



January 28, 2022

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 Tacoma Power's Participation  
in the EIM  
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 Tacoma Power (Tacoma), has determined that, following market simulation and an adequate period of parallel operations, the CAISO and Tacoma have met 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 Tacoma affidavit of Joseph A. Wilson, PE, Transmission and Distribution Power Section Manager. This filing certifies the readiness of the CAISO and Tacoma to proceed with Tacoma's participation in the CAISO's Energy Imbalance Market (EIM) on March 2, 2022, without exception, consistent with the requirement to do so at least 30 days prior.

### I. Background

The EIM 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

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<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).

authorities to join the EIM beyond the CAISO balancing authority area. The CAISO's EIM 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 EIM 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 EIM 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 EIM entity attesting that both have prepared and made ready the systems and processes for the new EIM entity to commence financially binding participation in the EIM.<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 Tacoma ran market simulation scenarios from October 1, 2021 to November 30, 2021. Parallel (*i.e.*, financially nonbinding) operations, which began on December 1, 2021, will run through at least January 28, 2022 and, in any event, will continue to be supported and available to Tacoma until March 2, 2022. During market simulation and parallel operations, the CAISO and Tacoma 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 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 Tacoma's participation in the EIM.

The market simulation confirmed system functionality and connectivity by identifying issues and software variances in advance of implementation that have since

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<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).

<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 2022 release, Western EIM Bonneville Power Administration entities at: <https://www.caiso.com/informed/Pages/ReleasePlanning/Default.aspx>.

been resolved. In addition, market simulation permitted the CAISO and Tacoma to validate performance of the systems and processes under a variety of structured scenarios. The market simulation dashboard dated December 3, 2021 demonstrated that the CAISO and Tacoma were ready to enter parallel operations. Having achieved the benefits from market simulation, the CAISO and Tacoma transitioned to parallel operations on December 1, 2021.

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 Tacoma 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 Tacoma 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 Tacoma to identify and resolve software issues. The dashboards dated December 22, 2021, January 3, 2022, and January 14, 2022 showed the progress during initial parallel operations as additional readiness criteria were met. The final dashboard, dated January 28, 2022, 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 Tacoma's compliance with criteria. The dashboard shows that all readiness criteria have been satisfied or will be satisfied by March 2, 2022.

Section 29(b)(6) requires that a senior officer of the CAISO and a prospective EIM entity attest (1) that the processes and systems of the prospective EIM 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 Tacoma affidavit of Joseph A. Wilson, PE, Transmission and Distribution Power Section 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 Tacoma is prepared to enter financially binding production EIM operations on March 2, 2022. 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 Tacoma has identified any exception to any of the readiness criteria. However, it will be necessary to update the Tacoma parallel

operations environment prior to March 2, 2022 following the recently announced delay of the Bonneville Power Administration EIM implementation date to May 3, 2022. The CAISO and Tacoma will coordinate their efforts associated with this activity and will follow up with respect to this readiness certification as may be appropriate.

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

Parallel operations allowed the CAISO and Tacoma to identify and resolve numerous input, process, and software issues prior to the commencement of financially binding operations.<sup>8</sup> The CAISO and Tacoma 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 Tacoma are ready to operate in production.

### **IV. Attachments**

- Attachment A: Readiness Dashboard Report
- Attachment B: Affidavit of Khaled Abdul-Rahman
- Attachment C: Affidavit of Joseph A. Wilson, PE
- Attachment D: Parallel Operations Market Quality Report

### **V. 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 Tacoma will notify the Commission in the event of any subsequent determination that the implementation

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<sup>8</sup> The market quality report on parallel operations dated January 21, 2022 explains how each of these issues impacted the market results and how they were resolved by the CAISO and Tacoma.

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of Tacoma into the EIM on March 2, 2022 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**

**Tacoma Power**

**Participation in the Energy Imbalance Market**

**California Independent Systems Operator Corporation**

**January 28, 2021**

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 indicating that the averages for EIM BAA load generation and interchange values are within tolerances during measured dates.	Tariff section 29.2(b)(7)(A)(i)
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 show the average deviation between telemetered values (SCADA).	Tariff section 29.2(b)(7)(A)(ii)
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 the EIM Entity including unit level SCADA vs SE estimates from EMS and an analysis comparing total deviation/total actual MW.	Tariff section 29.2(b)(7)(A)(ii i)
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	Tacoma provided evidence via email confirming that this criteria has been verified and CAISO provided email to confirm	Tariff section 29.2(b)(7)(A)(i v)
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	Email from CAISO affirming that all planned agreement tasks are complete.	Tariff section 29.2(b)(7)(K)(i)

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.	Tacoma Power	Complete	Tacoma affirmed all training for Operators is complete. CAISO training lead provided confirmation email.	Tariff section 29.2(b)(7)(B)
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 evidence of Tacoma EIM BAA from Forecast Monitor showing accuracy measurements for T-60, FMM and RTD.	Tariff sections 29.2(b)(7)(C)(i)-(iii)
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	Tacoma EIM and CAISO Short term Forecasting team confirmed that Tacoma EIM does not have any VER.	Tariff section 29.2(b)(7)(C)(iv)
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.	Tariff section 29.2(b)(7)(K)(iv)



