California Independent System Operator Corporation

February 28, 2020

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 Salt River Agricultural Improvement and Power District's Participation in the Energy Imbalance Market
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 Salt River Project Agricultural Improvement and Power District (SRP), has determined that, following market simulation and an adequate period of parallel operations, the CAISO and SRP 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 Petar Ristanovic, Vice President of Technology, and the sworn SRP affidavit of Christopher R. Janick, Senior Director, Power Delivery. This filing certifies the readiness of the CAISO and SRP to proceed with SRP's participation in the CAISO's Energy Imbalance Market (EIM) on April 1, 2020, without exception, consistent with the requirement to do so at least 30 days prior.

[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).

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 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 SRP ran market simulation scenarios from December 9, 2019 to January 31, 2020. Parallel (*i.e*., financially nonbinding) operations, which began on February 1, 2020, will run through at least February 28, 2020 and, in any event, will continue to be supported and available to SRP until April 1, 2020. During market simulation and parallel operations the CAISO and SRP have engaged in frequent 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

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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 March 16 Order at P 30.

5 *Id.,* n.85.

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

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 SRP'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 been resolved. In addition, market simulation permitted the CAISO and SRP to validate performance of the systems and processes under a variety of structured scenarios. The market simulation dashboard dated January 31, 2020 demonstrated that the CAISO and SRP were ready to enter parallel operations. Having achieved the benefits from market simulation, the CAISO and SRP transitioned to parallel operations on February 1, 2020.

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 SRP 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 SRP 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 SRP to identify and resolve software issues. The dashboard dated February 14, 2020 showed the progress during initial parallel operations as additional readiness criteria were met. The final dashboard, dated February 25, 2020, 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 SRP's compliance with criteria. The dashboard shows that all readiness criteria have been satisfied or will be satisfied by April 1, 2020.

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

[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 SRP entry for 2019 at: http://www.caiso.com/informed/Pages/ReleasePlanning/Default.aspx.

satisfaction of the readiness criteria. Attachments B and C, respectively, contain the sworn CAISO affidavit of Petar Ristanovic, Vice President of Technology and the sworn SRP affidavit of Christopher R. Janick, Senior Director, Power Delivery 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 SRP is prepared to enter financially binding production EIM operations on April 1, 2020. 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 SRP has identified any exception to any of the readiness criteria.

III. Market Quality Report on Parallel Operations

Parallel operations allowed the CAISO and SRP to identify and resolve numerous input, process, and software issues prior to the commencement of financially binding operations.[8] The CAISO and SRP worked diligently during parallel operations to identify the cause of the infeasibilities that arose. The attached Market Quality Report 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.

The CAISO validated both prices and schedules based on the data input to the market systems throughout the first 14 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 SRP are ready to operate in production.

V. Attachments

Attachment A: Readiness Dashboard Report

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[8] The market quality report on parallel operations dated February 21, 2020 explains how each of these issues impacted the market results and how they were resolved by the CAISO and SRP.

Attachment B: Affidavit of Petar Ristonavic

Attachment C: Affidavit of Christopher R. Janick

Attachment D: Parallel Operations Market Quality Report

VI. Conclusion

The CAISO respectfully requests that the Commission accept this certification as consistent with section 29.2(b)(6) of the CAISO tariff. The CAISO will notify the Commission in the event of any subsequent determination that the implementation of SRP into the EIM on April 1, 2020 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

Counsel for the California Independent System Operator Corporation

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 February, 2020.

/s/ Martha Sedgley

Martha Sedgley
California ISO
250 Outcropping Way
Folsom, CA 95630

ATTACHMENT
A

Readiness Criterion ID	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. Discrepancies, if any, are accounted for in terms of imbalance adjustment	ISO	**Complete**	ISO EMS team provided an email with EMS screen shots confirming 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	ISO	**Complete**	ISO EMS team provided an email with EMS screen shots confirming that the average deviation between the telemetered values (SCADA) meets the threshold specified in the readiness criteria.	**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	ISO	**Complete**	ISO EMS team provided an email with 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)(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	ISO	**Complete**	SRP provided an email stating that they have no non-conforming loads that meet the criteria.	**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**	SRP provided CAISO with copies of all executed agreements and attached the SRP EIM Agreement checklist. All agreements are stored in SRP's EIM document repository.	**Tariff section 29.2(b)(7)(K)(i)**

Readiness Criterion ID	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. · "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.	SRP	**Complete**	SRP emailed confirmation that training is complete for all EIM Entity operators who have responsibility for EIM operations, transactions and settlements, including a tracking spreadsheet with trained personnel.	**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 · 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).	ISO	**Complete**	ISO Short Term Forecasting team is providing daily forecast reports starting 1/21/2020. SRP provided details on weather stations.	**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.) · Accuracy of the CAISO forecast of EIM demand based on historical actual load data for the defined EIM demand forecast boundaries.	Forecasting entity must demonstrate delivery of Unit MW forecast at 5 min intervals for at least three hours ahead in addition to current hour and next hour forecast. 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.	ISO	**Complete**	ISO Short Term Forecasting team provided an email along with screenshots for wind and solar that confirm SRP has delivered VER forecasts in Parallel Operations.	**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.	ISO	**Complete**	ISO Short Term Forecasting team provided an email along with screenshots that confirm ISO is getting stable estimates of data that feeds the calculation for the Flexible Ramp Product Uncertainty during Parallel Operations.	**Tariff section 29.2(b)(7)(K)(iv)**

Readiness Criterion ID	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.	SRP	**Complete**	ISO Market Quality team provided an email indicating that SRP passed all the criteria for readiness criteria 10, 11, and 12 for 5 days.	**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	SRP	**Complete**	ISO Market Quality team provided an email indicating that SRP passed all the criteria for readiness criteria 10, 11, and 12 for 5 days.	**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.	ISO	**Complete**	ISO Market Quality team provided an email indicating that SRP passed all the criteria for readiness criteria 10, 11, and 12 for 5 days.	**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**	Signed non-disclosure agreement has been provided as evidence.	**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.	SRP	**Complete**	SRP sent an email confirming that all operating procedures are defined, and verified.	**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 completed and will not have any issues deemed significant. Any exceptions will be explained or have an interim solution that is functionally equivalent.	SRP	**Complete**	Critical functional testing is complete. Testing Timeline summary provided showing completion.	**Tariff section 29.2(b)(7)(E)(i)**

