



March 2, 2021

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 Los Angeles Department of
Water and 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.¹ The CAISO, in consultation with the Los Angeles Department of Water and Power (LADWP), has determined that, following market simulation and an adequate period of parallel operations, the CAISO and LADWP 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 LADWP affidavit of Paul R. Schultz, Director of Power External Energy Resources. This filing certifies the readiness of the CAISO and LADWP to proceed with LADWP's participation in the CAISO's Energy Imbalance Market (EIM) on April 1, 2021, 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

¹ 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, 2014.² In a March 16, 2015 order,³ the Commission concluded that certain readiness safeguards are necessary prior to activating a prospective EIM entity in production.⁴ 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.⁵ Following two compliance filings, the Commission accepted the CAISO's proposed readiness criteria.⁶ These criteria appear in section 29.2(b)(7) of the CAISO Tariff.

II. Readiness Reporting, Determination, and Attestations

The CAISO and LADWP ran market simulation scenarios from November 3, 2020 to January 29, 2021. Parallel (*i.e.*, financially nonbinding) operations, which began on January 30, 2021, will run through at least March 2, 2021 and, in any event, will continue to be supported and available to LADWP until April 1, 2021. During market simulation and parallel operations the CAISO and LADWP 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.⁷ 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 LADWP'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

² 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).

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

⁴ *Id.* at P 30.

⁵ *Id.* n.85.

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

⁷ 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 EIM Entities LADWP entry for 2021 at: <http://www.caiso.com/informed/Pages/ReleasePlanning/Default.aspx>.

been resolved. In addition, market simulation permitted the CAISO and LADWP to validate performance of the systems and processes under a variety of structured scenarios. The market simulation dashboard dated January 29, 2021 demonstrated that the CAISO and LADWP were ready to enter parallel operations. Having achieved the benefits from market simulation, the CAISO and LADWP transitioned to parallel operations on January 30, 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 LADWP 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 LADWP 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 LADWP to identify and resolve software issues. The dashboard dated February 15, 2021 showed the progress during initial parallel operations as additional readiness criteria were met. The final dashboard, dated February 26, 2021, 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 LADWP's compliance with criteria. The dashboard shows that all readiness criteria have been satisfied or will be satisfied by April 1, 2021.

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 LADWP affidavit of Paul R. Schultz, Director of Power External Energy Resources 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 LADWP is prepared to enter financially binding production EIM operations on April 1, 2021. 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 LADWP has identified any exception to any of the readiness criteria.

III. Market Quality Report on Parallel Operations

Parallel operations allowed the CAISO and LADWP to identify and resolve numerous input, process, and software issues prior to the commencement of financially binding operations.⁸ The CAISO and LADWP worked diligently during parallel operations to identify the cause of the infeasibilities that arose. The attached Market Quality Report indicates that the majority of the power balance infeasibilities identified during the period of parallel operations associated with the readiness determination were valid. These infeasibilities largely appear to have resulted from the challenge of operating a parallel environment while balancing the system in real-time, and will benefit from the six-month transition period for new EIM entities when the operators have the opportunity to fully understand the EIM dynamics and focus their response in a more timely manner. The report also demonstrates that the remainder of power balance infeasibilities 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 17 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 LADWP are ready to operate in production.

⁸ The market quality report on parallel operations dated February 26, 2021 explains how each of these issues impacted the market results and how they were resolved by the CAISO and LADWP or will be resolved prior to the implementation date.

IV. Attachments

Besides this transmittal letter, this filing includes these attachments:

- Attachment A: Readiness Dashboard Report
- Attachment B: Affidavit of Khaled Abdul-Rahman
- Attachment C: Affidavit of Paul R. Schultz
- 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 LADWP will notify the Commission in the event of any subsequent determination that the implementation of LADWP into the EIM on April 1, 2021 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

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Attachment A – Readiness Dashboard Report

Informational Readiness Certification for

Los Angeles Department of Water and Power’s

Participation in the Energy Imbalance Market

California Independent Systems Operator Corporation

March 2, 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 provided data and screen shots indicating that the averages of EIM BAA load generation and interchange values are within tolerances during measured dates during Market Simulation and Parallel Operations.	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 that shows the average deviation between telemetered values (SCADA) during Market Simulation and Parallel Operations.	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 reports showing the State Estimator is solving for LADWP including unit level SCADA vs SE estimates from EMS and analysis comparing total deviation/total actual MW in the Market Simulation and Parallel Operations environments.	Tariff section 29.2(b)(7)(A)(iii)
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 EMS team provided an email summarizing the non-conforming loads and other non-generating resources and stating they are modeled separately at CAISO. Additionally, he provided a spreadsheet with JOUs and Pseudo Ties.	Tariff section 29.2(b)(7)(A)(iv)
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 an email stating that all agreements have been executed and included the official notification from Regulatory contracts showing each agreement status.	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.	LADWP	Complete	LADWP sent an email confirming that all training is complete. CAISO training lead confirmed.	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"> Accuracy of the CAISO forecast of EIM demand based on historical actual load data for the defined EIM demand forecast boundaries. Identification of weather station(s) locations used in forecasting, if applicable. 	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	ISO Short term Forecasting team provided screenshots of EIM BAA from the 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	ISO Short term Forecasting team provided screenshots verifying that VER forecasts have been submitted and the data flow has been demonstrated.	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	ISO Short term Forecasting team provided screenshots verifying that CAISO has all load, wind, and solar forecast data necessary to perform the flexible ramp calculation. And that thresholds are in place, to be re-evaluated in March prior to go-live based on a larger set of parallel production data.	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.	LADWP	Complete	LADWP provided an email with CMRI reports indicating that LADWP passed the balancing standards required for Market Simulation. CAISO Integration Lead provided an email stating that the balance test was met for 5 days during Parallel Operations.	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.	LADWP	Complete	LADWP provided an email with CMRI reports indicating that LADWP passed the flexible ramping test standards required for Market Simulation. CAISO Integration Lead provided an email stating that the Flex Ramp sufficiency test was met for 5 days during Parallel Operations.	Tariff section 29.2(b)(7)(D)(iii)
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	LADWP provided an email with CMRI reports indicating that LADWP passed the capacity test standards required for Market Simulation. CAISO Integration Lead provided an email stating that the Capacity test was met for 5 days during Parallel Operations.	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 "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.	Tariff section 29.2(b)(7)(K)(i)
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.	LADWP	Complete	LADWP provided CAISO with the completed procedures.	Tariff section 29.2(b)(7)(K)(ii)

