Memorandum

To: ISO Board of Governors and Western Energy Imbalance Market Governing Body

From: Anna McKenna, Vice President of Market Policy and Performance

Date: May 10, 2023 (May 15, 2023 Addendum)

Re: **Decision on day-ahead market enhancements**

This memorandum requires ISO Board of Governors and WEIM Governing Body action.

EXECUTIVE SUMMARY

Management proposes to enhance the day-ahead market to better account for net load forecast uncertainty between the day-ahead and real-time markets, meet real-time ramping needs not addressed by hourly schedules or committed capacity in the day-ahead market, reduce the need for manual operator out-of-market actions, and improve supply commitment in the day-ahead market residual commitment process when cleared physical supply is either greater than or less than the balancing authority area's (BAA) load forecast. The increasing prevalence of variable energy resources, critical to meeting renewable energy and greenhouse gas emissions reduction goals, has introduced additional uncertainty and variability. The unpredictability of these energy imbalances creates challenging system conditions which drive out-of-market actions to manage them. Finally, these proposed enhancements are important elements of the extended day-ahead market (EDAM) because they enable supply and demand diversity benefits in the day-ahead market optimization across the expanded footprint.

Management's proposal is the product of extensive stakeholder engagement and addresses detailed design elements and concerns raised by stakeholders and industry experts in the development of an imbalance reserve product to enhance the day-ahead market. After four years of stakeholder discussion and consideration, in February, in response to stakeholder requests, Management delayed presenting a proposal for a decision to the ISO Board of Governors and WEIM Governing Body to allow additional time to address stakeholder concerns, particularly regarding the nodal design of imbalance reserve procurement. Management also extended the stakeholder process to further consider stakeholder feedback, alternative designs of the imbalance reserve product, and address remaining concerns. Management's proposal benefited greatly from the productive dialogue with stakeholders during the extended stakeholder process. In particular, the proposal incorporates additional modeling and procurement

flexibility that addresses stakeholder concerns about the computational performance and market impact of the nodal procurement of imbalance reserves, congestion arising from deployment scenarios, and uncertainty in the volume of protected exports in real-time.

Management proposes an imbalance reserve product in the integrated forward market (IFM) in the day-ahead market to reduce the need for out-of-market actions and produce a market solution that accurately reflects costs and system conditions. In addition to the incorporation of the imbalance reserve product in the IFM, Management also proposes to modify the residual unit commitment (RUC) process of the day-ahead market to create distinct reliability capacity and to allow for decremental reliability capacity in addition to incremental capacity relative to the IFM schedules.

Joint ISO Board of Governors and WEIM Governing Body motion:

> ***Moved, that the ISO Board of Governors and WEIM Governing Body approve the day-ahead market enhancements as described in the memorandum dated May 10, 2023 and the Addendum dated May 15, 2023, with the exception of the day-ahead must-offer obligation for resource adequacy capacity eligible to provide imbalance reserves, which remains under the sole authority of the ISO Board of Governors; and***
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> ***Moved, that the ISO Board of Governors and the WEIM Governing Body authorize Management to make all necessary and appropriate filings with the Federal Energy Regulatory Commission to implement the change proposed in this memorandum, including any filings that implement the overarching initiative policy but contain discrete revisions to incorporate Commission guidance in any initial ruling on the proposed tariff amendment.***

ISO Board of Governors motion:

> ***Moved, that the ISO Board of approve the day-ahead must-offer obligation for resource adequacy capacity eligible to provide imbalance reserves element of the day-ahead market enhancements proposal, as described in the memorandum dated May 10, 2023 and the Addendum dated May 15, 2023; and***
>
> ***Moved, that the ISO Board of Governors and the WEIM Governing Body authorize Management to make all necessary and appropriate filings with the Federal Energy Regulatory Commission to implement the change proposed in this memorandum, including any filings that implement the overarching initiative policy but contain discrete revisions to incorporate Commission guidance in any initial ruling on the proposed tariff amendment.***

BACKGROUND

In September 2019, the ISO conducted an analysis of price formation in the day-ahead and real-time markets and produced a report titled *Price Performance Analysis*. The report identified factors that contribute to price differences between the day-ahead and real-time markets and proposed solutions to mitigate potential inefficiencies. The report also identified large price imbalances between the day-ahead and 15-minute markets, finding that day-ahead prices were persistently higher than real-time prices. The report attributed these price differences in part to out-of-market actions taken by system operators to procure additional capacity after the IFM to meet potential real-time supply and load imbalances.

