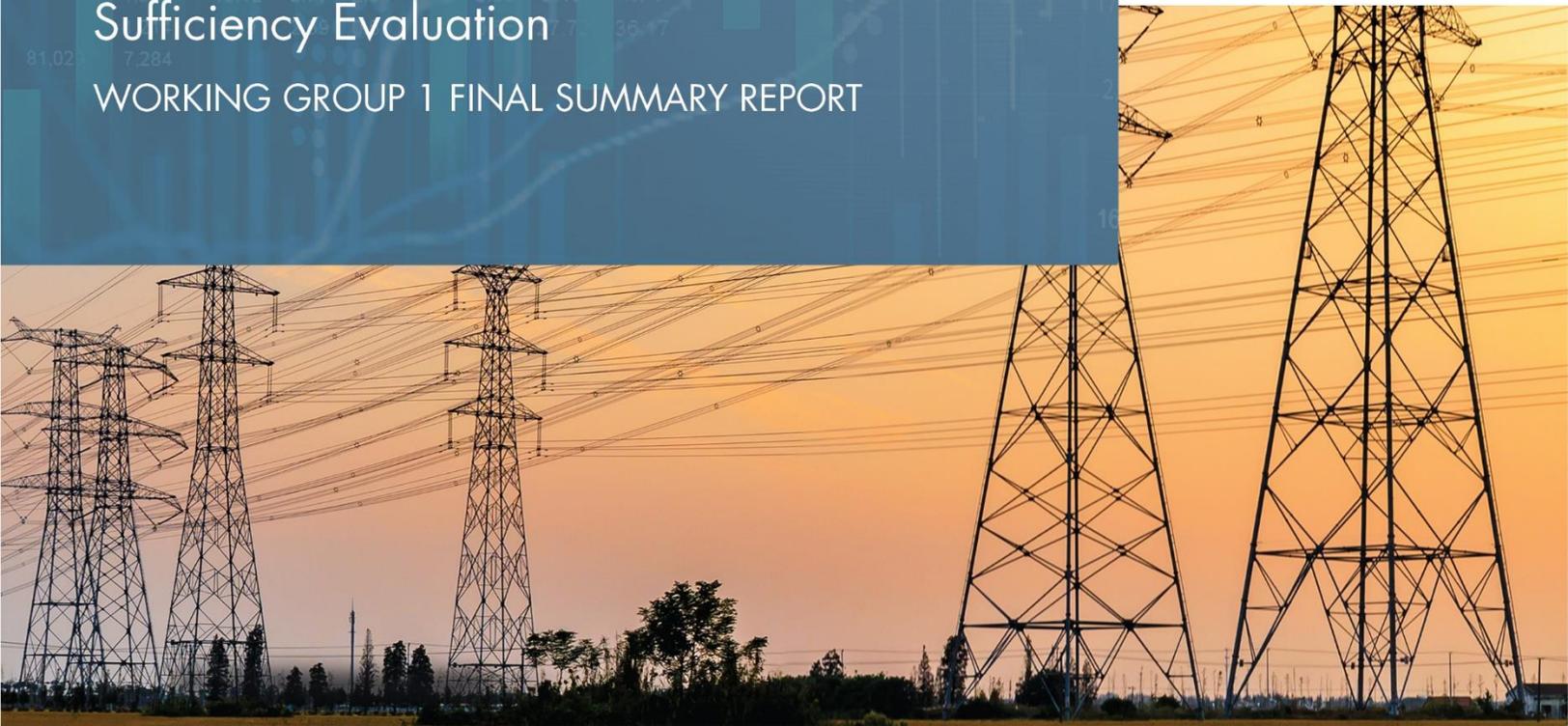


# EDAM

## EXTENDED DAY-AHEAD MARKET

Supply Commitment and Resource  
Sufficiency Evaluation

WORKING GROUP 1 FINAL SUMMARY REPORT



March 30, 2022

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## 1 Preamble

The CAISO launched the *Extended Day Ahead Market (EDAM)* initiative in November 2021 to design the framework for extending the Day Ahead Market across balancing authority areas (BAA) in the western interconnection to derive the efficiencies and benefits through optimized resource commitment and build upon the Western Energy Imbalance Market (WEIM) collaboration. As part of the overall stakeholder process, the CAISO sought to leverage the stakeholder perspectives and ideas early in the process to help inform development of a comprehensive straw proposal. To that end, the CAISO introduced three stakeholder working groups on critical components of an EDAM.

**Working Group 1: Resource Sufficiency and Supply Commitment.** The working group focused on discussing different design elements of the resource sufficiency evaluation in the Day Ahead Market under which each participating EDAM BAA would bring forward sufficient capacity to meet their expected demand and associated uncertainty. The discussion included consideration of the consequences for failing to pass the resource sufficiency evaluation as well as how sufficiency, and other components of the EDAM framework, should be considered in establishing the level of confidence in market transfers.

**Working Group 2: Transmission Commitment and Congestion Rent Allocation.** The working group focused on a framework for how transmission could be made available to the market to support transfers between EDAM BAAs and the allocation of congestion review and compensation for the associated transmission. The discussion also included focus on the ability of the market to respect and allow for the exercise of transmission rights independent of the EDAM. Finally whether or how entities outside of the EDAM footprint could interact with the market were considered.

**Working Group 3: GHG Accounting.** The working group focused on designing a framework for accurate GHG accounting and reporting requirements arising out of Day Ahead Market commitment and market participation to facilitate compliance with current and emerging greenhouse policy requirements in states adopting GHG regulation polices across the EDAM footprint while also respecting states that are not adopting GHG regulations.

The stakeholder working groups met over an eleven week period, from January 3<sup>rd</sup> to March 17<sup>th</sup>, through an open and inclusive process to foster dialogue, the sharing of

ideas, presentations and perspectives.<sup>1</sup> In the initial meetings, each working group reviewed and ratified a list of scope items to discuss over the course of the meetings, reviewed the relevant *Extended Day Ahead Market Common Design Principles and Concepts*,<sup>2</sup> and developed a general schedule of when topics would be covered in the working groups to facilitate stakeholder engagement. As part of working group process stakeholders in addition to CAISO developed presentations to share their perspectives, ideas, or frameworks for consideration and vetting through the process.

The working group summary reports attempt to capture the summary of the discussion across each one of the working groups, and are not intended to capture all positions or points of discussion heard during the meetings.<sup>3</sup> While these summaries, and the more detailed working group discussions, will help inform the CAISO comprehensive straw proposal on the initiative which is targeted for publication the last week of April 2022, the summaries are not intended to be a representation or indication of the direction of the CAISO straw proposal.

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<sup>1</sup> Each working group met twice per week, with a two hour duration for each meeting. Over the eleven week period, the three working groups totaled 60 meetings.

<sup>2</sup> The *Extended Day Ahead Market Common Design Principles and Concepts* were developed by a group of WEIM Entities and California Participating Transmission Owners, facilitated by the CAISO, in an effort to provide an initial point for consideration on various topics that would need to be considered further in designing an EDAM. Link: <https://www.caiso.com/Documents/EDAM-Common-Design-Principles-Concepts.pdf>

<sup>3</sup> Each working group meeting has been recorded and is accompanied by a weekly written summary that can be found on each working group web page. For a more detailed view into each meeting, stakeholders are encouraged to access these documents. Link: <https://stakeholdercenter.caiso.com/StakeholderInitiatives/Extended-day-ahead-market>

## 2 Introduction

The Extended Day-Ahead Market (EDAM) Working Group 1 (WG1) was established to hold discussions focused on the Supply Commitment and Resource Sufficiency Evaluation (RSE) components of the EDAM market design. Each of the twice-weekly meetings, held between January 3<sup>rd</sup> and March 16<sup>th</sup>, began with the participation logistics and the planned discussion topics for the day. The purpose of the resource sufficiency evaluation is to ensure that each EDAM Entity brings sufficient capacity in the day ahead timeframe to meet its expected demand and a level of associated uncertainty. The working group discussed the different components of a resource sufficiency evaluation, including the consequences of failing the evaluation in the day ahead market. Additionally, the working group discussed the level of confidence in EDAM transfers and market transfers overall, while also discussing topics not originally on the list of scope items such as the role of the Residual Unit Commitment (RUC) and convergence bidding in EDAM. These are all critical items to consider in the design of the EDAM. This report captures the WG1 discussion topics and stakeholder comments observed over the working group sessions.

