



March 3, 2023

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

## **INFORMATIONAL FILING-NO NOTICE REQUIRED**

**Re: California Independent System Operator Corporation  
Informational Readiness Certification for the WAPA-DSW's  
Participation in the WEIM  
Docket No. ER15-861-000**

Dear Secretary Bose:

The California Independent System Operator Corporation (CAISO) submits this informational filing in compliance with section 29.2(b)(6) of the CAISO tariff.<sup>1</sup> The CAISO, in consultation with the Western Area Power Administration (WAPA-DSW), has determined that, following market simulation and an adequate period of parallel operations, the CAISO and WAPA-DSW have met or will meet all readiness criteria specified in section 29.2(b)(7). In support of this determination the CAISO hereby submits the sworn CAISO affidavit of Khaled Abdul-Rahman, Vice President of Power System and Market Technology, and the sworn WAPA-DSW affidavit of Jack Murray, Senior Vice President and Desert Southwest Regional Manager. This filing certifies the readiness of the CAISO and WAPA-DSW to proceed with WAPA-DSW's participation in the CAISO's Western Energy Imbalance Market (WEIM) on April 5, 2023, consistent with the requirement to do so at least 30 days prior.

---

<sup>1</sup> The Commission has determined that readiness certifications are considered informational filings and will not be noticed for comment. See *Cal. Indep. Sys. Operator Corp.*, 153 FERC ¶ 61,205 at P 86 and n.173 (2015); see also *Cal. Indep. Sys. Operator Corp.*, 155 FERC ¶ 61,283 at P 8 (2016).

## I. Background

The WEIM provides other balancing authority areas the opportunity to participate in the real-time market for imbalance energy that the CAISO operates in its own balancing authority area. PacifiCorp's balancing authorities were the first two balancing authorities to join the WEIM beyond the CAISO balancing authority area. The CAISO's WEIM tariff provisions went into effect on October 24, 2014, in time for the first trading day of November 1, 2014.<sup>2</sup> In a March 16, 2015 order,<sup>3</sup> the Commission concluded that certain readiness safeguards are necessary prior to activating a prospective WEIM entity in production.<sup>4</sup> Accordingly, the Commission directed the CAISO to include provisions in its tariff to ensure the readiness of any new WEIM entity. The Commission further required that the certification of market readiness include a sworn affidavit from an officer of the CAISO and an officer of the prospective WEIM entity attesting that both have prepared and made ready the systems and processes for the new WEIM entity to commence financially binding participation in the WEIM.<sup>5</sup> Following two compliance filings, the Commission accepted the CAISO's proposed readiness criteria.<sup>6</sup> These criteria appear in section 29.2(b)(7) of the CAISO Tariff.

## II. Readiness Reporting, Determination, and Attestations

The CAISO and WAPA-DSW ran market simulation scenarios from December 1, 2022 to January 12, 2023. Parallel (*i.e.*, financially nonbinding) operations, which began on February 2, 2023, will run through at least April 4, 2023 and, in any event, will continue to be supported and available to WAPA-DSW until April 5, 2023. During market simulation and parallel operations the CAISO and WAPA-DSW have engaged in daily discussions to track progress and confirm the status of each readiness criterion, and the CAISO has regularly reported on readiness status in market forum discussions and publicly posted a

---

<sup>2</sup> See *Cal. Indep. Sys. Operator Corp.*, 147 FERC ¶ 61,231 (2014) (June 19 Order) (conditionally accepting tariff revisions to implement Energy Imbalance Market); *Cal. Indep. Sys. Operator Corp.*, 149 FERC ¶ 61,058 (2014) (order denying requests for rehearing, granting in part and denying in part requests for clarification, and conditionally accepting tariff revisions on compliance with regard to order listed above); Commission Letter Order, 149 FERC ¶ 61,005 (Oct. 2, 2014) (order granting CAISO request to extend effective date of Energy Imbalance Market tariff revisions from September 23, 2014, to October 24, 2014, for trading day November 1, 2014).

<sup>3</sup> *Cal. Indep. Sys. Operator Corp.*, 150 FERC ¶ 61,191 (2015) (March 16 Order).

<sup>4</sup> March 16 Order at P 30.

<sup>5</sup> *Id.* n.85.

<sup>6</sup> *Cal. Indep. Sys. Operator Corp.*, 153 FERC ¶ 61,205 (2015).

table or “dashboard,” showing progress towards meeting the readiness criteria.<sup>7</sup> The process of updating the readiness dashboard through this joint effort involved representatives from both organizations, including the senior officers who have attested that the parties’ processes and systems are ready for WAPA-DSW’s participation in the WEIM.

The market simulation confirmed system functionality and connectivity by identifying issues and software variances in advance of implementation that have since been resolved. In addition, market simulation permitted the CAISO and WAPA-DSW to validate performance of the systems and processes under a variety of structured scenarios. The market simulation dashboard dated December 28, 2022 demonstrated that the CAISO and WAPA-DSW were ready to enter parallel operations. Having achieved the benefits from market simulation, the CAISO and WAPA-DSW transitioned to parallel operations on February 2, 2023.

The parallel operations phase is designed to test performance of the systems and processes in a financially non-binding environment using historical data and information from production systems to the maximum extent possible. The CAISO and WAPA-DSW have engaged in parallel operations to examine capabilities at different times and conditions (morning ramp, evening ramp, low load and peak load). Doing so has permitted WAPA-DSW to understand the interaction between resource plans, base schedules, outage management, manual dispatch, and the CAISO full network model. This period has also allowed the CAISO and WAPA-DSW to identify and resolve software issues. The dashboards dated December 28, 2022, January 30, 2023, and February 21, 2023, showed the progress during initial parallel operations as additional readiness criteria were met. The final dashboard, dated February 28, 2023, is included as Attachment A.

The dashboard sets forth each of the readiness criteria in the tariff, the metrics by which the CAISO measures satisfaction of the criteria, and the actions or status that demonstrate WAPA-DSW’s compliance with criteria. The dashboard shows that all readiness criteria have been satisfied or will be satisfied by April 5, 2023, with two criteria shown as “on track.” While WAPA-DSW and CAISO have collaboratively worked to satisfy nearly all the readiness criteria, WAPA-DSW continues work on readiness criteria No. 25, which requires WAPA-DSW to be capable of verifying the CAISO’s daily and monthly settlement

---

<sup>7</sup> More information on the status of these other reports consistent with CAISO tariff section 29.2(b)(8) is available on the CAISO website under the Spring 2023 release, Western EIM WAPA-DSW entities at: <https://www.caiso.com/informed/Pages/ReleasePlanning/Default.aspx>.

statements, and weekly invoices. WAPA-DSW anticipates the work on this item to be complete no later than April 5, 2023.

In addition to criteria No. 25, WAPA-DSW continues work on readiness criteria No. 26, which requires WAPA to verify that it can properly sub-allocate WEIM charges and credits to its transmission customers consistent with WAPA's tariff and applicable rate schedules. WAPA-DSW expects this work to be complete by April 5, 2023, but no later than when WAPA-DSW issues its first WEIM bill to its transmission customers currently scheduled for April 5, 2023.

In any event, Section 29(b)(6) requires that a senior officer of the CAISO and a prospective WEIM entity attest (1) that the processes and systems of the prospective WEIM Entity have satisfied or will have satisfied the readiness criteria set forth in section 29.2(b)(7) as of the Implementation Date; (2) to any known issues requiring resolution prior to the Implementation Date in accordance with section 29.2(b)(8); (3) to any exceptions from the established thresholds specified in the Business Practice Manuals, and that despite such exceptions the criteria were met or will be met as specified in 29.2(b)(7); and (4) that the Implementation Date is conditional on the resolution of the known issues identified in the certificates and any unforeseen issues that undermine the satisfaction of the readiness criteria. Attachments B and C, respectively, contain the sworn CAISO affidavit of Khaled Abdul-Rahman, Vice President of Power System and Market Technology and the sworn WAPA-DSW affidavit of Jack Murray, Senior Vice President and Desert Southwest Regional Manager in satisfaction of this requirement.

The affidavits are based upon the engagement by these senior officers in assessing the readiness criteria as reported in the dashboard, including supporting documentation. The CAISO believes that the market simulation and parallel operations to date demonstrate that WAPA-DSW is prepared to enter financially binding production WEIM operations on April 5, 2023. As discussed in the Market Quality Report included as Attachment D, any issues identified in the parallel operations have been resolved or will be resolved. Neither the CAISO nor WAPA-DSW has identified any exception to any of the readiness criteria.