Readiness Criterion ID	Readiness Category	Criteria	Measurable Elements	Threshold	Owner	Status	Evidence	Tariff Mapping
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 completed and will not have any issues deemed significant. Any exceptions will be explained or have an interim solution that is functionally equivalent.	SRP	**Complete**	Critical system testing is complete. Testing Timeline summary provided showing completion.	**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 CASIO issued certificates are requested within the appropriate timeframes. All identified employees provided the necessary EIM system access certificates.	Joint	**Complete**	SRP 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. Also included is the evidence for the user permissions.	**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**	Critical interface testing is complete. Testing Timeline summary provided showing completion.	**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**	SRP provided the testing timeline summary document reflecting that Day-In-The-Life testing was complete and successful.	**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**	SRP completed all 13 pre-defined structured scenarios including settlement validation. ISO provided a structured scenario progress chart. SRP provided a testing timeline summary showing all Market Simulation testing is complete.	**Tariff section 29.2(b)(7)(I)(iii)**
21	Market Simulation	Unstructured scenarios simulation	The prospective EIM Entity operators execute and pass all unstructured scenarios provided by prospective EIM Entity	All significant issues resolved or have an interim solution that is functionally equivalent.	SRP	**Complete**	Not applicable as SRP has no unstructured scenarios to execute.	**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	ISO	**Complete**	ISO sent an email confirming that this criteria has been met during the Market Simulation testing period.	**Tariff section 29.2(b)(7)(I)(v)**
23a	Market Simulation	MS 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 operation	ISO	**Complete**	ISO sent an email confirming that this criteria has been met during the Market Simulation testing period.	**Tariff section 29.2(b)(7)(I)(vi)**

Readiness Criterion ID	Readiness Category	Criteria	Measurable Elements	Threshold	Owner	Status	Evidence	Tariff Mapping
23b	Parallel Operations	PO 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	ISO	**Complete**	The ISO Market Quality Team provided a detailed analysis report on the Market Solution, prices, and quality of data during the SRP 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**	SRP provided a final schedule 1 and list of participating resources. CAISO sent confirmation of participating resources.	**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	Sample monthly settlement statement and invoice with corresponding daily statements produced during market simulation and parallel operations are verifiably accurate against available data.	Joint	**Complete**	SRP confirmed receipt of initial and recalculation statements from agreed trade dates. ISO settlement leads verifies the accuracy of its settlement statements and invoices made available during parallel operations.	**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**	SRP confirmed that settlement statements and Invoices received for the agreed trade dates reflect accurate allocations. ISO settlement lead verifies 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.	ISO	**Complete**	ISO Market Quality team and DMM both provided emails confirming they are able to see the data they require 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.	ISO	**Complete**	ISO executive sponsor provided an email with evidence indicating that Parallel Operations ran consistently within normal production CAISO Market disruption tolerances, including RTD/RTPD cumulative uptime average, RTD, FMM and STUC uptime percentage values.	**Tariff section 29.2(b)(7)(J)**

Readiness Criterion ID	Readiness Category	Criteria	Measurable Elements	Threshold	Owner	Status	Evidence	Tariff Mapping
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**	SRP sent an email with submitted outages. ISO responded with confirmation that the outages were received as intended by SRP.	**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.	SRP	**Complete**	SRP sent email evidence that these processes are in place. ISO RTMO sent confirmation that they tested the voice messaging.	**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	SRP	**Complete**	CAISO sent an email that this training was complete as part of RC onboarding.	**Tariff section 29.2(b)(7)(H)(ii)**
32	Communications between the CAISO and the prospective EIM Entity	3rd 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	Joint	**Complete**	SRP provided an email stating they do not have any third party transmission service providers or path operators that support EIM transfers or Real-Time Dispatch.	**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	SRP	**Complete**	SRP provided an email confirming they can use any of their participating and non-participating resources as part of the SRP Generation Plan process to participate in ABC.	**Tariff section 29.2(b)(7)(K)(iii)**

ATTACHMENT
B

California ISO

Affidavit of Petar Ristanovic Certifying Readiness of the Salt River Agricultural Improvement and Power District (SRP) to Operate as an EIM Entity

I, Petar Ristanovic, Vice President of Technology for the California Independent System Operator Corporation (CAISO), hereby certify as follows:

1. As the Vice President of 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 SRP 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 SRP's April 1, 2020 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 SRP will be ready to implement SRP into the Energy Imbalance Market on April 1, 2020.

4. I will ensure that the CAISO maintains resource commitments necessary to sustain readiness through April 1, 2020 and address any unexpected conditions that may arise before April 1, 2020 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 SRP on April 1, 2020 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, 2020.

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

Petar Ristanovic, Vice President of Technology

February 25, 2020

ATTACHMENT
C

AFFIDAVIT OF CHRISTOPHER R. JANICK CERTIFYING READINESS OF SALT RIVER PROJECT AGRICULTURAL IMPROVEMENT AND POWER DISTRICT ("SRP") TO OPERATE AS AN ENERGY IMBALANCE MARKET ("EIM") ENTITY

I, Christopher R. Janick, Senior Director, Power Delivery, for SRP, hereby certify as follows:

1. As the Senior Director, Power Delivery, I am ultimately responsible at SRP for ensuring that all the systems and processes that support and enable the SRP Balancing Authority Area to participate in EIM are established and ready for EIM operations. As such, I have overall responsibility for the implementation of SRP's entry into that market.

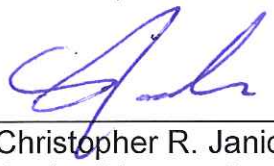
2. I have reviewed the readiness dashboard and find that it is accurate and complete. All applicable readiness criteria set forth in the California Independent System Operator's ("CAISO") tariff and business practice manual for the EIM have been satisfied or are expected to be satisfied as of SRP's April 1, 2020, 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 SRP will be ready to implement SRP's entry into the EIM on April 1, 2020.

4. I will ensure that SRP maintains resource commitments necessary to sustain readiness through April 1, 2020, and address any unexpected conditions that may arise before April 1, 2020, 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 SRP's entry on April 1, 2020, 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, 2020.