ISO system operators increasingly have had to rely on out-of-market actions because the day-ahead market does not procure flexible reserves to cover net load uncertainty. Over the last several years, they have had to manually increase the forecast used in RUC in an attempt to procure capacity beyond the supply scheduled in the IFM to address the high net load uncertainty and ensure system reliability. Meeting net load uncertainty by procuring flexible imbalance reserves reduces the need to rely on out-of-market actions.

In addition to enabling ISO system operators to better manage unpredictable conditions, using an imbalance reserve product, rather than out-of-market actions, to procure flexible reserves to meet net load uncertainty provides several market efficiency benefits. The proposed day-ahead market enhancements provide the following benefits compared to the existing framework:

- **Maximizes the value of imbalance reserve through co-optimization**. Co-optimizing imbalance reserves with energy and ancillary services helps maximize their value to the market because the day-ahead market will make more effective unit commitment decisions and better allocate system ramping capability. In addition, the marginal price of imbalance reserves will consider the opportunity costs associated with providing imbalance reserves instead of other co-optimized products. The resulting prices will make suppliers indifferent to whether they receive an incremental energy schedule or an imbalance reserve award.
- **More efficiently compensates resources for flexible reserves through transparent market prices.** Currently, the market does not compensate resource adequacy resources for participating in the real-time market without day-ahead schedules. Instead, they must recover their costs through resource adequacy contract payments. Procuring flexible reserves using bids and compensating resources for those flexible reserves through direct market payments will create more efficient market outcomes by allowing the market optimization to consider costs when scheduling and committing units. It also will

make the value of flexible reserves known to market participants through a transparent market price, which should incentivize resources to provide more flexibility to the market.

- **Sufficient ramping capability**. Under the status quo, there is no assurance the supply committed or scheduled in the RUC process is sufficient to meet real-time market ramping needs. Imbalance reserves are 15-minute dispatchable, making them more flexible than supply procured in the RUC process.
- **Improved deliverability**. Confidence in deliverability of the imbalance reserve product will be improved through the proposed deployment modeling in the IFM process relative to how the RUC process attempts to ensure deliverability of committed capacity using adjustments to forecast demand. Unlike the use of RUC adjustments, deploying imbalance reserves in the integrated forward market will better ensure flexible reserves are deliverable to locations on the system where there are expected uncertainty needs.
- **Improves feasibility of day-ahead export schedules**. Relying on the RUC forecast adjustments to procure additional reserves can cause export schedules that cleared the IFM to no longer be feasible in the RUC process. Management expects imbalance reserves will significantly reduce the use of RUC forecast adjustments, so there is less chance export schedules clearing the IFM will be infeasible in the RUC process. In addition, by requiring imbalance reserve product procurement in the IFM, the market will not clear day-ahead export schedules that cannot be supported after considering the CAISO balancing authority area's flexible reserve needs.
- **More 15-minute non-EDAM import schedules**. The opportunity to sell imbalance reserves into the ISO market should encourage non-EDAM importers to set up their system resources as 15-minute dispatchable, giving the ISO real-time market additional flexibility.
- **Aligns with extended day-ahead market**. Imbalance reserves will optimize the scheduling of flexible resources across the EDAM footprint and maximize the diversity benefit of a large market footprint. By pooling the uncertainty risk over a wider geographic footprint, imbalance reserves reduce each EDAM BAA's individual net load uncertainty requirement and capacity procurement via the EDAM diversity benefit.

PROPOSAL

Management's proposal comprises two primary sets of changes to the day-ahead market: the introduction of an imbalance reserve product and modifications to the RUC process.

