

162 FERC ¶ 61,120  
UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Kevin J. McIntyre, Chairman;  
Cheryl A. LaFleur, Neil Chatterjee,  
Robert F. Powelson, and Richard Glick.

California Independent System Operator Corporation      Docket No. ER18-461-000

ORDER ON TARIFF REVISIONS

(Issued February 14, 2018)

1. On December 15, 2017, the California Independent System Operator Corporation (CAISO) filed, pursuant to section 205 of the Federal Power Act (FPA),<sup>1</sup> proposed revisions to its tariff (CAISO tariff) to implement system functionality enhancements to the Energy Imbalance Market (EIM) and to extend the modeling functionality for non-generator resources to other resources that participate in CAISO's markets and the EIM. In this order, the Commission accepts the proposed revisions to CAISO's tariff, effective February 15, 2018, as requested.

**I. Instant Filing**

2. The EIM allows balancing authorities (BAs) in the Western Interconnection to participate in CAISO's real-time market for imbalance energy. CAISO proposes revisions to its tariff to implement a number of system functionality enhancements to the EIM.<sup>2</sup> Specifically, CAISO's proposed revisions provide for: (1) the ability to match EIM intertie schedule changes after the close of the real-time market with non-participating resources in order to increase the balancing options available to EIM entities; (2) the ability to automate changes to mirror system resources at intertie scheduling points between CAISO and an EIM entity in order to automate a manual process; (3) the option to use CAISO's settlement process to settle imbalance energy resulting from changes in base energy transfers between EIM entities to reduce the burden of the EIM entities' own settlement process; and (4) the capability to submit

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<sup>1</sup> 16 U.S.C. § 824d (2012).

<sup>2</sup> CAISO's proposed tariff revisions were approved by the EIM Governing Body and the CAISO Governing Board in mid-2017. *See* December 15 Filing at 2-3 (citing Attachments C and D).

hourly generation distribution factors for aggregated non-participating resources to improve the market's modeling of these resources. In addition to the EIM enhancements, CAISO proposes revisions to its tariff to expand the use of its non-generator resource modeling functionality in the real-time market. CAISO explains that these proposed tariff revisions will benefit EIM entities and entities within the CAISO Balancing Authority Area (BAA). In addition, CAISO asserts that the proposed tariff revisions will facilitate Powerex Corp.'s (Powerex) and Idaho Power Company's anticipated participation in the EIM.<sup>3</sup> CAISO's proposed tariff revisions are discussed in detail below.

**A. Automated Matching of Import/Export Schedule Changes with an EIM Non-Participating Resource**

3. Under the current EIM structure, CAISO explains that EIM entities submit hourly base schedules representing their base supply and demand. EIM entities must communicate how they will maintain balance between resources and loads in response to import or export schedule changes that occur after EIM base schedules have been submitted to CAISO at 40 minutes before the operating hour (T-40). Such changes may arise either from new bilateral transactions entered into after T-40 or from reductions to interchange schedules that were included in EIM base schedules, but were later impacted by transmission curtailment after T-40. Currently, when imbalances in the market occur due to import/export schedule changes after the base schedule has been submitted to CAISO, an EIM entity can resolve the issue by either: (1) manually dispatching a resource up or down in its BAA, or (2) allowing the EIM to dispatch participating resources to resolve the imbalance.<sup>4</sup> CAISO explains that the former option is a manual process that is time consuming and prone to error, and the latter option results in less energy available for use in the EIM.<sup>5</sup>

4. CAISO states that the proposed functionality will provide a third option to resolve an intertie schedule change. Specifically, CAISO proposes to add tariff Section 29.34(s) (EIM Auto-Match), which will allow an EIM entity to match one or more non-

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<sup>3</sup> On November 3, 2017, CAISO filed four agreements with Powerex and one agreement with British Columbia Hydro & Power Authority to provide the contractual framework for Powerex's participation in the EIM. *Calif. Indep. Sys. Op. Corp.*, Docket Nos. ER18-251-000, *et al.* (filed Nov. 3, 2017) (Powerex Filing). Powerex and Idaho Power Company plan to commence participation in the EIM on April 4, 2018.

<sup>4</sup> December 15 Filing at 3. According to CAISO, the EIM entity may choose to execute either option in the event of an import/export imbalance.

