California Independent
System Operator Corporation

August 21, 2015

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. ER15-1919-___**

**Amendment of Tariff Filing: Energy Imbalance Market Year One Enhancements – Phase 1**

Dear Secretary Bose:

On June 15, 2015, as amended June 25, 2015, and July 1, 2015, the California Independent System Operator Corporation ("CAISO") filed a tariff amendment in this docket to revise the CAISO tariff provisions governing the Energy Imbalance Market. This filing answers the questions in the Commission's July 30, 2015 letter requesting additional information regarding the CAISO's proposal and amends the proposed tariff language to address questions raised at the August 11, 2015 conference in this proceeding. The Commission sought information on two aspects of the CAISO's proposal: the EIM transfer schedule cost and the greenhouse gas bid adder. The CAISO hereby provides the information requested and, in some cases, amends the originally proposed tariff language to be fully responsive to the request.

The amendments to the proposed tariff provisions address the EIM transfer costs, which the CAISO refers to as an EIM transfer schedule cost to accurately reflect its use in the optimization. Specifically, the CAISO proposes to ensure that the impact of the EIM transfer schedule cost will be *de minimis* by (1) requiring that the EIM transfer schedule cost be less than $0.01/MWh (instead of the $0.10/MWh cap reflected in the June 15 filing); and (2) providing that the EIM transfer schedule cost will be the lowest cost that enables the CAISO's security constrained economic dispatch to uniquely identify a scheduling path that optimizes the objective of satisfying three criteria specified in the tariff. The

criteria that the CAISO will include in the tariff are that the EIM transfer schedule cost (1) maximizes the use of the capacity made available for EIM transfers in both the fifteen minute market and real-time dispatch; (2) minimizes the number of e-tags required to comply with WECC scheduling practices; and (3) minimizes the impact of outages or curtailments on the e-tags used to account for EIM transfers based on historical outage and curtailment data for each EIM Internal Intertie. The amended tariff will also specify the circumstances that can give rise to a revision of the EIM transfer schedule costs: (1) when an EIM Entity Balancing Authority Area is added or subtracted from the EIM Area; (2) there is a seasonal transmission system ratings change; or (3) the transmission system topology changes. Finally, the tariff will specify that the CAISO will reflect the EIM transfer schedule cost in the marginal cost of congestion component of the locational marginal price ("LMP"). These proposed tariff changes complete the CAISO's response and are discussed in context of the question that prompted the change.

The CAISO's filings in this docket originally requested that the Commission permit the tariff amendment to become effective October 1, 2015, except for certain provisions that the CAISO requested be made effective on September 15, 2015. In light of the responses below and this amendment, the CAISO now requests an effective date of October 27, 2015 for all tariff provisions that were proposed in the June 15 filing as well as those that have been amended by this filing. This effective date will allow testing and tuning of all functions to occur in parallel operations and support NV Energy's participation in the Energy Imbalance Market as of November 1, 2015.[1] In addition, the CAISO respectfully requests that the Commission issue an order by October 21, 2015. Having a Commission order at least 5 days before the requested effective date and a few days before the implementation of NV Energy will allow the CAISO a reasonable amount of time to take into account the Commission's direction.

## I. Background and Introduction

On June 15, 2015, the CAISO filed proposed tariff modifications to provisions governing the operation of the CAISO's Energy Imbalance Market to (1) allow the use of available transfer capability for EIM transfers, (2) provide a cost based approach for greenhouse gas bidding by EIM participating resources

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[1] On July 31, 2015, the CAISO issued a market notice stating that the NV Energy implementation date changed from October 1, 2015 to November 1, 2015. *See* http://www.caiso.com/Documents/SupplementalStakeholderProcessPlanned_EIM_ReadinessCriteriaTariffLanguage.htm.

and a means for such resources to avoid dispatch for purposes of serving CAISO load, (3) align the EIM administrative charge with the grid management charge, and (4) include additional elements for the evaluation of resource sufficiency. On June 25, 2015, the CAISO submitted an errata to add a section of the transmittal letter (section III.E of the transmittal as corrected) that described one of the tariff changes that had been inadvertently omitted during editing.[2] On July 1, 2015, the CAISO submitted an amendment to the original filing to revise the requested effective date of a single tariff provision proposed in the June 15 filing.[3]

On July 30, 2015, the Commission's Office of Energy Market Regulation issued a deficiency letter. The letter indicated that the Commission needed more information regarding the CAISO's proposed use of a EIM transfer cost parameter to optimize the scheduling of EIM transfers and proposed compliance with the Commission's directive that it provide a mechanism for EIM market participants to opt out of energy sales into California. The letter asked specific questions regarding each issue and directed the CAISO to respond within 30 days. Separately, the Commission also noticed a conference to discuss these questions, which occurred on August 11, 2015. The presentation that the CAISO provided at the conference is included as Attachment C to this filing.

## II. Transfer cost parameter.

### A. CAISO's Explanation In June 15 Filing

In the transmittal letter, the CAISO explained that the EIM transfer limit ensures that imbalance energy transfers between EIM balancing authority areas are within the transmission capability made available to the Energy Imbalance Market. The CAISO noted that section 29.17(f) currently limits EIM transfers between balancing authority areas based on the aggregate transmission rights made available to support EIM transfers. This approach is appropriate for transfers among the CAISO and PacifiCorp balancing authority areas because there is a single EIM transfer path between each balancing authority area. However, as more balancing authority areas participate in the Energy Imbalance Market, there will be multiple potential EIM transfer paths among the balancing authority areas. For example, NV Energy will be using available transmission capacity over multiple intertie scheduling points between both the CAISO and PacifiCorp East to support EIM transfers. The CAISO pointed out that in order to

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[2] *See* Docket No. ER15-1919-000 (noticing that comments on the errata are due July 16, 2015).

[3] *See* Docket No. ER15-1919-001 (noticing that comments on the amended effective date are due July 16, 2015).

allow NV Energy and other transmission providers to offer available transmission capacity and maximize EIM transfers among balancing authority areas, the CAISO needed to revise section 29.17(f) to consider EIM transfer limits separately for each intertie scheduling point.

Currently, in the fifteen-minute market and real-time dispatch, the CAISO enforces intertie scheduling limits to ensure energy schedules do not exceed each intertie's transmission capacity. In the transmittal letter, the CAISO explained that, under the proposed tariff revisions, it would similarly apply these intertie scheduling limits to interties used in the Energy Imbalance Market. As the CAISO indicated, because there may be multiple potential intertie scheduling paths for scheduling EIM transfers, the CAISO is proposing to include a transfer cost in the market optimization to enable the market to select the most direct path.

In its filing, the CAISO indicated that the proposed tariff provisions did not provide for explicit settlement of the transfer cost. However, because the market optimization considers this cost, it can affect locational market prices. Therefore, the CAISO committed that during market simulation and prior to the effective date of the proposed tariff revisions, it would evaluate the appropriate level of the transfer cost by balancing the benefits of including transfer costs with the impact on locational marginal prices. To limit the impact of the transfer cost, the CAISO proposed to cap the cost at $0.10/MWh in new tariff section 29.17(g). Further, the CAISO committed that after completing its evaluation and determining the appropriate EIM transfer schedule cost, the CAISO would brief its Board and file a revised EIM transfer schedule cost cap with the Commission.

Finally, the CAISO proposed to amend section 11.5.4 to revise the manner in which the financial value of EIM transfers will be used as part of the financial settlement of the real-time imbalance energy offset for each balancing authority area in the Energy Imbalance Market. As previously approved by the Commission, the CAISO does not settle EIM transfers explicitly because they represent the imbalance energy of resources supporting the EIM transfer, which the CAISO settles with the individual participating resources.[4] The CAISO did not, and again does not propose changes to this construct. However, to calculate the real-time imbalance energy offset for a balancing authority area, the CAISO settlement calculations must consider the financial value of the EIM transfer to balance supply and demand settlements within the balancing authority area. Currently, the CAISO calculates the financial value by multiplying the price at the intertie over which the EIM transfer is scheduled by the quantity of the EIM transfer. However, because the intertie is not the actual location of the

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4 *Cal. Indep. Sys. Operator Corp.*, 147 FERC ¶ 61,231 (2014).

generation within an EIM balancing authority, the CAISO proposed to use the system marginal energy cost for the purpose of settling the real-time imbalance energy offset charge. The system marginal energy cost is the component of the locational marginal price that represents the marginal cost of providing energy from the reference location. The CAISO did not as part of that discussion describe how the EIM transfer schedule cost would be reflected in the LMP and appreciates that the Commission staff's questions on this topic as it has led the CAISO to conclude that the CAISO should indicate in the tariff how the EIM transfer schedule costs will affect the LMP.

### B. Commission Questions Regarding Transfer Cost Parameter

*1. Please provide additional context regarding the reason that the EIM Transfer parameter approach is needed.*

The Energy Imbalance Market efficiently dispatches participating resources across the entire EIM area, which results in real-time flows between balancing authority areas when (1) there are less expensive resources in one area relative to another and (2) there is transmission capacity available to the Energy Imbalance Market to move such resources. These flows constitute EIM transfers and are part of the net interchange between participating EIM balancing authority areas. In determining these dispatches, the CAISO's optimization software takes into account physical flow limits on interties between balancing authority areas.

Under procedures established by the Western Electricity Coordinating Council ("WECC"), scheduling is based on contract paths, not physical flows.[5] EIM transfers are not exempt from these scheduling requirements. WECC procedures require the relevant balancing authority areas, in this case the EIM entities, to account for energy transfers between balancing authority areas using e-tags. To comply with these requirements, the CAISO's optimization produces contract-path schedules for EIM transfers by distributing the net EIM transfer (the difference between generation and load in each EIM balancing authority area) to available interties, *i.e.,* the optimization assigns specific megawatt transfers to specific interties. Absent the WECC contract path scheduling procedures, it would be sufficient merely to account for the net physical flow and not distribute that flow to specific interties in order to account for the EIM transfer on a specific contract path.

Under the current configuration with only the PacifiCorp east and PacifiCorp west balancing authority areas participating in the Energy Imbalance

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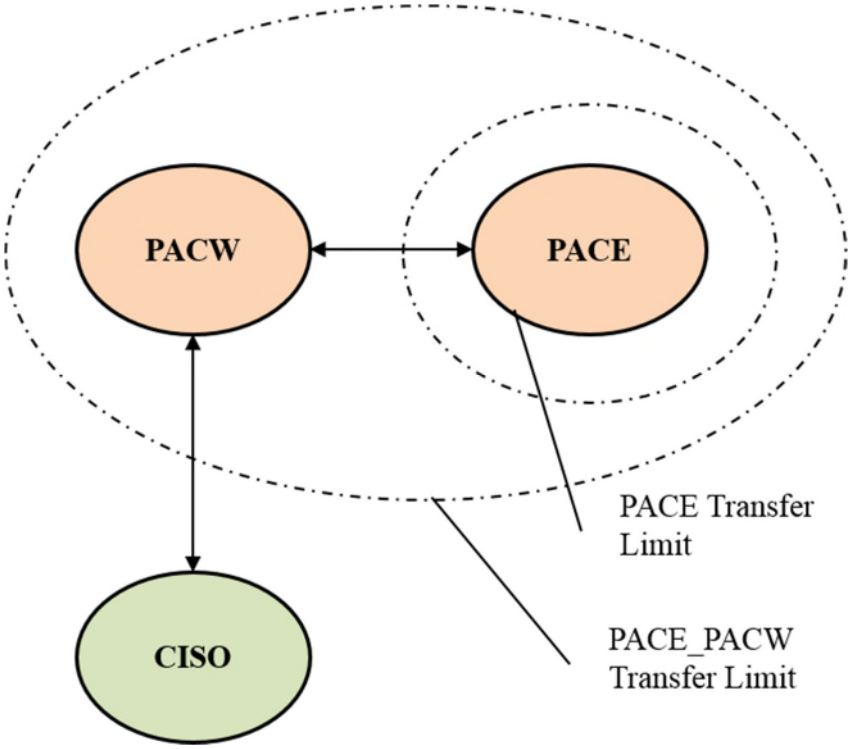
[5] The CAISO procedures that reflect these WECC requirements are included as Attachment E for the Commission's information.

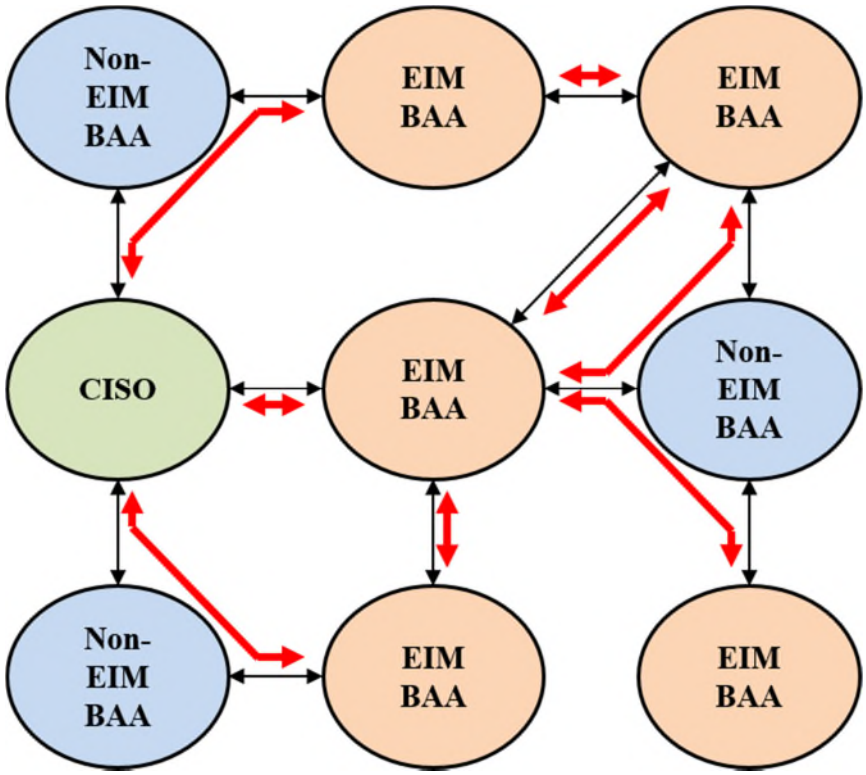
Market, determining EIM transfers schedules and e-tags is straightforward. There is only one available contract path between each EIM Entity, as shown in Figure 1.

**Figure 1**



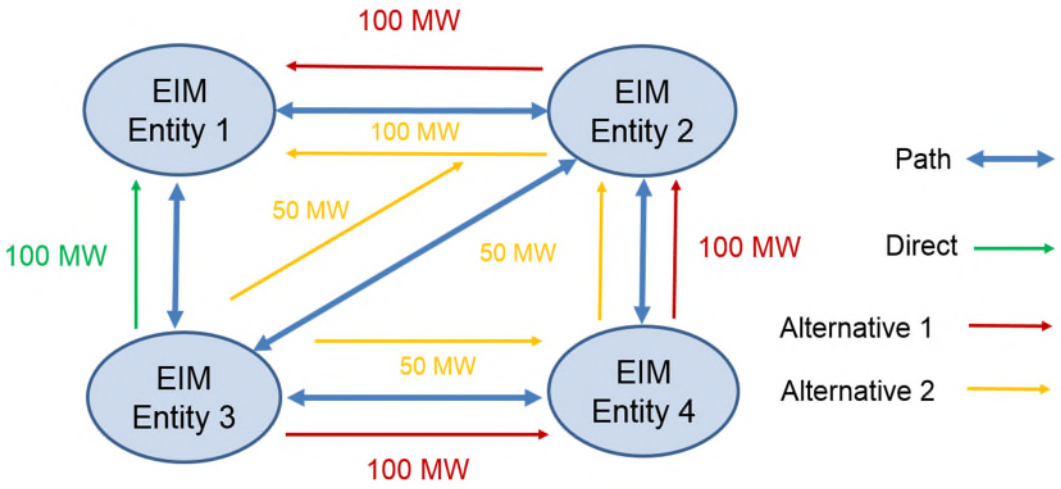

Only two transfer limits are necessary to account for all flows across the linear pathway among the current EIM balancing authority areas. As the number of EIM entities increases, however, so will the number of possible contract paths that can be used to account for an EIM transfer schedule. These possibilities may include paths among multiple EIM entity balancing authority areas as well as through non-EIM entity balancing authority areas on which EIM entities hold contractual rights. Figure 2 illustrates such a future state.

**Figure 2**




Where there are multiple interties, there can be multiple feasible EIM transfer schedules for any particular net EIM transfer. For a simple example, consider Figure 3 below that identifies four balancing authorities areas with 100 MW of available transmission capacity between the following balancing authority areas: EIM entity 1 and EIM entity 2, EIM entity 1 and EIM entity 3, EIM entity 2 and EIM entity 3, EIM entity 2 and EIM entity 4 and EIM entity 3 and EIM entity 4. The numerous possible combinations of interties and the potential for segmenting the EIM transfer among various possible pathways allows for multiple potential schedules for a 100 MW EIM transfer from EIM entity 2 to EIM entity 1. Figure 3 illustrates three such paths.

**Figure 3**




Currently there is no parameter by which the CAISO's optimization can distinguish among the possible pathways or even between imports and exports. In the example above, the CAISO's optimization may very well select one path for EIM transfers in one five-minute interval and a completely different path in the next. The optimization solution could randomly select the paths and randomly distribute the energy among the selected paths. For example, even with no physical flows between balancing authority areas and no associated scheduling requirement, the market optimization could identify a 50MW import and a 50MW export at the same intertie that would require an update to e-tags when no update otherwise would be required.

Having frequent and unexplained changes in the EIM transfer schedules impacts efficiency and can unnecessarily increase the administrative costs of accounting for EIM transfers consistent with WECC scheduling practices. The process of creating additional e-tag changes represents additional workload for entities responsible for e-tags and introduces greater potential for error. Also, the e-tags would need to reflect the path changes, and this would be an additional operational burden that could further increase the potential for errors. Although it would be possible to automate some of these processes, the administrative costs of the automation itself and the associated oversight would still increase EIM entity costs of participation in the Energy Imbalance Market.

Even if the EIM entity automated its e-tag change management processes, the CAISO would be unable to indicate why the optimization chose one path over another, and market participants included on the e-tags would be unable to understand the reasons for the choice of contract paths. For example, in administering unscheduled flow procedures and other WECC-wide coordination efforts, the reliability coordinator uses the expected energy profile when determining which schedules to curtail. If the expected net energy transfer

randomly appears across multiple expected energy profiles, accounting for unscheduled flow mitigation would be even more complex.

Including in the optimization a mechanism for identifying paths in a consistent manner will promote efficiency and consistency, as well as reduce the aforementioned burdens and concomitant costs. Although the exact level of cost savings is not readily quantifiable, cost reductions are conceptually apparent and expected. Because the multiple paths selected provide no benefits from a scheduling or actual flow perspective, there is no justification for imposing these additional burdens and risks on the balancing authority areas.

An appropriate solution must not only ensure consistency, it must also satisfy other important objectives. From an operating perspective, all paths are not equally preferable. An optimal EIM scheduling path is one that (1) maximizes the use of capacity made available for EIM transfers in the fifteen- and five minute markets; (2) minimizes the number of e-tags required to comply with WECC scheduling practices; and (3) minimizes the impact of outages and curtailments on the e-tags used to account for EIM transfers.