Imbalance Reserves

Imbalance Reserve Product

The day-ahead market currently does not have a product that provides flexible reserves to address day-ahead to real-time uncertainty. The declining predictability of energy

imbalances between the net load forecasted in the day-ahead market and the net load forecasted in the real-time market is requiring system operators to take out-of-market actions to secure additional supply. The proposed imbalance reserve product will ensure the day-ahead market schedules have sufficient flexible reserves to meet net load imbalances and ramping needs that materialize between the day-ahead and real-time markets, reducing the need for manual adjustments and creating a more efficient market outcome.

Management proposes to introduce an imbalance reserve product in the IFM. The IFM will procure imbalance reserves in the upward and downward direction, with the quantity of procured imbalance reserves based on the historical uncertainty in the day-ahead load, solar, and wind forecasts. Only resources dispatchable in the fifteen-minute market would be eligible to provide imbalance reserves, and the market would cap awards at the resource's 30-minute ramping capability. The market would consider transmission constraints to ensure imbalance reserves are deliverable in the day-ahead timeframe to locations where uncertainty is anticipated to materialize. Resources awarded imbalance reserves would receive a day-ahead payment at the product's locational marginal price.

Imbalance Reserve Product in the Integrated Forward Market

Imbalance reserves ensure the real-time market has sufficient dispatch capability to meet net load imbalances between the day-ahead and real-time markets. The IFM will procure and compensate flexible reserves. Under the proposed design, the IFM will continue to co-optimize energy and ancillary services, and it would include imbalance reserves in the co-optimization. The IFM will procure imbalance reserves in both the upward and downward direction. The imbalance reserve up and the imbalance reserve down are incremental and decremental reserves procured to meet the hourly upward and downward imbalance reserve requirement based on historical net load imbalance between the day-ahead and real-time markets.

Although the day-ahead market will schedule imbalance reserves in hourly intervals, the market will base the maximum award on a resource's 30-minute ramp capability, and eligible resources must be dispatchable in the 15-minute market. An imbalance reserve schedule results in an obligation to provide economic energy bids in the real-time market. This proposal includes an unavailability penalty for imbalance reserves to ensure resources follow through on this obligation.

Under Management's proposal, the market considers transmission constraints when awarding imbalance reserves in the IFM to ensure they are deliverable. The market accomplishes this by using upward and downward deployment scenarios. The IFM would solve the base scenario and deployment scenarios simultaneously, resulting in the procurement of imbalance reserves that ensure scheduled day-ahead physical supply can meet the uncertainty requirements if deployed without violating transmission constraints. Some stakeholders expressed concern that procurement of imbalance reserves using the deployment scenarios to evaluate deliverability could add

unnecessary complexity and delay DAME implementation. Management evaluated these comments and concluded that procuring an imbalance reserve product deemed deliverable in the day-ahead has several benefits over a procurement approach that ignores deliverability, which is generally characteristic of zonal approaches:

- Deliverable imbalance reserves procurement supports an operationally feasible and reliable day-ahead market by enabling the market to ensure the reserves are deliverable to where the uncertainty is expected to materialize without violating transmission constraints
- Assures the market would not award and pay for reserves from resources that are behind constraints and undeliverable in the day-ahead timeframe. Ignoring deliverability in the procurement of imbalance reserves could lead to awarding and paying for reserves on resources that are knowingly behind constraints
- More accurate prices for imbalance reserve awards because prices represent a locational value of flexible resources
- Improves confidence in EDAM transfers because there is more assurance that energy and imbalance reserve schedules are deliverable

Some stakeholders[1] urged the ISO to adopt an approach to imbalance reserves that models deliverability similar to the way the ISO procures ancillary services. They argued that such an approach would simplify market design and reduce the need for additional design elements like local market power mitigation. Management's proposal responds to this stakeholder feedback, by including the following:

- *Allow for the flexible activation/deactivation of individual transmission constraints in deployment scenarios.* This will enable the ISO to enforce fewer transmission constraints in the deployment scenarios if necessary due to lower computational performance or market performance. This will also enable the ISO to collaborate with EDAM balancing authorities to identify the most critical transmission constraints to enforce.
- *Implement a tunable parameter to define the proportion of imbalance reserve awards that are deployed with resulting flows in the deployment scenarios*. This addresses stakeholder concerns about excess congestion costs resulting from the deployment scenarios.