<sup>5</sup> *Id.* Attachment E at 9.

participating resource with an inertie system resource within the EIM entity's BAA for CAISO to dispatch in the event of an inertie schedule change.<sup>6</sup> The proposed tariff section provides that the EIM entity may submit a designation to the Master File of EIM non-participating resources, within its BAA, to automatically match import/export schedule changes outside of the clearing of the real-time market.<sup>7</sup> Under this option, CAISO states that the non-participating resource(s) will provide the balancing adjustments that support the schedule change of the import or export modeled by the inertie system resource.<sup>8</sup> In such cases, the market will automatically adjust the dispatch of the non-participating resource(s) to match the import or export schedule change represented by the inertie system resource.<sup>9</sup>

5. CAISO proposes to settle auto-matched transactions at the instructed imbalance energy price, and settle any deviation, from the matched quantity by the non-participating resource or the associated inertie schedule, as uninstructed imbalance energy. CAISO notes that this proposal is consistent with how it settles the schedule change today if the EIM entity submits changes manually.<sup>10</sup> In addition, CAISO notes that it will omit the auto-matched portion of the EIM inertie or scheduling point schedule change from the historical inertie schedule for the determination of additional resource sufficiency test requirements for the relevant EIM entity BAA.<sup>11</sup> According to CAISO, this exemption ensures that the non-participating resource responded to the schedule change.

6. CAISO asserts that the auto-match enhancement was supported by all stakeholders and will benefit them by enabling the most efficient use of resources, preserving participating resource bid ranges, and minimizing errors that may result from manual dispatches.<sup>12</sup> Further, CAISO avers that this functionality will increase the balancing

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<sup>6</sup> To clarify the automated matching functionality, CAISO proposes to add a definition for EIM Auto-Match in Appendix A of its tariff.

<sup>7</sup> December 15 Filing at 3-4.

<sup>8</sup> This provision is designated for scheduling imbalances after T-40. *Id.* Attachment E at 9.

<sup>9</sup> December 15 Filing at 4.

<sup>10</sup> *Id.*

<sup>11</sup> *Id.* (citing proposed tariff Section 29.34(s)(3)(B) (CAISO Actions in Response to Inertie Schedule Change)).

<sup>12</sup> *Id.* at 4-5.

options available to EIM entities, reduce the need for manual dispatch, and maintain the amount of available energy bids from participating resources.<sup>13</sup>

**B. Automatic Changes to “Mirror” System Resources at Intertie Scheduling Points between CAISO BAAs and EIM Entity BAAs**

7. CAISO explains that mirror system resources<sup>14</sup> are used to mirror import/export schedules between CAISO and an EIM entity at CAISO intertie scheduling points.<sup>15</sup> The mirror system resource is used to balance the non-EIM intertie schedules with CAISO so that the real-time market optimization does not observe an imbalance that must be resolved by the market.<sup>16</sup> According to CAISO, this procedure allows the market to solve for both CAISO’s BAA and the adjacent EIM BAA simultaneously.<sup>17</sup> CAISO explains that currently, EIM entity scheduling coordinators are responsible for submitting base schedules and manually updating them for mirror system resources. According to CAISO, because this process relies on manual submission, it is prone to mistakes that produce incorrect market outcomes. Therefore, CAISO proposes to allow EIM entities to utilize its market software to automatically update mirror system resource schedules.<sup>18</sup> This enhancement, like the auto-matching enhancement, will automate communication of EIM entity actions to maintain balance between resources and loads following interchange schedule changes, thus ensuring the market receives accurate information

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<sup>13</sup> *Id.* at 4.

<sup>14</sup> An EIM Mirror System Resource is a system resource at a scheduling point registered to an EIM Entity that is used to mirror CAISO intertie schedules at the scheduling point when the associated energy is generated at, wheeled through, or consumed at the corresponding EIM Entity BAA.

<sup>15</sup> December 15 Filing at 4-5, Attachment E at 13.

<sup>16</sup> For example, a 50 MW day-ahead import to the CAISO BAA would be matched with a corresponding 50 MW mirror export schedule out of an EIM BAA at a CAISO intertie scheduling point. *Id.* Attachment E at 13.

