Extended Day-Ahead Market

Bundle One

Straw Proposal

July 20, 2020

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Extended Day-Ahead Market
Straw Proposal

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1. Executive Summary

This paper presents a straw proposal to address the first set of elements that would be part of an approach to enable energy imbalance market (EIM) entities' participation in the day-ahead market in a framework similar to the existing EIM approach for the real-time market. The approach contemplated in this effort does not require full integration into the CAISO balancing authority area as participating transmission owners (PTO), nor does it require formation of or participation in regional transmission organization (RTO). The extended day-ahead market (EDAM) will improve market efficiency and more effectively integrate renewable resources by optimizing day-ahead unit commitment, producing hourly schedules, and improving transmission utilization across a larger footprint.

The CAISO has separated the EDAM initiative into three bundles of topics. The first bundle includes the resource sufficiency evaluation, transmission provision, and the distribution of revenues related to congestion and enforcement of transfer constraints. The second bundle will address greenhouse gas accounting, inclusion of ancillary services, implementation of the second phase of the extension of the full network model (*i.e.*, FNM Phase 2), and the EDAM administration fee. The final bundle will address price formation, inclusion of convergence bidding, external resource participation, enhancements to market power mitigation, and any additional topics identified through the consideration of the first two bundles. The CAISO proposes this sequence because the development of policy around each bundle is fundamental to development of policy for the subsequent bundles. Approaching the initiative in these separate bundles will allow for a more clear and efficient path for successfully completing the initiative.

The EDAM will incorporate the same principles of the Western EIM: voluntary participation, low-entry cost, no exit fees, and retention of balancing authorities' operational control over their resources and transmission. Participation in EDAM will be optional for EIM entities. Therefore, the proposed design must contemplate that some EIM entities may still elect to participate only in the CAISO's real-time market and not EDAM. However, participating in the EDAM requires participation in the EIM.

EIM entities that elect to participate in the EDAM will retain flexibility and independence, including retaining their balancing authority and planning functions. Extending the day-ahead market to EIM entities will provide several regional benefits. It will leverage the CAISO day-ahead market for more efficient hourly shaped economic transactions across the West. It will reduce renewable resource integration costs by increasing geographic and resource diversity. It will also improve reliability through better coordination among balancing authorities in the West. Finally, EDAM has opportunity to reduce curtailment of renewable resources.

Resource adequacy will be the responsibility of each load serving entity in coordination with their state and local regulatory authority. Distinctly different, the resource sufficiency evaluation, as part of an EDAM, is similar in intent to the resource sufficiency evaluation in the EIM that ensures each EIM balancing authority area can independently meet its needs prior to benefiting from transfers with other balancing authority areas. This ensures that one balancing authority area does not lean on another balancing authority area. Under the EDAM construct, it may be necessary to determine if similar measures are needed between load serving entities within a balancing authority area and what

information can the market operator to an EDAM balancing authority area to manage under its tariff. The EDAM will not change state or local control over integrated resource planning. The decisions regarding forward procurement of capacity for resource adequacy will remain with the load serving entity in coordination with their state and local regulatory authorities. Likewise, transmission planning and investment decisions remain with each balancing authority area, state and local regulatory authority.

2. Discussion of Voluntary Participation

Voluntary participation has been a key principle of the EIM from its beginning, and has proven to be an important factor in its success. The concept of what voluntary participation means in the context of EDAM will necessarily need to evolve, but can be founded on similar principles.[1] Most importantly, the general guiding principle should be that more EDAM participation will be better for everyone—more resources participating with bids, combined with more transmission made available, will lead to more efficient market outcomes and increased benefits. The emphasis will be to incentivize (rather than mandate) participation with resources and transmission in the market so that the EDAM can optimize the largest pool of resources over the largest possible area.

Participation in the EDAM in general will be entirely a voluntary decision of each entity, just as it is in the EIM. The only pre-condition for EDAM participation is that the balancing authority is a participant in EIM; i.e., an EIM entity must have implemented the EIM in its balancing authority area to implement the EDAM in its balancing authority area, either previously or concurrently.

Similarly, the decision to exit the EDAM is entirely a voluntary decision of the participating balancing authority, and there will not be any associated exit fee. An entity could exit from the EDAM only, or from the EDAM and the EIM concurrently or sequentially. As in the EIM, the CAISO will require advance notice for EDAM termination, and will recover the associated administrative fee during the notice period to account for the CAISO's wind down expenses. Although the six-month notice currently applicable for EIM may be a guiding principle, the appropriate length for the termination notice period for EDAM must consider the EDAM design elements, such as the resource sufficiency requirements or use of congestion revenue rights. The guiding principle for exiting the EDAM will nevertheless be the same as those the CAISO has developed for the EIM, which is to provide fair and adequate termination notice in consideration of the associated rights and obligations. The CAISO proposes an initial 6 month notice period during which the entity would pay the EDAM administrative fee, similar to the EIM. The CAISO

[1] The Commission recently explained what voluntary participation means in the context of EIM transmission availability in its order accepting the Bonneville Power Administration EIM Implementation Agreement and its order on rehearing of the CAISO proposal to allow EIM entities to enforce a net export limit. *See Cal. Ind. System Op*, 170 FERC ¶ 61,168 (2020), at p. 26 (noting that the CAISO tariff expressly allows for the use of either the ITR or ATC mechanisms and does not require that an EIM entity use a specific mechanism to make transmission available for EIM transfers)*;* and *Cal. Ind. System Op.*,171 FERC ¶ 61,220, at p. 18 (2020) (noting that although EIM entities have discretion over the amount of transmission to turn over to the EIM and the amount of generation to offer into the EIM, the EIM itself should be operated efficiently to promote competitive outcomes).

believes the 6 months is sufficient if an EDAM balancing authority elects to utilize congestion revenue rights to distribute congestion revenue within its balancing authority area since only a monthly allocation is currently contemplated.

Although defining what voluntary participation means in terms of joining or exiting the EDAM may be more obvious, determining what is voluntary or mandatory for all the other EDAM functions that fall in between these bookends is more complicated. Therefore, in this initiative, the CAISO and stakeholders must evaluate each design element and the associated incentives to determine what approach will maximize participation, yet ensure the CAISO operates an efficient market that promotes competitive outcomes while harmonizing with EDAM entities' modified Open Access Transmission Tariff (OATT). For example, there are certain operational necessities of being able to participate in the market that ensure the balancing authority area has sufficient resource capability to pass the associated resource sufficiency evaluation. The resource sufficiency evaluation will include day-ahead tests that allows participants to access the benefits of the EDAM in a manner that supports reliability and prevents entities from leaning on the resources in other balancing authority areas. In this sense, these tests will impose a mandatory function on participation related to resource sufficiency. In addition, there will be some requirement for making transmission available to support resource sufficiency obligations, and there will be the need to consider the allocation of congestion revenues collected in the day-ahead as well as revenues associate with the enforcement of transfer constraints. In contrast, the provision of additional transmission in support of transfers from transmission providers will be voluntary with incentives provided by usage fees. Beyond these requirements, participants should be incentivized to economically bid all resources into the market through appropriate compensation at market clearing prices.

In addition, differences between CAISO balancing authority area participants and EDAM balancing authority area participants may also affect what voluntary participation means with respect to certain EDAM design elements. Understanding and appreciating these differences is important for the development of the associated EDAM design element in a manner that allows for fair and comparable alignment of all participants' interests. Allowing voluntary day-ahead market participation by balancing authority areas other than the CAISO may be acceptable, but it will need consideration to ensure it strikes the correct balance. Consideration of the relative voluntary nature of participation as we extend the day-ahead market to balancing authority areas outside the CAISO is essential for a successful outcome, and the EDAM design necessarily must consider and balance this inescapable duality among participants in terms of each market element in which it arises.

3. Stakeholder Comments

Importance of day-ahead market enhancements initiative

The majority of stakeholders recognized the interdependency between the CAISO's day-ahead market enhancements and Expanded Day-Ahead Market initiatives. Those that did also identified imbalance reserves as a critical input into any resources sufficiency test and the determination of a diversity benefit. Stakeholders advocated for the CAISO to ensure the day-ahead market enhancements initiative

is done prior to or in concert with EDAM. The CAISO currently plans to implement the day-ahead market enhancement is Fall 2022, prior to implementing EDAM and onboarding EIM entities.

Resource Sufficiency

Stakeholders showed support for the implementation of a resource sufficiency evaluation as necessary to prevent balancing authority areas from unduly leaning on other balancing authority areas. They expressed explicit concerns that leaning can enable balancing authority areas to systematically avoid self-sufficient forward procurement practices, which would erode the regional diversity benefits that can be obtained through the EDAM. Given the potential incentive to avoid forward procurement to serve their load, several stakeholders suggested the resource sufficiency evaluation should serve in a preventative mitigation function rather than a retroactive financial penalty as it would be difficult to determine the appropriate level of financial penalty. Stakeholders also expressed a desire for a standardized approach for the submission of a resource sufficiency plan or day-ahead offers from participating and non-participating resources.

The CAISO is proposing that the resource sufficiency evaluation require that all balancing authority areas offer sufficient resources to meet their bid-in demand, reliability capacity to meet forecasted net load, provide ramp capability to meet their 24-hour net demand variation, and their forecasted ancillary service and imbalance reserve requirements (adjusted for diversity benefit). Similar to EIM, if a balancing authority area fails the resources sufficiency evaluation, this should not limit the ability for others to continue to benefit from transfers. However, at a minimum, a balancing authority area that fails will not be eligible for energy transfers beyond the amount of contracted capacity and transfer capability shown for resource sufficiency into and/or from the balancing authority areas. In addition, the appropriate elements of the EIM resources sufficiency evaluation will continue to apply to all balancing authority areas in the EDAM into the real-time market.

Stakeholders recognized the challenges of accounting for transmission access for resources external to a balancing authority area within the resource sufficiency evaluation, as correct accounting for this transmission is essential to ensuring the reliability of the EDAM results. Stakeholders varied from suggesting that all imports be backed by long-term firm rights, while others suggesting that transmission procured in a shorter time horizon with priority over non-firm transmission be eligible. Stakeholders also brought up the possibility of using e-Tags as a mechanism of showing transmission reservations for resources external to the balancing authority area being shown in a resource sufficiency evaluation. Nearly all stakeholders agreed that the EDAM interaction with how transmission is released by transmission providers under the traditional OATT paradigm needs to be carefully considered. In addition, while additional transmission sales up until the real-time market should be allowed, the majority of stakeholders expressed support for a freeze of OATT transmission bilateral sales during the resource sufficiency evaluation and EDAM's optimization process.

Stakeholders asked for additional details regarding the diversity benefit discussed in the workshop; specifically which forecast the resource sufficiency evaluation would use. Stakeholders also asked if the diversity benefit will be net of the resource sufficiency evaluation requirements, and if so, how will this

reduction be calculated for a balancing authority area? Additionally some stakeholders disagreed with using the diversity benefit to reduce imbalance reserve requirements because they considered it to represent implicit leaning.

