

Bonneville Power Administration

Day-Ahead Market Policy Paper Attachment 1

Staff Recommendation on Day-Ahead Market Participation

April 2024

1. Introduction

In July 2023, the Bonneville Power Administration began to engage the region in a public process to evaluate its potential participation in a day-ahead market. As one of the largest wholesale power and transmission providers in the Western Interconnection, Bonneville's decision regarding day-ahead markets will play a critical role in the energy and capacity market landscape for the region, and it will directly impact many other entities' decisions regarding day-ahead market participation. This paper shares Bonneville staff's initial findings, preliminary analysis and recommendations regarding day-ahead market participation. Nothing in this staff recommendation constitutes a final decision, and the agency invites additional public input and comments to inform Bonneville's final analysis and decision planned for late 2024.

Utilities across the West are considering day-ahead markets as a means of optimizing dispatch from a larger pool of loads and resources with the objective of lowering the cost of power for consumers. A day-ahead market takes a wide-geographic area view of loads, resources, and transmission to develop a security constrained economic dispatch¹ of participating resources. A day-ahead market is expected to enable more efficient use of existing transmission, result in transparent price formation, enable more efficient integration of variable energy resources, provide appropriate compensation for flexible resource capability, and facilitate coordinated management of uncertainties. Two day-ahead market options have emerged: the California Independent System Operator (CAISO)'s Extended Day-Ahead Market (EDAM) and the Southwest Power Pool (SPP)'s Markets+.

At this time, Bonneville believes it is prudent to share staff's preliminary analysis, acknowledge regional input received to date, and clarify next steps in its process for continued evaluation and decision-making regarding potential participation in a day-ahead market. Bonneville staff recommends that Bonneville pursue participation in a day-ahead market because it promises to support and bolster the available supply of power needed to meet Bonneville's firm power obligations and its transmission and delivery. Day-ahead security constrained economic dispatch markets would harness regional and inter-regional coordination of both resources and transmission, without impeding the ability of Bonneville's customers to meet emerging state requirements and policies related to development of carbon-free resources and associated environmental attributes.

At this time, staff also believes the SPP's Markets+ day-ahead market is the preferred market for Bonneville and its customers based on the current market design and governance features of the two markets. Several studies demonstrate that a single West-wide market may yield significant benefits. Bonneville acknowledges that a single market could be of value if benefits are equitably distributed. For Bonneville to participate, such a market would need to align with the evaluation principles set forth below. Notably, as discussed in section 7, independent market governance is an essential requirement.

¹ A day-ahead market would optimize a participant's loads, resources and transmission within the market footprint using a security constrained unit commitment and economic dispatch on a day-ahead basis with hourly granularity. A potential day-ahead market is expected to have a much larger volume of transactions than a real-time market.

With the continued evolution toward organized markets in the West, it is critical for Bonneville to continue to be a leader in the development of these markets. Given the size and position of Bonneville within the region, it is important that Bonneville engage in the development of both SPP's Markets+ and CAISO's EDAM. Day-ahead markets are anticipated to produce a range of impacts to Bonneville preference customers, depending on whether customers are in the same or different market footprints than Bonneville. With the anticipation of serving preference loads in different market footprints, Bonneville must maintain understanding and awareness of the market design, operational protocols, and business practices for each respective market. Therefore, it is necessary to continue Bonneville's active participation in the development processes, implementation, and eventual operation of both EDAM and Markets+, regardless of whether Bonneville decides to pursue participation in either market.

In this recommendation, staff discuss their perspective on participation in an organized market. We acknowledge that participation in a market may impact Bonneville customers in different ways. This recommendation assesses full participation of Bonneville's balancing authority area (BAA) in a day-ahead market. Customer loads and resources located in the Bonneville BAA would be settled by the market operator. Customer loads located outside the Bonneville BAA may fall within the same day-ahead market, a different day-ahead market, or outside of a day-ahead market. Bonneville's engagement in the development of both market options ensures that the agency will understand the expectations, processes, and practices for serving customer loads across the region.

