December 15, 2017

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

Re: California Independent System Operator Corporation
Docket No. ER18-____-000
2017 Consolidated EIM Initiatives and Resource Modeling Tariff Amendments

Dear Secretary Bose:

The California Independent System Operator Corporation ("CAISO") respectfully submits for filing an amendment to the CAISO Tariff[1] to implement several system functionality enhancements to the Energy Imbalance Market ("EIM") and extend the use of the modeling functionality the CAISO uses for non-generator resources to other resources participating in the CAISO's markets and the EIM. These amendments derive from the 2017 Consolidated EIM Initiatives effort. The proposed EIM system functionality enhancements will automate manual processes, facilitate bilateral financial settlement, and expand the market's modeling capabilities. These enhancements are consistent with existing EIM design and principles. The CAISO also proposes to extend the option to use the CAISO's non-generator resource modeling functionality to additional resource types. The CAISO requests an effective date for the tariff revisions of February 15, 2018, such that they will be in effect when the CAISO releases the functionality to the market and certifies readiness for the scheduled commencement of Powerex Corp.'s ("Powerex") and Idaho Power Company's participation in the EIM.[2]

[1] The CAISO makes this filing pursuant to Section 205 of the Federal Power Act, 16 U.S.C. § 824d, and Sections 35.11 and 35.13 of the Commission's regulations, 18 C.F.R. §§ 35.11, 35.13.

[2] The CAISO filed the Powerex participation agreements in Docket No. ER18-251 and requested an effective date of February 15, 2018, concurrent with the requested effective date of this amendment. Powerex and Idaho Power Company plan to commence participation in the EIM on April 4, 2018.

I. BACKGROUND

The EIM provides other balancing authority areas in the Western Interconnection with the opportunity to participate in the real-time market for imbalance energy that the CAISO operates in its own balancing authority area. The CAISO's market rules allowing EIM participation went into effect on October 24, 2014, for the first trading day November 1, 2014.

The EIM has continued to develop and attract the interest of a diverse array of participants throughout the Western Interconnection. Currently five other entities are participating in the EIM and, along the way, the CAISO has made incremental improvements to the EIM as new entities have joined. The Idaho Power Company, Powerex, the City of Seattle, by and through its City Light Department, the Balancing Authority of Northern California on behalf of the Sacramento Municipal Utility District, the Los Angeles Department of Water and Power, and the Salt River Agriculture Improvement and Power District are expected to commence participation in the EIM within the next three years.

On November 1, 2017, the CAISO submitted for filing and acceptance, among other agreements, the Powerex Canadian EIM Entity Agreement between the CAISO and Powerex, a British Columbia corporation and the wholly-owned subsidiary of British Columbia Hydro & Power Authority ("BC Hydro"), a provincially-owned Crown corporation subject to the jurisdiction of the British Columbia Utilities Commission. Powerex will be the first international entity participating in the EIM and the first that is not a balancing authority. Powerex will participate in the EIM with residual capability of the BC Hydro system. Although, as discussed below, the CAISO did not develop these amendments specifically to accommodate Powerex's participation in the EIM, certain of the proposed functionalities facilitate that participation.[3]

The proposed amendments derive from the CAISO's 2017 Consolidated EIM Initiatives effort.[4] Four of the five proposed tariff revisions providing EIM system functionality enhancements are under the EIM Governing Body's primary authority. The EIM Governing Body approved these tariff revisions on November 28, 2017.[5] The fifth enhancement concerns resource modeling more generally,

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[3] It is not uncommon for the CAISO to identify enhancements to the EIM as new entities commence participation, engage in a stakeholder process to consider the benefits of proposed enhancements and to implement such features concurrently with the participation of the new EIM entity.

[4] This initiative initially included three proposals that stakeholders did not support. The CAISO presented the features addressed in this filing in the straw proposal. The stakeholder materials for this initiative area available on the CAISO website at: http://www.caiso.com/informed/Pages/StakeholderProcesses/ConsolidatedEnergyImbalanceMarketInitiatives.aspx.

[5] The memo provided to the EIM Governing Body is include as Attachment C.

and this modification falls under the EIM Governing Body's advisory role because the model applies throughout the CAISO market. The EIM Governing Body reported its support for the proposed amendments to the CAISO Governing Board on December 14, 2017 and the CAISO Governing Board approved the amendment on that same day.[6]

II. PROPOSED AMENDMENTS

The proposed EIM system functionality enhancements include (1) the ability to match EIM intertie schedule changes after the close of the real-time market with non-participating resources; (2) the opportunity to automate changes to "mirror" system resources at intertie scheduling points between the CAISO and an EIM entity; (3) the option to settle imbalance energy resulting from changes in base energy transfers between EIM entities; and (4) the capability to submit hourly generation distribution factors for aggregated non-participating resources. In addition, the CAISO proposes rules governing the expanded use of its non-generator resource modeling functionality in the real-time market generally. The CAISO discusses these proposed enhancements in greater detail below.

A. EIM system functionality enhancements

1. Automatic "matching" import or export schedule changes to a non-participating resource within the applicable EIM entity balancing area

Under the EIM structure, EIM entities submit hourly base schedules representing their base supply and demand. When an import or export schedule included in a base schedule changes after final base schedules are submitted, the EIM entity must maintain balance between supply and demand. Today, the EIM entity may decide to (1) manually dispatch a resource in its balancing authority area for operational reasons or if it has a reliability concern; or (2) allow the EIM to resolve the imbalance by dispatching participating resources in the market, including through the available balancing capacity mechanism.

The proposed amendment adds a new subsection 29.34(s)[7] to offer a third option for maintaining the balance of an EIM entity's supply and demand if there is an import or export schedule change. Often this results from a bilateral transaction after the last opportunity to update base schedules and prior to the e-tag submission deadline for such transactions, but it may also

[6] The memo provided to the CAISO Governing Board is include as Attachment D.

[7] All references to sections or subsections in this transmittal letter are references to the CAISO tariff.

occur at any time to address a transmission curtailment or other operational issues that require an intertie schedule change. The proposed enhancement provides a third option to the EIM Entity: it allows an EIM entity to designate one or more pairs of a non-participating resource and an intertie system resource within its balancing authority area that the CAISO will dispatch to automatically match the intertie schedule change. The non-participating resource will provide the balancing adjustments that support the schedule change of the import or export modeled by the intertie system resource. In such cases, the market will automatically adjust that non-participating resource's dispatch to match the import or export schedule change represented by the intertie system resource. The tariff amendment refers to this feature as an "auto-match."

The CAISO will settle auto-matched transactions at the instructed imbalance energy price. The CAISO will settle any deviation by the non-participating resource or the associated intertie schedule from the matched quantity as uninstructed imbalance energy. This is consistent with how the CAISO settles the change today if the EIM entity submitted it manually.

The CAISO will also omit the auto-matched portion of the EIM intertie or scheduling point schedule change from the historical intertie schedule over/under-scheduling histogram for the determination of additional resource sufficiency test requirements for the relevant EIM entity balancing authority area.[8] This exemption recognizes that the non-participating resource responded to the schedule change. Thus, the energy imbalance created by the schedule change did not utilize the bid-range of participating resources and the over/under-scheduling performance of the EIM entity should not reflect an increased requirement for additional bid-range of participating resources.

This functionality will increase the balancing options available to EIM entities, reduce the need for manual dispatch and maintain the amount of available energy bids from participating resources. Recognizing that the balancing authority will use non-participating resources to respond to import/export schedule changes allows the energy bids from participating resources to be available to meet imbalances within the EIM, rather than being consumed by a schedule change due to bilateral transactions or operational changes. Having this deeper pool of supply available makes the EIM more resilient, which in turn should increase the benefits of the EIM to all participants. In addition, this enhancement will ensure that the import or export schedule changes and non-participating resource schedule changes are simultaneously

[8] The histogram is calculated monthly and used by the CAISO to determine whether an EIM entity's historical intertie schedule changes warrant an increase in the resource sufficiency tests. *See, e.g.,* CAISO tariff sections 29.34(l)(4)(B) and 29.34(m)(6)(ii). The details of the histogram calculation are set forth in the business practice manual for the energy imbalance market as noted in the CAISO tariff.

communicated to the market. This improves market efficiency relative to the current practice of manually dispatching resources because manual dispatches may not occur until after an import or export schedule change is already communicated to the market. This in turn reduces the potential for additional real-time imbalance energy offset costs.

Stakeholders support this functionality because it automates what otherwise would require a manual process, allows EIM entities to match intertie schedule changes for additional purposes and facilitates participation in the EIM. Initially some stakeholders were concerned that there was insufficient distinction from the current manual dispatch function and that an EIM entity could only designate one resource per balancing authority area for purposes of auto-matching. The CAISO responded to these concerns by enhancing the functionality to permit EIM entities to designate multiple resources within each balancing authority area for auto-matching, providing additional detailed examples in the draft final proposal of how the functionality worked under different circumstances, walking stakeholders through numerous examples, and proposing tariff changes that separate the auto-match feature from the manual dispatch feature.[9] These steps in the stakeholder process addressed concerns by stakeholders previously associated with this enhancement.

2. Automatic changes to "mirror" system resources at intertie scheduling points between the CAISO balancing authority area and an EIM entity balancing authority area

Today, the CAISO needs to model import or export schedules between the CAISO balancing authority area and an EIM entity balancing authority area (*i.e.,* a schedule for energy that originates in, is consumed in, or wheels through an EIM entity balancing authority area) that occur outside the real-time market. This need results from the interplay between the operation of the day-ahead and real-time markets in the CAISO balancing authority area and the operation of the EIM in other balancing authority areas. The real-time optimization in the CAISO balancing authority area follows from the day-ahead market schedules while the real-time optimization in the EIM entity balancing authority areas follows from their base schedules. Unless changes to the import or export schedules between the CAISO and the EIM entity are accurately modeled, particularly given that these schedule changes occur regularly as a result of CAISO day-ahead market awards, the market solution would not be correct. The market would observe a difference and solve for it when in fact no difference should exist. In such circumstances, the CAISO requires a mechanism to balance the schedule with a schedule for a system resource so the market optimization does not observe an imbalance that the EIM attempts to resolve.

[9] The draft final proposal is included as Attachment E to provide these examples.

This modeling practice exists today and is known to EIM entities as mirroring, and the system resources used for that purpose are known as mirror system resources.[10] Market participants in the CAISO balancing authority area may be less familiar with this practice because they do not use it and it is described in two distinct areas of the tariff, one concerning the CAISO scheduling points and the other concerning the modeling and management of EIM interties. Currently, EIM entities are responsible for manually updating mirror system resource schedules to balance the non-EIM energy schedules with the CAISO. This process is prone to mistakes because it relies on manual submission, and mistakes in this process produce incorrect market outcomes that should have been addressed. Proposed new section 29.27(c) will no longer require EIM entities to be responsible for this update. Rather, EIM entities will have the option to choose to have the CAISO's market software automatically update the mirror system resource schedules. Because this automation increases the CAISO's role regarding schedule changes, it now needs to be more clearly documented in the CAISO tariff. The amendment also adds definitions of EIM Mirror and EIM Mirror System Resource to clarify the process.

The amendment will allow EIM entities to automate a manual process they currently may need to perform and eliminate the potential for EIM entities to submit incorrect mirror system resource values as a result of the manual process. Stakeholders universally support or do not oppose the automated updating of mirror system resources because it automates a manual process and ensures accurate market modeling and outcomes.

3. Financial settlement of imbalance energy resulting from energy transfers between EIM entity balancing authority areas that are included in EIM base schedules

Bilateral interchange transactions between two EIM entities are modeled using "base energy transfer system resources."[11] Currently, the CAISO does not settle imbalances from schedule changes of energy transfer system resources, such as those due to bilateral interchange transactions. However, settling this imbalance energy among EIM entities through their own settlement processes has been a burden for some EIM entities. The amendment is designed to provide EIM entities with alternatives to reduce that burden.

[10] The draft final proposal, Attachment E, includes an example of how this process works.

[11] The CAISO established energy transfer system resource modeling to support the EIM transfer cost approved by the Commission in *Cal. Indep. Sys. Operator Corp.*, 153 FERC ¶ 61,087 (2015), and this functionality is detailed in Appendix A of the business practice manual for the energy imbalance market.

Under proposed new subsection 29.11(q), the CAISO will provide the affected EIM entities with nonbinding settlement information on imbalance energy from schedule changes of base energy transfer system resources if (1) both entities request it; and (2) the EIM entities agree on a location for the settlement of the schedule changes. This will facilitate settlement for those EIM entities that wish to do the settlement themselves.

Further, proposed new subsection 29.11(r) will provide an opportunity to further reduce that settlement burden by allowing two EIM entities to elect to have the CAISO financially settle the transactions between them through its settlement system, rather than them settling it outside of the market.[12] The CAISO will undertake the settlement if (1) each EIM entity agrees to establish a base energy transfer system resource between the EIM entity balancing authority areas; (2) each EIM entity scheduling coordinator agrees upon the pricing location based on the ratio of the pricing at the source and sink EIM entity balancing authority areas in accordance with the procedures in the business practice manual for the energy imbalance market; and (3) the designated EIM entity scheduling coordinator submits e-tags reflecting the schedule and any changes to the base energy transfer system resource.

Proposed new subsection 29.11(r) also sets forth how the CAISO will settle the schedule changes if requested. The CAISO will settle the schedule changes as fifteen-minute market instructed imbalance energy or real-time dispatch instructed energy depending on the settlement interval in which the e-tag is received by the CAISO, without regard for other fifteen-minute market or real-time dispatch instructed energy types. The schedule change may also be settled as an operational adjustment if the CAISO receives the e-tag after the end of the operating hour. The CAISO will calculate the settlement based on the difference between the e-tag and the base energy transfer system resource base schedule at the ratio of the locational marginal prices for each base energy transfer system resource, excluding any contribution that the base energy transfer system resource might have otherwise had on the real-time imbalance energy offset and real-time market bid cost recovery pursuant to subsection 29.11(f).

The proposed settlement treatment is consistent with the settlement of other imbalances that are observed in the market and settled as imbalance energy, except that only the energy portion will be settled. Settlement without regard to ramping and other attributes that are settled in the market is appropriate because only the difference in the quantity of the energy scheduled

[12] EIM entities are not permitted to enter into inter-SC trades. *See* CAISO Tariff section 29.28. Although settling these transactions does not constitute an inter-SC trade because, for example, it can only be modified through changes to the CAISO master file registration process, it shares some characteristics of inter-SC trades in that the CAISO is facilitating settlement of transactions outside of the market between counterparties based on market information.

between EIM balancing authority areas should be settled. All other attributes associated with the base transfer system resource would be settled in the market. Again, these contributions are reflected in the settlement of the market itself and should not be considered in the settlement of the differences in the base transfer system resources proposed in the amendment.