The CAISO views the diversity benefit as foundational to the benefit of EDAM, and believes if correctly applied it will not result in unequitable leaning by any single participant. The CAISO is proposing an approach that calculates the diversity benefit by calculating the imbalance reserves requirements for each balancing authority area independently, as well as calculating it for the EDAM footprint as a whole. The diversity benefits will then be distributed pro-rata to each balancing authority area based on the reduction between the summed individual balancing authority area requirements and the EDAM footprint requirement.

Stakeholders asked if the resource sufficiency evaluation will review the internal deliverability of the resources offered. They expressed concern regarding nominated resources being undeliverable or causing routine congestion.

At this time, the CAISO is not proposing to determine the deliverability or cost associated with utilizing capacity prior to performing the resource sufficiency evaluation. Rather the CAISO is proposing rules similar to the EIM resource sufficiency test where resources defined in CAISO's master file must be capable of performing when dispatched, must be realistic and reflect actual operating capability, and should reflect actual historical performance, not simply nameplate values. The CAISO also proposes to develop resource sufficiency metrics, which will aid in identifying balancing authority areas that are not proactively resolving resource sufficiency shortfalls. The day-ahead market will ensure that energy schedules, reliability capacity awards and imbalance reserves are deliverable based upon the transmission limits of the day-head market.

Congestion Revenue and Transfer Revenue

Stakeholders expressed concern regarding the voluntary nature of transmission participation because it can make forward procurement of transmission rights difficult while also creating the incentive for parties to withhold such rights to maximize congestion revenue. Stakeholders indicate this concern is exacerbated with the "all or nothing congestion approach" that currently exists for the distribution of congestion revenue.

To promote the participation of transmission the CAISO is proposing to differentiate between congestion revenue and transfer revenue. Congestion revenue exists in the CAISO's current day-ahead market and results from load paying a higher locational marginal price than generation/imports are paid when there is congestion on the transmission system within the balancing authority area. The CAISO is proposing a new concept called transfer revenue, since there will be multiple balancing authority areas in the EDAM. The transfer revenue concept proposes the calculation of each balancing authority areas specific marginal energy costs. When price difference occur the transfer capability, made available by transmission customers or transmission providers, between balancing authority areas in the EDAM is binding.

Transmission providers will be allowed to make available transfer capability at usage fee. The usage fee or hurdle rate will be included in the market optimization, which will result in transfer revenue collected, which can then compensate the transmission provider. The CAISO believes that this approach will encourage transmission providers to offer additional unsold transmission into EDAM.

CAISO balancing authority area stakeholders questioned how an EDAM congestion revenue allocation would affect the current CAISO congestion revenue rights (CRR) framework. They also asked if the CAISO's CRR rules would be extended to the broader EDAM. Stakeholders also questioned the interaction between the proposed transmission buckets, only a portion of which contain hurdle rates, may affect the CAISO Transmission Access Charge (TAC) applied to the California participants. Stakeholders brought up questions regarding the mechanics of the transmission revenue allocation, given the varying types of potential rights holders on each side of the constraint. These items are discussed further in the body of the paper.

Transmission Provision

Stakeholders broadly supported the voluntary nature of participation as foundational to EDAM, however expressed significantly different perspectives on the meaning of voluntary participation. Some stakeholders expressed a desire for monthly transmission nominations, while others supported offering transmission on an hourly basis each day.

A number of stakeholders within the CAISO balancing authority area expressed concern with a framework that would allow external balancing authority area entities to participate voluntarily with only short-term transmission commitments. This is because transmission providers within the CAISO balancing authority area have to make all of their transmission available in all hours. They are concerned such a disparity in the transmission participation rules may create a structural disadvantage for them relative to participants from balancing authority areas outside the CAISO. The CAISO is committed to an EDAM design that results in net benefits for all participants while ensuring that all participants are on a level playing field.

A number of stakeholders advised that significant additional work is necessary on the EDAM transmission cost recovery design. Some stakeholders supported compensation for the EDAM transmission use of bucket 1 and 2 transmission to ensure no revenue shortfall, while others view this as a sunk cost to serve load.[2] Multiple stakeholders expressed a desire to retain the ability to continue to sell bucket 2 transmission in the bilateral markets under the applicable OATTs on an hourly basis. Stakeholder also expressed the need to honor scheduling rights of transmission customer that elect not to participate in the EDAM. Stakeholders support the concept of a hurdle rate associated with bucket 3 transmission as a potential revenue recovery mechanism that will encourage participation of unsold transmission to the EDAM. Stakeholders requested additional details of how wheeling transactions

[2] The transmission buckets are defined more fully later this document. Briefly, bucket 1 consists of resources sufficiency evaluation transmission from a transmission customer; bucket 2 consists of non-resource sufficiency evaluation transmission from a transmission customer; and bucket 3 consists of non-resource sufficiency evaluation transmission from a transmission provider.

would be accounted for across multiple balancing authority areas. Other stakeholders asked the CAISO instead consider a transmission access charge (TAC) for all buckets of transmission offered in the EDAM. Stakeholders requested examples of how the CAISO's proposal for the provision of transmission would work.

The CAISO is proposing that all offered transmission be eligible for transfer revenue. Bucket 1 transmission is proposed to be required for external resources shown to pass the resource sufficiency evaluation. It also proposes that participant would be able to voluntarily offer bucket 2 and 3 transmission to the EDAM or offer their transmission for sale bilaterally via each balancing authority area's OATT.

Other

Some stakeholders asked that the CAISO consider market design modifications to account for natural gas limitations in their balancing authority area. The CAISO currently offers biddable maximum energy parameters for resources, and has functionality to limit regional gas consumption, currently only authorized application is for the Southern California gas region, if deemed necessary. The CAISO asks for specific examples of the types of issues stakeholders are facing and if the current functionality possessed by the CAISO would be insufficient to address their concerns. Stakeholders also suggested guarantees for cost recovery on the procurement of gas, where nomination timelines do not align with EDAM. The CAISO asks for detailed examples of the specific concerns that stakeholders have so the CAISO can better understand how a solution may fit into the EDAM design.

Stakeholders raised the concern of how the EDAM design would interact with the CAISO's resource adequacy program. They question how the resource adequacy programs must offer obligation would compare to non-CAISO balancing authority areas showings in their resource sufficiency plans. Stakeholders also raised the question if bid trading on resource adequacy resources will be allowed if resource adequacy procurement is beyond what is required in the daily resource sufficiency evaluation. The CAISO believes it should be allowed and plans to address this issue in a future straw proposal; to aid in the development of this policy we ask for comment on how this can be accommodated.

Stakeholders also submitted comments on the potential procurement of ancillary services, if convergence bidding will be extended to EDAM and how the CAISO would propose to administer the EDAM market and addition to its existing market and reliability functions. The CAISO recognizes these concerns and plans to address them as a portion of bundles two and three of the EDAM initiative.

4. Resource Sufficiency Evaluation

Resource adequacy and integrated resource planning are the responsibility of each load serving entity in consultation with their state and local regulatory authority. Distinctly different, the resource sufficiency evaluation addresses leaning at a balancing authority area level since EDAM transfers occur between balancing authority areas and not between load serving entities.

4.1. Principles

The CAISO proposes the following principles for the EDAM resource sufficiency evaluation:

1. Ensure all balancing authority areas can individually meet their capacity, flexibility, and transmission needs with equivalent quality[3] of resources to share in the diversity benefit.
2. Incent making transmission and bid range available for optimal and efficient scheduling.
3. Enable forward trading of energy, reserve capacity and flexibility while accurately accounting for resources.
4. Apply transparent and stable tests equally across the EDAM and EIM footprints.
5. Ensure feasible day-ahead schedules while each balancing authority area remains responsible for its reliability and resource adequacy.

A foundation of EDAM is also to achieve these principles while retaining state or local control over integrated resource planning. The decisions regarding forward procurement of capacity and flexibility for resource adequacy will remain with the utility and balancing authority area in coordination with their state and local regulatory authorities. California has established annual and monthly resource adequacy requirements for utilities in its jurisdiction, while other states establish resource adequacy requirements within their jurisdictions that may differ from California's requirements. Without trying to impose specific resource adequacy requirements across state jurisdictions, EDAM can provide a common framework within its day-ahead time horizon that enable participants share in the diversity benefits across the larger footprint, provided everyone is on starting from a sufficiently resourced level. This section outlines the details for achieving these principles.

4.2. Objectives

As discussed at the February 11 and February 12, 2020 stakeholder workshops, resource sufficiency is critical in enabling EDAM participants to reduce costs and gain market efficiencies through day-ahead unit commitment and scheduling across a larger footprint that provides diversity benefits and helps with renewable integration. There are two major objectives of the resource sufficiency evaluation. The first objective is to prevent balancing authority areas from leaning, by ensuring each balancing authority area brings sufficient resources into the EDAM. The second objective is to ensure that day-ahead awards for EDAM transfers of energy and capacity are reliable so balancing authority areas can trust that other participating balancing authority areas will honor their transfer obligations. Each of these objectives is discussed in further detail below.

Leaning

The primary purpose of the resource sufficiency evaluation is to prevent leaning. Balancing authority areas should not be able to lean on the capacity, flexibility, and transmission of other balancing authority areas to meet their own load serving obligations. For example, if balancing authority area #1

[3] In the event a balancing authority area has higher supply uncertainty because the fleet is composed of a higher percentage of intermittent resources, wind and solar, that balancing authority area will have a higher imbalance reserve requirement in the day-ahead market.

has demand of 10,000 MW and supply of 8,000 MW, expecting the EDAM to cover the 2,000 MW shortfall in supply is considered leaning. Thus, balancing authority area #1 should not be able to procure additional energy or capacity beyond the 8,000 MW they offered into the market. Balancing authority area #1 should bilaterally forward contract prior to the start of the day-ahead market for the 2,000 MW of short-term supply, either as energy capacity or imbalance reserves, to transfer the bid range obligation from the selling balancing authority area.

Reliability of Day-Ahead Awards

Many elements of the resource sufficiency evaluation at the February 11 and February 12, 2020 workshops focused on the reliability of day-ahead awards. The EIM entities discussed multiple market design elements to this effect, including procurement of "high quality" transmission, the amount of uncertainty covered, day-ahead tagging, fuel adequacy, deliverability of internal supply offers, and historical resource performance.

The CAISO proposes that day-ahead market energy and capacity schedules between EDAM balancing authority areas should have the same priority to each balancing authority area as meeting their own load. This is similar to an existing design of the CAISO market. If an export is linked to a non-resource adequacy resource in the CAISO, it has a higher scheduling priority than a spot export that is not linked to a non-resource adequacy resource.[4] An EDAM transfer out of the CAISO should have the same, higher schedule priority as an export linked to a non-resource adequacy resource.

