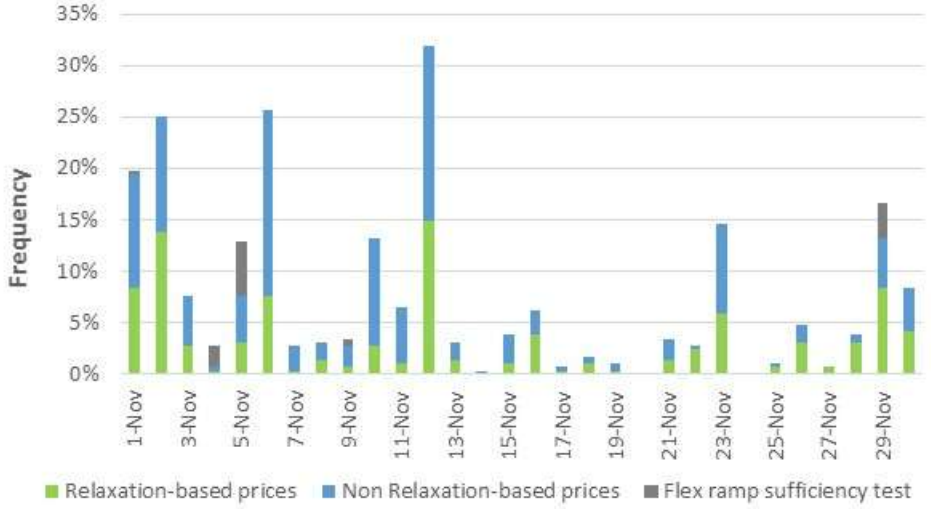


Figure 15: Frequency of five-minute intervals with power balance infeasibility in PAC East.



The imbalance energy transfers may also be subject to relaxation to address infeasibilities; there were few instances only in the PAC East transfer that resulted in relaxation; there were no instances of relaxation of EIM transfers between PAC and CAISO. The summary of these instance are listed in Table 1 and Table 2. All these instances occurred before the period applicable for the waiver associated with this report.

Table 1: Statistics of EIM transfer infeasibilities for PAC East. Fifteen-minute market.

Date	Maximum	Minimum	Average	Count
6-Nov-14	51.4	1.1	26.2	2
10-Nov-14	121.0	121.0	121.0	1
12-Nov-14	126.7	72.0	99.3	2
13-Nov-14	130.9	16.9	76.2	3

Table 2: Statistics of EIM transfer infeasibilities for PAC East. Five-minute market.

Date	Maximum	Minimum	Average	Count
6-Nov-14	65.2	65.2	65.2	1
10-Nov-14	114.3	97.9	106.1	2

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 15th day of December, 2014.

/s/ Sarah Garcia

Sarah Garcia