Local Market Power Mitigation of Imbalance Reserve Bids and Imbalance Reserve Demand Curve

Currently, day-ahead market energy bids are subject to local market power mitigation in the IFM. The market power mitigation tests for resources located in uncompetitive supply locations and mitigates those resources' energy bids to the higher of their cost-based default energy bids or the competitive locational marginal price. The competitive

[1]Bonneville Power Administration (BPA), California Energy Storage Alliance (CESA), NV Energy, Puget Sound Energy (PSE), San Diego Gas & Electric (SDG&E), Vistra, Western Power Trading Forum (WPTF)

locational marginal price is the marginal price of energy excluding the non-competitive congestion components of the locational marginal price. The IFM then uses the mitigated bids. Management proposes to incorporate the same approach for mitigating imbalance reserve-up offers. Imbalance reserve mitigation is necessary because local transmission constraints can lead to uncompetitive imbalance reserve supply conditions. In locations with uncompetitive supply conditions, suppliers could utilize their position on the grid to exercise local market power through their imbalance reserve offers.

Management proposes to mitigate imbalance reserve offers to the higher of a default availability bid or the competitive locational marginal price. In contrast to the default energy bid that the ISO uses to estimate a specific resource's marginal energy cost, Management proposes to use a common system-wide default availability bid for imbalance reserve mitigation. This default availability bid would be the same price for all resources across all market intervals. Management proposes to set the default availability bid price at $55/MWh. The default availability bid price was established by analyzing historical spinning reserve bids, which are representative of the costs of making a resource available for dispatch in the real-time market. The default bid level is based on the 80th percentile of the historical spinning reserve offers. This provides a conservative way of approximating the competitive cost to provide reserves until more data becomes available and it provides strong assurances that resources will not be mitigated below their costs.

The proposal also includes a demand curve to limit the amount of imbalance reserves the market procures as prices increase. Management considered several different approaches to establishing the demand curve values, and in response to significant stakeholder feedback, it proposes an initial demand curve that would cap imbalance reserve procurement at $55/MWh for the capacity. Given this new demand curve, the market power mitigation proposal can be simplified to a $55/MWh bid cap because both the default availability bid and the demand curve cap are set at the same $55/MWh price. Although the demand curve functionality eliminates the immediate need for market power mitigation features, Management still intends to develop these features even though they will not be active upon the market's launch. This will allow the ISO to use such features in the future if operational experience shows that further mitigation or a different demand curve structure is warranted.

Day-ahead imbalance reserves must-offer obligations for resource adequacy resources

Management proposes to extend the must-offer obligations of resource adequacy resources to include an offer obligation to imbalance reserves. Resource adequacy resources are required to submit bids for energy and all services they are eligible to provide. Therefore, with the introduction of the imbalance reserve product, resource adequacy capacity eligible to provide imbalance reserves (*i.e.*, capacity that can be dispatched in the 15-minute market intervals) will have a must-offer obligation for imbalance reserves for the portion of their energy bid that is not self-scheduled. This

requirement will ensure all resource adequacy capacity capable of providing imbalance reserves is available to provide the service. This will increase the competitiveness of the product, improve congestion management, and reduce concerns about physical withholding. In addition, in the context of the EDAM, this will better ensure that the ISO balancing authority area passes the day-ahead resource sufficiency evaluation.

Certain stakeholders[2] raised concerns that paying for imbalance reserves could result in double payments to ISO resource adequacy resources because resource adequacy contracts already compensate resources for their availability to the market. Some stakeholders supported[3] an automatic transfer of revenues from suppliers to load serving entities and to characterize the product such that suppliers would be required to transfer any revenue associated with imbalance reserves to load serving entities. Management determined that if the ISO provides certain information to the parties, the parties to these contracts can address these issues between themselves. This approach is preferable given these parties are most familiar with their contracts. For example, certain stakeholders[4] have indicated they can reconcile any double payment concerns if the ISO provides a breakdown of the imbalance reserve marginal price by capacity versus opportunity cost. Management proposes to provide this information and work with stakeholders to determine what information they require to reconcile their contractual issues.