Throughout this process, Bonneville has balanced the need to expedite its evaluation with ensuring there is adequate time to thoroughly engage with the public. Bonneville has updated its process timeline in section 16 to provide additional time for public review and comment while aligning with the schedules of the market design options in the West. Issuing this staff recommendation now supports our objectives of engaging in an open and transparent process, while positioning us to advocate for the strongest market design that will benefit Bonneville, its customers, and the Pacific Northwest region. Bonneville appreciates the robust engagement and feedback it has received thus far and looks forward to continuing dialogue regarding this evaluation and decision process.

2. Bonneville's Day-Ahead Market Evaluation Principles

Bonneville's 2024-2028 Strategic Plan² sets the agency's path in an era of transformation for the Pacific Northwest's electric grid. Through the transformation, Bonneville will maximize the value of the federal hydropower and transmission systems while ensuring a reliable, resilient electric power grid capable of supporting regional growth. An objective in meeting this goal is fostering market evolution to enhance the delivery of cost-effective, reliable power and transmission service.

In its decision process, Bonneville will assess the business case for day-ahead market participation based on both quantitative and qualitative evaluation components. Bonneville will continue to

² Bonneville Power Administration, 2024-2028 Strategic Plan, *available at* <https://www.bpa.gov/-/media/Aep/about/who-we-are/strategic-plan/2024-2028-strategic-plan.pdf>

evaluate potential day-ahead market participation based on the following evaluation principles, which were shared with stakeholders in public workshops:

- **Statutes** – Bonneville meets its statutory, regulatory, and contractual obligations.
- **Reliability** – Bonneville maintains efficient, economical, and reliable delivery of power and transmission service to its customers.
- **Reliability** – Market design includes resource sufficiency and/or resource adequacy frameworks that ensure reliability.
- **Business** – Bonneville’s participation is supported by a sound business rationale.
- **Strategy** – Bonneville’s participation is consistent with Bonneville’s 2024-2028 Strategic Plan.
- **Governance** – The market has a durable, effective, and independent governance structure which provides fair representation to all market participants and stakeholders. Decision-making and stakeholder engagement occurs in a transparent and inclusive manner.
- **Customers** – Bonneville’s evaluation of day-ahead market participation includes transparent consideration of the commercial and operational impacts on its products and services.
- **Greenhouse Gas (GHG)** – Bonneville will evaluate how participation will impact GHG emissions attributed to the federal system and customers’ ability to comply with state carbon programs. Participation must maintain the value of the low-carbon nature of the federal system to the extent possible.

As Bonneville evaluates potential participation in a day-ahead market, Bonneville’s core principle is meeting its statutory and contractual obligations. If it participates in a day-ahead market, Bonneville would continue to offer long-term transmission and power sales contracts to ensure a lasting and reliable power supply for customers. In a day-ahead market, the market would optimize dispatch of resources based on security constrained economic dispatch that does not delineate which resources serve each load, though some market features may recognize resource attribution to load. Bonneville staff is assessing whether day-ahead market participation will deliver value for its customers in terms of greater efficiency, lower costs, and increased reliability in power supply and transmission. Bonneville staff expects that an economized dispatch will achieve these objectives if it elects to join a day-ahead market.

Based on stakeholder feedback, staff also considered potential day-ahead market participation through the lenses of firmness of power supply, certainty of delivery, and environmental attributes. This recommendation addresses firmness of power supply in section 8, focusing on ensuring adequate supply through resource planning. The recommendation addresses certainty of delivery in section 10 on transmission, describing how a day-ahead market paradigm would build upon existing constructs. The recommendation addresses how market designs would provide for transparent accounting of environmental attributes in section 11 on GHG accounting.

3. Preliminary Legal Assessment

Stakeholders asked Bonneville to explain its legal authorities to participate in a day-ahead market. To meet this request, Bonneville included a preliminary legal assessment as Attachment 2. The

assessment briefly discusses Bonneville's statutory authority to participate in organized markets, ability to meet its preference and Northwest Power Act section 5(b) firm power sales obligations, policy regarding environmental attributes, transmission authorities, rate-setting directives, tariff revision processes, and environmental obligations.