The EIM transfer schedule cost is a mechanism for ensuring the optimization selects a set of optimal paths that are efficient and consistent with these goals. The CAISO markets will assign a *de minimis* EIM transfer schedule cost to each energy transfer schedule to select a unique and optimal EIM transfer schedule. The CAISO will determine the EIM transfer schedule cost for each intertie schedule that will best achieve the optimal path. More optimal paths will have a lower cost relative to less optimal paths. As discussed in response to the next question, the use of the EIM transfer schedule cost parameter will have no more than a *de minimis* effect on the LMPs.[6]

The first criterion—maximizing the use of capacity made available for EIM transfers in the fifteen and five minute markets—will maximize the efficient and reliable dispatch across the EIM area. For example, assume there are two 75 MW EIM transfer schedules, one of which allows only 15 minute schedule changes (EIM transfer #1) and the other of which allows 15-minute and 5-minute schedule changes (EIM transfer #2). Schedules from both the fifteen minute market and real-time dispatch are determined by enforcing the EIM transfer limit. If in the fifteen minute market, the 15-minute schedule of 75 MW is accounted for on the second EIM transfer #2, then in the real-time dispatch no incremental EIM

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[6] There should be no impact on the merit order dispatch because the margin for dispatch will always be less than the maximum EIM transfer schedule cost, which is less than $.01/MWh. The level of precision for bidding in the CAISO markets is $.01.

transfers could occur because EIM transfer #1 cannot be used to account for 5-minute changes.

The second criterion—minimizing the number of e-tags that the operator must update—is important because it reduces the administrative costs described above. It will also reduce the likelihood of e-tag errors and the administrative costs of correcting those errors.

The third criterion—minimizing the impact of outages and curtailments on the e-tags used to account for EIM transfers—is important because transmission curtailments and outages can require last-minute revisions of EIM transfer schedules, with consequent administrative burdens. Moreover, because the market optimization must respect both physical and scheduling limits, the loss of capacity on scheduled interties may require re-optimization. Scheduling EIM transfers on paths that historically have fewer observed curtailments and outages can mitigate this market inefficiency.

2. *To the extent CAISO's proposal modifies the EIM's original design, which relies on a flow-based optimization, by instead relying on a path priority based approach for EIM Transfers, please explain the rationale for this decision. On the other hand, if CAISO's proposal will not alter the original EIM design's reliance on a flow-based optimization, please explain how the current method of optimization is maintained with the introduction of the transfer cost parameter. Staff understands the Transfer Parameter as a mechanism to select which transmission path will be used to transfer imbalance energy, not as a limit to either flows or LMPs. If staff's understanding is incorrect, please explain whether the Transfer Parameter does in fact act as a limit to flows or LMPs.*

The CAISO's proposal does not alter the CAISO's reliance on flow-based optimization as originally designed. As explained above, the EIM transfer schedule cost only affects the manner in which the CAISO can assign the flow-based optimization results to specific scheduling paths to facilitate compliance with WECC e-Tagging business practices. In other words, the EIM transfer schedule cost does not determine where actual flows will occur; it only identifies which contract path the appropriate EIM entity will schedule its net EIM interchange for energy accounting purposes consistent with WECC e-Tagging business practices.

The CAISO's optimization dispatches resources based on bids, operational characteristics, and the location of the resource. It currently determines LMPs based on the marginal bid, congestion, and losses at each node or aggregation point. As proposed, the optimization will use the EIM transfer schedule cost to determine the distribution of net interchange, which applies at the balancing authority area level, not the resource or location level. Because the software will apply the EIM transfer schedule cost to all resources in

the relevant EIM entity balancing authority area, the EIM transfer schedule cost will have an effect on LMPs, but, as discussed below, the effect will be *de minimis*.

Just as congestion reflects the cost of redispatch, the *de minimis* EIM transfer cost reflects the cost of identifying the optimal scheduling path. The marginal cost of congestion is the transmission-related charge that reflects the cost of redispatch for withdrawals at particular locations based on the system conditions. The EIM transfer cost similarly reflects the cost of identifying the optimal scheduling path on the multiple EIM transfers. The CAISO is proposing to reflect the EIM transfer schedule cost component as part of the marginal cost of congestion component of the LMP because of the similarity of their functions. To provide this construct in the tariff, the CAISO is proposing to amend Section 29.17(g) and Appendix C of the CAISO tariff to indicate that the marginal cost of congestion component will also reflect the EIM transfer schedule cost. The EIM transfer cost then flows through the real-time congestion offset charge.[7]

Since its initial filing, the CAISO has been conducting studies to determine the lowest EIM transfer schedule cost that will accomplish the goal of identifying the optimal EIM transfer schedule and satisfying the three criteria identified in the response to Question #1 and set forth in the amended tariff language. Based on this analysis, the CAISO has concluded that the purpose of the EIM transfer schedule cost can be achieved by application of an EIM transfer schedule cost less than $0.01/MWh.

The CAISO's June 15 proposal established a maximum EIM transfer schedule cost of $0.10. However, in light of the CAISO's determination that the EIM transfer schedule cost need not be greater than $0.01/MWh, the CAISO is amending its proposal to (1) establish a maximum EIM transfer schedule costs of less than $0.01/MWh; and (2) require that the EIM transfer schedule cost be the minimum cost that the CAISO determines will achieve the purpose of the EIM transfer schedule cost. This will ensure that the impact of the EIM transfer schedule cost will be *de minimis*. Further, recognizing that there may be concerns regarding the CAISO's discretion even though the EIM transfer schedule cost will be capped at a *de minimis* level, the CAISO proposes to amend its tariff to limit its discretion in determining the level of the EIM transfer schedule cost. Specifically, the CAISO is amending its proposal to include the following standard and criteria for establishing and revising the parameter in the tariff. The EIM transfer schedule cost must optimize the following objectives: (1) maximize the use of the capacity made available for EIM transfers in both the

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[7] *See* CAISO Tariff section 11.5.4.1.1 (providing for settlement of the real-time congestion offset charge).

fifteen minute market and real-time dispatch; (2) minimize the number of e-tags required to comply with WECC scheduling practices; and (3) minimize the impact of outages or curtailments on the e-tags used to account for EIM transfers based on historical outage and curtailment data for each EIM Internal Intertie. The amended tariff will also specify the circumstances that can give rise to a revision of the EIM transfer schedule costs, which include (1) when an EIM Entity Balancing Authority Area is added or subtracted from the EIM Area; (2) there is a seasonal transmission system ratings change; or (3) the transmission system topology changes. Table 1 provides an example of the impact of the EIM transfer schedule cost on LMPs.

**Table 1**

| BAA | LMP | | BAA | LMP |
|---|---|---|---|---|
| CISO | $40.0000 | | CISO | $40.0000 |
| EIM1 | $40.0000 | → | EIM1 | $39.9999 |
| EIM2 | $40.0000 | | EIM2 | $40.0001 |
| EIM3 | $40.0000 | | EIM3 | $40.0002 |

The precision limit for bids into the CAISO's market is $0.01/MWh. On the other hand, the cost parameters for in the market software optimization are configurable to several more decimal points. Because the CAISO proposes to limit the cost parameter to an amount less than $0.01, the cost impact on the total LMP settlement is likely to impact the LMP in miniscule amounts.

The CAISO's optimization, like any other process that seeks optimal economic or scientific solutions through complex algorithms with large numbers of inputs, can only work to a certain degree of precision. For example, in determining congestion, the CAISO's system disregards shift factors (the percentage of power flow a marginal injection at a PNode contributes to a transmission line) of less than two percent.[8] An EIM transfer schedule cost of less than $0.01/MWh should thus be considered within an acceptable degree of system precision in the same manner as the disregard of insignificant shift factors or the bids themselves.

Between the cap on the EIM transfer schedule cost and the clear criteria for its determination, the transfer cost can be considered the equivalent of a formula rate. The CAISO initially considered, but rejected, adopting a post-

processing approach to determine the optimum EIM transfer schedules applying an EIM transfer schedule cost. Such a post process does not exist in any of the CAISO systems and would necessitate expenditures on new software enhancements. The CAISO concluded that the existing market systems could accomplish the same goal with minimal enhancements. Moreover, by incorporating it into the market systems, the selection of the paths is optimized through the market clearing process, which considers the selection of the optimal path based on the three criteria adopted above, while considering the various market conditions.

3. *CAISO states that "because the optimization can account for EIM transfers on multiple paths with different transfer limits, the CAISO needs a parameter to determine efficiently on which E-tags to schedule the EIM transfer for accounting purposes."*

   a. *Please clarify what CAISO means by the term "E-tags" within this statement.*

In the sentence identified by the Commission, the CAISO is referring to the WECC process for accounting for exchanges of energy between balancing authority areas consistent with WECC's contract path scheduling construct.[9] Although the Energy Imbalance Market dispatches resources consistent with physical flow constraints, the process to account for EIM transfers of energy between balancing authority areas is through the e-tags created by the appropriate EIM entity.

E-tags are used to schedule interchange transactions as part of balancing authority area operations. E-tags document the movement of energy across an intertie scheduling point over prescribed contract paths, for a given duration, and for a given energy profile, and include information about those entities with responsibilities for the receipt and delivery of the energy. E-tags may contain information about the different types of entities involved in moving power across interchanges, including generators, transmission system operators, energy traders, and load serving entities. They are used by balancing areas to confirm interchange transactions between them and ensure interchanges are within transmission limits. All balancing authorities on the path of the transmission on the e-tag have to approve them. Currently, the WECC receives all e-tag data in the Western Interconnection, respectively, in near real-time, to assist the reliability coordinator in identifying transactions that may need curtailment when transmission constraints occur.

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[9] *See* Attachment E, which includes the CAISO operating procedure for e-tag requirements. http://www.caiso.com/Documents/2510.pdf

E-tags require that, prior to scheduling transactions, one of the participants involved in a transaction must submit certain transaction-specific information, such as the source and sink balancing authority areas and control areas along the contract path, as well as the transaction's level of priority and transmission reservation OASIS reference numbers, to control area operators and transmission operators on the contract path.

For example, the Bonneville Power Administration currently enforces a rate of change constraint on 5-minute transfers referred to as the dynamic transfer capability with respect to the California-Oregon Intertie, but allows unlimited change in the fifteen-minute market up to the interchange rights holder's transmission rights. To maximize transfers for PacifiCorp through the Bonneville Power Administration's system, EIM transfers are tagged using static tags in the fifteen-minute market and the dynamic tag for the real-time dispatch. This procedure was specifically addressed in an amendment to the PacifiCorp EIM Entity Agreement.[10] Otherwise, dynamic schedules are primarily used for EIM transfers because the same e-Tag can be used to account for energy scheduled in both the fifteen-minute market and real-time dispatch.

*a. Do these "E-tags" refer to EIM dynamic tags?*

In the Energy Imbalance Market, EIM entities can use both static and dynamic e-Tags to account for EIM transfers, but the use of static e-Tags is limited to one intertie and is an exception to the use of dynamic e-Tags in accordance with the CAISO tariff as noted above.[11]

*b. Are any other "E-tag" types included?*

No.

*5. Please provide a specific example illustrating CAISO's design, including details of how the parameter will function in practice to select a more optimal path in a particular situation.*

Consider an example involving EIM transfers among the CAISO balancing authority area and three EIM Entity balancing authority areas. This example is illustrated in Attachment C, and the CAISO is including it here in order to provide the narrative explanation. Figure 4 and the tables in this example identify an EIM transfer as ET[exporting balancing authority area],[importing balancing authority

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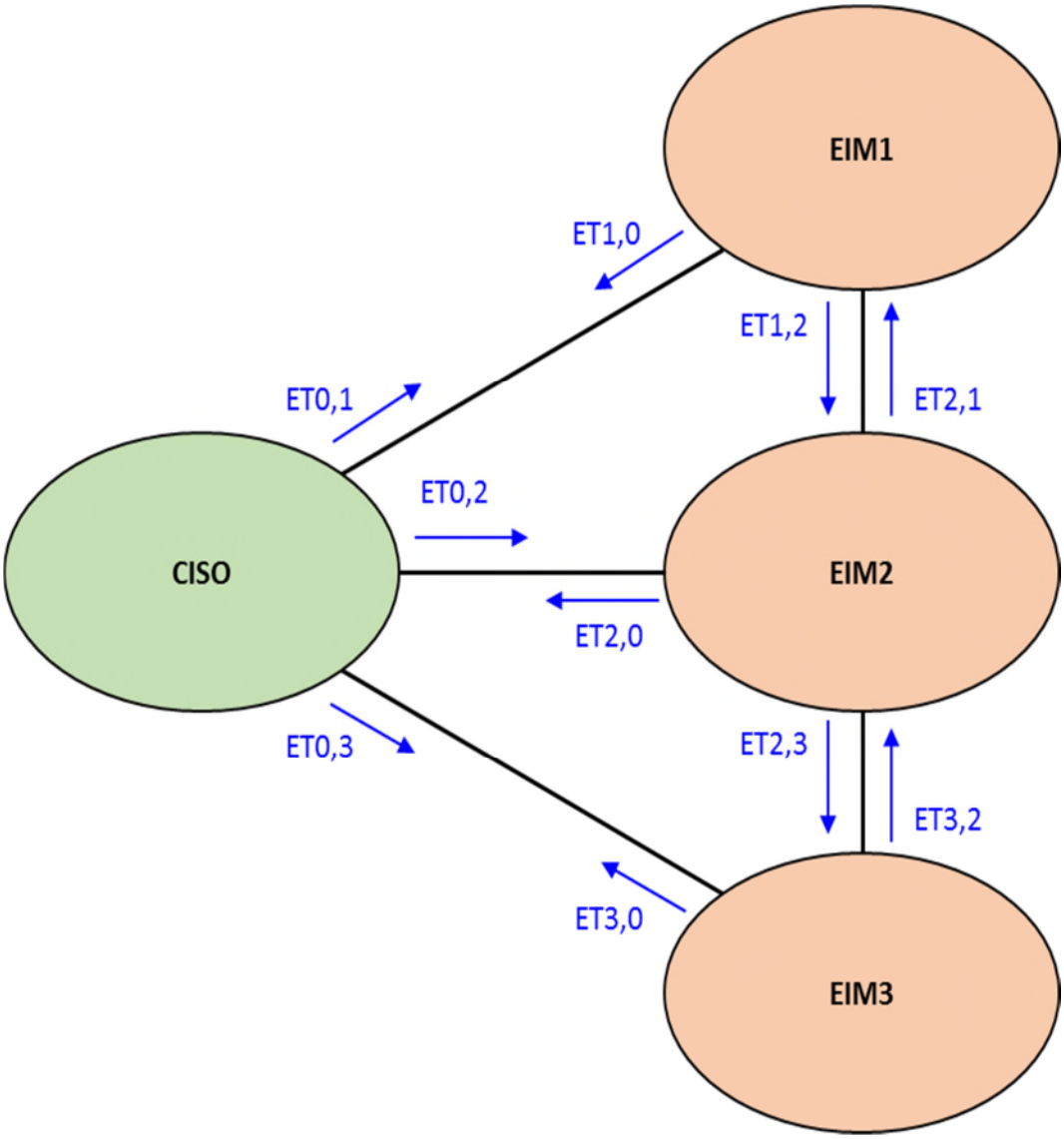
[10] *See* FERC Docket ER14-2607, 148 FERC ¶ 61,243 (September 29, 2014).

[11] *See* CAISO Tariff section 29.7(e); and FERC Docket ER14-2607, 148 FERC ¶ 61,243 September 29, 2014) (accepting a non-confirming amendment to the EIM Entity Agreement that allows static e-Tags to account for EIM transfers).

area]. For example ET0,1 is an export from the CAISO to EIM entity 1. G[balancing authority areas] and L[balancing authority area] refer to the load and generation in the identified balancing authority area.

**Figure 4**




Without any EIM transfer schedule cost, one of multiple potential random solutions is the following:

**Table 2.**

| BAA | Resource | Min | Schedule | Max | Bid |
|---|---|---|---|---|---|
| CISO | G0 | 0 | 1400 | 1500 | $ 40 |
| | L0 | | 1000 | | |
| | T0 | | 400 | | |
| | ET0,1 | 0 | 0 | 200 | $ - |
| | IT0,1 | 0 | 200 | 300 | $ - |
| | ET0,2 | 0 | 100 | 100 | $ - |
| | IT0,2 | 0 | 0 | 100 | $ - |
| | ET0,3 | 0 | 500 | 550 | $ - |
| | IT0,3 | 0 | 0 | 500 | $ - |
| EIM1 | G1 | 0 | 700 | 700 | $ 30 |
| | L1 | | 500 | | |
| | T1 | | 200 | | |
| | ET1,0 | 0 | 200 | 300 | $ - |
| | IT1,0 | 0 | 0 | 200 | $ - |
| | ET1,2 | 0 | 0 | 0 | $ - |
| | IT1,2 | 0 | 0 | 200 | $ - |
| EIM2 | G2 | 0 | 1000 | 1000 | $ 20 |
| | L2 | | 600 | | |
| | T2 | | 400 | | |
| | ET2,0 | 0 | 0 | 100 | $ - |
| | IT2,0 | 0 | 100 | 100 | $ - |
| | ET2,1 | 0 | 0 | 200 | $ - |
| | IT2,1 | 0 | 0 | 0 | $ - |
| | ET2,3 | 0 | 500 | 550 | $ - |
| | IT2,3 | 0 | 0 | 0 | $ - |
| EIM3 | G3 | 0 | 0 | 2000 | $ 50 |
| | L3 | | 1000 | | |
| | T3 | | -1000 | | |
| | ET3,0 | 0 | 0 | 500 | $ - |
| | IT3,0 | 0 | 500 | 550 | $ - |
| | ET3,2 | 0 | 0 | 0 | $ - |
| | IT3,2 | 0 | 500 | 550 | $ - |

The marginal resource is G0, setting the price at $40/MWh. The optimal EIM transfers for the balancing authority areas (T0-T3) are 400 MWh, 200 MWh, 400 MWh, and –1000 MWh, respectively. However, this particular solution has an inefficient set of random EIM transfer schedules (distribution of EIM transfers onto interties); specifically, 50MW are transferred from CAISO to EIM3 through EIM2 (ET0, 2 and ET2, 3), even though they could be transferred directly (ET0,

3) under the scheduling limit on the direct intertie between CAISO and EIM3. Adding a small EIM transfer schedule cost (a flat $0.0001/MWh on each intertie) is sufficient to yield the following unique efficient solution. Adding a small transfer cost allows the optimization to choose among otherwise equally viable transfer paths based on the criteria set forth in the tariff.

**Table 3**

| BAA | Resource | Min | Schedule | Max | Bid |
|---|---|---|---|---|---|
| CISO | G0 | 0 | 1400 | 1500 | $40.0000 |
| | L0 | | 1000 | | |
| | T0 | | 400 | | |
| | ET0,1 | 0 | 0 | 200 | $0.0001 |
| | IT0,1 | 0 | 200 | 300 | $0.0001 |
| | ET0,2 | 0 | 50 | 100 | $0.0001 |
| | IT0,2 | 0 | 0 | 100 | $0.0001 |
| | ET0,3 | 0 | 550 | 550 | $0.0001 |
| | IT0,3 | 0 | 0 | 500 | $0.0001 |
| EIM1 | G1 | 0 | 700 | 700 | $30.0000 |
| | L1 | | 500 | | |
| | T1 | | 200 | | |
| | ET1,0 | 0 | 200 | 300 | $0.0001 |
| | IT1,0 | 0 | 0 | 200 | $0.0001 |
| | ET1,2 | 0 | 0 | 0 | $0.0001 |
| | IT1,2 | 0 | 0 | 200 | $0.0001 |
| EIM2 | G2 | 0 | 1000 | 1000 | $20.0000 |
| | L2 | | 600 | | |
| | T2 | | 400 | | |
| | ET2,0 | 0 | 0 | 100 | $0.0001 |
| | IT2,0 | 0 | 50 | 100 | $0.0001 |
| | ET2,1 | 0 | 0 | 200 | $0.0001 |
| | IT2,1 | 0 | 0 | 0 | $0.0001 |
| | ET2,3 | 0 | 450 | 550 | $0.0001 |
| | IT2,3 | 0 | 0 | 0 | $0.0001 |
| EIM3 | G3 | 0 | 0 | 2000 | $50.0000 |
| | L3 | | 1000 | | |
| | T3 | | -1000 | | |
| | ET3,0 | 0 | 0 | 500 | $0.0001 |
| | IT3,0 | 0 | 550 | 550 | $0.0001 |
| | ET3,2 | 0 | 0 | 0 | $0.0001 |
| | IT3,2 | 0 | 450 | 550 | $0.0001 |

The physical schedules are identical, but the energy transfer schedules are somewhat different (the differences are shown in red). In this solution, the direct energy transfer schedule from CAISO to EIM3 is maximized to 550MWh, reducing the circulating energy transfer schedule through EIM2. This occurs because the circulating energy transfer schedule accrues twice the EIM transfer schedule cost on the two interties from CAISO to EIM2, and then to EIM3, compared to the direct intertie from CAISO to EIM3.