4.3. Diversity Benefit

The diversity benefit allows EDAM balancing authority areas to share flexibility obligations for day-ahead to real-time uncertainty, thus reducing the total quantity of imbalance reserves, being developed in the DAME initiative, needed to cover the net load forecast error across the EDAM footprint. This is similar to the flexible ramping product diversity benefit in EIM. The CAISO is proposing to calculate the diversity benefit for all EDAM participants. The CAISO would calculate the imbalance reserves requirements for each balancing authority area independently, as well as for the EDAM footprint as a whole. The CAISO would then distribute the diversity benefits pro-rata based on the reduction between the summed individual balancing authority area requirement and the EDAM footprint requirement.

4.4. Trading Bid Range

Balancing authority areas or load serving entities within balancing authority areas participating in EDAM will have the ability to trade day-ahead resource sufficiency obligations including energy capacity and flexibility obligations. Trading "bid range" will change each balancing authority area's obligation in the resource sufficiency evaluation. Trading a resource's capacity obligations will increase the capacity requirement of the source balancing authority area and reduce the capacity requirement of the sink balancing authority area. Similarly, trading a resource's flexibility obligations will increase the imbalance

[4] *See* Section 31.4 of the CAISO tariff.

reserve obligation (either imbalance reserve up or imbalance reserve down) of the source balancing authority area and reduce the obligation of the sink balancing authority area.

For example, in the table below, balancing authority area #1 has an imbalance reserve up requirement of 1000 MW and balancing authority area #2 has an imbalance reserve up requirement of 150 MW. Balancing authority area #1 procures 170 MW of imbalance reserve up from three resources in balancing authority area #2. This reduces the imbalance reserve requirement for balancing authority area #1 because they are procuring an obligation to provide this need from balancing authority area #2. Balancing authority area #2 has a higher imbalance reserve up requirement since some of their resources are providing and obligation to provide imbalance reserve up to balancing authority area #1 and balancing authority area #2 still needs to meet its own 150 MW imbalance reserve requirement.

Table 1- Resource Trades and Balancing Authority Area Obigations

	BAA#1	BAA#2
BAA Imbalance Reserve Up Requirement (MW)	1000	150
BAA#1 Procures IRU Resource A		40
BAA#1 Procures IRU Resource B		50
BAA#1 Procures IRU Resource C		80
		170
BAA Imbalance Reserve Up Obligation (MW)	830	320

Figure 1 below also illustrate the change in requirement between the balancing authority area #1 and balancing authority area #2 as a result of the balancing authority area #2's obligation. Balancing authority area #1 will have a lower imbalance reserve up requirement by the amount of the obligation traded to balancing authority area #2. This reduces the amount of imbalance reserve bids needed in balancing authority area #1 to pass the resource sufficiency evaluation.

All obligation trades will pay transmission rates pursuant to the relevant OATT from the source balancing authority area to the sink balancing authority area boundary. This compensates the source balancing authority area for the incremental use of its transmission system. The sink balancing authority is revenue sufficient because load in the sink balancing authority area has already paid transmission to serve their load regardless of whether the load is served through an import or internal generation.

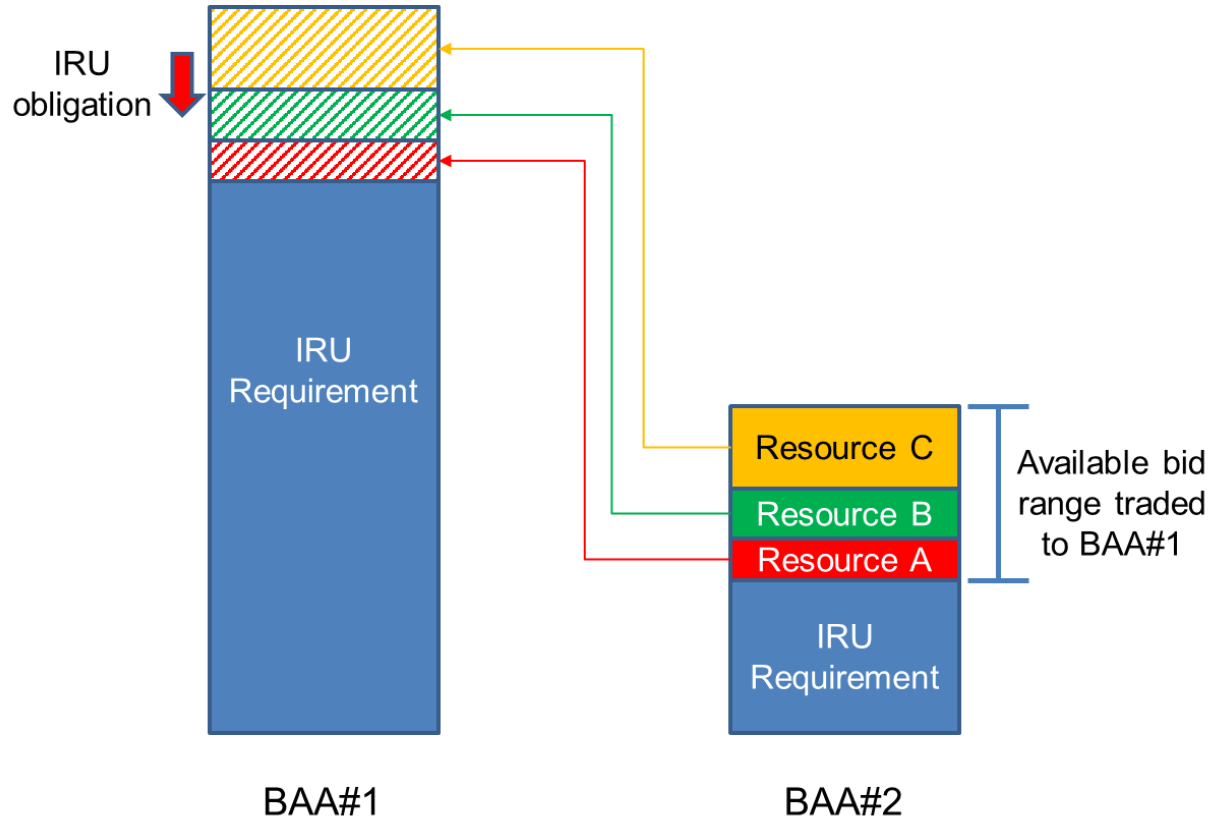

Figure 1- Transferring Imbalance Reserve Obligations

Because EDAM transfers require transmission, trading "bid range" enables the market to capture additional diversity benefits such as ramping differences between EDAM balancing authority areas, that can't fully be realize through the market. For example, in the figure below, balancing authority area #1's load is increasing from 4,000 to 5,000 MW and balancing authority area #2 is moving from 5,000 to 4,000 MW. Using only internal resources, these balancing authority areas would have to ramp their own resources up or down to meet their load (Figure 2). However, collectively there is no ramp across the total system. These balancing authority areas can trade in a way to reduce the ramping needs in their individual balancing authority area footprint. Figure 2 shows balancing authority area #1 exporting 1,000 MW to balancing authority area #2 in hour 1 so that neither balancing authority area has to ramp up or down their internal resources in the following hour. This represents one of many ways balancing authority area #1 and balancing authority area #2 can trade to relieve their respective ramping needs. This trade reduces the cumulative ramping requirement for both balancing authority areas in the resource sufficiency evaluation.

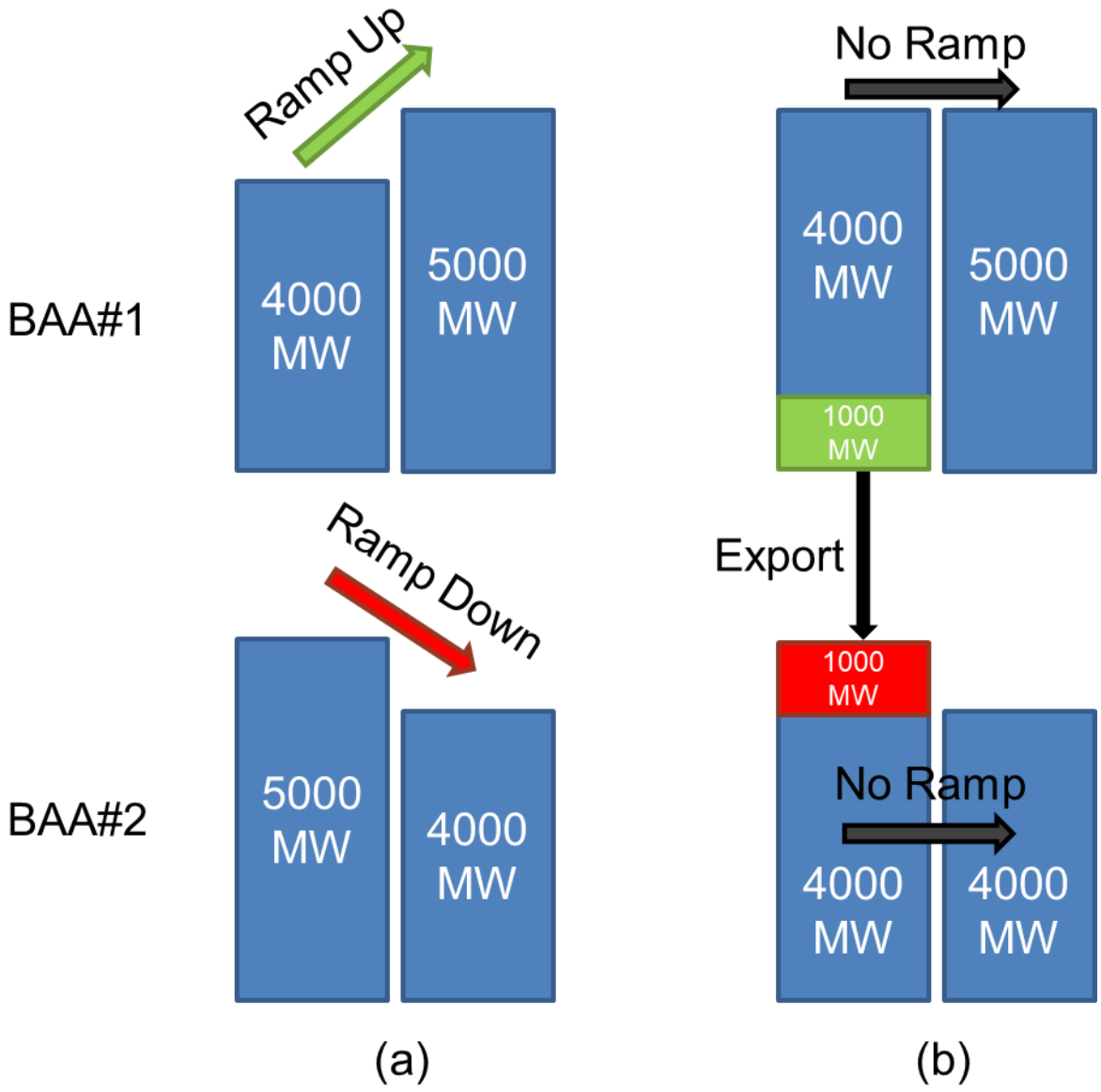

Figure 2 - Meeting Ramping Needs by Trading Bid Range

The CAISO proposes that balancing authority areas working with their load serving entities will have until 10:00am on the day before the trade date to trade and procure their day-ahead obligations bilaterally. To the extent a balancing authority area was not sufficient day-ahead or additional real-time market needs beyond the imbalance reserve requirement materializes, balancing authority areas can still trade bid range obligations up to T-75 of the operating hour in real-time, to meet the EIM resource sufficiency.