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



Christopher R. Janick
Senior Director, Power Delivery
February 25, 2020

ATTACHMENT
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Market Validation of Parallel Operations For Salt River Project (SRP) EIM Entity

February 21, 2020

Contents

Executive Summary

Parallel operations activities of the Energy Imbalance Market (EIM) started on February 1, 2020; this effort provides an opportunity to assess the readiness of the Salt River Project (SRP), the prospective EIM Entity, to participate in the Energy Imbalance Market. 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 SRP 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 SRP (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 February 1 through February 14. 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 SRP 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 SRP with an opportunity to go over specific day-to-day processes and activities required for the operation of the EIM. This set-up provides SRP 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 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 fourteen days of parallel operations, the SRP resources were not following the ISO dispatch instructions, however, the market applications were operated in two configurations. First, from February 1 through February 11, the market application was using the resource actual telemetry as the input but the resources were not following the market instructions. Second, starting on February 11, the ISO implemented 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.

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

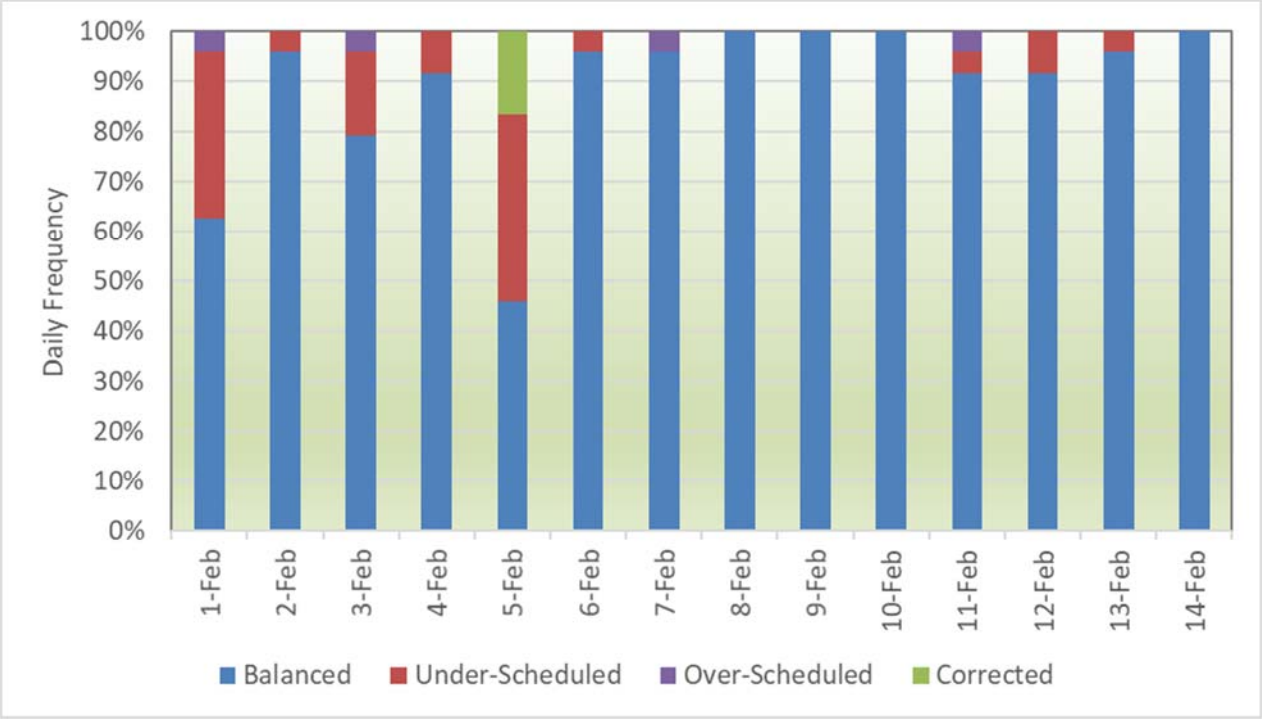
the actual production environment. The process of combining information from two systems needs some time to synchronize the data flow across various applications.

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 SRP'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 performance of SRP BAA for the balancing test as required under section 29.34(k) of the ISO tariff. The ISO calculated the frequency for each day, by dividing 24 hours the number of hours where the prospective EIM entity was under-scheduled, over-scheduled and passed the balancing test.