6. *Finally, please clarify in which optimization of the real-time market (15-minute, five-minute, or both) CAISO proposes to use the EIM transfer cost parameter. CAISO states that the transfer cost parameter "will allow the market optimization to differentiate the value of scheduling on more optimal paths rather than less optimal paths."*

The EIM transfer schedule cost parameter is used in both the fifteen-minute market and the five-minute real-time dispatch.

a. *Please explain what CAISO means by "more optimal paths" and "less optimal paths," and indicate the basis for this differentiation.*

As discussed in response to Question 1, direct paths, which minimize the number of e-Tags that must be updated, are more optimal than indirect paths because of reduced operational impacts and uncertainties in the market. Paths that allow both fifteen-minute market and real-time dispatch schedule changes are more optimal than paths that only allow only five-minute market schedule changes because this increases the available flexibility of resources in the market. Five minute changes are truly dynamic and provide the greatest flexibility for the market optimization. Additionally, paths with less frequent curtailments or outages are more optimal than paths with more-frequent outages because they avoid the risk of redispatch under such conditions. Including a *de minimis* EIM transfer schedule cost allows the optimization to identify a more optimal path based on the criteria included in the tariff and avoids having frequent and unexplained changes in the EIM transfer schedules, which can increase administrative costs of accounting for EIM transfers consistent with WECC scheduling practices. As discussed above, with the inclusion of multiple EIM transfer paths, because the optimization looks for the least cost dispatch it may schedule a series of offsetting flows to reach the optimal solution. However, they may be necessary only for purposes of the power flow solution necessary for the market clearing process, and no actual flows or contract paths actually apply.

*b. Please indicate who determines the "relative priorities of various paths." What role will the EIM BAAs or any other entities have in determining the path priorities?*

The CAISO, as the market operator, would determine the path priority based on the information provided by the EIM entity and based on the criteria the CAISO proposes herein to include in its tariff. As a balancing authority area, the EIM entity determines which interties can be used for EIM transfers as well as the capacity available for EIM transfers and as a result it is important to have the EIM entity's input. The process to establish priorities would therefore be consultative, but the CAISO will exercise its independent judgment to ensure that the path priorities and the determination of EIM transfer schedule costs are consistent with the tariff criteria and do not favor any market participant.

*c. Which entity has the final decision-making authority with respect to determining path priorities?*

As noted in response to Question 6.b, the CAISO as the market operator will have the final decision making authority to determine path priorities. This authority will be subject to the applicable terms of the CAISO's approved tariff and the business practice manual change management procedures.

*d. Please indicate how CAISO intends to assign the cost parameters to different paths.*

As discussed above, more optimal paths will have a lower cost parameter relative to less optimal paths. Under the proposed EIM transfer schedule cost, both will be less than $0.01/MWh. Based on market simulation, the objective will be to set the EIM transfer schedule cost at the lowest possible level that will allow the market optimization to differentiate between paths with different priorities according to the tariff criteria.[12]

*e. Please indicate where CAISO plans to document its selection criteria.*

As discussed above, the CAISO is amending its proposal to include the three criteria for determining path priorities in section 29.17 (h) of the tariff. The three criteria are minimizing the number of e-Tags associated with EIM transfers; maximizing use of EIM transfers in the FMM and RTD; and reducing the impact of outages and curtailments. The CAISO has explained the benefits of these criteria in response to Question 1. The CAISO proposes to include these criteria

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[12] *See* Attachment D (testing transfers between PACE and NVE in market simulation scenario 21).

in the tariff. Tariff section 29.17(h) will also state the principle that the EIM transfer schedule cost will be the lowest cost that enables the CAISO's security constrained economic dispatch to uniquely identify a scheduling path that optimizes the objective of satisfying the three tariff criteria. The business practice manual for the Energy Imbalance Market would include additional details, including those noted below.

*f. Please explain how often CAISO anticipates that the relative priority of paths will be recalibrated.*

The CAISO will recalibrate EIM transfer schedule cost to maintain consistency with the established criteria when required based on seasonality, when new EIM entities join, or when the system topology changes significantly. The CAISO will manage the change process through the business practice change management procedures.

*g. Please specify what triggers would justify a change to the priority of paths and if CAISO plans on including this information in the business practice manual or tariff.*

See response to Question 6.f.

*h. Please indicate if notice will be provided to stakeholders of any recalibration.*

Yes, the business practice manual change management process requires the CAISO to provide stakeholders notice of the proposed changes in the EIM transfer schedule cost parameters and an opportunity to comment on the proposed changes in priorities. The CAISO holds monthly meetings to review changes in business practice manuals.[13]

*i. Please explain how CAISO proposes to calculate the transfer cost parameters in a potential new EIM entity's market simulation.*

The CAISO will determine the EIM transfer schedule cost through an iterative process. The CAISO will determine the cost by testing ever decreasing costs below the maximum cost until the optimal scheduling path consistent with the established criteria can no longer be determined by the market optimization. In other words, the CAISO will run a series of tests, reducing the value each time, until an optimal solution can no longer be produced. The value before the optimization fails to produce an optimal result would be the lowest effective parameter value. The CAISO will use the lowest cost that allows the market

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[13] *See* http://www.caiso.com/rules/Pages/BusinessPracticeManuals/Default.aspx .

optimization to correctly determine the optimal scheduling path based upon the application of the criteria included in the tariff.

*j. Does the addition of new EIM entities necessitate modifications to the transfer cost parameters of the previously integrated EIM entities?*

The addition of a new EIM entity will require additional transfer cost parameters for any new interties, but will not necessarily require modification of existing transfer cost parameters or it change the maximum cost. Whether modifications to the EIM transfer schedule cost below the cap are necessary will depend on the location of the new balancing authority relative to the existing EIM entities and the CAISO balancing authority area.

*l. Please indicate if specific simulation scenarios are planned, and if so, provide further details regarding the scenarios and measures for success.*

The CAISO intends to conduct a number of structured scenarios during market simulation. Currently there is one scenario planned to validate transfer schedules between PacifiCorp East and NV Energy. The CAISO will use different EIM transfer schedule costs for the two contract paths between these balancing authority areas to produce the optimal schedules. The CAISO is including an outline of this scenario as Attachment D to this filing.

*m. Finally, please explain how much actual market operation experience CAISO believes is needed to finalize the parameters.*

The CAISO believes that the functional testing of the software, the market simulation, and the parallel operation will provide adequate experience to finalize the initial EIM transfer schedule costs and to reflect those parameters in the business practice manual.

*7. CAISO's proposed tariff revisions do not include any procedures to identify how the new transfer cost parameters will impact LMPs.*

As noted above, proposed section 29.17(j) of the tariff provides that the CAISO will include the EIM transfer schedule cost in the marginal cost of congestion component of the LMP associated with the resources located in the balancing authority area that supported the EIM transfer. The EIM transfer schedule cost will only have a *de minimis* impact on the LMP because it is less than $0.01/MWh, and the CAISO will set the actual number at the lowest level necessary to achieve the purpose of the transfer cost, consistent with the criteria the CAISO proposes to include in the tariff. The CAISO will impose the EIM transfer schedule cost on the aggregate resources scheduled at the margin (between limits) and include it in the LMP of the balancing authority area where

that aggregation is located. The CAISO will add the EIM transfer schedule cost to the LMP of the marginal resource in the group that includes the import and subtract it from the marginal resource in the group that includes the export. In this way, the impact, if any, should be reflected in the system marginal energy cost of the resources in the EIM balancing authority area that supported the EIM transfer. See Table 1 above.

*a. Has CAISO developed any such procedures?*

Because the only impact on LMPs is the addition of the EIM transfer schedule cost itself, which will be a known amount less than $0.01/MWh that the CAISO will determine consistent with the criteria set forth in the amended tariff provisions, no additional procedures are necessary.

*b. What procedures, if any, are in place for evaluating the outcome of the distribution of the settlement impact of the transfer cost parameters, over time, on various entities?*

See response to Question 7.a.

*c. To the extent that there are such procedures, please indicate if CAISO intends to include them in the business practice manual and, if so, why CAISO considers such procedures to be appropriate for inclusion in the business practice manual instead of the filed tariff?*

See response to Question 7.a.

*8. CAISO proposes to cap the cost of any EIM Transfer parameter at $0.10 per MWh. Please explain how CAISO determined the level of the proposed transfer parameter cost cap and how the amount will effectively differentiate the value of scheduling on more optimal paths rather than less optimal paths.*

As discussed above, based on the results of functional testing to date, the CAISO herein is amending its proposal to limit the EIM transfer schedule cost to less than $0.01/MWh. The CAISO has been conducting analyses on an iterative basis since its original filing. These analyses demonstrate that an EIM transfer schedule cost capped at a reduced level of less than $0.01/MWh will consistently identify the optimal path for EIM transfers. The CAISO intends to continue these analyses to determine the lowest amount at which each specific EIM transfer schedule cost parameter can accomplish this goal. As discussed above, this is an iterative process. As also discussed above, the EIM transfer schedule cost will differentiate the value of scheduling on more optimal paths rather than less optimal paths by adding a *de minimis* cost to energy schedule on less optimal paths.

## III. Greenhouse gas bidding by EIM participating resources.

### A. Initial Explanation

The CAISO explained in the June 15 transmittal letter that energy generated in California or imported into California is subject to California's greenhouse gas regulations. Current section 29.32 of the CAISO tariff allows EIM resources to include a greenhouse gas bid adder in addition to their energy bids so they can reflect costs incurred under California greenhouse gas regulations in their energy bids for energy to be transferred into California.

The CAISO contemplated that EIM participating resources that wished to avoid exports into California could do so by submitting high bid adders. The Commission did not find this a sufficient protection and, in the June 19, 2014 Order, directed the CAISO to add a mechanism to allow an EIM participating resource scheduling coordinator to opt out completely from consideration for EIM transfer into the CAISO. In addition, the Commission directed the CAISO to base the greenhouse gas bid adder on the expected cost of greenhouse gas compliance obligations.

The CAISO intended its proposed revision to section 29.32 contained in the June 15 tariff amendment filing to comply with the Commission's order. The CAISO's designed its bid-adder proposal in response to stakeholder input. Under the proposed revisions, an EIM participating resource may submit a single MW quantity and single bid price on an hourly basis to express its willingness to serve as the source of an EIM transfer into the CAISO and be subject to California's greenhouse gas regulations. If the EIM participating resource does not submit a bid adder, or submits a bid adder with a zero MW quantity, the market will not consider the EIM participating resource's output when determining EIM transfers into California. The MW quantity is independent of the resource's energy bid curve; thus, only the output of the EIM participating resource up to the MW quantity bid is eligible for delivery to CAISO.

In compliance with the Commission's directive to base greenhouse gas bid adders on the costs of compliance with California's greenhouse gas regulations, the proposed revisions provide that the scheduling coordinator for an EIM participating resource may submit an hourly bid adder at or below its daily maximum greenhouse gas cost as calculated by the CAISO, but not less than zero. For purposes of the bid adder, the CAISO proposes to use a variable cost option and a negotiated rate option. Under the variable option, the CAISO will calculate the a single daily cap for a resource that reflects the product of the resource's maximum heat rate as registered with the CAISO, index prices for greenhouse gas emission allowances, and the resource's emission rate. The CAISO also proposes to apply a 10 percent adder to this calculated cost. Under the variable cost option, if the scheduling coordinator submits a greenhouse gas bid price above the resource's daily cap, the CAISO will set the greenhouse gas

bid price to the daily maximum greenhouse gas cost. If an EIM participating resource submits a MW quantity, but fails to submit a greenhouse gas bid price, the CAISO will reject the bid.

As discussed in the July 15 filing, the CAISO calculates a daily maximum greenhouse gas cost in a similar manner to that in which the CAISO calculates greenhouse gas costs as part of default energy bids and commitment costs for resources inside the CAISO balancing authority area. Because all of the output of a resource inside the CAISO is subject to California's greenhouse gas regulations, there is no provision for CAISO resources to submit a separate greenhouse gas cost bid adder. Rather, the cost of compliance is integrated with the resource's energy bid. However, when calculating a resource's default energy bid, the CAISO accounts for fuel costs and greenhouse gas regulation compliance as separate cost components The CAISO calculates separate greenhouse gas compliance costs for each MW segment of a CAISO resource's default energy bid, and for a resources minimum load and start-up costs. The CAISO estimates greenhouse gas compliance costs based on the marginal greenhouse gas emissions of the resource, based the resource's incremental heat rate, the greenhouse gas emission rate per unit of fuel, and index prices for of greenhouse gas "allowances".[14] Generators separately purchase greenhouse gas allowances to comply with the greenhouse gas regulations.

In the July 15 tariff amendment, the CAISO proposed to base the daily maximum greenhouse gas cost on an EIM participating resource's maximum heat rate, as registered with the CAISO, a daily index of greenhouse gas allowance price, and the resource's greenhouse gas emission rate. The CAISO estimates the greenhouse gas allowance price using published price indices. As discussed *infra*, an EIM resource's actual greenhouse gas costs can exceed the daily maximum greenhouse gas cost estimated by the CAISO. That is why the CAISO proposed a 10 percent bid adder. The CAISO also noted that an EIM participating resource can negotiate a greenhouse gas emissions cost with the CAISO. For bids at EIM external interties, the CAISO proposed to calculate the maximum cost as the carbon dioxide equivalent emission rate of the resource

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[14] *See* http://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Market%20Instruments, page K-2.

with the highest such rate in the WECC region and the applicable greenhouse gas allowance price.

### B. Commission Questions Regarding Greenhouse Gas Adder.

*CAISO states that allowing EIM participating resources to bid up to each unit's maximum greenhouse gas compliance cost plus 10 percent increases flexibility and will enhance, rather than deter, EIM Transfers into California.*

As initially explained, the CAISO determines the maximum greenhouse gas compliance cost for EIM participating resources based on three possible formulations.[15] The result of any three formulations represents only an estimate of actual maximum compliance costs. The amount of costs resulting from that CAISO calculation may not reflect the actual maximum costs that an EIM participating resource may incur to comply with GHG requirements. They may incur greater costs. Accordingly, the CAISO also proposed a 10 percent margin above the estimated cost of compliance to account for cost uncertainty and mitigate the risk that the CAISO's estimate could result in an under recovery of the EIM participating resources actual compliance costs. The CAISO's calculated bid adder cap creates a ceiling for resources to bid to recover greenhouse gas compliance costs. The CAISO's proposal provides them with a modest opportunity to recover those potential costs in their bids, similar to the manner in which the Commission has permitted other cost uncertainties to be accounted for in relatively small bid adders.

*a. Please explain why it is appropriate to allow participating resources to bid more than their greenhouse gas compliance cost.*

The CAISO believes it can best answer the Commission's question by dividing it into two sub-questions: (1) why is it appropriate to use a calculated maximum compliance cost to set a maximum bid adder, as opposed to a compliance cost calculated based on a resource's actual emissions rate at the time it is dispatched to serve California load; and (2) why is it appropriate to include a 10 percent adder? As discussed below, it is just and reasonable to allow an EIM participating resource to submit a greenhouse compliance cost up to its calculated maximum compliance cost because its greenhouse gas emission rate when dispatched to serve load in the CAISO may not correspond to the actual emission rate on which its compliance obligation is based. Also, as discussed below, the 10 percent adder is just and reasonable because it allows for costs that may not be captured in the CAISO's estimation of greenhouse gas

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15 *See* proposed CAISO Tariff section 29.32(a)(3).

compliance costs and provides comparable treatment to resources located within the CAISO.

*Maximum compliance cost.*

California greenhouse regulations determine the amount of greenhouse gas allowances a resource must annually submit. This compliance requirement is determined retrospectively using the resource's annual emissions and production in MWh over each year.[16] As a general matter, emissions will vary according to the amount of fuel actually burned. The amount of fuel burned per MWh of production, which is the resource's heat rate, will vary according to its actual operational level (percentage of maximum capacity). Because the California greenhouse gas regulations calculate resources' emissions rates retrospectively each year, the emission rate they calculate equates to an average emission over the units various operating levels over the year.

California's greenhouse gas regulations apply to first deliverers of electricity—*i.e.,* the owner or operator of an electricity generating facility in California or an electricity importer.[17] Resources subject to California's greenhouse gas regulations that are located within the CAISO balancing authority area have a compliance obligation irrespective of whether the CAISO dispatches them to serve CAISO load or to support an EIM transfer to serve load in another EIM entity's balancing authority area.

As described above, the CAISO determines greenhouse gas compliance costs for resources within the CAISO which are incorporated into bid caps that vary with a resources output level. Resources within the CAISO can consequently incorporate their greenhouse gas compliance costs, which vary with output level, into their energy bids that also vary with output level. As described above, the amount of greenhouse gas allowances a resource must submit under the greenhouse gas regulations is determined by the California Air Resources Board at the end of each year based on a resource's overall output over the year. Because all of the output of a resource located within the CAISO is subject to the greenhouse gas regulations, all of its output in a particular market interval is incorporated into the calculation of its annual emissions and its greenhouse gas compliance obligation. Consequently, its incremental emissions at its various output levels in each market interval over a year are incorporated

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[16] California Code of Regulations Title 17, Division 3, Chapter 1, Subchapter 10, Article 2, § 25111.

[17] California Code of Regulations Title 17, Division 3, Chapter 1, Subchapter 10, § 958111(b).

into its annual emissions on which its greenhouse gas compliance obligation is based.

In contrast, an EIM participating resource must submit greenhouse gas allowances only to the degree that the CAISO actually dispatches it to serve load in the CAISO balancing authority area in a given market interval. However, its emission rate used for calculating its greenhouse gas compliance obligation may not correspond to its incremental heat rate when it is supporting an EIM transfer. The calculated daily maximum compliance cost is only an estimate of the maximum cost of the necessary compliance instruments, under an *assumed* index cost. The calculation of the daily maximum greenhouse gas cost for an EIM participating resource is equivalent to the highest heat rate point on an ISO resources default energy bid curve. The ISO is applying the same rule to calculate each of the points of the GHG cost curve; however, for EIM participating resource this is a single value for the curve because for the reasons discussed above.

For a simple example, assume an EIM participating resource has a total annual production of 100,000 MWh. During the course of the year, the CAISO dispatches 50,000 MWh to serve California load, during which time the unit is at an operating level with an 8 mmBTU/MWh heat rate. Assume that this would produce a greenhouse gas bid adder cap of $10/MWh. While producing the other 50,000 MWh, the resource is operating at a less efficient operating level with a 12 mmBTU/MWh heat rate. This results in an average 10 mmBTU/MWh heat rate over the year, which would equate to $12.50/MWh greenhouse gas compliance cost and is the basis for calculating the resources emission rate for determining the number of greenhouse gas allowances it must submit for its transfers to California. This is a greater cost than the $10/MWh based on the heat rate for the operating level when it was serving California load.