### **III. Market Quality Report on Parallel Operations**

Parallel operations allowed the CAISO and WAPA-DSW to identify and resolve numerous input, process, and software issues prior to the commencement of financially binding operations.<sup>8</sup> The CAISO and WAPA-DSW

---

<sup>8</sup> The market quality report on parallel operations dated February 24, 2023 explains how each of these issues impacted the market results and how they were resolved by the CAISO and WAPA-DSW.

worked diligently during parallel operations to identify the cause of the infeasibilities that arose. The attached Market Quality Report demonstrates that the majority of the power balance infeasibilities identified during the period of parallel operations associated with the readiness determination were caused by input data issues, some of which are unique to the parallel operations environment and software issues, all of which have been or will be resolved by the implementation date.

The CAISO validated both prices and schedules based on the data input to the market systems throughout the first 38 days of parallel operations. This validation demonstrates that the market solution produced is as expected and consistent with the market rules as designed based on the input data. The analysis conducted for the report accounts for the fact that input data may be influenced by limitations inherent in the parallel operations environment and these limitations may affect the quality of the solution. When factors affecting the input data are controlled for, the numerical quality of the market solution is good and indicates that the systems and processes of WAPA-DSW are ready to operate in production.

**V. Attachments**

- Attachment A: Readiness Dashboard Report
- Attachment B: Affidavit of Khaled Abdul-Rahman
- Attachment C: Affidavit of Jack Murray
- Attachment D: Parallel Operations Market Quality Report

## VI. Conclusion

The CAISO respectfully requests that the Commission accept this certification as consistent with section 29.2(b)(6) of the CAISO tariff. The CAISO or WAPA-DSW will notify the Commission in the event of any subsequent determination that the implementation of WAPA-DSW into the WEIM on April 5, 2023 should be delayed, the reason for the delay, the new implementation date if it can be determined, and whether a portion or all of this certification needs to be reissued.

Respectfully submitted,

**By: /s/ John C. Anders**  
John C. Anders

Roger E. Collanton  
General Counsel  
Burton A. Gross  
Deputy General Counsel  
John C. Anders  
Assistant General Counsel  
California Independent  
System Operator Corporation  
250 Outcropping Way  
Folsom, CA 95630  
Tel: (916) 608-7287  
[janders@caiso.com](mailto:janders@caiso.com)

Counsel for the California Independent System Operator Corporation

**Attachment A – Readiness Dashboard Report**

**Informational Readiness Certification for**

**WAPA-DSW's**

**Participation in the Energy Imbalance Market**

**California Independent Systems Operator Corporation**

**March 3, 2023**

Readiness Criterion Identifier	Readiness Category	Criteria	Measurable Elements	Threshold	Owner	Status	Evidence	Tariff Mapping
1	Prospective EIM Entity Full Network Model Integration	Generation, Interchange and Load comparison	Load, EIM Internal Intertie and EIM External Interties, and Generating Unit definition in the Full Network Model is consistent with the Load, EIM Internal Intertie and EIM External Interties, and Generating Unit definition in the exported prospective EIM Entity network model file that it delivered to the CAISO.	Data matches within 10%, measured in MW capacity to start parallel operation, and within 5% before full activation. Any Discrepancies are accounted for in terms of imbalance adjustment	CAISO	Complete	CAISO EMS team generated data and provided screen shots that proved that the averages for EIM BAA load generation and interchange values are within tolerances during the specified measured dates.	<a href="#">Tariff section 29.2(b)(7)(A)(i)</a>
2	Prospective EIM Entity Full Network Model Integration	Comparison of SCADA measurement	SCADA measurements used in prospective EIM Entity EMS model match the measurements observed by the CAISO through the CAISO EMS model	Critical and used SCADA measurements match 90% to start parallel operation and 95% before full activation, measured in MW, outside of any exception in EMS model	CAISO	Complete	CAISO EMS team provided screen shots from EMS that showed the average deviation between telemetered values (SCADA).	<a href="#">Tariff section 29.2(b)(7)(A)(ii)</a>
3	Prospective EIM Entity Full Network Model Integration	State Estimator solution	CAISO state estimator solution is equivalent or superior to the prospective EIM Entity state estimator solution for its Balancing Authority Area.	State Estimator solutions converge >90% of the time in two days before parallel operation and three days before full activation. Solution differences within 10% before parallel operation and 5% before full activation measured in MW or justified due to different external BAA modeling	CAISO	Complete	CAISO EMS team provided a report showing that the State Estimator is solving for WAPA-DSW including unit level SCADA vs State Estimator estimates, and an analysis comparing total deviation/total actual MW.	<a href="#">Tariff section 29.2(b)(7)(A)(iii)</a>
4	Prospective EIM Entity Full Network Model Integration	Non-Conforming Load, Behind-the-Meter Generation, Pseudo Ties, and Dynamic Schedules	Physical representation of the prospective EIM Entity's network matches the Base Market Model that accounts for non-conforming load, behind-the-meter generation, pseudo-ties, and dynamic schedules, and third party transmission service provider and path operator information that supports EIM Transfers and Real-Time Dispatch in the Energy Imbalance Market, as applicable	Prospective EIM Entity major non-conforming loads > 5% of prospective EIM Entity total actual load in MW are modeled separately from conforming load in market model	CAISO	Complete	CAISO completed their analysis and provided an email with results, stating the criteria have been met.	<a href="#">Tariff section 29.2(b)(7)(A)(iv)</a>
5	Agreements	Execution of Necessary Agreements	The prospective EIM Entity has executed all necessary agreements.	The prospective EIM Entity will execute all agreements, as outlined in Section 5 of the EIM BPM within the required timelines outlined in Section 5.	JOINT	Complete	CAISO provided evidence that all contracts have been executed.	<a href="#">Tariff section 29.2(b)(7)(K)(i)</a>



Readiness Criterion Identifier	Readiness Category	Criteria	Measurable Elements	Threshold	Owner	Status	Evidence	Tariff Mapping
6	Operations Training	Completion of mandatory training courses	Prospective EIM Entity operators who will have responsibility for EIM operations, transactions and settlements, will complete CAISO training modules.	Prospective EIM Entity operators will Complete training and close-of-training assessment in the appropriate timeframes as outlined in “100 series”– an introduction to Energy Imbalance Market training “200 series”– the specific hourly and daily tasks and duties for normal operation training module; and “300 series”– the assessment of market results and response to contingencies and abnormal situations training module.	WAPA-DSW	Complete	WAPA-DSW provided an email confirming that all EIM training is complete, including evidence of all who attended training.  CAISO training lead confirmed that training is complete for WAPA-DSW.	<a href="#">Tariff section 29.2(b)(7)(B)</a>
7	Forecasting Capability	Load forecast capability	Definition of EIM demand forecast boundaries based on the conforming and non-conforming load characteristics, as applicable. <ul style="list-style-type: none"> <li>Accuracy of the CAISO forecast of EIM demand based on historical actual load data for the defined EIM demand forecast boundaries.</li> <li>Identification of weather station(s) locations used in forecasting, if applicable.</li> </ul>	All Plant Information (PI) tags and historical data for defined load area(s), and non-conforming load, if applicable, compared with load forecasts provided from CAISO (if CAISO load forecast used).	CAISO	Complete	CAISO Short Term Forecasting team provided reports and screen shots from the forecast monitoring showing accuracy measurements.	<a href="#">Tariff sections 29.2(b)(7)(C)(i)-(iii)</a>
8	Forecasting Capability	Variable Energy Resource (VER) forecast capability	Identification of the source of VER forecasts. (If a participating wind or solar unit requires a CAISO forecast, then BPM and Tariff requirements apply.)	Forecasting entity must demonstrate delivery of Unit MW forecast at 5 min intervals for at least three hours ahead. Forecasting entity must also provide base schedule by T-75, T-55 and T-40. EIM Entity provides to CAISO real-time MW production PI tags.	CAISO	Complete	CAISO Short Term Forecasting team provided reports and screen shots from the forecast monitoring showing accuracy measurements.	<a href="#">Tariff section 29.2(b)(7)(C)(iv)</a>
9	Forecasting Capability	Flexible capacity requirements	CAISO has established flexible capacity requirements for the prospective EIM Entity Balancing Authority Area and the combined EIM Area including the prospective EIM Entity	The CAISO has received and stored all historical data from the prospective EIM Entity necessary and sufficient for the CAISO to perform the flexible ramp requirement.	CAISO	Complete	CAISO short term forecasting team provided evidence that the ISO is getting stable estimates of the data that feeds the calculation for the Flexible Ramp Product Uncertainty.	<a href="#">Tariff section 29.2(b)(7)(K)(iv)</a>
10	Balanced Schedules	Base schedule balancing capability	The prospective EIM Entity Scheduling Coordinator demonstrates its ability to balance EIM demand and EIM supply for the prospective EIM Entity’s Balancing Authority Area	90% or greater of base schedules balance tests during monitored hours are within 10% average imbalance of load forecast over one day period before parallel operation, and 5% average over five full days before full activation. The CAISO will provide examples of MW thresholds for each prospective EIM Entity to indicate a reasonable threshold as it applies to a given EIM Entity and	WAPA-DSW	Complete	WAPA-DSW provided CMRI reports as evidence that this criterion was met in Market Simulation.  CAISO Market Quality team provided daily market reports that show the criterion was met for Parallel Operations.	<a href="#">Tariff section 29.2(b)(7)(D)(i)</a>