Figure 1: Daily frequency of power balancing test results

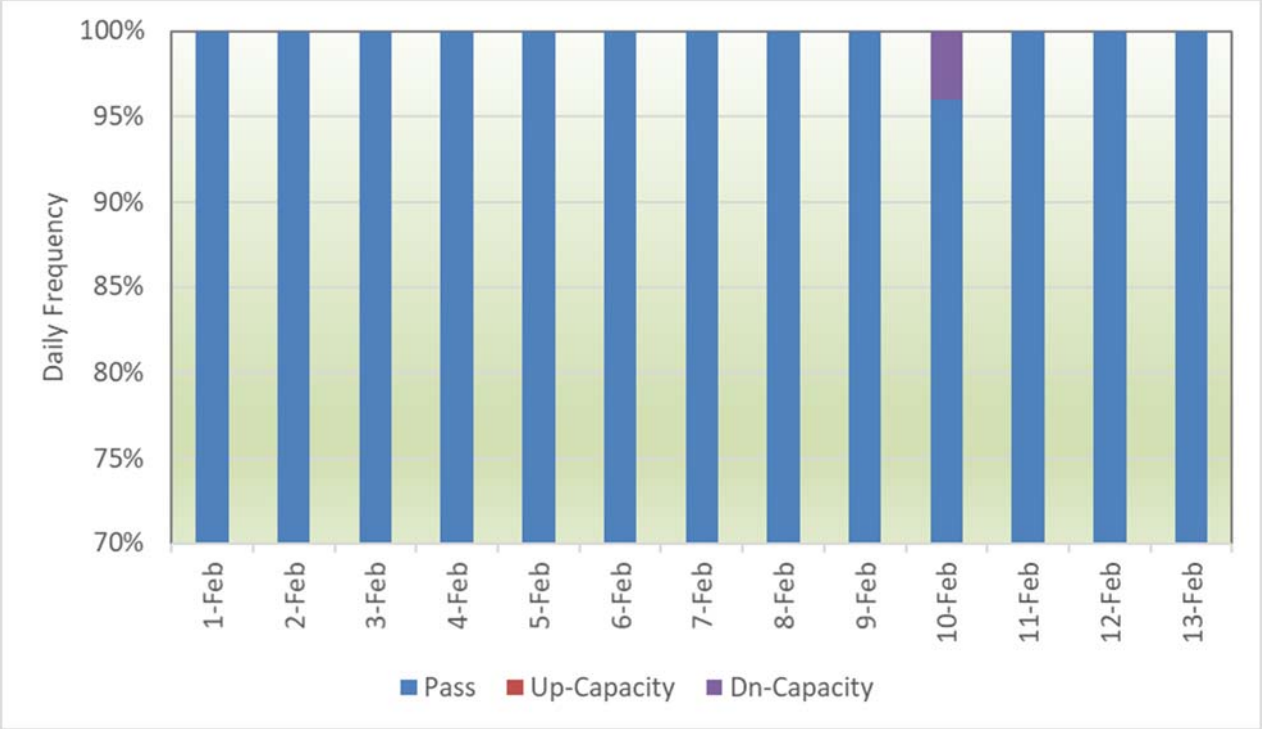


The balancing test provides a reference of how well balanced (energy supply defined by the hourly base schedules meets the demand defined by the forecast respectively) the EIM entity BAA is going to come into the real-time energy imbalance market. Having a large percentage of positive imbalance means 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 two weeks of parallel operations, SRP passed the balancing test for 90 percent of the times. There were three sets of ISO parallel-operations set-up issues that were affecting SRP's ability to pass the balancing test. First, the market application was not considering base schedules on an export system resource due to a data set-up issue. Thus, when the application was performing the balancing test, it appeared that SRP was over-scheduled in some hours even though based on base schedules submitted to the BSAP application, SRP was balanced. This issue mainly affects SRP's balancing test results for one hour on February 1, 2020 and five hours on February 5, 2020. Since the SRP's balancing test results for five hours on February 5, were impacted by ISO issues, those intervals were set to "Pass" status on the ISO's Customer Market Results Interface (CMRI) application. These intervals are shown as "Corrected" in Figure 1. Second, all market participants use the Outage Management System (OMS) to provide resource limitations to reflect planned or forced outages. OMS maintains a list of all market resources and various attributes that describe resource capabilities. Before February 1, SRP was part of the ISO's Reliability Coordinator (RC), and several of their resources were modeled as Aggregate Resources. After February 1, the resource modeling was transitioned to Multi-Stage Generators (MSG). There was a data transfer issue between the ISO market application and the OMS such that the market was receiving incorrect outage information for several MSGs. This issue impacted SRP's ability to pass the balancing test on February 1 through February 5. Third, all EIM participants submit their base schedules to the ISO's Base Schedule Application Portal (BSAP) for each trading hour before the submission deadline. Subsequently, this information is passed on to various downstream applications that perform various resources sufficiency tests, including the balancing test. For a couple of isolated hours, the data transfer between BSAP and Balancing Authority Area Operations Portal (BAAOP) failed. As a result, SRP failed the balancing test even though SRP had balanced base schedules in BSAP. This issue impacted one balancing failure for February 11, 2020.

A second test carried out before running the real-time market is the bid range capacity test. SRP passed the capacity test in 99.7 percentage of hours between February 1 and February 14. 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 hours, an automated process transfers this bid to various applications for downstream market processes. On February 10, 2020, hour ending 15, in the ISO parallel operations environment, this automated process failed to transfer bids to BAAOP application that performs the capacity test. This resulted in a capacity test failure for SRP.

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 27.34 (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 up test failures observed in the first two weeks of parallel operation for the SRP BAA and Figure 4 shows the daily frequency of flex ramp down test failures observed in the first two weeks of parallel operation for the SRP BAA. From February 1 through February 14, SRP passed the flexible ramp up tests in 100 percent of the hours and passed the flex ramp down test 95.54 percent of the hours. An analysis of flexible ramp sufficiency failures for SRP pointed to several issues, which were impacting its ability to pass this test. The SRP resource portfolio consists of several multi-stage generating (MSG) resources, which are an

aggregation of several individual resources, that can operate in different configurations. In the ISO markets, each MSG resource consists of several configurations, which represent the operation of one or more combinations of individual generators. The fifteen-minute market unit commitment process determines which configuration an MSG resource should operate based on economics and resource characteristics. Also, the five-minute market sends information about the actual configuration that MSG resource is operating. If there is a difference in initial configuration between the fifteen-minute market and the five-minute market, then the fifteen-minute market takes into account these differences by adjusting SRP demand in proportion to the differences in MSG configuration. For the first four days of parallel operations, due to incorrect telemetry information received by the market for SRP MSG resources, the fifteen-minute market was considering a significant reduction to demand. This issue resulted in several SRP resources to be dispatched to their physical minimum operating point. The flexible ramp sufficiency test uses the optimal dispatch information from the fifteen-minute market results to determine flexible up and flexible ramp down test. Due to the incorrect telemetry information fed to the five-minute market, SRP failed several flexible ramp down tests between February 1 through February 5. Second, when a balancing area authority (BAA) fails the bid-range capacity test, it automatically fails the flexible ramp sufficiency test. On February 10, 2020 SRP failed the flexible ramp sufficiency tests because it failed the bid-range capacity test due to ISO's system issue. The root cause of these issues are captured in the prior section. On February 5, 2020, SRP failed the balancing test due to an ISO system issue which is described in the previous section. This same issue also drove the flexible ramp down test. Since ISO issues impacted the SRP's flexible ramp sufficiency test results for five hours on February 5, those intervals were set to "Pass" status on the ISO's CMRI application. These intervals are shown as "Corrected" in Figure 4.