### 2.1 Principles and Scope Items

The working group session began with a review of principles and scope items related to the Supply Commitment and Resource Sufficiency EDAM Working Group 1 with the goal of reviewing, clarifying, modifying or adding items as needed. This review of guiding principles relevant to resource sufficiency included the following:

1. An RSE will ensure EDAM entities can meet individual capacity, flexibility and balancing authority obligations based on conditions known in the day ahead time frame.
2. EDAM participation should not modify state/local control or other aspects of long term capacity, resource adequacy or integrated resource planning.
3. The RSE should recognize and count the resources complying with various resource adequacy and planning programs of EDAM entities.
4. The RSE should be transparent and applied equally across all EDAM entities.
5. Failure to meet the EDAM RSE should carry incentive-based consequences to ensure EDAM transfer feasibility and prevent leaning among EDAM entities.
6. EDAM transfers are considered firm and reliable under different conditions.

Stakeholders discussed the principles to understand the meaning and raised questions related to these principles, while other questions were related to specific topics planned for discussion and those were deferred to the planned time to discuss the applicable

scope topics. As for comments related to the principles, there were several suggestions for a presentation to provide further clarity on the principles of EDAM. The principles discussion generated several questions related to the EDAM design objectives, suggesting a need for background information and a consensus. Such a review would be helpful to set the stage for discussion of the scope items. The review of the scope items generated questions, comments and suggested additions and while some details and objectives were added to the existing scope items, the items listed were not altered to add any new items. The suggestions for a review of fundamentals were acknowledged and addressed in the following meeting.

## 2.2 RSE Fundamentals

During the January 5<sup>th</sup> meeting, George Angelidis provided a foundational overview of the rationale behind the RSE to establish a common understanding for the scope item discussions. The RSE purpose is to ensure each EDAM Balancing Authority Area (BAA) submits physical schedules and bids to satisfy capacity and ramping capability to meet their reliability requirements. These include hourly demand forecast/uncertainty, and ancillary service requirements. The BAA requirements will be adjusted by declared bilateral energy/capacity transfers on bucket 1 transmission. After passing the RSE, economic displacement takes place in the Integrated Forward Market (IFM) and RUC processes. This raised questions and comments regarding transmission buckets, load versus demand bids for use in IFM and/or RUC market runs, inclusion of greenhouse gas (GHG) considerations, impact of demand resources on load, and a suggestion that the fundamentals of the day ahead and real time markets be consistent. Clarifications were provided for the questions and comments relevant to RSE while topics such as GHG were deferred to the appropriate working group.

Each EDAM BAA submits sufficient capacity to meet demand forecast plus ancillary services and sufficient flexible capacity to meet cumulative forecast and uncertainty variation across consecutive hours, while considering bucket 1 transmission transfer capability. After passing the RSE, the IFM runs and considers the transmission under all buckets available for additional optimization. While the concept of an EDAM BAA voluntarily bidding in load as an extension of the CAISO's existing day ahead market exists, rather than testing against this quantity, the RSE would instead test for the ability to meet forecasted next day requirements. The group considered the premise of expanding the day ahead market rather than redesign, which drew comments that EDAM should include regional considerations and not merely be an extension of the current day ahead market. This was acknowledged with the understanding that the day ahead market is the foundation and serves as the starting point for discussion.

Further comments/questions included clarification of demand/virtual bidding, RUC process, expectations for an entity with transmission not participating, honoring resource adequacy obligations in EDAM, and uncertainty relative to congestion and outages. Clarification provided that uncertainty is based on demand forecast only and does not include outages. Final comments and questions included an indication that the day ahead market was the expected foundation for EDAM, a suggestion to discuss timing of failure consequences, and another for potential need for a deliverability test.

## 2.3 Summary of Working Group 1 Progression

Following is a high level summary of the topics covered during the 11 weeks of WG1 sessions:

- **Weeks 1-2**: Reviewed principles, scope items, and fundamentals, discussed the 45 day ahead advisory showing, and began discussing EDAM RSE.
- **Weeks 3-6**: Continued EDAM RSE discussion including timing, test criteria, resource qualification, energy-limited and use-limited resource considerations, a number of different potential levels for an evaluation framework, and treatment of imports.
- **Weeks 7-8**: Completed discussion of the RSE regarding treatment of imports, discussed failure consequences and began review of residual unit commitment and convergence bidding concepts.
- **Weeks 9-11**: Completed failure consequences discussion and review of the RUC and convergence bidding process and discussed the EDAM transfer reliability topic under a variety of system conditions.

Discussion in the twice weekly sessions was facilitated through presentations provided both by participants and CAISO staff, along with the benefit of robust stakeholder dialogue. The following sections, which attempted to address all the topics listed in the initial scope item list for WG1, are organized accordingly into the major topic areas discussed throughout the eleven weeks of meetings.

## 3 45-Day Advisory Showing

The concept of a 45 day advisory showing was reviewed and discussed during the early WG 1 sessions. Participants in the discussion noted that the point of a 45-day showing is to provide some level of transparency regarding each BAA and respective plans to meet load obligations to provide an added level of confidence going into the month. In the event of potential shortages, this also allows time to resolve these before the actual EDAM RSE. The idea was to keep the process simple and not burdensome on the

submitting entities, with monthly peak granularity, while making adjustments as needed, in contrast to an hourly assessment as some suggested was necessary. A few commenters suggested that the advisory “showing” should be a two day ahead RUC style run instead of a 45 day showing. A commenter suggested the evaluation granularity must be hourly to account for energy limited resources such as hydro and that the purpose is resource sufficiency rather than resource adequacy intended to meet load forecast rather than the monthly peak every hour of the month. It was clarified that the 45 day advisory showing was not intended to be an onerous exercise and instead to provide a level of confidence to the market operator that EDAM entities have general plans in place to have sufficient capacity to meet monthly peak load. Other comments included: shorter advisory showing does not provide time to correct deficiencies, advisory showing addresses a need for market participant to gain confidence there will not be leaning, a suggestion of a need to clarify the reliability coordinator role, a comment that the BAA operator may not have a plan on a 45 day basis, and a suggestion to clarify the purpose of the 45 day advisory showing. Comments on the Advisory Showing category included inquiries regarding the equivalent in the DAM and participation rules, and a suggestion to consider wheel through rules. Overall, stakeholders generally questioned the value and purpose of the 45 day showing, considering that the resources sufficiency evaluation is conducted in the day ahead timeframe.

During the January 10 WG1 meeting, Danny Johnson presented the 45 day ahead advisory showing purpose to provide the CAISO a preliminary look at how the BAAs were planning to meet their respective obligations, give an advanced look and an opportunity to resolve potential issues such as double counting. A question regarding whether a diversity credit concept would be considered was asked and the response was that the diversity credit concept was not considered because this is more valuable closer to the operating day. There was also discussion around defining market operation versus grid operation functions and establishing justification for 45 day ahead advisory for EDAM. Given the number of questions, the 45 day ahead advisory showing topic was referred back to the entities involved with the original proposal for further details with an action item to bring additional information back at a future meeting when ready; however, the topic was not raised again during the remaining sessions.

## **4 EDAM Resource Sufficiency Evaluation (RSE)**

## 4.1 Purpose

The Resource Sufficiency Evaluation purpose began with a review of the concepts in a presentation during January 10 meeting. Comments and questions included the following areas: RSE intention, suggestion the assessment must be hourly not monthly or daily, and further concerns were expressed regarding potential overlap between the market and grid operator. There were a number of suggestions including: the RSE should include a deliverability test for internal resources, need to clarify application of BAA to BAA transfers and external resources, a need to understand the expectation of CRR modeling and allocation, and a need to understand the interplay between the EDAM and real time markets. Further questions and comments included physical schedule and bids versus bi-lateral trade, whether full load and supply participates, counting rules, and how to ensure inputs to test supply and demand. A response stated the RSE is required to ensure that supply is sufficient and economic equity is maintained among the participating entities. There were also suggestions to include provisions to account for diversity benefits and to include the RSE benefits in the RSE purpose slides.