Stakeholders support this functionality because it is voluntary and meets the needs of EIM entities that will use the functionality.

4. Submission of generation distribution factors for aggregated non-participating resources

The CAISO uses generation distribution factors to model aggregated resources at the underlying physical resource locations.[13] The market uses this information in the optimization to reflect accurately the impact on flows of individual resources. EIM entities provide generation distribution factors for aggregate participating resources as part of the hourly energy bids submitted for these resources. EIM entities cannot currently submit generation distribution factors for aggregate non-participating resources because non-participating resources are only required to submit base schedules, which do not include hourly bids. It is the hourly bidding process that allows generation distribution factors to be submitted for EIM participating resources. The CAISO seeks to extend this opportunity to update generation distribution factors hourly to non-participating resources even though they will not submit hourly bids.

Proposed new subsection 29.27(d) will allow EIM entities to submit generation distribution factors for non-participating resources that consist of aggregations of multiple physical generators in a configuration approved by the CAISO. EIM entities will submit this information through their EIM base schedule, not through hourly bids. The CAISO will distribute the base schedule and any imbalances of aggregate EIM non-participating resources using the submitted base generation distribution factors, if available, or otherwise the registered default base generation distribution factors for the aggregate resource registered in the CAISO's master file.

Accurate generation distribution factors for aggregated non-participating resources provided through base schedules will improve the market's modeling. For this reason, stakeholders support this functionality.

[13] The aggregation of resources in the CAISO markets generally is governed by the section 27 of the CAISO tariff and the full network model business practice manual.

B. Non-generator resource model market rule modifications

1. The non-generator resource model has served as an tool to integrate battery storage and other resources

In the CAISO's markets, non-generator resources are resources that can operate as generation or load, or both.[14] These resources can be dispatched to any operating level within their operating range but are subject to constraints regarding the amount of energy they can generate or curtail. Examples of non-generator resources include, but are not limited to, battery storage, flywheels, and dispatchable demand response. These resources may submit bids for energy and all ancillary services (regulation, spinning reserve, and non-spinning reserve) for which they are certified under the CAISO's applicable technical and operating requirements. For this reason, the CAISO developed a non-generator resource model that allows the CAISO to model these resources' capabilities and constraints and ensure that the CAISO's dispatch recognizes these characteristics.[15] As part of its implementation efforts, the CAISO developed a functional model to support both limited energy storage resources and dispatchable demand response.[16]

The non-generator resource model allows non-generator resources (*e.g*. a battery) to operate continuously across an operating range that includes both negative and positive generation (*i.e*., charging and discharging). This model also recognizes that non-generator resources have a MWh constraint that limits the amount of energy they can store and produce. In the case of a battery, this state of charge reflects the amount of energy stored in proportion to the limit on the amount of energy that can be stored, typically expressed as a percentage.

As part of its initial implementation of this functionality, the CAISO modeled the resource's initial state of charge value based on the ending state of charge value from the previous day's market awards. When there are no previous day's awards, the CAISO models the initial state of charge value for the resource as 50 percent of its maximum energy limit.[17] In 2016, the CAISO filed tariff revisions to allow non-generator resources to submit their own state of charge value as a bid parameter in the day-ahead market.[18] The Commission

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[14] *See* Definition of Non-Generator Resources in Appendix A of the CAISO tariff.

[15] *See* CAISO tariff revisions filed in Commission Docket ER11-4353 on August 22, 2011. *See also Cal. Indep. Sys. Operator Corp.*, 137 FERC ¶ 61,165 (2011).

[16] *See* 2.1.13 of the CAISO business practice manual for market operations.

[17] *See* Table on bidding limitation for Non-Generator Resources in Section 4.1.1 of the CAISO's Business Practice Manual for Market Instruments. https://bpmcm.caiso.com/BPM%20Document%20Library/Market%20Instruments/BPM_for_Market%20Instruments_V46_clean.doc.

[18] *See* CAISO tariff revisions filed with the Commissioner Docket No. ER16-1735 on May 18, 2016.

accepted these revisions.[19] This feature allows non-generator resource operators to self-manage their energy limits and provides the CAISO's systems with more accurate market information regarding the resource based on actual conditions.

2. Extending use of the CAISO's non-generating resource modeling functionality benefits the CAISO's market and the EIM

In this filing, the CAISO proposes to extend the use of the non-generator resource model for use by to other resource types in the CAISO's markets and the EIM. The CAISO is not proposing to create a new resource type or change the non-generator model itself. For purposes of this filing, the CAISO identifies its non-generator resource modeling functionality as non-generator resource generic modeling, which the CAISO proposes to define as follows:

> [A] functionality used by the CAISO to recognize that a resource or aggregation of resources may be dispatched to any operating level within a continuous generating operating range from a negative PMin to a positive PMax.

In proposed section 27.10, the CAISO explains that scheduling coordinators with resources that have a PMax greater than zero may elect to use this modeling functionality.

> The CAISO employs functionality to model Non-Generator Resources' participation in the CAISO's markets. Resource types other than Non-Generator Resources that have a PMax greater than zero may also elect to use this modeling functionality. As further described in the Business Practice Manual and consistent with the CAISO's Full Network Model database release schedule, Scheduling Coordinators may elect to use Non-Generator Resource Generic Modeling functionality for individual resources or an aggregation of resources.

A fundamental reason to limit use of this functionality to resources that can generate energy is that the CAISO will not treat resources using the non-generator resource generic modeling functionality as measured demand when the resource is operating in a negative range or consuming energy. The CAISO does not treat electric battery storage as measured demand under the

[19] *Cal. Indep. Sys. Operator Corp*., 156 FERC ¶ 61,110 (2016).

non-generator resource model when the resource operates in a negative range even though the resource is consuming energy. In some cases, especially aggregated resources, a resource using non-generator resource generic modeling will be capable of operating in a negative operating range. Like electric battery storage, the scheduling coordinator for the resource using non-generator resource generic modeling functionality will not be subject to CAISO settlement charges applicable to measured demand other than the locational marginal price for energy.[20] The CAISO will not invoice the scheduling coordinator for the resource with charges applicable to measured demand when the resource is operating in a negative range between PMin and zero because the negative generation is not actual demand but rather represents reduced generation. In contrast resources that are dispatchable demand response and use the non-generator resource model will continue to be treated as measured demand. These resources are not consuming energy for later production. This approach is consistent with the CAISO's current design of settlement rules for different types of non-generator resources.[21]

Similar to the enhancements made to the CAISO's modeling of non-generator resources in 2016, the CAISO proposes that scheduling coordinators electing to use non-generator resource generic modeling must self-manage their energy limits.[22] This feature requires scheduling coordinators that elect to use the non-generator resource generic modeling for their resources to self-manage their energy limits. With the use of bids, the scheduling coordinators can provide the CAISO's market systems with more accurate market information regarding the resource's state of charge (*i.e*. capability to produce or consume energy) based on actual conditions.

In considering the applications to which the non-generator resource model may apply, the CAISO identified several market rules to govern its use. For example, the CAISO will not observe costs normally associated with resource management for resources electing to use the non-generator resource generic modeling functionality, including but not limited to start-up costs, minimum load costs, or transition costs.[23] This is consistent with the treatment of existing resources that use non-generator resource modeling and reflects the characteristic of a resource to move continuously across an operating range.[24] Moreover, the CAISO will not observe these resources'

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20 *See* proposed CAISO tariff section 11.6.5.

21 *See* CAISO Business Practice Manual Configuration Guide: MSS Netting Version 5.7 at 6, Business Rules 6.5-6.7. https://bpmcm.caiso.com/BPM%20Document%20Library/Settlements%20and%20Billing/Configuration%20Guides/Pre-Calcs/BPM%20-%20CG%20PC%20MSS%20Netting_5.7.doc

22 *See* proposed CAISO tariff section 27.10.

23 *Id.*

24 *See* Table on bidding limitation for Non-Generator Resources in Section 4.1.1 of the

MWh constraints. Consistent with the enhancements to the CAISO's market rules previously accepted by the Commission, the CAISO proposes to make non-generator resource generic modeling functionality available to all resource types on the condition that scheduling coordinators manage their resources' energy limits based on actual conditions. With respect to a resource capable of operating continuously across a positive and negative operating range, the resource's state of charge is theoretically unlimited and the resource operator is best suited to manage the energy limits the resource is facing based on actual conditions through the use of bids.

Similar to other resources using non-generator resource modeling, the CAISO is proposing that resources electing to use non-generator resource generic modeling functionality submit bids that contain the components specified in section 30.5 based on how the resource is participating in the CAISO Markets (*e.g.*. to provide energy, ancillary services, *etc.)*.[25] The CAISO also proposes tariff revisions to clarify that it will apply its market power mitigation process to energy bids of resources electing to use non-generator resource generic modeling functionality based on bid mitigation rules that apply to the underlying participating resource.[26]

Currently, bids from non-generator resources are not subject to the market power mitigation process.[27] However, the CAISO proposes to require that bids from resources that elect to use non-generator resource generic modeling will be subject to the CAISO's market power mitigation process, if the underlying resource type is subject to existing bid mitigation rules. For example, if the underlying resource is a natural gas-fired participating resource, then its bid will be subject to mitigation. If the underlying resource is a storage device, then its bid will not be subject to market power mitigation because storage devices are currently exempt from market power mitigation.[28] These tariff changes do not change existing market power mitigation practices. Instead, these changes are responsive to the request of the CAISO's Department of Market Monitoring that the CAISO clarify how the market power mitigation process will apply to bids from resources electing to use non-generator resource generic modeling functionality.

CAISO's business practice manual for market instruments. https://bpmcm.caiso.com/BPM%20Document%20Library/Market%20Instruments/BPM_for_Market%20Instruments_V46_clean.doc.

25 *See* proposed changes to CAISO tariff section 30.5.6.

26 *See* proposed CAISO tariff section 27.10.

27 See CAISO tariff sections 31.2 and 34.1.5.

28 See CAISO tariff sections 31.2 and 34.1.5.

In addition, the CAISO is proposing tariff revisions to clarify that bids from resources comprised of multiple technologies that include non-generator resources will remain subject to all applicable market power mitigation under the CAISO Tariff, including local market power mitigation. Thus, for example, a resource comprised of a natural gas fired participating generator and a storage device will be subject to the market power mitigation processes. Bids should not be exempted from the market power mitigation process simply by virtue of co-locating a storage device at the resource. Otherwise, a large resource whose bids are typically subject to the market power mitigation process could obtain an exemption and exercise market power unchecked simply by combining its resource with a small electric battery storage resource. During the CAISO's stakeholder process, the Department of Market Monitoring urged the CAISO to clarify these rules to avoid the possibility of creating an inadvertent exemption from the market power mitigation process.

As part of the stakeholder initiative underlying this tariff filing, the CAISO recognized that use of the non-generator resource model could support a resource comprised of an aggregation. In other contexts, the CAISO has clarified how it would settle energy from resources comprised of an aggregation of resources. For example, the CAISO has identified settlement rules for distributed energy resource aggregations that participate as a wholesale market resource based on an aggregation of resources located at one or more pricing node.[29] In the case of resources using non-generator resource modeling, the CAISO's proposed rules are comparable. The CAISO will settle energy generated or consumed by a non-generator resource or a resource electing to use non-generator resource generic modeling functionality at the locational marginal price of the applicable pricing location. For resources comprised of multiple pricing locations, settlement for energy transactions will reflect the weighted average locational marginal price of the pricing locations based on the applicable generation distribution factors submitted through the resources' bid or as registered in the CAISO's master file. Consistent with the provisions of section 11.5.2, the CAISO will impose uninstructed imbalance energy on a resource's scheduling coordinator if the resource does not follow a dispatch instruction.

Finally, resources electing to use non-generator resource modeling functionality will not at this time qualify as resource adequacy resources under the CAISO's tariff. The CAISO is proposing this rule because it is has not designed the must-offer rules or configured its systems to support bid generation rules based on those requirements. The inability to count for resource adequacy purposes may not be critical for the initial instances of non-generator resource generic modeling applications. For example, its use to support Powerex's proposed EIM participating resource does not require the resource to qualify for

[29] CAISO tariff section 11.6.4.

resource adequacy nor does the proposal to use the functionality to support the provision of regulation by a dynamic system resource. The CAISO recognizes, however, that qualifying for resource adequacy may be critical to other applications and will address these questions through a future policy initiative.

3. The non-generator resource generic modeling functionality will have immediate applications and can support additional use cases

The CAISO plans to use non-generator resource modeling functionality to facilitate the provision of regulation down by dynamic system resources. The CAISO also plans to use this modeling functionality to integrate Powerex's EIM participating resource into the EIM. The non-generator resource model is well-suited to these applications because it can model an aggregation of resources that can operate continuously across both a positive and negative range.

In the case of a dynamic system resource seeking to provide regulation down, the modeling functionality will allow a scheduling coordinator to offer regulation down from its system resources without a day-ahead energy schedule. In the CAISO's market, a system resource is defined in part as "a group of resources, single resource, or a portion of a resource located outside of the CAISO Balancing Authority Area. . . ."[30] Based on the current modeling functionality, a dynamic system resource must submit a day-ahead sale of energy into the CAISO market in order to also offer regulation down capacity. Without this day-ahead energy schedule, the CAISO's market systems will not recognize the system resource as having an operating level that the CAISO's energy management system can dispatch as regulation down. However, the CAISO's existing non-generator resource model when applied to a system resource recognizes that a system resource can reduce output into a negative range without the need for a day-ahead energy schedule. The CAISO can model the resource as having both a positive range when the resource produces energy and a negative range when the resource's host balancing authority reduces generation serving its native load to provide regulation down to the CAISO market. By extending non-generator resource modeling functionality to this resource type, the CAISO can facilitate the provision of regulation down control service by dynamic system resources.