Thus, the greenhouse gas compliance costs calculated by the CAISO based on the heat rate for an EIM participating resource's operating level in any single market interval when it is dispatched to serve California load may not reflect resources' actual the compliance costs on which its annual greenhouse gas compliance obligation is based. This possibility could expose the EIM participating resource to a risk that its actual compliance costs may not be covered by a cost determined by the CAISO according to its heat rate curve. Because it would be unjust and unreasonable to deprive the EIM participating resource of the ability to recover as close as possible to its actual compliance costs, the CAISO proposed to base the daily maximum compliance cost on a resource's maximum heat rate. This allows the EIM participating resource scheduling coordinator the ability to submit a greenhouse gas cost adder that it concludes is reflective of a resource's actual greenhouse gas compliance costs.

*10 percent adder.*

As discussed above, for the purposes of the maximum greenhouse gas bid adder the CAISO determines maximum greenhouse gas costs as the product of the maximum heat rate increment on the EIM participating resource's heat rate curve, the resource's emission factor, and the daily index of the greenhouse gas compliance instruments. The maximum daily compliance cost determined by the CAISO is only an estimate of the maximum cost of the necessary compliance instruments, using an *assumed* index cost. For example, this calculation does not take into account incidental costs of compliance such as developing and maintaining a compliance and monitoring program to adhere to the regulations. California's GHG regulations reflect a significant program that requires participating resource scheduling coordinators to undertake initial and ongoing compliance obligations and remain informed on any program changes that the California Air Resources Board adopts affecting electricity importers.

Sellers also face the risk that the actual cost of compliance instruments will vary from the index cost used by the CAISO to determine the maximum compliance cost on the day when a resource is dispatched. The actual surrendering of GHG compliance instruments can be many months later than the day the EIM participating resource submits its bid, thus leaving them with significant price risk if the procurement of compliance instruments occurs later than the resource is dispatched. A participating resource scheduling coordinator may need to secure a compliance instrument at a cost that exceeds the daily index used by the CAISO to calculate the maximum GHG bid adder. Thus, an adder is necessary to account for the uncertainty facing EIM participating resources because they will not know the exact portion of their energy deemed delivered to serve CAISO load until the EIM participating resource scheduling coordinator receives the market results from an individual dispatch. This fact could result in the EIM participating resource scheduling coordinators needing to obtain compliance instruments after the fact and potentially needing to pay more than the index price the CAISO used to set the maximum GHG bid adder price associated with a specific dispatch. Under similar circumstances, *e.g..,* in connection with the CAISO's calculation of default energy bids, the Commission has concluded that a 10 percent adder is just and reasonable and presents market participants with a reasonable opportunity to recover their costs[18] The CAISO's proposal is consistent with that ruling. It is necessary to address inherent cost uncertainty, provide a reasonable opportunity for EIM resources to recover their actual costs, and avoid a potentially confiscatory rate.

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[18] *See Cal. Indep. Sys. Operator Corp.*, 116 FERC ¶ 61,274 at PP 1045 - 1046 (2006). *See also*, *Cal. Indep. Sys. Operator Corp.*, 142 FERC ¶ 61,191 (March 2013) at P 29.

It is important to note, however, one distinction from the default energy bid process that makes the 10% even more appropriate here. The default energy bid ensures that a resource recovers its costs. The cap on bid adders for EIM participating resources does not. There is no *ex post* process to "make-whole" EIM resources for the actual greenhouse gas compliance costs they occur. The bid adder only provides an opportunity to recover those costs. Although the cap appropriately ties the bid adder to the compliance costs, it must be high enough to provide a reasonable opportunity for cost recovery. For the reasons described above, the 10% adder is necessary for this purpose.

*b. What flexibility is provided by allowing resources to bid above their greenhouse gas costs and how does this flexibility benefit the market?*

The CAISO believes that the proposed flexibility is more accurately described as providing EIM participating resources with a reasonable opportunity to recover their actual greenhouse gas compliance costs. As indicated above, the daily maximum greenhouse gas compliance costs that the CAISO calculates is really only an estimate of the maximum cost of compliance instruments and does not reflect other greenhouse gas-related costs an EIM participating resource may incur. The CAISO's proposal recognizes this fact. As explained above, an EIM participating resource will not know its actual greenhouse gas compliance costs prior to dispatch and therefore cannot be assured of recovering them in its bid. The proposed "flexibility" simply allows the EIM participating resource to bid an amount, up to an amount slightly above (*i.e.*, 10 percent) CAISO-calculated estimated daily maximum greenhouse gas compliance cost that the EIM participating resource believes will provide a reasonable opportunity to recover its actual costs.

Absent that ability, an EIM participating resource scheduling coordinator that has concerns about fully recovering its greenhouse gas compliance costs may elect not make its resources available for delivery to the CAISO by selecting a zero MW quantity as available for dispatch to serve load within the CAISO. This outcome would decrease market efficiency and liquidity by reducing the pool of resources to support an EIM transfer to the CAISO. Because all EIM participating resources compete solely on the greenhouse gas bid price for purposes of determining which resources are is delivered to the CAISO, a reduction in liquidity because resources opt out could reduce the incentive for EIM participating resources to bid their expected actual costs, which may be lower than the estimated maximum compliance cost.

Because all EIM participating resources across the entire EIM area are eligible to be deemed delivered to the CAISO and the greenhouse gas payment is based upon the marginal greenhouse gas bid adder, the CAISO expects the market to be highly competitive. EIM participating resources that wish to remain competitive should have an incentive to bid as close as possible to their actual

compliance cost. To the extent resources bid above their estimated costs and are accepted in the optimization, the level of the adder limits the impact.

*c. Please explain why it is necessary to allow resources to change the greenhouse gas adder hourly rather than daily.*

To the maximum extent possible, the CAISO desires to treat CAISO internal resources, CAISO imports on an EIM external intertie, and EIM participating resources similarly. In the first two cases, the resource's greenhouse gas compliance cost is included in its energy bid, and may change hourly. It is appropriate to provide EIM participating resource scheduling coordinators the same flexibility. This will ensure a more level playing field and avoid any potential for undue discrimination. Because the CAISO already allows internal resources to change their greenhouse gas bids hourly, allowing EIM participating resources to do the same does not create any new or unforeseen issues.

## IV. Response to Southern California Edison Comments

Southern California Edison Company ("SoCal Edison") submitted comments regarding the greenhouse gas provisions in the June 15 tariff amendment filing on the date noticed for comments on the June 25 errata. In light of the Commission's July 30 letter, the CAISO is responding to those comments through this amendment.

SoCal Edison asserts that anything beyond a simple yes/no flag goes beyond compliance with the Commission's directive. SoCal Edison states that if a generator is willing to be subject to possible greenhouse gas compliance, there is no reason to allow it to limit the amount it is willing to sell to California. SoCal Edison is concerned that the CAISO proposal could lead to market inefficiencies.[19]

SoCal Edison's concern about potential market inefficiencies from allowing an EIM participating resource scheduling coordinator to change each hour the amount of energy it is willing to sell to California is misplaced. This argument fails to recognize that, under the current tariff, a market participant importing energy into California from a non-EIM balancing authority area already can decide what quantity of energy it is willing to offer as an import to the ISO for each hour. The CAISO has not identified any market efficiencies that have resulted from this, and SoCal Edison points to none.

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[19] SoCal Edison at 3.

SoCal Edison argues that reasons that the CAISO provided at a stakeholder meeting for rejecting a flag—multiple ownership of a resource when one owner does not want to comply with California's GHG regulations and the requirement of some renewable resources may have a requirement to serve a state's native load—do not justify the CAISO's proposal. With respect to the first, SoCal Edison states that in the case of multiple ownership, the party willing to sell into California can agree to be responsible for greenhouse gas compliance.[20] This solution, however, would put the burden on a generation owner to bear greenhouse gas compliance costs in connection with energy for which it receives no compensation. This is not just and reasonable.

Regarding the second reason, SoCal Edison argues that having a varying quantity to sell to California does not achieve the objective of ensuring that the generator is serving its native load. According to SoCal Edison, if there is a requirement to serve native load, then there needs to be an option to prevent sales into to all other balancing authority areas, such as PacifiCorp East to PacifiCorp West or Nevada Energy, not just the CAISO. The flaw with this argument is that the CAISO's systems do not identify where energy from a specific resource sinks except for greenhouse gas compliance purposes, *i.e.,* unless it is deemed delivered to California. Thus, only in the case of deliveries to California could a case be made that a resource is not fulfilling its native load obligations. EIM participating resources must be able to vary the amount eligible for export to California on an hourly basis so they can meet their obligations to serve native load, which also varies hourly.

## V. Attachments

Attachment A: Clean Tariff Records

Attachment B: Marked Tariff Records

Attachment C: August 11, 2015 Conference Presentation

Attachment D: Market Simulation Scenario

Attachment E: CAISO E-Tag Operating Procedure

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20 Id.

## VI. Conclusion

For the reasons set forth in this filing, the CAISO respectfully requests that the Commission accept the proposed tariff revisions, as amended by this letter, effective October 27, 2015, and issue an order by October 21, 2015 as requested.

Respectfully submitted,

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**Attachment A – Clean Tariff Records**

**Deficiency Response: Energy Imbalance Market Year One Enhancements – Phase 1**

**California Independent System Operator Corporation**

**29.17 EIM Transmission System.**

* * *

(f) **EIM Transfer Availability.**

(1) **In General.** The ISO will model individual constraints for each EIM Transfer limit submitted by each EIM Entity that makes transmission available on an EIM Internal Intertie.

(2) **Use of Interchange Transmission Rights.** The EIM Entity Scheduling Coordinator shall determine the EIM Transfer limit made available for use in the Real-Time Market through interchange transmission rights and communicate that limit to the CAISO prior to the start of the next Dispatch Interval in accordance with the procedures and timelines for submission and acceptance in the Business Practice Manual for the Energy Imbalance Market.

(3) **Use of Available Transfer Capability.** The EIM Entity Scheduling Coordinator shall determine the EIM Transfer limit made available to the Real-Time Market through available transfer capability in accordance with its tariff and communicate that limit to the CAISO prior to the start of the next Dispatch Interval in accordance with the procedures and timelines for submission and acceptance in the Business Practice Manual for the Energy Imbalance Market.

(4) **Multiple EIM Transfer Limits.** If there are two or more EIM Entity Balancing Authority Areas that share the same EIM Internal Intertie, the CAISO's Security Constrained Economic Dispatch in the Real-Time Unit Commitment and Real-Time Dispatch will enforce the individual EIM Transfer limit for each EIM Entity Balancing Authority Area while allowing Energy to wheel through the EIM Entity Balancing Authority Areas based on the transmission made available for use in the Real-Time Market.

(5) **EIM Transfers and CAISO Scheduling Points.** EIM Transfers shall compete for Available Transfer Capability at interties that are an EIM Internal Intertie and a CAISO Scheduling Point.

(6) **EIM Transfer Limit Constraints.** The CAISO's Security Constrained Economic Dispatch in the Real-Time Unit Commitment and Real-Time Dispatch shall enforce the EIM Transfer limit and the associated physical limit at each EIM Internal Intertie.

(g) **EIM Transfer Schedule Cost.**

(1) **In General.** The CAISO's Security Constrained Economic Dispatch in the Fifteen Minute Market and Real-Time Dispatch shall use an EIM Transfer schedule cost associated with EIM Transfers at each EIM Internal Intertie to determine the optimal scheduling path for EIM Transfers, which in all intervals shall be less than $0.01.

(2) **Objectives.** The CAISO shall use the lowest EIM Transfer schedule cost determined based upon the objectives of—

(A) maximizing the use of the transmission capacity made available for EIM Transfers in both the Fifteen-Minute Market and Real-Time Dispatch;

(B) minimizing the number of E-Tags required to comply with the WECC scheduling practices; and

(C) minimizing the impact of outages or curtailments on the E-Tags used to account for EIM Transfers based on historical outage and curtailment data for each EIM Internal Intertie.

(3) **EIM Transfer Schedule Cost Publication.** The CAISO will publish the EIM Transfer schedule cost associated with each EIM Internal Intertie in the Business Practice Manual for the Energy Imbalance Market.

(4) **EIM Transfer Schedule Cost Adjustment.** The CAISO may adjust the EIM Transfer schedule costs to maintain the path priorities established by the criteria in Section 29.17(g)(2) when an EIM Entity Balancing Authority Area is added or subtracted from the EIM Area, as seasonal transmission system ratings change, or the transmission system topology changes.

(5) **Locational Marginal Price.** The CAISO will reflect the EIM Transfer schedule cost in the Marginal Cost of Congestion.

* * *

## Appendix C

## Locational Marginal Price

The CAISO shall calculate the price of Energy at Generation PNodes, Scheduling Points, and Aggregated Pricing Nodes, as provided in the CAISO Tariff. LMPs can be set by Bids to sell or purchase Energy. The CAISO establishes Trading Hub prices and LAPs as provided in the CAISO Tariff. The LMPs at PNodes, including Scheduling Points, and Aggregated Pricing Nodes include separate components for the marginal cost of Energy, Marginal Cost of Congestion, and Marginal Cost of Losses. As provided in Sections 6.5.3.2.2 and 6.5.5.2.4, Day-Ahead Market LMPs are calculated and posted on a Day-Ahead basis for each hour of the Day-Ahead Market for Energy and for each Dispatch Interval for the Real-Time LMPs.

### A. LMP Composition

In each hour of the Day-Ahead Market for Energy, the CAISO calculates the LMP for each PNode, which is equal to the marginal cost of Energy available at the PNode in the hour, based on the Bids of sellers and buyers selected in the Day-Ahead Market for Energy as specified in the Day-Ahead Schedule. The CAISO designates a Reference Bus, r, for calculation of the System Marginal Energy Cost (SMECr). The CAISO uses a distributed Reference Bus to define an aggregate value of Energy for the CAISO Balancing Authority Area. The Locational Marginal Prices are not determined by resources that are not eligible to set the Locational Marginal Price, which includes resources that have constraints that prevent them from being marginal. For each bus other than the Reference Bus, the Transmission Provider determines separate components of the LMP for the marginal cost of Energy, Marginal Cost of Congestion, and Marginal Cost of Losses relative to the Reference Bus, consistent with the following equation:

$LMP_i = SMEC_r + MCC_i + MCL_i$

$LMP_r = SMEC_r$

where:

- $SMEC_r$ is the LMP component representing the marginal cost of Energy (also referred to as λ) at the Reference Bus, r (System Marginal Energy Cost).
- $MCC_i$ is the LMP component representing the Marginal Cost of Congestion (also referred to as $\rho$) at bus *i* relative to the Reference Bus; which also reflects any EIM Transfer schedule costs applied pursuant to Section 29.17(g).
- $MCL_i$ is the LMP component representing the Marginal Cost of Losses (also referred to as $\gamma$) at bus *i* relative to the Reference Bus.

For each PNode within an EIM Entity Balancing Authority Area, the LMP shall include a fourth component, the EIM Bid Adder component.

* * *

**C. Marginal Congestion Component Calculation**

The CAISO calculates the Marginal Costs of Congestion at each bus as a component of the bus-level LMP; and also reflects any EIM Transfer schedule costs applied pursuant to Section 29.17(g). The Marginal Cost of Congestion (MCCi) component of the LMP at bus i is calculated using the equation:

$$MCC_i = -\left(\sum_{k=1}^{k} PTDF_{ik} * FSP_k\right)$$

where:

- *K* is the number of thermal or interface Transmission Constraints.

$PTDF_{ik}$ is the Power Transfer Distribution Factor for the generator at bus *i* on interface *k* which limits flows across that constraint when an increment of power is injected at bus *i* and an equivalent amount of power is withdrawn at the Reference Bus. The industry convention is to ignore the effect of losses in the determination of PTDFs.

- FSPk is the constraint Shadow Price on interface *k* and is equivalent to the reduction in system cost expressed in $/MWh that results from an increase of 1MW of the capacity on interface *k*.

The Shadow Price at a given binding Transmission Constraint is the value per MW of the next increment of generation that would flow across the constrained path by relaxing the binding Transmission Constraint. The PTDF of a PNode with respect to a transmission path (and direction on the path) measures the change in the power flow through the path (positive or negative, with respect to the designated direction on the path) as a result of an incremental injection at the Node, balanced by incremental change of Load at the Reference Bus.

* * *

**Attachment B – Marked Tariff Records**

**Deficiency Response: Energy Imbalance Market Year One Enhancements – Phase 1**

**California Independent System Operator Corporation**

**29.17 EIM Transmission System.**

* * *

(f) **EIM Transfer Availability.**

(1) **In General.** The ISO will model individual constraints for each EIM Transfer limit submitted by each EIM Entity that makes transmission available on an EIM Internal Intertie.

(2) **Use of Interchange Transmission Rights.** The EIM Entity Scheduling Coordinator shall determine the EIM Transfer limit made available for use in the Real-Time Market through interchange transmission rights and communicate that limit to the CAISO prior to the start of the next Dispatch Interval in accordance with the procedures and timelines for submission and acceptance in the Business Practice Manual for the Energy Imbalance Market.

(3) **Use of Available Transfer Capability.** The EIM Entity Scheduling Coordinator shall determine the EIM Transfer limit made available to the Real-Time Market through available transfer capability in accordance with its tariff and communicate that limit to the CAISO prior to the start of the next Dispatch Interval in accordance with the procedures and timelines for submission and acceptance in the Business Practice Manual for the Energy Imbalance Market.

(4) **Multiple EIM Transfer Limits.** If there are two or more EIM Entity Balancing Authority Areas that share the same EIM Internal Intertie, the CAISO's Security Constrained Economic Dispatch in the Real-Time Unit Commitment and Real-Time Dispatch will enforce the individual EIM Transfer limit for each EIM Entity Balancing Authority Area while allowing Energy to wheel through the EIM Entity Balancing Authority Areas based on the transmission made available for use in the Real-Time Market.

(5) **EIM Transfers and CAISO Scheduling Points.** EIM Transfers shall compete for Available Transfer Capability at interties that are an EIM Internal Intertie and a CAISO Scheduling Point.

(6) **EIM Transfer Limit Constraints.** The CAISO's Security Constrained Economic Dispatch in the Real-Time Unit Commitment and Real-Time Dispatch shall enforce the EIM Transfer limit and the associated physical limit at each EIM Internal Intertie.

(g) **EIM Transfer Schedule Cost.**

(1) **In General.** The CAISO's Security Constrained Economic Dispatch in the Fifteen Minute Market ~~Real-Time Unit Commitment~~ and Real-Time Dispatch shall use ~~include~~ an EIM Transfer schedule cost associated with EIM Transfers at each EIM Internal Intertie to determine the optimal scheduling path for EIM Transfers, which in all intervals shall be less than $0.01~~, not to exceed $0.10~~.

(2) **Objectives.** The CAISO shall use the lowest EIM Transfer schedule cost determined based upon the objectives of—

(A) maximizing the use of the transmission capacity made available for EIM Transfers in both the Fifteen-Minute Market and Real-Time Dispatch;

(B) minimizing the number of E-Tags required to comply with the WECC scheduling practices; and

(C) minimizing the impact of outages or curtailments on the E-Tags used to account for EIM Transfers based on historical outage and curtailment data for each EIM Internal Intertie.

(3) **EIM Transfer Schedule Cost Publication.** The CAISO will publish the EIM Transfer schedule cost associated with each EIM Internal Intertie in the Business Practice Manual for the Energy Imbalance Market.