Readiness Criterion Identifier	Readiness Category	Criteria	Measurable Elements	Threshold	Owner	Status	Evidence	Tariff Mapping
				indicate the potential implications of a swing from 5% over to 5% under forecast in one hour to the next.				
11	Balanced Schedules	Flexible ramping sufficiency test capability	The prospective EIM Entity \ Scheduling Coordinator demonstrates its ability to pass the flexible ramping sufficiency test.	Passes 90% of the time or greater over monitored hours of one day before parallel operation and five non-consecutive days before full activation.	WAPA-DSW	Complete	WAPA-DSW provided CMRI reports as evidence that this criterion was met in Market Simulation.  CAISO Market Quality team provided daily market reports that show the criterion was met for Parallel Operations.	<a href="#">Tariff section 29.2(b)(7)(D)(iii)</a>
12	Balanced Schedules	Capacity test capability	The prospective EIM Entity Scheduling Coordinator demonstrates its ability to pass capacity test	Passes 90% of the time or greater over monitored hours of one day before parallel operation and five non-consecutive days before full activation. The CAISO will explain the implications of any potential issues with the reliability of an EIM Entity to meet its capacity requirements.	CAISO	Complete	WAPA-DSW provided CMRI reports as evidence that this criterion was met in Market Simulation.  CAISO Market Quality team provided daily market reports that show the criterion was	<a href="#">Tariff section 29.2(b)(7)(D)(ii)</a>
13	Operating Procedures	CAISO operating procedures (relevant to EIM operations)	The prospective EIM Entity signs CAISO non-disclosure agreement and receives appropriate CAISO “public” and “restricted” operating procedures	Operating procedures NDA signed by the prospective EIM Entity.  The prospective EIM Entity receives CAISO operating procedures four months prior to the parallel operations date.	JOINT	Complete	CAISO Training lead provided an email stating that an NDA is no longer required as all operating procedures are now posted on the public site.	<a href="#">Tariff section 29.2(b)(7)(K)(i)</a>
14	Operating Procedures	Prospective EIM Entity operating procedures	The prospective EIM Entity operating procedures are defined, updated, and tested for the EIM Entity Scheduling Coordinator	The prospective EIM Entity operating procedures are updated tested and implemented prior to parallel operations date.	WAPA-DSW	Complete	WAPA-DSW confirmed that operating procedures are defined and tested.	<a href="#">Tariff section 29.2(b)(7)(K)(ii)</a>
15	System Readiness & Integration	Functional Testing	The prospective EIM Entity and the CAISO will test the functional and system elements in accordance with functional and system testing documentation posted on the CAISO website	All tasks identified in the functional and system testing documentation are complete and will not have any issues deemed significant.  Any exceptions will be explained or have an interim solution that is functionally equivalent.	WAPA-DSW	Complete	WAPA-DSW provided evidence indicating that this testing is complete. CAISO confirmed.	<a href="#">Tariff section 29.2(b)(7)(E)(i)</a>
16	System Readiness & Integration	System Integration	The prospective EIM Entity and CAISO will test system integration testing in accordance with the system integration testing documentation posted on the CAISO website	All tasks identified in the system integration testing documentation are complete and will not have any issues deemed significant.  Any exceptions will be explained or have an interim solution that is functionally equivalent.	WAPA-DSW	Complete	WAPA-DSW provided evidence indicating that this testing is complete. CAISO confirmed.	<a href="#">Tariff section 29.2(b)(7)(E)(ii)</a>

Readiness Criterion Identifier	Readiness Category	Criteria	Measurable Elements	Threshold	Owner	Status	Evidence	Tariff Mapping
17	System Readiness & Integration	The prospective EIM Entity system access complete	All prospective EIM Entity employees who require system access to perform EIM-related job functions identified and have necessary certificates.	All prospective EIM Employees performing job functions for EIM market are identified. All CAISO issued certificates are requested within the appropriate timeframes. All identified employees provided the necessary EIM system access certificates.	WAPA-DSW	Complete	WAPA-DSW sent an email confirming they have established CAISO system access for all who need access and have a plan in place for provisioning access in production.	Tariff section 29.2(b)(7)(E)(iii)
18	System Readiness & Integration	ISO - prospective EIM Entity interfaces	Data interfaces between prospective EIM Entity's systems and CAISO systems are tested	ISO and prospective EIM Entity identify significant data interface issues. EIM Entity and CAISO executives to approve exceptions.	JOINT	Complete	WAPA-DSW provided evidence indicating that this testing is complete. CAISO confirmed.	Tariff section 29.2(b)(7)(E)(i)
19	Market Simulation	Day in the life simulation	The prospective EIM Entity operators are able to meet the market timelines	The prospective EIM Entity grid operations staff complete end-to-end daily market workflow with no critical defects.	JOINT	Complete	WAPA-DSW provided evidence indicating that this testing is complete. CAISO confirmed.	Tariff section 29.2(b)(7)(I)(ii)
20	Market Simulation	Structured scenarios simulation	The prospective EIM Entity operators execute and pass all structured scenarios provided by CAISO	All significant issues resolved or have an interim solution that is functionally equivalent.	JOINT	Complete	WAPA-DSW confirmed that all structured scenarios were executed successfully and validated through settlement statements. CAISO team responded that they concur.	Tariff section 29.2(b)(7)(I)(iii)
21	Market Simulation	Unstructured scenarios simulation	The prospective EIM Entity operators execute and pass all unstructured scenarios provided by prospective EIM Entity	All significant issues resolved or have an interim solution that is functionally equivalent.	JOINT	Complete	WAPA-DSW provided an email that they would have no formal unstructured scenarios.	Tariff section 29.2(b)(7)(I)(iv)
22	Market Simulation	Market results reports	Market results are appropriate based on inputs	The prospective EIM Entity and CAISO executive project sponsors approve the market results reports during market simulation	WAPA-DSW	Complete	CAISO Market Quality team provided evidence that the market results are appropriate based on input.	Tariff section 29.2(b)(7)(I)(v)
23a	Market Simulation	Market quality review	Prices are validated based on input data	Market simulation prices and MWs schedules/dispatches are validated by CAISO market quality team for entry into parallel operations	CAISO	Complete	CAISO Market Quality team provided evidence that prices are appropriate based on input.	Tariff section 29.2(b)(7)(I)(vi)
23b	Parallel Operations	Market quality review	Prices are validated based on input data	Parallel operations prices and MWs schedules/dispatches are validated by the CAISO market quality team	CAISO	Complete	CAISO Market Quality team provided an analysis report on the Market Solution, prices, and quality of data during Parallel Operations	Tariff section 29.2(b)(7)(I)(vi)
24	Market Simulation	The prospective EIM Entity Identification	Validation of SCID's and Resource ID's	The CAISO has established and the prospective EIM Entity has tested all necessary SCIDs and Resource IDs established for the prospective EIM Entity's Balancing Authority Area	JOINT	Complete	WAPA-DSW and CAISO teams sent emails verifying that SCIDs and resource IDs are established and tested.	Tariff section 29.2(b)(7)(I)(i)