Figure 3: Daily frequency of flexible ramp up test results

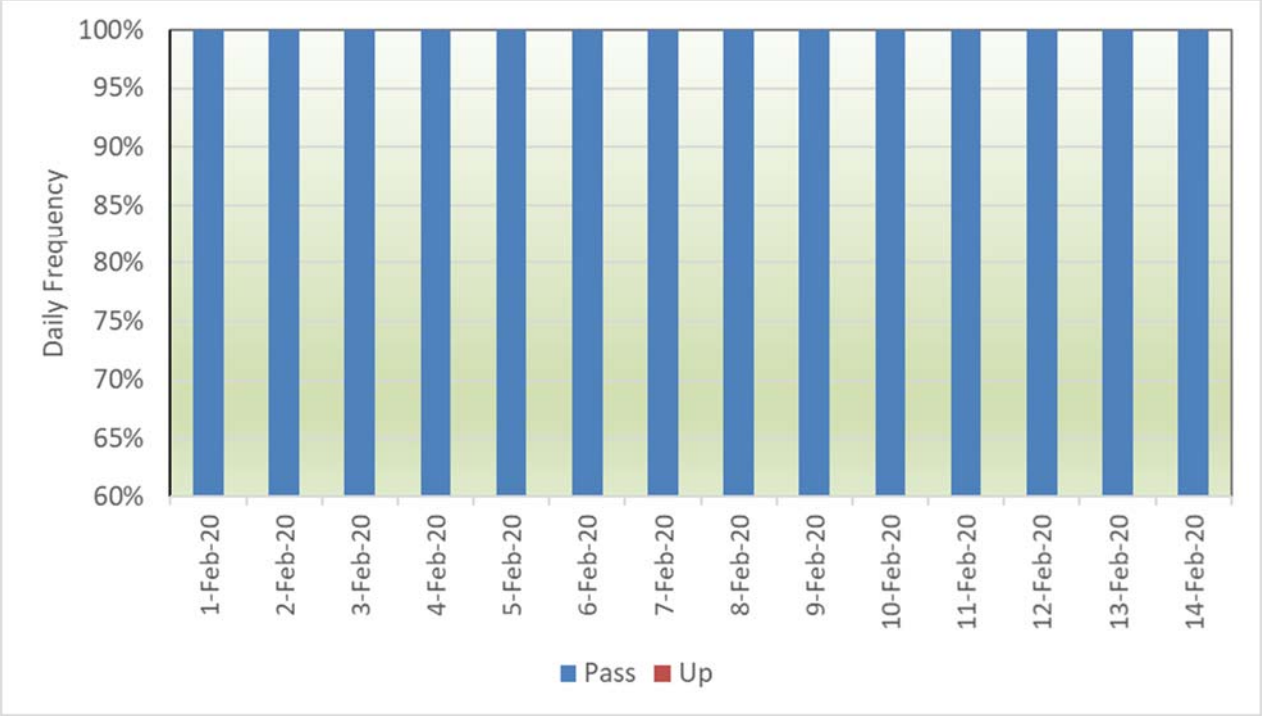


Figure 4: Daily frequency of flexible ramp down test results

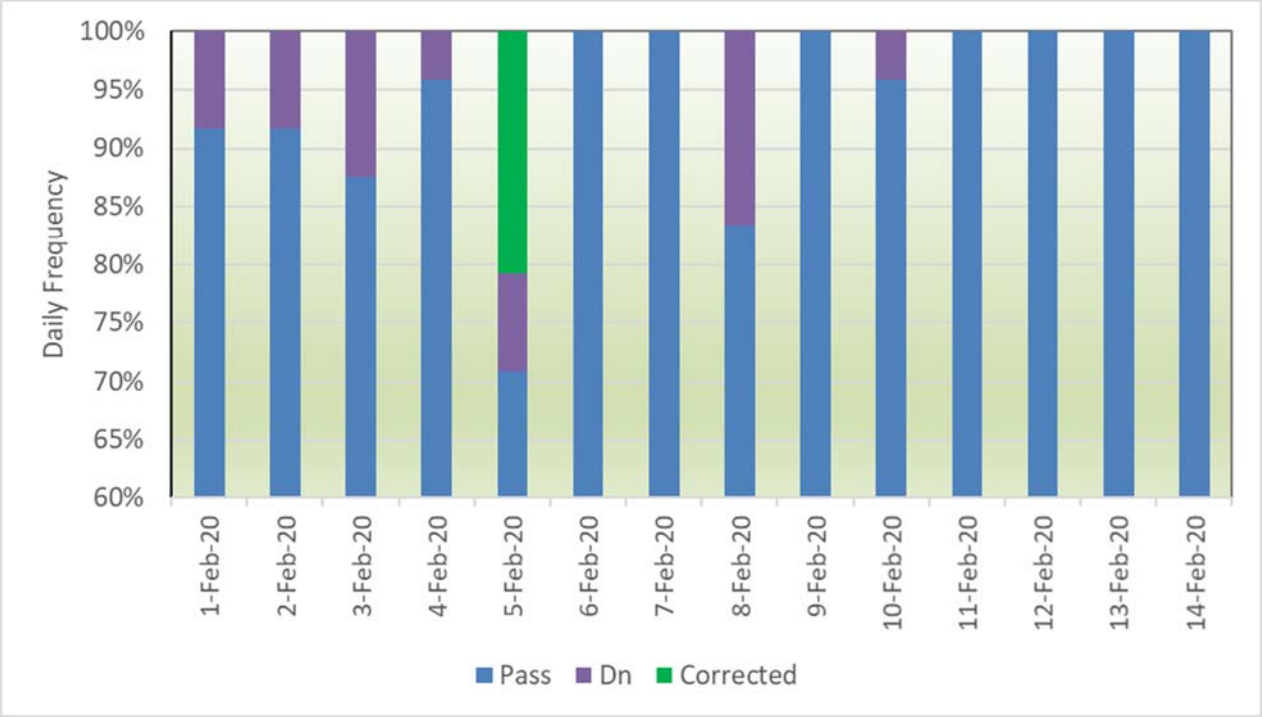
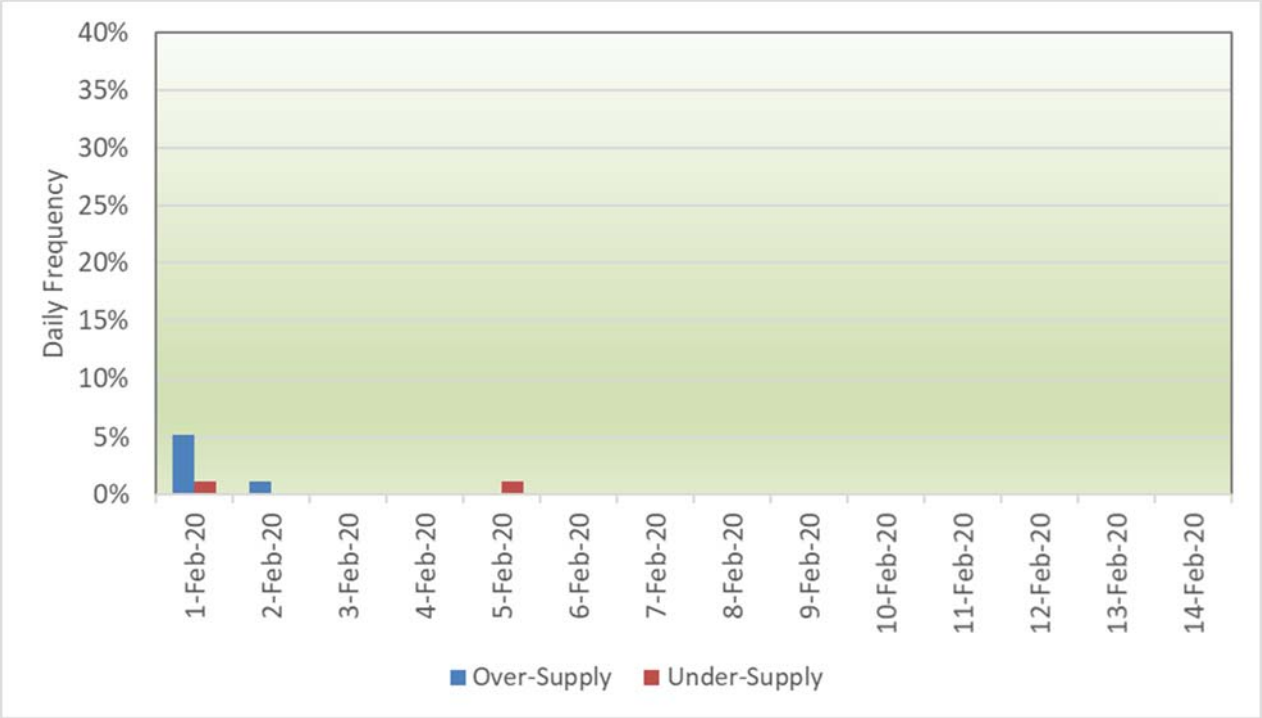