## 4.2 Guiding Principles

The working group reviewed the initial guiding principles for the EDAM Resource Sufficiency Evaluation (RSE) including: EDAM entity submits physical bids and schedules for hourly demand plus uncertainty, plus hourly ancillary services, plus cumulative demand and uncertainty variation hour to hour; BAA requirements adjusted by bilateral energy/capacity transfers on bucket 1 transmission (this replaces the diversity benefits concept used in the WEIM); after passing the RSE, economic displacement takes place in the IFM/RUC. Questions were presented on the following topics: whether RSE is just a check or power flow, what if bids are not simultaneously feasible, and how transfers are considered. Responses indicated the intent is to ensure resources are feasible and the hourly capacity test concepts were reviewed which include considering ramp up and down requirements, contingency reserve requirements and imbalance reserve up and down requirements. The concepts for the cumulative ramp capability test were also discussed to check feasibility of meeting cumulative ramps up and down starting from both lowest and highest points. There were questions regarding how to account for the ancillary service requirement changes in the market. There is not a dynamic tool to address this, so the BAA determines ahead of time and is responsible for setting the ancillary service requirements in EDAM and to provide adjustments in real time. Clarification was provided that RUC uses the same ancillary service values as IFM. There was a question regarding the transfer details answered by a statement that transfers between EDAM entities shown prior to running the EDAM for the purpose of passing the RSE are established using registered information and

submitted in the market to reflect obligation and commitments of the transfers. The reaction was a comment that this just creates more questions and further suggestion to have the concepts documented. To address these questions, there was a suggestion to present previous older materials put together by EIM entities. All entities were encouraged to prepare and provide any valuable presentations. A comment that the cumulative ramp capability test could deviate based on forecast versus actual brought clarification that this is covered in the uncertainty calculation. The discussion highlighted the tension between a robust RSE and the various desired features including transparency, frequency, ability to pre-test and information to correct any deficiencies.

### **4.3 Timing and Frequency**

The focus of the meeting turned to discussion of the resource sufficiency scope topics starting with advisory screens. After a few unrelated questions, there was discussion regarding the number and timing of the advisory runs and ability for EDAM BAA to assess RSE status. There were a number of suggestions including: a single submission and single result along with a need to identify consequence for failing before determining timing and cure period; multiple submissions with the first at two days ahead, and a second several hours before EDAM before the binding screen; a simple process with 6:00 am and 9:00 am screens; and an on demand screen. There was a question and concern regard the duration of the RSE because this may impact the frequency and timing of the process and details of inputs and results. The CAISO response was the screen would be completed in a matter of minutes because the design is a simple comparison of supply and demand considering latest outage information and bucket 1 transfers without a deliverability check. This was followed by a suggestion to document the details for review. Comments on the suggested options suggested any screen two days in advance should be in the afternoon to ensure information is available, a caution against too many runs because it creates more work with minimal additional value, any transmission check should be 6:00-9:00am given transmission is frozen at 9:00am, and uncertainty requirement makes the calculation dynamic and complicates the on-demand concept. There was a question regarding what cure would look like for the advisory screens and what that would mean for each BAA. For any indication of insufficiency, the CAISO or other BAA would need to develop individual responses. This is not a topic for this work group to consider.

## 4.4 Demand Forecast

Discussion progressed to granularity and detail regarding the demand forecast. Questions include whether there should be alternatives to the CAISO forecast. While it is important to use the most accurate forecast possible, it is also important to give the BAA some certainty. Comments included a suggestion that if the forecast is only CAISO then the design needs to consider the accuracy and require a check; however, there was also a suggestion an alternative should be offered. Design acknowledges the forecast needs to be accurate and any alternative forecast would need incentives to ensure accuracy.

## 4.5 Advisory Screen

The EDAM RSE discussions continued after a January 12 presentation to review an RSE advisory topic. The consensus was that, while there were several suggestions, no clear options were apparent. Advisory options include some combination of the following: two day ahead, 6:00am, 9:00am, and/or on demand screens. Comments included: suggestion to poll for preferred options, suggestion to perform advisory screen sometime between 6:00-9:00am day ahead, preference not to perform two day advance run but not sooner than afternoon, and a preference for the idea of on-demand screen to allow participants to check status two day ahead or day ahead with forecast frozen at 6am. Questions were posed regarding: intent to measure demand and uncertainty, benefits of the advisory, and consequences of failing the screen. These questions were followed by suggestions to document a proposal for review. While previous discussion seemed to focus on suggestions for multiple advisory screens, the timely on-demand option with a forecast fixed in time seemed to carry the day. There were further comments as follows: that the advisory intent is to provide EDAM entity time to cure if short, a suggestion to include consideration of a diversity benefit, the RSE should be based on hourly load forecast assessment, and an idea to perform an energy test in lieu of requiring hourly capacity test.

## 4.6 Concepts Review

As a result of stakeholder comments, Jeff Spires, representing Powerex Corp, volunteered to present the *EIM Entities Presentation on EDAM regarding the Resource Sufficiency Design* previously presented on February 11, 2020. Jeff reviewed the presentation background as representing the views of the diverse group of EIM entities at the time of the presentation approximately two years ago. Jeff covered the objectives and principles through slide 9 of the presentation including topics on the opportunity EDAM presents for regional benefits, the core objectives of resource sufficiency, and an

appropriate resource sufficiency standard; then, Jeff turned to the stakeholders for questions. The definition of leaning in the market, defining uncertainty and prioritization of imports topics were discussed along with the question of whether resource sufficiency would require procurement beyond existing resource adequacy or planning programs. Responses included the notion that resource sufficiency is fundamental to ensure the market will have capacity and energy to meet reliability, and an acknowledgement that while resource sufficiency will not alter resource adequacy or planning programs, additional procurement may be required to meet the resource sufficiency evaluation. There were comments regarding a need for process related to instances of failure including capability of resolving deficiencies, and that these are related to the failure consequences topic. There were also several comments and questions regarding the definition and application of a diversity benefit and the need to require reliable transfers to avoid leaning.

Jeff continued with the EIM Entity Presentation on EDAM, Resource Sufficiency Design to cover an illustrative day ahead timeline and proposed test structure slides and then transitioned to discussion on these topics. The question of whether the test should be peak versus hourly was presented to stakeholders and responses generally indicated that a 24 hour test is necessary. Additional comments included: an importance for entities to be resource sufficient entering the day, an importance to incorporate diversity benefit providing the market is sufficient, the process should not interfere with state programs and still require all entities are resource sufficient, and to find a balance between simplicity versus accuracy tradeoffs.

Jeff continued the presentation with a single hour example, a 24 hour example, proposed test structure, and components capacity requirements topics, then discussion continued around the question of forecast options. Several participants indicated support for a desire to use the best and most accurate forecast and an option to use an alternate forecast to the CAISO default such as the entities' own forecasts. In terms of the forecast details, these should be hourly and include load forecast plus uncertainty. While there was some discussion regarding the composition of uncertainty, there did not seem to be a clear consensus. In addition, there was a question regarding whether to include reserves and the need to be part of the uncertainty component.

## 4.7 Responsibilities

There were comments and questions surrounding the expectations for the entity submitting bids versus the entity with the obligation to the RSE. The proposal expectation is the Scheduling Coordinator (SC) responsible for the resource will submit the bids, and each Balancing Authority Area (BAA) may need to develop a mechanism

to ensure passage. The details of this have not been discussed, so this area is open for suggestions. A question of who would see the advisory screen was answered with the expectation the BAA would be the entity able to manage and view the RSE advisory screen. Further comment stated this raises questions regarding how the BAA can ensure the SCs are submitting sufficient bids to meet the RSE. A comment relative to the energy profile discussion from the prior session indicated a concern with a requirement for SCs to submit a profile because this is not currently part of the defined bids and SCs may not be willing to submit the new information.

A comment regarding use limited resources supported the idea that bids should reflect the resource capability. There was also a comment supporting the concept that the BAA has responsibility for passing the RSE, accompanied by a suggestion it would be helpful to have a mechanism to facilitate resource sufficiency. The response to this comment was that this has not been considered so as not to presume a design as to how to do this for BAAs. This has been seen as an activity each BAA would be expected to perform based on its own process and circumstances. The discussion concluded with a question regarding the goal of the group and the response confirmed the goal is to establish a resource sufficiency evaluation common design to ensure the EDAM entities have sufficient capacity coming into the market.