The CAISO will offer this modeling functionality to all EIM entities for purposes of modeling EIM participating resources and EIM non-participating resources. The first proposed use of the non-generator resource generic modeling functionality in the EIM is the aggregation of resources that constitutes Powerex's EIM participating resource. Powerex proposes to participate in the EIM with residual capacity from the BC Hydro system. Powerex intends to

[30] *See* Appendix A to the CAISO tariff, definition of System Resource.

register an aggregate participating resource representing residual capability made available to the EIM from eight Provincial hydroelectric facilities that are capable of responding to intra-hour changes in generation, load, and interchange. The residual capability that participates in the EIM shares the same eight physical resources with an aggregated non-participating resource that serves BC Hydro load. The aggregated participating and non-participating resources will have different generation distribution factors, which will be provided to the CAISO by BC Hydro.

The use of non-generator resource generic modeling functionality will allow the CAISO to represent Powerex's aggregated resource as logical resource so that the market recognizes that it can operate continuously across both a positive and negative operating range. Powerex plans to elect to use the non-generator resource generic modeling functionality because the distribution of its base aggregate schedule across its aggregated EIM non-participating resource will differ from the EIM dispatch of the aggregate EIM participating resource. For instance, all eight physical generating facilities may be scheduled in the base, but only a few will be responding to EIM dispatch. This necessitates the logical separation of the base schedule and the EIM dispatch on different resources. Because the EIM dispatch can be incremental or decremental to the base schedule, the aggregated EIM participating resource will have a zero MW base schedule and modeled so that it can move continuously across a positive or negative operating range. When providing transfers to other EIM entities, the aggregated resource will operate in a positive range reflecting an increase in output from the BC Hydro system. When accepting transfers from the CAISO or EIM entities, the aggregated resource will operate in a negative range reflecting a decrease in output from the BC Hydro system.

As the CAISO gains experience with different resources using non-generator resource generic modeling functionality, it anticipates that other applications may arise. However, the tariff rules offered here will allow the CAISO to extend the use of this modeling functionality in a manner that supports more efficient participation in the CAISO's ancillary services markets and the EIM. During the stakeholder process, several stakeholders, including existing and prospective EIM entities, expressed support for extending the use of the non-generator resource modeling functionality. Some stakeholders asked questions about potential applications of non-generator resource modeling functionality, no stakeholders have opposed the CAISO's proposal.

III. STAKEHOLDER PROCESS

The CAISO released an issue paper on June 13, 2017, and conducted a web conference regarding the issue paper on June 20, 2017. The CAISO updated the issue paper and presentation on June 27, 2017. Stakeholders provided comments on July 3, 2017.[31]

The CAISO posted a straw proposal on July 31, 2017, which it followed up on with a stakeholder meeting on August 4, 2017. As a result of stakeholder comments, the straw proposal eliminated the issue of third party transmission contribution from the scope of the initiatives. The straw proposal also added the five market enhancements that are the subject of this tariff amendment. Stakeholder submitted comments on August 18, 2017.

The CAISO issued the draft final proposal on September 5, 2017, and conducted a web conference on the proposal on September 12, 2017. The draft final proposal eliminated two more issues from the initiatives as the result of stakeholder comments: management of bilateral schedule changes and equitable sharing of wheeling benefits. The draft final proposal also provided further discussion of the market enhancements that are the subject of this tariff amendment. Stakeholder provided comments on September 28, 2017 (except for one set of comments received October 11, 2017). The CAISO also discussed the initiatives in a web conference on the Powerex implementation agreement, held on October 3, 2017.

The CAISO posted proposed tariff language on November 3, 2017, stakeholders submitted comments on November 29, 2017, and the CAISO and conducted a web conference on November 30, 2017. The revised draft tariff language was posted on December 1, 2017, stakeholders commented on December 6, 2017, and the CAISO conducted a web conference on December 7, 2017. Final draft tariff language was posed on December 13, 2017.

IV. EFFECTIVE DATE

Pursuant to Section 35.11 of the Commission's regulations,[32] the CAISO requests that the Commission accept the proposed amendment for filing, and permit it to become effective on February 15, 2018. The requested effective date supports the CAISO's 2018 winter release and the certification of readiness in support of Powerex's and Idaho Power Company's participation in the EIM on April 4, 2018.

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[31] All documents related to the CAISO's stakeholder process can be found on the CAISO website: http://www.caiso.com/informed/Pages/StakeholderProcesses/ConsolidatedEnergyImbalanceMarketInitiatives.aspx

[32] 18 C.F.R. § 35.11.

V. COMMUNICATIONS

In accordance with the Commission's regulations,[33] correspondence and other communications regarding this filings filing be served upon the following individuals, whose names should be placed on the official service list established by the Commission with respect to this filing:

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VI. SERVICE

The CAISO has served this filing upon the California Public Utilities Commission and all parties with effective Scheduling Coordinator Service Agreements under the CAISO Tariff. In addition, the CAISO has posted the filing on the CAISO's website**.**

VII. ATTACHMENTS

The following documents, in addition to this transmittal letter, support the instant filing:

Attachment A	Revised CAISO Tariff sheets that incorporate the proposed changes described above;
Attachment B	The proposed changes to the CAISO Tariff shown in red-line format
Attachment C	EIM Governing Body memorandum;
Attachment D	CAISO Board of Governors memorandum; and

[33] 18 C.F.R. § 385.203(b).

Attachment E Draft Final Proposal.

VI. CONCLUSION

For all the foregoing reasons, the Commission should accept the proposed amendment to become effective on February 15, 2018.

Respectfully submitted,

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Counsel for the California Independent System Operator Corporation

Attachment A – Clean Tariff Records

2017 Consolidated EIM Initiatives and Resource Modeling Tariff Amendments

California Independent System Operator Corporation

11.6 PDRs, RDRRs, Distributed Energy Resource Aggregations, Non-Generator Resources

*** * * ***

11.6.5 Settlements of Non-Generator Resources

Settlements for Energy generated or consumed by a Non-Generator Resource or a resource using Non-Generator Resource Generic Modeling functionality will reflect the applicable PNode or Aggregated PNode. For such resources comprising a single PNode, settlement for Energy transactions will reflect the LMP at that PNode. For such resources comprising multiple PNodes settlement for Energy transactions will reflect the weighted average LMP of the PNode(s) based on the applicable Generation Distribution Factors submitted through the resources' Bid or as registered in the Master File. Consistent with the provisions of Section 11.5.2, the CAISO will impose UIE on a resource's Scheduling Coordinator if the resource does not follow a Dispatch Instruction. When operating in a negative range between PMin and 0, the CAISO will not consider a Non-Generator Resource or a resource using Non-Generator Resource Generic Modeling functionality as Measured Demand so long as the resource can generate Energy. If a Non-Generator Resource operates solely as dispatchable demand response, the CAISO will treat the resource as Measured Demand.

*** * * ***

27.10 Election to Use Non-Generator Resource Generic Modeling Functionality

The CAISO employs functionality to model Non-Generator Resources' participation in the CAISO's markets. Resource types other than Non-Generator Resources that have a PMax greater than zero may also elect to use this modeling functionality. As further described in the Business Practice Manual and consistent with the CAISO's Full Network Model database release schedule, Scheduling Coordinators may elect to use Non-Generator Resource Generic Modeling functionality for individual resources or an aggregation of resources. For these resources, the CAISO will not observe costs normally associated with resource management, including but not limited to Start-Up Costs, Minimum Load Costs, or Transition Costs. The CAISO will not observe these resources' MWh constraints. The CAISO's market power mitigation processes, including Local Market Power Mitigation, will apply to resources electing to

use Non-Generator Resource Generic Modeling functionality consistent with the provisions of Sections 31.2 and 34.1.5 of the CAISO Tariff. If Bids from a particular resource type are not subject to market power mitigation pursuant to the provisions Sections 31.2 and 34.1.5 of the CAISO Tariff, then use of Non-Generator Resource Generic Modeling functionality will not make Bids from the resource subject to market power mitigation. Resources subject to market power mitigation that elect to use Non-Generator Resource Generic Modeling functionality may use any of the methods under the CAISO's Tariff to establish a Default Energy Bid. Resources electing to use Non-Generator Resource Generic Modeling functionality are not eligible to be Resource Adequacy Resources.

*** * * ***

29.7 EIM Operations Under Normal and Emergency Conditions.

*** * * ***

(g) **EIM Manual Dispatch.** The EIM Entity may issue an EIM Manual Dispatch to an EIM Participating Resource or a non-participating resource in its Balancing Authority Area, outside of the Market Clearing of the Real-Time Market, when necessary to address reliability or operational issues in the EIM Entity Balancing Authority Area that the CAISO is not able to address through normal economic Dispatch and Congestion Management.

* * * *

29.11. Settlements and Billing for EIM Market Participants.

*** * * ***

(b) **Imbalance Energy.**

(1) **FMM Instructed Imbalance Energy.**

(A) **Calculation.**

(i) **EIM Participating Resources.** The CAISO will calculate an EIM Participating Resource's FMM Instructed Imbalance Energy in the same manner as it calculates FMM Instructed Imbalance Energy under Section 11.5.1.1, except that references to the Day-Ahead Schedule in the relevant Appendix A definitions shall be deemed references to the EIM Base Schedule and that the CAISO will include any Energy from an EIM Manual Dispatch of the EIM Participating Resource in the FMM that is identified by the EIM Entity Scheduling Coordinator prior to the start of the FMM.

(ii) **Non-Participating Resources.** The CAISO will calculate the FMM Instructed Imbalance Energy of non-participating resources in an EIM Entity Balancing Authority Area in the same manner as it calculates FMM Instructed Imbalance Energy under Section 11.5.1.1, except that references to the Day-Ahead Schedule in the relevant Appendix A definitions shall be deemed references to the EIM Base Schedule and that the CAISO will include any Energy from an EIM Manual Dispatch or EIM Auto-Match of the EIM non-participating resource in the FMM that is identified by the EIM Entity Scheduling Coordinator prior to the start of the FMM.

(B) **Settlement.** The CAISO will settle –

(i) the FMM Instructed Imbalance Energy with the EIM Participating

Resource Scheduling Coordinator for EIM Participating Resources; and

(ii) with the applicable EIM Entity Scheduling Coordinator for non-participating resources in an EIM Entity Balancing Authority Area.

(2) **RTD Instructed Imbalance Energy.**

(A) **Calculation.**

(i) **EIM Participating Resources.** The CAISO will calculate an EIM Participating Resource's RTD Instructed Imbalance Energy in the same manner in which it calculates RTD Instructed Imbalance Energy under Sections 11.5.1.2 and 11.5.5, except that the CAISO will include any Energy from an EIM Manual Dispatch of the EIM Participating Resource in the RTD that is identified by the EIM Entity Scheduling Coordinator.

(ii) **Non-Participating Resources.** The CAISO will calculate the RTD Instructed Imbalance Energy of non-participating resources in an EIM Entity Balancing Authority Area in the same manner in which it calculates RTD Instructed Imbalance Energy under Section 11.5.1.2 and 11.5.5, except that the CAISO will include any Energy from an EIM Manual Dispatch or EIM Auto-Match of the EIM non-participating resource in the RTD that is identified by the EIM Entity Scheduling Coordinator.

(B) **Settlement.** The CAISO will settle the RTD Instructed Imbalance Energy –

(i) with the EIM Participating Resource Scheduling Coordinator for EIM Participating Resources; and

(ii) with the applicable EIM Entity Scheduling Coordinator for non-participating resources in an EIM Entity Balancing Authority Area.

(3) **Uninstructed Imbalance Energy.**

(A) **EIM Participating Resources.**

(i) **Calculation.** For EIM Participating Resources and an EIM Entity Balancing Authority Area's dynamic import/export schedules with external resources, the CAISO will calculate Uninstructed Imbalance Energy in the same manner in which it calculates Uninstructed Imbalance Energy under Section 11.5.2.1.

(ii) **Settlement.** The CAISO will settle the Uninstructed Imbalance Energy with the EIM Participating Resource Scheduling Coordinator or the EIM Entity Scheduling Coordinator, as applicable.

(B) **Non-Participating Resources.**

(i) **Calculation.** For non-participating resources in an EIM Entity Balancing Authority Area, the CAISO will calculate Uninstructed Imbalance Energy in accordance with Section 11.5.2, except that the CAISO will treat an EIM Base Schedule as a Day-Ahead Schedule and the CAISO will treat an EIM Manual Dispatch and an EIM Auto-Match as a Dispatch Instruction.

(ii) **Settlement.** The CAISO will settle the Uninstructed Imbalance Energy for non-participating resources in an EIM Entity Balancing Authority Area at the applicable RTD Locational Marginal Price in accordance with Section 11.5.2.1 with the applicable EIM Entity Scheduling Coordinator and will treat EIM Balancing Authority Demand in the same manner as the CAISO treats CAISO Demand under that Section.

(C) **Non-Participating Load.**

(i) **Calculation.** For non-participating Load in an EIM Entity Balancing Authority Area, the CAISO will calculate Uninstructed Imbalance Energy in accordance with Section 11.5.2.2, except

that the CAISO will determine deviations based on the EIM Base Load Schedule.

(ii) **Settlement.** The CAISO will settle Uninstructed Imbalance Energy for non-participating Load in an EIM Entity Balancing Authority Area at the applicable Default LAP Hourly Real-Time Price in accordance with Section 11.5.2.2 with the applicable EIM Entity Scheduling Coordinator and will treat EIM Balancing Authority Demand in the same manner as the CAISO treats CAISO Demand under that Section.

*** * * ***

(q) **EIM Transfer System Resource Settlement Information.** The CAISO will provide EIM Entities with non-binding Settlement information associated with Energy transfer schedule changes from their respective base schedules between EIM Entity Balancing Authority Areas if –

(1) the EIM Entities provide the CAISO with a mutually agreed upon location for the settlement of such schedule changes; and

(2) the EIM Entities request that the CAISO provide such information.

(r) **EIM Transfer System Resource Settlement.**

(1) **EIM Transfer System Resource Registration.** The CAISO will provide each EIM Entity with financially binding Settlement of Energy transfer schedule changes from its respective base schedules between EIM Entity Balancing Authority Areas if –

(A) each EIM Entity that shares an EIM Internal Intertie and desires such Settlement agrees upon a to/from EIM Transfer system resource pricing location in their respective EIM Entity Balancing Authority Area;

(B) each EIM Entity Scheduling Coordinator registers the agreed upon

to/from EIM Transfer system resource pricing locations, including the ratio of the pricing at each location to be shared among them, in accordance with the procedures in the Business Practice Manual for the Energy Imbalance Market; and

(C) each EIM Entity Scheduling Coordinator submits E-Tags that associate Energy transfer schedule changes with the registered EIM Transfer system resource.