Readiness Criterion Identifier	Readiness Category	Criteria	Measurable Elements	Threshold	Owner	Status	Evidence	Tariff Mapping
25	Settlements	ISO Settlement Statements and Invoices published to the prospective EIM Entity and EIM Participating Resources	The CAISO Settlement statements and invoices match the operational data published to stakeholders or fed into settlement system and the resulting calculations correspond to the formulas defined in ISO's tariff and BPMs	Monthly settlement statement and invoice with corresponding daily statements produced during market simulation and parallel operations are verifiably accurate against available data.	JOINT	On Track	WAPA-DSW's new Settlement system validation is lagging. Validation is expected to complete by end of March 2023.	Tariff section 29.2(b)(7)(F)(i)
26	Settlements	The prospective EIM Entity settlement statements and invoices reflect accurate allocations to the prospective EIM Entity customers prior to financially binding operations.	Verification that settlement statements and invoices accurately reflects system and market data	The prospective EIM Entity settlement statements and invoices that allocate charges and credits to its customers accurately reflect system and market data during parallel operations.	JOINT	On Track	WAPA-DSW's new Settlement system validation is lagging. Validation is expected to complete by the end of May 2023.	Tariff section 29.2(b)(7)(F)(ii)
27	Monitoring	Data monitoring	Sufficient and adequate data is available to the CAISO and the Department of Market Monitoring	All required market monitoring data is available during testing and during post go-live for the key metrics (any exceptions will be addressed). CAISO will provide a market report that will provide publicly available information to all market participants.	CAISO	Complete	CAISO Market Quality team provided an email verifying that they are able to see the data they require to complete their analysis. Daily reports are being provided.  DMM sent an email confirming that they are able to access the data to complete their analysis.	Tariff section 29.2(b)(7)(K)(v)
28	Parallel Operations Plan	Deployment plan	Parallel operations run consistently and in accordance with the timeframe set forth in the prospective EIM Entity specific parallel operation plan	Parallel operations runs consistently within normal production CAISO Market disruption tolerances.	CAISO	Complete	CAISO management provided an email attesting that Parallel Operations ran consistently within normal tolerances, and cited the market quality team's analysis report.	Tariff section 29.2(b)(7)(J)
29	Outage Management System	Transmission and generation outage submittal and retrieval	The prospective EIM Entity will verify its ability to submit and retrieve outage information with the CAISO	The prospective EIM Entity validate their ability to submit and retrieve transmission out-of-service outages, generation Pmax derates, generation Pmin rerates, and generation out-of-service outage tickets within the required timelines.	JOINT	Complete	WAPA-DSW submitted several outages and submitted outage IDs to CAISO for review. CAISO confirmed their accuracy.	Tariff section 29.2(b)(7)(G)
30	Communications between the CAISO and the prospective EIM Entity	Voice and/or electronic messaging	Implemented process and procedures used for voice and/or electronic messaging	The process and procedures are incorporated into the prospective EIM Entities business processes before the start of market simulation.	WAPA-DSW	Complete	WAPA-DSW provided an email confirming they have implemented processes and procedures for voice and electronic messaging.	Tariff section 29.2(b)(7)(H)(i)

Readiness Criterion Identifier	Readiness Category	Criteria	Measurable Elements	Threshold	Owner	Status	Evidence	Tariff Mapping
31	Communications between the CAISO and the prospective EIM Entity	Communication tools	Staff are trained on communication procedures and tools	The prospective EIM Entity operations staff who will have responsibility for EIM operations, transactions and settlements are trained on the relevant operating procedures and tools used for EIM related communications before the start of parallel operations	WAPA-DSW	Complete	WAPA-DSW provided an email confirming that training on communications tools has been completed.	<a href="#">Tariff section 29.2(b)(7)(H)(ii)</a>
32	Communications between the CAISO and the prospective EIM Entity	3 <sup>rd</sup> party transmission service provider	The third party transmission service provider information that supports EIM Transfers and Real-Time Dispatch included in the Full Network Model is available during parallel operations	The CAISO provides third party transmission service provider and path operator information to the prospective EIM Entity through parallel operations	WAPA-DSW	Complete	WAPA-DSW provided an email stating they have no cases where WAPA-DSW is reliant on third party transmission for generation within the BA to get to the load.	<a href="#">Tariff section 29.2(b)(7)(H)(iii)</a>
33	EIM Available Balancing Capacity	Identification of EIM Available Balancing Capacity	Participating resources and non-participating resources for EIM Available Balancing Capacity.	The prospective EIM Entity has identified EIM participating resources and non-participating resources that it intends to designate in the EIM Resource Plan as EIM Available Balancing Capacity	WAPA-DSW	Complete	WAPA-DSW sent an email confirming they have tested the Available Balancing Capacity feature.	<a href="#">Tariff section 29.2(b)(7)(K)(iii)</a>

**Attachment B – Affidavit of Khaled Abdul-Rahman**

**Informational Readiness Certification for**

**WAPA-DSW's**

**Participation in the Energy Imbalance Market**

**California Independent Systems Operator Corporation**

**March 3, 2023**



Affidavit of Khaled Abdul-Rahman Certifying Readiness of the Western Area Power Administration (WAPA-DSW) Implementation in the Energy Imbalance Market

I, Khaled Abdul-Rahman, Vice President of Power Systems and Market Technology for the California Independent System Operator Corporation (CAISO), hereby certify as follows:

1. As the Vice President of Power Systems and Market Technology, I am responsible for the systems and processes that support and enable the Energy Imbalance Market and, as such, I have responsibility for the implementation of WAPA-DSW into that market.
2. I have reviewed the readiness dashboard and find that it is accurate and complete. All readiness criteria set forth in the CAISO's tariff and business practice manual have been satisfied or are expected to be satisfied as of WAPA-DSW's April 5, 2023 implementation date as further explained in WAPA-DSW's certification of readiness.
3. Based on the readiness dashboard and other materials and my own review of relevant information and direct involvement with the readiness efforts, including testing, market simulation, training and parallel operations, and barring unforeseen developments, the systems and processes of the CAISO and WAPA-DSW will be ready to implement WAPA-DSW's implementation in the Energy Imbalance Market on April 5, 2023.
4. I will ensure that the CAISO maintains resource commitments necessary to sustain readiness through April 5, 2023 and address any unexpected conditions that may arise before April 5, 2023 that could undermine grid operation or market operation within the existing EIM Area. I will continue to monitor progress and resolve any unexpected conditions that may arise.
5. Actual implementation of WAPA-DSW on April 5, 2023 is conditioned upon the lack of any unexpected and unresolved issues that could undermine grid operation or market operation within the existing EIM Area. I will update this certification in the event any unexpected issues are not resolved as of April 5, 2023.

I hereby declare under penalty of perjury that the foregoing statements are true and correct to the best of my knowledge, information, and belief:

DocuSigned by:  
*Khaled Abdul-Rahman*  
018C998C28F6404...

Khaled Abdul-Rahman, Vice President, Power Systems and Market Technology

March 3, 2023

**Attachment C – Affidavit of Jack Murray**

**Informational Readiness Certification for**

**WAPA-DSW's**

**Participation in the Energy Imbalance Market**

**California Independent Systems Operator Corporation**

**March 3, 2023**



Affidavit of Jack D. Murray certifying readiness of the  
Western Area Power Administration (WAPA-DSW) Implementation  
in the Energy Imbalance Market

I, Jack D. Murray, Senior Vice President and Desert Southwest Regional Manager of WAPA-DSW, hereby certify as follows:

1. As the Senior Vice President and Desert Southwest Regional Manager, I am ultimately responsible to the WAPA-DSW for ensuring that all the systems and processes that support and enable the WAPA-DSW Balancing Authority Area to participate in EIM are established and ready for EIM operations. As such, I have overall responsibility for the implementation of WAPA-DSW's entry into that market.
2. I have reviewed the readiness dashboard and find that it is accurate and complete. All applicable readiness criteria set forth in the California Independent System Operator's ("CAISO") tariff and business practice manual for the EIM have been satisfied or are expected to be satisfied as of WAPA-DSW's April 5, 2023, implementation date.
3. While WAPA and CAISO have collaboratively worked to satisfy nearly all the readiness criteria, I want to acknowledge that WAPA is still working on readiness criteria No. 25 which requires WAPA to be capable of verifying the CAISO's daily and monthly settlement statements, and weekly invoices. WAPA's vendor solution for shadow settlements is currently providing data that approximates CAISO's results but will require improvement to provide us with a consistent shadow capability. We anticipate the work on this item to be complete no later than April 5, 2023.
4. In addition to criteria No. 25, I also want to acknowledge that WAPA is still working on readiness criteria No. 26 which requires WAPA to verify that it can properly sub-allocate EIM charges and credits to its transmission customers consistent with attachment T of WAPA's tariff and applicable rate schedules. I expect this work to be complete by April 5, 2023, but no later than when WAPA issues its first EIM bill to transmission customers currently scheduled for May 25, 2022.
5. Except as qualified in section 3 and 4 above, based on the readiness dashboard and other materials prepared for me or for those that report directly to me and my own review of relevant information and direct involvement with readiness efforts, including testing, market simulation, training, and parallel operations, and barring unforeseen developments, the systems, and processes of CAISO and WAPA-DSW will be ready to implement WAPA-DSW's participation in the EIM on April 5, 2023.
6. I will ensure that WAPA-DSW maintains resource commitments necessary to sustain readiness through April 5, 2023, and address any unexpected conditions that may arise before April 5, 2023, that could undermine grid operation or market operation within the existing EIM Area. I will continue to monitor progress and resolve any unexpected conditions that may arise.