Readiness Criterion Identifier	Readiness Category	Criteria	Measurable Elements	Threshold	Owner	Status	Evidence	Tariff Mapping
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.	LADWP	Complete	LADWP provided evidence indicating that this testing is complete. CAISO 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.	LADWP	Complete	LADWP provided evidence indicating that this testing is complete. CAISO 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.	LADWP	Complete	LADWP provided an email stating that all access is in place for Parallel Operations and a plan is in place for Production access.	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	LADWP 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	LADWP 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	CAISO provided a report indicating the completed status of each of the identified scenarios. Additionally, reports were provided that documented what occurred during the execution of each scenario. No report for scenario 1 as a formal execution was not necessary, and 7 because it was not applicable for LADWP.	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	LADWP identified 2 unstructured scenarios for readiness certification. <ul style="list-style-type: none"> US1 IPP Dynamic Dispatch US2 Glendale and Burbank Implementation LADWP provided an email stating the testing of these scenarios completed successfully. Noting that the Mona and Gonder limits were not verified in Parallel Operations, but verification is before Go-live.	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	LADWP	Complete	CAISO provided an email stating that the market results are appropriate for market simulation.	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 provided an email stating that the market results are appropriate for market simulation.	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 provided the Parallel Operations Market Quality Report indicating that CAISO validated both prices and schedules based on input data that fed to the market systems 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	CAISO provided an email with the Resource ids, SC IDs, and the completed roles matrix.	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	LADWP provided an email confirming receipt of initial and recalculation statements and confirmed core functionality has been demonstrated; while situational "corner cases" are being addressed with bug fixes and are expected to be resolved prior to Go-live. CAISO confirmed the accuracy during parallel operations.	Tariff section 29.2(b)(7)(F)(i)

Readiness Criterion Identifier	Readiness Category	Criteria	Measurable Elements	Threshold	Owner	Status	Evidence	Tariff Mapping
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	LADWP sent an email confirming that the settlement statements and Invoices received for the agreed trade dates reflect accurate allocations. CAISO verified the accuracy of the statements and invoices made available during parallel operations.	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	ISO Market Quality team provided an email verifying that they are able to see the data they require to complete their analysis. DMM provided 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 provided an email stating that Parallel Operations is running as anticipated.	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	The prospective EIM Entity verified their ability to submit transmission out-of-service outages, generation Pmax derates, generation Pmin rerates, and generation out-of-service outage tickets within the required timelines. CAISO confirmed that they were able to receive them.	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.	LADWP	Complete	CAISO Training lead provided an email stating that this training has been completed for LADWP.	Tariff section 29.2(b)(7)(H)(i)
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	LADWP	Complete	CAISO Training lead sent an email confirming that this training is complete.	Tariff section 29.2(b)(7)(H)(ii)

Readiness Criterion Identifier	Readiness Category	Criteria	Measurable Elements	Threshold	Owner	Status	Evidence	Tariff Mapping
32	Communications between the CAISO and the prospective EIM Entity	3 rd 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	LADWP	Complete	LADWP provided an email confirming that do not have any third party transmission providers. CAISO responded that they confirm this is true.	Tariff section 29.2(b)(7)(H)(iii)
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	LADWP	Complete	LADWP provided an email confirming that they validated the ABC functionality with participating and non-participating resources.	Tariff section 29.2(b)(7)(H)(iii)

Attachment B – Affidavit of Khaled Abdul-Rahman

Informational Readiness Certification for

Los Angeles Department of Water and Power’s

Participation in the Energy Imbalance Market

California Independent Systems Operator Corporation

March 2, 2021

Affidavit of Khaled Abdul-Rahman Certifying Readiness of Los Angeles Department of Water and Power (LADWP) 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 LADWP 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 LADWP's April 1, 2021 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 LADWP will be ready to implement LADWP's implementation in the Energy Imbalance Market on April 1, 2021.
4. I will ensure that the CAISO maintains resource commitments necessary to sustain readiness through April 1, 2021 and address any unexpected conditions that may arise before April 1, 2021 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 LADWP on April 1, 2021 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 1, 2021.

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

March 2, 2021

Attachment C – Affidavit of Paul R. Schultz

Informational Readiness Certification for

Los Angeles Department of Water and Power’s

Participation in the Energy Imbalance Market

California Independent Systems Operator Corporation

March 2, 2021

Affidavit of Paul R. Schultz certifying readiness of the
Los Angeles Department of Water and Power (LADWP) Implementation
in the Energy Imbalance Market

I, Paul R. Schultz, Director of Power External Energy Resources of LADWP, hereby certify as follows:

1. As the Director of Power External Energy Resources, I am ultimately responsible to the LADWP for ensuring that all the systems and processes that support and enable the LADWP EIM Entity Balancing Authority Area to participate in EIM are established and ready for EIM operations. As such, I have overall responsibility for the implementation of LADWP'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 LADWP's April 1, 2021, 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 LADWP will be ready to implement LADWP's participation in the EIM on April 1, 2021.
4. I will ensure that LADWP maintains resource commitments necessary to sustain readiness through April 1, 2021 and address any unexpected conditions that may arise before April 1, 2021 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 LADWP's entry on April 1, 2021 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 1, 2021.

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



Paul R. Schultz
Director of Power External Energy Resources
February 26, 2021

Attachment D – Parallel Operations Market Quality Report

Informational Readiness Certification for

Los Angeles Department of Water and Power's

Participation in the Energy Imbalance Market

California Independent Systems Operator Corporation

March 2, 2021

**Market Validation of Parallel Operations
For Los Angeles Department of Water and Power
(LADWP) EIM Entity**

February 26, 2021

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Executive Summary

Parallel operations activities of the Energy Imbalance Market (EIM) started on January 30, 2021. This effort provides an opportunity to assess the readiness of the Los Angeles Department of Water and Power (LADWP), 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 LADWP Balancing Authority Area (BAA) 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 LADWP (BAA).