(2) **Settlement for EIM Transfer System Resource Changes.** The CAISO will settle EIM Transfer system resource changes established pursuant to Section 29.11(r)(1) as –

(A) FMM Instructed Imbalance Energy or RTD Instructed Energy based on the Settlement Interval in which the E-Tag is received, without regard for other Energy types identified in Sections 11.5.1.1 or 11.5.2.2, or as an Operational Adjustment if the E-Tag is received after the end of the Operating Hour for purposes of Energy accounting in accordance with the applicable WECC business practices;

(B) based on the difference between the E-Tag and the EIM Transfer system resource base schedule;

(C) at the ratio of the Locational Marginal Prices for each registered financial EIM Transfer system resource location; and

(D) excluding any contribution that the base EIM Transfer system resource might have otherwise had on the Real-Time Imbalance Energy Offset pursuant to Section 29.11(e)(3) and RTM Bid Cost Recovery pursuant to Section 29.11(f).

*** * * ***

29.27 CAISO Markets and Processes.

* * * *

(c) **Automated EIM Mirror.** If the CAISO updates an Interchange E-Tag for a schedule change outside of the Market Clearing of the Real-Time Market for System Resources and Scheduling Points and the associated energy is generated at, wheeled through, or consumed at an EIM Entity Balancing Authority Area, the CAISO can automatically EIM Mirror the schedule change using the relevant EIM Mirror System Resource if requested by the EIM Entity in accordance with the procedures specified in the Business Practice Manual for the Energy Imbalance Market.

(d) **Base GDFs for Aggregated EIM Non-Participating Resources.** The CAISO will allow base Generation Distribution Factor submission for aggregate EIM non-participating resources through the submission of EIM Base Schedules and will distribute the base schedule and any imbalances of aggregate EIM non-participating resources using the submitted base GDFs, if available, or otherwise the registered default base GDFs for the resource in the Master File, normalized for Outages.

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29.34 EIM Operations

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(s) **EIM Auto-Match.**

(1) **Designation.** An EIM Entity may submit a designation to the Master File of EIM non-participating resources, up to the number specified in the Business Practice Manual, in its Balancing Authority Area to automatically match import/export schedule changes outside of the Market Clearing of the Real-Time Market because of changes to E-Tags at one or more designated EIM Interties or Scheduling Points, up to the number designated in the Business Practice Manual for the Energy Imbalance Market.

(2) **Duration of Designation.** Any designation under paragraph (1) of this subsection shall remain in effect until the EIM Entity notifies the CAISO that it is terminating the designation by a submission to the Master File.

(3) **CAISO Actions in Response to Intertie Schedule Change.** If an EIM Entity designates a non-participating resource under paragraph (1) of this subsection, the CAISO, upon identification of an associated EIM Intertie or Scheduling Point schedule change outside of the Market Clearing of the Real-Time Market, shall –

(A) reflect a matching schedule change to the EIM non-participating resource in the Real-Time Market using the EIM Auto-Match feature; and

(B) omit the EIM Intertie or Scheduling Point schedule change from the historical intertie schedule over/under-scheduling histogram for the determination of additional capacity test requirements for relevant EIM Balancing Authority Area(s) under Sections 29.34(l)(4)(B) and 29.34(m)(6)(ii) that are registered for EIM Auto-Match in accordance with the procedures specified in the Business Practice Manual for the Energy Imbalance Market.

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30.5.6 Non-Generator Resource Bids

Scheduling Coordinators must ensure that Non-Generator Resource Bids or Bids from resources using Non-Generator Resource Generic Modeling functionality contain the Bid components specified in this Section 30.5 based on how the resource is then participating in the CAISO Markets, namely, whether it is providing Supply, Demand, and/or Ancillary Services Bids. In addition to the Bid components listed in this Section 30.5, Scheduling Coordinators representing Non-Generator Resources may submit Bids including the State of Charge for the Day-Ahead Market to indicate the forecasted starting physical position of the Non-Generator Resource. Scheduling Coordinators representing Non-Generator Resources using Regulation Energy Management must submit Bids compliant with the requirements of Section 8.4.1.2.

* * * *

31.2 Day-Ahead MPM Process

After the Market Close of the DAM, and after the CAISO has validated the Bids pursuant to Section 30.7, the CAISO will perform the MPM process, which is a single market run that occurs prior to the IFM Market Clearing run. The Day-Ahead MPM process determines which Bids need to be mitigated in the IFM and when RMR Proxy Bids should be considered in the IFM for RMR Units. The Day-Ahead MPM process optimizes resources to meet Demand reflected in Demand Bids, including Export Bids and Virtual Demand Bids, and to procure one hundred (100) percent of Ancillary Services requirements based on Supply Bids submitted to the DAM. Virtual Bids and Bids from Demand Response Resources, Participating Load, and Non-Generator Resources are considered in the MPM process, but are not subject to Bid mitigation. Bids from Participating Load resources that are not subject to Bid mitigation will also be considered in the MPM process. Bids from resources comprised of multiple technologies that include Non-Generator Resources will remain to be subject to all applicable market power mitigation under the CAISO Tariff, including Local Market Power Mitigation. The mitigated or unmitigated Bids and RMR Proxy Bids identified in the MPM process for all resources that cleared in the MPM are then passed to the IFM. The CAISO performs the MPM process for the DAM for the twenty-four (24) hours of the targeted Trading Day.

* * * *

34.1.5 Mitigating Bids in the RTM

34.1.5.1 Generally

After the Market Close of the RTM, after the CAISO has validated the Bids pursuant to Section 30.7 and Section 34.1.4, and prior to conducting any other RTM processes, the CAISO conducts a MPM process. The results are used in the RTM optimization processes. Bids on behalf of Demand Response Resources, Participating Load, and Non-Generator Resources are considered in the MPM process but are not subject to Bid mitigation. Bids from resources comprised of multiple technologies that include Non-Generator Resources will remain to be subject to all applicable market power mitigation under the CAISO Tariff, including Local Market Power Mitigation.

* * * *

Appendix A – Master Definitions Supplement

- EIM Auto-Match

The automatic matching of an EIM Entity's intertie schedule change outside the Market Clearing of the Real-Time Market because of changes to Interchange E-Tags at a designated EIM Intertie or Scheduling Point with matching changes to an associated EIM non-participating resource EIM Base Schedule.

* * * *

- EIM Mirror System Resource

A System Resource at a Scheduling Point registered to an EIM Entity for mirroring CAISO intertie schedules at that Scheduling Point, when the associated Energy is generated at, wheeled through, or consumed at the corresponding EIM Entity Balancing Authority Area.

* * * *

- EIM Mirror

The process by which an EIM Entity balances a CAISO intertie schedule associated with Energy that originates, is consumed in, or wheels through the EIM Entity Balancing Authority Area with an intertie schedule for the EIM Mirror System Resource. CAISO imports are mirrored as EIM Entity Balancing Authority Area exports and CAISO exports are mirrored as EIM Entity Balancing Authority Area imports.

* * * *

- Non-Generator Resource Generic Modeling

Non-Generator Resource Generic Modeling is a functionality used by the CAISO to recognize that a resource or aggregation of resources may be dispatched to any operating level within a continuous generating operating range from a negative PMin to a positive PMax.

Attachment B – Marked Tariff Records

2017 Consolidated EIM Initiatives and Resource Modeling Tariff Amendments

California Independent System Operator Corporation

11.6 PDRs, RDRRs, ~~or~~ Distributed Energy Resource Aggregations, Non-Generator Resources

* * * *

11.6.5 Settlements of Non-Generator Resources

Settlements for Energy generated or consumed by a Non-Generator Resource or a resource using Non-Generator Resource Generic Modeling functionality will reflect the applicable PNode or Aggregated PNode. For such resources comprising a single PNode, settlement for Energy transactions will reflect the LMP at that PNode. For such resources comprising multiple PNodes settlement for Energy transactions will reflect the weighted average LMP of the PNode(s) based on the applicable Generation Distribution Factors submitted through the resources' Bid or as registered in the Master File. Consistent with the provisions of Section 11.5.2, the CAISO will impose UIE on a resource's Scheduling Coordinator if the resource does not follow a Dispatch Instruction. When operating in a negative range between PMin and 0, the CAISO will not consider a Non-Generator Resource or a resource using Non-Generator Resource Generic Modeling functionality as Measured Demand so long as the resource can generate Energy. If a Non-Generator Resource operates solely as dispatchable demand response, the CAISO will treat the resource as Measured Demand.

* * * *

27.10 Election to Use Non-Generator Resource Generic Modeling Functionality ~~[Not Used]~~

The CAISO employs functionality to model Non-Generator Resources' participation in the CAISO's markets. Resource types other than Non-Generator Resources that have a PMax greater than zero may also elect to use this modeling functionality. As further described in the Business Practice Manual and consistent with the CAISO's Full Network Model database release schedule, Scheduling Coordinators may elect to use Non-Generator Resource Generic Modeling functionality for individual resources or an aggregation of resources. For these resources, the CAISO will not observe costs normally associated with resource management, including but not limited to Start-Up Costs, Minimum Load Costs, or Transition Costs. The CAISO will not observe these resources' MWh constraints. The CAISO's market power mitigation processes, including Local Market Power Mitigation, will apply to resources electing to

use Non-Generator Resource Generic Modeling functionality consistent with the provisions of Sections 31.2 and 34.1.5 of the CAISO Tariff. If Bids from a particular resource type are not subject to market power mitigation pursuant to the provisions Sections 31.2 and 34.1.5 of the CAISO Tariff, then use of Non-Generator Resource Generic Modeling functionality will not make Bids from the resource subject to market power mitigation. Resources subject to market power mitigation that elect to use Non-Generator Resource Generic Modeling functionality may use any of the methods under the CAISO's Tariff to establish a Default Energy Bid. Resources electing to use Non-Generator Resource Generic Modeling functionality are not eligible to be Resource Adequacy Resources.

* * * *

29.7 EIM Operations Under Normal and Emergency Conditions.

* * * *

(g) **EIM Manual Dispatch.** The EIM Entity may issue an EIM Manual Dispatch to an EIM Participating Resource or a non-participating resource in its Balancing Authority Area, outside of the Market Clearing of the Real-Time Market, when necessary to address reliability or operational issues in the EIM Entity Balancing Authority Area that the CAISO is not able to address through normal economic Dispatch and Congestion Management.

* * * *

29.11. Settlements and Billing for EIM Market Participants.

* * * *

(b) **Imbalance Energy.**

(1) **FMM Instructed Imbalance Energy.**

(A) **Calculation.**

(i) **EIM Participating Resources.** The CAISO will calculate an EIM Participating Resource's FMM Instructed Imbalance Energy in the same manner as it calculates FMM Instructed Imbalance Energy under Section 11.5.1.1, except that references to the Day-Ahead Schedule in the relevant Appendix A definitions shall be deemed references to the EIM Base Schedule and that the CAISO will include any Energy from an EIM Manual Dispatch of the EIM Participating Resource in the FMM that is identified by the EIM Entity Scheduling Coordinator prior to the start of the FMM.

(ii) **Non-Participating Resources.** The CAISO will calculate the FMM Instructed Imbalance Energy of non-participating resources in an EIM Entity Balancing Authority Area in the same manner as it calculates FMM Instructed Imbalance Energy under Section 11.5.1.1, except that references to the Day-Ahead Schedule in the relevant Appendix A definitions shall be deemed references to the EIM Base Schedule and that the CAISO will include any Energy from an EIM Manual Dispatch or EIM Auto-Match of the EIM non-participating resource in the FMM that is identified by the EIM Entity Scheduling Coordinator prior to the start of the FMM.

(B) **Settlement.** The CAISO will settle –

(i) the FMM Instructed Imbalance Energy with the EIM Participating

Resource Scheduling Coordinator for EIM Participating Resources; and

(ii) with the applicable EIM Entity Scheduling Coordinator for non-participating resources in an EIM Entity Balancing Authority Area.

(2) **RTD Instructed Imbalance Energy.**

(A) **Calculation.**

(i) **EIM Participating Resources.** The CAISO will calculate an EIM Participating Resource's RTD Instructed Imbalance Energy in the same manner in which it calculates RTD Instructed Imbalance Energy under Sections 11.5.1.2 and 11.5.5, except that the CAISO will include any Energy from an EIM Manual Dispatch of the EIM Participating Resource in the RTD that is identified by the EIM Entity Scheduling Coordinator.

(ii) **Non-Participating Resources.** The CAISO will calculate the RTD Instructed Imbalance Energy of non-participating resources in an EIM Entity Balancing Authority Area in the same manner in which it calculates RTD Instructed Imbalance Energy under Section 11.5.1.2 and 11.5.5, except that the CAISO will include any Energy from an EIM Manual Dispatch or EIM Auto-Match of the EIM non-participating resource in the RTD that is identified by the EIM Entity Scheduling Coordinator.

(B) **Settlement.** The CAISO will settle the RTD Instructed Imbalance Energy –

(i) with the EIM Participating Resource Scheduling Coordinator for EIM Participating Resources; and

(ii) with the applicable EIM Entity Scheduling Coordinator for non-participating resources in an EIM Entity Balancing Authority Area.

(3) **Uninstructed Imbalance Energy.**

(A) **EIM Participating Resources.**

(i) **Calculation.** For EIM Participating Resources and an EIM Entity Balancing Authority Area's dynamic import/export schedules with external resources, the CAISO will calculate Uninstructed Imbalance Energy in the same manner in which it calculates Uninstructed Imbalance Energy under Section 11.5.2.1.

(ii) **Settlement.** The CAISO will settle the Uninstructed Imbalance Energy with the EIM Participating Resource Scheduling Coordinator or the EIM Entity Scheduling Coordinator, as applicable.

(B) **Non-Participating Resources.**

(i) **Calculation.** For non-participating resources in an EIM Entity Balancing Authority Area, the CAISO will calculate Uninstructed Imbalance Energy in accordance with Section 11.5.2, except that the CAISO will treat an EIM Base Schedule as a Day-Ahead Schedule and the CAISO will treat an EIM Manual Dispatch and an EIM Auto-Match as a Dispatch Instruction.

(ii) **Settlement.** The CAISO will settle the Uninstructed Imbalance Energy for non-participating resources in an EIM Entity Balancing Authority Area at the applicable RTD Locational Marginal Price in accordance with Section 11.5.2.1 with the applicable EIM Entity Scheduling Coordinator and will treat EIM Balancing Authority Demand in the same manner as the CAISO treats CAISO Demand under that Section.