7. Actual implementation of WAPA-DSW's entry on April 5, 2023, is conditioned upon the lack of any unexpected and unresolved issues that could undermine grid operation or market operation within the existing EIM Area. I will update this certification in the event any unexpected issues are not resolved as of April 5, 2023.

I hereby declare under penalty of perjury that the foregoing statements are true and correct to the best of my knowledge, information, and belief.

Jack D.  
Murray

Digitally signed by Jack D.  
Murray  
Date: 2023.02.28  
19:43:57 -07'00'

---

Jack D. Murray  
Senior Vice President and  
Desert Southwest Regional Manager  
March 1, 2023

**Attachment D – Parallel Operations Market Quality Report**

**Informational Readiness Certification for**

**WAPA-DSW's**

**Participation in the Energy Imbalance Market**

**California Independent Systems Operator Corporation**

**March 3, 2023**



California ISO

---

**Market Validation of Parallel Operations  
for Western Area Power Administration – Desert  
Southwest Region (WAPA-DSW) Entity**

**February 24, 2023**

## Contents

<b>EXECUTIVE SUMMARY .....</b>	<b>3</b>
<b>BACKGROUND AND SCOPE .....</b>	<b>4</b>
<b>MARKET TRENDS .....</b>	<b>5</b>
<b>MARKET VALIDATION ITEMS.....</b>	<b>11</b>
<b>CONCLUSION .....</b>	<b>12</b>

## Executive Summary

Parallel operations activities of the Western Energy Imbalance Market (WEIM) started on February 2, 2023. This effort provides an opportunity to assess the readiness of Western Area Power Administration – Desert Southwest Region (WAPA-DSW), the prospective Energy Imbalance Market (WEIM) Entity, to participate in the WEIM. One of the readiness criteria requires the ISO to provide a market performance report for the period of parallel operations carried out for the integration of WAPA-DSW into the real-time energy imbalance market. This report fulfills that requirement and summarizes the main findings of market validation carried out by the ISO with an emphasis on the WEIM results for the WAPA-DSW.

The ISO validated both prices and schedules as part of the overall market performance based on input data that fed to the market systems parallel operations from February 2 through February 15, 2023. This validation demonstrates that the market solution produced is as expected and is consistent with the market rules as designed, recognizing that the input data may be influenced by limitations inherent in the parallel operating environment and these limitations may affect the quality of the solution. When factors affecting the input data are controlled for, the quality of the market solutions are as expected and indicate that the systems and processes of WAPA-DSW are capable of operating in production.

## Background and Scope

The intent of parallel operations is to run the market to simulate as close as practically possible actual operating conditions of the system, and to provide WAPA-DSW with an opportunity to go over specific day-to-day processes and activities required for the operation of the WEIM. This set-up provides WAPA-DSW and the ISO with an opportunity to test their systems and procedures in advance of financially binding market operations.

Although closely resembling actual operations, parallel operations have some inherent limitations that need to be considered when evaluating market results, including the following:

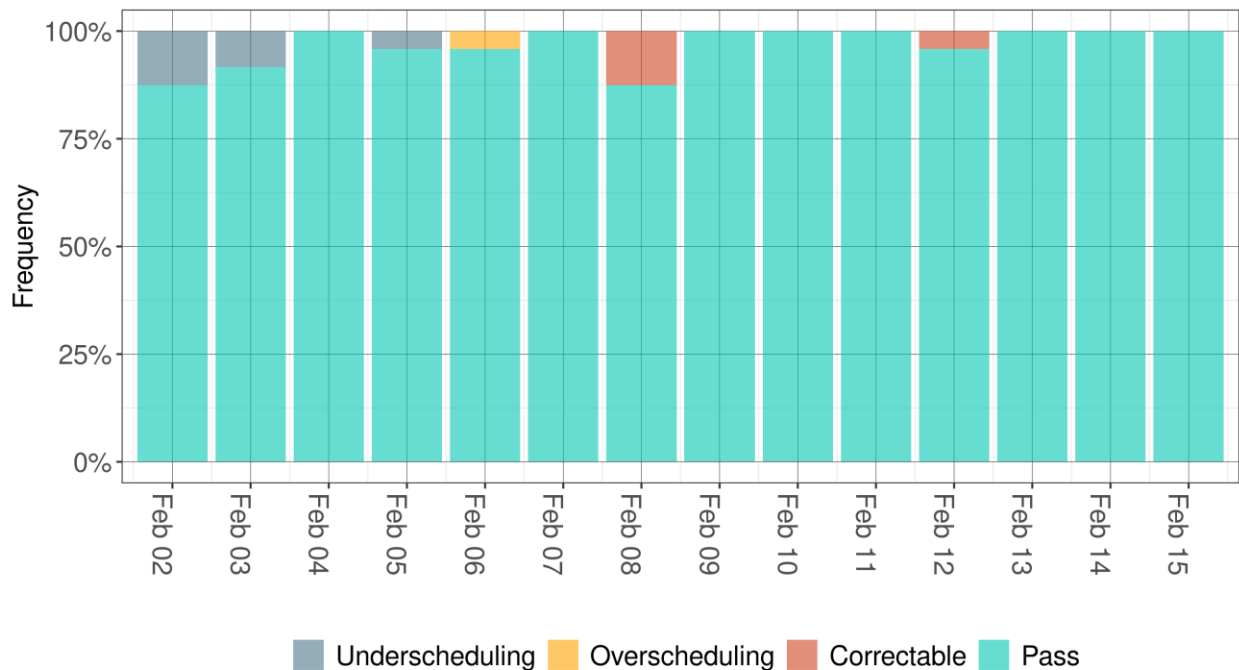
- i) The real-time market requires a set of data inputs to run. In actual real-time market operations, many of these inputs are dynamic, dependent on the participants' resources actual performance, and following instructions. For example, in an actual operating environment, telemetry received from resources gives the information to the ISO system of the operating status of the units, which are changing dynamically and interact with the market systems as the conditions change. During parallel operations, these iterative and interactive data processes are limited because the resources of the prospective WEIM entity are not yet required to follow their five-minute dispatch instruction. Similarly, if telemetry from actual production is used, there may be a potential for mismatches between what the actual system is running with versus what the market is projecting due to units potentially not following market instructions. Therefore, the information regarding the resource's performance feedback to the market systems may or may not be related to the dispatch instruction issues through the parallel operations environment.
- ii) In actual operations, intertie resources require a closed loop for the market system to fully reflect the system and market conditions and intertie schedules eventually need to be tagged in order to reflect the system data flows. For parallel operations, it is not possible to replicate fully the actual tagging process, which may pose an additional challenge based on the data that is fed into the market system.
- iii) During parallel operations, the market participant is still defining its resources' data, including characteristics and bids, which consist of three-part bids used for generation resources that require careful consideration of start-up, minimum load and energy bid costs. During this period, the participant is also learning the impacts of the resources constraints on the actual operations of the market.
- iv) During the period of parallel operations, the prospective WEIM entities bids and base schedules are merged with the bids and base schedules from the current production systems to simulate the actual production environment. The process of combining information from two systems needs some time to synchronize the data flow across various applications.

These factors, among others, have an effect on the market results and the quality of the solution. Therefore, conclusions on the quality of the market results must consider the input data and the inherent set-up for parallel operations to avoid misleading conclusions about the actual functionality and robustness of the market. The Market Trends section provides metrics that capture WAPA-DSW’s market performance during parallel operations; also, it includes various system issues that were identified during parallel operations and that affected market performance. The Market Validation items section provide a summary of issues identified during parallel operations.