CAISO proposes that bids and self-schedules for imports and exports at CAISO intertie scheduling points would not be permitted from or to balancing authority areas participating in the EDAM. All participation

for the EDAM balancing authority area will be at the resource level in its balancing authority area. Since EIM entities may have day-ahead schedules with the CAISO, the EIM does accommodate intertie bidding and bidding at the resource level within the EIM balancing authority area so that the day-ahead schedules can be re-bid into the real-time market. This is not needed in the day-ahead market, because participating resources in the EDAM can be awarded day-ahead energy schedules that serve CAISO load through an EDAM transfers using the same transmission that would be used to meet an import schedule.

Requiring all participation from an EDAM BAA to be at the resource level does not limit an EDAM balancing authority area from providing resource adequacy capacity to CAISO load serving entities. Rather, resource adequacy resources will translate into a trade of obligation for capacity or imbalance reserves in the source balancing authority area and a reduction in the CAISO's balancing authority area capacity or flexibility obligation. This is essentially the same as trading "bid range" between two EDAM balancing authority areas.

The CAISO recognizes that it would be beneficial to facilitate bid trading on resource adequacy resources if resource adequacy procurement is beyond what is required in the daily EDAM resource sufficiency evaluation. The CAISO plans to address this issue in a future straw proposal. Stakeholder comments on this straw proposal will inform the formulation on how this can be accommodated.

4.5. Timeline

Today, bids into the CAISO's day-ahead market can be submitted up to seven days in advance. This will also be the case for EDAM. CAISO's business practice manuals will document details of the CAISO tariff's criteria for the resource sufficiency, as described in subsections below and implemented in the bidding portal and supporting systems.[5] Technical documentation will describe the electronic interfaces that can enable integration with market participants' own business systems. EDAM entities including the CAISO can verify in advance that their submitted bids would pass the resource sufficiency evaluation within that seven-day window given the current forecast, allowing for adjustments well in advance of the binding test if necessary. This would be advisory information only – not to impact the day-ahead market timeline. It is undetermined whether the CAISO will provide this tool or whether EDAM entities will be responsible for this functionality on their own. If CAISO provides a system for testing whether submitted bids meet the resource sufficiency criteria, the tool would allow EDAM entities to validate and manage their schedules, but if EDAM entities develop the tools themselves, they could enable customized integration with their scheduling and other business systems.

[5] As further described in subsections below, the resource sufficiency criteria include:

- Capacity Test – whether economic bids are sufficient to meet load forecasts, reserve requirements, and imbalance energy requirements
- Cumulative Ramp Test - whether ramping capability is sufficient to meet forecasted requirements across multiple time intervals.

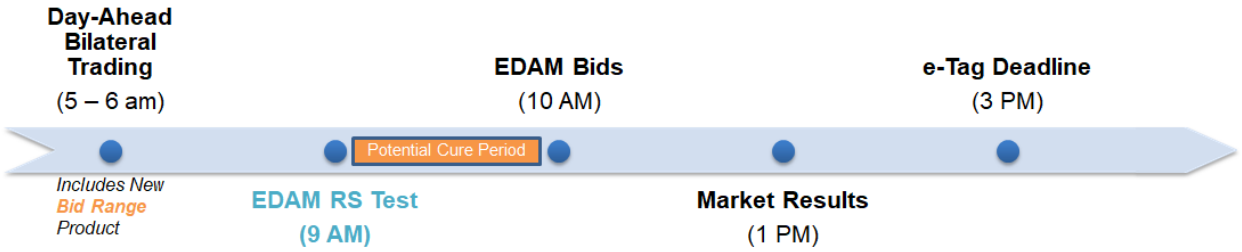

Figure 3 - Proposed Resource Sufficiency Evaluation Timeline

As an initial step in the day-ahead market, preliminary targets for market requirements will be set at 5:00 AM (Pacific prevailing time) to help inform bilateral trading. The final requirement for load and variable energy resources will be set at either 8:00 or 9:00. The EDAM resource efficiency evaluation will begin at 9:00 AM, with informational tests occurring at 9:30 and 9:45 to allow balancing authority areas to make adjustments in pursuit of passing. The time by which the forecast will be fixed for the binding resource sufficiency evaluation remains to be determined via this stakeholder process. Fixing the forecast at between 5:00 AM and 8:00 AM would give the balancing authority areas more time to react to pass the test but the forecast would be less accurate (the market runs at 10:00 AM using the 10:00 AM demand forecast). Fixing the forecast at 9:00 AM would give balancing authority areas less time to react before the market closes but would be more accurate relative to the forecast used to run the market. The CAISO asks that stakeholder comment on the correct time and balance between this tradeoff.

The market will close at 10:00 AM and market results will be published by 1:00 PM, consistent with today's day-ahead market. The e-Tag deadline will be 3:00 PM, and serves as a final validation of EDAM's awarded schedules prior to EIM's real-time resource sufficiency evaluation.

4.6. Eligible Supply

The CAISO proposes that all self-schedules and certain economic bids can count towards the resource sufficiency evaluation. For example, the following resources can be used to meet demand and upward flexibility requirements:

- All internal supply, including generation and other qualified supply resources
- Trade obligations of capacity or flexibility from another EDAM balancing authority area
- Resource sufficiency evaluation import schedule (not bids) from a non-EDAM balancing authority area
- CAISO resource adequacy imports (modeled via full network model phase 2) from non-EDAM balancing authority areas

The following will increase the demand and downward flexibility requirements:

- Trade obligations of capacity or flexibility to another EDAM balancing authority area

- Resources sufficiency evaluation export schedules (not bids) to a non-EDAM balancing authority area
- CAISO resource adequacy exports (modeled via full network model phase 2) from non-EDAM balancing authority areas

The following economic bids should not count toward the resource sufficiency evaluation:

- Virtual supply
- Virtual demand
- CAISO non-resource adequacy imports from non-EDAM balancing authority areas
- CAISO non-resource adequacy exports to non-EDAM balancing authority areas

CAISO will propose to also use these EDAM rules for imports and exports for EIM's real-time resource sufficiency evaluation upon implementation of the EDAM.

Resources as accepted in CAISO's master file must be capable of performing when dispatched, must be realistic and reflect actual operating capability, and should reflect actual historical performance, not simply nameplate values. Fuel limitations, ambient de-rates, outages, and other restrictions known prior to the day-ahead market must be reported into CAISO's outage management system prior to the final EDAM resource sufficiency evaluation. The market optimization process discussed in other sections will ensure deliverability of the awarded schedules.

4.7. EDAM Resource Sufficiency Evaluation

Each EDAM balancing authority area must have sufficient self-schedules and economic bids from physical supply resources to independently meet the following:

- Bid-in demand
- Bid-in supply with ramp capability to meet 24-hour net demand variation
- 100 percent of forecasted ancillary services requirement
- Reliability capacity to meet forecasted net load
- Imbalance reserves up and down (IRU/IRD) less the diversity benefit

The CAISO determines a day-ahead forecast for each balancing authority area. The CAISO forecast for each balancing authority area's load and variable energy resources will be updated regularly so that balancing authority areas can continuously get updated information on the various requirements and targets. EIM/EDAM scheduling coordinators can also use a third party forecast provider for load and variable energy resource forecasts. As described above, CAISO will provide advisory information before the market closes to inform balancing authority areas whether they are meeting their requirements.

Ancillary services will be optimized in the day-ahead market, but each balancing authority area is initially expected to self-provide their ancillary service obligations and will be tested as such in the resource sufficiency evaluation. The CAISO and stakeholders will consider the possibility of trading ancillary

services between balancing authority areas and/or economically offering ancillary services in the day-ahead market in a future bundle two.

Capacity Test

The CAISO proposes an hourly capacity test will be conducted with the following criteria:

- The sum of regulation down offers must be greater than or equal to the balancing authority area's regulation down requirement.
- The sum of regulation up, spinning reserve, and non-spinning reserve offers must be greater than or equal to the balancing authority area's regulation up, spinning reserve, and non-spinning reserve requirements, as determined by NERC standards and reserve sharing group obligations (with which EDAM will maintain consistency).
- The sum of imbalance reserve up offers must be greater than the balancing authority area's imbalance reserve up requirement (minus the diversity benefit).
- The sum of imbalance reserve down offers must be greater than the balancing authority area's imbalance reserve down requirement (minus the diversity benefit).
- There must be enough economic energy offers to meet the imbalance reserve requirements in both directions. (Self-schedules do not contribute to meeting imbalance reserve requirements.)
- There must be enough upward capacity relative to forecasts to meet the sum of regulation up, spinning reserves, non-spinning reserves, and imbalance reserves up requirements.
- There must be enough downward capacity relative to forecasts to meet the sum of regulation down and imbalance reserves down requirements.
- The capacity test only compares bids to requirements, and does not ensure congestion feasibility.
- To the extent the CAISO identifies there are congested areas within a balancing authority area, there may be a need to do sub-regional capacity tests.