Some stakeholders indicated that they are unable to reconcile these concerns on their own. In particular, the California Public Utility Commission (CPUC) noted that if parties under resource adequacy contracts cannot resolve potential double payment issues, ratepayers will be exposed to potential double payments. In response, Management proposes a three-year transitional period where the ISO will offer a resource adequacy "true-up" mechanism to facilitate these bilateral arrangements in the ISO settlement system. This mechanism would be available only to parties that mutually agree to opt-in to this settlement treatment. Management commits to work with the CPUC and the contracting parties to provide specific solutions to existing contracts the parties to such contracts cannot reconcile. For example, if the contract parties determine it is ambiguous whether their contract already compensated the resource for imbalance reserve product, the ISO can fashion a settlement adjustment that splits the resource's imbalance reserve earnings in half.

RUC Changes

The RUC process bridges the gap between a BAA's demand forecast and the physical energy cleared in the IFM by procuring incremental supply that was not scheduled or committed in the IFM to ensure sufficient physical supply to meet the BAA's day-ahead demand forecast. The addition of the imbalance reserve product in the IFM allows for

[2] California Community Choice Association (CalCCA), CPUC Public Advocates Office, Middle River Power, Vistra, WPTF
[3] CalCCA, Six Cities
[4] Pacific Gas and Electric (PG&E), Southern California Edison (SCE), SDG&E

more clearly defined distinct reliability capacity procured through RUC to meet the balancing authority's load. Management proposes to modify RUC to allow the definition of incremental as well as decremental reliability capacity relative to the IFM schedules. This change also will enable RUC to produce downward capacity, which it is not capable of doing today.

A reliability capacity award would result in an obligation for a resource to provide economic energy bids to the real-time market, limited to a resource's 60-minute ramp capability. Resources awarded reliability capacity would have their reliability capacity awards settled at a reliability capacity locational marginal price. This product addresses scenarios where the cleared physical supply differs from the BAA's demand forecast. This can occur when bid-in load clears the IFM less than or greater than the BAA load forecast or when the market clears net virtual supply or demand.

Finally, multi-stage generating resource configurations are currently committed in the IFM and passed to RUC as an input. System operators must exceptionally dispatch the units down manually to manage congestion or oversupply. This proposal would enhance RUC to transition multi-stage generating resources in the downward direction without shutting them down completely. This will help manage congestion in RUC and avoid out-of-market actions by system operators.

Market Power Mitigation Pass for RUC

Management proposes to include a new market power mitigation pass after the IFM and before RUC to assess the competitiveness of reliability capacity offers for RUC. This proposal would mitigate reliability capacity offers to the higher of a default availability bid or the competitive locational marginal price. The RUC default availability bid would be a static system-wide default availability bid for reliability capacity mitigation, and it would be the same price for all resources across all market intervals.

Although RUC currently procures supply nodally, market power is not a concern because RA capacity must participate in RUC at a price of $0, so RA resources are unable to withhold either physically or economically. Market power mitigation in RUC is necessary in DAME because all resources, including RA resources, can offer non-zero prices for reliability capacity up and down. RA resources must be able to bid non-zero prices in RUC so reliability capacity is competitively procured across the EDAM.

Real-time bidding obligations based on day-ahead awards

Resources that receive reliability capacity awards or imbalance reserve awards in the day-ahead market must provide economic energy bids for the full range of their awards in the real-time market. Real-time must-offer obligations will apply in the hours that a resource has an award. This will ensure resources awarded these products will bid in the real-time market for optimal utilization during awarded hours.

Day-ahead must-offer obligations for resource adequacy resources

Resources providing resource adequacy capacity that currently must submit RUC availability bids will also be required to bid their resource adequacy capacity into RUC for reliability capacity up. Resource adequacy capacity can bid into RUC at any price between the bid floor and the bid cap. As noted above, allowing RA resources to bid non-zero prices in RUC is necessary to procure reliability capacity competitively across the EDAM.

Real-time must-offer obligations for resource adequacy resources

Management's proposal maintains the ISO balancing area resource adequacy real-time must-offer obligation.