## Market Trends

Figure 1 shows the WAPA-DSW BAA’s performance for the balancing test as required under section 29.34(k) of the ISO tariff for the period of February 2, 2023 until February 15, 2023. The balancing test provides a reference of how well balanced (energy supply defined by the hourly base schedules meets the demand defined by the forecast respectively) the WEIM entity BAA is going to be into the real-time energy imbalance market. Having a large percentage of positive imbalance means the real-time market will be the last resort to balance the area incrementally. The incremental balancing of supply will come from the bid-in capacity made available in the market in addition to the base schedule or WEIM transfers between the participating WEIM entities’ BAAs. During the first 14 days of parallel operations, WAPA-DSW passed the balancing test in 97.92 percent of hours. For February 8 and February 12, 2023, there was an issue with the parallel operations environment, which incorrectly processed the load forecast for WAPA-DSW leading to a correctable event. WAPA-DSW passed the majority of the tests with less than 1 MW submission difference and has been diligent about identifying the issues that have caused failures.

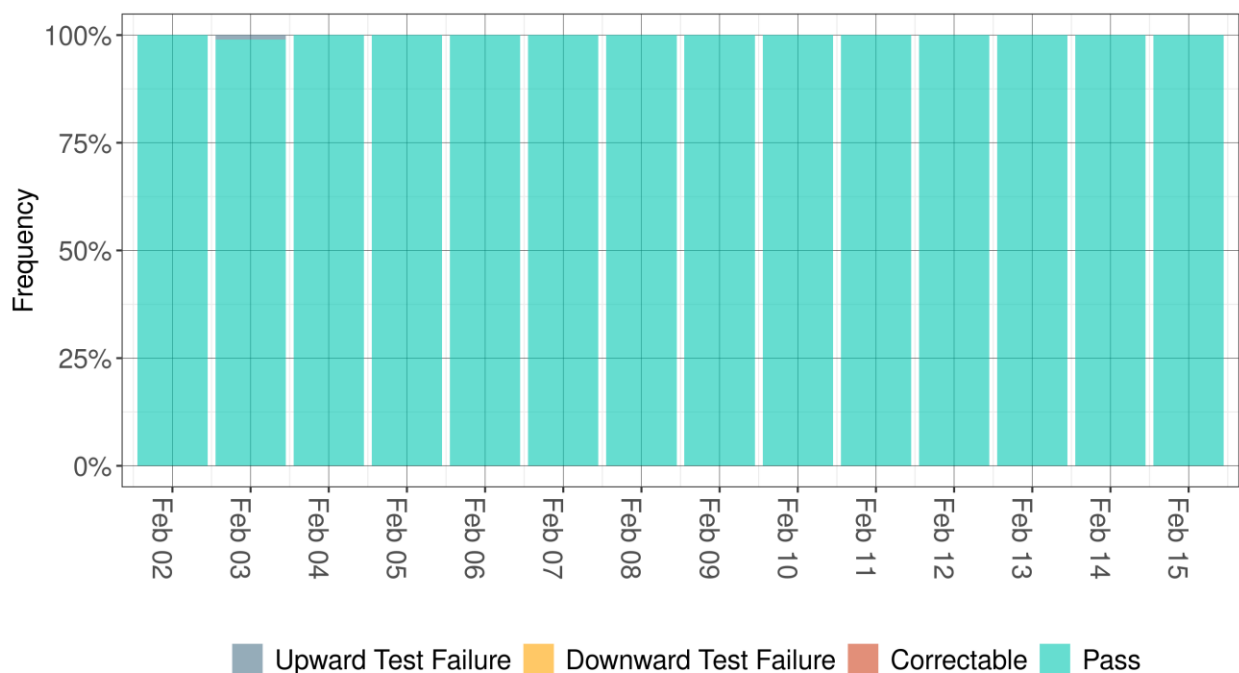
**Figure 1: Daily frequency of power balancing test results**



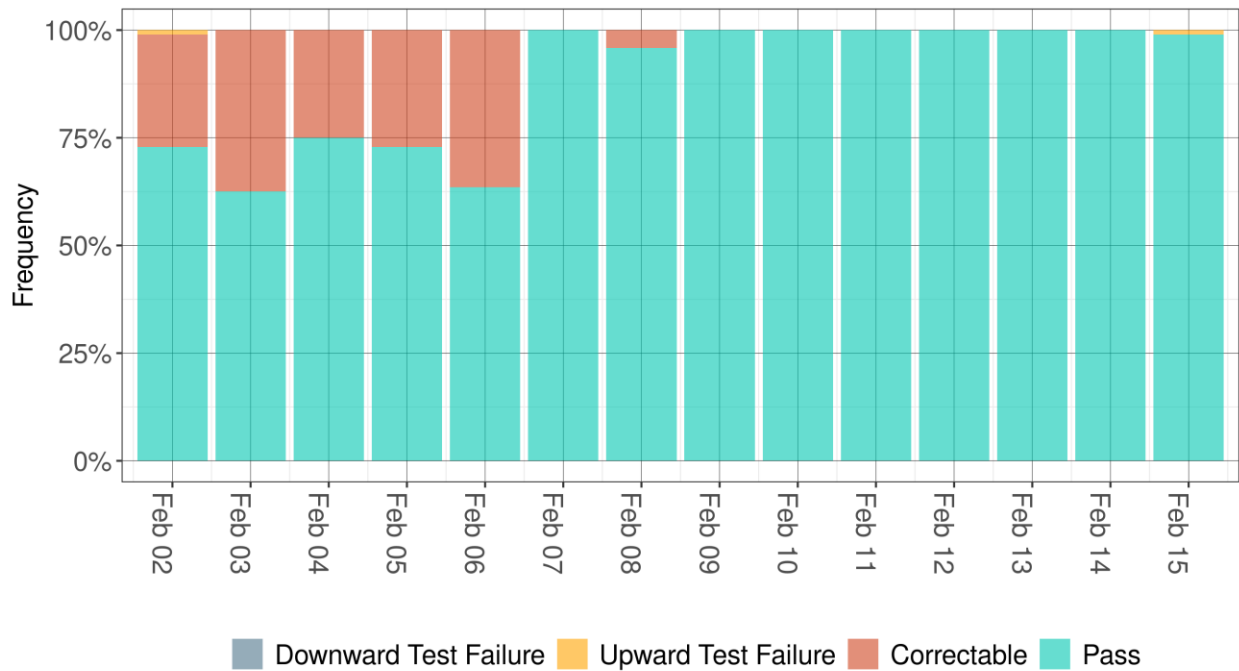


A second test carried out before running the real-time market is the bid-range capacity test. Figure 2 shows the WAPA-DSW BAA’s performance for the bid-range capacity test for February 2 through February 15, 2023. During the first 14 days of parallel operations, WAPA-DSW passed 99.93 percent of the tests.