During the deliberation of resource qualification, there was a significant amount of dialogue regarding the roles and responsibilities of Scheduling Coordinators (SC) and Balancing Authority Areas (BAA)s as well as the need for a clear mechanism to ensure a passing Resource Sufficiency Evaluation (RSE).

#### **4.8 Resource Capability Considerations**

Discussion moved on to specific resource capability considerations slide review and further discussion on the granularity and forecast topics. Questions were raised regarding whether uncertainty should be considered, whether EDAM entities would procure AS in EDAM and with regard to leaning whether the BAA or LSE should be responsible for the RSE test. There was agreement the policy needs to consider these questions and a suggestion that assumptions and limitations on the gas system and difference between gas day and EDAM timeline also need to be considered. The question regarding whether the RSE should be either an LSE or BAA test was responded to with clarification and apparent consensus that the test be at the BAA level. Alternative views were invited for presentation at a later meeting if any entity desires to present a different approach. Further discussion on the leaning topic included comments regarding whether the question of leaning is one of reliability or economic, and that there is no difference as both lead to the same result. There were also further

supporting comments that the RSE test at the BAA level would be the best approach because this allows the BAA an opportunity to resolve short/long positions within the BAA.

## **4.9 Resource Qualification and Counting**

Discussion regarding RSE included details to cover resource qualification and counting rules. Resources should be as modeled in the BAA while resources external to the BAA are handled with bucket 1 transfers. There was a discussion regarding whether capacity should be considered at Pmax rather than NQC and whether RA status should be considered. A response suggested that resources are only considered for bids submitted. Specific resources types were discussed as described below.

### **4.9.1 Hydro**

The discussion of hydro qualification and counting used an example of 25 MW hydro resource with a 200 MWh daily energy limit. An option was presented to assume a profile and limit using a peak shaving energy limit to distribute the energy to the peak periods of the day. A suggestion to use a bid range capacity test or an assumption the capacity is available all hours did not seem to garner much support. An option in which the entity provides the profile seemed to gain the most alignment. Further discussion on treatment of reserves, resource adequacy counting, bids, details of the profile and non-dispatchable resources garnered a suggestion and commitment to develop specific examples to help answer these questions. A question regarding whether SCs could under represent capability was answered with statement that bidding is voluntary. The profile submitted was confirmed not to represent a self-commitment in the market.

### **4.9.2 Energy Storage**

The energy storage qualification example included a 50 MW battery with a 200 MWh maximum storage capability. A question regarding bids and alignment with the profile gained response that a simple validation could be included with checks for the energy profile, bids and energy limits including SOC. There was a question regarding the battery energy profile and how to represent the charge component, followed by additional questions and all these were met with a commitment to consider these questions and provide specific examples.

### **4.9.3 Variable Energy Resources (VER)**

The variable energy resources slide included examples for solar and wind including a 100 MW solar resource and a 50 MW wind resource and each showing an output profile. The concept that the IFM principle of using the lower of the bid quantity or day ahead forecast quantity is the expected treatment in the market, and that it would be reasonable to use this in the resource sufficiency evaluation. A question regarding the potential for a resource to produce more was responded with statement that virtual bids can be submitted higher than the forecast. There were a few comments regarding the day ahead forecast and uncertainty. A response stated that the assumption using DAME as the baseline would include imbalance reserves to cover uncertainty. Similar physical perspective concepts discussed for solar apply equally to wind. A question regarding participating and non-participating resources was responded to with a statement that participating is represented by submission of bids. A question asked if the CAISO would provide an option to supply a VER forecast or will this be a BAA responsibility only? The response is the CAISO would like to see stakeholder feedback on this question.

### **4.9.4 Multi-Stage Generating (MSG)**

The Multi-Stage Generating (MSG) resource qualification and verification included the point that the MSG model does not allow forbidden regions because the model accommodates these through the definition of available operating regions in selected configurations. MSG capacity qualification is based on the maximum resource capability using initial conditions and considering ramping limitations based on range up and down from the lowest and highest points, respectively. The proposal then maximizes both the capacity and flexibility to give the best chance for the EDAM Entity to pass the resource sufficiency evaluation (RSE). The responses to questions regarding initial conditions clarified the initial conditions are from the end of the previous day and an entity has the ability to indicate a self-schedule to ensure a resource is included at lowest or current configuration. A question regarding consideration of procured capacity was answered with clarification that the proposed resource sufficiency only looks at bids, so to the extent a resource procurement paradigm requires and results in bid submission then the resources will be considered.

A gas consideration question was deferred to planned discussion later for conventional resources, then a continuation of the MSG discussion included a restatement that MSGs will count to the maximum value a given resource can reach based on initial conditions. A question regarding which configurations are bid into the market generated the following clarification: the RSE will only consider the configurations with bids; however, the bidding rules may result in modifications, only as necessary to ensure the

bids submitted are feasible. For example, if bids were submitted for configurations 1 and 3 but not 2, and reaching configuration 3 requires a transition through 2, then bids will be added for configuration 2. In response to further questions regarding treatment of bids in RSE versus market, clarification stated the submitted bids are used by both RSE and the market and the use in each will be as defined by design. This was followed by a suggestion to provide clarity in examples.

#### ***4.9.5 Hybrid***

The hybrid qualification discussion used an example of a 100 MW hydro resource with a 0 MW Pmin, a 100 MW solar resource, and a 25 MW battery resource. Rules were discussed that hybrid resources are seen as normal resources and will be treated similar to conventional resources in the market. A comment suggested an expectation that hybrid resources may also be energy limited. A question regarding the use of the State of Charge (SOC) parameter received clarification that resources modeled with the Limited Energy Storage Resource (LESR) fuel type would result in the use of SOC in calculations.

#### ***4.9.6 Conventional***

An example 100 MW gas resource with 1 daily start limitation was described along with consideration of inter-temporal constraints and an expectation that bids reflect any constraints. A question about the optimization drew a reinforcement that the submitted bids must reflect constraints for the RSE. An inquiry regarding optimizing gas in the market for any gas constraints, generated the response as an example in which the bids need to reflect capability for gas procurement. A comment from entity not currently participating in a day ahead market inspired a description of the gas burn report and the gas nomogram, a comment in the chat that market participants are responsible for managing gas supply risks as best they can, and other comments regarding gas markets and timing considerations that may make the RSE challenging. One comment indicated that the discussions are very detailed and due to time required to digest the ideas, a lack of comments should not be interpreted as reaching consensus. Further regarding the RSE verification, there needs to be an understanding of the test methodology or structure and how resource capability is applied to particular hours. A statement that a high level principle should reflect actual resource capability showing de-rates and limitations was asked for something specific. Clarification suggested the RSE should test whether resources can deliver at the bid level in real time and further clarified the RSE should reflect limitations applied in the market.

#### **4.9.7 Demand Response**

The additional considerations for Demand Response (DR) discussion began with statements generally indicating entities would use available practices to manage DR resources. The proposal was described as follows: to the extent resources can be represented by bids, resources can submit bids for use in the RSE. There was an expectation stated that there may be some bids that are used conditionally, so these should only be used when available to the market. This topic was then opened for discussion and a request for input regarding existing programs and how to consider these. Programs mentioned included ones with up to 10% of load that must be considered, a description of phase 1 DR for EIM use and several supported the idea of allowing inclusion of the approved DR programs. Comments also suggested an intent to allow for broader participation and that it is better to place bids into the day ahead as a resource rather than an adjustment to forecast. This discussion concluded with an unanswered question of whether stakeholders are advocating for a better model to reflect the DR programs more accurately and a commitment to give the topic more thought.

During a later meeting, further demand response dialogue considered the question of how to represent DR resources currently not qualifying for or not capable under existing market modeling options. There were suggestions to wait for DR enhancements under development for the WEIM and another to allow DR programs to be reflected as adjustments to the demand forecast. An inquiry with stakeholders to describe how the un-modeled programs are used received a few responses including programs scheduled in day ahead or held as an option for real time to meet uncertainty forecast while others approach with the intent to use in the day ahead and unwind if not needed in real time. Another comment suggested that DR utilization needs monitoring and oversight to ensure programs are effective. The exchange on this topic concluded with summary of two options to use a load modifier or an ability to model with new or existing DR model.