(4) **EIM Transfer Schedule Cost Adjustment.** The CAISO may adjust the EIM Transfer schedule costs to maintain the path priorities established by the criteria in Section 29.17(g)(2) when an EIM Entity Balancing Authority Area is added or subtracted from the EIM Area, as seasonal transmission system ratings change, or the transmission system topology changes.

(5) **Locational Marginal Price.** The CAISO will reflect the EIM Transfer schedule cost in the Marginal Cost of Congestion.

**[NOTE: The marked revisions to Section 29.17 above are only those proposed in this filing; the revisions proposed in the June 15th filing are shown as clean underlying text, rather than marked changes.]**

* * *

## Appendix C

## Locational Marginal Price

The CAISO shall calculate the price of Energy at Generation PNodes, Scheduling Points, and Aggregated Pricing Nodes, as provided in the CAISO Tariff. LMPs can be set by Bids to sell or purchase Energy. The CAISO establishes Trading Hub prices and LAPs as provided in the CAISO Tariff. The LMPs at PNodes, including Scheduling Points, and Aggregated Pricing Nodes include separate components for the marginal cost of Energy, Marginal Cost of Congestion, and Marginal Cost of Losses. As provided in Sections 6.5.3.2.2 and 6.5.5.2.4, Day-Ahead Market LMPs are calculated and posted on a Day-Ahead basis for each hour of the Day-Ahead Market for Energy and for each Dispatch Interval for the Real-Time LMPs.

### A. LMP Composition

In each hour of the Day-Ahead Market for Energy, the CAISO calculates the LMP for each PNode, which is equal to the marginal cost of Energy available at the PNode in the hour, based on the Bids of sellers and buyers selected in the Day-Ahead Market for Energy as specified in the Day-Ahead Schedule. The CAISO designates a Reference Bus, r, for calculation of the System Marginal Energy Cost (SMECr). The CAISO uses a distributed Reference Bus to define an aggregate value of Energy for the CAISO Balancing Authority Area. The Locational Marginal Prices are not determined by resources that are not eligible to set the Locational Marginal Price, which includes resources that have constraints that prevent them from being marginal. For each bus other than the Reference Bus, the Transmission Provider

determines separate components of the LMP for the marginal cost of Energy, Marginal Cost of Congestion, and Marginal Cost of Losses relative to the Reference Bus, consistent with the following equation:

$LMP_i = SMEC_r + MCC_i + MCL_i$

$LMP_r = SMEC_r$

where:

- $SMEC_r$ is the LMP component representing the marginal cost of Energy (also referred to as λ) at the Reference Bus, r (System Marginal Energy Cost).
- $MCC_i$ is the LMP component representing the Marginal Cost of Congestion (also referred to as $\rho$) at bus $i$ relative to the Reference Bus; which also reflects any EIM Transfer schedule costs applied pursuant to Section 29.17(g).
- $MCL_i$ is the LMP component representing the Marginal Cost of Losses (also referred to as $\gamma$) at bus $i$ relative to the Reference Bus.

For each PNode within an EIM Entity Balancing Authority Area, the LMP shall include a fourth component, the EIM Bid Adder component.

* * *

**C. Marginal Congestion Component Calculation**

The CAISO calculates the Marginal Costs of Congestion at each bus as a component of the bus-level LMP; and also reflects any EIM Transfer schedule costs applied pursuant to Section 29.17(g). The Marginal Cost of Congestion (MCCi) component of the LMP at bus i is calculated using the equation:

$$MCC_i = -\left(\sum_{k=1}^{k} PTDF_{ik} * FSP_k\right)$$

where:

- $K$ is the number of thermal or interface Transmission Constraints.

PTDF*ik* is the Power Transfer Distribution Factor for the generator at bus *i* on interface *k* which limits flows across that constraint when an increment of power is injected at bus *i* and an equivalent amount of power is withdrawn at the Reference Bus. The industry convention is to ignore the effect of losses in the determination of PTDFs.

- FSPk is the constraint Shadow Price on interface *k* and is equivalent to the reduction in system cost expressed in $/MWh that results from an increase of 1MW of the capacity on interface *k*.

The Shadow Price at a given binding Transmission Constraint is the value per MW of the next increment of generation that would flow across the constrained path by relaxing the binding Transmission Constraint. The PTDF of a PNode with respect to a transmission path (and direction on the path) measures the change in the power flow through the path (positive or negative, with respect to the designated direction on the path) as a result of an incremental injection at the Node, balanced by incremental change of Load at the Reference Bus.

* * *

**Attachment C – FERC Technical Conference Presentation**

**Deficiency Response: Energy Imbalance Market Year One Enhancements – Phase 1**

**California Independent System Operator Corporation**

# Proposed EIM transfer cost and GHG bid adder

Don Tretheway
Senior Advisor, Market Design and Regulatory Policy

George Angelidis
Principal, Power Systems Technology Development

FERC Conference
August 11, 2015

# Concepts relevant to account for net energy interchange between BAAs participating in the EIM

- EIM transfer
  - Positive for export and negative for import

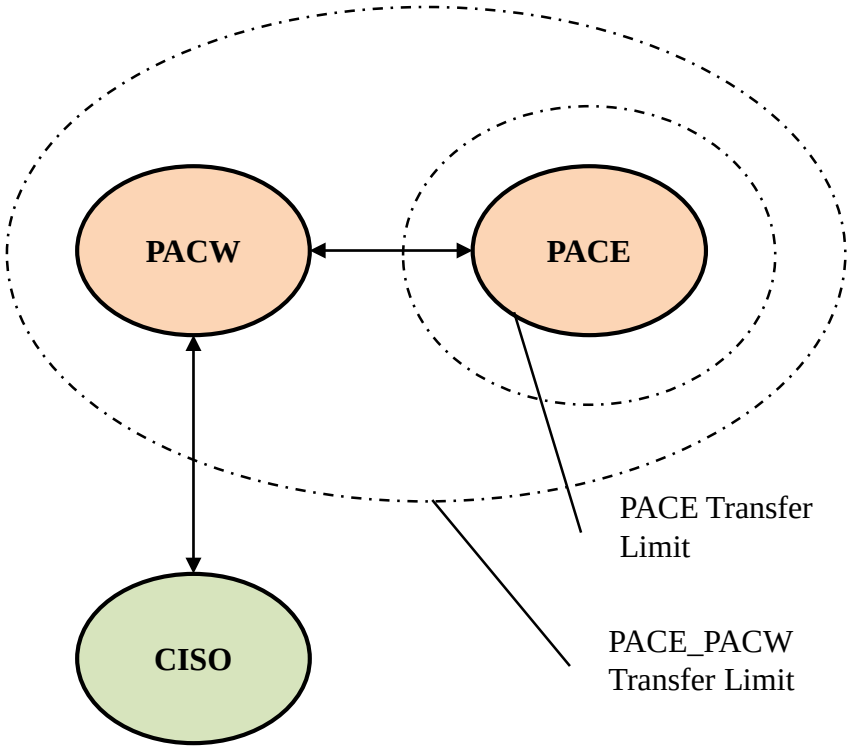
- Energy transfer schedule
  - The assignment of an EIM transfer to an intertie for tagging purposes
  - Separate for import and export, modeled by energy transfer system resources

# Energy transfers calculated by the market optimization are used for energy accounting purposes via e-tags

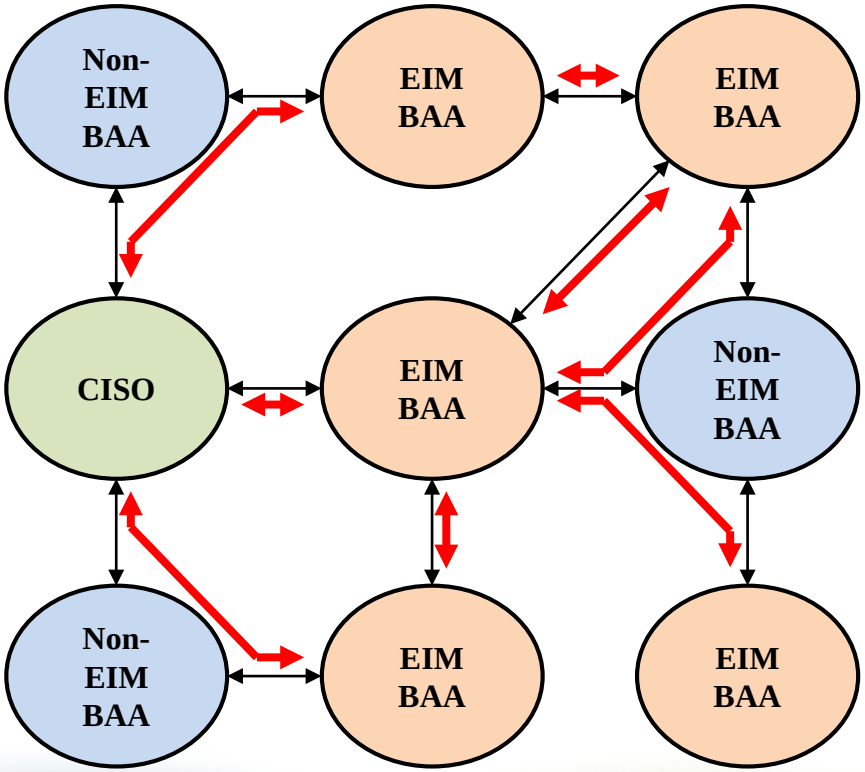
- Intertie schedules must be accounted for via an e-tag to comply with WECC scheduling practices
- E-tags are required for energy transfers between BAAs
- E-tags associated with energy transfers can be static or dynamic, and they are separate for imports and exports
  - Static e-tags are currently used only to account for energy transfers in FMM between PACW and CISO through BPAT

# Need to transition from EIM transfer constraints by BAA group to individual energy transfer schedule limits

EIM transfer constraints by BAA group (current)




EIM transfer constraints using energy transfer schedule limits (future)



# Achieving an optimal scheduling path enhances efficiency of tagging requirements

- Direct paths, which minimize the number of e-Tags that must be updated, are more optimal than indirect paths
- Paths that allow both FMM and RTD schedule changes, versus paths that only allow FMM or RTD schedule changes, are more optimal
- Paths with less frequent curtailments or outages are more optimal than paths with more-frequent outages

# EIM transfer cost

- A small cost parameter that the market software assigned to each energy transfer schedule that the market optimization to select the most optimal paths
- The CAISO, as the market operator, in consultation with the EIM entity would determine the path priority
- More optimal paths will have a lower cost parameter relative to less optimal paths

# EIM transfer cost ensures that the market optimization calculates a unique and efficient solution

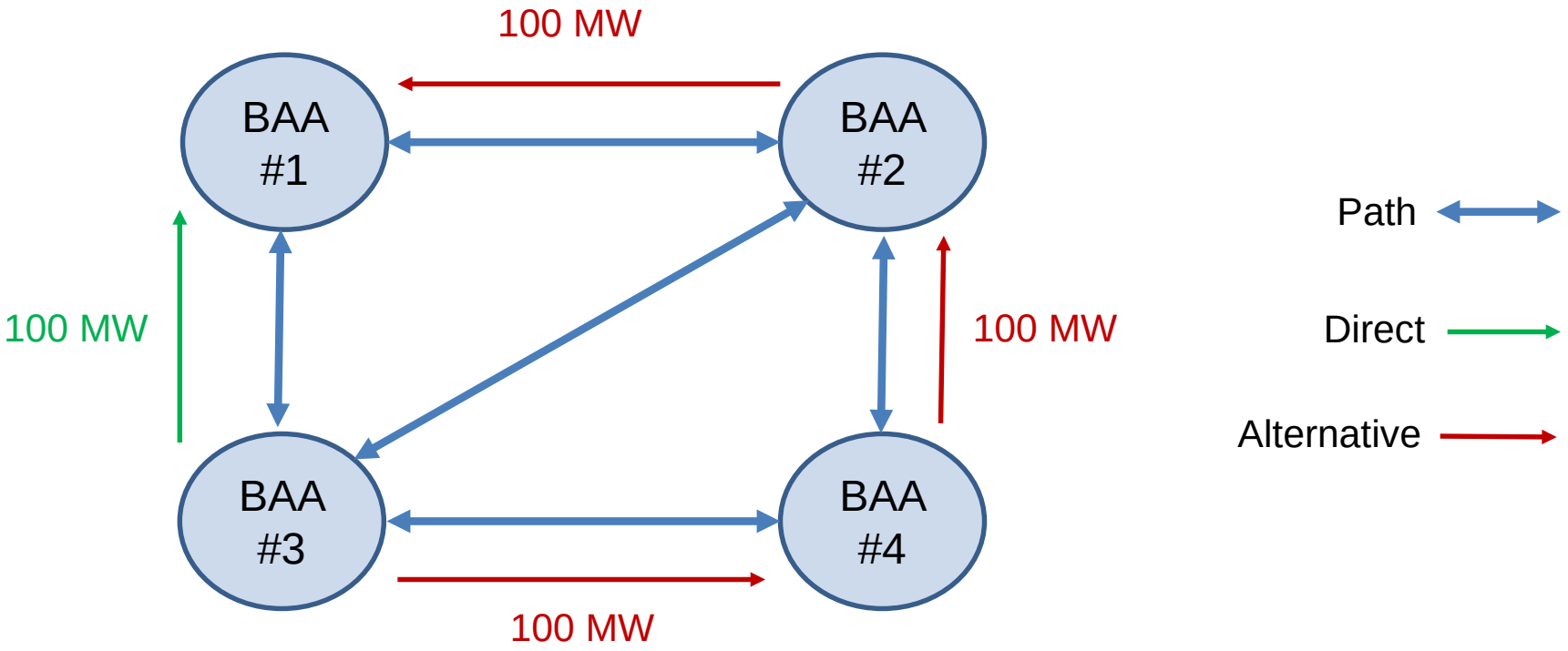
- EIM dispatches resources optimally using bids resulting in real-time energy flows among BAAs in EIM area
- EIM transfers may use available transmission capability or transmission rights made available by an EIM entity
- CAISO does not settle EIM transfers as an explicit import or export for a BAA because the settlement is with the resources within that BAA
- Without EIM transfer costs, the optimization could result in different random transfer patterns across intervals

# EIM transfer cost is sufficiently small to not alter the flow-based dispatch or settlement of EIM participating resources

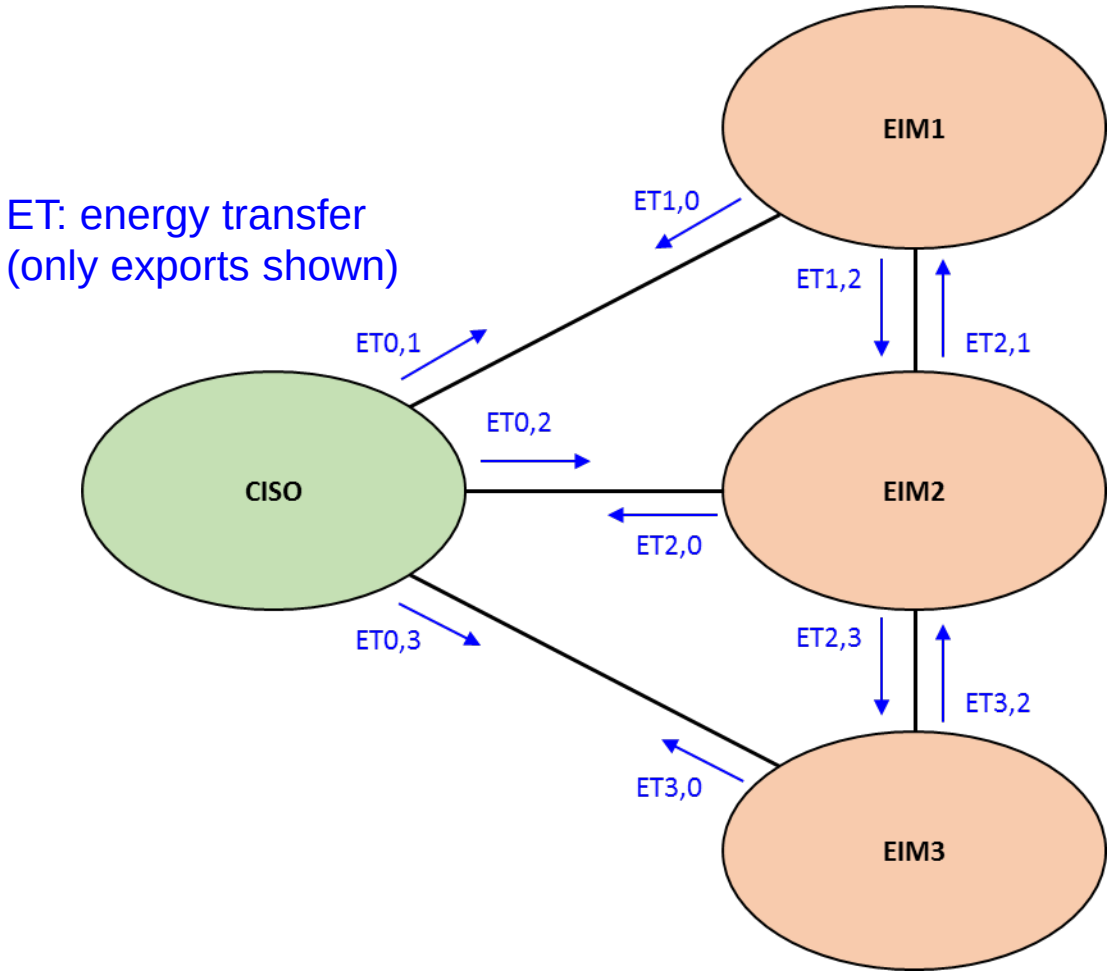
- Distribution of the EIM transfer cost over the available intertie paths should not affect dispatch
- Energy transfer limits are not physical flow limits, but scheduling limits
- Market operator uses net EIM transfers to adjust neutrality cost allocation among the BAAs in the EIM area