Readiness Criterion Identifier	Readiness Category	Criteria	Measurable Elements	Threshold	Owner	Status	Evidence	Tariff Mapping
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 indicate the potential implications of a swing from 5% over to 5% under forecast in one hour to the next.	Tacoma Power	Complete	Tacoma provided screen shots of "Balancing Test Results" report from CMRI to support the criteria for Pre-Parallel Ops (Market Simulation).  CAISO Market Quality team provided daily reports to support the criteria during Parallel Ops.  CAISO provided an email summarizing the results and verifying that the criteria was met by entity.	Tariff section 29.2(b)(7)(D)(i)
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.	Tacoma Power	Complete	Tacoma provided screen shots of "Balancing Test Results" report from CMRI to support the criteria for Pre-Parallel Ops (Market Simulation).  CAISO Market Quality team provided daily reports to support the criteria during Parallel Ops.  CAISO provided an email summarizing the results and verifying that the criteria was met by entity.	Tariff section 29.2(b)(7)(D)(ii i)
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	Tacoma provided screen shots of "Balancing Test Results" report from CMRI to support the criteria for Pre-Parallel Ops (Market Simulation).  CAISO Market Quality team provided daily reports to support the criteria during Parallel Ops.  CAISO provided an email summarizing the results and verifying that the criteria was met by entity.	Tariff section 29.2(b)(7)(D)(ii )
13	Operating Procedures	CAISO operating procedures (relevant to EIM operations)	The prospective EIM Entity signs CAISO non-disclosure agreement and receives appropriate CAISO	Operating procedures NDA signed by the prospective EIM Entity.	JOINT	Complete	CAISO lead - This RC is out of date - NDA no longer necessary b/c the information is posted online.	Tariff section 29.2(b)(7)(K)(i)

Readiness Criterion Identifier	Readiness Category	Criteria	Measurable Elements	Threshold	Owner	Status	Evidence	Tariff Mapping
			“public” and “restricted” operating procedures	The prospective EIM Entity receives CAISO operating procedures four months prior to the parallel operations date.				
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.	Tacoma Power	Complete	Tacoma's operating procedures are complete and are uploaded to Kiteworks.	Tariff section 29.2(b)(7)(K)(ii)
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.	Tacoma Power	Complete	Tacoma provided completed Testing Timeline spreadsheet and CAISO Integration Lead reviewed/confirmed.	Tariff section 29.2(b)(7)(E)(i)
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.	Tacoma Power	Complete	Tacoma provided completed Testing Timeline spreadsheet and CAISO Integration Lead reviewed/confirmed.	Tariff section 29.2(b)(7)(E)(ii)
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.	Tacoma Power	Complete	Tacoma EIM provided an email stating that all access is in place for Parallel Operations and a plan is in place to ensure all access is in place for production.  CAISO Client Rep confirmed.	Tariff section 29.2(b)(7)(E)(ii)
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	Tacoma provided completed Testing Timeline spreadsheet and CAISO Integration Lead reviewed/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	Tacoma provided completed Testing Timeline spreadsheet and CAISO Integration Lead reviewed/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	CAISO provided a completed Structured Scenario Report and a Structured Scenario Status matrix.  Tacoma sent a confirmation email of completion and CAISO validated.	Tariff section 29.2(b)(7)(I)(iii)

Readiness Criterion Identifier	Readiness Category	Criteria	Measurable Elements	Threshold	Owner	Status	Evidence	Tariff Mapping
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	Tacoma stated in an email that it is not going to conduct any unstructured scenarios, CAISO Integration Lead confirmed.	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	Tacoma Power	Complete	ISO Market Quality Team provided an email summarizing the Market Results and confirming they are appropriate to meet the threshold criteria.	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 confirmation email that validate market prices and MWs schedules/dispatches observed in market simulation exercises	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.	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	Tacoma provided updated Schedule 1 and CAISO provided Tacoma with a list of all assigned SCID/Resource IDs and the Roles Matrix in a confirmation email.	Tariff section 29.2(b)(7)(I)(i)
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	Complete	Tacoma provided the final updated schedule 1 form and an email confirming this criteria has been met.  CAISO provided a list of all SCIDs and Resource IDs and the completed Roles Matrix, and an email confirming this criterion has been met.	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	Complete	Tacoma settlement lead confirmed receipt of initial and recalculation statements from agreed trade dates.  CAISO settlement lead verified the accuracy of its settlement statements and invoices made available during parallel operations.	Tariff section 29.2(b)(7)(F)(ii)

Readiness Criterion Identifier	Readiness Category	Criteria	Measurable Elements	Threshold	Owner	Status	Evidence	Tariff Mapping
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 were able to see the data required to complete their analysis.  DMM confirmed that they were 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 Executive Sponsor provided an email with evidence indicating that Parallel Operations ran consistently within normal production CAISO Market disruption tolerances.  CAISO verified that Parallel Operations ran consistently within normal CAISO disruption tolerances. RTD/RTPD cumulative uptime average, RTD, FMM and STUC uptime percentage values.	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	CAISO Integration lead and OMS BSM provided evidence that outages were created by Tacoma and processed by CAISO OMS application.  Tacoma provided evidence that internal applications were automatically processing outages and these outages match those provided by the CAISO.	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.	Tacoma Power	Complete	Tacoma PM provided email evidence stating that processes have been implemented that include use of the Everbridge notification system used by CAISO and CAISO performed a test to confirm.	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	Tacoma Power	Complete	Tacoma provided evidence that all appropriate staff have been trained on the communication procedures and tools.  CAISO Training lead sent a confirmation email.	Tariff section 29.2(b)(7)(H)(ii)
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	Tacoma Power	Complete	Tacoma affirmed that they do not use any 3 <sup>rd</sup> party transmission service providers as defined. CAISO Integration lead confirmed NA.	Tariff section 29.2(b)(7)(H)(ii)
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	Tacoma Power	Complete	Tacoma email to CAISO stating that its systems are capable of designated ABC capacity on registered EIM resources whether participating or non-participating and that CAISO system allowed this submission of ABC Capacity. Tacoma confirmed that functionality has been tested and the criteria has been met.	Tariff section 29.2(b)(7)(K)(ii)

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

**Informational Readiness Certification for**

**Tacoma Power**

**Participation in the Energy Imbalance Market**

**California Independent Systems Operator Corporation**

**January 28, 2021**

Affidavit of Khaled Abdul-Rahman Certifying Readiness of the Tacoma Power (Tacoma)  
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 Tacoma 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 Tacoma's March 2, 2022 implementation date.
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 Tacoma will be ready to implement Tacoma's implementation in the Energy Imbalance Market on March 2, 2022.
4. I will ensure that the CAISO maintains resource commitments necessary to sustain readiness through March 2, 2022 and address any unexpected conditions that may arise before March 2, 2022 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 Tacoma on March 2, 2022 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 March 2, 2022.