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 January 30 through February 15. 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 LADWP 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 LADWP with an opportunity to go over specific day-to-day processes and activities required for the operation of the EIM. This set-up provides LADWP 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:

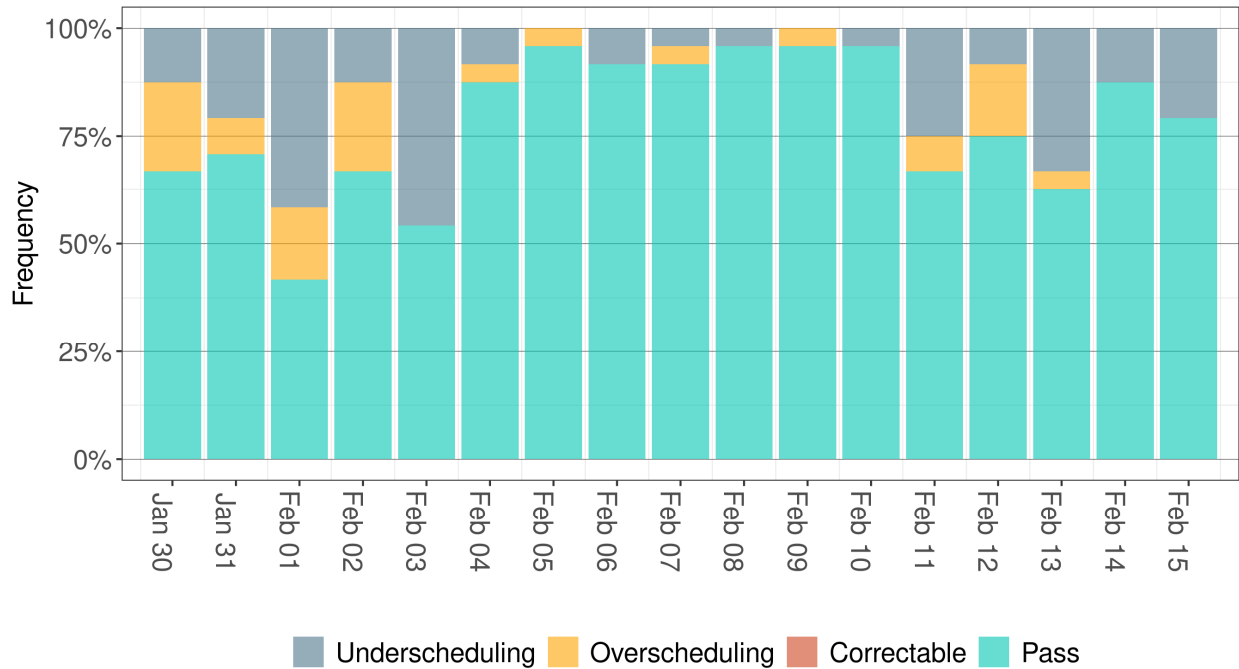
- i) The real-time market requires a set of data inputs to run. In actual real-time market operations, many of these inputs are dynamic, dependent on the participants' resources actual performance, and following instructions. For example, in an actual operating environment, telemetry received from resources 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 the 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 Seventeen days of parallel operations, not all LADWP resources were following the ISO dispatch instructions, however, the market applications were operated in two configurations. The first configuration used the resource actual telemetry as the input but the resources may not follow 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 nine of the 17 days, and the other eight 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.

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 LADWP's market performance during parallel operations; also, it includes various system issues that were identified during parallel operations and that impacted market performance. The Market Validation items section provide a summary of issues identified during parallel operations.

Market Trends

Figure 1 shows the LADWP BAA's performance for the balancing test as required under section 29.34(k) of the ISO tariff. 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 in 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 17 days of parallel operations, LADWP passed the balancing test in 78 percent of hours; however, they passed the balancing test for 94.44 percent of hours between February 5 until February 10. The readiness criteria to pass the balancing test requires the prospective EIM entity to pass the balancing test at least in 90 percent of the hours for at least five business days. The LADWP passed the readiness criteria by passing the balancing test in 94.44 percent of hours for six continuous days from February 5 until February 10.

There were three sets of issues that were affecting LADWP's ability to pass the balancing tests. First, LADWP hourly import and export transactions were not accurately accounted for in the balancing test due to data set-up issues either in the ISO systems or in the LADWP vendor systems that drove the balancing test failures. For instance, there was an incorrect set-up for imports and exports in the ISO master files for the North of Oregon Border (NOB) inter-tie schedules in some hours. Also, there was a similar issue affecting import and export schedules for the BAA at the Intermountain Power Project (IPP) inter-tie. Similar to data issues in the ISO systems, there were data configuration issues in the LADWP vendor applications for the NOB inter-tie that affected import and export inter-tie transactions. Second, LADWP was training its operators for EIM duties while managing other production activities. The covid-19 pandemic affected LADWP's ability to fully staff the EIM desk. At times, LADWP operators were performing production roles and performing balancing duties at the same desk. Due to shared responsibilities, the LADWP operators prioritized other production duties over passing the balancing tests. Third, LADWP systems had network connectivity issues that adversely influenced the EIM operator's ability to pass the balancing test for some trade hours.

Figure 1: Daily frequency of balancing test results


A second test carried out before running the real-time market is the bid-range capacity test. Figure 2 and Figure 3 show the LADWP BAA’s performance for the bid-range capacity test up and down from January 30, 2021 to February 15, 2021. The LADWP BAA passed the bid-range up capacity test in 99.69 percent of the hours and the bid-range down capacity test in 99.82 percent of the hours.

An ISO system issue on February 3 drove the bid-range up capacity test failure. 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 bids to various applications for downstream market processes. On February 3, 2021, hour ending 12, in the ISO parallel operations environment, this automated process failed to transfer bids to the application that performs the capacity test, resulting in capacity test failures for LADWP. In Figure 2, the bid-range up capacity failure is labelled as correctable events because an ISO system issue drove it. The capacity test failures on February 6 and 15 were because LADWP did not submit bids.