EIM transfer cost should not be a material component of the LMP

# The EIM transfer cost will select optimal path to schedule EIM transfers



# EIM transfer cost will allow the market operator to determine the optimal path for e-tag energy accounting



# Adding a small EIM transfer cost on each intertie is sufficient to yield the following unique efficient solution

| BAA | Resource | Min | Schedule | Max | Bid |
|---|---|---|---|---|---|
| CISO | G0 | 0 | 1400 | 1500 | $ 40 |
| | L0 | | 1000 | | |
| | T0 | | 400 | | |
| | ET0,1 | 0 | 0 | 200 | $ - |
| | IT0,1 | 0 | 200 | 300 | $ - |
| | ET0,2 | 0 | 100 | 100 | $ - |
| | IT0,2 | 0 | 0 | 100 | $ - |
| | ET0,3 | 0 | 500 | 550 | $ - |
| | IT0,3 | 0 | 0 | 500 | $ - |
| EIM1 | G1 | 0 | 700 | 700 | $ 30 |
| | L1 | | 500 | | |
| | T1 | | 200 | | |
| | ET1,0 | 0 | 200 | 300 | $ - |
| | IT1,0 | 0 | 0 | 200 | $ - |
| | ET1,2 | 0 | 0 | 0 | $ - |
| | IT1,2 | 0 | 0 | 200 | $ - |
| EIM2 | G2 | 0 | 1000 | 1000 | $ 20 |
| | L2 | | 600 | | |
| | T2 | | 400 | | |
| | ET2,0 | 0 | 0 | 100 | $ - |
| | IT2,0 | 0 | 100 | 100 | $ - |
| | ET2,1 | 0 | 0 | 200 | $ - |
| | IT2,1 | 0 | 0 | 0 | $ - |
| | ET2,3 | 0 | 500 | 550 | $ - |
| | IT2,3 | 0 | 0 | 0 | $ - |
| EIM3 | G3 | 0 | 0 | 2000 | $ 50 |
| | L3 | | 1000 | | |
| | T3 | | -1000 | | |
| | ET3,0 | 0 | 0 | 500 | $ - |
| | IT3,0 | 0 | 500 | 550 | $ - |
| | ET3,2 | 0 | 0 | 0 | $ - |
| | IT3,2 | 0 | 500 | 550 | $ - |

| BAA | Resource | Min | Schedule | Max | Bid |
|---|---|---|---|---|---|
| CISO | G0 | 0 | 1400 | 1500 | $40.0000 |
| | L0 | | 1000 | | |
| | T0 | | 400 | | |
| | ET0,1 | 0 | 0 | 200 | $0.0001 |
| | IT0,1 | 0 | 200 | 300 | $0.0001 |
| | ET0,2 | 0 | 50 | 100 | $0.0001 |
| | IT0,2 | 0 | 0 | 100 | $0.0001 |
| | ET0,3 | 0 | 550 | 550 | $0.0001 |
| | IT0,3 | 0 | 0 | 500 | $0.0001 |
| EIM1 | G1 | 0 | 700 | 700 | $30.0000 |
| | L1 | | 500 | | |
| | T1 | | 200 | | |
| | ET1,0 | 0 | 200 | 300 | $0.0001 |
| | IT1,0 | 0 | 0 | 200 | $0.0001 |
| | ET1,2 | 0 | 0 | 0 | $0.0001 |
| | IT1,2 | 0 | 0 | 200 | $0.0001 |
| EIM2 | G2 | 0 | 1000 | 1000 | $20.0000 |
| | L2 | | 600 | | |
| | T2 | | 400 | | |
| | ET2,0 | 0 | 0 | 100 | $0.0001 |
| | IT2,0 | 0 | 50 | 100 | $0.0001 |
| | ET2,1 | 0 | 0 | 200 | $0.0001 |
| | IT2,1 | 0 | 0 | 0 | $0.0001 |
| | ET2,3 | 0 | 450 | 550 | $0.0001 |
| | IT2,3 | 0 | 0 | 0 | $0.0001 |
| EIM3 | G3 | 0 | 0 | 2000 | $50.0000 |
| | L3 | | 1000 | | |
| | T3 | | -1000 | | |
| | ET3,0 | 0 | 0 | 500 | $0.0001 |
| | IT3,0 | 0 | 550 | 550 | $0.0001 |
| | ET3,2 | 0 | 0 | 0 | $0.0001 |
| | IT3,2 | 0 | 450 | 550 | $0.0001 |

# CAISO proposes to apply EIM transfer cost in both 15-min and 5-min optimizations to determine optimal transfer pattern

- Direct paths minimize the number of e-tags to be updated and are more optimal than indirect/circular paths
- Paths that allow both 15-min and 5-min schedule changes are more optimal than those that don't
- Paths with less frequent curtailments or outages are more optimal than paths with more frequent outages
- More optimal paths will have a lower cost parameter
  - The EIM transfer cost will be set to the lowest value that allows the market optimization to differentiate among path priorities

# Priorities may require adjustment based on new EIM entities, seasonally, or as topology and BAA boundaries change

- CAISO proposed the maximum EIM transfer cost of $0.10 per MWh based on initial functional testing

- CAISO will apply the lowest cost between zero and $0.10 per MWh that allows the market optimization to observe the relative priority of each path
  - The parameter cost and the path priorities will be set forth in the CAISO's business practice manuals

- CAISO has validated transfer schedules between PacifiCorp and NV Energy in structured scenarios
  - The CAISO will apply different EIM transfer costs for the two available paths to observe the optimal schedules

# EIM transfer cost can have a negligible impact on location marginal prices

| BAA | LMP |
|---|---|
| CISO | $40.00 |
| EIM1 | $40.00 |
| EIM2 | $40.00 |
| EIM3 | $40.00 |

| BAA | LMP |
|---|---|
| CISO | $40.00 |
| EIM1 | $39.99 |
| EIM2 | $40.01 |
| EIM3 | $40.02 |

- EIM transfer cost on constrained transfer does not have an impact on LMPs
- EIM transfer cost on marginal transfer to a BAA with a marginal resource does not have an impact on the LMPs in that BAA
- EIM transfer cost on marginal transfer to a BAA without a marginal resource has an impact on the LMPs in that BAA:
  - EIM transfer cost on marginal export transfer is subtracted from LMPs in the BAA; and
  - EIM transfer cost on marginal import transfer adds to LMPs in the BAA

Further questions on the EIM transfer cost proposal?

# GHG design treats EIM participating resources serving CAISO load similarly to resources within CAISO

- GHG regulations apply to first deliverers of electricity
- Resources located in the CAISO have a compliance obligation regardless of the delivery location
- EIM participating resources incur a GHG compliance obligation if dispatched to serve CAISO load
- EIM participating resources submit two bid components: (1) energy and (2) GHG compliance costs
- CAISO minimizes total bid costs to serve load both within CAISO and load outside of CAISO

# CAISO proposes to allow EIM participating resources to bid up to their maximum daily cost

- GHG bid adder covers costs of compliance plus any financial risk between the actual cost and the daily cost
  - Cost curve of the default energy bid dispatch should cover the annual emission responsibility for CAISO resources
  - EIM participating resource may be dispatched to serve imbalances outside of California without cost recovery
  - No guarantee that the resources' annual emissions will be the same as the energy deemed delivered to the CAISO
- Facilitates EIM participating resources making capacity available for dispatch to the CAISO
  - Without ensuring costs can be recovered, the resource could bid zero MW to support EIM transfers to CAISO

# An example illustrates how the GHG proposal seeks to treat similarly situated resources similarly

| | MW Quantity Offered | $1000 Bid Cap Applied | MPM Applied | DEB GHG Treatment | Limits on GHG Bidding |
|---|---|---|---|---|---|
| ISO Internal Resource | Hourly | Energy Bid | Energy Bid | Daily cost curve with 10% adder | N/A |
| ISO Import | Hourly | Energy Bid | N/A | N/A | N/A |
| EIM Participating Resource | Hourly | Energy Bid + GHG Bid | Energy Bid | N/A | Daily maximum cost with 10% adder |

Further questions on GHG bid adder proposal?

**Attachment D – Market Simulation Scenario**

**Deficiency Response: Energy Imbalance Market Year One Enhancements – Phase 1**

**California Independent System Operator Corporation**

California ISO
Shaping a Renewed Future

# Market Simulation Structured Scenarios

# Energy Imbalance Market Implementation - Nevada Energy and Energy Imbalance Market Year 1 Enhancements

**Version 1.4**

**August 13, 2015**

## Location of Document

***Link***

## Revision History

| Date | Version | Description | Author |
|---|---|---|---|
| 2/24/15 | Draft | Initial Draft | Christopher McIntosh |
| 3/25/15 | Draft | Updated with PSTD Input | Christopher McIntosh |
| 3/31/15 | Draft | Updated with Settlements Input | Christopher McIntosh |
| 3/31/15 | Draft | Ready for Internal Review | Christopher McIntosh |
| 4/16/15 | 1.0 | Initial Version | Christopher McIntosh |
| 5/5/15 | 1.1 | Additional Scenario Added | Christopher McIntosh |
| 6/16/15 | 1.2 | Split SC Actions to ISO Market Participant and EIM Market Participant and Scenario 21 Added | Christopher McIntosh |
| 7/27/15 | 1.3 | Updated with Scenario Trade Dates and Execution Times | Christopher McIntosh |
| 8/13/15 | 1.4 | Added Scenario 22, updated execution dates for scenario 12, 13, 9 and 3 | Christopher McIntosh |

# Table of Contents

# 1. Introduction

The objective of this document is to provide the information needed by the existing and new EIM entities to participate in the structured market simulation scenarios. For scope of this implementation and this initiative, please refer to the EIM 1 year enhancements imitative - External Business Requirements Specification at – (link)

# 2. Structured Scenario Approach

## 2.1 High Level Overview

These identified scenarios will be executed during the structured scenario portion of the EIM and FNM Expansion market simulation.

## 2.2 Structured Scenarios Conditions and Setup

The following additional setup will be used by the ISO during the scenario execution.

1. ISO is using Production TD July 22nd, 2015 as its base inputs for Market Simulation, ISO will augment this data with the relevant EIM data and use the TD's bids as the base bid set. This will also include base schedules for EIM and demand forecast for non EIM entities from WECC. Interchange Schedules will be pulled from WIT for this TD as well.
2. Determined by the scenario specifics ISO may seed MP's bids or allow the MP's to bid in whatever resources they see fit for the scenario.
3. All EIM Entity's will need to balance during the timeframes identified in the scenario "Execution Time" as well as provide the EIM Transfer Resource Limits.

## 2.4 Structured Scenarios

| Scenario Number | EIM Implementation - Nevada Energy and EIM Year 1 Enhancements – TD 8/4/15; Execution Time - 8/3/15 14:00 – 16:00 | |
|---|---|---|
| 1 | Description | DAM NVE Model Validation – Base Schedule Calculation, Transaction ID and Hubs |
| | ISO Actions | ISO will load standard bid set for ISO resources from production save case; for non EIM entities we will create base schedules based on interchange data, and demand forecast. For EIM entities ISO will validate that submitted base schedules are balanced and feasible. ISO will run DAM and Real Time markets and publish results. Publish Settlements Statements. |
| | EIM Market Participant Actions | EIM entity submits base schedules and verifies outcome DAM results, Expected Energy and Settlements Statements. |
| | ISO Market Participant Actions | Review EIM GHG Shadow Prices, EIM Transfer Limits, EIM Transfer MW's, EIM Transfer Net MW, EIM Transfer Shadow Price, EIM Transfer Schedule Shadow Prices, EIM Entity Demand Forecast, EIM BAA NSI and EIM LMP's on OASIS. |
| | Expected Outcome | Published results will be based on EIM entity base schedules and non EIM ISO generated base schedules. |
| | Anticipated Settlement Outcome | CC 4564, CC 64750, CC 6045, CC 6046, CC 67740, and CC 67740 |

| Scenario Number | EIM Implementation - Nevada Energy and EIM Year 1 Enhancements – TD 8/4/15; Execution Time - 8/3/15 14:00 – 16:00 | |
|---|---|---|
| **2** | Description | FNM Expansion DAM – Binding Physical Flow and Scheduling Constraints |
| | ISO Actions | ISO will obtain information from EIM entities for transmission interface constraints (TCOR/TIE). ISO will de-rate the transmission interface according to the information provided to cause congestion. ISO will load standard bid set for ISO resources from production save case; for non EIM entities we will create base schedules based on interchange data, and demand forecast. For scheduling constraints on EIM interties with non-EIM BAAs ISO will populate 15min intertie bids. For EIM entities ISO will validate that submitted base schedules are balanced and feasible. ISO will run DAM and Real Time markets and publish results. Publish Settlements Statements. |
| | EIM Market Participant Actions | Provide ISO transmission interface constraints (TCOR/TIE) through the EIM dynamic limits interface. EIM entities will review base schedules and resubmit for real time based on DAM results. Verify outcome DAM results, Expected Energy and Settlements Statements. |
| | ISO Market Participant Actions | Review EIM GHG Shadow Prices, EIM Transfer Limits, EIM Transfer MW's, EIM Transfer Net MW, EIM Transfer Shadow Price, EIM Transfer Schedule Shadow Prices, EIM Entity Demand Forecast, EIM BAA NSI and EIM LMP's on OASIS. |
| | Expected Outcome | Identified interfaces of the EIM entities will be congested and final results including congestion will be available. |
| | Anticipated Settlement Outcome | CC 4564, CC 64750, If dispatched in FMM CC 64600 or RTM CC64700. Congestion for CC 67740 and CC 64770 |

| Scenario Number | EIM Implementation - Nevada Energy and EIM Year 1 Enhancements – TD 8/13/15; Execution Time - 8/13/15 14:00 – 18:00 | |
|---|---|---|
| 3 | Description | EIM Real Time – Flexible Ramping Sufficiency Test NVE/ISO |
| | ISO Actions | ISO will load an ISO standard bid set; for non EIM entities ISO will create base schedules based on interchange data, and demand forecast. For EIM entities ISO will validate the schedules are balanced and feasible. ISO will set the Flex Ramp requirements (FRR) above available flex ramp capability in the EIM BAA. Broadcast the ISO, EIM BAA, and EIM footprint total load forecast, broadcast the FRR for the ISO, EIM BAAs, and EIM footprint to the Market. Perform flexible ramping requirement sufficiency test. T-75, T-55, T-40. |
| | EIM Market Participant Actions | Verify outcome Real Time results, Expected Energy and Settlements Statements. |
| | ISO Market Participant Actions | Review EIM GHG Shadow Prices, EIM Transfer Limits, EIM Transfer MW's, EIM Transfer Net MW, EIM Transfer Shadow Price, EIM Transfer Schedule Shadow Prices, EIM Entity Demand Forecast, EIM BAA NSI and EIM LMP's on OASIS. |
| | Expected Outcome | NVE/ISO fails the flex ramp sufficiency test for some hours; NSI constraint will be binding leading to price separation between the EIM BAA and rest of EIM Area. Flex Ramp price will be set by penalty price in the EIM BAA. Flex requirements will be available in OASIS. |
| | Anticipated Settlement Outcome | CC 7050, CC 7024, and CC 7056 |

| Scenario Number | EIM Implementation - Nevada Energy and EIM Year 1 Enhancements – TD 8/5/15; Execution Time - 8/5/15 14:00 – 18:00 | |
|---|---|---|
| 4 | Description | EIM Real Time – Congestion Management within EIM Entity BAAs |
| | ISO Actions | ISO will obtain information from EIM entities for transmission interface constraints. ISO will de-rate the transmission flowgates according to the information provided. ISO will load our standard bid set, for non EIM entities we will create base schedules based on interchange data, and demand forecast. For EIM entities ISO will validate the schedules are balanced and feasible. ISO will run DAM and Real Time markets and publish results. Publish Settlements Statements. |
| | EIM Market Participant Actions | Provide ISO transmission interface constraints (TCOR/TIE) through the EIM dynamic limits interface. Verify Congestion Information on OASIS, Real Time results, Expected Energy and Settlements Statements. |
| | ISO Market Participant Actions | Review EIM GHG Shadow Prices, EIM Transfer Limits, EIM Transfer MW's, EIM Transfer Net MW, EIM Transfer Shadow Price, EIM Transfer Schedule Shadow Prices, EIM Entity Demand Forecast, EIM BAA NSI and EIM LMP's on OASIS. |
| | Expected Outcome | Units will be dispatched and or committed/decommitted to relieve congestion. LMP will include congestion component. |
| | Anticipated Settlement Outcome | CC 4564, CC 64600, CC 64700, CC64750, CC 67740 and CC 64770 |

| Scenario Number | EIM Implementation - Nevada Energy and EIM Year 1 Enhancements – TD 8/6/15; Execution Time - 8/6/15 14:00 – 18:00 | |
|---|---|---|
| 5 | Description | EIM Real Time – Manual Dispatches for EIM Resources |
| | ISO Actions | ISO will load the ISO standard bid set; for non EIM entities ISO will create base schedules based on interchange data, and demand forecast. For EIM entities ISO will validate the schedules are balanced and feasible. ISO will run DAM and Real Time markets and publish results. Publish Settlements Statements. |
| | EIM Market Participant Actions | EIM BAA will manually dispatch selected EIM participating resources notifying the ISO accordingly. |
| | ISO Market Participant Actions | Review EIM GHG Shadow Prices, EIM Transfer Limits, EIM Transfer MW's, EIM Transfer Net MW, EIM Transfer Shadow Price, EIM Transfer Schedule Shadow Prices, EIM Entity Demand Forecast, EIM BAA NSI and EIM LMP's on OASIS. |
| | Expected Outcome | The market application will dispatch the resources in accordance with the ED instructions. |
| | Anticipated Settlement Outcome | CC 64600, CC 64700, CC 67740, and CC 64770 |

| Scenario Number | EIM Implementation - Nevada Energy and EIM Year 1 Enhancements – TD 8/13/15; Execution Time - 8/13/15 14:00 – 18:00 | |
|---|---|---|
| 6 | Description | EIM Real Time – EIM Specific Resource Mitigation |
| | ISO Actions | ISO to create a local constraint in the EIM BAA to trigger local market power mitigation. |
| | EIM Market Participant Actions | Submit expensive bids on the EIM participating resources that are expected to be mitigated. |
| | ISO Market Participant Actions | Review EIM GHG Shadow Prices, EIM Transfer Limits, EIM Transfer MW's, EIM Transfer Net MW, EIM Transfer Shadow Price, EIM Transfer Schedule Shadow Prices, EIM Entity Demand Forecast, EIM BAA NSI and EIM LMP's on OASIS. |
| | Expected Outcome | Resource with market power will be mitigated using their default energy bid and reported on CMRI. |
| | Anticipated Settlement Outcome | CC 64600, CC 64700, CC 66200 and CC 66780 |

| Scenario Number | EIM Implementation - Nevada Energy and EIM Year 1 Enhancements – TD 8/11/15; Execution Time - 8/11/15 14:00 – 17:00 | |
|---|---|---|
| 7 | Description | EIM Real Time – GHG Charges |
| | ISO Actions | ISO to increase the Load Forecast for the ISO BA. EIM specific energy bids are cheaper than other imports to ISO BA. |
| | EIM Market Participant Actions | MP will provide GHG bid adder for selected participating resources in the EIM BAA. Review Settlements Statements. |
| | ISO Market Participant Actions | Review EIM GHG Shadow Prices, EIM Transfer Limits, EIM Transfer MW's, EIM Transfer Net MW, EIM Transfer Shadow Price, EIM Transfer Schedule Shadow Prices, EIM Entity Demand Forecast, EIM BAA NSI and EIM LMP's on OASIS. |
| | Expected Outcome | GHG payments will be properly awarded to the exporting resources based on their export allocation values. |
| | Anticipated Settlement Outcome | CC 64600, CC 64700, CC 491, CC 67740, CC 69850, CC 64770, and CC 66200 |

| Scenario Number | EIM Implementation - Nevada Energy and EIM Year 1 Enhancements – TD 8/5/15; Execution Time - 8/5/15 14:00 – 18:00 | |
|---|---|---|
| **8** | Description | EIM Real Time – Neutrality |
| | ISO Actions | ISO to increase the Load Forecast for the ISO BA. EIM specific bids are cheaper than other imports to ISO BA. |
| | EIM Market Participant Actions | Review Settlements Statements. |
| | ISO Market Participant Actions | Review EIM GHG Shadow Prices, EIM Transfer Limits, EIM Transfer MW's, EIM Transfer Net MW, EIM Transfer Shadow Price, EIM Transfer Schedule Shadow Prices, EIM Entity Demand Forecast, EIM BAA NSI and EIM LMP's on OASIS. |
| | Expected Outcome | Transfer of RT neutrality between BAA and allocation to relevant SC's based on the EIM transfer. |
| | Anticipated Settlement Outcome | CC 64600, CC 64700, CC 67740, CC 69850, and CC 64770 |

| Scenario Number | EIM Implementation - Nevada Energy and EIM Year 1 Enhancements – TD 8/25/15; Execution Time - 8/25/15 14:00 – 16:00 | |
|---|---|---|
| 9 | Description | EIM Real Time – Contingency Event in the EIM BAA |
| | ISO Actions | ISO to verify the receipt of the contingency event notification from the EIM Entity. ISO will freeze the EIM transfer of the EIM Entity BAA at the last optimal solution. |
| | SC Actions | EIM Entity performs contingency dispatch using manual dispatch instructions that are communicated to the ISO. EIM resources to follow ADS instructions which reflect the manual dispatch. |
| | ISO Market Participant Actions | Review EIM GHG Shadow Prices, EIM Transfer Limits, EIM Transfer MW's, EIM Transfer Net MW, EIM Transfer Shadow Price, EIM Transfer Schedule Shadow Prices, EIM Entity Demand Forecast, EIM BAA NSI and EIM LMP's on OASIS. |
| | Expected Outcome | EIM entity takes appropriate actions to resolve their contingency. Contingency does not affect dispatch or prices in the ISO area. |
| | Anticipated Settlement Outcome | CC 64600, CC 64700, CC 67740, CC 69850, and CC 64770 |