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



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

January 28, 2022

**Attachment C – Affidavit of Joseph A. Wilson, PE**

**Informational Readiness Certification for**

**Tacoma Power**

**Participation in the Energy Imbalance Market**

**California Independent Systems Operator Corporation**

**January 28, 2021**





3628 South 35th Street  
Tacoma, Washington 98409-3192

TACOMA PUBLIC UTILITIES

Affidavit of Joseph A. Wilson certifying readiness of the  
City of Tacoma, Department of Public Utilities, Light Division, d/b/a Tacoma  
Power (Tacoma Power) Implementation  
in the Energy Imbalance Market

I, Joseph A. Wilson, PE, Transmission and Distribution Power Section Manager of Tacoma Power, hereby certify as follows:

1. As the Transmission and Distribution Power Section Manager, I am ultimately responsible for Tacoma Power's systems and processes that support and enable the Tacoma Balancing Authority Area to participate in EIM and are ready for EIM operations. As such, I have overall responsibility for the implementation of Tacoma'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 Tacoma's March 2, 2022, implementation date.
3. 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 Tacoma will be ready to implement Tacoma's participation in the EIM on March 2, 2022.
4. I will ensure that Tacoma maintains resource commitments necessary to sustain readiness through March 2, 2022 and address any unexpected conditions that may arise before March 2, 2022 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 Tacoma's entry on March 2, 2022 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 March 2, 2022.

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

Joseph A. Wilson, PE  
T&D Manager

January 12, 2022

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

**Informational Readiness Certification for**

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California ISO

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# **Market Validation of Parallel Operations For Tacoma Power (TPWR) EIM Entity**

**January 21, 2022**

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## Executive Summary

Parallel operations activities of the Energy Imbalance Market (EIM) started on December 1, 2021. This effort provides an opportunity to assess the readiness of the Tacoma Power (TPWR), the prospective Energy Imbalance Market (EIM) Entity, to participate in the EIM. One of the readiness criteria require the ISO to provide a market performance report for the period of parallel operations carried out for the integration of TPWR 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 EIM results for the TPWR.

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 December 1, 2021 through January 7, 2022. This validation demonstrates that the market solution produced is as expected and 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 TPWR 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 TPWR with an opportunity to go over specific day-to-day processes and activities required for the operation of the EIM. This set-up provides TPWR 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 EIM 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. For the first month of parallel operations, the TPWR resources in the production system were not following the ISO's Parallel Operations dispatch instructions, however, the market application was operated in two configurations. The first configuration used the resource actual telemetry as the input but the resources were not following the market instructions. The second configuration was an echo back system, which fed back the resource dispatch operating target as its telemetry thereby creating a scenario of a perfect response by resources for every dispatch instruction. The first configuration, using actual telemetry, was used in six of the 38 days, and the other 32 days used the echo-back system for all or part of the day.
- 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 EIM 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.
- v) From December 23, 2021 to January 3, 2022, support for parallel operations by TPWR and the California ISO was suspended due to holidays<sup>1</sup>. Some bids and schedules were entered ahead of time but the monitoring of the environment was drastically reduced, and thus the results during this time period do not reflect the same quality of solution as the rest of the period.

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 TPWR'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

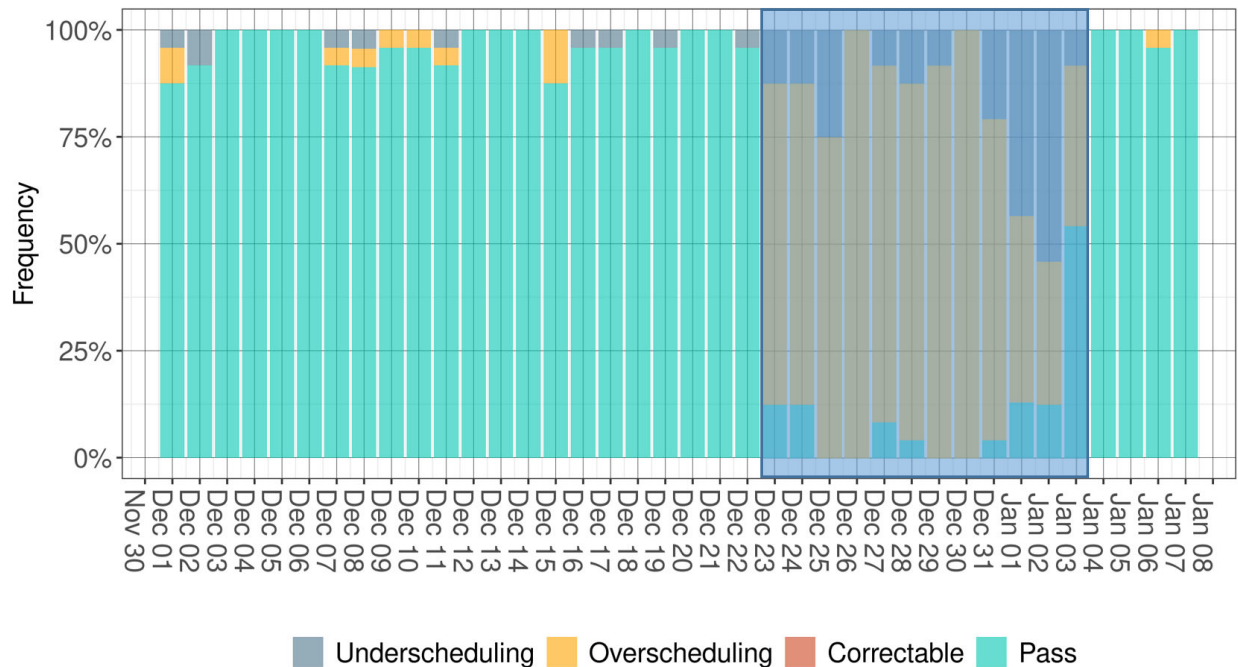
Figure 1 shows the TPWR BAA's performance for the balancing test as required under section 29.34(k) of the ISO tariff for the period of December 1, 2021 until January 7, 2022. The balancing test provides a reference of how well balanced (energy supply defined by the hourly base schedules meets the demand defined by the forecast respectively) the EIM 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 EIM transfers between the participating EIM entities' BAAs. During the first 27 days of parallel operations, by discounting the period of parallel operations without support from December 24 through January 3, TPWR passed the balancing test in 97.53 percent of hours. The Balancing failures that occurred were all related to submission issues. These submission issues ranged from software tagging issues on TPWR's vendor's side to issues with servers

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<sup>1</sup> Parallel OPS was supported for part of the day on January 3, 2022.