#### **4.9.8 Uncontracted 3<sup>rd</sup> Party Supply**

The topic of uncontracted supply opened with the question of how to model this in the RSE. The initial idea is to consider submitted bids and capacity sold through bucket 1 transfers. An example was offered for discussion of a 500 MW resource with 200 MW sold as RA, 200 MW sold to transfer and 100 MW uncontracted, accompanied by the question of how is the 100 MW considered. The response suggested that for a resource modeled in the CAISO, the 200 MW transfer is a bucket 1 transfer and the remaining 100 MW would be counted in the CAISO BAA to the extent a bid is submitted into the market. A question was raised to ask if a BAA is resource sufficient but there is

an uncontracted resource, could this be allocated to short BAAs and the response was not in the RSE, because it would have to be shown in the bucket 1 transfers. A question regarding intertie bidding framework was deferred until some details are worked out. Regarding the questions of how uncontracted supply should count towards the BAA, the reply stated it will be counted to the BAA unless declared as bucket 1 transfer. A follow up asked what if the resource is off loaded or not operating, which yielded the high level principle, if the resource doesn't bid they will not be considered. There was also the clarification that a self-schedule is considered a bid. The uncontracted supply topic concluded with an expressed concern regarding the notion of whether uncontracted supply should be considered in the RSE if there is no obligation to bid.

#### **4.9.9 Firm Energy Imports**

Discussion on the Firm Energy Imports topic included comments regarding the reliance of entities on the WSPP Schedule C contractual arrangements and concerns regarding the timing of confirming the source and transmission path relative to the RSE. Several comments confirmed the timing of the source and transmission confirmation varies from early morning to late afternoon. The relevance of the discussion was stated to consider how the resources may be counted in the RSE. While there was dialogue around the primary use of the WSPP Schedule C, a firm energy contract, there was a comment that the Schedule B capacity contract is also used.

The Firm Energy Import topic discussion continued to gain an understanding of various import arrangements and a CAISO proposed treatment. The questions and comments regarding firm energy imports considerations included descriptions of the WSPP Schedule C arrangements to provide an awareness of this procurement mechanism. In general, the point of delivery into the sink BAA and potentially the source are known in the 8-8:30am timeframe while the scheduling and tagging may be as late as 3:00pm, though usually known well in advance. Questions regarding certainty of actual delivery of the capacity generally were viewed with high confidence while some questioned the reliability when the transmission path has not been identified. The arrangements were also described as ranging from short to long term, expected to be a primary mechanism to resolve any shortage in an advisory RSE, not curtailable for economic reasons, and a necessary part of the portfolio. Concerns expressed regarding tight supply conditions received responses that performance monitoring could be used to ensure the mechanism is functioning and firmness increases when parties engage in direct interaction with providers to ensure they are real. In events where a source fails, the counter party is given an opportunity to cure followed by liquidated damages for any non-delivery, so failures are rare. This example was also discussed to address

concerns expressed for the potential of day ahead export curtailments. Three examples of WSPP transactions were presented and discussed to help understand expectations of these arrangements and these did generate significant discussion which in the end suggested that the key information for purposes of the RSE is to provide bids at the point of delivery, although there were alternative views expressed that information back to the source is necessary.

The February 16 discussion included a review of the WSPP Schedule C concepts to understand their nature. In general, they were described as providing a firm source of energy with a known point of delivery. There were comments regarding the terms “firm” and “reliable” and how they apply, so there seems to be a need for development of further definitions to specify requirements associated with imports for use in the RSE. On a related note, questions and comments related to timing and market functions suggested the need for documentation and discussion to identify areas of common expectation such as creating a draft timeline of activities related to the RSE. The question of whether a unit contingent arrangement would be accepted in the RSE was raised and response suggested this should be acceptable whereas non-firm that can be interrupted for any reason would not be acceptable. Comments and replies regarding ancillary service capacity suggested that this must be accounted for appropriately. Further discussion investigated the question of how a bid without a source can be considered firm and whether these can be considered reliable to show up on a stressed day.

## **4.10RSE Structure**

### ***4.10.1 Calculation Example***

The January 26 meeting discussion began with a review of the Calculation Example for the Extended Day-Ahead Market (EDAM) Resource Sufficiency Evaluation (RSE) in a simple Excel spreadsheet which will be posted as an educational tool to help with understanding. Response to a question about energy limited resources, clarified that the example does not have a limit on energy and this concept would be covered in the energy limited slides. Regarding the question of whether the energy transfer would have any confirmation from BAA1 to BAA2, the answer was that one approach is to establish that a transmission schedule is registered in Master File with one entity establishing the transfer limit. A question regarding whether the energy transfer is between EDAM BAAs versus bidding was confirmed. The bid process and timing questions were discussed as bids can be submitted up to 7 days in advance and the RSE would be expected to run immediately after the close of the market just after 10:00

am, then bids are submitted into the market if they pass while the action in the event of RSE failure has yet to be determined. Bids cannot be revised after deadline. This was followed by a lengthy conversation about upward uncertainty versus imbalance up reserve transfer elements of the example, and this concluded with the clarification that the imbalance reserve up transfer is an additional obligation in which one BAA provides reserves to another BAA, similar to a bi-lateral transfer of an ancillary service (AS) obligation.

#### ***4.10.2 Considering Energy-Limits – Operating Plan***

The working group reviewed the concept of an hourly advisory operating schedule for use in the RSE, and there was a comment to reinforce the idea that the operating plans would only be used in the RSE. A question whether there might need to be a step to look for an additional feasible schedule to meet the demand forecast was responded to with a comment that the assumption is the operating schedule would be submitted with knowledge of the need based on a known demand forecast and other considerations. This generated an exchange regarding ability of entities to submit an hourly operating schedule due to uncertainty of need, timing challenges or reliance on the optimization.

#### ***4.10.3 Hydro Operating Schedule Example***

The hydro operating schedule example used a net demand forecast as the basis to create the hydro operating profile. There was a question regarding whether there are other things to look at beyond net demand, and the response was there are certainly other basis to consider beyond the net demand. There was also a comment that the test will need both energy and capacity bids and the entity was invited to provide a presentation on the suggestion. Further concerns were expressed regarding the requirement to provide an energy profile in bids and a suggestion of using the bids as is. The response to these comments explained that the profile was an option to avoid running the market. This was followed by suggestion to have an RSE that recognizes constraints. Then there was a dialogue that this can be an option but there is a trade off in which the on demand feature may not be available because recognizing all the constraints requires an optimization which takes more time. The dialogue included comments that both paths may be worth exploring and the hydro forecast for purposes of the RSE would be the best available information at time of the showing. Entities with ideas were encouraged to present them in future meetings.

#### **4.10.4 Structure Considerations**

Further discussion of the RSE structure considered issues such as does the RSE test for max capacity in a given hour and also test across 24 hours as well as a concern to test for flexibility and feasibility. There was a suggestion the EDAM entity would provide the operating plan/profile and this would address some of the concerns raised. Further comments agreed with idea the BAA would present the operating plan although there is a concern the BAA may not know how the SC will submit bids. With two extremes, a there may need to be a solution in the middle. This dialogue reverted the discussion back to the question of how all entities coordinate to ensure a passing RSE. While the BAA approach seemed to gain some traction, there were concerns this would not be workable in the event of failure which may require an optimization approach. Then returning to the energy limited topic, there was recognition that the energy limited concepts would also apply for a gas resource with gas fuel volume limitations. The question regarding the intent of the advisory schedule was described as an indication how to meet schedules and reflect energy limitations. Then a comment explained the energy limit bid parameter could also be used to reflect the gas fuel volume limit. Another option suggested was for the BAA Entity to provide a unified plan for the BAA. Alternatively, there was an idea that the EDAM entity would receive the bid information and use the information to create a plan at the EDAM level. The question then becomes are the EDAM entities prepared and capable of providing this service? The level of optimization is assumed to be relatively simple without including the congestion and some other constraints. EIM entities were asked to weigh in on this question. Responses included needs more evaluation, iteration may be necessary to consider inter-temporal constraints and ensure passing the test, the burden would be too much, and suggestion the market perform this function. One consideration to think through is the BAA must have a mechanism to satisfy their obligations.