(C) **Non-Participating Load.**

(i) **Calculation.** For non-participating Load in an EIM Entity Balancing Authority Area, the CAISO will calculate Uninstructed Imbalance Energy in accordance with Section 11.5.2.2, except

that the CAISO will determine deviations based on the EIM Base Load Schedule.

(ii) **Settlement.** The CAISO will settle Uninstructed Imbalance Energy for non-participating Load in an EIM Entity Balancing Authority Area at the applicable Default LAP Hourly Real-Time Price in accordance with Section 11.5.2.2 with the applicable EIM Entity Scheduling Coordinator and will treat EIM Balancing Authority Demand in the same manner as the CAISO treats CAISO Demand under that Section.

* * * *

(q) **EIM Transfer System Resource Settlement Information.** The CAISO will provide EIM Entities with non-binding Settlement information associated with Energy transfer schedule changes from their respective base schedules between EIM Entity Balancing Authority Areas if –

(1) the EIM Entities provide the CAISO with a mutually agreed upon location for the settlement of such schedule changes; and

(2) the EIM Entities request that the CAISO provide such information.

(r) **EIM Transfer System Resource Settlement.**

(1) **EIM Transfer System Resource Registration.** The CAISO will provide each EIM Entity with financially binding Settlement of Energy transfer schedule changes from its respective base schedules between EIM Entity Balancing Authority Areas if –

(A) each EIM Entity that shares an EIM Internal Intertie and desires such Settlement agrees upon a to/from EIM Transfer system resource pricing location in their respective EIM Entity Balancing Authority Area;

(B) each EIM Entity Scheduling Coordinator registers the agreed upon

to/from EIM Transfer system resource pricing locations, including the ratio of the pricing at each location to be shared among them, in accordance with the procedures in the Business Practice Manual for the Energy Imbalance Market; and

(C) each EIM Entity Scheduling Coordinator submits E-Tags that associate Energy transfer schedule changes with the registered EIM Transfer system resource.

(2) **Settlement for EIM Transfer System Resource Changes.** The CAISO will settle EIM Transfer system resource changes established pursuant to Section 29.11(r)(1) as –

(A) FMM Instructed Imbalance Energy or RTD Instructed Energy based on the Settlement Interval in which the E-Tag is received, without regard for other Energy types identified in Sections 11.5.1.1 or 11.5.2.2, or as an Operational Adjustment if the E-Tag is received after the end of the Operating Hour for purposes of Energy accounting in accordance with the applicable WECC business practices;

(B) based on the difference between the E-Tag and the EIM Transfer system resource base schedule;

(C) at the ratio of the Locational Marginal Prices for each registered financial EIM Transfer system resource location; and

(D) excluding any contribution that the base EIM Transfer system resource might have otherwise had on the Real-Time Imbalance Energy Offset pursuant to Section 29.11(e)(3) and RTM Bid Cost Recovery pursuant to Section 29.11(f).

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29.27 CAISO Markets and Processes.

* * * *

(c) **Automated EIM Mirror.** If the CAISO updates an Interchange E-Tag for a schedule change outside of the Market Clearing of the Real-Time Market for System Resources and Scheduling Points and the associated energy is generated at, wheeled through, or

consumed at an EIM Entity Balancing Authority Area, the CAISO can automatically EIM Mirror the schedule change using the relevant EIM Mirror System Resource if requested by the EIM Entity in accordance with the procedures specified in the Business Practice Manual for the Energy Imbalance Market.

(d) **Base GDFs for Aggregated EIM Non-Participating Resources.** The CAISO will allow base Generation Distribution Factor submission for aggregate EIM non-participating resources through the submission of EIM Base Schedules and will distribute the base schedule and any imbalances of aggregate EIM non-participating resources using the submitted base GDFs, if available, or otherwise the registered default base GDFs for the resource in the Master File, normalized for Outages.

* * * *

29.34 EIM Operations

* * * *

(s) **EIM Auto-Match.**

(1) **Designation.** An EIM Entity may submit a designation to the Master File of EIM non-participating resources, up to the number specified in the Business Practice Manual, in its Balancing Authority Area to automatically match import/export schedule changes outside of the Market Clearing of the Real-Time Market because of changes to E-Tags at one or more designated EIM Interties or Scheduling Points, up to the number designated in the Business Practice Manual for the Energy Imbalance Market.

(2) **Duration of Designation.** Any designation under paragraph (1) of this subsection shall remain in effect until the EIM Entity notifies the CAISO that it is terminating the designation by a submission to the Master File.

(3) **CAISO Actions in Response to Intertie Schedule Change.** If an EIM Entity designates a non-participating resource under paragraph (1) of this subsection,

the CAISO, upon identification of an associated EIM Intertie or Scheduling Point schedule change outside of the Market Clearing of the Real-Time Market, shall –

(A) reflect a matching schedule change to the EIM non-participating resource in the Real-Time Market using the EIM Auto-Match feature; and

(B) omit the EIM Intertie or Scheduling Point schedule change from the historical intertie schedule over/under-scheduling histogram for the determination of additional capacity test requirements for relevant EIM Balancing Authority Area(s) under Sections 29.34(l)(4)(B) and 29.34(m)(6)(ii) that are registered for EIM Auto-Match in accordance with the procedures specified in the Business Practice Manual for the Energy Imbalance Market.

* * * *

30.5.6 Non-Generator Resource Bids

Scheduling Coordinators must ensure that Non-Generator Resource Bids or Bids from resources using Non-Generator Resource Generic Modeling functionality contain the Bid components specified in this Section 30.5 based on how the ~~Non-Generator R~~resource is then participating in the CAISO Markets, namely, whether it is providing Supply, Demand, and/or Ancillary Services Bids. In addition to the Bid components listed in this Section 30.5, Scheduling Coordinators representing Non-Generator Resources may submit Bids including the State of Charge for the Day-Ahead Market to indicate the forecasted starting physical position of the Non-Generator Resource. Scheduling Coordinators representing Non-Generator Resources using Regulation Energy Management must submit Bids compliant with the requirements of Section 8.4.1.2.

* * * *

31.2 Day-Ahead MPM Process

After the Market Close of the DAM, and after the CAISO has validated the Bids pursuant to Section 30.7, the CAISO will perform the MPM process, which is a single market run that occurs prior to the IFM Market Clearing run. The Day-Ahead MPM process determines which Bids need to be mitigated in the IFM and when RMR Proxy Bids should be considered in the IFM for RMR Units. The Day-Ahead MPM process optimizes resources to meet Demand reflected in Demand Bids, including Export Bids and Virtual Demand Bids, and to procure one hundred (100) percent of Ancillary Services requirements based on Supply Bids submitted to the DAM. Virtual Bids and Bids from Demand Response Resources, Participating Load, and Non-Generator Resources are considered in the MPM process, but are not subject to Bid mitigation. Bids from Participating Load resources that are not subject to Bid mitigation will also be considered in the MPM process. Bids from resources comprised of multiple technologies that include Non-Generator Resources will remain to be subject to all applicable market power mitigation under the CAISO Tariff, including Local Market Power Mitigation. The mitigated or unmitigated Bids and RMR Proxy Bids identified in the MPM process for all resources that cleared in the MPM are then passed to the IFM. The CAISO performs the MPM process for the DAM for the twenty-four (24) hours of the targeted Trading Day.

* * * *

34.1.5 Mitigating Bids in the RTM

34.1.5.1 Generally

After the Market Close of the RTM, after the CAISO has validated the Bids pursuant to Section 30.7 and Section 34.1.4, and prior to conducting any other RTM processes, the CAISO conducts a MPM process. The results are used in the RTM optimization processes. Bids on behalf of Demand Response Resources, Participating Load, and Non-Generator Resources are considered in the MPM process but are not subject to Bid mitigation. Bids from resources comprised of multiple technologies that include Non-Generator Resources will remain to be subject to all applicable market power mitigation under the CAISO Tariff, including Local Market Power Mitigation.

* * * *

Appendix A – Master Definitions Supplement

- EIM Auto-Match

The automatic matching of an EIM Entity's intertie schedule change outside the Market Clearing of the Real-Time Market because of changes to Interchange E-Tags at a designated EIM Intertie or Scheduling Point with matching changes to an associated EIM non-participating resource EIM Base Schedule.

* * * *

- EIM Mirror System Resource

A System Resource at a Scheduling Point registered to an EIM Entity for mirroring CAISO intertie schedules at that Scheduling Point, when the associated Energy is generated at, wheeled through, or consumed at the corresponding EIM Entity Balancing Authority Area.

* * * *

- EIM Mirror

The process by which an EIM Entity balances a CAISO intertie schedule associated with Energy that originates, is consumed in, or wheels through the EIM Entity Balancing Authority Area with an intertie schedule for the EIM Mirror System Resource. CAISO imports are mirrored as EIM Entity Balancing Authority Area exports and CAISO exports are mirrored as EIM Entity Balancing Authority Area imports.

* * * *

- Non-Generator Resource Generic Modeling

Non-Generator Resource Generic Modeling is a functionality used by the CAISO to recognize that a resource or aggregation of resources may be dispatched to any operating level within a continuous generating operating range from a negative PMin to a positive PMax.

Attachment C – EIM Governing Body Memorandum

2017 Consolidated EIM Initiatives and Resource Modeling Tariff Amendments

California Independent System Operator Corporation

Memorandum

To: Energy Imbalance Market Governing Body

From: Keith Casey, Vice President, Market & Infrastructure Development

Date: November 22, 2017

Re: **Decision on Consolidated Energy Imbalance Market (EIM) Initiatives**

This memorandum requires EIM Governing Body action.

EXECUTIVE SUMMARY

Management proposes to make several EIM system functionality enhancements and to modify the market rules for the ISO's core non-generator resource model that is generally available to resources in the ISO market.

The proposed EIM system functionality enhancements are intended to automate manual processes, facilitate bilateral financial settlement, and expand the market's modeling capabilities. The proposed functionality enhancements are consistent with existing EIM design and principles. Management seeks approval of these enhancements under the EIM Governing Body's primary authority.

The non-generator resource market rule modifications fall under the EIM Governing Body's advisory role, as this element is severable from the other EIM design changes being proposed under this umbrella initiative and the changes being proposed are generally applicable to the non-generator resource model, which is available to the entire ISO market. Although the non-generator resource model was recently approved by the ISO Board of Governors as part of the *Energy Storage and Distributed Energy Resource* policy initiative, in reviewing potential uses of the model, Management identified certain aspects that would benefit from additional clarification and inclusion in the ISO tariff.

The scope of the *Consolidated EIM Initiatives* policy initiative originally included three other items that were included in the 2017 policy development roadmap: (1) third party contribution of transmission to the EIM, (2) a mechanism to manage bilateral schedule changes, and (3) equitable sharing of wheeling benefits. Management removed these items from the scope of this initiative because stakeholders did not support moving forward with these items at this time.

Management proposes the following motion:

Moved, that the EIM Governing Body approves the proposed EIM system functionality enhancements, as described in the memorandum dated November 22, 2017.

DISCUSSION AND PROPOSAL

The following sections describe Management's proposed EIM system functionality enhancements and its proposed non-generator resource market rule modifications. They also include summaries of stakeholder comments. A brief discussion follows regarding items originally included in the policy initiative but that Management removed based on stakeholder input.

The proposed enhancements will be available to all EIM participants, and in the case of the non-generator resource market rule modifications, to all participants throughout the ISO market. The proposed enhancements are important to supporting Idaho Power and Powerex joining the EIM in spring 2018.

EIM system functionality enhancements

The EIM system functionality enhancements will automate existing manual processes, facilitate bilateral settlements, and improve modeling accuracy. The proposed enhancements are consistent with the existing EIM design and principles.

The proposed EIM system functionality enhancements are under the EIM Governing Body's primary authority and are as follows:

- **Automate "matching" import or export schedule changes to a non-participating resource within the applicable EIM balancing area**

  EIM Entities submit hourly base schedules representing their base supply and demand. When an import or export schedule included in a base schedule changes after final base schedules are submitted, an EIM Entity must balance supply and demand by (1) manually dispatching a resource in its balancing area, or (2) allowing the EIM to resolve the imbalance by dispatching participating resources.

  Management proposes an enhancement to offer a third option for an EIM Entity's supply and demand to remain balanced in the event of an import or export schedule change. This enhancement will allow EIM Entities to select a non-participating resource within its balancing authority area for which the market will automatically adjust its schedule to match an import or export schedule change.

  This functionality will reduce the need for manual dispatch and maintains the amount of available energy bids from participating resources, which are needed for the EIM's resource sufficiency tests. In addition, this enhancement will ensure that the import or export schedule change and non-participating resource

schedule change are simultaneously communicated to the market. This will improve market efficiency relative to the current practice of manually dispatching resources, because manual dispatches may not take place until after an import or export schedule change is already communicated to the market.

Stakeholders support this functionality as it automates a manual process and facilitates participation in the EIM.

- **Automate changes to "mirror" system resources at intertie scheduling points between the ISO balancing area and an EIM balancing area**

  "Mirror" system resources are used to model non-EIM import or export schedules with the ISO, such as day-ahead market awards, inside the EIM balancing area. The mirror system resource is used to balance the non-EIM intertie schedule with the ISO so that the market optimization does not observe an imbalance that must be resolved by the EIM.

  Currently, EIM Entities are responsible for manually updating mirror system resource schedules to equal the non-EIM energy schedules with those of the ISO. Management proposes an enhancement in which EIM Entities will no longer be responsible for this update. Rather, the ISO market software will automatically update the mirror system resource schedules. This will automate a manual process and eliminate the potential for EIM Entities to submit incorrect mirror system resource values.

  Stakeholders support the automated updating of mirror system resources because it automates a manual process and ensures accurate market modeling.

- **Enable financial settlement of imbalance energy resulting from energy transfers between EIM balancing areas that are included in EIM base schedules**

  Bilateral interchange transactions between two EIM Entities are modeled using "base energy transfer system resources." Currently, the ISO does not settle imbalance energy based on base energy transfer system resources schedule changes, such as those due to bilateral interchange transactions. Management proposes an enhancement to calculate a locational marginal price for these transactions at a location specified by the two EIM Entities. The use of this functionality will be voluntary. This enhancement would also allow the two EIM Entities to elect to have the ISO financially settle the transaction through its settlement system rather than them settling it outside of the market.