**Figure 2: Daily frequency of bid range capacity test results**

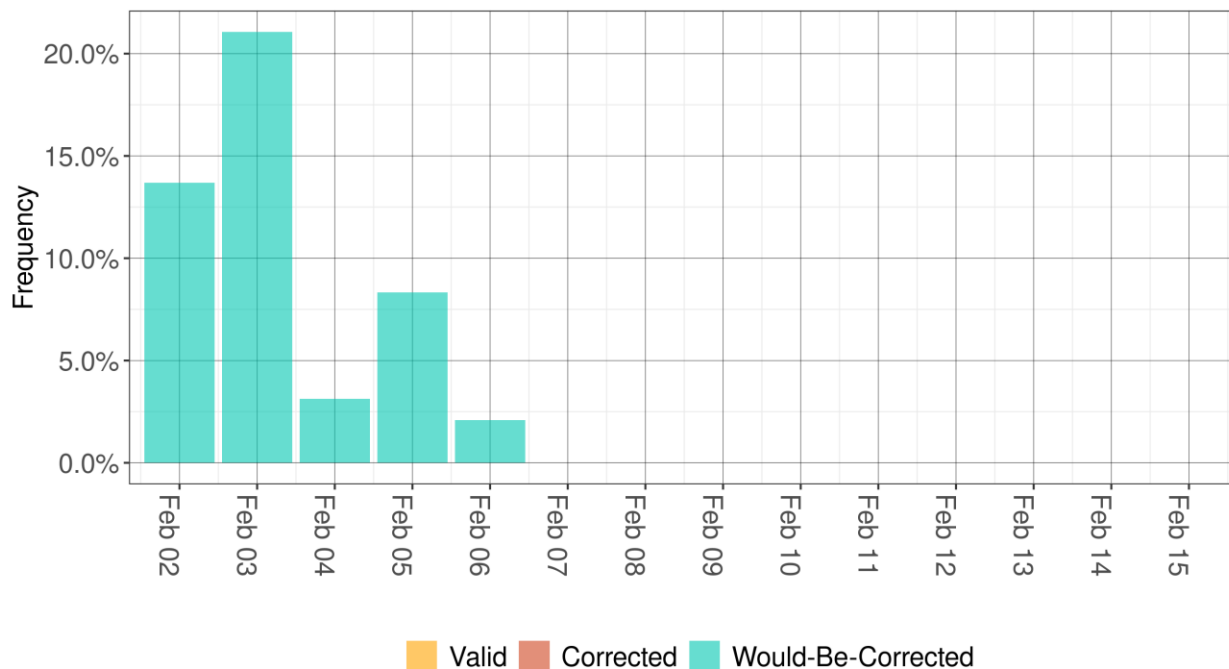


A third test carried out before running the real-time market is the flexible ramp sufficiency test, as required by section 29.34 (m) of the ISO tariff. The flexible ramp sufficiency test evaluates whether the WEIM entity has sufficient flexible ramp capacity to meet both its upward and downward ramp requirements based on optimized resource schedules before the trading hour. From February 2<sup>nd</sup> to February 6<sup>th</sup>, there was an issue where duplicate base ETSR schedules were incorrectly submitted by WAPA-DSW, this resulted in large MW swings for all resources due to the varying base schedules. As this was an incorrect submission from the WAPA-DSW entity, this is considered as a correctable event. From February 2 through February 15, 2023, WAPA-DSW passed the flexible ramp up tests in 99.85 percent of the hours and passed the flex ramp down test in 100 percent of the hours.

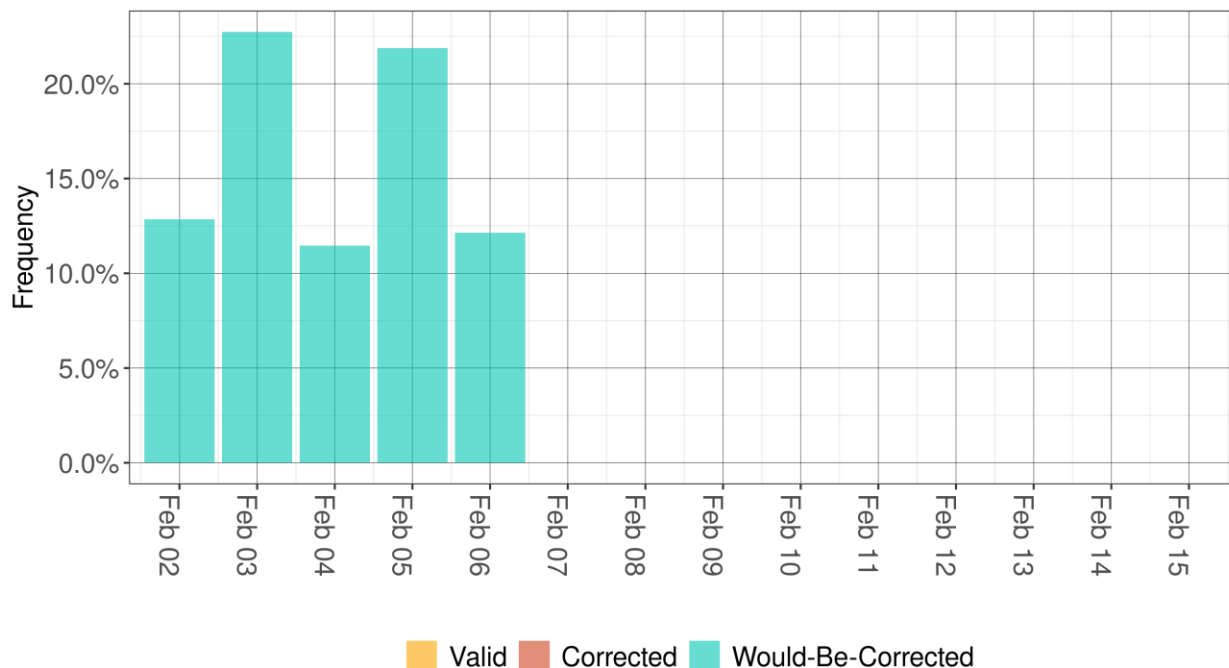
**Figure 3: Daily frequency of flexible ramp test results**


Figures 4 and 5 show the frequency of power balance constraint infeasibilities for under-generation conditions in both the Fifteen Minute Market (FMM) and real-time dispatch (RTD) markets. The power balance constraint infeasibilities are pegged to the corresponding penalty prices, of \$1000/MWh (or \$2000 for certain conditions under implementation of FERC order 831) for under-supply infeasibilities, and about -\$150/MWh for over-supply infeasibilities. However, during parallel operations, the WEIM market for WAPA-DSW has been set-up to run under the conditions reflecting the price discovery mechanism that is in effect under the transitional period (the first six months in an actual production system). Under this functionality, when its power balance constraint is infeasible, the market will reflect the last economic signal instead of the penalty prices. The first six months transitional period pricing is based on the FERC Order<sup>1</sup>, which grants the prospective WEIM entity the time to re-adjust and fine-tune its systems, processes, and procedures to avoid conditions that trigger administrative penalty prices due to false under-supply or over-supply conditions. The transition period pricing also shields the prospective WEIM entity from getting administrative penalty prices during the first six months. This period allows the entity to gain production experience in dealing with timely response to inform the market about operators’ manual actions that are taken or decided outside the market to maintain the WEIM entity BAA reliability or balancing needs such as deployment of operating reserve in response to forced outages.

<sup>1</sup> *Calif. Ind. System Op.*, 153 FERC ¶ 61,104 (2015).

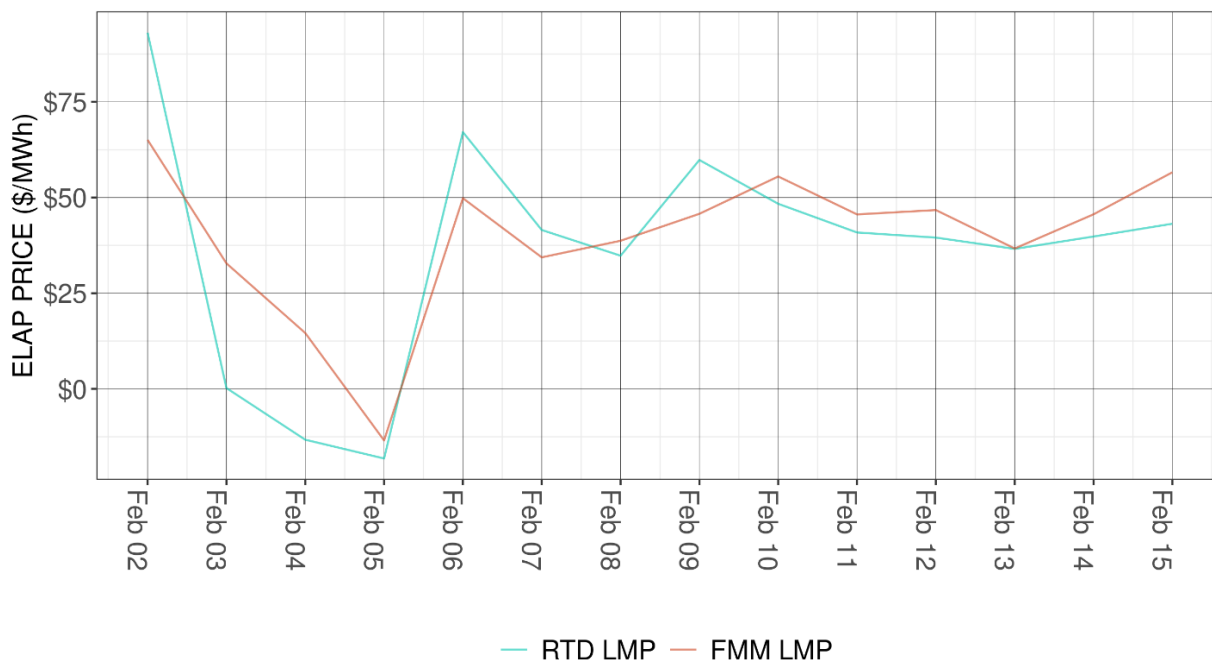
**Figure 4: Daily frequency of supply infeasibilities in the fifteen-minute market**


All of the infeasibilities observed in the FMM and RTD market were due to the duplicate base schedules submitted for the base ETSRs mentioned earlier and hence they are all deemed as correctable events.