#### **4.10.5 RSE Framework**

The objective was stated to discuss two Evaluation frameworks to cover the EDAM RSE Framework topic which began with a review of the Bid Based Sufficiency Framework using an additional bidding element to provide a profile for energy limited resources proposed to be submitted by 9:00 am. Comments included suggestions of other options previously discussed and the response was that these did not seem to gain sufficient traction or have enough detail to be included in the discussion. Comments relative to the Bid Based Sufficiency Framework included a concern regarding the approach not having flexibility to move energy where needed in the RSE, and then the discussion moved to the Day Ahead Sufficiency Plan Framework. While there were a few

comments supportive of the plan framework, many were primarily focused on alternatives as summarized in the next paragraph.

The majority of comments offered during the presented RSE Frameworks deviated from the frameworks outlined and seemed to suggest one or more alternative frameworks. Concepts discussed included an optimization, a hybrid using capacity and aggregate energy checks, or something in-between. Discussion around what was referred to as an optimization approach seemed to gain support and garnered comments that the methodology must be as simple as possible to allow for the advisory checks to be completed quickly to support the consensus for an on-demand capability and allow time for curing of potential deficiencies. This approach would not consider transmission, startup and shutdown for example. The notion of an aggregate energy check to verify total energy supplied for the day given energy limits submitted in bids against the demand forecast was met with the caution that a daily test would result in failure for the entire day rather than specific hours, and an unanswered question regarding how this approach would evaluate flexibility. Another concern with an aggregate energy test was expressed as an inability to know the capacity is valid. There were several comments in support of using an optimization or balancing approach including suggestions to be careful to limit constraints. There were requests and suggestions to provide slides showing details of the viable frameworks in the next meeting.

The RSE framework discussion continued with a review of concepts generally accepted for any framework. The points generally accepted include: evaluating day ahead sufficiency across the full 24 hour horizon, test for both capacity and flexibility, allow on-demand RSE runs by the EDAM entity and a final scheduled advisory run at 0900 with inputs locked at this time. Additional tests will be required to ensure sufficient ancillary service and imbalance reserve bids to satisfy the associated requirements. The conceptual frameworks in the recent discussions included: a day ahead sufficiency plan in which each entity submits a load/resource plan with commensurate bids; a hybrid bid schedule in which sufficiency is demonstrated through bids with a new advisory operating schedule component; and an optimized sufficiency portfolio framework in which bids are evaluated, subject to selected constraints, to identify the best supply/load balance to establish sufficiency.

With regard to the RSE framework discussion, the two frameworks presented, a bid-based framework where sufficiency is demonstrated through bids alone including an advisory operating schedule and a BAA submitted load/resource plan framework, both received some supporting comments; however, there were also many comments and questions suggesting alternative frameworks including an optimization or energy balance framework option that received several supporting comments and a commitment to present details of the framework at the next meeting. While other

potential frameworks or suggestions were deliberated, none of these gained any commitment to develop the details for presentation.

#### ***4.10.6 RSE Optimization Framework***

The Optimization Framework presentation began with a discussion of the objectives to: use submitted bids, minimize hourly failures, honor energy bid limits, ramp rates, variable energy resource (VER) forecast, daily energy limits, and state of charge (SOC) limits. With the concept of a very quick on-demand execution, the proposed simplifications included: no transmission constraints or scheduling limits, and no constraints for start-up, minimum up/down time or daily starts. While these simplifications seems to be generally accepted, simplifications related to multi-stage generators (MSG), ancillary services (AS), imbalance reserves (IR), and ramp rates generated a comment that the approach should strive to do the best and most accurate test possible with the time allowed. These sentiments were reinforced with additional comments of concern that the MSG, AS, IR and ramp rate simplifications may create inaccurate results. There were several comments generally supportive of the concept along with the general idea of a process to maximize accuracy while maintaining a short run duration. Other comments suggested the mechanism include validation to ensure no double counting of capacity. A question regarding the duration expectation of the RSE received responses suggesting the duration not exceed five minutes.

Discussion also included a question of whether there would be an opportunity for an EDAM entity to use the optimization on their own and the response was all entities should be using the same tools on a single platform. A question regarding how import bids will be treated was provided a response that the model will take the resources as provided in the test. The question of how each BAA will cure for any failure circumstances will be left as a question each BAA must answer for itself. An inquiry regarding the transparency of the RSE was introduced and the response provided was that everyone should know and the information is aggregated, so it could be shared and sharing may help facilitate a cure. Other comment supported the optimization framework to avoid the additional steps of the previous alternatives discussed, and expressed concern for the publishing status of the RSE. These points were acknowledged with a commitment to consider as details are developed further. Following this discussion, the presentation of the optimization model continued.

Details of the proposed framework were reviewed including notation used, requirement constraints, capacity and ramp capability constraints, objective function alternatives, and properties. A question regarding whether outages would be considered was confirmed with a reply that outages will be applied to bids prior to running through the

RSE. Regarding the properties, the use of weighting factors to give the importance to critical periods received supporting comments. There was also a suggestion to utilize the existing objective function to the extent possible as this will be the best way to ensure there is no leaning. It was also suggested that economics may make the optimization easier while GHG may create additional challenges. Stakeholder comments ranged from support for the proposed framework with condition to identify key constraints and AS considerations to an expressed need for time to consider the proposal. There was also a suggestion to consider how the GHG approach may impact this proposal in the planned combined meeting; however, a response was provided that the GHG approach will not have an impact on the RSE. The topic and meeting closed with a commitment to consider the feedback and refine the optimization framework accordingly.

## 5 Failure Consequences

The suggestions for failure consequences included limiting participation of transfers and financial penalties. The concept of limiting transfers did not seem to gain any support as comments included in this approach may be too onerous or result in unintended consequences. The financial penalties notion gained more consideration including comments that penalties should not outweigh the EDAM benefits, penalty basis could be production costs savings or capacity cost savings, a need to create an assurance leaning is not incented, potential for a progressive penalty increasing with frequency, and an idea to transfer penalties as a benefit to entities able to fill the capacity shortfall. The failure consequences discussion seemed to rule out the idea of limiting transfers as a consequence and included good discussion regarding the idea of financial penalties and potential incentives.

The failure consequences dialogue continued from previous meeting in which the notion of limiting participation of transfers received little to no support and ideas of financial penalties/incentives seemed to garner broad support. The failure consequences questions to explore with regard to a financial penalties approach were stated as: hourly/daily assessment, potential use of high risk periods such as seasons or critical hours, and potential for progressive penalties related to frequency or severity of failures. A concern for the potential of leaning and potential price impact was discussed relative to an incentive/penalty approach. Then a hurdle rate proposal was presented and discussed. This approach would limit transfers during failed hours and relax the limitation to allow transfer at predefined hurdle to ensure supply within deficient BAA is utilized depending on selected rate and compensate supporting entities. There was a

comment that there be a confirmation in the market of a feasible solution with the hurdle rate approach and questions relative to the timing and applicability relative to EDAM and EIM along with requests for more details on pricing and compensation. There was also a concern expressed regarding the market sensitivity to a hurdle rate and a comment the market feasibility requirement may address this. An IFM re-run proposal was presented to run IFM with no transfer limitation, then rerun with only bucket 1 transfers and charge deficient BAAs the re-dispatch costs. After questions and comments primarily for clarification of the proposal, the CAISO presented options to cure day ahead insufficiency through a hosted energy and imbalance trading platform, and this resulted in further questions/comments for clarity and relationship to other elements of the EDAM design. The meeting concluded after presentation of the concepts of options for day ahead procurement decisions and additional mechanisms needed to ensure high reliability.

## 5.1 Consequence based on Persistent Failure

The first of the three questions asked if there is merit to the idea of increasing consequences for persistent failures. Responses included: increases are supported coupled with a backstop mechanism to freeze transfers or an alternative with details to be determined; need expressed for a process and criteria for returning to normal participation; need expressed for robust and transparent oversight such as DMM reporting; question regarding how consequences imposed on balancing authority area (BAA) will translate to the underlying entities received reply, BAA is ultimately responsible for managing the process to establish rules for curing and allocating any cost for failures; and a question to understand possible diversity credits was answered with response that all capacity submitted will be subject to market optimization to realize the benefits.

## 5.2 Consequence Timing

The second question requested thoughts on different levels of financial consequences based on time of year and received the following input: suggestion to base consequences on system conditions with greater level when BAA is under stress, although a challenge was raised regarding the appropriate counterfactual to use, to which price cap triggers was offered; clarification was provided that the on-demand option with demand forecast at set time is expected to be part of the RSE proposal; a question regarding curing options was met with a response that the bid range or capacity trading options either before or after the final RSE may be considered; concerns were expressed with availability of excess supply and desire to see a truly

efficient way to incorporate all capacity in the market; and questions were received about failure consequence timing and view of demand response in the EDAM (these have been discussed previously).