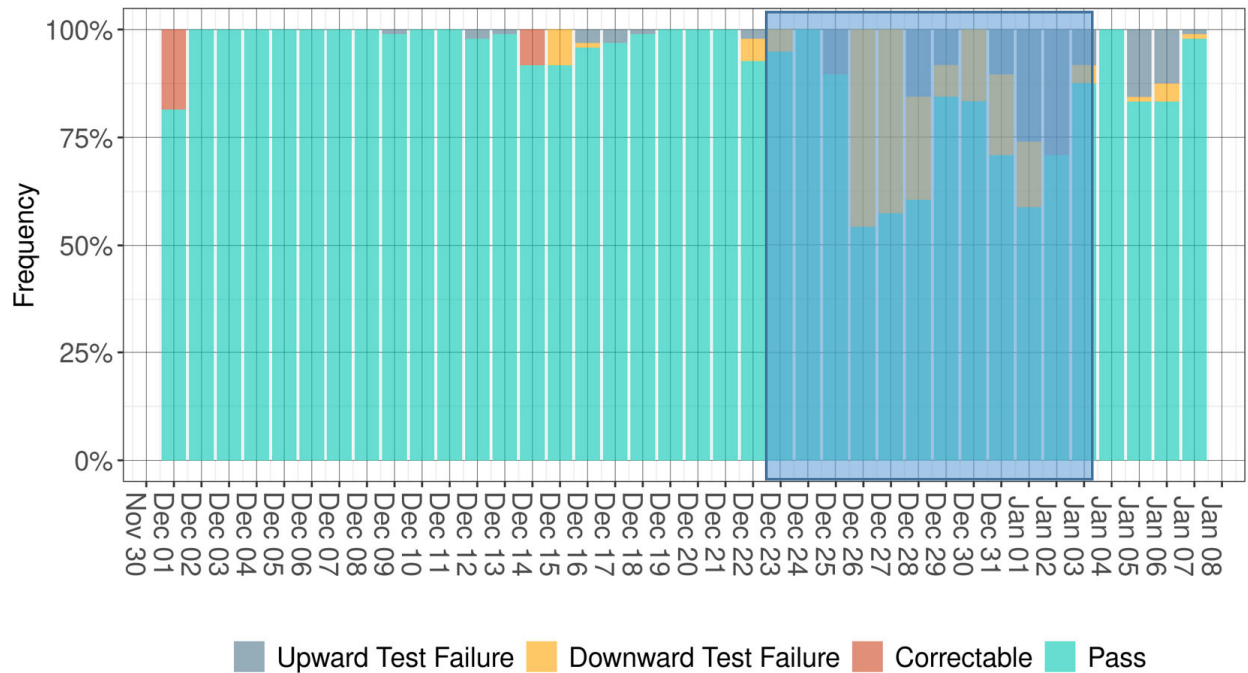
where the balancing application was running. TPWR has passed the majority of the tests with less than 1 MW submission difference and has been diligent about identifying the issues that have caused failures.

**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 TPWR BAA’s performance for the bid-range capacity test for December 1, 2021 through January 7, 2022. All EIM market participants use Scheduling Infrastructure and Business Rules (SIBR) application to submit bids to the ISO market. After the deadline to submit bids for each trading hour, an automated process transfers this bid to various applications for downstream market processes. On December 1, 2021, hour ending 10, 15 and 17, in the ISO parallel operations environment, this automated process was delayed in transferring bids to the BAAOP application that performs the capacity test, resulting in capacity test failures for TPWR. On December 14, 2021, hour ending 18, this automated process was interrupted by a market patch and caused capacity test failures. In Figure 2, these bid-range capacity test failures were represented as correctable events because it was a result of ISO automation process failure. With the correctable event removed from the count of failures and by discounting the period of parallel operations without support, TPWR has passed 98.42 percent of the tests. During the 27 days of active parallel operations with support, there were some valid bid-range capacity test failures. On December 9, 2021, bid range upward capacity test failure in hour ending 23 was due to participating resource carrying regulation up and spinning reserve so that bid range capacity was limited. Other valid failure in the later days shared the same cause that participating resource bid range upward capacity was limited by upward capacity reserve base schedule.