  Stakeholders support this functionality as it is voluntary and meets the needs of EIM Entities that will utilize the functionality.

- **Allow for the submission of generation distribution factors for aggregated non-participating resources**

  Generation distribution factors are used to accurately model aggregated resources at the underlying physical resources. The market uses this information to accurately reflect the flow impact from individual resources in the market optimization. EIM Entities provide generation distribution factors for participating resources as part of the hourly energy bids submitted for these resources. EIM Entities cannot currently submit generation distribution factors for non-participating resources because there are not hourly bids for these resources.

  Management proposes an enhancement to allow EIM Entities to submit generation distribution factors for non-participating resources that consist of aggregations of multiple physical generators. Accurate generation distribution factors for aggregated non-participating resources will improve the market's modeling.

  Stakeholders support this functionality because they recognize it is critical for accurate market modeling.

Non-generator resource model market rule modifications

Management proposes modifications to the market rules for the core "non-generator resource" market model. These modifications fall under the EIM Governing Body's advisory role because the model is used throughout the ISO market.

The ISO developed the non-generator resource model to accurately reflect the operational characteristics of storage devices in the market. These resources are able to seamlessly move from injecting energy to withdrawing energy from the grid. However, their ability to do so is limited by the storage device's state of charge. Consequently, the ISO enforces a constraint to respect these storage devices' states of charge to ensure these resources receive feasible dispatches.

As part of the ISO's *Energy Storage and Distributed Energy Resources* policy initiative, Management determined that there are devices or aggregations of distributed energy resources that do not need the state of charge respected. Consequently, the initiative developed a non-generator resource model that does not have a state of charge constraint. This is referred to as the "core" non-generator resource model.

During the implementation of the "core" non-generator resource model, the ISO realized it could be used more broadly in the ISO market for applications other than modeling distributed energy resources. These uses include modeling Powerex's upcoming participation in the EIM. The core non-generator resource model is useful for this because it can model an aggregation of resources participating in the EIM.

In reviewing these other potential applications of the non-generator resource model, Management identified certain market rules that are needed for its broad use. Management proposes the following market rules for using the non-generator resource model:

1. The non-generator resource must be capable of generating energy. Consequently, for negative generation, the resource will not be subject to ISO settlement charges applicable to demand other than any appropriate energy settlement. The non-generator resource will not be charged these settlement charges applicable to demand, which are generally uplift charges, because the negative generation is not actual demand, but rather represents reduced generation relative to a baseline.

2. Whether the non-generator resource's energy bids are subject to local market power mitigation will be based on the underlying resource's technology. The local market power mitigation rules in the ISO tariff for that technology will apply to the generic non-generator resource. 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.

3. Non-generator resources using the core model will not be eligible to count for resource adequacy capacity at this time due to current system configuration limitations. Changes needed to address resource adequacy may be addressed through a future policy initiative.

Stakeholders support these modifications because they leverage existing resource modeling and provide additional clarity on use of the core non-generator resource model.

SCOPE CHANGES

Management removed three items from the scope of the consolidated EIM initiatives because stakeholders did not support addressing these items at this time. The items are briefly summarized below and are as follows: (1) third party contribution of transmission to the EIM, (2) a mechanism to manage bilateral schedule changes, and (3) equitable sharing of wheeling benefits.

Third Party Transmission Contribution

This item would have allowed parties that are not EIM participants to contribute transmission to enable the dispatch of greater quantities of energy transfers between EIM balancing areas. The contributed transmission would increase transfer capability between EIM balancing areas and, in exchange, the third party would receive any

congestion revenue the market generated due to congestion on the contributed transmission.

Stakeholders commented that this functionality would not currently be widely used and, consequently, that implementing this functionality would be an inefficient allocation of ISO resources. This initiative will remain in the ISO initiative catalog so it can be pursued in the future if a stronger need materializes.

Management of Bilateral Schedule Changes

This item sought to develop a mechanism to hedge the imbalance energy settlement of schedule changes involving bilateral transacted imports or exports made after EIM Entities' base schedule submission deadline.

At the October 2016 FERC technical conference regarding economic bidding on EIM balancing areas' interties, market participants expressed that there was no mechanism to limit imbalance energy charges associated with these schedule changes. The ISO stated it could use its existing "wheel through" intertie bidding functionality to help market participants manage imbalance energy charges associated with these schedule changes, and committed to exploring modifications with stakeholders.

However, after exploring potential modifications to the "wheel through" intertie bidding functionality, stakeholders commented that the modifications would likely not be useful in limiting imbalance energy charges. Management and stakeholders came to the conclusion that EIM Entities could more effectively address the issue through changes to how imbalance energy is settled under their respective open access transmission tariffs and through changes to their business practices. Stakeholders agreed it was unnecessary for the ISO to move forward with this item.

Equitable Sharing of Wheeling Benefits

This item explored the situation in which the EIM frequently uses an EIM balancing area's transmission to support energy transfers by wheeling energy through its balancing area. In this scenario, the source balancing area benefits from selling incremental energy, the sink balancing area benefits from serving load at lower costs, however, it can be argued the intermediary balancing area being wheeled through receives no benefit although it facilitated the transfer.

The policy initiative explored whether an inequity exists and several potential means to distribute a share of energy transfers' benefits to intermediary balancing areas that facilitate wheeling of energy transfers.

Stakeholders generally opposed implementation of a settlement mechanism to distribute benefits to intermediary balancing authority areas. Stakeholders recognized that although net wheeling occurs throughout the EIM footprint, all EIM Entities currently have greater amounts of transactions for which they are the generation source or

serving load than transactions for which they are merely facilitating wheeling. As a result, stakeholders generally do not believe this issue should be addressed now. This initiative will remain in the ISO's initiative catalog so it can be pursued in the future if conditions change.

CONCLUSION

Management requests the EIM Governing Body approve the system functionality enhancements described in this proposal. These enhancements will automate existing manual processes, facilitate bilateral financial settlement, and improve the market's modeling accuracy. Management also requests that the EIM Governing Body support the ISO Board of Governor's approval of the described core non-generator resource market rule modifications.

In addition to their market-wide benefits, the proposed enhancements are important to support Idaho Power and Powerex joining the EIM in spring 2018.

Attachment D – CAISO Board of Governors Memorandum

2017 Consolidated EIM Initiatives and Resource Modeling Tariff Amendments

California Independent System Operator Corporation

Memorandum

To: ISO Board of Governors

From: Keith Casey, Vice President, Market & Infrastructure Development

Date: December 6, 2017

Re: **Decision on consolidated energy imbalance market initiatives**

This memorandum requires Board action.

EXECUTIVE SUMMARY

Management proposes to modify the market rules for the ISO's core non-generator resource model. The non-generator resource model was recently approved by the ISO Board of Governors as part of the *energy storage and distributed energy resource* policy initiative. In reviewing potential uses of the model, Management identified certain aspects that would benefit from additional clarification and inclusion in the tariff. The EIM Governing Body has an advisory role on the non-generator resource market rule modifications and will be providing verbal comment on these proposed changes to the ISO Board at the general session meeting.

Several EIM system functionality enhancements, which were included in the consolidated EIM initiatives, were approved by the EIM Governing Body on November 29, 2017 and are on the Board's consent agenda. The EIM system functionality enhancements automate manual processes, facilitate bilateral financial settlement, and expand the market's modeling capabilities. The enhancements are consistent with the existing EIM design.

Management proposes the following motion:

> ***Moved, that the ISO Board of Governors approves the proposal to clarify market rules for the non-generator resource model as described in this memorandum dated December 6; and***
>
> ***Moved, that the ISO Board of Governors authorizes Management to make all necessary and appropriate filings with the Federal Energy Regulatory Commission to implement the non-generator resource model described in this memorandum, including any filings that implement the overarching initiative policy but contain discrete revisions to incorporate Federal Energy Regulatory Commission guidance in any initial ruling on the proposed tariff amendment.***

DISCUSSION AND PROPOSAL

Management proposes modifications to the market rules for the “core” non-generator resource market model. The EIM Governing Body supports these modifications under their advisory role.

The ISO developed the non-generator resource model to accurately reflect the operational characteristics of storage devices in the market. These resources are able to seamlessly move from injecting energy to withdrawing energy from the grid. However, their ability to do so is limited by the storage device’s state of charge. Consequently, the ISO enforced a constraint to respect the storage device’s state of charge to ensure the resource receives a feasible dispatch.

As part of the ISO’s *energy storage and distributed energy resources* policy initiative, Management determined there are devices or aggregations of distributed resources that do not need the state of charge to be enforced. Consequently, the initiative developed a non-generator resource model that does not have a state of charge constraint. This is referred to as the “core” non-generator resource model.

During the implementation of the “core” non-generator resource model, the ISO realized the “core” model could be used more broadly in the ISO market for applications other than modeling distributed energy resources. For example, it can be used to support Powerex’s participation in the EIM which will use the non-generator model to model its aggregated resources in the EIM. In addition, the core non-generator model will facilitate the provision of regulation down from neighboring balancing authority areas without the need for an energy schedule.

In reviewing these other potential applications of the non-generator resource model, Management identified certain market rules that are needed for its broad use. Management proposes the following market rules for using the core non-generator resource model:

1. The non-generator resource must be capable of generating energy. Consequently, for negative generation, the resource will not be subject to ISO settlement charges applicable to demand other than any appropriate energy settlement. The non-generator resource will not be charged these settlement charges applicable to demand, which are generally uplift charges, because the negative generation is reducing generation relative to a baseline and is not actual load.

2. Whether the non-generator resource’s energy bids are subject to local market power mitigation will be based on the underlying resource’s technology. The local market power mitigation rules in the tariff for that technology will apply to the generic non-generator resource. 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.

3. Non-generator resources using the core model will not be eligible to count for resource adequacy capacity at this time due to current system configuration limitations. Changes needed to address resource adequacy may be addressed through a future policy initiative.

Stakeholders support these modifications because they leverage existing resource modeling and provide additional clarity on use of the core non-generator resource model. For additional information on stakeholder comments, reference Appendix A: stakeholder comment matrix.

PROPOSAL ELEMENTS APPROVED BY EIM GOVERNING BODY

Several EIM system functionality enhancements that were included in the consolidated EIM initiatives effort fall under the EIM Governing Body's primary authority. At its November 29, 2017 meeting, the EIM Governing Body approved these enhancements for inclusion on the Board's December 14 consent agenda. A copy of the November 22, 2017 memo and stakeholder matrix provided to the EIM Governing Body are included for the Board's reference as part of the consent agenda item.

The EIM system functionality enhancements, which are described in the EIM Governing Body memo, will automate existing manual processes, facilitate bilateral settlements, and improve modeling accuracy. The enhancements are consistent with the existing EIM design principles.

SCOPE CHANGES

Management removed three items from the scope of the consolidated EIM initiatives because stakeholders did not support addressing these items at this time. These items are as follows: (1) third party contribution of transmission to the EIM, (2) a mechanism to manage bilateral schedule changes, and (3) equitable sharing of wheeling benefits. A detailed description of each of these items and details on why they were ultimately were not supported by stakeholders at this time can be found in the November 22, 2017 EIM Governing Body Memo included for the Board's reference as part of the consent agenda item.

CONCLUSION

Management requests the ISO Board of Governors approve the described generic non-generator resource market rule modifications. These changes will allow the model to be efficiently and broadly used by EIM entities and neighboring balancing areas. The model leverages existing resource modeling and the proposed market rules provide necessary clarity on use of the core non-generator resource model.

Attachment E – Draft Final Proposal

2017 Consolidated EIM Initiatives and Resource Modeling Tariff Amendments

California Independent System Operator Corporation

Consolidated EIM Initiatives

from 2017 Roadmap

Draft Final Proposal

September 5, 2017

Consolidated EIM Initiatives Draft Final Proposal

Table of Contents

1. Purpose

The purpose of the Consolidated EIM Initiatives effort is to combine energy imbalance market (EIM) related items from the 2017 roadmap into one initiative. This consolidation will facilitate the stakeholder process and make efficient use of resources.

Originally, the initiative contained three items that were presented in the Issue Paper:

- Third party transmission contribution
- Management of bilateral schedule changes
- Equitable sharing of wheeling benefits

Additionally, new functionalities are being developed for the ISO 2017 Winter Release that will also affect the EIM. These functionalities require tariff changes and will be available to benefit all EIM BAAs as well as the ISO BAA. Hence, these items were introduced in the Consolidated EIM Initiatives Straw Proposal:

- Automated matching of import/export schedule changes with a single EIM non-participating resource
- Automated mirror system resources at ISO intertie scheduling points
- Base EIM transfer system resource imbalance settlement
- Leverage new non-generator resource (NGR) modeling functionality
- Allow submission of base generation distribution factors (GDFs) for aggregated EIM non-participating resources

Based on stakeholder feedback from the Issue Paper and Straw Proposal, the ISO decided to remove the 2017 roadmap items from scope of the initiative. This Draft Final Proposal describes the reasons for the scope changes and gives additional information regarding the new EIM functionalities.

2. Stakeholder Engagement and EIM Governing Body Role

Stakeholder input is essential for successful policy development. The Consolidated EIM Initiatives stakeholder process shapes market design, policy and Tariff changes through a series of proposals, meetings and written stakeholder comments.

Table 1 lists the planned schedule for the Consolidated EIM Initiatives stakeholder process.

Table 1: Schedule for Consolidated EIM Initiatives Stakeholder Process

Item	Date
Post Draft Final Proposal	September 5, 2017
Stakeholder Conference Call	September 12, 2017
Stakeholder Comments Due	September 22, 2017
EIM Governing Body Meeting	October 10, 2017
Board of Governors Meeting	November 1-2, 2017

The ISO is committed to providing ample opportunity for stakeholder input into its market design, policy development, and implementation activities. The ISO requests stakeholders to submit written comments to InitiativeComments@caiso.com.

2.1. EIM Governing Body Role

This policy initiative involves market rules changes that fall within the EIM governing body's primary authority and advisory authority.