### **5.3 Consequence Magnitude**

The third question stakeholders considered was whether to increase magnitude of consequence with magnitude of failure and this received a comment in support for percentage based approach and questions regarding forecast accuracy, answered as most accurate forecast available and whether a footprint wide check would be considered, which was given response this was not previously considered.

### **5.4 Hurdle Rate**

The discussion then transitioned to a review of the hurdle rate and administrative penalties options. The hurdle rate input included: dynamic rate may be better than fixed which may provide gaming opportunities; preference expressed for administrative penalties over hurdle rate; suggestion that a hurdle rate would interfere with market efficiency with addition of artificial costs to bids; concern for burden of hurdle rate and preference for optionality; concern for shifting problem around; concern for creating incentive to withhold to gain penalty rates.

### **5.5 Administrative Penalty**

Administrative penalty comments included: i) suggestion to apply only for habitual leaning; ii) financial penalty may not be best approach in light of the EDAM intent to help each other, so transfer limits might be more appropriate although the question of how to set transfer limits is an open question; iii) opposition for the idea of an opportunity to procure capacity in EDAM and the need for failure consequences to ensure entities offer enough capacity to meet their obligations; iv) a comment supporting a limit on transfers as a consequence; v) importance of a well-defined test; vi) additional comments indicating neither the hurdle rate nor administrative penalties viewed as effective consequences; and vii) concerns expressed regarding potential of double penalties such as penalty in EDAM and then EIM for the same failure. The CAISO team provided a response that the proposed design will take these comments into account.

## **5.6 Relationship to Confidence or Relative Priority of EDAM Transfer**

When discussing confidence in transfers, the consequence of RSE failure topic came back up. The question came down to whether an EDAM BAA that does not pass RSE should have the same priority on EDAM transfers, if they were to exist, as transfers to an EDAM BAA that passed the RSE. One perspective offered was that if the BAA that failed the RSE were subject to financial consequence by design, there should not be an additional consequence. Others had the perspective that only those BAAs that pass the RSE should benefit from the confidence of resultant EDAM transfer and therefore should be prepared have its EDAM transfer ahead of a BAA shedding firm load.

## **6 High Level EDAM Design Review**

### **6.1 Residual Unit Commitment and Convergence Bidding**

The objective of this discussion was to present a briefing on Residual Unit Commitment (RUC) and Convergence Bidding (CB) processes to provide an understanding of these current market designs to consider for potential application to the Extended Day Ahead Market (EDAM). Stakeholders were asked to consider sharing their positions regarding inclusion of the residual unit commitment (RUC) and convergence bidding (CB) processes in the Extended Day Ahead Market (EDAM) at the end of the presentations.

### **6.2 Residual Unit Commitment**

The presentation covered the functions RUC provides in the overall day ahead market process, including capacity awards to close the gap between bid-in demand and forecast demand, commitment of extra-long-start resources; and then explained the support RUC provides to the EDAM resource sufficiency evaluation (RSE), including procuring reliability capacity for Western Energy Imbalance Market (WEIM) not scheduled in the integrated forward market (IFM), along with the ability to maintain power balance constraints for issues not identified in the EDAM RSE. Participants must make all IFM capacity available to RUC in order to provide the best ability to pass the WEIM RSE. Comments and questions on this portion of the meeting included: a preference for an IFM design that clears all the products needed by the market; an inquiry for the demand forecast used in RUC was responded with the same one used in the EDAM RSE; response to question the RSE only purpose is to establish Balancing Authority Area (BAA) is sufficient; RUC capacity is declared through the RUC process based on the bids submitted; regarding potential to adjust the forecast after the RSE and before RUC, there may be operator driven adjustments; concerning price signals

sent by bid-in demand in IFM versus forecast demand in RUC, there is no impact because the capacity is decoupled from the IFM energy schedules; all organized markets execute separate IFM and RUC processes and all energy submitted in IFM must also be bid into RUC.

The meeting then moved to the presentation of RUC transfer examples which depicted several simple RUC scenarios with and without RUC transfers alongside virtual bidding as well. Comments and questions on this presentation included: concerns of potential for gaming due to RUC clearing a different amount than the demand forecast which received a request to send in examples of the concerns to be properly considered and answered; and regarding question of payment for transfers, this is accomplished through existing RUC cost allocation methodology. The meeting ended with request of stakeholders to share their perspectives with regard to the inclusion of RUC and CB into the EDAM design and this request was met with more questions about the workings of RUC and CB including: the detailed components of IFM and RUC such as imbalance reserves, flexible ramping and interrelationships; functioning of virtual bidding BAA to BAA and potential asymmetries make need for CB unclear; and others suggesting need for more details regarding the interaction and dependencies between RUC and CB.

A further presentation of the RUC process in a subsequent meeting described RUC as an element of the day ahead market that follows the market power mitigation and integrated forward market (IFM) components. The purpose of RUC is to ensure sufficient capacity is committed to meet the differences between cleared physical supply/demand and forecast demand which is driven by the following: bid-in and forecast load, variable energy resource (VER) schedules and forecast output, and the net virtual supply or net virtual demand. Comments and responses clarified that the RUC award is for capacity rather than energy and they do carry an obligation to bid in the real time market in which bids are inserted if not submitted by the resource. In addition, there are no pay provisions for unavailable RUC capacity. The proposal for EDAM consideration is to include RUC with day ahead market enhancements (DAME) where reliability capacity up/down procurement will be used to meet imbalance uncertainty. A question regarding the need for RUC in spite of RSE was answered with statement that RUC is a market mechanism to ensure sufficient capacity is made available to meet the differences previously discussed. Further, RUC only procures capacity to potentially provide energy based on day ahead requirements and is not dependent on the demand cleared in IFM. Regarding any requirement to bid into RUC, bidding is voluntary with respect to the RSE because it is based upon the submitted energy bids as currently proposed. The RUC optimization uses the same security constrained unit commitment process used by IFM but uses demand forecast instead of demand bids and IFM schedules are fixed in RUC. The presentation also covered

availability bids, capacity available, payments and cost allocation, and the optimization horizon. Questions and comments were received on the topics of price formation implications of RUC, timing relative to curing deficiencies, whether or not there are incentives to bid into RUC, and details regarding application to EDAM.

### **6.3 Convergence Bidding**

The Convergence Bidding process review continued from the previous meeting with description of convergence bidding in which virtual demand bids represent a commitment to buy at the day ahead price and liquidate at the 15-minute price while virtual supply bids represent a commitment to sell at the day ahead price and liquidate at the 15-minute price. The presentation also covered how convergence bids affect the physical market, a summary of convergence bidding features, the benefits to participants and the market, and additional requirements. Questions and comments regarding the convergence bidding topic included: a request for more information about “position limits”, which generally limit virtual bid quantities to the physical capabilities of the eligible locations; an inquiry regarding how virtual bids mitigate an outage, accompanied with reply the award is liquidated in the real time market in the opposite direction to provide a hedge; a request for comment regarding use as potential hedge for congestion risk, which was confirmed as another hedging use by submission of paired bids across the congestion interface.

### **6.4 Residual Unit Commitment in EDAM**

The EDAM design includes the EDAM pass sequence, resource sufficiency evaluation (RSE), integrated forward market (IFM), market power mitigation (MPM) for IFM, RUC, and MPM for RUC. Questions and comments on the EDAM overview presentation included: market results need for RSE to which the response stated only the intent and bucket 1 transmission is needed; non-CAISO BAAs to self-schedule ancillary service (A/S) would lead to no co-optimization of energy and A/S was confirmed with additional clarification that the EDAM BAA must provide sufficient capacity and imbalance reserves; regarding constraint enforcement in the RSE, all constraints enforced except transmission; regarding daily energy limits applicable to hydro, this capability will be available to all resource types including gas resources; as to whether CB is proposed to be applicable to EDAM, this is a question for stakeholders to consider and entities were invited to present their perspectives; the premise uses the proposed day ahead market enhancement design; request for a mechanism to cover both hourly and daily gas limitation was confirmed that daily energy limit is the proposed mechanism currently; RUC confirmed not to be a mechanism to cure RSE deficiencies, rather the only cure is

to increase bids submitted in the day ahead market; concern expressed regarding transmission capacity withholding; and a comment transmission used in RUC would be compensated. The March 7 meeting included a return to the questions and comments left in the queue at the end of the meeting on March 2<sup>nd</sup> regarding the reliability unit commitment (RUC) and convergence bidding (CB) topics. The questions raised included: inquiry regarding granularity of virtual bids and RUC to which the response was granularity will be the same; question regarding CB applicable in some BAAs and not others, which was met with response there could be an impact; further questions regarding the details and understanding of RUC and application of RUC; and a final comment supporting RUC. This completed the discussion on the RUC and CB in EDAM Design topic.