<sup>17</sup> *Id.*

<sup>18</sup> *See* proposed Section 29.27(c) of CAISO’s tariff (Automated EIM Mirror). To clarify the mirror system resource modeling process, CAISO proposes to define EIM Mirror and EIM Mirror System Resources in Appendix A of its tariff.

about any changed conditions.<sup>19</sup> CAISO notes that the auto-mirroring functionality can be combined with the auto-matching functionality.<sup>20</sup>

8. CAISO states that this proposed functionality is supported by stakeholders and will allow EIM entities to automate the existing process and eliminate potential errors associated with manual submission.<sup>21</sup>

**C. Financial Settlement of Imbalance Energy from Energy Transfers Between BAAs**

9. CAISO models bilateral transactions between EIM entities using base energy transfer system resources (Base ETSRs). According to CAISO, the EIM entity registers a minimum of two Base ETSRs (i.e., one in the import direction and one in the export direction) to model bilateral activity with each counterparty EIM entity. In order to help facilitate the settlement of bilateral transactions in the EIM, CAISO proposes to provide EIM entities with nonbinding settlement information for Base ETSR schedule changes if both parties request it, and agree on a location for the settlement of the schedule changes.<sup>22</sup> CAISO explains that the data will allow EIM entities to determine the point of delivery of the Base ETSR and, as a result, the locational marginal price used for settlement between the two EIM entities will be known.

10. In addition, CAISO proposes to allow EIM entities to designate CAISO to financially settle their transactions through the CAISO settlement system, rather than the parties settling them outside of the market. CAISO states that it will undertake such a financial settlement if: (1) each EIM entity establishes a Base ETSR between the EIM entity BAAs; (2) each EIM entity agrees on the pricing location in accordance with the tariff requirements; and (3) the designated EIM entity scheduling coordinator submits

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<sup>19</sup> December 15 Filing at 5-6.

<sup>20</sup> *Id.* Attachment E at 13.

<sup>21</sup> *Id.* at 6.

<sup>22</sup> *Id.* at 7 (citing proposed tariff Section 29.11(q) (EIM Transfer System Resource Settlement Information)).

e-tags reflecting the schedule and any changes to the Base ETSR.<sup>23</sup> CAISO notes that this functionality is voluntary and supported by stakeholders.

**D. Submissions of Base Generation Distribution Factors (Base GDF) for Aggregated Non-Participating Resources**

11. Under the existing EIM structure, CAISO uses generation distribution factors to model aggregated resources at the underlying physical resource locations, which enables it to model the impact of flows from individual resources that make up the aggregation. The generation distribution factors are submitted by EIM entities as part of the hourly bidding process. In an effort to extend this functionality to additional resources, CAISO proposes to add tariff Section 29.27(d) (Base GDFs for Aggregated EIM Non-Participating Resources), which allows an EIM entity to submit generation distribution factors for aggregated non-participating resources<sup>24</sup> via its base schedule. CAISO states that it will distribute the base schedule and any imbalances of aggregate EIM non-participating resources using the submitted Base GDFs. When this information is unavailable, CAISO will use the registered default Base GDFs for the aggregate resource registered in CAISO's master file.<sup>25</sup>

12. CAISO explains that this proposed functionality is supported by stakeholders because it enables accurate modeling on an hourly basis and allows the market to run efficiently and economically.<sup>26</sup>

**E. Expanding Non-Generator Resource Modeling Functionality**

13. CAISO previously developed a non-generator resource model to reflect the operational characteristics of storage devices in the market. CAISO explains that these resources are able to both inject energy into and withdraw energy from the grid, however, their ability to do so is limited by the storage device's state of charge. Consequently, CAISO states that it enforces a constraint to ensure these resources receive feasible dispatches. As part of its *Energy Storage and Distributed Energy Resources* policy

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<sup>23</sup> *Id.* (citing proposed tariff Section 29.11(r) (EIM Transfer System Resource Settlement)). This section additionally sets forth the process by which CAISO will settle schedule changes and calculate the financial settlement.

<sup>24</sup> Aggregated non-participating resources may consist of multiple physical generators in a configuration approved by CAISO. *Id.* at 8.