The EIM Governing Body will have primary authority in approving the policy resulting from the following EIM functionalities:

- Automated matching of import/export schedule changes with a single EIM non-participating resource
- Automated mirror system resources at ISO intertie scheduling points
- Base EIM transfer system resource imbalance settlement
- Allow submission of base generation distribution factors (GDFs) for aggregated EIM non-participating resources

The EIM Governing Body will have advisory authority in approving the policy resulting from the following EIM functionality:

- Leverage new non-generator resource (NGR) modeling functionality

3. Resources

3.1. Energy Imbalance Market Resources

The EIM is a real-time market used to economically dispatch participating resources to efficiently balance supply, transfers between balancing authority areas (BAA), and load across its footprint. The EIM extends the ISO's real-time market and leverages the FERC Order No. 764 market design changes implemented in May 2014. As such, the EIM includes a fifteen-minute market and five-minute real-time dispatch across the combined network of the ISO and EIM entities.

This initiative assumes a basic understanding on the EIM design, which went live on November 1, 2014. Review the EIM Draft Final Proposal and the EIM Year 1 Enhancements for additional information on the EIM design including: definitions, policy decisions, and descriptions of EIM design components. The EIM Draft Final Proposal and EIM Year 1 Enhancements are posted at:

Energy Imbalance Market Draft Final Proposal:
https://www.westerneim.com/Documents/EnergyImbalanceMarket-DraftFinalProposal092313.pdf

Energy Imbalance Market Year 1 Enhancements:
https://www.westerneim.com/Documents/DraftFinalProposal_EnergyImbalanceMarketYear1Enhancements.pdf

3.2. Consolidated EIM Initiatives Resources

The Consolidated EIM Initiatives Issue Paper and Straw Proposal outline the issues and proposals for this initiative. They are critical in understanding the scope for this Draft Final Proposal. The papers can be referenced at the following links:

Consolidated EIM Initiatives Issue Paper:
http://www.caiso.com/Documents/IssuePaper-ConsolidatedEnergyImbalanceMarketInitiatives_Updated.pdf

Consolidated EIM Initiatives Straw Proposal:
http://www.caiso.com/Documents/StrawProposal-ConsolidatedEnergyImbalanceMarketInitiatives.pdf

The EIM Enhancements Winter 2017 Business Requirements Specification (BRS) lists the business rules needed to implement the new EIM functionalities. This document includes details regarding the business process impacts and business requirements. The BRS can be referenced at the following link:

EIM Enhancements Winter 2017 BRS:
http://www.caiso.com/Documents/BusinessRequirementsSpecification-EIMWinter2017Enhancements.pdf.

4. Scope Changes

4.1. Third Party Transmission Contribution – Removed from Scope in the straw proposal

The intent of this initiative was to allow third party transmission owners[1] to contribute transmission capacity located between two EIM BAAs for use in the EIM. It was originally believed this would benefit EIM and non-EIM entities. EIM entities would benefit due to increased energy transfer throughout the EIM area, while non-EIM entities that contributed transmission capacity would be eligible to receive congestion revenues. This functionality would result in a financial benefit when the contributed transmission capacity is used and valuable.

The Issue Paper proposed that third parties would receive congestion rents only for the transmission contribution; other payment types are outside the scope of what the ISO is considering. However, stakeholder comments indicated congestion rents may not be adequate compensation. Specifically, a transmission contribution would increase the amount of capacity between EIM BAAs and therefore reduce the likelihood that congestion would occur. Without congestion, there would be no financial benefit for the transmission contribution.

Additionally, stakeholders did not believe this functionality would be widely used. Concerns were expressed that the implementation cost would outweigh the financial benefit. Therefore, stakeholders stated that pursuing this initiative would be an inefficient allocation of ISO resources.

Based on stakeholder feedback, the ISO removed the Third Party Transmission Contribution from the scope of this initiative in the Straw Proposal. Stakeholder feedback agreed with the decision to remove this item from the scope of the initiative.

Implementation of this functionality at a later date may be a solution to help address concerns regarding compensation for net wheeling. For example, an EIM Entity supporting wheeling transactions could change their OATT to limit transmission available for use in the EIM to only support their own BAA's imports/exports. Additional transmission capacity could be purchased and donated back into the EIM by another entity. This would enable the intermediary BAA to receive payment for the transmission capacity supporting the wheel and the entity who donated the transmission capacity would be eligible to receive congestion revenues.

Also, the EIM transfer cost could be leveraged to address stakeholders requests to allow contribution of transmission, but at a minimum cost. Currently the EIM transfer cost is set at $0.001. Its purpose is to ensure the most direct ETSR path is used for accounting for EIM transfers minimizing the number of e-Tags that must be updated. If the entity contributing the transmission had an approved transmission rate for the contribution service, the ISO could

[1] The term "transmission owner" is broadly defined as any entity holding firm transmission rights. This may be direct ownership or contract rights.

include this cost as the EIM transfer cost. These ETSRs would only be scheduled after all other ETSRs are exhausted.

The ISO will move the Third Party Transmission Contribution to the Stakeholder Initiatives Catalog so it can be considered at a later date based on prioritization. The Annual policy initiatives roadmap process can be found at the following link:

> *Annual policy initiatives roadmap process:*
> http://www.caiso.com/informed/Pages/StakeholderProcesses/AnnualPolicyInitiativesRoadmapProcess.aspx

4.2. Management of Bilateral Schedule Changes – Removed from Scope in the draft final proposal

Management of bilateral schedule changes was proposed to allow market participants better opportunity to hedge transactions after the EIM entities' base schedule submission deadline. The ISO proposed to leverage the current wheel through functionality to economically determine bilateral schedule changes that source in the EIM area or wheel across the EIM area. This would allow market participants with potential bilateral transactions to express a bid price at which the balanced source/sink pair would result in a schedule change.

Stakeholders commented that the ISO can address part of this issue by improving the ISO market timelines. This would enable EIM entities to move their base schedule deadline (currently T-57) closer to the NAESB e-Tagging timeline of T-20. However, the EIM will still initiate prior to the e-tagging deadline. As a result, any remaining imbalance settlement concerns will need to be managed by EIM entity business practices or changes to the OATT settlement of wheel schedule changes.

Stakeholder feedback proposed it is unnecessary to move forward with this initiative and therefore it has been removed from scope. The ISO outlined detailed examples in the Straw Proposal explaining how EIM entities can manage bilateral schedule changes through their OATTs and business practices.

4.3. Equitable Sharing of Wheeling Benefits – Removed from Scope in the draft final proposal

Under the current EIM design each EIM entity is responsible for its own transmission cost recovery through its OATT. EIM entities benefit from the reciprocal benefits provided by the transmission made available to the EIM. The purpose of this initiative is to investigate equitable sharing of benefits when an EIM transfer wheels through an EIM BAA.

The ISO identified a potential inequity resulting from the amount of wheeling transactions that occur throughout the EIM area. Said differently, some EIM entities experience more net wheeling than others relative to EIM transfers that sink or source within the EIM BAA.

The ISO suggested two solutions in the Straw Proposal to allow benefits to be more evenly dispersed throughout the EIM. The first option (1) is an ex-post payment based on the amount of net wheeling that occurs. The second option (2) is a rate that can be incorporated into the market and therefore allow market competition while providing compensation for net wheeling.

Stakeholders generally opposed implementation of either option. Stakeholders recognized that although net wheeling occurs throughout the EIM footprint, all EIM Entities are currently have more EIM transfers in and EIM transfers out than wheeling. Transfers in and transfers out are a direct economic benefit to the EIM BAA; therefore all EIM Entities are benefiting more than they are facilitating wheels. This item has therefore been removed from scope.

In order to address all stakeholder concerns, the ISO is committing to monitor net wheeling as the EIM footprint expands. Net wheeling data will be included in in the EIM quarterly benefits report going forward.

Quarterly Benefits Reports:
https://www.westerneim.com/Pages/About/QuarterlyBenefits.aspx

Additionally, Equitable Sharing of Wheeling Benefits will be included in the Stakeholder Initiatives Catalog so it can be considered at a later date if merited. The annual policy initiatives roadmap process can be found at the following link:

Annual policy initiatives roadmap process:
http://www.caiso.com/informed/Pages/StakeholderProcesses/AnnualPolicyInitiativesRoadmapProcess.aspx

4.4. EIM Enhancements Winter 2017

The ISO is currently developing new EIM functionalities that will be implemented in the Winter of 2017. These enhancements will be available to all EIM Entities[2] and are intended to automate manual processes and facilitate operation of the EIM. The Straw Proposal presented an overview of the functionalities. Additionally, the EIM Enhancements Winter 2017 BRS includes specific details including business rules.

This Draft Final Proposal will highlight benefits and provide an overview of each functionality. Participants are encouraged to review the BRS for specific details.

EIM Enhancements Winter 2017 BRS:
http://www.caiso.com/Documents/BusinessRequirementsSpecification-EIMWinter2017Enhancements.pdf.

[2] The Non-Generator Resource modeling functionality is also available to Scheduling Coordinators.

5. Policy for EIM Enhancements Winter 2017

The ISO has identified several EIM design enhancements that will be available to all EIM entities when implemented in the Winter of 2017. The new Non-Generator Resource modeling functionality (section 5.4) is available to all Scheduling Coordinators. These enhancements are intended to facilitate and automate manual processes making it easier for entities to participate in the EIM. Tariff revisions are required to support these enhancements for all EIM entities.[3]

5.1. Automated Matching of Import/Export Schedule Changes with a Single EIM Non-Participating Resource

This functionality allows the ISO to automatically adjust a single EIM non-participating resource (NPR) schedule in an EIM BAA to match import or export schedule change after T–40. This will enable an automatic adjustment to replace a manual dispatch and still maintain the available bid range for use in the EIM dispatch. The intent of this enhancement is to provide EIM BAAs another tool to manage known imbalance and resolve it ahead of time so they have maximum control of what energy is made available for the real-time dispatch.

There are currently two solutions to solve imbalance if a schedule change occurs after T-40. The first solution (1) is for the BAA Operator to manually dispatch a generator internal to the EIM BAA to resolve the imbalance. This a manual process and therefore takes time and may be prone to error. However, the manual dispatch will maintain the available bid stack for use in the real time energy imbalance market. The second solution (2) is for the EIM entity to allow the market to resolve the imbalance by using the available bid stack. This results in less energy available for use in the real time energy imbalance market. It is the choice of each EIM entity to determine which approach to use.

The new functionality will provide an alternate solution and tool to resolve a schedule change. The EIM entity will now be able to utilize a third solution (3) of allowing a non-participating resource's (NPR's) schedule to automatically adjust when an intertie schedule change occurs.

The example shown below demonstrates the current practice of issuing a manual dispatch instruction (Figure 1) to the EIM non-participating resource. If imports to an EIM entity BAA decrease after T–40 by 20 MW, the EIM BAA operator will need to manually dispatch (as shown in the example) or allow the market software to solve the imbalance.

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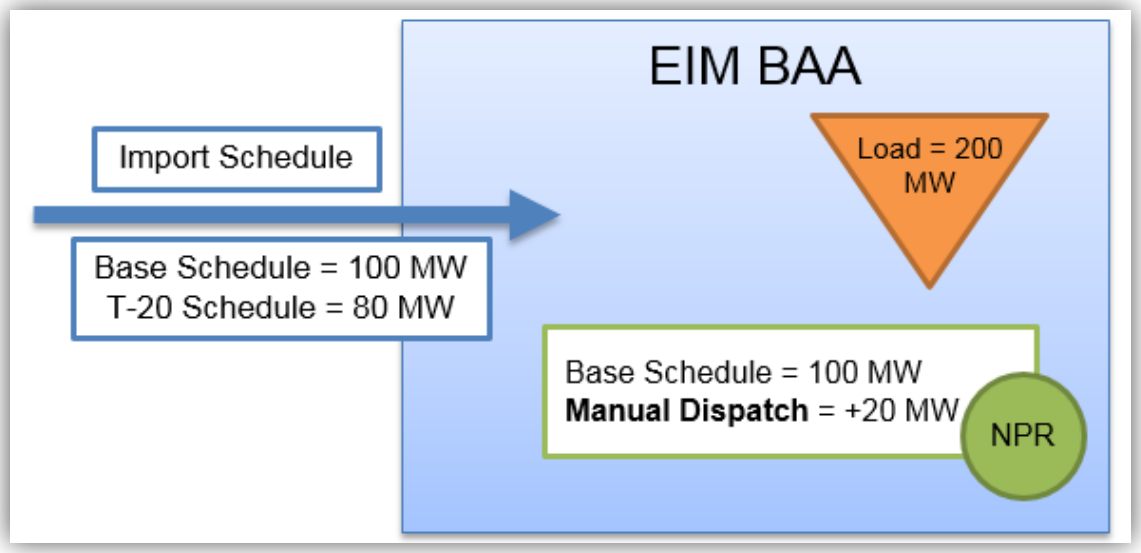
[3] The Powerex implementation agreement included a principle that would exempt transactions wholly outside the US from the EIM administrative charge. This feature is not generally applicable to EIM entities so the ISO intends to support this functionality through FERC acceptance of a participation agreement. *See* CAISO Transmittal Letter and Answer in FERC Docket No. ER17-1796-000 (explaining that the ISO will separately submit for FERC acceptance participation agreements in support of the Powerex implementation).

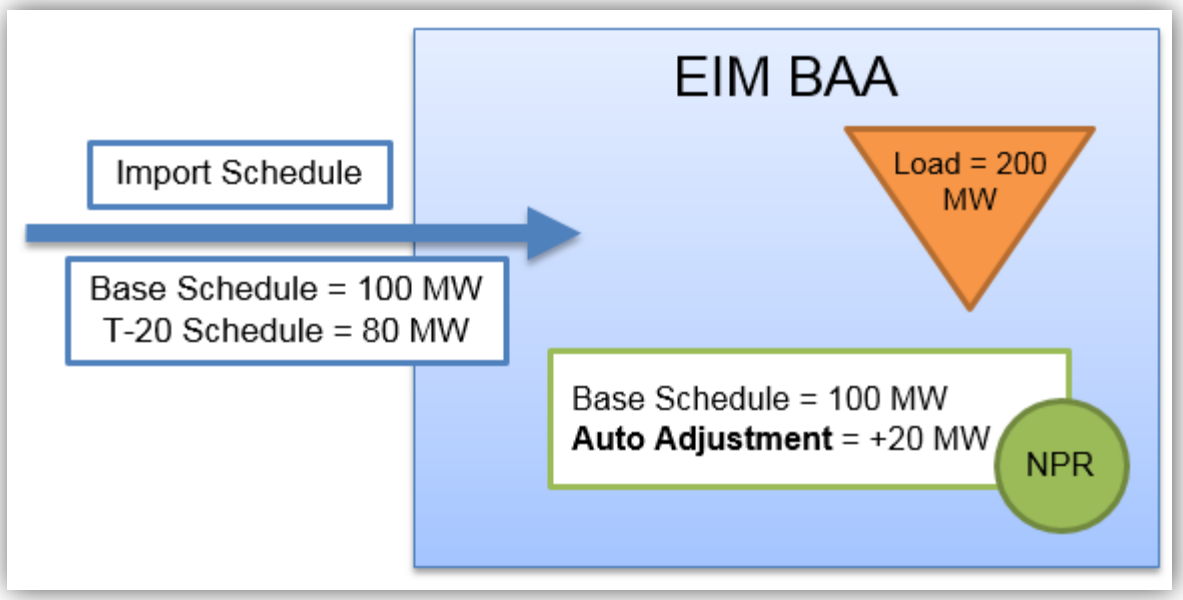
Figure 1: Manual Dispatch required to balance the import base schedule change after T-40.