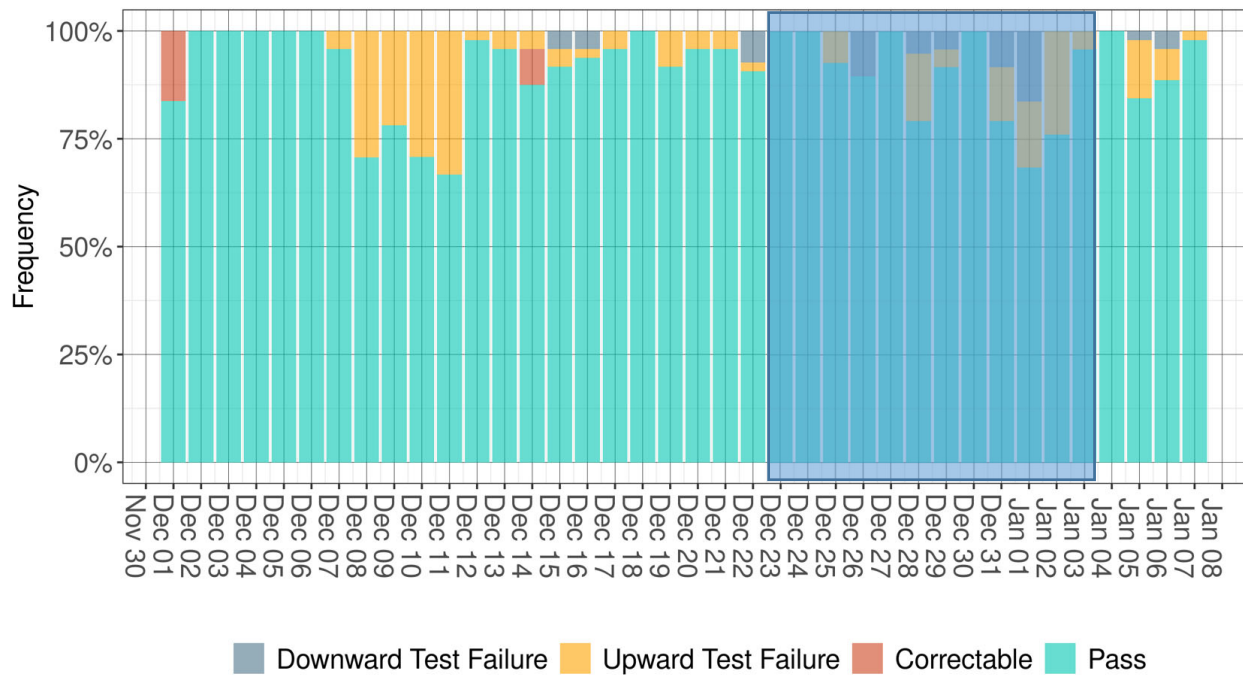
**Figure 2: Daily frequency of bid range capacity test results**


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 flexibility test evaluates whether the EIM entity has sufficient flexible ramp capacity to meet its both upward and downward ramp requirements based on optimized resource schedules before the trading hour. Figure 3 shows the daily frequency of flex ramp test failures observed in the reported period of parallel operation for the TPWR BAA. From December 1, 2021 through January 7, 2022, by discounting the period of parallel operations without support, TPWR passed the flexible ramp up tests in 93.21 percent of the hours and passed the flex ramp down test 99.19 percent of the hours. On December 1, there was a system issue that affected TPWR’s flexible ramp sufficiency test results in hour ending 10, 15 and 17, which is represented as a correctable event in Figure 3. TPWR failed the flex ramp sufficiency test due to an ISO parallel operations system issue that delayed the bid merging process. Since the ISO system process issue drove the flex ramp sufficiency test failure, this failure is classified as a correctable event. On December 14, a market patch affected bid transfer process in hour ending 18, which made this system process issue another correctable event.

During the reported period of parallel operations, there were some valid flexible ramp test failures. On December 7, 2021, the TPWR BAA failed the flexible ramp-up test for all four fifteen-minute intervals in the hour ending 24. This test failure was due to a TPWR non-spinning reserve base scheduling submission issue related to the application TPWR used to perform such task. The flex ramp-up test failures on December 8, 2021 in the early hours of day were driven by the same issue. Besides this, it was observed in these hours that the base schedule submittals on two resources violated a market logic, which required the sum of base schedule on energy, regulation up, spinning reserve and non-spinning reserve to be less than or equal to the Pmax of the resources. On December 9, 2021, the flex ramp-up failure in the first

interval of hour ending 23 was due to large net scheduled interchange(NSI) decrease in the import direction with participating resource carrying upward reserve at the same time. The large NSI change contributed negatively to the upward flex ramp capacity and resources with large amount of upward reserve base schedule resulted in insufficient capacity to meet the flex ramp-up requirement.

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

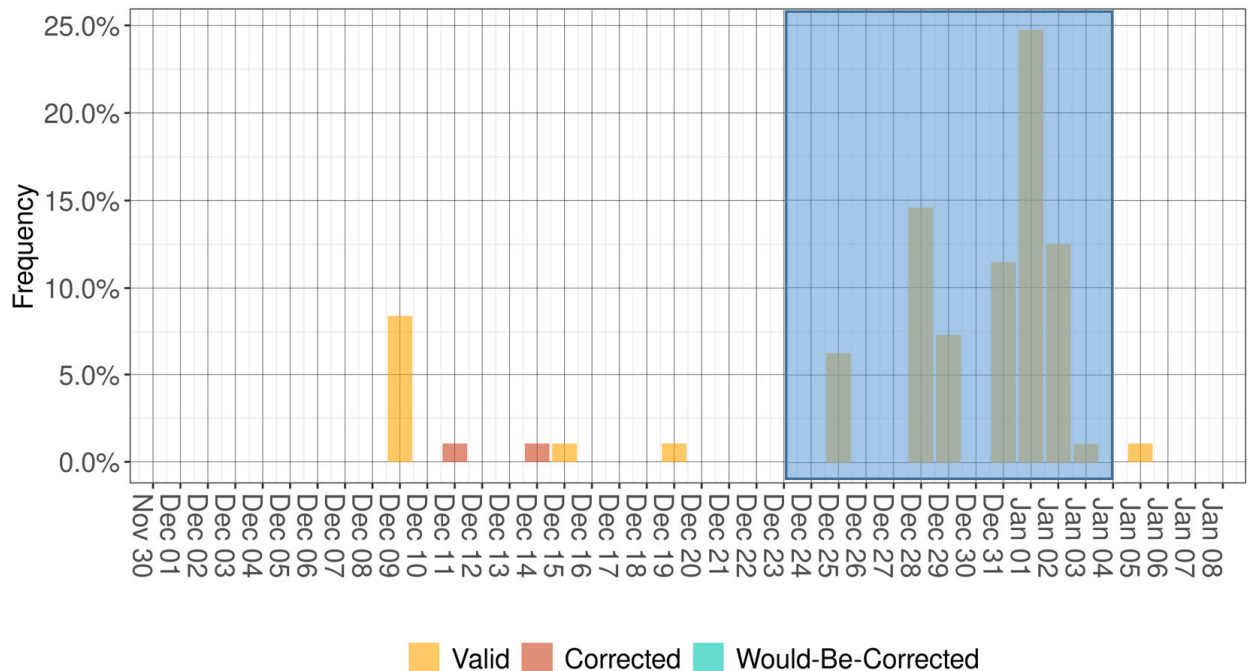


Figures 4 and 5 show the frequency of power balance constraint infeasibilities for under-generation conditions in both the Fifteen Minute Market (FMM) and real-time dispatch (RTD) markets. The power balance constraint infeasibilities are pegged to the corresponding penalty prices, of \$1000/MWh (or \$2000 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 EIM market for TPWR 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 the 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>2</sup>, which grants the prospective EIM 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 EIM entity from getting administrative penalty prices during the first six month. This period allows the entity to gain production experience in dealing with timely response to inform the market about operators’ manual actions that are