## **7 Transfer Reliability**

### **7.1 Confidence in EDAM Transfers**

The CAISO team presented an overview of the confidence in EDAM transfers topic, key considerations for the discussion, and the concept of transfer reliability as a prerequisite to realize EDAM benefits in both the day ahead and real time. Questions regarding this presentation generally inquired about the market functioning in stressed conditions, and this was followed by presentation of EDAM transfer reliability examples by Bobby Olsen, SRP.

### **7.2 EDAM Transfer Examples**

Bobby presented examples 1 and 2 which represented two examples of how firm EDAM transfers might resolve in real time. Example 1 represented a case in which there is a real time loss of generation and the re-dispatch of transfers to meet all obligations whereas in example 2, the loss of generation results in insufficient footprint capacity. There were no questions or comments on Example 1. Comments on Example 2 began with an observation that the shortfall would be larger without the Western Energy Imbalance Market (WEIM). There were a number of comments and questions regarding variations on the example, who bears responsibility for various contingencies, and how EDAM will change the market function. The response stated that the distinct difference is the base schedules are not fully optimized. There was also an expressed need to explain scenarios of various emergencies and contingencies. An example of a day ahead export and RUC scheduling counter flow from an adjacent area was discussed and this was followed by another example describing an export scheduled

with an equal and opposite export. A concern regarding use of RUC was expressed and others responded that RUC is designed to secure the needed physical capacity.

Bobby Olsen resumed with a review of the second example continued from the previous session and then opened for questions and comments. A question regarding how reserves fit into the situation was raised along with another regarding which BAA should carry the deficiency and whether there should be load shedding. Responses included descriptions in which reserves can be used in the current hour to meet the need and then reserves depleted would need to be replaced in the next hour. There were suggestions of potential for different levels of firmness based on system conditions as well as discussion around potential obligation linked to any BAAs failing the resource sufficiency evaluation (RSE); however, there was also a sentiment expressed by several that the BAA with the lost generation should be on the hook to procure the replacement capacity. The group contemplated the question, who should be responsible for the real time deficiency given the area C RSE failure. One argument for maintaining the firmness and obligation for area A to secure replacement is the idea that the deficient BAA will be subject to a failure consequence and to impose another consequence to replace in a contingency event may constitute a double penalty. Clarifications were provided to explain that the EDAM solves the minor deficiency in area C by optimizing available capacity in EDAM, then the Western Energy Imbalance Market (WEIM) RSE receives credit for the EDAM determined transfers, and then the WEIM re-optimizes to find the best overall solution with remaining capacity following the event. A question submitted in the chat asked, is it worth considering formally structuring WEIM/EDAM as a reserve sharing group? Other comments included: should there be a mechanism to signal a BAA receiving transfer awards to identify any need to carry additional reserves; BAAs in general expect to carry and deploy reserves to support transfers up to point of load shed; is there need for a mechanism to communicate the amount of transfers a BAA can support from a reserve perspective; the market optimization does optimize to ensure the contingency reserves are feasible; a concern regard a potential asymmetry in capacity margin for the CAISO if all capacity is offered into the market while other BAAs are not required to offer all capacity; and replacement reserve products may be used to replace reserves during contingency events.

EDAM transfer example discussed in the last session was resumed with a stated intent to be more specific about certain aspects of the examples. Before review of the example began, there were some comments regarding the potential for asymmetry between BAAs due to differing must offer requirements of participating entities and a concern expressed that this may result in some areas with tighter supply than others. Any asymmetry is not expected to be significant and the market should provide an

incentive to bid which should minimize the potential for this concern. Following this, the discussion moved back to the example with clarification the contingency reserves are separate from the uncertainty needs, and the EDAM transfers due to economic optimization of 100 MW from A to B and from B to C for energy and 100 MW from C to B and from B to A for imbalance reserve up (IRU). Questions and comments helped to clarify that both the energy and IRU in the example are a result of the EDAM economic optimization, the energy schedule is not dependent on the IRU, and the IRU is introduced as part of the Day Ahead Market Enhancements (DAME) initiative. A question introducing an intertie resource was given the response that existing rules would stand. The presentation described another example in which the IRU procurement was concentrated in area A and there were no questions.

### 7.3 Normal Operations Q&A

Focus of the discussion of the transfer example then shifted to several questions related to the examples under normal operations and the answers. The first was what is the scheduling priority of a transfer? The answer provided there is no priority because the transfers are scheduled and re-optimized economically. A question regarding the requirements for reserves was clarified as the larger of 3% load plus 3% generation or most severe single contingency (MSSC). The second question was what is the firmness of a transfer? The answer was the underlying transmission is highly reliable and the transfer is scheduled and re-optimized economically. This brought question and subsequent clarification that the re-optimization includes self-schedules included at penalty prices. There was another question regarding potential limitations of multi-stage generator (MSG) resources given differences in granularity between the day ahead and real time market and the answer provided the WEIM can unwind or make further commitments to the extent feasible for given time frames. A clarifying question regarding whether the test will change in real time was given response that the EDAM transfers will be considered in the WEIM RSE. The next question was does a transfer increase reserve requirements? The answer was there is no need to procure reserves because the market does this with contingency reserves and IRUs. The next question was what if there is a generator forced outage in area A? In this case, the contingency reserve is dispatched in A to substitute for lost supply. And the final question was what if there is an outage on an intertie that supports a transfer? The answer provided a specific description from the example indicating as long as IRU is feasibly procured, it should be able to meet collective realized uncertainty. Several variations were discussed with conclusion that the participants see benefits from EDAM because the optimizations make everyone better off than without the EDAM.

## 7.4 Emergency Operations Q&A

Then the working group discussed questions and answers regarding emergency conditions. The first was what if a contingency occurs beyond the MSSC? In this situation, all contingency reserves are dispatched followed by flexible ramp up and energy bids. The next question was what if uncertainty materializes beyond the 95<sup>th</sup> percentile for every BAA in the market footprint? All flexible ramp and all energy bids are dispatched. In either of these cases, if more is still needed, the operator actions may be necessary out of the market including: conditional supply or demand response dispatch, emergency assistance from other BAAs, manual commitment and dispatch capacity not in the market, interruptible demand options, and the last resort, and pro rata export cut and load management. This final option was introduced as a “shared pain,” middle ground, approach which received a supporting comment.

## 8 Conclusion

The Working Group 1 was able to address the majority of the scope items identified in the Initial/Draft List of Scope Items to be Considered - EDAM Working Group 1 - Supply Commitment and Resource Sufficiency Evaluation (RSE) as this summary report has detailed. The discussion, comments, and questions have provided valuable input to the EDAM stakeholder process and already begun to shape the EDAM design through the insights given to the ISO Team and the information received that will inform the development of the straw proposal. The WG1 began to build support and in some cases generated ideas in the following areas:

- EDAM RSE will be conducted at the BAA level, across the full 24-hour period based on hourly demand with reserves and uncertainty needs to satisfy overall capacity and flexibility needs, using the most accurate forecast, provided by either the EDAM Entity or the CAISO;
- EDAM Entity will have the ability to execute the advisory sufficiency test prior to close of the day ahead market to test their ability to pass the RSE before the actual RSE;
- EDAM RSE test is shaping up to being based on a sufficiency optimization framework based on the robust discussion and input from stakeholders during the WG1 sessions.

These are just a few examples of areas where the strong engagement of stakeholders in the working group process is demonstrating great value that will be realized as the straw proposal is developed. The CAISO greatly appreciates the participation and input

from all entities and individuals who attended the sessions and contributed to the discussion and development of ideas.