| Scenario Number | EIM Implementation - Nevada Energy and EIM Year 1 Enhancements – TD 8/11/15; Execution Time – 8/11/15 11:00 – 13:00 | |
|---|---|---|
| 10 | Description | EIM Real Time – Contingency Event in the ISO BA |
| | ISO Actions | ISO will simulate a contingency in the ISO BA via RT contingency. ISO will load our standard bid set, for non EIM entities we will create base schedules based on interchange data, and demand forecast. For EIM entities ISO will validate the schedules are balanced and feasible. ISO will run DAM and Real Time markets and publish results. Publish Settlements Statements. |
| | EIM Market Participant Actions | EIM resources receive dispatch instructions through ADS. |
| | ISO Market Participant Actions | Review EIM GHG Shadow Prices, EIM Transfer Limits, EIM Transfer MW's, EIM Transfer Net MW, EIM Transfer Shadow Price, EIM Transfer Schedule Shadow Prices, EIM Entity Demand Forecast, EIM BAA NSI and EIM LMP's on OASIS. |
| | Expected Outcome | Contingency event in CAISO area does not affect dispatches or prices in the EIM BAs. |
| | Anticipated Settlement Outcome | CC 64600, CC 64700, CC 67740, CC 69850, and CC 64770 |

| Scenario Number | EIM Implementation - Nevada Energy and EIM Year 1 Enhancements – TD 8/19/15; Execution Time - 8/19/15 10:00 – 14:00 | |
|---|---|---|
| 11 | Description | EIM Entity BAA Isolation ISO BA, PAC BA's and NVE BAA |
| | ISO Actions | ISO to set EIM Transfer to zero (small threshold) Energy Transfer limits will be set on all interties for a given BAA |
| | EIM Market Participant Actions | Verify transfer limits |
| | ISO Market Participant Actions | Review EIM GHG Shadow Prices, EIM Transfer Limits, EIM Transfer MW's, EIM Transfer Net MW, EIM Transfer Shadow Price, EIM Transfer Schedule Shadow Prices, EIM Entity Demand Forecast, EIM BAA NSI and EIM LMP's on OASIS. |
| | Expected Outcome | ISO and EIM Entity BAAs are dispatched separately. |
| | Anticipated Settlement Outcome | CC 64600, CC 64700, CC 67740, CC 69850, and CC 64770 |

| Scenario Number | EIM Implementation - Nevada Energy and EIM Year 1 Enhancements – TD 8/13/15; Execution Time - 8/13/15 11:00 – 13:00 | |
|---|---|---|
| 12 | Description | Restricted MW EIM Transfer limit for EIM Entity BA to EIM Entity BAA |
| | ISO Actions | ISO to set EIM Transfer low/high limits to a to be determined agreed upon value Energy Transfer limits will be set on all interties between two BAAs |
| | EIM Market Participant Actions | Verify transfer limits |
| | ISO Market Participant Actions | Review EIM GHG Shadow Prices, EIM Transfer Limits, EIM Transfer MW's, EIM Transfer Net MW, EIM Transfer Shadow Price, EIM Transfer Schedule Shadow Prices, EIM Entity Demand Forecast, EIM BAA NSI and EIM LMP's on OASIS. |
| | Expected Outcome | EIM transfers from EIM Entity to EIM Entity are limited |
| | Anticipated Settlement Outcome | CC 64600, CC 64700, CC 491, CC 67740, CC 69850, and CC 64770 |

| Scenario Number | EIM Implementation - Nevada Energy and EIM Year 1 Enhancements – TD 8/13/15; Execution Time - 8/13/15 11:00 – 13:00 | |
|---|---|---|
| **13** | Description | Restricted MW EIM Transfer limit for EIM Entity to ISO BAA |
| | Description | Restricted MW EIM Transfer limit for EIM Entity BA to ISO BAA |
| | ISO Actions | ISO to set EIM Transfer low/high limits to a to be determined agreed upon value |
| | EIM Market Participant Actions | Verify transfer limits |
| | ISO Market Participant Actions | Review EIM GHG Shadow Prices, EIM Transfer Limits, EIM Transfer MW's, EIM Transfer Net MW, EIM Transfer Shadow Price, EIM Transfer Schedule Shadow Prices, EIM Entity Demand Forecast, EIM BAA NSI and EIM LMP's on OASIS. |
| | Expected Outcome | EIM transfers from EIM Entity to EIM Entity are limited |
| | Anticipated Settlement Outcome | CC 64600, CC 64700, CC 491, CC 67740, CC 69850, and CC 64770 |

| Scenario Number | EIM Implementation - Nevada Energy and EIM Year 1 Enhancements – TD 8/20/15; Execution Time - TD 8/20/15 09:00 – 18:00 | |
|---|---|---|
| 14 | Description | EIM Entity Separation from EIM market |
| | ISO Actions | ISO will update EIM entity daily separation flag in Master File. ISO to set the Flex Ramp requirement to zero for the EIM BAA. ISO to set Flex Ramp Requirement Test to failed for the EIM BAA. ISO to lock the (NSI=base NSI) for the EIM BAA. ISO does not enforce EIM BAA transmission constraints. ISO verifies SIBR rejects any energy bids from resources belonging to the EIM entity. UFE Inclusion Flag will be set to zero in Settlements. |
| | EIM Market Participant Actions | EIM entity must submit base schedules. EIM entity SC must submit meter data equal to base schedules. |
| | ISO Market Participant Actions | Review EIM GHG Shadow Prices, EIM Transfer Limits, EIM Transfer MW's, EIM Transfer Net MW, EIM Transfer Shadow Price, EIM Transfer Schedule Shadow Prices, EIM Entity Demand Forecast, EIM BAA NSI and EIM LMP's on OASIS. |
| | Expected Outcome | No Unit Commitment/Economic Dispatch for EIM resources from the real time market. |
| | Anticipated Settlement Outcome | No charges should trigger |

| Scenario Number | EIM Implementation - Nevada Energy and EIM Year 1 Enhancements – TD 8/18/15; Execution Time - 8/18/15 14:00 – 18:00 | |
|---|---|---|
| 15 | Description | Local RT Congestion Resolved by NVE resources |
| | ISO Actions | ISO will create a real time reduction in the transmission limit on ISO BA internal transmission that can be resolved by NVE EIM resources outside of ISO BA. ISO to constrain internal transmission and in the remaining area ISO to insure load exceeds available generation. |
| | EIM Market Participant Actions | SC will submit cost-based bids on resources that can resolve the congestion. |
| | ISO Market Participant Actions | Review EIM GHG Shadow Prices, EIM Transfer Limits, EIM Transfer MW's, EIM Transfer Net MW, EIM Transfer Shadow Price, EIM Transfer Schedule Shadow Prices, EIM Entity Demand Forecast, EIM BAA NSI and EIM LMP's on OASIS. |
| | Expected Outcome | ISO will dispatch out of area resource to resolve congestion problem. This test may not perform well if the efficiency of NVE resources is too low for resolving ISO internal congestion. |
| | Anticipated Settlement Outcome | CC 4564, CC 491, CC 64600, CC 64700, CC 66200; CC 67740, CC 69850, CC 64770 and CC 66780 |

| Scenario Number | EIM Implementation - Nevada Energy and EIM Year 1 Enhancements – TD 8/18/15; Execution Time - 8/18/15 11:00 – 13:00 | |
|---|---|---|
| 16 | Description | Impact of Real Time Unit Commitment on EIM Entity |
| | ISO Actions | ISO will create scenario in which either EIM BAA load forecast falls short or a forced outage or similar circumstance induces the CAISO system to commit a short-start unit in the EIM area.<br>Ideally, the unit will be started but will not be economical over its entire minimum running time, creating a bid cost recovery impact. |
| | EIM Market Participant Actions | SC submits bids for a short start unit with a zero base schedule, including startup and minimum run costs. Minimum up time should be set to the max allowable for a short start unit, to keep it running under uneconomical conditions. |
| | ISO Market Participant Actions | Review EIM GHG Shadow Prices, EIM Transfer Limits, EIM Transfer MW's, EIM Transfer Net MW, EIM Transfer Shadow Price, EIM Transfer Schedule Shadow Prices, EIM Entity Demand Forecast, EIM BAA NSI and EIM LMP's on OASIS. |
| | Expected Outcome | CAISO commits the unit. If possible, the unit should be uneconomical for part of its run time. Bid cost recovery payments will be due to the unit. |
| | Anticipated Settlement Outcome | CC 66200 and CC 66780 |

| Scenario Number | EIM Implementation - Nevada Energy and EIM Year 1 Enhancements – TD 8/18/15; Execution Time - 8/18/15 14:00 – 18:00 | |
|---|---|---|
| 17 | Description | Local RT Congestion Resolved by PacifiCorp resources for NVE |
| | ISO Actions | ISO will create a real time reduction in the transmission limit on NVE internal transmission that can be resolved by PacifiCorp EIM resources. PacifiCorp to constrain internal transmission and in the remaining area PacifiCorp to insure load exceeds available generation. |
| | EIM Market Participant Actions | SC will submit cost-based bids on resources that can resolve the congestion. |
| | ISO Market Participant Actions | Review EIM GHG Shadow Prices, EIM Transfer Limits, EIM Transfer MW's, EIM Transfer Net MW, EIM Transfer Shadow Price, EIM Transfer Schedule Shadow Prices, EIM Entity Demand Forecast, EIM BAA NSI and EIM LMP's on OASIS. |
| | Expected Outcome | EIM market will dispatch PacifiCorp resource to resolve congestion problem in NVE. This test may not perform well if the efficiency of NVE resources is too low for resolving ISO internal congestion. |
| | Anticipated Settlement Outcome | CC 4564, CC 64600, CC 64700, CC 66200; CC 67740, CC 69850, CC 64770 and CC 66780 |

| Scenario Number | EIM Implementation - Nevada Energy and EIM Year 1 Enhancements – TD 8/13/15; Execution Time - 8/13/15 09:00 – 18:00 | |
|---|---|---|
| 18 | Description | Joint ownership of resource in EIM BAA |
| | ISO Actions | ISO to work with EIM Entities to identify joint ownership resources in the BAA. ISO to demonstrate new joint ownership resource dispatch functionality. |
| | EIM Market Participant Actions | Validate dispatch instructions. |
| | ISO Market Participant Actions | Review EIM GHG Shadow Prices, EIM Transfer Limits, EIM Transfer MW's, EIM Transfer Net MW, EIM Transfer Shadow Price, EIM Transfer Schedule Shadow Prices, EIM Entity Demand Forecast, EIM BAA NSI and EIM LMP's on OASIS. |
| | Expected Outcome | ISO successfully dispatches the joint ownership resource as per design. |
| | Anticipated Settlement Outcome | CC 64600, CC 64700, and CC 4564 |

| Scenario Number | EIM Implementation - Nevada Energy and EIM Year 1 Enhancements – TD 8/18/15; Execution Time - 8/18/15 11:00 – 13:00 | |
|---|---|---|
| 19 | Description | One Year Enhancements Flex Ramp Constraints Modeling Validation |
| | ISO Actions | ISO will load an ISO standard bid set; for non EIM entities ISO will create base schedules based on interchange data, and demand forecast. For EIM entities ISO will validate the schedules are balanced and feasible. ISO to dispatch to Flex Ramp via new modeling requirements. |
| | EIM Market Participant Actions | Validate dispatch instructions. |
| | ISO Market Participant Actions | Review EIM GHG Shadow Prices, EIM Transfer Limits, EIM Transfer MW's, EIM Transfer Net MW, EIM Transfer Shadow Price, EIM Transfer Schedule Shadow Prices, EIM Entity Demand Forecast, EIM BAA NSI and EIM LMP's on OASIS. |
| | Expected Outcome | ISO to demonstrate Flex Ramp requirements are met and prices are optimal. |
| | Anticipated Settlement Outcome | CC 7050, CC 7024, and CC 7056 |

| Scenario Number | EIM Implementation - Nevada Energy and EIM Year 1 Enhancements – TD 8/19/15; Execution Time - 8/19/15 14:00 – 18:00 | |
|---|---|---|
| 20 | Description | ISO capacity test using the histogram percentiles PacifiCorp and NVE |
| | ISO Actions | ISO will load an ISO standard bid set; for non EIM entities ISO will create base schedules based on interchange data, and demand forecast. For EIM entities ISO will validate the schedules are balanced and feasible. MQS calculates histogram values to an agreed upon value per EIM BAA. |
| | EIM Market Participant Actions | View results in CMRI for capacity percentage calculation and results. |
| | ISO Market Participant Actions | Review EIM GHG Shadow Prices, EIM Transfer Limits, EIM Transfer MW's, EIM Transfer Net MW, EIM Transfer Shadow Price, EIM Transfer Schedule Shadow Prices, EIM Entity Demand Forecast, EIM BAA NSI and EIM LMP's on OASIS. |
| | Expected Outcome | ISO to demonstrate EIM BAA needs to have more capacity based on their historical decline rate. |
| | Anticipated Settlement Outcome | CC 7050, CC 7024, and CC 7056 |

| Scenario Number | EIM Implementation - Nevada Energy and EIM Year 1 Enhancements – TD 8/19/15; Execution Time - 8/19/15 14:00 – 18:00 | |
|---|---|---|
| 21 | Description | EIM Entities BA Transfer Schedule Validation, PACE and NVE |
| | ISO Actions | ISO will load an ISO standard bid set; for non EIM entities. ISO will create base schedules based on interchange data, and demand forecast including base transfer schedules for the NEVP ETSRs on the GON.PAV and REDB interties. For EIM entities ISO will validate the schedules are balanced and feasible. ISO will validate the necessary data flows to the Market Operator which facilitates the EIM (15-minute transfers and 5-minute transfers) across the PACE to NVE interface(s). ISO will work with the Entity's to verify tagged values as part of the EIM Interchange integration. |
| | EIM Market Participant Actions | NVE sends ETSR ATC limits to ISO for their internal EIM interties, including GON.PAV and REDB, via the EIM Dynamic Transmission Limit web service.<br><br>PacifiCorp and NVE tag/approve the transfers and send the final after the fact dynamic tagged values to ISO as part of the EIM Interchange integration for neutrality settlement. |
| | ISO Market Participant Actions | Review EIM GHG Shadow Prices, EIM Transfer Limits, EIM Transfer MW's, EIM Transfer Net MW, EIM Transfer Shadow Price, EIM Transfer Schedule Shadow Prices, EIM Entity Demand Forecast, EIM BAA NSI and EIM LMP's on OASIS. Review neutrality allocation to PACE and NEVP considering Energy Transfer Schedule deviations from base. |
| | Expected Outcome | Energy Transfer Schedules at GON.PAV and REDB are limited by the corresponding limits; neutrality allocation to PACE and NEVP reflects energy transfer schedules at GON.PAV and REDB. |
| | Anticipated Settlement Outcome | CC 64600, CC 64700, CC 491, CC 67740, CC 69850, and CC 64770 |

| Scenario Number | EIM Implementation - Nevada Energy and EIM Year 1 Enhancements – TD 8/26/2015; Execution Time - 8/26/2015 14:00 – 16:00 | |
|---|---|---|
| **22** | Description | Available Capacity (Reserves) |
| | ISO Actions | ISO will change system conditions to cause infeasibility in an EIM BAA, to demonstrate the available capacity functionality. |
| | EIM Market Participant Actions | EIM Entities will need to register their non-R and PR for regulation capacity. Also submit energy bids in regulation range for PR and regulation capacity base schedules for both PR an NPR. |
| | ISO Market Participant Actions | No Action |
| | Expected Outcome | Energy bid for participating resources in regulation range and default energy bid for non-participating resources will be used for dispatch to resolve infeasibility. If infeasibility is resolved price will be set by the last marginal bid. If infeasibility is not resolved price will go to $1,000. |
| | Anticipated Settlement Outcome | For participating resources that have bids in regulation range being dispatched, bid cost in regulation range associated with instructed energy will be included in Energy Bid Cost Recovery.<br><br>For non-participating resources that have default energy bids being dispatched, default energy bid cost associated with instructed energy will be included in energy Bid Cost Recovery. |

# 3. ISO Market Simulation Contact

Please contact MarketSim@caiso.com if you have any questions or concerns regarding these scenarios.

**Attachment E –Operating Procedure 2510 (E-Tagging)**

**Deficiency Response: Energy Imbalance Market Year One Enhancements – Phase 1**

**California Independent System Operator Corporation**

# Table of Contents



# Purpose

Provides details of e-Tagging Interchange Schedule transactions and validating them with CAISO market awards to all applicable entities.

# 1. Responsibilities

| | |
|---|---|
| CAISO | The CAISO validates Interchange transactions, and confirms them with adjacent Balancing Authorities (BA) prior to implementing them in the ACE equation. Additionally the CAISO assesses Interchange transaction for reliability purposes, adequacy of transmission rights, and ensures market awards are not exceeded prior to e-Tag implementation. The CAISO uses the Interchange transaction scheduler (ITS) software to process NERC e-Tags, and when necessary, curtail e-Tags that do not pass validation or meet requirements. The CAISO complies with NERC Standards and WECC business practices related to Interchange and implements Confirmed Interchange as received from the Interchange Authority. |
| Scheduling Coordinators (SCs) | SCs are entities certified by the CAISO for the purposes of undertaking functions specified in the CAISO tariff. This includes ensuring Interchange Schedules are prepared in accordance with NERC, WECC, and CAISO requirements and providing e-Tags for all applicable transactions. However, SC's are not specifically identified in NERC and WECC standards and might not meet the strict definition of a Purchasing Selling Entity (PSE) as defined in the NERC Glossary of Terms. . As such the SC is responsible for ensuring their transactions are properly tagged by a PSE, SCs must be awarded CAISO market bids and Self-Schedules on all tags for validation purposes. Failure to satisfy these CAISO/NERC/NAESB tagging requirements may result in refusal by the CAISO to implement the Interchange Schedule, irrespective of CAISO market awards. |
| Western Interchange Tool (WIT) | WIT acts as the Western Interconnection's Interchange Authority (IA). In accordance with NERC standards, WIT receives requests for interchange (RFI) via e-Tags from various entities and distributes these requests to reliability entities (BA's and Transmission Service Providers) and market entities and for reliability and market assessments, respectively. WIT also confirms or denies interchange based on criteria set forth in NERC/NAESB standards and WECC Interchange Regional Business Practices. |

| | |
|---|---|
| Other BAs and Transmission Service Providers **(TSP)** | In accordance with NERC/NAESB standards, BAs will either approve or deny arranged interchange requests received from WIT based upon reliability considerations. Additionally BAs will implement confirmed interchange received from WIT and sending and receiving BAs will agree to interchange prior to implementing it in their ACE equation. |

# 2. Scope/Applicability

**2.1 Background**

Interchange Schedules are Energy Schedules where Energy is transferred between Balancing Authority Areas and they require coordination between multiple entities. The primary method for providing this coordination is the e-Tag. Various entities can communicate important information pertaining to the Interchange transaction to each other via the internet using computer applications, which are based on the e-Tag specifications and schema maintained by the North American Energy Standards Board (NAESB). A PSE can communicate Interchange transaction information to reliability entities using e-Tags, including Balancing Authorities such as the CAISO. Similarly, a reliability entity can communicate reliability limits on Interchange transactions to PSEs and other reliability entities using e-Tags. E-Tags should be prepared by PSEs in accordance with NERC, WECC, and CAISO requirements to facilitate effective operations between Balancing Authority Areas within the Western Interconnection. A detailed discussion on the theoretical and practical application of Interchange transactions and the use of e-Tags can be found in the references.