<sup>2</sup> *Calif. Ind. System Op.*, 153 FERC ¶ 61,104 (2015).

taken or decided outside the market to maintain the EIM entity BAA reliability or balancing needs such as deployment of operating reserve in response to forced outages.

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

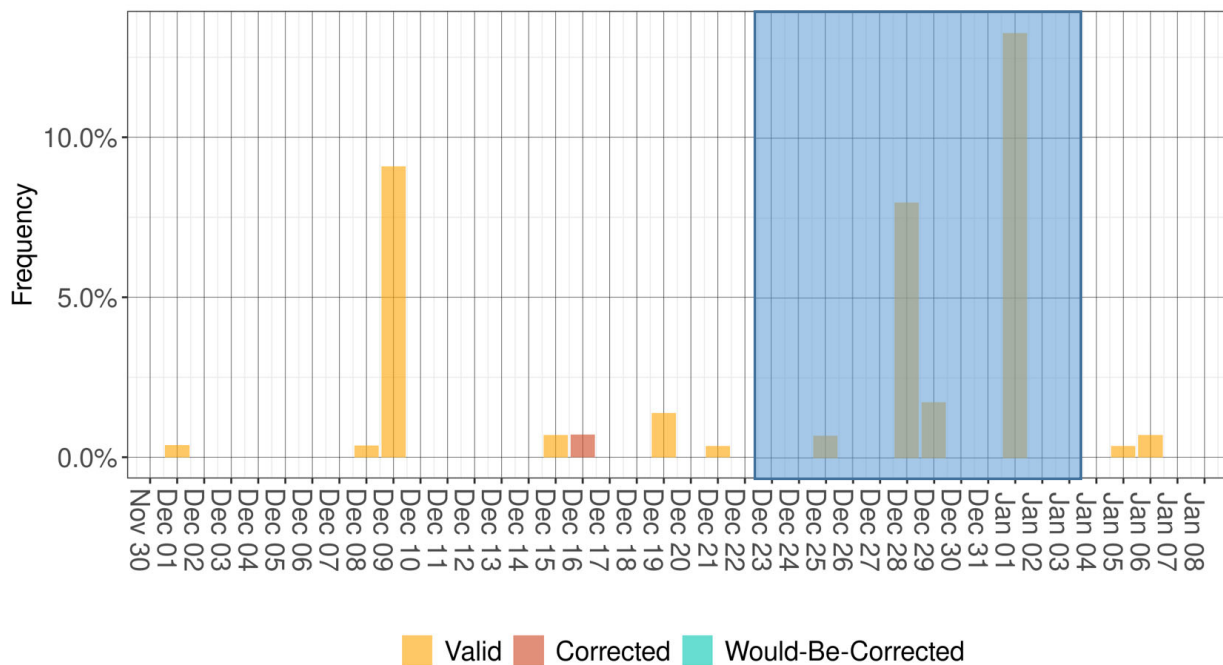


For the fifteen-minute market, TPWR had two correctable infeasibilities from December 01, 2021 through January 07, 2022. The infeasibility in hour ending 23 interval 3 on December 11 was due to a software defect related to ETSR transfer constraint. The ETSR transfer limit was capped due to flex ramp test failure. However, the defect prevented the transfer from being fully used and resulted in under-supply infeasibility. The defect was previously identified and the software vendor is working on a resolution. The infeasibility in hour ending 14 interval 1 on December 14 was due to the same software defect that impacted ETSR transfer constraint. There were some valid infeasibilities during this time period. On December 9, TPWR failed flex ramp-up test due to non-spinning reserve base schedule submission. In RTPD, the resource output was capped again by Pmax minus the non-spinning reserve and could not be dispatched across the forbidden region to meet system demand. On December 19 and January 5, the non-spinning base schedule issue was also the root cause of infeasibility. On December 15, TPWR failed flex ramp-up test in hour ending 23 due to insufficient ramp-up capacity to account for net import schedule decrease. With ETSR transfer limit capped, system was in under-supply condition. On January 3, TPWR had an issue submitting base schedule, which resulted in sufficiency test failure and infeasibility.

For the five-minute market, TPWR had one correctable under-supply power balance infeasibility. On December 16, market had an issue receiving payload containing bid information in hour ending 3. The power balance constraint could not be satisfied without participating resource and system was in under-supply condition. On December 1, in the first hour of parallel operation, the market was still stabilizing