Figure 5 and 6 shows the frequency of power balance infeasibilities for both under-generation and over-generation conditions in both the FMM and RTD markets. The power balance constraint infeasibilities are pegged to the corresponding penalty prices, of $1000/MWh for under-supply infeasibilities, and about -$150/MWh for over-supply infeasibilities. However, during parallel operations, the EIM market for SRP 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 actual production system); under this functionality, when a power balance constraint is infeasible, the market will reflect the last economical signal instead of the penalty prices. The first six months transitional period pricing is based on the FERC Order[1] 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 while gaining production experience for the 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.

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

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



From February 1 through February 14 for the Fifteen Minute Market (FMM), SRP had under-supply power balance infeasibilities in 0.15 percent of intervals and over-supply infeasibilities in 0.45 percent of intervals. In the fifteen-minute market, all over-supply infeasibilities occurred on February 1 and February 2, which were driven by the ISO system issue related to incorrect telemetry information for SRP's MSG resources. This issue is described in detail in the section of Market Validation items. The under-supply infeasibilities occurred on February 1 and February 5; the under-supply infeasibility on February 1 occurred in the hour ending 1, which was related to the transitional period issues on the first day of parallel operations.

For the five-minute market, SRP had under-supply power balance infeasibilities in 3.5 percent of interval and over-supply power balance infeasibilities in 11.24 percent of intervals. The five-minute market dispatches are based on the telemetry input, since SRP was not following telemetry information and the market was using the actual resource output from February 1 through February 11, this market set-up was the primary driver for these infeasibilities. In the five-minute market, 78 percent of the total under-supply infeasibilities and 100 percent of the over-supply infeasibilities occurred on these days.