As shown in Figure 1, 200 MW of load in the EIM BAA was balanced by 100 MW from the NPR plus 100 MW from an import schedule. However, by T-20 the import schedule changed to 80 MW. The EIM BAA operator balanced the 20 MW shortage by manually dispatching the NPR an incremental amount of 20 MW. This is a manual process that must be completed by the operator.

The automatic adjustment (Figure 2) duplicates the same result as the manual dispatch but requires no manual action, occurs instantaneously, and removes the potential of manual error.

Figure 2: Automatic adjustment will change NPR schedule to balance the import base schedule change that occurred after T-40.



As shown in Figure 2, the NPR schedule is still adjusted automatically by an incremental amount of 20 MW to balance the base schedule change that occurred after T-40. However, in this example the adjustment occurred automatically without the need for a manual dispatch. The settlement in both examples is the same: buy 20 MW at the import locational marginal price (LMP) and sell 20 MW at the NPR LMP.

This purpose of this enhancement is to facilitate the management of changes to base schedules that represent bilateral contracts outside the EIM. For this reason, it is limited to EIM non-participating resources such as system resources, including base energy transfer system resources (Base ETSRs).

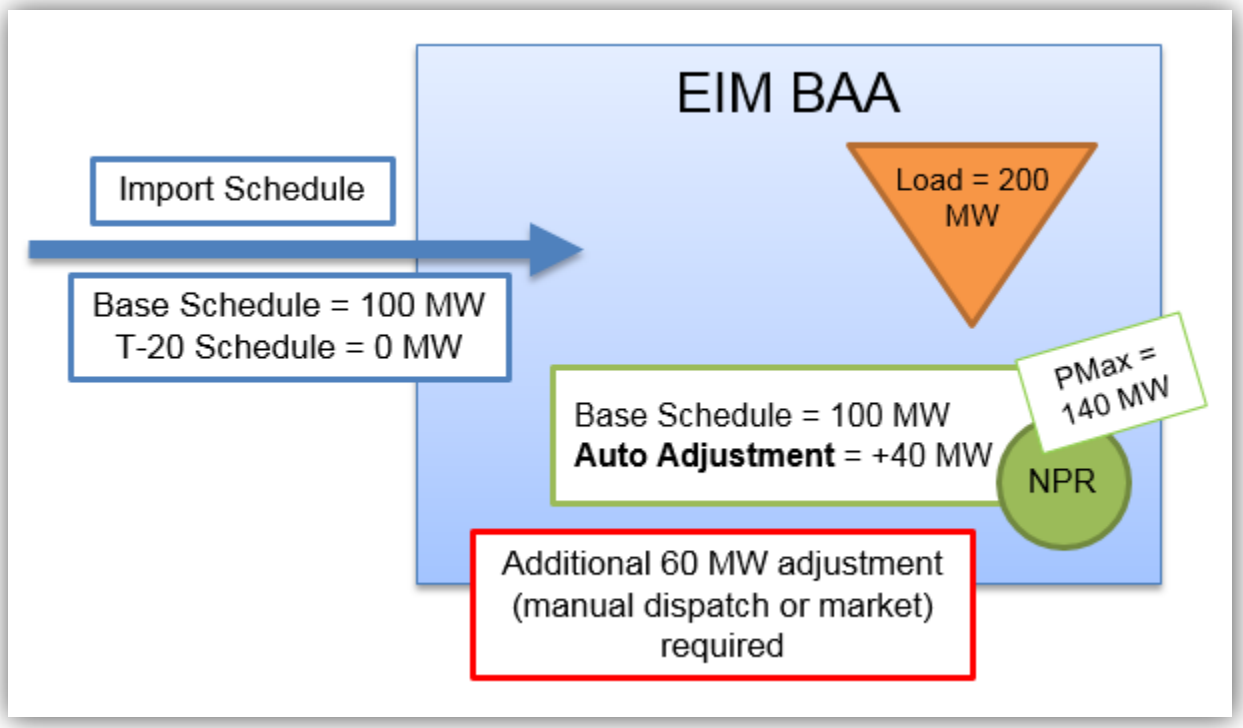
Additionally, the NPR will need to be exempt from the hourly block schedule error that is included in the resources sufficiency evaluation[4]. The reason for this exemption is because no bid range is used from participating resources to resolve the imbalance created by the schedule change. This will benefit EIM Entities because the NPR will automatically adjust for deviations in intertie schedules instead of needing the market to make adjustments. This exemption, however, does not eliminate participants from receiving the imbalance settlement as shown in Figure 1 and Figure 2.

The ISO proposes to allow EIM Entities to select a NPR that will be used for this functionality. This enables the entity to select a generator that has ramping capacity and characteristics that will be the most beneficial and economic. The market will automatically use the NPR schedule for auto-balancing to the extent that the generator is available. Beyond that point, the market will re-dispatch available participating resources. Additionally, the EIM BAA operator always has the option to send a manual dispatch.

An example of the auto adjustment up to the limitation of the unit can be seen in Figure 3. The NPR in Figure 3 has a PMax of 140 MW. Therefore, if the NPR base schedule is set to 100 MW it can only be adjusted up 40 MW so the PMax is not exceeded.

[4] For more information about the schedule error that is included in the resources sufficiency evaluation, reference Section 7 of the EIM Year 1 Enhancements Draft Final Proposal: https://www.westerneim.com/Documents/DraftFinalProposal_EnergyImbalanceMarketYear1Enhancements.pdf

Figure 3: Auto-adjustment cannot exceed limitations of the associated NPR.



As shown in Figure 3, the NPR did not have the capability to accommodate the entire schedule change. Therefore, the schedule was auto adjusted to the unit's PMax and the remaining imbalance can be managed by a manual dispatch or the market.

If limitations of the NPR do not allow for the entire schedule change to be balanced, the market will still need to solve for the imbalance. This can be done by manual dispatch or by the market. If the market solves for the imbalance, the resources moved as a result of the imbalance are still required to be in the resource sufficiency test.

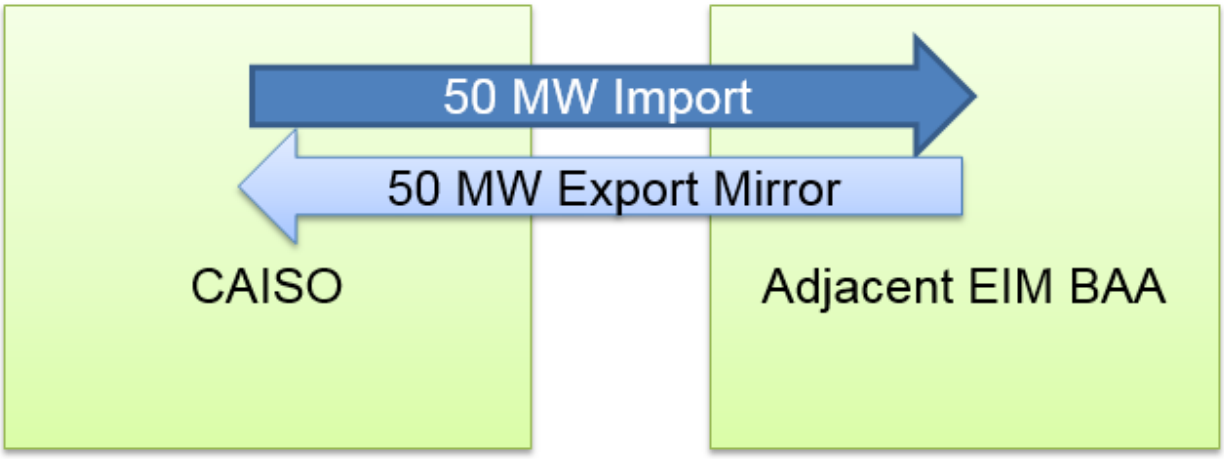
This functionality will be implemented in two phases. The Phase 1 (implemented Winter 2017) will allow for only one NPR to be paired to an intertie schedule changes. Phase 2 (implementation targeted for Fall 2018) will allow for multiple NPR and intertie schedule change pairs. This will enable EIM Entities to use their most efficient resources to auto-match intertie schedule changes when the change occurs after T-40. EIM entities can utilize this enhancement as a tool to preserve their bid range from participating resources to support EIM transfers rather than balancing a bilateral trade outside of the EIM.

5.2. Automated Mirror System Resources at ISO Intertie Scheduling Points

This new functionality was requested by EIM participants and will facilitate the automation of mirror system resources at ISO intertie scheduling points.

Mirror system resources are used to mirror import/export schedules between the ISO and an EIM entity at ISO intertie scheduling points. This allows the market to solve for both the California ISO and adjacent EIM BAAs simultaneously. For example, a 50 MW import to NEVP would be mirrored with a 50 MW export from CAISO.

Figure 4: 50 MW import to an EIM BAA and its corresponding 50 MW mirror export schedule at an ISO Intertie scheduling point.



Schedules clear through the ISO's market processes such as the day ahead market, the fifteen minute market, and the real-time dispatch. EIM entities are responsible for mirroring these schedules by submitting base schedules for their designated mirror system resources. Additionally, the EIM entity must adjust the mirror schedules for changes made to base schedules after T–40.

This enhancement will automate the mirroring of import/export schedule changes after T–40 that occur at ISO intertie scheduling points. The functionality is limited to mirroring ISO import/export schedules from registered system resources; ISO intertie transactions must still be mirrored manually via different mirror system resources.

The auto-mirroring functionality can be combined with the auto-matching functionality described in the previous section. An automated mirror system resource can be auto-matched to the non-participating resource used for that purpose. The automated mirror system resource must only

be mirroring ISO import/export self-schedules because bids must clear in the EIM and cannot be auto-matched.[5]

5.3. Base EIM Transfer System Resource Imbalance Settlement

Currently, the ISO models bilateral transactions between EIM entities using base energy transfer system resources (Base ETSRs). The EIM entity registers a minimum of two base ETSRs (one in the import direction and one in the export direction) to model bilateral activity with each counterparty EIM entity. Currently, the ISO does not settle Base ETSR schedule changes. This enhancement will provide EIM entities with settlement information for Base ETSRs schedule changes. The data will allow EIM entities to determine the point of delivery of the Base ETSR and therefore the LMP used for settlement between the two EIM entities will be known. The ISO will not require EIM Entities to use this data but it may help facilitate settlement of bilateral transactions in the EIM area.

5.4. Leveraging New Non-Generator Resource (NGR) Modeling Functionality

The ISO recently developed non-generator resource (NGR) modeling functionality to allow a resource to reduce output without having a forward energy schedule.[6] This new functionality will be available to all Scheduling Coordinators and enables the modeling of individual or aggregated EIM participating and EIM non-participating resources. Currently, if an NGR aggregate is operating at 0 MW, the dispatch cannot decrease to a negative output even if the aggregate has storage capabilities. With this enhancement, the aggregated resource can have a base schedule equal to zero and still be able to receive a dispatch instruction to reduce output.

The modeling functionality will not enforce a state of charge constraint that is used by storage resources in the ISO's market today. Resources utilizing this function will have a continuous operating range from negative to positive injection, and none of the costs normally associated with resource management including start-up cost, start up time, minimum up time, minimum down time, or forbidden operating regions. In addition, these resources will be subject to local market power mitigation (LMPM) and can use any of the methods under the ISO's tariff to

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5 If a self-schedule change is submitted, then the market will most likely accept the schedule change. An economic bid schedule change, on the other hand, is not guaranteed to be accepted. Therefore, only self-schedules can be used for auto-mirroring since they will clear in the market.

6 A full description of the NGR enhancements can be found in Section 6.2 of the Energy Storage Distributed Energy Resources (ESDER) Phase 2 Draft Final Proposal: http://www.caiso.com/Documents/DraftFinalProposal-EnergyStorage_DistributedEnergyResourcesPhase2.pdf

establish a default energy bid. Under the initial implementation, generic NGR will not be able to provide Resource Adequacy (RA). The existing dynamic competitive path assessment (DCPA) and LMPM methodologies will apply to the Generic NGR model considering it an algebraic injection. The energy bid of a resource modeled via the Generic NGR model will be subject to mitigation above the competitive LMP at its location.[7]

In addition to aggregated and individual resources, the NGR modeling functionality will be available for use on interties to support regulation down. For example, an intertie resource without a forward energy schedule will be able to provide regulation down to the ISO.

5.5. Allow submission of Base Generation Distribution Factors (GDFs) for aggregated EIM Non-Participating Resources

This enhancement will support base generation distribution factor (GDF) submission for aggregate EIM non-participating resources through the submission of base schedules. The market will distribute the base schedule and any imbalances of aggregate EIM non-participating resources using the submitted base GDFs, if available, or otherwise the registered default base GDFs for the resource in the Master File, normalized for outages. The base GDFs will be used to calculate the aggregate LMP for the aggregate EIM non-participating resource, as usual.

The implementation of this enhancement is critical to accurate modeling an on hourly basis and will enable the market to continue running efficiently and economically. Currently this feature is only supported for participating resources submitted via bids.

6. Next Steps

The ISO will discuss this Draft Final Proposal during the stakeholder conference call on September 12th. The ISO requests written comments from stakeholders; comments should be submitted by September 22nd to InitiativeComments@caiso.com.

[7] Additional details can be found in the EIM Enhancements Winter 2017 BRS Section 5.1, requirements EIMWNT17_BRQ161 – EIMWNT17_BRA165 (pages 15 – 17) and EIMWNT17_BRQ321 - EIMWNT17_BRQ325 (pages 25 – 26).