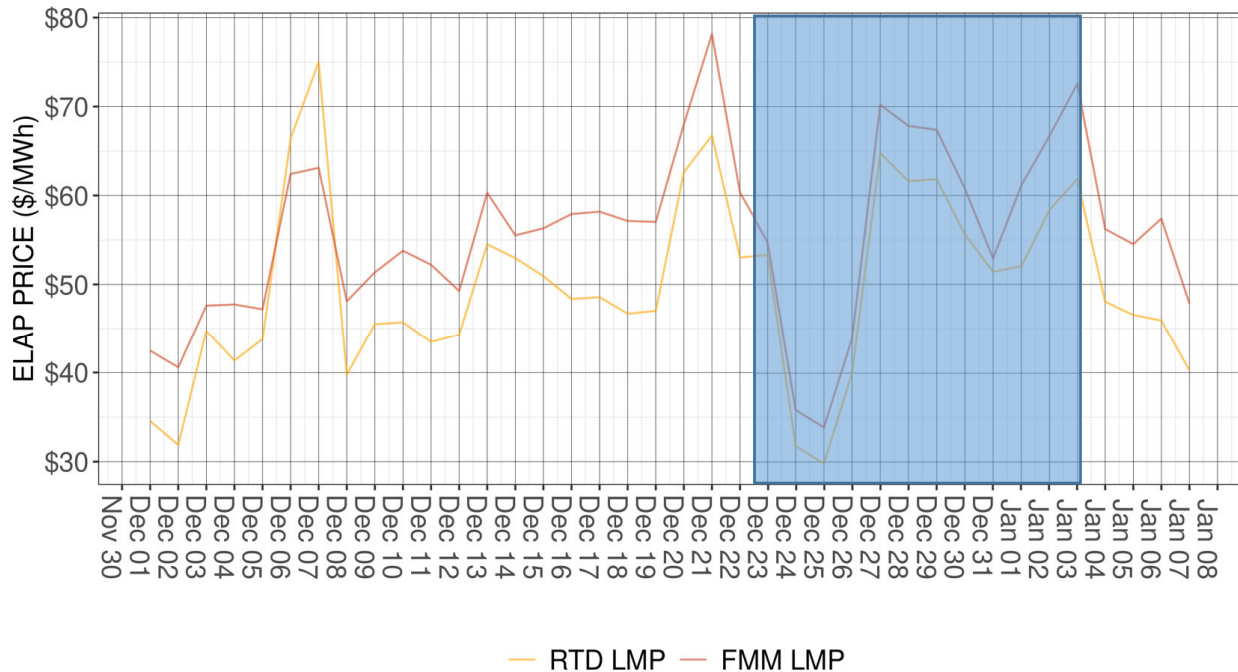
itself and the infeasibility in hour ending 2 was the result of lower NSI import tagging and resource in the process of ramping up. There were some valid infeasibilities during this time period. On December 8 and December 9, the infeasibility was driven by the non-spinning reserve base schedule mentioned earlier. The amount of NR on a resource was limiting the upward flex ramp capacity so that flex ramp-up test failed for the hour. In RTD, the non-spinning base schedule prevented resource from ramping up across the forbidden region and resulted in under-supply condition. On December 15, hour ending 23 saw resources shut down or carried large amount of spinning reserve. The NSI increase in the import direction could not offset the negative contribution to the flex ramp-up from TPWR internal resources, which caused flex ramp-up test failure and under-supply condition in RTD. On December 19, hour ending 17 infeasibility was driven by the same NR base schedule issue mentioned earlier. On December 21 in hour ending 23, NSI increased in the import direction but was still ramping. Two ETSRs were both binding due to low limit set by a neighboring entity so that no more ETSR dynamic transfer was able to flow. With two resources offline, ramping NSI flow and no EIM dynamic transfer, TPWR was in under-supply condition. On January 5, EIM transfer was limited due to bid rang up capacity test failure. With NSI import still ramping up, EIM transfer limitation and higher RTD forecast than RTBS, TPWR was in under-supply condition in the first interval. On January 6, the EMS simulator was turned off based on the schedule. When hour ending 8 interval 4 RTD was run, telemetry of a resource from production environment used by RTD indicated that the resource was operating within the forbidden operating region so that RTD schedule had to keep the resource at the lower end of the forbidden region. This was the cause of infeasibility in this hour.

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



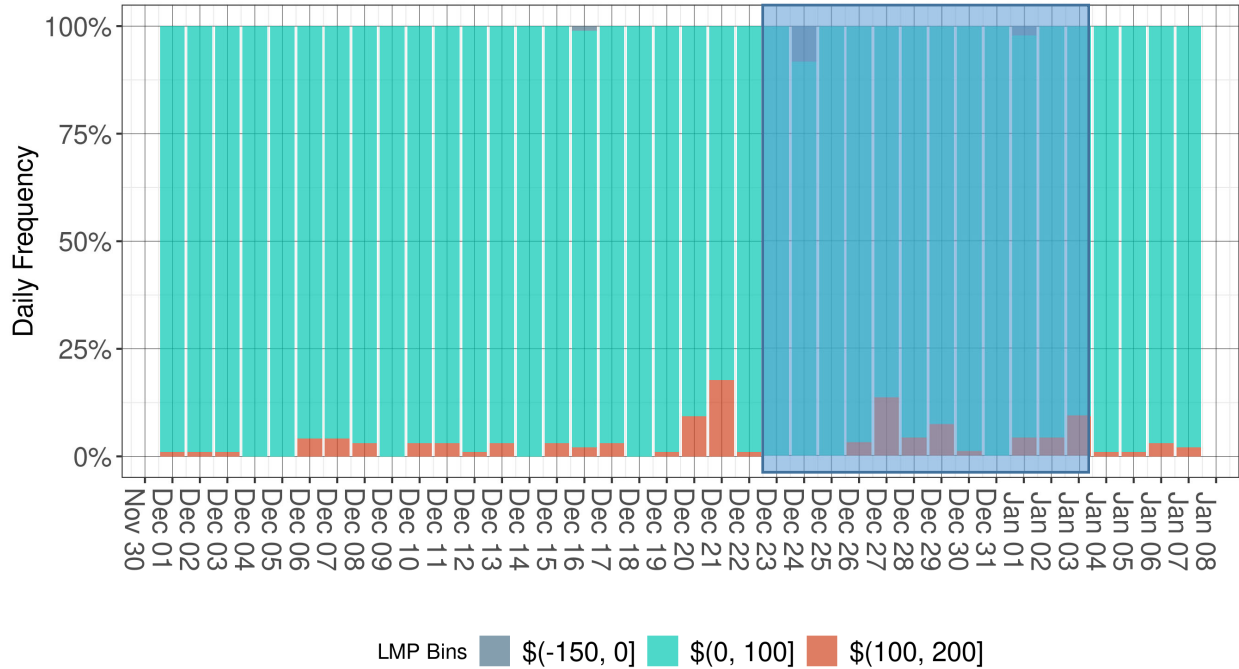
The Figure 6 shows the daily average ELAP locational marginal prices (LMPs) for the fifteen-minute market and the five-minute market. By discounting the period of parallel operations without support, the average daily prices from December 1, 2021 through January 7, 2022 in the fifteen-minute market were between \$40.58/MWh and \$78.15/MWh. The average five-minute prices were between \$31.88/MWh and \$75.01/MWh.