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

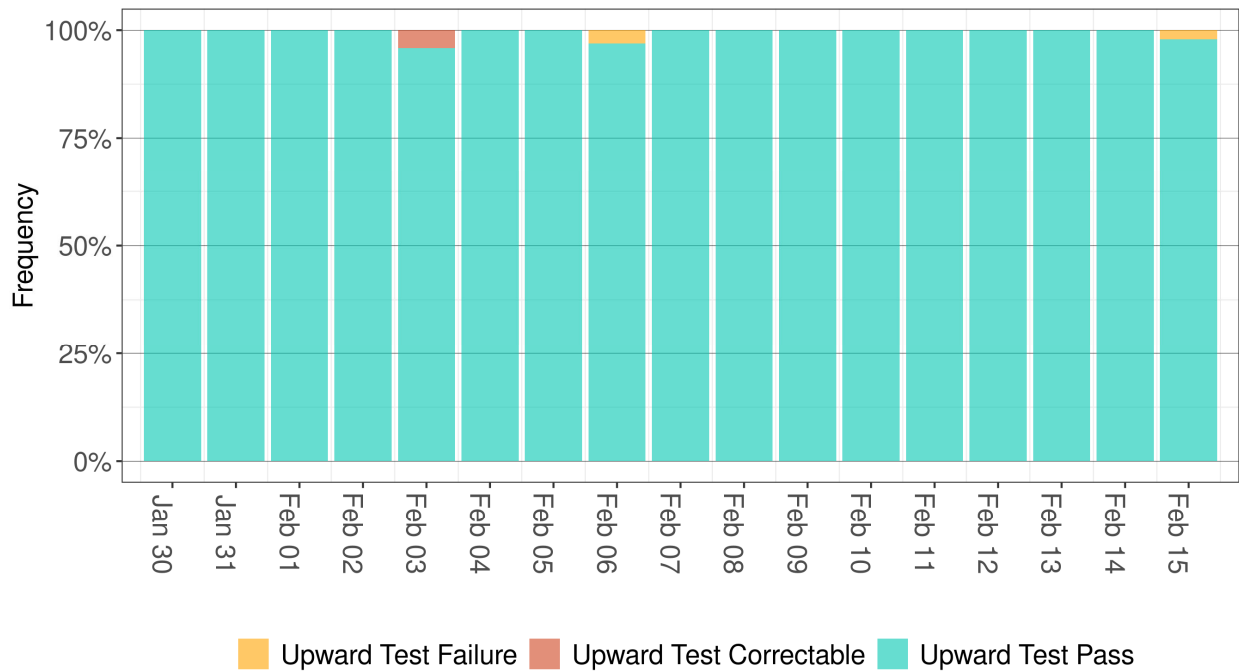
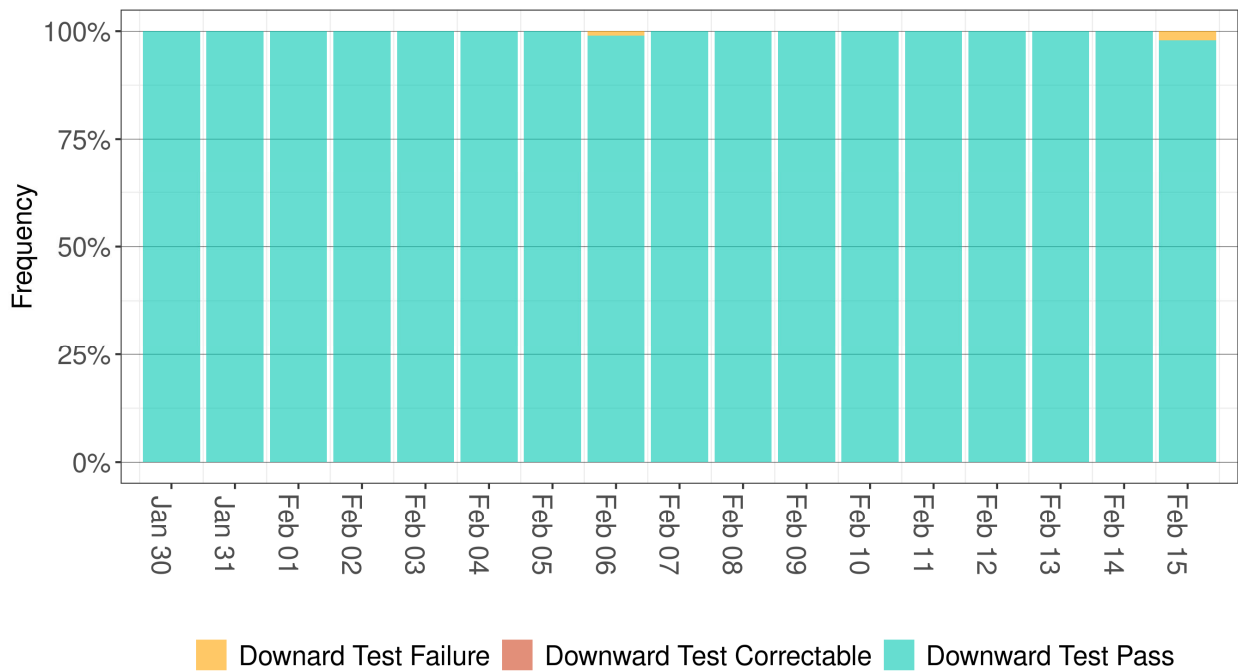


Figure 3: Daily frequency of bid range down capacity test results



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 4 and Figure 5 shows the daily frequency of flex ramp up and down test failures observed in the first 17 days of parallel operation. The LADWP BAA passed the flexible ramp up sufficiency test in 99.69 percent of hours and the flexible ramp down test for 98.71 percent of hours. On February 3, LADWP failed the bid-range up capacity test due to an ISO parallel operations system issue that was described in the prior section. When an EIM BAA fails the bid-range capacity test, it automatically fails the flexible ramp sufficiency test. Since the ISO system issue drove the bid-range capacity test failure, the flexible ramp sufficiency failure is classified as a correctable event in Figure 3 and Figure 4. LADWP failed flexible ramp tests in hour ending 21 on February 6 and hour ending 1 on February 15 because LADWP did not submit bids. All other flexible ramp test failures were driven by lack of resource ramp capacity to meet the requirement or the resources did not follow market instructions, which is expected since this is parallel operations.