**2.2 Scope / Applicability**

This procedure applies to SCs/PSEs and all other entities responsible for e-Tagging CAISO import and export Interchange Schedules.

# 3. Procedure Detail

### 3.1 NERC e-Tags

**3.1.1 E-Tagging Requirements**

The following describes the requirements for submitting a tag with the CAISO per NERC, WECC, and CAISO requirements:

| Step | SC/PSE Actions |
|---|---|
| 1 | **Create e-Tags** for all Interchange Schedules. |
| ***Note**: Transactions that are entirely within the CAISO BA Area using CAISO transmission such as SC to SC trades are considered network transmission service and should not be tagged.* | |
| 2 | **Tag** all Dynamic Schedules at the expected average MW profile for each 15 minute interval of the next scheduling hour.<br><br>**Update** all Dynamic Schedule e-Tags where the average energy profile in an hour is greater than 250 MW and in that hour the actual hourly integrated energy deviates from the hourly average energy profile indicated on the tag by more than ±10%.<br><br>**Update** all Dynamic Schedule e-Tags where the average energy profile in an hour is less than or equal to 250 MW and in that hour the actual hourly integrated energy deviates from the hourly average energy profile indicated on the tag by more than ±25 megawatt-hours.<br><br>**Update** all Dynamic Schedule e-Tags that the Reliability Coordinator or Transmission Operator determines the deviation, regardless of magnitude, to be a reliability concern and notifies the Purchasing-Selling Entity of that determination and the reasons.<br><br>**Update** each hour of a dynamic schedule with the actual value within 60 minutes of the completion of the operating hour to allow for correct Net Scheduled Interchange between BAs.<br><br>**Monitor** Dynamic Schedule e-Tags for reliability curtailments and make adjustments to the dynamic signal accordingly. After a reliability curtailment has been initiated and subsequently released, release the reliability limit profile on the appropriate Interchange transaction Tag at the time the reliability event allows for the reloading of the transaction, without releasing the reliability limit of other Balancing Authorities and Transmission Service Providers; The current level on the Interchange transaction Tag shall not be greater than the most limiting reliability limit. |

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| | It may be necessary to create an outage card in the outage management system to ensure the RT Market does not give the resource a DOT greater than the reliability curtailment limit.<br><br>**Submit** all intra-hour dynamic e-Tags at least 20 minutes before the operating hour for the first half hour schedules and before 15 minutes during the operating hour for the second half hour schedules. Intra-hour dynamic e-Tags follow all other NERC and WECC criteria for dynamic tag types.<br><br>***Note:*** *The transmission reservation, shown on the tag, should reflect the expected maximum MW usage, for the Dynamic Schedule, for the hour.*<br><br>***Note****: The Energy profile of the Dynamic Schedule must be updated with the final integrated Energy amount (MWh), as predetermined by a single, agreed-upon source, within 60 minutes after the completion of the Operating Hour.* |
| 3 | **Tag** all pseudo tie Energy transactions. Pseudo Tie e-Tags will follow the same criteria as Dynamic Tag Types |
| 4 | **Tag** all Ancillary Service (AS) Capacity Schedules:<br>• **Tag** Spinning and Non-Spinning reserve Interchange Capacity transactions with the transmission profile value awarded in the Day-Ahead Market (DAM) or RTPD.<br>• **Tag** the Energy Profile at zero until the Energy is actually dispatched and delivered.<br>• **Tag** the Transmission Allocation with firm transmission<br>***Note****: These requirements apply to both static and dynamic transfers.*<br>• **Tag** regulation (Import only) Interchange transactions, at the value awarded in the CAISO AS Market. The Energy profile should be set at the forward Energy Schedule, with the additional upward, awarded regulation Capacity, shown in the total reserved transmission profile value on the tag, over and above the forward Energy Schedule.<br>• **Adjust** tags for regulation, after the fact, for the actual integrated quantity of dynamically delivered regulation Energy by the next hour following the hour that the Energy was supplied.<br>***Note****: Dynamic Interchange Schedules – A single tag may be used for Energy and AS Awards (i.e. Upward Regulation) for Dynamic Schedules only. Reserves delivered via Dynamic Interchange Schedules* ***must*** *be on Firm Transmission Service for all lines of* |

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| | *interest. The product code used on Dynamic tags should always be "ENGY". Place the total MW value for all market awards, Energy and Capacity, in the transmission profile, and the actual Energy award MW value in the Energy profile of the NERC e-Tag. If awarded AS Capacity, and it is subsequently dispatched as Energy, then the dynamic e-Tag Energy profile is updated to reflect the final integrated quantity of Energy delivered via this Dynamic Interchange Schedule, inclusive of both Energy and AS Energy as dispatched.* |

### 3.1.2 Association of NERC Tags with CAISO Market Awards

The following describes how NERC Interchange Schedules (e-Tags) are associated with the respective CAISO market awards, by the CAISO Interchange transaction scheduler:

| Description |
|---|
| The CAISO Interchange transaction scheduler application requires additional, specific CAISO market transmission reservation information be provided on tags, to validate the Interchange Schedule with the corresponding market award or reservation. E-Tags must reflect all physical segments used on the CAISO Controlled Grid. A market award represents the transmission reservation on the associated CAISO Intertie and associated physical segments of the scheduling path used on the CAISO Controlled Grid.<br><br>This information is provided by the PSE, using the MISC Info field for Resource IDs or the Transmission Allocation portion of the e-Tag for Transaction ID.<br><br>This CAISO market award information allows Interchange transaction scheduler to process the timely and accurate settlement of import or export Interchange Schedules. |
| The Interchange Scheduler may curtail tags down to the CAISO DAM and HASP market awards, respectively, in Interchange transaction scheduler if necessary. |

The following table specifies the required Market data:

**MISC Info field for Resource IDs:**

| Token | Value |
|---|---|
| CAISO_CONTRACT | Contract Reference Number (CRN) used for Existing Transmission Contracts (ETC), Transmission Ownership Rights (TOR) or Converted Rights (CVR), as registered in the CAISO Master File, or "NONE" for Market Transmission. |
| CAISO_PRODUCT | "ENGY", "SPIN", or "NSPN" |
| CAISO_RES_ID | The Resource ID as registered in the CAISO Master File that is associated with the market award. |

**OASIS field for Transaction IDs**

| Transmission Allocation | | | |
|---|---|---|---|
| **TP** | **Owner** | **Product** | **OASIS** |
| **"-----"** | **"-----"** | **"-----"** | **"-----"** |
| **CISO** | **"-----"** | **"-----"** | **XXXX-XXXX_XXX-XXXX-XXXX-X-X-X-XXXX** |

***Note: See** "E-Tagging Your CAISO Market Awards" for complete instructions.*

### 3.1.3 E-Tag Submittal Timelines

The following e-Tag submission timelines must be adhered to:

| Step | PSE Actions |
|---|---|
| 1 | **Submit** tags on time to comply with NERC timetables and policies. |
| 2 | **Submit** Pre-Schedule tags by 1500 Pacific Prevailing Time on the day prior to the start of the transaction. |
| 3 | **Submit** the Intertie Hourly Transmission Profile and Energy Schedule on e-tags by 20 minutes prior to the start of the first interval of the next hour's market. Otherwise, the tag submittal deadline is 20 minutes prior to the start of the transacted interval. For example, the tag submittal deadline for the interval starting at 11:15 is 10:55. |
| 4 | **Submit** tags or adjustments to tags as soon as possible after transactions are awarded. |

**3.1.4 E-Tag Evaluation and Approval**

The CAISO Interchange transaction scheduler and the Interchange Scheduler evaluate tags for the following:

| Evaluation | Description |
|---|---|
| Valid Source/ Sink PSE Information | For tags that source or sink in CAISO BA Area, the source/sink PSE shall normally be a certified SC that has a NERC registered source or sink in the CAISO BA Area.<br><br>***Note:*** *Scheduling Coordinators may not designate the CAISO as a source or sink PSE.* |
| Correct Transmission Provider | CISO shall be listed as the transmission provider for use of all CAISO grid transmission (participating transmission). Scheduled use of non-ISO grid (non-participating transmission) within the CAISO BA Area by way of Existing Transmission Contracts (ETCs) or Transmission Ownership Rights (TORs) may show the Existing Transmission Contract Owner or the Non-Participating Transmission Owner as the transmission provider.<br>CISO shall not be designated as a transmission provider for any transmission segment, unless the transmission segment is comprised of ISO grid located within the ISO BA Area, or for external transmission, available for Scheduled use by ISO Market Participants, for which the ISO has dedicated rights. |
| Transmission Path (valid POR/POD) | CAISO POR's and POD's are listed in CAISO Operating Procedure 2510A POR/POD Scheduling Path Cross Reference, along with the CAISO Interchange Scheduling points, for use when submitting Market Bids or Self-Schedules on the ties, through SIBR.<br><br>CAISO transmission service is considered as network transmission service. However, multiple physical path transmission segments must be shown on the e-Tag, in some situations to ensure all BA Area boundaries are identified or to accommodate the Scheduling detail requirements of adjacent BAs.<br><br>The CAISO validates use of WIT registered transmission paths, for all Interchange Schedules (e-Tags), in coordination with adjacent BAs.<br><br>E-Tags shall contain the correct Scheduling path (proper connectivity of Adjacent Balancing Authorities). |

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|---|---|
| Scheduling Entity | There should be only one Scheduling entity per line on an e-Tag.<br><br>Entries in the Scheduling entity field are considered sequential from top to bottom in the Scheduling entity column and from left to right if more than one appears on a physical path row.<br><br>For physical path rows that are adjacent to another BA Area (Intertie boundaries), the adjacent BA must be listed sequentially next to the CAISO BA Area. This is normally done on the adjacent row above or below the CAISO transmission segment but is also acceptable on the same row providing that correct sequence is maintained.<br><br>E-Tags shall be denied if any Scheduling entity field is blank for any physical path segments within the CAISO BA Area, any physical path using CAISO transmission, or any physical path row immediately adjacent to the CAISO BA Area.<br><br>Adjacent BA Areas for various point of receipt and point of deliveries are listed in CAISO Operating Procedure 2510A POR/POD Scheduling Path Cross Reference. |
| OASIS Reservation | For CAISO transmission, the Oasis Reservation listed on tag must be an exact duplicate of the Resource ID or Transaction ID that is submitted through the SC's portal into SIBR.<br><br>Only one CAISO OASIS number will be accepted on a tag. Stacking of multiple Resource IDs is not allowed. |
| Valid Energy Profile | The MW value in the Energy profile cannot exceed the total MW value in the reserved transmission profile, for Static Interchange Schedules, at any time.<br><br>However, the transmission profile MW value can and should equal or exceed the Energy profile for Dynamic Interchange Schedules, when used to Schedule Interchange Energy and/or Capacity (Spinning, Non-spinning or Regulation services).<br><br>The CAISO shall only confirm Arranged Interchange that it has the ability of generation to Ramp prior to the expiration of that scheduled reliability assessment period. |
| ***Note:*** *CAISO is registered in the NERC/NAESB registry as "CISO" in the SE, CA &TP capacities only.* | |

### 3.1.5 Tag Approval Prior to Knowledge of Final Market Schedules

The following describes tag approval prior to knowledge of final market Schedules:

| Step | CAISO Interchange Transaction Scheduler Actions |
|---|---|
| ***Note**: NERC tagging timelines allow submittal of tags prior to the CAISO publishing of final DAM and the Hour Ahead Scheduling Process (HASP) awards or Real-Time Pre-Dispatch (RTPD).* | |
| 1 | **Approve** tags within the allowed evaluation period.<br>***Note**: This may require the CAISO to approve or deny a NERC e-Tag prior to knowing the final market results.* |
| 2 | **Approve** tags following validation of all section 3.1.4 requirements. |
| **Step** | **SC Actions** |
| 3 | After the CAISO publishes its market results adjust the e-Tag according to the published market award, if needed. |

### 3.1.6 Emergency Tags

The following describes emergency tags:

| Emergency Tag Description |
|---|
| The "emergency" tag type is only used for tags at the request of the Interchange Scheduler or in response to an operational message from CAISO. |
| The CAISO may request use of an "emergency" tag type in the event an Import or Export Schedule is required after normal Scheduling timelines and the transaction is in response to a loss of transmission, potential reserve or Energy deficiency, or to supply or receive emergency assistance to another BA Area during a contingency event. |
| The "emergency" flag is not used nor requested by the CAISO for economic purposes or to expedite approval for a market transaction. |
| The CAISO denies all tags flagged as "emergency" unless the CAISO or another BA requested has requested approval of the emergency tag. |

**3.1.7 Interchange Schedule Implementation**

The following describes the Interchange Schedule implementation:

| Interchange and Market Award Correlation |
|---|
| Tag approval by the CAISO does not guarantee a CAISO market award/Transmission reservation. |
| All market import or export Interchange Schedules are subject to final approval and transmission allocation in the CAISO DA, or HASP and RTPD Energy markets. |
| All Interchange Schedules are subject to approval by adjacent BAs and transmission providers. |
| The Interchange Scheduler may curtail e-Tags due to reliability reasons or for violation of NERC, WECC, or CAISO e-Tag requirements.<br><br>Prior to the expiration of the reliability assessment period as defined in timing requirement tables for WECC in NERC Standard INT-006 Column B, the CAISO shall respond to each On-time Arranged Interchange, emergency Arranged Interchange and Reliability Adjustment Arranged Interchange to transition an Arranged Interchange to a Confirmed Interchange.<br>If a Reliability Adjustment Arranged Interchange is denied by the ISO, the Reliability Coordinator must be notified no more than 10 minutes after the denial.<br><br>If a Reliability Coordinator directs the modification of a Confirmed Interchange or Implemented Interchange for actual or anticipated reliability reasons, a Reliability Adjustment Arranged Interchange schedule shall be submitted within 60 minutes of the start of the modification. Also, if a Reliability Coordinator directs the scheduling of Interchange for actual or anticipated reliability reasons, a Request for Interchange shall be submitted within 60 minutes of the start of the Interchange Schedule. |
| Interchange Scheduler shall log all instances of tag curtailments due to reliability reasons. |

# 4. Supporting Information

**Operationally Affected Parties**

Shared on the Internet, Peak RC

**References**

Resources studied in the development of this procedure and that may have an effect upon some steps taken herein include but are not limited to:

| | |
|---|---|
| CAISO Tariff | |
| E-Tagging Your CAISO Market Awards | |
| California ISO Tagging Templates | |
| NERC Reliability Standards | BAL-002-WECC-2: R:1.1.2<br>INT-001-3: R: 1.1, 2<br>INT-003-3: R: 1<br>INT-004-2: R: 1<br>INT-004-2: R: 2<br>INT-006-3: R: 1<br>INT-009-1<br>INT-010-1 |
| NERC Interchange Reference Guidelines | |

**Definitions**

Unless the context otherwise indicates, any word or expression defined in the Master Definitions Supplement to the CAISO Tariff shall have that meaning when capitalized in this Operating Procedure.

The following additional terms are capitalized in this Operating Procedure when used as defined below:

None

**Version History**

| Version | Change | By | Date |
|---|---|---|---|
| 6.1 | On 5/1/11, 2510 version 6.0 (S-313) Reformatting included addition: Scope/Applicability, Periodic Review Criteria. Added signatures, version 5.3 comments, new effective date and minor version change | | 5/24/11 |
| 6.2 | Changes to the PSE Tagging Requirements on the first page.<br>Added Reliability Standards References to the References section. | | 7/11/11 |
| 6.3 | Updated Section 3.1.1<br>Deleted Requirement inside Section 3.1.4 Situations where the where the CISO may be the PSE.<br>Updated Section 2.2 Scope/Applicability | | 7/26/11 |
| 6.4 | Changed some references from CAISO to CISO in section 3.1.4 to reflect the CAISO's NERC registry designation. | | 8/25/11 |
| 7.0 | Annual Review, changes highlighted.<br>Purpose: Rewritten for clarity<br>Responsibilities: Rewritten and added WIT and Other BAs and TSPs.<br>Section 2.1 & 2.2: Rewritten for clarity<br>Section 3.1: (SC/PSE) step 1, added note. Step 2, added actions and note. Step 3, added content. Deleted note at end.<br>Section 3.1.2: Added content to description section.<br>Section 3.1.4: Removed option of using the CAISO as a PSE. Deleted content from "Scheduling Entity" box.<br>Section 3.1.5: (CAS) edited note. Step 3 (SC) summarized content.<br>Section 3.1.7: Added content<br>References: Added NERC standards<br>Appendix: Added 2510B | | 7/31/12 |

| | | | |
|---|---|---|---|
| 7.1 | Section 1: Updated CAISO responsibilities; updated reference to WECC Interchange Regional Business Practices.<br>Section 3.1.4: Updated description of Transmission Path (valid POR/POD) evaluation and Valid Energy Profile.<br>Section 3.1.7: Added statement regarding transition from Arranged Interchange to Confirmed Interchange. | | 2/12/13 |
| 7.2 | Section 3.1.7: Added RT Scheduler logging for all instances of tag curtailments due to reliability reasons or for violations | | 7/09/13 |
| 7.3 | Section 3.1.7 Changed the sentence that read "CAISO RT Scheduler shall log all instances of tag curtailments due to reliability reasons or for violation of NERC, WECC, or CAISO E TAG requirements" to "CAISO RT Scheduler shall log all instances of tag curtailments due to reliability reasons". | | 8/15/13 |
| 7.4 | Section 3.1.1 added to Dynamic e-Tag a section on reloading the e-Tag. | | 11/15/13 |
| 7.5 | Changed references of RT Scheduler or Pre-Scheduler to Interchange Scheduler. | | 12/16/13 |
| 7.6 | Changed references of Control Area Scheduler (CAS) and/or CAS to Interchange transaction scheduler<br>Changed SLIC outage reference to outage management system.<br>Changed reference of WECC Reliability Coordinator to Reliability Coordinator.<br>Section 3.1.7: Updated due to new NERC standards for Interchange (Changed references of Request for Interchange (RFI) and RFI and included new to paragraph). | | 10/01/14 |
| 7.7 | Added Transaction ID references AS requirement for Firm Transmission Service | | 10/15/14 |

| | | | |
|---|---|---|---|
| 8.0 | Periodic Review:<br>• In Section 1<br>• CAISO<br>• Scheduling Coordinators (SCs)<br>• Western Interchange Tool (WIT)<br>1. In Section 3.1.1<br>• Deleted Step 4<br>2. In Section 3.1.2<br>• Slightly modified the description<br>3. In Section 3.1.4<br>• Modified the description for OASIS Reservation | | 6/30/15 |

# 5. Periodic Review Procedure

| | |
|---|---|
| **Review Criteria** | There are no specific review criteria identified for this procedure, follow instructions in Procedures 5510 and 5520. |
| **Frequency** | Review as recommended in Procedures 5510 and 5520. |
| **Incorporation of Changes** | There are no specific criteria for changing this document, follow instructions in Procedures 5510 and 5520. |

# Technical Review

| Reviewed By Content Expert | Signature | Date |
|---|---|---|
| Operating Procedures | | 6/23/15 |
| Real-Time Operations | | 6/22/15 |
| Lead Interchange Scheduler | | 10/13/14 |

# Approval

| Approved By | Signature | Date |
|---|---|---|
| Director, Real-Time Operations | | 6/24/15 |

*Signed previous version only, changes to this version were minor and did not require full signature approval.

# Appendix

2510A POR/POD Scheduling Path Cross Reference
2510B Intra-Hour Scheduling Process