Restating these requirements visually:

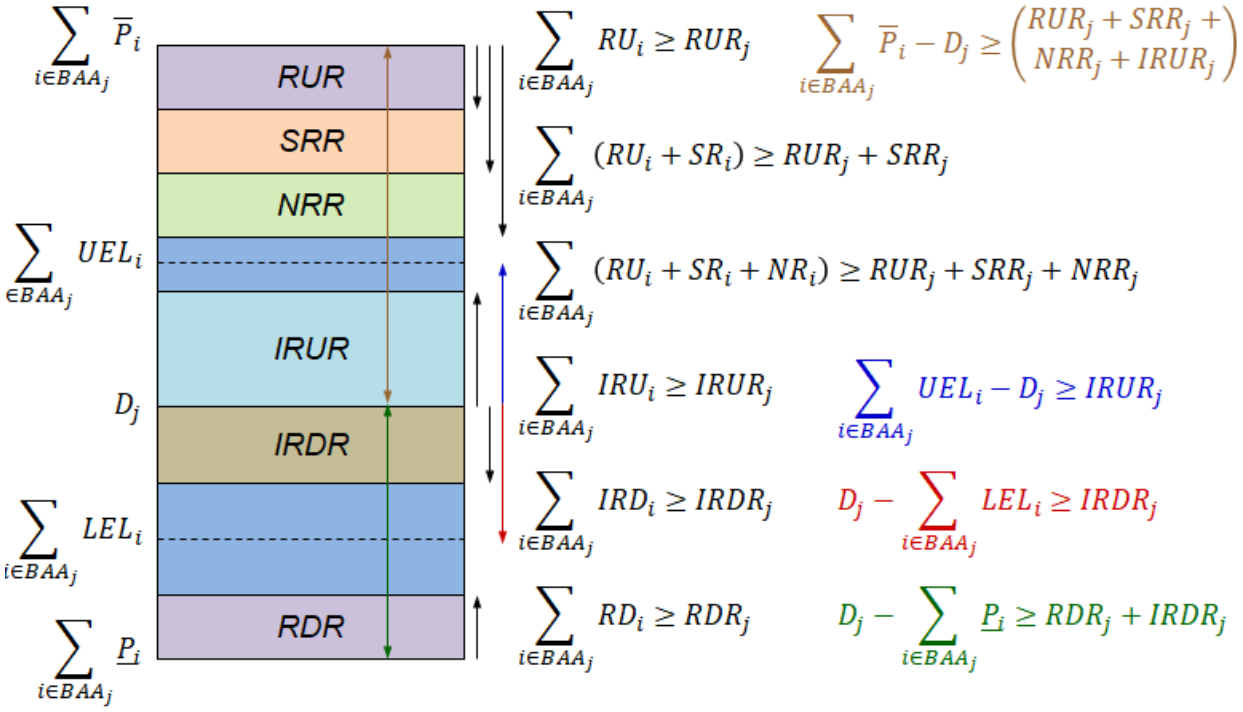

Figure 4 - Capacity Test

Cumulative Ramp Test

A cumulative ramp capability test will be conducted with the following criteria:

- If the movement in demand over some consecutive time horizon is upward, each balancing authority area must have sufficient upward ramp capability to meet its demand plus imbalance reserve up requirement in each of the intervals
- If the net movement in demand over some consecutive time horizon is downward, each balancing authority area must have sufficient downward ramp capability to meet its demand minus the imbalance reserve down requirement in each of the intervals

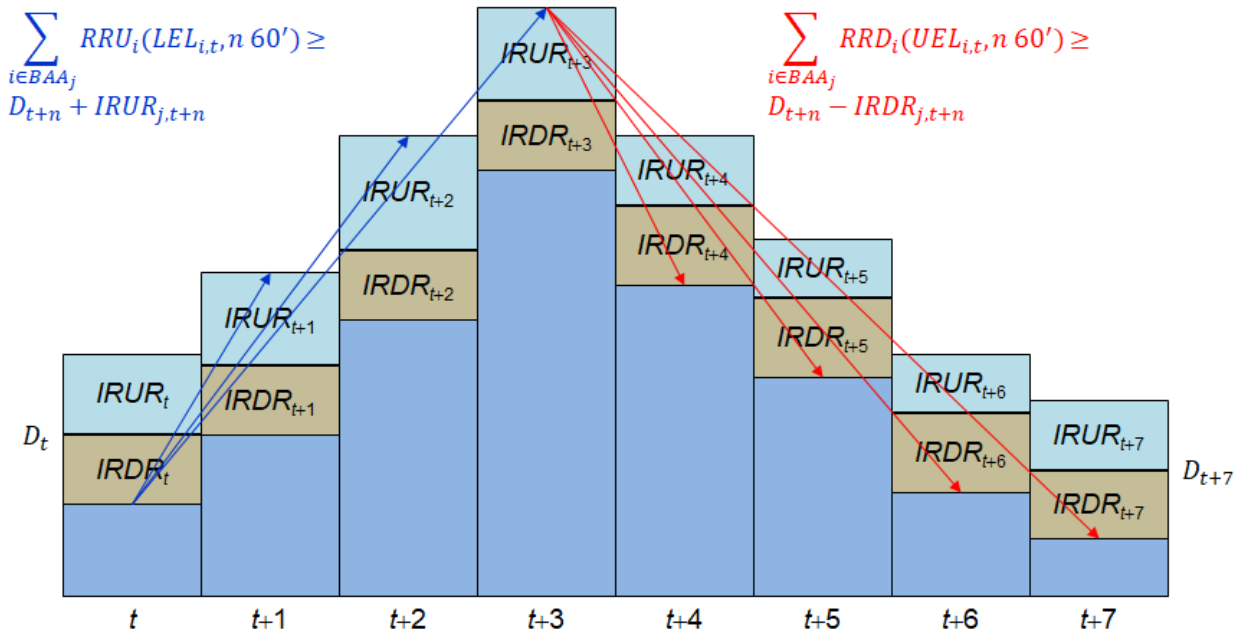

Figure 5 - Cumulative Ramping Test

4.8. Consequence of Test Failure

If a balancing authority area fails either the up or down capacity test for an hour, they will also fail the up or down ramp capability test for that hour. Failing the up or down ramp capability test for an hour means:

- Transfers (i.e., exports minus imports) net of all energy *plus* IRU /energy *minus* IRD will be limited from below/above in that hour to the net of declared energy *plus* IRU/energy minus IRD transfers on the transmission used in the resource sufficiency evaluation
- Transfers (*i.e.*, exports minus imports) net of up/down ancillary services will be limited from below/above in that hour to the net of declared up/down ancillary service transfer on the transmission used in the resource sufficiency evaluation

The EDAM will still optimize a failing balancing authority area's internal resource and provide a financially binding day-ahead schedule. If a balancing authority area fails the day-ahead resource sufficiency evaluation, the expectation is the balancing authority area will seek to address its insufficiency following EDAM's day-ahead process, prior to the real-time EIM market submissions.

- The balancing authority can enter into obligation trades with other EDAM balancing authority areas prior to the operating hour.
- It can manually dispatch or exceptionally dispatch internal supply that it did not offer into the day-ahead market.

CAISO considers the approach of limiting EDAM's transfers between balancing authority areas to be more workable than approaches that would allow unlimited transfers with financial charge beyond the limits that CAISO proposes to enforce. If the financial charges were simply to reflect hourly energy prices, the incentives for compliance could be inadequate. If the charges were to reflect the costs of building new capacity, they would significantly exceed the costs of scheduling additional energy prior to EIM's time horizon to make up for shortfalls after EDAM. The proposed limits on EDAM's transfers between balancing authority areas provides the opportunity for balancing authorities to cure the shortfalls at their own actual costs, instead of imposing an administratively determined cost.

CAISO also considers the balancing authority area to be the appropriate level for applying EDAM's resource sufficiency evaluation. The CAISO understands that in many cases, the load serving entities in the EDAM areas may be the load serving entity for the entire balancing authority area. However, the test would evaluate the ability to meet the resource sufficiency criteria as an entire balancing authority area and the consequences of failing the test would apply to the balancing authority area as a whole. In the case of the CAISO, even though individual load serving entities within its area may not meet similar resource sufficiency criteria, the CAISO balancing authority area as a whole must do so. With multiple load serving entities in a balancing authority area, diversity in their load and resource balances may offset each other so that the balancing authority area becomes resource sufficient even if some load serving entities are not individually balanced. If a balancing authority has a need to track the compliance of individual load serving entities, one possible solution that is currently available would be to establish separate default load aggregation points (DLAP) or develop sub-area concepts, with separate child resource IDs under a parent resource ID, like some utilities do within the CAISO balancing authority area. If the EDAM participant chooses this option, making a load serving entity financially responsible through the balancing authority's own tariff for a distinct default load aggregation point, would force the load serving entity pay the DLAP's real-time price for the cost of any day-ahead under-scheduling. Using the child resource ID for scheduling an individual load serving entity's demand would then enable the balancing authority to match the forecasted or scheduled demand with the load serving entity's resources and then use this comparison through provisions in its own tariff to establish a compliance mechanism as needed.

4.9. EIM Resource Sufficiency Evaluation

In EIM's resource sufficiency evaluation, EDAM balancing authority areas will be subject to the same real-time standards as EIM balancing authority areas, but will benefit from EDAM having already established feasible schedules, including imbalance reserves to cover uncertainty between the day-ahead and real-time market. However, because EDAM has ensured that its awarded schedules are feasible and balanced, only the capacity and flexibility tests are needed in EIM's resource sufficiency evaluation. In summary:

	EIM balancing authority area only	**EDAM balancing authority area**
Feasibility	Advises if there is unresolved congestion in base schedule	N/A because EDAM day-ahead schedules resolve congestion

Balance	Determines if balancing authority area is subject to over- or under-scheduling penalties	N/A because EDAM day-ahead schedules are balanced
Capacity	Tests for sufficient economic bids to meet 15-minute load forecast. Transfers are limited if failed.	Tests for sufficient economic bids to meet 15-minute load forecast. EIM transfers limited if failed, day-ahead schedules allowed.
Flexibility	Tests for sufficient ramping capability to meet 15-minute load forecast + flexible ramping product. Transfers are limited if failed.	Tests for sufficient ramping capability to meet 15-minute load forecast + flexible ramping product. EIM transfers limited if failure, day-ahead schedules allowed.

The day-ahead schedule for energy and imbalance reserves carries an obligation into real-time. The upper bid range for participating resources is the energy + imbalance reserve up + reliability capacity up schedules/awards. The lower bid range is the energy – imbalance reserve down – reliability capacity down schedules/awards. Participating resources can self-schedule energy in real-time up to their lower bid range. Balancing authority areas must have sufficient economic offers to cover their net imbalance reserve obligation (upper bid range – lower bid range).

Imbalances in net load between day-ahead and real-time may necessitate a balancing authority area to provide additional economic bids. For example, a balancing authority area needs more incremental economic bids if the sum of the net load imbalance and real-time flexible ramping product up requirement is greater than the day-ahead imbalance reserve up requirement. Conversely, a balancing authority area needs more decremental bids if the sum of the net load imbalance and the real-time flexible ramping down requirement is greater than the day ahead imbalance reserve down requirement.

However, the purpose of imbalance reserves and reliability capacity is to ensure that the EDAM footprint has sufficient real-time economic offers from participating resources collectively. The CAISO proposes to test the EDAM footprint for real-time resource sufficiency considering day-ahead awarded imbalance reserve and reliability capacity prior to determining if an individual EDAM balancing authority area should be tested for EIM resource sufficiency. If the real-time imbalance plus flexible ramping product requirement can be met for the EDAM footprint, then the real-time market can resolve the real-time need using the real-time must offer obligation from imbalance reserve and reliability capacity awards. Since both energy and capacity product awards result in EDAM transfers, there is also transmission available to support the EIM transfers necessary to resolve the EDAM footprint real-time imbalance need.

4.10. Review Process

For its own ongoing reviews of market performance as well as meeting the interests of stakeholders and other interested parties, CAISO will include reviews of EDAM performance. After the start of EDAM operations, CAISO will implement reporting on day-ahead resource sufficiency evaluation metrics and a corresponding review process. The CAISO plans to leverage the market performance and planning forum

to review metrics for this purpose. The CAISO also plans to include the resource sufficiency evaluation assessment results in future market performance reports.