Figure 4: Daily frequency of flexible ramp up test

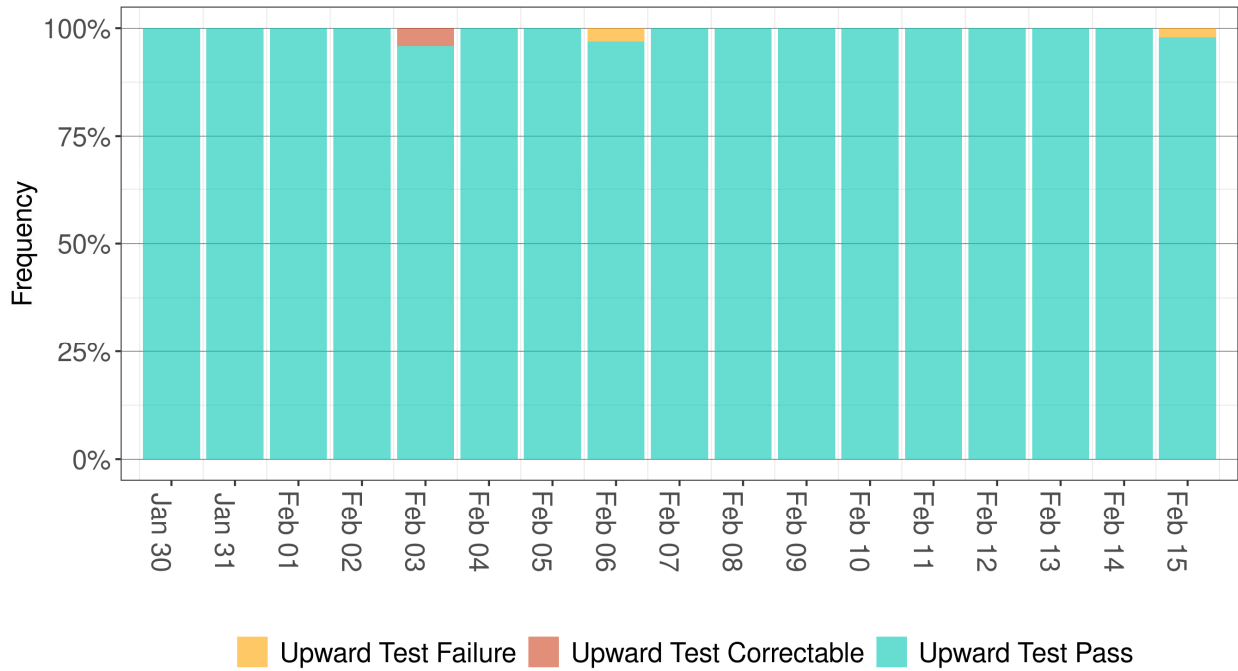


Figure 5: Daily frequency of flexible ramp down test

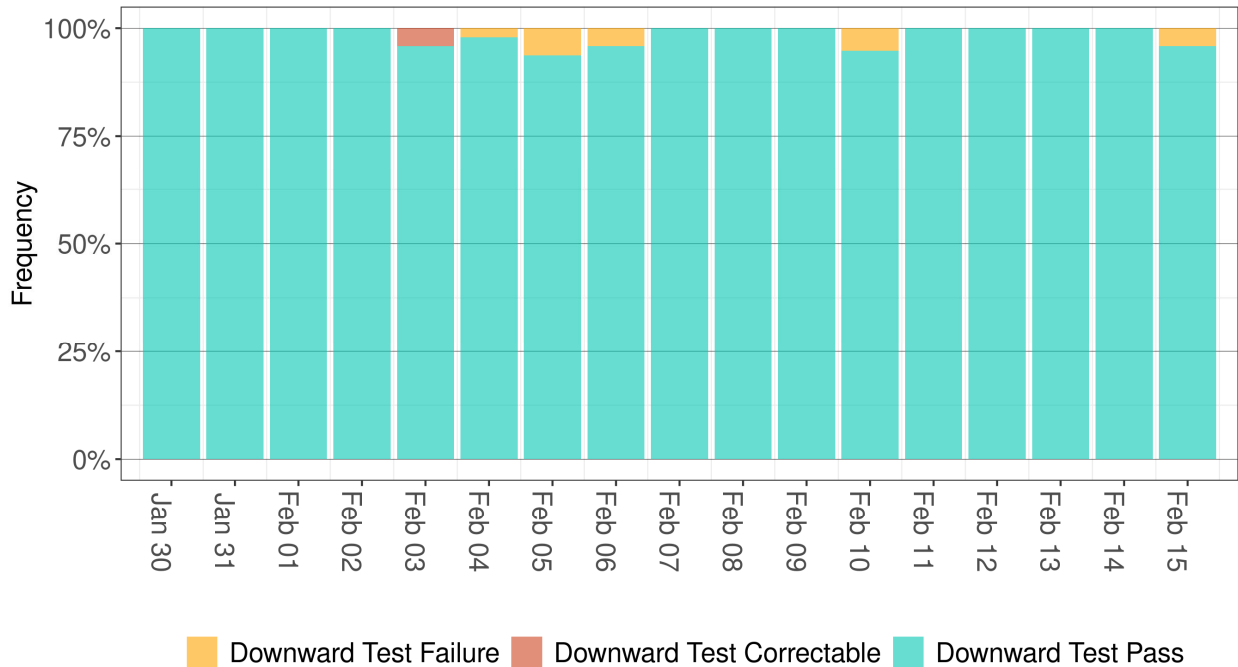
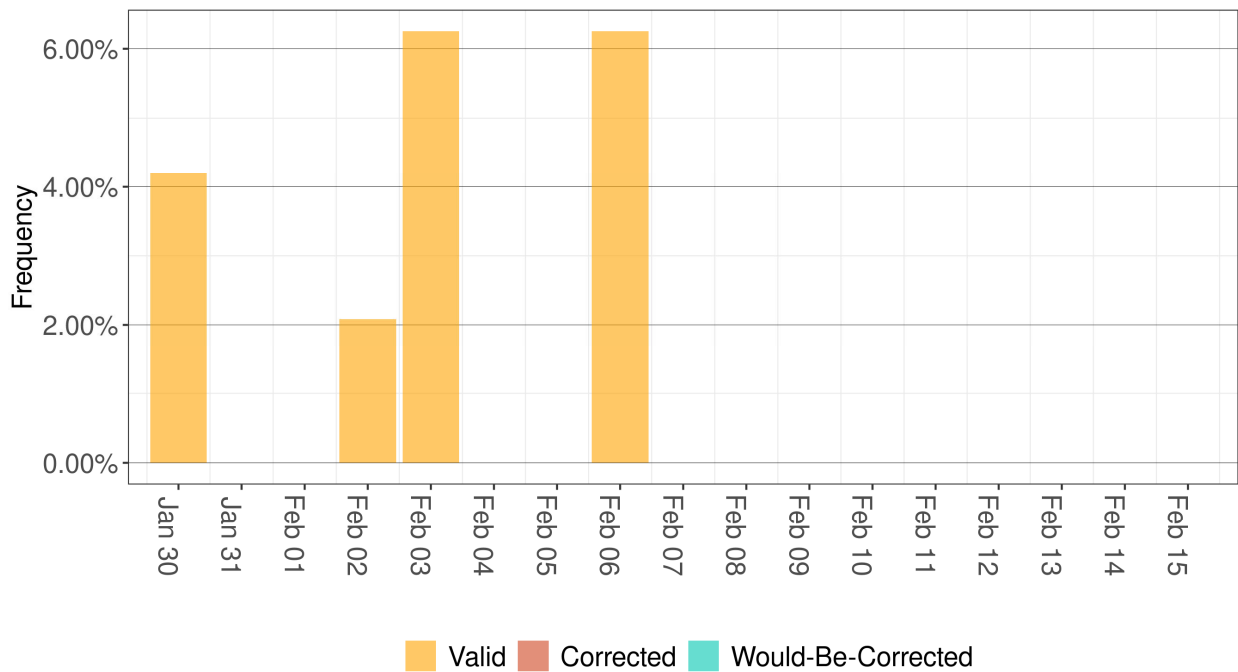