Figure 6: Daily frequency of supply infeasibilities in the five-minute market

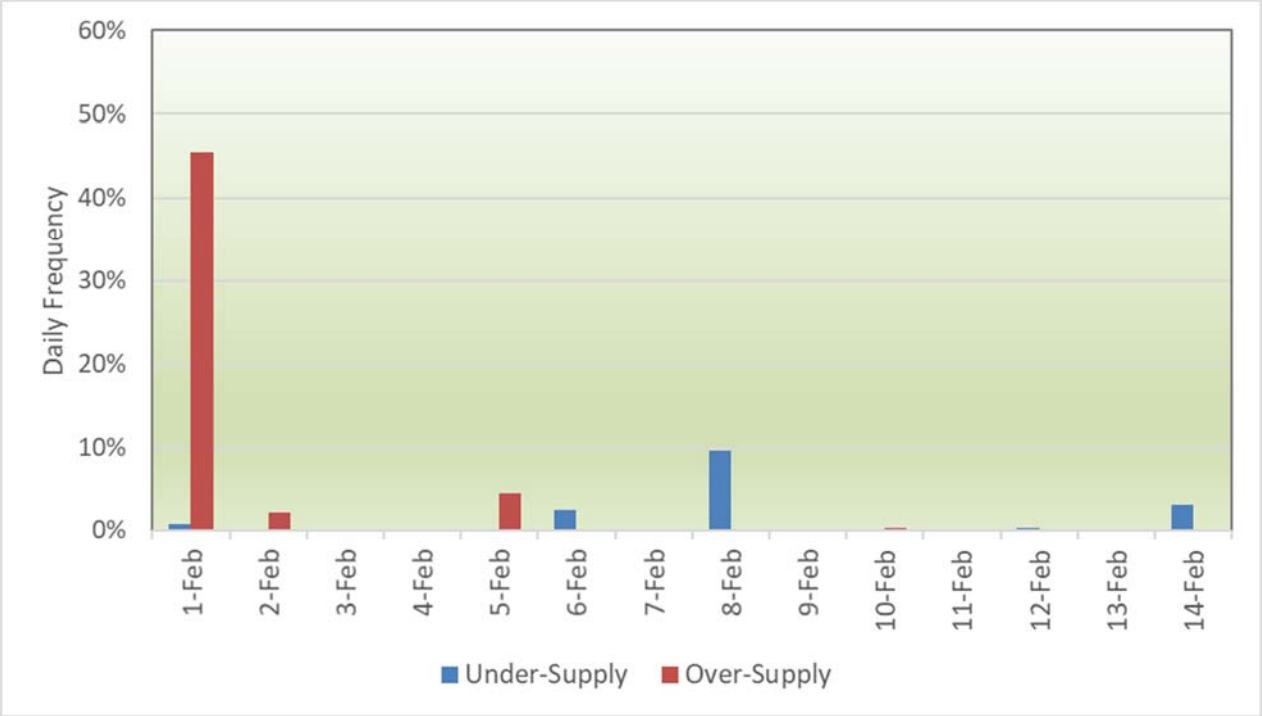


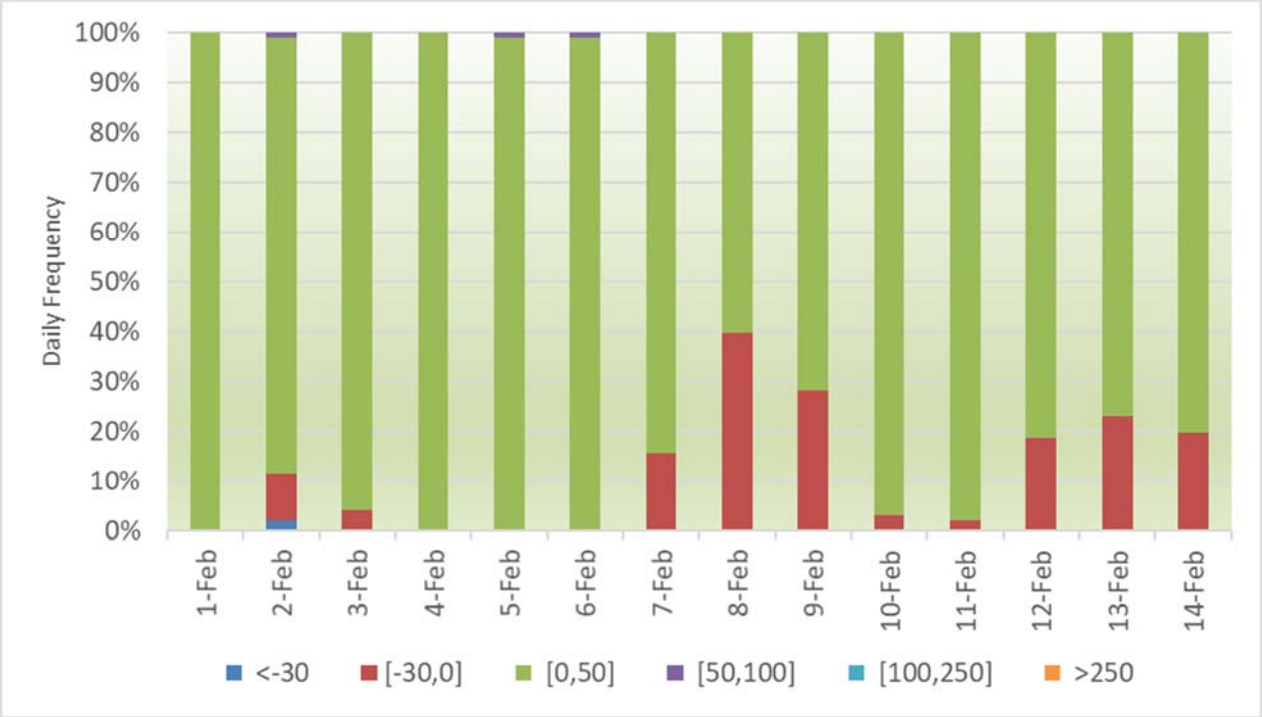
Figure 7 and 8 show the daily average ELAP LMPs for the fifteen-minute market and the five-minute market. The average daily prices from February 1 through February 14 in the fifteen-minute market were between $3.23/MWh and $26.21/MWh. The average five-minute prices were between -$101.51/MWh and $524.95/MWh. From February 1, 2020, through February 14, 2020, SRP had sufficient EIM transfer capability such that the EIM transfer constraints were not binding in the five-minute market. As a result, the SRP ELAP prices were set by a marginal resources not located in the SRP BAA. The spread in the five-minute market prices is mainly due to parallel operation simulation environment set-up.

Figure 7: Daily average of fifteen-minute prices

Figure 8: Daily average of five-minute prices

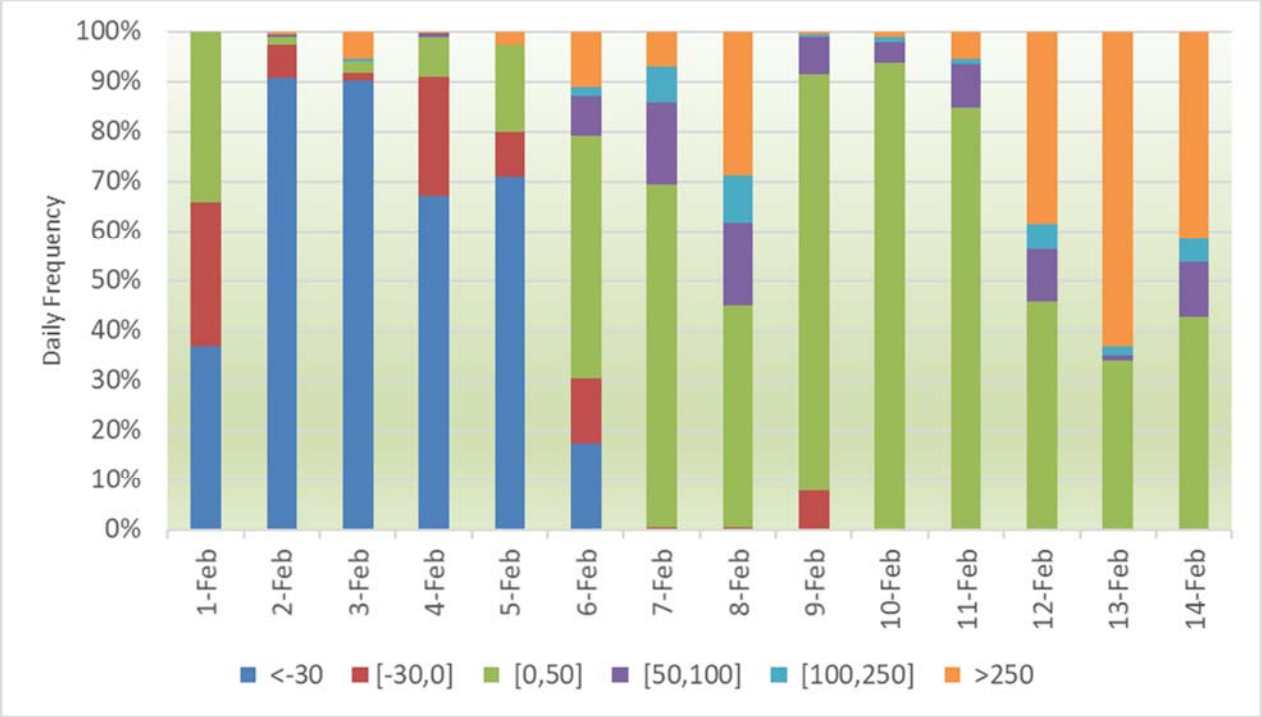
Figure 9 and 10 show the fifteen- and five-minute ELAP prices for the SRP BAA classified by price bins.