4.11. Topics to Be Addressed in a Future Straw Proposal

This straw proposal outlines the foundations for EDAM's resource sufficiency evaluation, but meaningful discussion of certain related topics may depend on refinements to these proposals. Nevertheless, stakeholder input on these topics will assist CAISO's further development of the resource sufficiency framework:

- Whether additional replacement reserves would be necessary
- How losses can be incorporated in the resource sufficiency evaluation
- Geographic fuel adequacy
- Clarity of roles of load serving entities versus balancing authority area

5. Transmission Provision

EIM participants make transmission available to support energy transfers through contributions of interchange rights holders or available transmission capacity. This transmission supports energy transfers between balancing authority areas at no transmission usage rate. These two methods are different for different participating balancing authority areas. Interchange rights holders have procured transmission, and on a voluntary basis have chosen to allow the transmission to be used for transfers. Available transmission capacity is residual transmission, *i.e.*, unused after the T-20 e-tagging deadline, with EIM transfers as the lowest priority use of the transmission. That is, if in real-time the transmission is used bilaterally and therefore not available to the EIM for transfers, the market will re-dispatch participating resources to ensure EIM transfers stay within the unused portion.

EDAM will require a different approach than EIM. Transmission customers can use transmission in real-time up until just prior to the operating hour, however the EDAM design cannot assume all transmission available in the day-ahead timeframe will remain unused by real-time. At the same time, transmission for EDAM day-ahead schedules for energy, ancillary services, reliability capacity and imbalance reserves must available with high confidence since each balancing authority area remains responsible for meeting its balancing authority area reliability requirements. Energy and ancillary services are products that are currently scheduled bilaterally between balancing authority areas with transmission service that determines the firmness of the service. Reliability capacity and imbalance reserves will be new products that must have the same level of transmission firmness as energy and ancillary services. If availability of day-ahead schedules, including reliability capacity and imbalance reserve awards, are doubtful, the sink balancing authority area may decide to commit additional internal resources to backfill the day-ahead schedules that it does not have full confidence will be available in real-time. This would diminish EDAM benefits. As a result, transmission to support EDAM transfers must have the same curtailment priority as internal load in each balancing authority area in order for energy and capacity schedules from the source balancing authority area to the sink balancing authority area to assure confidence for the sink balancing authority area.

5.1. Principles

The CAISO proposes the following principles for EDAM transmission design:

1. Fair and open access while maximizing transmission system usage while respecting long-term scheduling rights and other contractual arrangements.
2. Support efficient transmission investment while maintaining local control over transmission planning and investment decisions.
3. Incent transmission availability while maintaining voluntary participation.
4. Maximize efficient scheduling of energy and reserves.
5. Complement bilateral trading and provide additional transparency to improve forward resource planning.

5.2. Internal transmission limits determined by EDAM balancing authority

Under the CAISO's proposal, EDAM balancing authorities will provide the CAISO with the transmission limits for their system to be used in the day-ahead market. The CAISO believes different consideration may be appropriate for transmission internal to the balancing authority area and transmission to support exports out of its balancing authority area. The EDAM balancing authority area may elect not to release all transmission to the day-ahead market, since transmission customers can elect to use transmission, for example, to support bilateral trades, up until 20 minutes prior to the operating hour (T-20). If the transmission is used to support day-ahead schedules, and subsequently if a transmission customer elects to use transmission after the day-ahead market, the real-time market will need to re-dispatch EDAM participating resources. The cost of this re-dispatch is included in the real-time congestion offset, which is calculated for each balancing authority area individually so costs are not shifted between balancing authority areas. However, if the transmission was not included in the day-ahead market and subsequently a transmission customer elects not to use it prior to the real-time market, day-ahead market congestion may occur resulting less efficient or constrained schedules than the physical capability of the internal transmission system warrants. The cost of this inefficiency may sometimes be greater than the potential for re-dispatch resulting in real-time congestion offset charges.

Based on historical experience, the CAISO has determined not to limit nor compensate for parallel use of internal physical transmission capability due to unused transmission rights. However, the CAISO will respect such rights providing a perfect congestion hedge and re-dispatching other resources when the transmission is actually used in accordance with their rights[6] in the day-ahead and up until the final schedule deadline in real-time. This approach ensures the day-ahead flows accurately reflect the day-ahead schedules using the physical transmission system at the time of the day-ahead market. In addition, the CAISO notes that many existing transmission customer transmission moved to participating in the CAISO market as the customer realized the benefits of economically serving their load from the CAISO footprint and not their specific generation or imports. We are seeking feedback how physical

[6] Refer to CAISO Tariff Section 17.2.

transmission capability internal to an EDAM balancing authority area should be considered in the EDAM model and optimization while honoring non-participating rights on internal transmission.

Another potential approach to address the situation that transmission customers may use their scheduling rights after the day-ahead market is to self-schedule point-to-point transmission in the day-ahead market to represent the potential use after the day-ahead market. This will more accurately represent potential flows in the real-time market than limiting the transmission limits used in the day-ahead market. However, this can result in a day-ahead settlement for the difference in the price at the self-schedule's source and sink. It may also result in real-time market settlement as not all of these placeholder schedules will not flow in real-time.

5.3. Transmission to enable EDAM transfers

The CAISO proposes three buckets on transmission to enable EDAM transfers based upon discussion with stakeholder and their written comments. The transmission to support EDAM transfers is made available by transmission customer who have purchased export capability from the transmission provider, i.e. the balancing authority area. Since this transmission is purchased prior to the start of the day-ahead market, the transmission can be used with no incremental cost. In addition, the transmission provider can make available export transmission. Since this transmission has not be paid for by a transmission customer, it is made available for a usage fee which is used to compensate the transmission provider for the incremental use of its transmission system.

Resources sufficiency evaluation transmission from transmission customer (bucket 1)

In order to count an external resource towards a balancing authority area's day-ahead resource sufficiency evaluation, the load serving entity participating in the EDAM must purchase transmission from the source balancing authority area to the sink balancing authority area. Since the transmission must be purchased prior to clearing the day-ahead market, the cost of transmission is a sunk cost and does not need to be considered when determining optimal day-ahead schedules. In addition, the participating load serving entities would have had to procure the transmission on the intervening balancing authority area to accomplish this transaction even if the EDAM did not exist. This transmission enables EDAM transfers without a usage fee or hurdle rate. This transmission can be used to optimally schedule energy, ancillary services, reliability capacity and imbalance reserves across the EDAM footprint. The transmission customer will receive the transfer revenue, under the appropriate CAISO or balancing authority areas OATT rules, from the source EDAM balancing authority area, intermediate EDAM balancing authority areas and the sink EDAM balancing authority area.

Non-resource sufficiency evaluation transmission from transmission customer (bucket 2)

Transmission customers can also make available transmission that is not needed to pass the resource sufficiency evaluation in return for transfer revenues. This transmission also enables EDAM transfers without a usage fee or hurdle rate. The transmission can be used to optimally schedule energy, ancillary services, reliability capacity and imbalance reserves across the EDAM footprint. The transmission

customer will receive the transfer revenue, under the appropriate CAISO or balancing authority areas OATT rules, from the balancing authority areas from which it has purchased the transmission.

Non-resource sufficiency evaluation transmission from transmission provider (bucket 3)

Transmission providers can make incremental export unsold transmission available to support EDAM transfers. This transmission will include a usage fee to compensate the transmission provider for incremental use of its transmission system. There is no usage fee in the import direction since there is not incremental use of that balancing authority area's transmission system. The usage fee will be set by each balancing authority area according its OATT. For the CAISO balancing authority area, the CAISO proposes a usage fee equal to the variable portion of its wheeling access charge proposed for future implementation as part it Transmission Access Charge Structure Enhancements initiative.[7] The transmission provider also will receive transfer revenue associated with the transmission it makes available, which may exceed the usage fee. The transmission provider allocates these revenues according to its OATT. The CAISO proposes to allocate its transfer revenues to CAISO participating transmission owners in a manner similar to the wheeling access charge.

The usage charge should incentivize forward contracting with the most efficient resources, which will increase the quantity of bucket 1 transmission made available to the EDAM. Forward contracted external resources used for the resource sufficiency evaluation pay pancaked transmission rates to the extent the energy moves through multiple balancing authority areas. In return, the load serving entity receives the transfer revenue associated with being the transmission customer. However, the day-ahead market may determine that it is economic to schedule different external resources and pay an incremental usage fee for transmission. This provides feedback to the load serving entity that there is a more efficient way to forward contract, with the supply if it is being regularity economically scheduled in EDAM. In doing so, the load serving entity could receive the transfer revenue that is currently compensating the transmission provider for incremental use of its transmission system.

5.4. Establishing transfer limit between two EDAM balancing authority areas

Similar to the EIM, the transfer limit between two balancing authority areas is established based on transmission made available from both balancing authority areas. The export transmission capability is established by the source (exporting) EDAM balancing authority area. Import transmission capability is established by the sink (importing) EDAM balancing authority area. In the market, the lower of the export or import establishes the EDAM transfer limit. For example, assume the export EDAM balancing authority area transmission capability is 500MW and the import EDAM balancing authority area transmission capability is 400MW. The transfer limit in the market will be set at 400MW. If there are multiple balancing authority areas at an interties schedule point, then anintertie schedule constraint will be modeled and the transfer limit for an individual balancing authority area may not be limited. This is discussed further in the congestion revenue section.

[7] Additional information is available at http://www.caiso.com/StakeholderProcesses/Transmission-access-charge-structure-enhancements

5.5. Diversity benefit limited by EDAM transfer limit

The diversity benefit is the pro-rata reduction in a balancing authority area's imbalance reserve requirement because the system uncertainty is less than the sum of individual balancing authority areas uncertainty in the EDAM footprint. This results in each balancing authority area having a lower imbalance reserve requirement. If a balancing authority area has an import transfer capability that is less that its imbalance reserve up diversity benefit this will reduce the reduction in its balancing authority area requirement. Likewise, if a balancing authority area has export capability less that its imbalance reserve down diversity benefit, there will be a resulting reduction in its balancing authority area requirement. All transmission that is contributed will count towards the full diversity benefit, including export transfer capability made available by the transmission provider with a usage fee. Thus, a balancing authority area could receive its full diversity benefit even if bucket 1 or bucket 2 transmission is not made available.

5.6. Regional transmission charge

It has not yet been determined whether there should be a regional transmission charge for spot imports and exports with balancing authority areas that are not in the EDAM footprint. It is possible that imports and exports at the EDAM boundary are wheeled through other EDAM balancing authority areas, and do not just use transmission in balancing authority area in which the import or export crosses the EDAM's geographical boundary. The regional transmission charge would be charged to exports from the EDAM footprint and would be shared among all balancing authority areas in the EDAM footprint, not just the balancing authority areas on the boundary of the EDAM. The CAISO proposes to address this issue in bundle 3 when discussing external resource participation.