<sup>25</sup> *Id.*

<sup>26</sup> *Id.* at 8, Attachment E at 15.

initiative, CAISO determined that there are devices or aggregations of distributed energy resources that do not need the state of charge respected.<sup>27</sup> Consequently, the policy initiative engendered the development of a non-generator resource model that does not have a state of charge constraint (referred to herein as Generic NGR).<sup>28</sup>

14. In order to expand the use of the existing non-generator resource model to other resource types, CAISO proposes tariff Section 27.10 (Election to Use Non-Generator Resource Generic Modeling Functionality), which encompasses a series of market rules for using the Generic NGR model.<sup>29</sup> First, CAISO states that in order to use the Generic NGR modeling functionality, the resource must be capable of generating energy. For negative generation, CAISO will not enforce a state of charge constraint that is used by storage resources in CAISO's market; rather, resources will have a continuous operating range from negative to positive injection, and will not incur the costs normally associated with resource management.<sup>30</sup>

15. Second, CAISO proposes tariff revisions to clarify that the local market power mitigation rules in the CAISO tariff will apply to energy bids from resources that elect to use the Generic NGR modeling functionality, if the underlying resource type is subject to CAISO's market power mitigation process.<sup>31</sup> For example, if the underlying resource is a conventional generator, then it will be subject to mitigation. If the underlying resource is a storage device, then it will not be subject to market power mitigation because storage devices are currently exempt from market power mitigation.<sup>32</sup> CAISO also proposes to clarify that bids from resources comprised of multiple technologies that include non-

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<sup>27</sup> *Id.* Attachment D at 1-2.

<sup>28</sup> *Id.* at 9-10, Attachment E at 14.

<sup>29</sup> *Id.* at 10. To clarify the non-generator resource modeling functionality, CAISO proposes to define Non-Generator Resource Generic Modeling in Appendix A of its tariff. CAISO also proposes revisions to tariff Sections 30.5.6, 31.2, 34.1.5.1, and 11.6.5 to make them consistent with proposed tariff Section 27.10.

<sup>30</sup> CAISO states that the costs normally associated with resource management include start-up cost, start-up time, minimum up time, minimum down time, or forbidden operating regions. December 15 Filing at 14.

<sup>31</sup> *See* proposed Section 27.10 (Election to Use Non-Generator Resource Generic Modeling Functionality) of CAISO's tariff.

<sup>32</sup> December 15 Filing at 12-13, Attachment E at 15.

generator resources will remain subject to all applicable market power mitigation under the CAISO Tariff, including local market power mitigation.<sup>33</sup>

16. Third, resources electing to use the Generic NGR modeling functionality are not counted for resource adequacy at this time, because CAISO has not designed its must-offer rules or configured its systems to support bid generation rules based on those requirements. CAISO states that it intends to address this functionality in a future policy initiative.<sup>34</sup>

17. In addition to aggregated and individual resources, CAISO states that the Generic NGR model will be available for use on interties to support regulation down for dynamically scheduled resources. For example, an intertie resource without a forward energy schedule will be able to provide regulation down to CAISO.<sup>35</sup> According to CAISO, the first proposed use of the Generic NGR modeling functionality in the EIM is the aggregation of resources that makes up Powerex's EIM participating resources. It is anticipated that Powerex will register eight aggregated hydroelectric facilities that are capable of responding to intra-hour changes in generation, load, and interchange.<sup>36</sup>

18. CAISO states that these revisions will extend the use of non-generator resource modeling functionality in a manner that supports more efficient participation in its ancillary services markets and the EIM. CAISO also notes that stakeholders support these modifications because they leverage existing resource modeling and provide additional clarity on use of the existing non-generator resource model.<sup>37</sup>

#### **F. Effective Date**

19. CAISO requests that the Commission accept its proposed tariff revisions effective February 15, 2018, which CAISO states will support its market simulations and the certification of readiness necessary for Powerex's and Idaho Power Company's participation in the EIM on April 4, 2018.

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<sup>33</sup> See proposed Sections 31.2 (Day-Ahead MPM Process) and 34.1.5 (Mitigating Bids in the RTM) of CAISO's tariff.

<sup>34</sup> *Id.* at 13-14.

<sup>35</sup> *Id.* Attachment E at 15.

<sup>36</sup> *Id.* at 14-15.

<sup>37</sup> *Id.* at 15.