Lower priority exports

Updating the RUC market formulation in this proposal requires changes to the process for identifying exports at risk of curtailment in real-time. Economic exports and lower priority (LPT) exports that clear the IFM are at risk of curtailment in the real-time market. If these exports do not explicitly bid for reliability capacity up (RCU), they will be considered in the RUC scheduling run with RCU bids at penalty prices that maintain the merit order of their energy bids in the IFM. Consequently, if there is no available physical supply capacity in the RUC above energy schedules to meet both the demand forecast and the economic and LPT exports that cleared the IFM, the latter will receive a curtailment indication in the RTM in the form of RCU awards. The scheduling coordinator for these exports will be obligated to submit energy bids for the RCU capacity.

STAKEHOLDER ENGAGEMENT

After four years of stakeholder discussion, workshops and draft proposals, the ISO initially published the DAME final proposal on January 11, 2023, intending to bring it to the ISO Board of Governors and WEIM Governing Body for a decision in February. In response to stakeholder concerns, Management extended the DAME stakeholder process to facilitate additional discussion regarding key design elements, particularly the design of imbalance reserve procurement. Stakeholders expressed concerns about the cost of the imbalance reserve product and whether the proposed nodal design was the best path forward.[5] These stakeholders argued that the proposal was too complex and thus introduced significant market risk. They requested that the ISO instead begin with a zonal approach for procuring imbalance reserves, which they viewed as simpler.

[5] BPA, CalCCA, California Energy Storage Alliance (CESA), CPUC Public Advocates Office, NV Energy, Puget Sound Energy (PSE), San Diego Gas & Electric (SDG&E), Vistra, Western Power Trading Forum (WPTF)

They argued that a zonal approach would simplify the market design by reducing the need for complicated proposal elements, such as deployment scenarios and market power mitigation.

Between February and May, the ISO held six public meetings during which both the ISO and stakeholders presented their views on the proposed imbalance reserve product and alternative designs. After soliciting stakeholder presentations, the ISO held its first public meeting of the extended stakeholder process on February 27, 2023, with the Western Power Trading Forum, Vistra, and ISO staff presenting on their views of the imbalance reserve product. The ISO held a second public meeting on March 7, 2023, during which ISO staff, Vistra, and Southern California Edison presented their views on alternative designs. At the third public meeting on March 7, 2023, ISO staff and the Western Power Trading Forum again presented on their views of the proposal and design alternatives. On April 8, 2023, ISO staff held a fourth public meeting to review the draft revised final proposal published on April 6, 2023. ISO staff held a fifth public meeting on April 17, 2023, during which California Energy Storage Alliance and the ISO presented on the role of storage resources in the new market products. A final informational public meeting was held on May 2, 2023 to provide stakeholders with additional information on design considerations and implementation details for the imbalance reserve demand curve and procedures for assessing and establishing and tunable parameters. In addition, the Market Surveillance Committee considered the DAME proposal at its March 10, 2023 and May 4, 2023 general session meetings, with presentations by ISO staff and MSC members. The MSC's final opinion is attached for reference.

On March 20, 2023, the ISO published a comparison matrix highlighting the differences and tradeoffs between the design options discussed in the workshops. The matrix addressed three general design options:

- Nodal approach: procuring imbalance reserves within the IFM (co-optimized with energy and ancillary services) and using deployment scenarios to ensure the awards are transmission feasible if deployed as energy.
- Zonal approach: procuring imbalance reserves within the IFM (co-optimized with energy and ancillary services) similar to the procurement of ancillary services in designated zones established to manage congestion on major transmission interfaces within a BAA.
- SCE approach: procuring imbalance reserves within the RUC (co-optimized with reliability capacity) using nodal procurement to respect transmission constraints, with a fallback option of keeping imbalance reserves in the IFM but modeling less than full deployment of the imbalance reserves in the deployment scenarios.

Stakeholders submitted comments on March 30, 2023 based on the discussions from the first three stakeholder workshops. Feedback was mixed, with stakeholders

continuing to disagree on whether a nodal[6] or zonal[7] approach was preferable and whether downward imbalance reserves were necessary.[8] Some stakeholders suggested procuring imbalance reserves in the RUC process,[9] while other stakeholders disagreed with that proposal.[10] Several stakeholders expressed concern about the 15-minute ramping requirement of the imbalance reserve product,[11] and the potential cost associated with congestion induced in the deployment scenarios.[12] Other stakeholders commented on the imbalance reserve demand curve, the flexible application of constraints, local market power mitigation, and the nodal distribution of uncertainty demand. A summary of stakeholder positions and Management's responses thereto is included in the attached stakeholder matrix. Based on stakeholder feedback from comments and workshop discussions, the ISO published the draft revised final proposal on April 6, 2023.