4. Preliminary Business Case

As outlined in the day-ahead market evaluation principles, Bonneville's participation in a day-ahead market must be supported by a sound business rationale. Staff's initial analysis focused on the cost benefit study results obtained from Bonneville's participation in the Western Markets Exploratory Group (WMEG), a group of 26 utilities. The WMEG analysis examined CAISO's EDAM offering and SPP's Markets+ offering. Staff's assessment is that the business case established in the WMEG study justifies a recommendation for Bonneville to pursue day-ahead market participation.

Energy + Environmental Economics (E3) produced the WMEG study by employing a least-cost production cost modeling approach to examine varying market footprints over three different time windows of 2026, 2030, and 2035. The footprint variants consisted of a single market footprint across the interconnection accompanied by multiple varying footprints where potential market participants (i.e., WMEG members) were modeled in differing markets. The 2026 study year was used as the launch year of each respective day-ahead market offering. The 2030 study built on the 2026 study by creating some, but not a comprehensive, consolidation of balancing authorities and layered on an ancillary services market. The 2035 study examined the participants' creation of a regional transmission organization (RTO). Bonneville focused on the 2026 study because it views the 2030 and 2035 studies as more speculative.

In the October 23, 2023, workshop, Bonneville and E3 comprehensively discussed the WMEG results with stakeholders, focusing on the 2026 study results. E3 developed a business-as-usual case as a baseline to calculate the benefits associated with the 2026, 2030 and 2035 study years. The business-as-usual case provided an anchor point from which variances were calculated for each cost-benefit study category. The business-as-usual case represented a scenario of continued bilateral trading of forward and day-ahead positions with real-time represented by continued participation in an energy imbalance market.

While the business-as-usual case played a role in the WMEG study, Bonneville staff does not anticipate that it would be a risk-free alternative to day-ahead market participation because utilities across the Western Interconnection are contemplating market participation. Many of these utilities expect to make funding commitments to a day-ahead market in late 2024. Staff anticipates that access to trading hub liquidity and bilateral trading counterparties will decrease as more resources, load, and transmission are optimized in organized day-ahead markets. This belief is rooted in the premise that day-ahead security constrained economic dispatch markets help ensure least-cost dispatch and the most efficient use of transmission relative to the bilateral transactions and existing transmission reservation and scheduling business practices. Western utilities observed a similar trend in reduced volume and trading partners as entities have joined sub-hourly, real-time markets, the CAISO's Western Energy Imbalance Market (WEIM) and SPP's Western Energy Imbalance

Service (WEIS). Therefore, Bonneville staff views the business-as-usual as a less likely option that would carry at least a moderate level of risk.

A brief review of Bonneville's WMEG results illustrates how Bonneville was projected to benefit from participating in a day-ahead market.³ E3 provided results to WMEG members based on eight cost-benefit categories: Load Cost, Generation Cost, Reserve Cost, Generation Revenue, Reserve Revenue, Wheeling Revenue, and GHG Revenue. A Net Cost category summed the eight discrete categories to arrive at a total. Bonneville staff acknowledges that day-ahead market benefits reflect a wide range of potential outcomes between positive (benefits) and negative (costs) depicted in the study results. Bonneville is projected to receive increased benefits in four of six study cases, ranging from \$18.1 million to \$134.7 million annually. In two study cases, Bonneville is projected to experience potential reductions in revenue. The primary drivers of benefits come from projected increased revenue from more efficient marketing and reduced costs to load from reduced production costs. In both cases, day-ahead markets provide the opportunity for these benefits. Bonneville and E3 have a mutual understanding that the Wheeling Revenue category is not an appropriate proxy for Bonneville's wheeling revenue based on its transmission commercial business model and therefore Bonneville did not rely on E3's Wheeling Revenue analysis when assessing the results.⁴ The annual financial benefit range referenced above reflects the study results with the wheeling revenue analysis removed from the benefit calculations. The differences in the projected millions of dollars of benefits between cases are attributable to the varying market footprints, which emphasizes the criticality of the composition of a market footprint. For this reason, Bonneville will pay close attention and give significant consideration to the composition of potential day-ahead market footprints as neighboring entities make decisions regarding day-ahead market participation.