**Figure 5: Daily frequency of supply infeasibilities in the five-minute market**


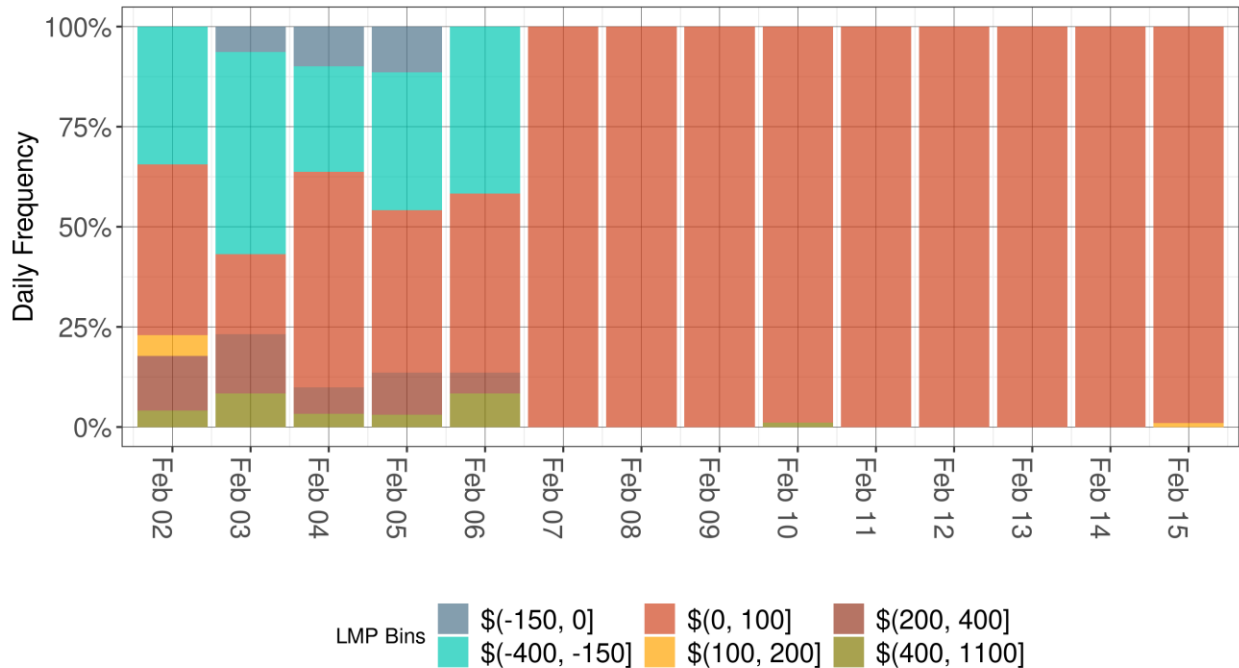
The Figure 6 shows the daily average ELAP locational marginal prices (LMPs) for the fifteen-minute market and the five-minute market. The average daily prices from February 2 through February 15, 2023 in the fifteen-minute market were between \$-13.47/MWh and \$65.07/MWh. The average five-minute prices were between \$-18.19/MWh and \$93.06/MWh.

**Figure 6: Daily average of fifteen-minute market and five-minute market prices**

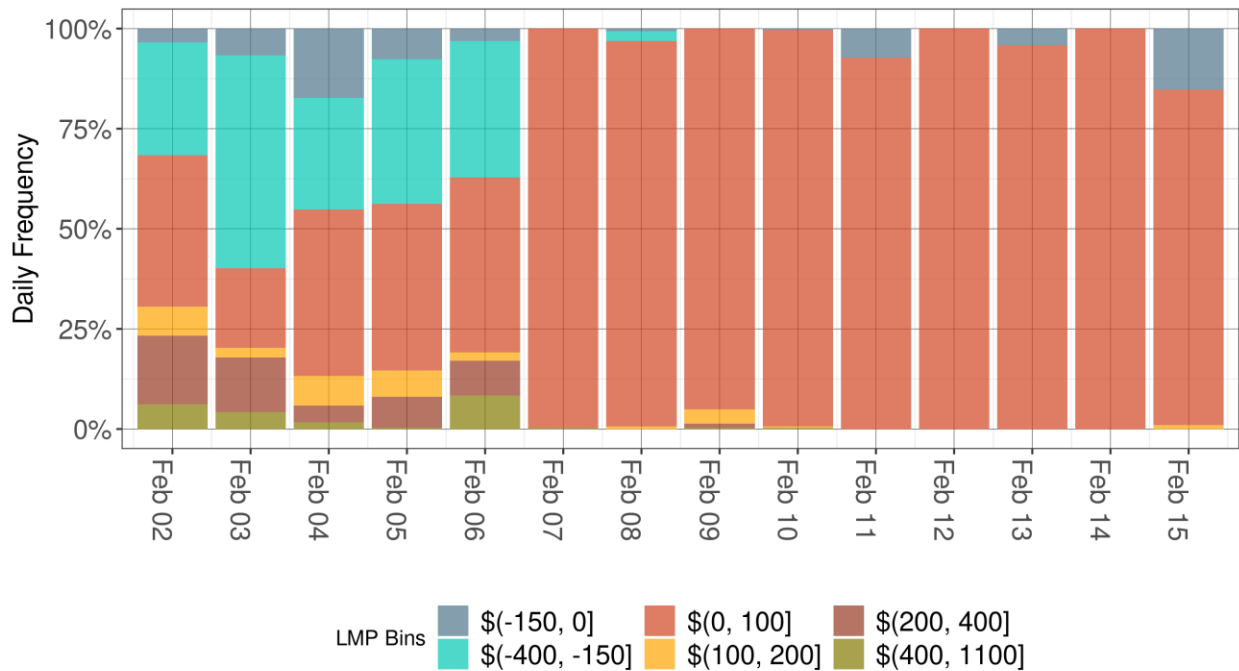


Figures 7 and 8 show the FMM and RTD ELAP prices for the WAPA-DSW BAA classified by price bins.

**Figure 7: Daily frequency of fifteen-minute prices organized by price ranges**



For all trade dates from February 2 through February 15, 2023 about 78.2 percent of the FMM intervals observed prices were between \$0/MWh and \$100/MWh. At the same time, 74.5 percent of the five-minute prices were between \$0/MWh and \$100/MWh. Excluding the trade dates between February 2<sup>nd</sup> and February 6<sup>th</sup> when there was a correctable event, 99.53 percent of the FMM intervals observed prices were between \$0/MWh and \$100/MWh, and 95.37 percent of the five-minute prices were between \$0/MWh and \$100/MWh.

**Figure 8: Daily frequency of five-minute prices organized by price ranges**


### Market Validation Items

1. **Parallel Operation Telemetry Streaming Issue**  
 From February 2 to February 8, 2023 the ISO was streaming in both production telemetry and Stage simulation telemetry data when it should have only been Stage simulation telemetry data. This caused large oscillations in resource output and as a result large oscillations in resource dispatch. The ISO corrected this to stream only simulator data.
  
2. **Stage run failures**  
 From February 10 to February 11, 2023, there were issues getting RTD runs to solve in Stage. There were data issues with resource parameters that made the solutions difficult to solve within the time parameters required so RTD runs were missed for an extended period of time. The ISO aligned the parameters so that the RTD optimization could solve.
  
3. **Resource Tolerance Values**  
 Resources with non-zero Pmin values are not dispatchable until the resource’s output reaches the Pmin MW value. However, the ISO needs to account for telemetry below the Pmin for power balance purposes. The ISO has a tolerance MW function to recognize when output is close to Pmin and then the real-time market can start dispatching the resource. The tolerance MW for the new WEIMs was set to zero MW in Stage so a small amount of telemetry was

recognized as full output at Pmin and causing erroneous dispatches in FMM. The ISO implemented tolerance MWs in the Stage environment on February 6, 2023.

4. Duplicate base schedules on base ETSR

Between February 2 and 6, duplicate schedules on base ETSRs were incorrectly submitted by WAPA-DSW, and this resulted in large MW swings for all WAPA-DSW resources due to the varying base schedules. The issue was corrected in the evening of February 6 after which prices and resource dispatches settled to reasonable values.

## Conclusion

The ISO validated both prices and schedules based on input data fed through the market systems parallel operations from February 2 through February 15, 2023. This validation demonstrates that the market solution was produced as expected and is consistent with the market rules as designed, recognizing that the input data may be influenced by limitations inherent in the parallel operating environment and these limitations may affect the quality of the solution. When factors affecting the input data are fixed or controlled for, the quality of the market solutions are as expected and indicate that the systems and processes of WAPA-DSW are capable of operating in production.

## 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, CA this 3rd day of March, 2023.

*/s/ Jacqueline Meredith*

Jacqueline Meredith  
California ISO  
250 Outcropping Way  
Folsom, CA 95630