5.7. EIM Wheeling Charge

The usage charge for bucket three transmission, made available by the transmission provider, could also potentially be used to compensate for incremental transmission use in the EIM. This would provide consistency between the day-ahead market and the real-time market. The real-time market may determine it is economic to schedule an external resource and incur the transmission charge. Charging different transmission rates in the day-ahead and real-time markets could result in changes to energy schedules because market considers the cost of transmission in the day-ahead market but not in the real-time market. In addition, it would address the concern for wheeling in the EIM that the CAISO has been monitoring. The concern is that an EIM balancing authority area may have wheels through its system that exceed the sum of the EIM transfer in and transfer out of that balancing authority area.

6. Transfer and Congestion Revenue Distribution

Congestion occurs in the market when lower cost generation cannot be fully dispatched to serve load because there are transmission constraints between the generation and load. As a result, load pays a higher locational marginal price than what the generation is paid at its location. As the market operator

the CAISO must allocate this over-collection of revenue associated with congestion. In practice, this congestion revenue is allocated either to those who have been allocated or procured congestion revenue rights or allocated to measured demand via settlement of congestion balancing and offset accounts.

6.1. Principles

The CAISO proposes the following principles for transfer revenue and congestion revenue distribution:

1. Allocate revenues to those long term exports and internal transmission customers who are paying for the long term investment in transmission
2. Distribute revenues equitably to support flexibility of meeting transmission customer needs with the proposed EDAM transmission buckets
3. Incent long term forward procurement of transmission for resource sufficiency evaluation
4. Respect long term traditional bilateral scheduling rights
5. Provide accurate accounting of congestion revenues between balancing authority areas in the EDAM

6.2. Difference between transfer revenue and congestion revenue

In Figure 4 below, a load serving entity in BAA 3 has forward contracted with a generator in BAA 1. The load serving entity includes the obligation created by the contract with generation in BAA 1 as supply for its resource sufficiency evaluation. In order to move the generation to its load, the load serving entity is a transmission customer of each balancing authority area shown. The load serving entity will submit an e-Tag, which when approved by the source/sink balancing authority areas, will create the EIM/EDAM transfer system resource (ETSR) that enable EDAM transfer to occur. The load serving entity is a transmission customer of BAA 1 from its generator to the export scheduling point. An ETSR is created from BAA 1 to BAA 2. The same load serving entity is also a transmission customer of BAA 2 in order to wheel the supply though. This creates another ETSR to support transfers between BAA 2 and BAA 3. Lastly, it is a transmission customer of BAA 3 to serve its load with the imported supply. When price differences between what its contracted generation is paid and what the load aggregation point charges, the load serving entity will need to a hedge. This is accomplished through the congestion revenue from price differences between generation/import and export/load aggregation points within a balancing authority area and transfer revenue to cover price differences between balancing authority areas.

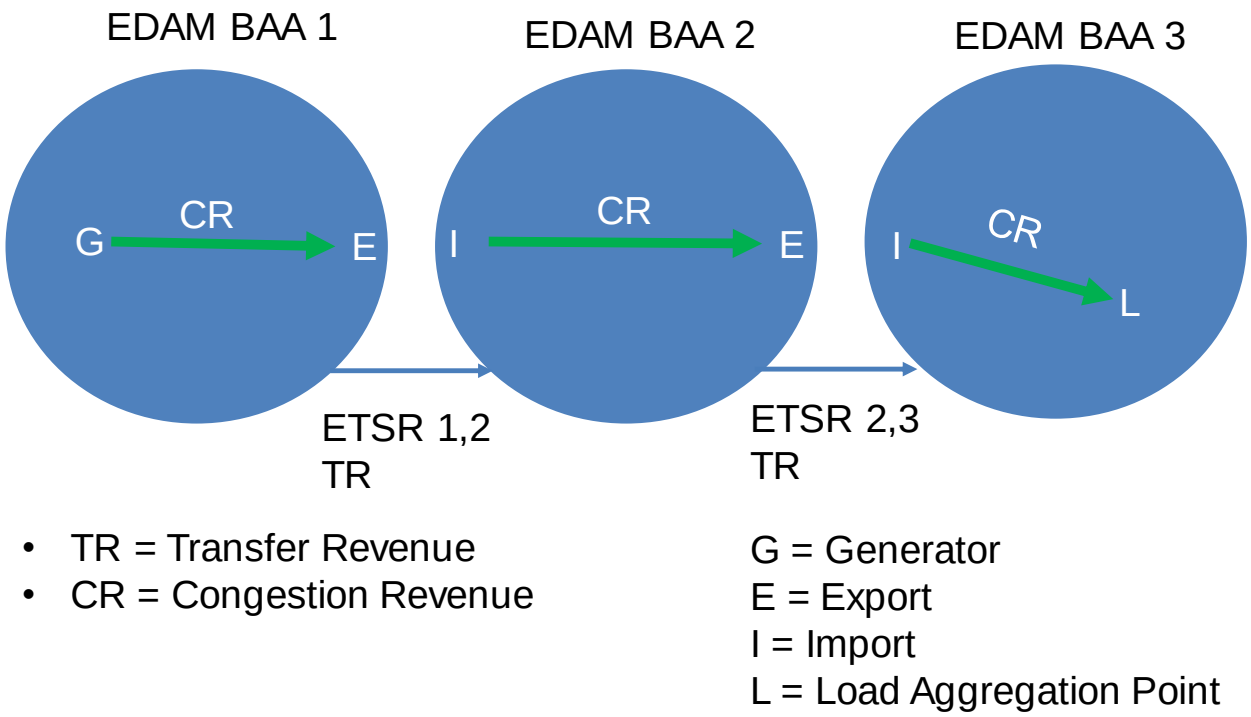

Figure 6 - Example of transfer revenue and congestion revenue

Transfer revenue

Transfer revenue is a new concept that the CAISO plans to implement for the both the day-ahead market and real-time market as part of the EDAM implementation. It is similar to the existing congestion revenue, which is the excess revenue resulting from load having a higher price than supply, but will be a separate amount calculated for energy transfers between balancing authority areas.

Currently, the CAISO does not explicitly settle EIM transfers as an import into the sink balancing authority area and as an export from the source balancing authority area at an intertie scheduling point. Currently, when EIM transfers limits are binding, the congestion costs attributable to the transfer limits are included in the marginal congestion component of the locational marginal price of resources within the source balancing authority area.

Under the EDAM construct, when transfer limits are binding this will result in a different marginal cost of energy for the source balancing authority area and the sink balancing authority area. There will no longer be a single system-wide marginal cost of energy, as each balancing authority area's marginal cost of energy will be determined by its power balance constraint shadow price. This removes the price differential between balancing authority areas from the marginal cost of congestion.

As a result, transfer revenue is the difference between the power balance constraint shadow price between the source and sink balancing authority area. If a balancing authority area's import capability is

binding, the marginal cost of energy in its balancing authority area will be higher than balancing authority areas exporting to that balancing authority area. The difference results in transfer revenue.

Transfer revenue from bucket 3 transmission is allocated 100% to the transmission provider in order to ensure the full usage fee is returned to the transmission provider. For transmission revenue from bucket 1 and bucket 2 transmission there are two options: 50%/50% between source/sink balancing authority areas and 100% to the source balancing authority area. The ISO proposes that 50%/50% split of bucket 1 and bucket 2 when the transfer is an EDAM to EDAM entity transfer path provides a balance of incentives and sharing of benefits of EDAM transfers.

Another open issue is if the transfer revenue is settled directly by the CAISO with the transmission customer or with EIM/EDAM entity scheduling coordinator representing the balancing authority area. If the latter, this will enable each EDAM balancing authority area to sub-allocate the transfer revenue to its transmission customers in accordance with its OATT. If the former, this will assure uniform settlement of transfer revenue across the EDAM footprint.

Congestion revenue

Congestion revenue is the difference between marginal congestion component of internal supply nodes and internal demand nodes. Internal supply nodes include generation at their location and imports at their intertie schedule points. Internal demand nodes include load at its load aggregation point and exports at the intertie schedule point. While load is settled at load aggregation points, load distribution factors distribute the load aggregation point to individual load withdrawal nodes. Currently, the CAISO uses congestion revenue rights to distribute congestion revenue to CAISO load serving entities who are responsible for paying for the CAISO transmission system.

The CAISO allocates congestion revenue rights to load serving entities. On an annual and monthly basis, load serving entities can nominate, up to their load forecast, source/sink pairs based upon how they plan to meet their load. Currently , an out of balancing authority area load serving entities can also nominate source/export pairs if the load serving entity has prepaid on a monthly basis the CAISO's wheeling access charge. As discussed below, EDAM entities may elect to adopt similar congestion revenue treatment for out of balancing authority area load serving entities in its balancing authority area. In which case, the out of balancing authority area load serving entity will become a CRR holder. If an EDAM entity does not elect to adopt congestion revenue rights, it will need to develop an alternative settlement directly with the transmission customer.

The CAISO will settle congestion revenue directly with CRR holders. This is no change from the current settlement process in the CAISO balancing authority area. For the other balancing authority areas in the EDAM, the CAISO will settle with out of balancing authority area load serving entities and the EIM/EDAM

entity scheduling coordinator[8]. Similar to EIM, the congestion revenue will be calculated for each individual balance authority area and each balancing authority area will have its individual day-ahead congestion balancing account. In order to ensure full funding of congestion revenue rights, the payments to CRR holders will be reduced pro-rata to the amount of congestion revenue collected through the day-ahead market[9]. An EDAM balancing authority area may chose to utilize the CAISO's congestion revenue rights design to distribute congestion revenue to its transmission customers that are participating in the EDAM, in which case the CRR holder will be compensated directly by the CAISO.. Remaining congestion revenue payments to the EDAM entity scheduling coordinator will be further allocated to its transmission customer based upon its OATT.

6.3. Intertie bidding in CAISO

The CAISO will continue to support intertie bidding at its boundary[10]. The CAISO enforces intertie scheduling limits. When the limits are binding in the import direction the price is lower at the import scheduling point than internal nodes. This results in a difference in the marginal congestion component between nodes internal to the CAISO balancing authority area and the intertie scheduling points. Intertie scheduling points are considered internal nodes that are located at the boundary of the CAISO balancing authority area. This resulting price differences result in congestion revenue, which for the day-ahead market is allocated to CRR holders.

However, some stakeholders have argued that this congestion at the intertie scheduling point is the result of the EDAM transfer. Therefore, congestion on intertie schedule constraints should be considered part of the EDAM transfer revenue, at least for the capacity that is common between the EDAM balancing area and the CAISO. They therefore then conclude that the revenue associated with portion of intertie constraint that is common with the EDAM transfer flow should be shared between balancing authority areas in the EDAM. The applicability of sharing transfer revenue is further complicated when there are combinations of the EDAM transfers and intertie bidding from non-EDAM balancing authority areas into the CAISO feeding into the same scheduling limit constraint. We are seeking feedback regarding if the portion of intertie constraint of the CAISO that is common with EDAM transfer capability should be considered EDAM transfer revenue and therefore be shared as transfer revenue.