Figure 6 and 7 shows the frequency of power balance constraint infeasibilities for under-generation generation conditions in both the FMM and RTD markets. The power balance constraint infeasibilities are pegged to the corresponding penalty prices, of \$1000/MWh for under-supply infeasibilities, and about - \$150/MWh for over-supply infeasibilities. However, during parallel operations, the EIM market for LADWP 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 Order¹, 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 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 6: Daily frequency of under-supply infeasibilities in the fifteen-minute market



From January 30 until February 15 the LADWP BAA had under-supply infeasibilities in slightly more than one percent of intervals in the fifteen-minute market while the LADWP BAA had under-supply infeasibilities in 7.59% of intervals in the five-minute market. For the first 17 days of parallel operations, not all of the LADWP resources were following the ISO dispatch instructions. However, the market

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

applications were operated in two configurations. The first configuration used the resource actual telemetry as the input but the resources did not follow the market instructions. The second configuration was 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 nine of the 17 days. The other eight days used this logic for all or part of the day.

For those trade dates, when the parallel operations system were using the actual telemetry to feed as an input to the real-time market and not all of the LADWP resources were following ISO market dispatch instructions. It created a mismatch between market dispatch instruction and actual resource operating point that resulted in significant imbalance requirement during parallel operations. This mismatch was the main driver for the under-supply infeasibilities. When the ISO systems were using the perfect echo back telemetry that were based on ISO market instructions, LADWP had minimal under-supply infeasibilities except that the under-supply infeasibilities in HE 21 on February 6 were mainly because LADWP did not submit bids.

On February 8, there were under-supply infeasibilities in more than 30 percent of intervals for the five-minute market largely due to the implications of parallel operations. On this day, LADWP resources were not following the parallel operations market dispatches that drove these significant infeasibilities. LADWP had passed the flexible ramp-up sufficiency test that would allow the BAA to use import EIM transfers to meet its energy imbalance requirement. However, the BAA had locked its EIM Transfers, thereby losing its ability to import energy through its ETSRs to meet the imbalance requirement in the fifteen-minute market and the five-minute market. The market started additional resources in the BAA to meet the imbalance requirement. Since the LADWP resources were not following market instructions from parallel operations, these resources did not come online. The resources were online in the fifteen-minute market but were offline in the five-minute market because the five-minute market uses the telemetry information to determine market awards. The combined output of the additional resources that did not follow market instructions was more than 300 MW and drove a significant portion of under-supply infeasibilities on February 8.