As a result of the additional stakeholder process, several model and procurement flexibility enhancements and clarifications are included in Management's proposal directly responding to stakeholder feedback. These included:

- **Implement flexibility to define which transmission constraints to enforce in the deployment scenarios.** This will give the ISO flexibility to adjust the transmission constraints enforced in the deployment scenarios in response to optimization performance, market performance, or operational experience. This will also enable the ISO to work with EDAM BAA operators to define the critical constraints that will be enforced in the deployment scenarios in their balancing authority area. This modification addresses stakeholder concerns regarding the computational performance and market impact of the nodal approach to procurement of imbalance reserves.
- **Implement a tunable parameter to control the proportion of imbalance reserve awards deployed with resulting flows in the deployment scenarios.** The ability to model only a subset of imbalance reserve flows will mitigate concerns about excess congestion costs.
- **Expand the imbalance reserve product to include the 30-minute ramp-capable portion of the resource.** This is less restrictive than the previous 15-minute ramping restriction and is less costly because it requires fewer resources to provide imbalance reserves.

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[6] BANC, California Department of Water Resources (CDWR), DMM, Middle River Power, PacifiCorp, Public Generating Pool, Sacramento Municipal Utility District (SMUD), SCE, Seattle City Light, Tacoma Power
[7] BPA, CESA, Puget Sound Energy, Vistra, WPTF
[8] Puget Sound Energy, CESA, Six Cities, Vistra
[9] SCE, Six Cities
[10] BANC, BPA
[11] BANC, CPUC, DMM, Los Angeles Department of Water and Power (LADWP), NV Energy, PacifiCorp, PG&E, Seattle City Light
[12] PG&E, SCE

- **Include a mechanism to collect congestion revenue rent on imbalance reserve flows and redistribute it to entities entitled to the congestion revenue.** This mechanism will calculate displaced congestion revenue from imbalance reserve flows and redistribute it according to existing processes.
- **Commitment to evaluating the need to add a layer of regional uncertainty to the nodal uncertainty approach.** This evaluation will address stakeholder concerns that the approach to distributing uncertainty in the deployment scenarios is flawed because it does not account for differences in uncertainty across locations.
- **Include a three year "opt-in" transitional resource adequacy true-up mechanism.** This mechanism will allow entities to choose to have specific imbalance reserve and reliability capacity payments that overlap with RA capacity settled by the ISO.

During the extended stakeholder process, the ISO also provided additional documentation of previous challenges with flexible ramping product deliverability as reflected in prior ISO published reports. These issues drove the need to consider the same flexible ramping product nodal procurement approach for the proposed imbalance reserves product. This information supported the need to address the deliverability and price formation issues previously identified. The ISO also clarified that a negotiated bid option for imbalance reserves and reliability capacity will be available after the ISO gains operational experience with the associated bids/costs.

After thorough consideration of stakeholder feedback, Management concluded that the benefits of a nodal approach (as described above) warrant the increased complexity. Under a zonal approach, resources known to be undeliverable due to transmission constraints could be awarded imbalance reserves. This would significantly reduce the value of the product and require balancing authority areas to take out-of-market actions to ensure sufficient resources are available to meet uncertainty needs.