## II. Notice and Responsive Filings

20. Notice of CAISO's filing was published in the *Federal Register*, 82 Fed. Reg. 61,755 (2017), with interventions and protests due on or before January 5, 2018. Timely motions to intervene were filed by PacifiCorp; Puget Sound Energy, Inc.; NV Energy, Inc.; Idaho Power Company; the Cities of Anaheim, Azusa, Banning, Colton, Pasadena, and Riverside, California; Modesto Irrigation District; Southern California Edison Company; Northern California Power Agency; Pacific Gas and Electric Company; Bonneville Power Administration; the City of Santa Clara, California and the M-S-R Public Power Agency; Powerex; and Portland General Electric Company. The Sacramento Municipal Utility District (SMUD) filed a timely motion to intervene and comments in support of the filing, and Powerex filed timely comments in support of the filing. The Balancing Authority of Northern California (BANC) filed a motion to intervene out-of-time. No protests were filed.

21. Powerex and SMUD support CAISO's proposed EIM enhancements. Powerex explains that many of the proposed revisions automate communication to the EIM regarding activity that is already permitted and that already occurs today, albeit through manual processes. Powerex believes that automation of these existing functions will reduce staffing burden, ensure more timely communication of information to the EIM, and increase accuracy by reducing errors associated with manual data entry. Powerex states that the proposed enhancements also expand the availability of existing non-generator resource modeling for other purposes, including supporting Powerex's EIM participation as a Canadian EIM Entity. According to Powerex, each of the proposed EIM enhancements supports increased efficiencies in the EIM.<sup>38</sup>

22. SMUD supports CAISO's proposed enhancements, particularly with respect to CAISO's proposal to extend the use of Generic NGR modeling to other types of resources. SMUD states that these tariff revisions will facilitate the provision of regulation down by dynamic system resources and allow scheduling coordinators to offer regulation down from their system resources without a day-ahead energy schedule.<sup>39</sup> SMUD explains that it currently provides regulation up services to CAISO, and allowing SMUD and other market participants to offer regulation down service would benefit both CAISO and SMUD customers.<sup>40</sup>

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<sup>38</sup> Powerex Comments at 5.

<sup>39</sup> SMUD Comments at 2.

<sup>40</sup> *Id.* at 3.

### **III. Discussion**

#### **A. Procedural Matters**

23. Pursuant to Rule 214 of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.214 (2017), the timely, unopposed motions to intervene serve to make the entities that filed them parties to this proceeding.

24. Pursuant to Rule 214(d) of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.214(d) (2017), the Commission will grant BANC's late-filed motion to intervene given its interest in the proceeding, the early stage of the proceeding, and the absence of undue prejudice or delay.

#### **B. Commission Determination**

25. We accept CAISO's proposed EIM system functionality enhancements effective February 15, 2018, as requested. We find that the automated matching and the automatic mirroring functionalities will result in more efficient EIM market outcomes by automating manual processes that are prone to errors and better maintain balance between resources and load following intertie schedule changes. We also find that CAISO's proposal to provide non-binding settlement information to EIM entities and to settle imbalances between Base ETSRs upon request will benefit EIM entities by providing greater transparency and additional options for settling imbalance energy, which CAISO states has been a burden for some EIM entities. We find that allowing EIM entities to submit Base GDFs for aggregated non-participating resources will enable accurate modeling on an hourly basis in the market optimization.

26. Moreover, we accept CAISO's proposal to expand the use of the Generic NGR modeling functionality to other resources participating in CAISO's markets and the EIM. We also accept CAISO's corresponding tariff revisions that clarify its market mitigation process for energy bids of resources electing to use the Generic NGR modeling functionality. We find that expanding the use of this modeling functionality will facilitate the inclusion of additional resources in the EIM, support efficient participation in CAISO's ancillary services markets, and enable the sale of regulation down by resources outside of the CAISO market. More generally, we find that CAISO's proposed EIM enhancements improve market efficiency by automating manual processes, providing greater transparency into bilateral transactions, and enabling increased participation of resources in both the EIM and CAISO markets.

The Commission orders:

CAISO's proposed tariff revisions are hereby accepted for filing effective February 15, 2018, as discussed in the body of this order.

By the Commission.

( S E A L )

Kimberly D. Bose,  
Secretary.