[8] The EIM entity scheduling coordinator represents the balancing authority area. The CAISO settles non-participating resources and balancing authority area level offset costs. The EIM entity scheduling coordinator then settles with its customers based upon its OATT rules.
[9] Additional information on the CRR1B changes is available at http://www.caiso.com/InitiativeDocuments/DraftFinalProposalSecondAddendum-CongestionRevenueRightsAuctionEfficiencyTrack1B.pdf
[10] In bundle 2, the CAISO is proposing to modify modeling of imports and exports under the Full Network Model Phase 2 methodology which eliminates bidding at intertie scheduling points and aligns import (export) bidding with the source (sink) balancing authority area.

6.4. Optional monthly congestion revenue rights process

The CAISO uses a monthly process to distribute congestion revenue rights to load serving entities. On a monthly basis load serving entities are eligible to nominate source/sink pairs up to their forecasted load. The CAISO then performs a simultaneous feasibility test to prudently distribute congestion revenue rights among the load serving entities. The CAISO also performs a CRR auction, but is not proposing this functionality for EDAM balancing authority areas. This is because the CAISO only allocates congestion revenue rights to load serving entities, whereas, under the OATT a transmission customer is not exclusively load serving entities, but also third party generators and exporters. Thus, these market participants can procure either point to point or network service which provides schedule information on where the supply that served their load was located, that enables the EDAM balancing authority area to allocate the congestion revenue.

If an EDAM balancing authority (transmission provider) so choses under their OATT, an out of balancing authority area load serving entity (external transmission customer) may be eligible to nominate source to export pairs and receive CRRs. Electing to offer CRRs would provide consistent and comparable treatment for out of balancing authority area load serving entities in the CAISO and EDAM balancing authority area. This export transmission would be available for the entire month to support EDAM transfers.

In addition, an EiM/EDAM entity scheduling coordinator may elect to develop a monthly plan for how load will be served in its balancing authority area and this could serve as a set of source/sink pairs to nominate in the monthly CRR allocation. These CRRS would be settled with the EIM/EDAM entity scheduling coordinator. A simultaneous feasibility test would be performed across the EDAM footprint, which would improve the allocation of CRRs in all balancing authority areas in the EDAM footprint. The EDAM balancing authority area monthly plan is non-binding for daily participation and does not limit the ability to make future transmission sales. In the event the EDAM balancing authority area does not elect to participate in the monthly CRR allocation, all congestion revenue collected will flow into the day-ahead congestion revenue balancing account.

6.5. EDAM balancing authority area sub-allocating congestion revenues

A potential approach is to settle congestion revenue with the EDAM balancing authority area who will then allocated these revenues according to its OATT rules. This section describes the CAISO's current congestion revenue rights allocation process to assist EDAM balancing authority areas in developing their allocation processes.

Congestion revenue rights were developed to create a mechanism to distribute congestion revenues when load serving entities seek to use the market to serve their load versus scheduling rights. In return for forgoing the exclusive use of their physical scheduling rights, the load serving entities nominate congestion revenue rights from the source of the resources they have contracted with to their load sink. This ensures that if generation they have not contracted with is used to serve their load, the load serving entity receives the same congestion hedge had their own generation be used.

The process to distribute congestion revenue for load serving entities that are not economically participating in the EDAM should be relatively straightforward. The non-participating load serving entity will self-schedule its generation and self-schedule its load. The EDAM entity schedule coordinator can then allocate the congestion difference from the generation node to the load withdrawal point and provide the perfect hedge.

However, if a load serving entity is economically participating in the EDAM to serve its load, its generation may not be dispatched to serve its load as there is more economic generation that can utilize their transmission rights. The inability to directly tie which generator serves which load will make sub-allocating congestion revenues absent a CRR or similar mechanism is non-trivial and uncertain if there are multiple load serving entities in a balancing authority area economically participating in the EDAM to serve their load. The CRR mechanism decouple the physical use of the transmission system from the distribution of congestion revenues. The transmission customer receives congestion revenue independent of which generation is using the transmission it has procured to serves it load.

The CAISO's current congestion revenue rights design supports out of balancing authority area load serving entities ability to nominate source/sink pairs on an equal footing with CAISO load serving entities. In doing so, out of balancing authority area load serving entities are not disadvantaged from economically participating in the CAISO market with their generation located within the CAISO. The congestion revenue rights provide the out of balancing authority area load serving entity with the congestion hedge for procuring transmission out of the CAISO balancing authority area. The CAISO plans to continue allowing out of balancing authority area load serving entities to be eligible for congestion revenue rights in the EDAM.

CAISO load serving entities as well as other load serving entities will presumably procure some capacity from resources located in a different balancing authority area than where their load is located. This capacity will be used to pass the load serving entity's balancing authority area's resource sufficiency evaluation. As a result, this supply will be economically participating in the EDAM because the load serving entity is using the EDAM to serve its load most efficiently. The OATT methodology developed by an EDAM balancing authority area to distribute congestion revenue to external load serving entities should seek to provide comparable treatment to the CAISO's out of balancing authority area load serving entity approach to the extent possible. Alternatively, EDAM Entities could consider enabling load-serving entities who are transmission customers in their balancing authority area and are participating in EDAM the ability to nominate CRRs in the monthly allocation process in which case the CRRs would be compensated directly by the CAISO as a CRR holder.

6.6. Summary of Potential Approaches

As discussed above, there are several options for distributing congestion and transfer revenues for stakeholders to consider. The options are driven by (1) when/how revenues are split between balancing

authority areas and (2) if the transmission customer[11] has a direct settlement with the CAISO or the its balancing authority area.

When transfers occur, both transfer revenue and congestion revenue may be collected. Transfer revenue is collected if the transfer limits biding between balancing authority areas. Congestion revenue is collected if the intertie scheduling limit is binding. In both cases, there are two options for distributing the revenues between the source and sink areas. This creates four unique scenarios for distributing the revenues:

1. ITC congestion revenue 100% import direction, Transfer revenue 100% export direction
2. ITC congestion revenue 100% import direction, Transfer revenue 50%/50%
3. ITC congestion revenue 50%/50%, Transfer revenue 100% export direction
4. ITC congestion revenue 50%/50%, Transfer revenue 50%/50%

The CAISO seeks stakeholder feedback as to which of the four options best achieves the principles discussed above and balances incentives for the both transmission provision and distribution of transfer/congestion revenue.

The next determination is if transfer revenue and/or congestion revenue should be settled by the CAISO with transmission customers or the EIM/EDAM scheduling coordinator (EESC). As discussed above, different decision may be appropriate depending if a transmission customer (load serving entity) is or is not participating the EDAM. This creates additional scenarios to consider:

Transmission Customer in EDMA	Transfer Revenue w/ CAISO	Transfer Revenue w/ EESC	Congestion Revenue w/CAISO	Congestion Revenue w/ EESC
Participating	X		X	
Participating		X	X	
Participating	X			X
Participating		X		X
Non-Participating		X		X
Non-Participating	X			X
Non-Participating		X	X	
Non-Participating	X		X	

The CAISO seeks stakeholder feedback as to which of the four options for participating transmission customers and non-participating transmission customers best achieves the principles discussed above for the both transmission provision and distribution of transfer/congestion revenue.

[11] The CAISO will always have a direct settlement with the transmission provider for bucket 3 transmission via the EIM/EDAM entity scheduling coordinator.

7. Stakeholder Engagement and EIM Governing Body Role

Stakeholder input is critical for developing market design policy. The schedule proposed below allows several opportunities for stakeholder involvement and feedback. Where there are public meetings, the CAISO will also try, where feasible, to align with other regional meetings, so as to minimize travel and overlap. We will need the assistance of stakeholders to keep us informed of any such opportunities or conflicts, all along the way.

7.1. Schedule

Table 2 lists the proposed schedule for the Extended Day-Ahead Market stakeholder process.

Table 2: Schedule for Extended Day-Ahead Market Stakeholder Process

Item	Date
Post Straw Proposal	*July 20, 2020*
Stakeholder Meeting	*July 27 & 29, 2020*
Stakeholder Comments Due	*September 10, 2020*
Post Revised Straw Proposal (tentative)	*Mid- to late October, 2020*
Stakeholder Meeting (tentative)	*Late October, 2020*
Stakeholder Comments Due (tentative)	*Early December, 2020*
Post Draft Final Proposal	*Mid-January, 2021*
Stakeholder Call	*Late January, 2021*
Stakeholder Comments Due	*Early March, 2021*
EIM Governing Body Meeting (advisory)	*Q4 2021 / Q1 2022*
CAISO Board of Governors Meeting	*Q4 2021 / Q1 2022*

7.2. EIM Governing Body Role

The Charter for Energy Imbalance Market Governance (Charter) and the related Guidance for Handling Policy Initiatives within the Decisional Authority or Advisory Role of the EIM Governing Body (Guidance Document) require that the CAISO document in each policy paper CAISO management's tentative plan for obtaining approval to file tariff amendments to implement the proposal. This typically includes a tentative determination as to the role of the EIM Governing Body in that process, including whether the policy initiative, or portions of it, would fall within the EIM Governing Body's primary authority or advisory role as defined in the Charter and the Guidance Document.

Although it is unclear at this time exactly what rule changes will be needed to effectuate EDAM, many of the changes would involve revising the day-ahead market rules. Under the Charter and the Guidance Document, the EIM Governing Body's authority, whether primary authority or advisory, is focused on the real-time market rules and any generally applicable rules that apply to participation in all CAISO markets (such as credit policies and the like). Day-ahead market rules, by contrast, are not currently with the purview of the EIM Governing Body's primary authority or advisory role. Thus, absent any further action a large portion of the elements of this stakeholder initiative would be outside the EIM Governing Body's current authority to review.

Because EDAM is fundamentally about expanding the existing EIM to include an opportunity for day-ahead market participation, CAISO management believes it will be important for the EIM Governing Body to participate in the approval of all aspects of the proposed EDAM market design. Accordingly, CAISO management is proposing to request that the CAISO Board of Governors approve a one-time departure from the current decisional classification rules that would apply specifically to the process for approving the EDAM market design. In particular, management proposes to request that the CAISO Board of Governors direct the CAISO to bring all aspects of the proposed EDAM market design to both the EIM Governing Body and the CAISO Board of Governors for approval. Under this "joint authority" construct, CAISO management would be able to move forward with tariff amendments to implement EDAM only if both the EIM Governing Body and the CAISO Board of Governors have approved the proposed market design.

The CAISO welcomes any comments from stakeholders on this proposal for approval of the EDAM market design.