Following publication of the Draft Revised Final Proposal on April 6, 2023 and accompanying addendum published on April 24, 2023, the ISO held a stakeholder workshop focused on storage resources April 17, 2023. A final set of stakeholder comments was due on April 24, 2023. Although some stakeholders broadly supported the changes included in the draft revised final proposal,[13] other stakeholders identified remaining concerns. In particular, stakeholders requested the ISO provide additional justification for capping the imbalance reserve demand curve at $55/MWh and further clarity regarding the implementation of the imbalance reserve demand curve and the tunable parameters. In addition, stakeholders requested additional analytical support and metrics related to enforcing constraints in deployment scenarios and the process for changing the tunable parameters. Finally, stakeholders expressed concerns about the complexity of the new energy storage state of charge constraints and how they would align with existing constraints.[14] In response to these remaining stakeholder

[13] CDWR, DMM, LADWP, Pacific Generating Pool, PacifiCorp, Public Power Council, SCE,
[14] AES, Cal CCA, CESA, Middle River Power, REV Renewables, SCE, WPTF

concerns, the ISO held an additional stakeholder meeting on May 2, 2023 to provide further context and justification for the key changes incorporated into the revised final proposal – particularly the imbalance reserve demand curve and procedures for assessing and establishing tunable parameters. Although some stakeholders continue to request that the ISO delay bringing the proposal to the ISO Board of Governors and WEIM Governing Body for a decision,[15] Management has determined that given interdependencies between the DAME and EDAM initiatives and EDAM tariff filing deadlines, further delaying the DAME initiative risks delaying the planned Fall 2024 implementation of EDAM. The ISO remains committed to working with stakeholders to refine implementation details and provide additional clarity on recently-added elements in the proposal.

The ISO published the revised final proposal on May 1, 2023. The additional stakeholder engagement described above led to the following changes to Management's proposal focused on the imbalance reserve demand curve, market power mitigation, and storage resources:

- **Implement an imbalance reserve demand curve for all EDAM balancing areas including the ISO balancing area, and cap the imbalance reserve up and down demand curve values at $55/MWh.** Further evaluation and discussion of the prior demand curve approach revealed the prior proposal could lead to high prices solely for the ISO balancing authority area for providing flexibility throughout the EDAM footprint. By capping the demand curve values at the default bid price for imbalance reserve mitigation, market participants can gradually gain experience and adapt to the new market design. This approach is more consistent with the approach taken by the Mid-Continent Independent System Operator with a similar product. This approach allows for a smoother transition, reducing the likelihood for unforeseen issues or price spikes.
- **Revise local market power mitigation and the imbalance reserve bid cap in connection with the imbalance reserve demand curve.** The newly proposed demand curve (described above) negates the effect of local market power mitigation for imbalance reserves because the mitigated bid has the same value as the cap of the demand curve. However, Management still proposes to implement local market power mitigation procedures should the need arise where the parameters for the demand curve or the mitigated bids change in a way that makes the mitigation binding. The newly proposed demand curve also reduces the imbalance reserve offer cap from $247/MWh to $55/MWh.
- **Storage resource participation.** Provides non-RA storage resources the option to participate in the RUC process and require RA storage resources to participate in the RUC process. Storage resources must also anticipate and hold upper and lower values for state of charge to support imbalance reserve awards in the day-ahead market and ensure that they can deliver imbalance reserve awards in the real-time market.

[15] BPA, Middle River Power, Powerex, Six Cities, The Energy Authority, WPTF

- **Clarify an exception to the joint authority classification of this initiative.** Section 3.1 proposes a bidding obligation for California RA resources.[16] This element will remain under the sole authority of the ISO Board of Governors, with no role for the WEIM Governing Body.

Prior to the extended stakeholder engagement process, some stakeholders opposed applying market power mitigation measures to the new market products, arguing that energy mitigation is sufficient.[17] However, Management provided examples of how imbalance reserve bids could result in the exercise of market power, even when local market power mitigation was applied to energy bids. Therefore, Management believes it is appropriate to apply local market power mitigation measures to imbalance reserves and reliability capacity.

A detailed discussion of stakeholder positions on critical aspects of the proposal is included as an attachment to this memorandum.

CONCLUSION

Management requests the ISO Board of Governors and the WEIM Governing Body approve Management's day-ahead market enhancements proposal described in this memorandum. These enhancements will improve the ISO's day-ahead market, better account for variability and uncertainty, and maximize the benefits of West-wide diversity in the day-ahead market's optimization.

[16] Day-Ahead Market Enhancements Revised Final Proposal, page 28
[17] BPA, CESA, Middle River Power, PG&E, Public Generating Pool, REV Renewables, Vistra, WPTF