Figure 7: Daily frequency of supply infeasibilities in the five-minute market

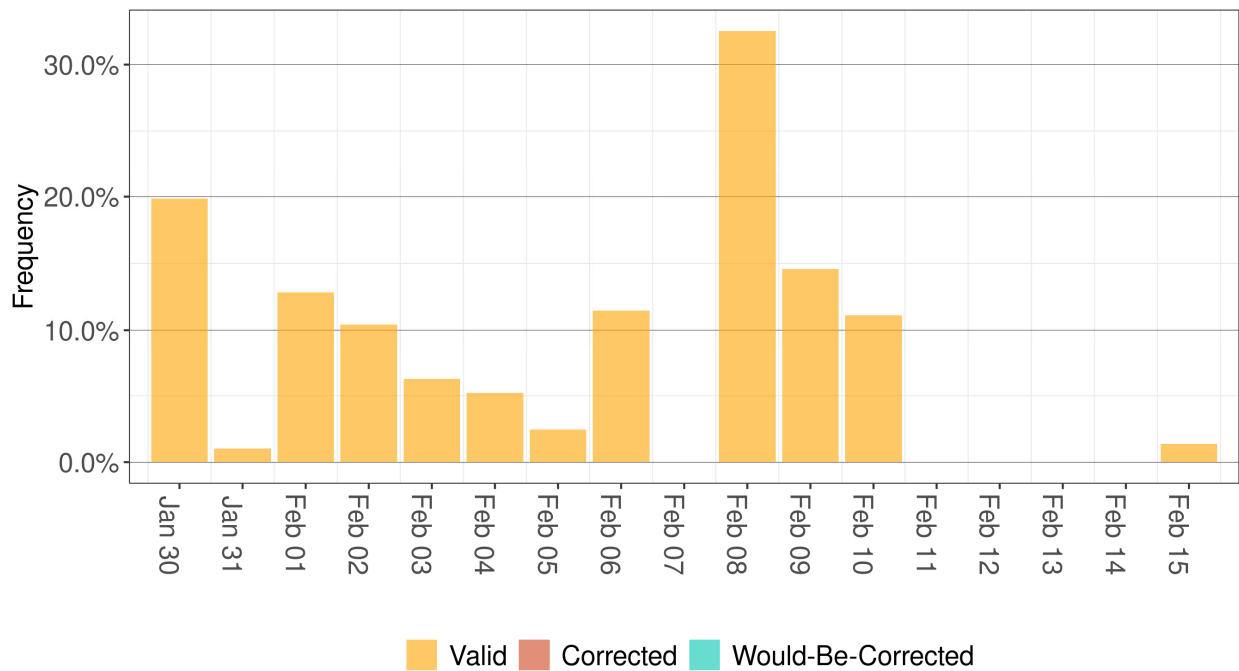


Figure 8 shows the daily average ELAP LMPs for the fifteen-minute market and the five-minute market. The average daily prices from January 30 through February 15 in the fifteen-minute market were between \$7.73/MWh and \$177.01/MWh. The average five-minute prices were between \$7.36/MWh and \$181.99/MWh.

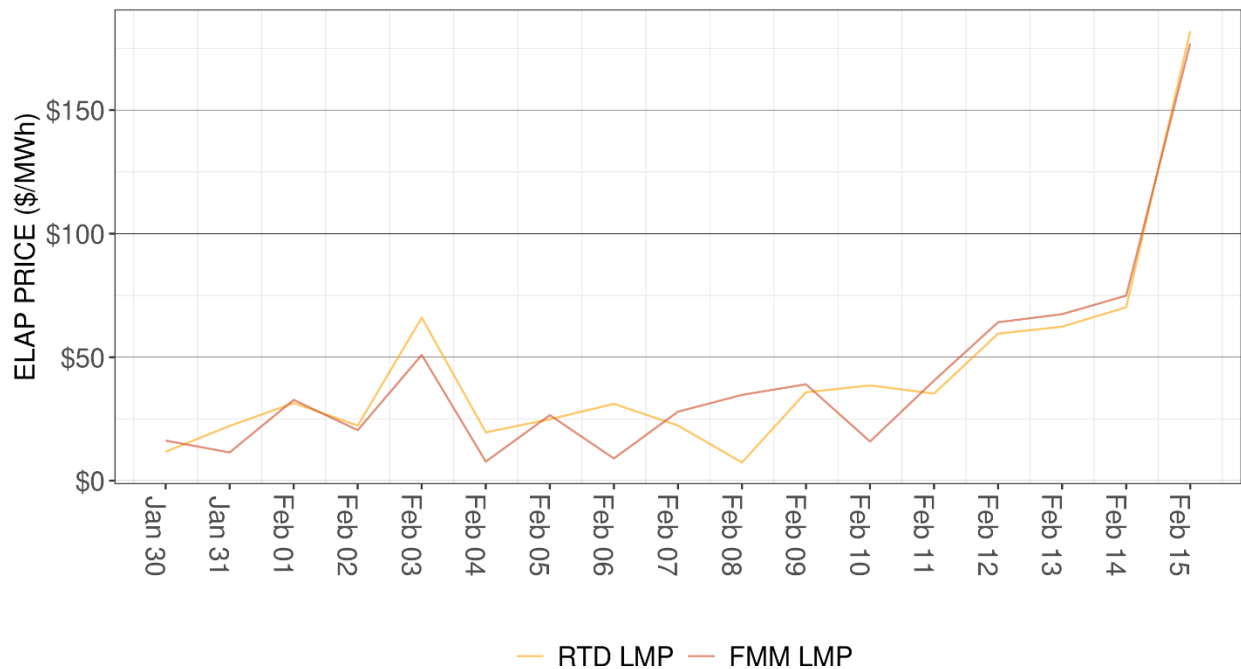
Figure 8: Daily average of fifteen-minute prices


Figure 9 and 10 show the fifteen-minute ELAP prices and the five-minute ELAP prices for the LADWP BAA classified by price bins. For all trade dates from January 30, through February 15, about 89 percent of the FMM intervals observed prices between \$0/MWh and \$100/MWh. At the same time, 87 percent of the five-minute prices were between \$0/MWh and \$100/MWh.