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



For all trade dates from February 1 through February 14, about 88 percent of the FMM intervals observed prices were between $0/MWh and $50/MWh, and about 12 percent of intervals observed prices between -$30/MWh and $0/MWh. At the same time, 44 percent of the five-minute prices were between $0/MWh and $50/MWh, 27 percent of the five-minute prices were below -$30/MWh and the remaining 30 percent of the RTD prices were in other ranges.

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



Market Validation Items

1. Balancing failures due to a set-up issue.

Type of issue: Hourly Mirror Resource Schedule

All EIM participants submit their base schedules in BSAP application; these base schedules are transferred to ISO's BAAOP to perform the balancing test. The BAAOP application was excluding base schedules on certain import/export mirror resource schedules because in the parallel operations environment the resource had an incorrect parameter. Thus, when the application was performing the balancing test, it appeared that SRP was over-scheduled in some hours, even though based on base schedules submitted to the BSAP application, SRP was balanced. This issue affected SRP balancing test results on February 1 and February 5. This issue was resolved starting on before noon on February 5.

2. Resource Telemetry

Type of issue: Incorrect Telemetry

The Real-Time application uses the resource telemetry information to calculate the initial operating point for the resource, which is used as the starting point in the five-minute market. Due to simulation issues, bad telemetry data was used for several resources. It caused erroneous starting points for resources and resulted in over-supply and under-supply infeasibilities.

Type of issue: MSG configuration and Telemetry

SRP resource portfolio consists of several multi-stage generating (MSG) resources, which are an aggregation of several individual resources, that can operate in different configurations. In the ISO markets, each MSG resource consists of several configurations, which represent the operation of one or more combinations of individual generators. The fifteen-minute market unit commitment process determines which configuration an MSG resource should operate based on economics and resource characteristics. Also, the five-minute market sends information about the actual configuration that MSG resource is operating. If there is a difference in initial configuration between the fifteen-minute market and the five-minute market, then the fifteen-minute market adjusts the system demand to account for these differences. For the first four days of parallel operations, due to incorrect telemetry information received by the market for SRP MSG resources, the fifteen-minute market was calculating a significant reduction to demand. This issue resulted in several SRP resources to be dispatched to their physical minimum operating point. The flexible ramp sufficiency test use the optimal dispatch information from the fifteen-minute market results to determine flexible ramp up and flexible ramp down test. Due to the incorrect telemetry information fed to the five-minute market, SRP failed several flexible ramp down tests between February 1 through February 5. In addition, the same issue was driving under-supply and over-supply infeasibilities in both the fifteen-minute and the five-minute market.

3. Generating Resource unit connectivity status in the Full Network Model.

Type of issue: Unit connectivity (UCON) status for circuit breakers.

The SRP resources HM_1_PSH4 was electrically disconnected from the network due to a data input error at the ISO end. These units were online and generating, but in the market model, they were disconnected because a switch that connects these resources to the grid was in open position. The ISO resolved this issue by removing the incorrect manual override on the status of the circuit breaker on February 14, 2020.

4. VER resource Forecast

Type of issue: VER Forecast

For the duration of parallel operations, the ISO market application was receiving forecast information only for SRP resources but not for resources in the rest of the BAAs. Therefore, in both the fifteen-minute and five-minute markets, VER resources were dispatched based on their bids received in the production system. Also, for several intermittent five-minute intervals, the market was receiving wind forecast information for ISO resources; as a result, there was a significant difference in the VER dispatches between two consecutive five-minute intervals. In addition, the same issue resulted in large differences in VER dispatches between fifteen and five-minute markets.

Type of issue: VER persistence

Starting on February 12, 2020, in the parallel-operations environment, the ISO market application was using a telemetry simulator. There were issues with VER persistence feature and the telemetry simulator, which resulted in significant swings in the resource dispatches in the five-minute market. This issue was resolved on February 13, 2020.

5. Software Defects

During parallel operations, two software defects were identified that impacted the market solutions.

a. In the EIM a resource has the ability to submit only an energy base schedule and no economic bids. Such resources are known as non-participating resources. It is expected that non-participating resources should always be dispatched to their energy base schedule. An instance was identified when the resource dispatch in the five-minute market was below its energy base schedule. This issue was reported to the software vendor on February 4, 2020.
b. Net export capacity is one of the several inputs used to calculate the flexible ramp requirement for the BAA to evaluate the ramp capacity in the BAA; this component substantially reduces the total downward capacity requirement. Due to a software defect, the Real-Time balancing application was using a lower number, which resulted in a higher requirement for SRP, and it failed the flex ramp down sufficiency test. This issue was reported to our software vendor on February 18, 2020.

The ISO's market application software vendor has fixed these two issues and provided an update to the current production software version. The ISO is currently testing these updates, and once this software version passes ISO's validation process, it will be deployed in production before the SRP go-live date of April 1, 2020.

Conclusion

The ISO validated both prices and schedules based on input data that was fed through the market systems parallel operations from February 1 through February 14. 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 SRP are capable of operating in production.