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

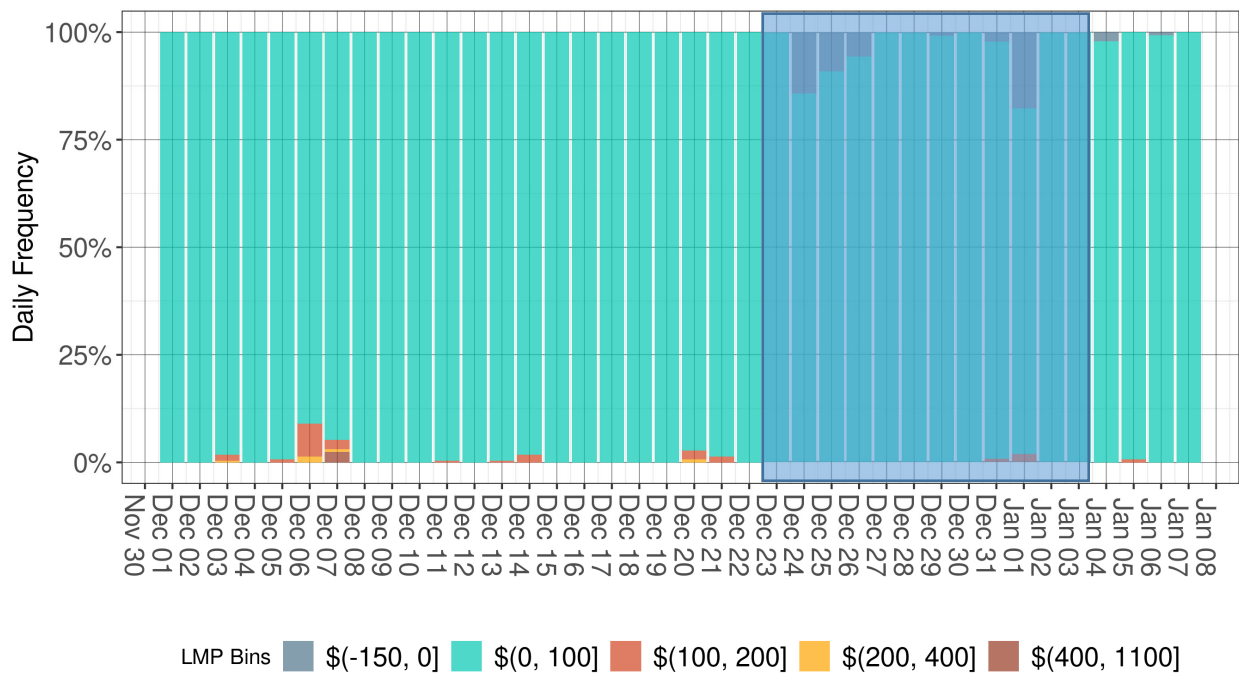


Figures 7 and 8 show the FMM and RTD ELAP prices for the TPWR BAA classified by price bins. For all trade dates from December 1, 2021 through January 7, 2022 about 97 percent of the FMM intervals observed prices were between \$0/MWh and \$100/MWh. At the same time, 98 percent of the five-minute prices were between \$0/MWh and \$100/MWh.

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



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



## Market Validation Items

### 1. Parallel Operation bid transfer Issue

All EIM market participants use Scheduling Infrastructure and Business Rules (SIBR) application to submit bids to the ISO market. After the deadline to submit bids for each trading hour, an automated process transfers all the bids to various applications for downstream market processes. On December 1, 2021, hour ending 10, 15 and 17, and on December, 14 hour ending 18, in the ISO parallel operations environment, this automated process failed to transfer bids for several BAAs, including TPWR BAA, to other market applications. The real-time base schedule and resource sufficiency tests use the corresponding EIM BAA's bids to perform bid-range capacity test and the flexible ramp sufficiency test. Because the bids were missing due to the system issue, all the balancing areas including TPWR failed the bid-range capacity test and the flexible ramp sufficiency test. After the issue was identified, a fix was implemented to resolve the delay of bid merging process. The automated process is controlled via an in-house developed tool to facilitate the parallel operation set up and is not used or needed in production environment, where all bids come to the market from one source.

Resolution: This was an issue in a tool used within the setup of parallel operations only and therefore is not a production issue.

### 2. Available Balancing Capacity(ABC) submittal

ISO has identified a market logic was not followed when TPWR submitted available balancing capacity for resource sufficient tests. The sum of the base schedules from energy, regulation up, spinning reserve and non-spinning reserve shall be less than the resource Pmax. When the market logic was no followed, it contributed to multiple bid range capacity test and flex ramp sufficiency test failures. In some FMM and RTD run, this issue also prevented resource from crossing the forbidden operating region or delayed the crossing process, which led to under-supply infeasibility.

Resolution: TPWR identified an application issue with available balancing capacity submittal and a fix was implemented in January 2022 so that sufficiency test failures were significantly reduced. TPWR is working on establishing a process to ensure this market logic is followed when submitting base schedule to further reduce the amount of sufficiency test failure.

## Conclusion

The ISO validated both prices and schedules based on input data fed through the market systems parallel operations from December 1, 2021 through January 7, 2022. This validation demonstrates that the market solution produced is as expected and 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 TPWR 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 28th day of January, 2022.

*/s/ Jacqueline Meredith*

Jacqueline Meredith  
California ISO  
250 Outcropping Way  
Folsom, CA 95630