Figure 9: Daily frequency of fifteen-minute prices organized by price ranges

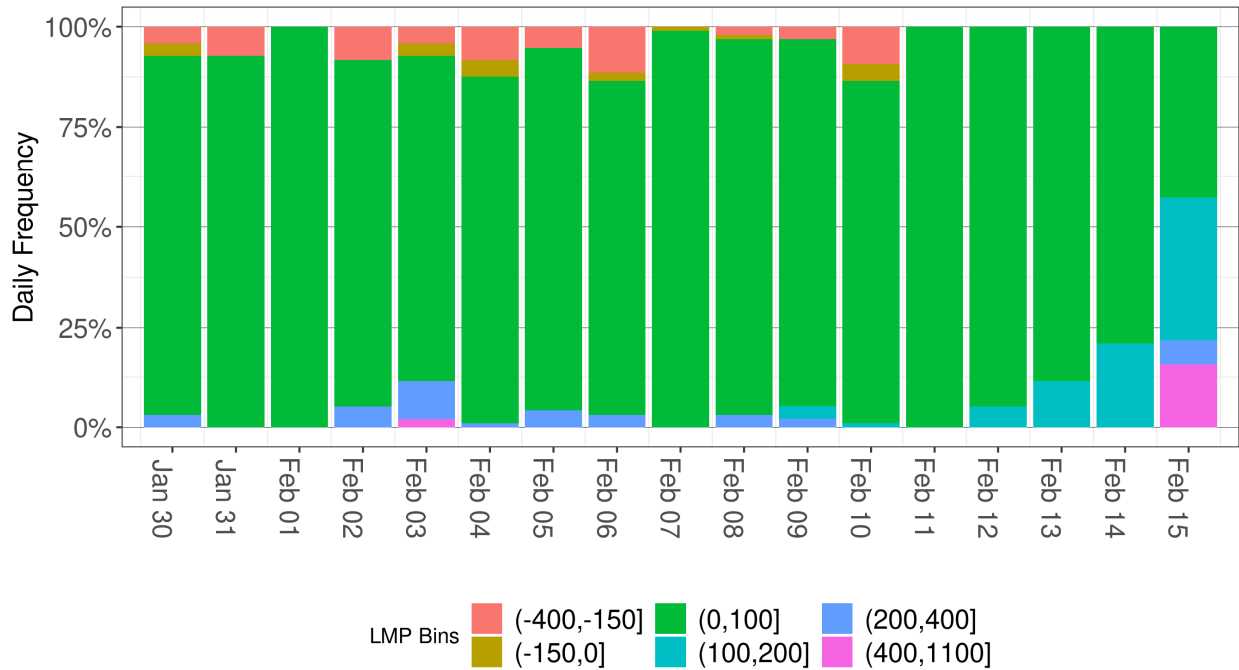
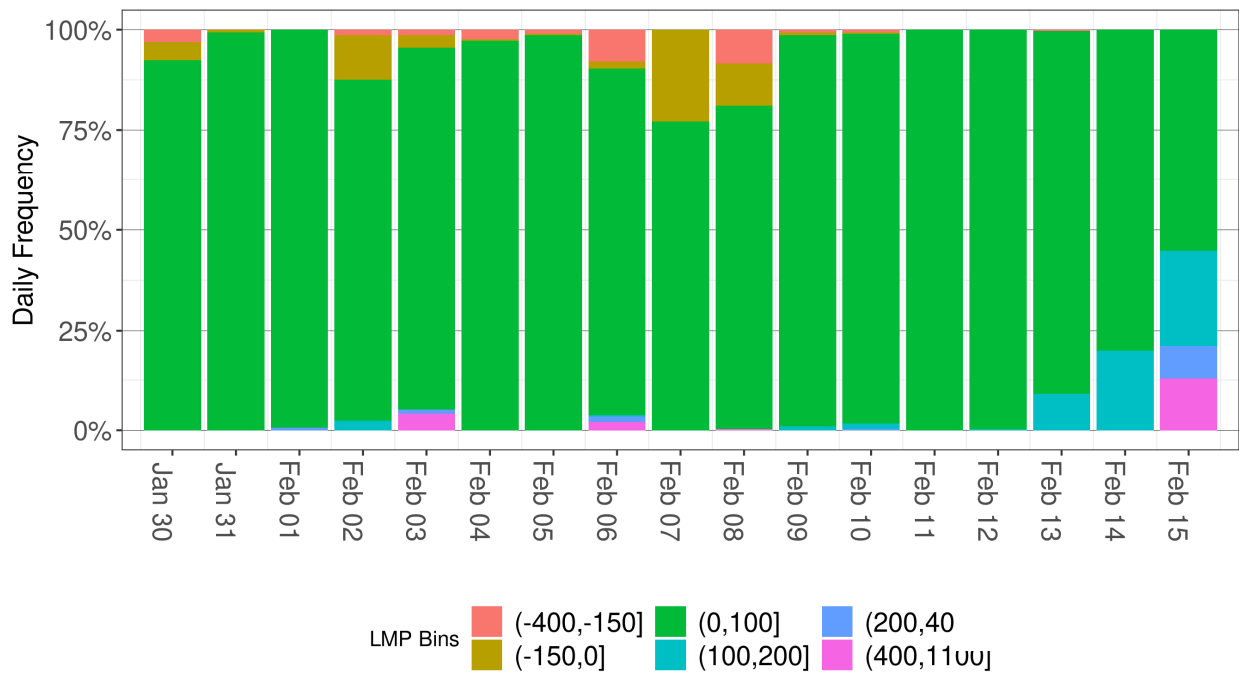


Figure 10: Daily frequency of five-minute prices organized by price ranges



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 February 3, 2021, hour ending 12, in the ISO parallel operations environment, this automated process failed to transfer bids for several BAAs, including LADWP 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 LADWP failed the bid-range capacity test and hence the flexible ramp sufficiency test. 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 were all bids come to the market from one source.

2. Software Defects

During parallel operations, the ISO identified two software defects that affected LADWP's market solutions.

- a. The Area-To-Area Net Schedule Interchange (AANSI) in the models of the two High-Voltage-Direct-Current (HVDC) links operated by LADWP includes the AANSI of CAISO, LADWP, City of Glendale and City of Burbank due to a software issue. It should have only included the AANSI of City of Glendale and City of Burbank based on EIM design rules. The filtering of data is being addressed.
- b. The resources to account for the HVDC energy losses are needed for the power balance constraints. However, they are incorrectly scheduled at Pmax instead of the telemetry value in the advisory intervals in RTD due to a software defect.
- c. Some resources are shown in the market application as electrically disconnected. Therefore, the market application is not able to start up them when they are base scheduled. This may result in infeasibilities to meet the power balance.

The ISO has reported the software issue to the market application vendor and expects the vendor to deliver a fix before LADWP joins the EIM market.

3. Switch modeling issue

Certain switches are used to start up or shut down resources. These switches need to be identified with certain naming convention in the market such that the market application is able to start up a resource even when the telemetry status of the switches is off. It was identified that some switches were not correctly labelled in the LADWP network model and caused the delay of the market application to start up resources. The issue was resolved by properly labelling the switches in the market network model.

Conclusion

The ISO validated both prices and schedules based on input data fed through the market systems parallel operations from January 30 through February 15. 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 LADWP 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 2nd day of March, 2021.

/s/ Jacqueline Meredith

Jacqueline Meredith
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