Bonneville staff believes that on balance, the WMEG study demonstrates quantitative benefits to warrant continuing a path toward participation in a day-ahead market under various footprints. Bonneville will continue to test this initial direction throughout its DAM public process. Staff acknowledge that, viewing certain quantitative metrics in isolation, day-ahead markets with larger footprints and more overall load are likely to result in higher levels of expected benefits. WMEG study results show differing expected price levels depending on market footprint. Higher market energy prices in recent years have contributed to increased Bonneville revenue variability, and comparatively higher prices in EDAM footprint scenarios could indicate more potential future

³ WMEG materials and detailed cost-benefit results may be found in the October 23, 2023, workshop folder on Bonneville's Day-Ahead Market process page at <https://www.bpa.gov/learn-and-participate/projects/day-ahead-market>.

⁴ E3 assumed that transmission revenue collected today essentially ceased once an entity became a day-ahead market participant. The Wheeling Revenue attributed to each study participant was determined by first calculating Wheeling Revenue for the entire footprint and then proportioning the revenue to each entity based on their percentage share of total load in the market. The study did not include existing transmission contractual agreements when calculating Wheeling Revenue. Bonneville expects that these contractual agreements will remain even in the event of market participation. E3 agreed with Bonneville that this assumption to exclude existing contracts does not reflect a likely outcome from Bonneville's day-ahead market participation.

revenue variability. That said, the anticipated distribution of costs and benefits within a larger footprint may vary based upon market design factors not addressed in the study.

Overall, staff views the WMEG results as providing a good indicator for Bonneville's expected outcomes from day-ahead market participation. Based on the WMEG results, staff recommends that the agency pursue participation in a day-ahead market. During review of the cost-benefit study results at the October 2023 workshop, stakeholders asked whether Bonneville would perform any further quantitative analysis before it makes a decision on whether to participate in a day-ahead market. Bonneville intends to analyze several different scenarios as a follow-on to the WMEG results. Bonneville will brief the public and invite comments on the additional quantitative results during the upcoming workshops in summer of 2024.

5. Bonneville Participation in the CAISO EDAM and SPP Markets+ Processes

This section summarizes Bonneville's participation in the development of the CAISO EDAM and SPP Markets+ day-ahead market designs.

EDAM

Bonneville has engaged in commercial activity with the CAISO for decades, and the CAISO serves as Bonneville's Reliability Coordinator. The CAISO's WEIM development started in 2013, and Bonneville was significantly involved in the formation of the market when PacifiCorp decided to join. This initial implementation and operation of WEIM required the use of Bonneville's transmission system. In addition, many of Bonneville's business operations practices were impacted by the WEIM early in its development because Bonneville serves preference loads inside the PacifiCorp balancing authority. In May 2022, Bonneville became a participant in the WEIM. Bonneville was an active stakeholder as CAISO developed the hydro default energy bid concept and is currently engaged in the price formation enhancements initiative. In addition, Bonneville was engaged in the revisions to CAISO's governance model and its transition to joint authority for WEIM governance.

More recently, Bonneville has dedicated substantial resources to engage in CAISO's multi-year EDAM and Day-Ahead Market Enhancement design processes. Beginning with initial discussions of the EDAM proposal in 2018, Bonneville staff has participated in workshops and submitted comments on the proposals at every opportunity. While assessing the proposal overall, Bonneville focused on the resource adequacy and sufficiency frameworks, price formation, transmission design, and the GHG market design. Bonneville submitted extensive comments to CAISO during the EDAM development process and to the Federal Energy Regulatory Commission on the EDAM tariff filing.

Markets+

SPP operates an RTO with a footprint across 14 states in the Eastern Interconnection. SPP also operates the WEIS real-time market. SPP provides Reliability Coordinator services in both the Eastern and Western Interconnection. SPP is developing the Markets+ day-ahead market and RTO West in the Western Interconnection.

Bonneville has worked with SPP since 2019 on the design of the Western Resource Adequacy Program (WRAP). The Western Power Pool and WRAP participants, representing a diverse resource mix across a large footprint, chose SPP as the WRAP program operator and leveraged its expertise to design the program. SPP is responsible for modeling, analyses, and technical operations of the WRAP's Forward Showing and Operations Program that are designed to ensure long-term and short-term resource adequacy for participants.

In 2022, SPP began to develop the Markets+ proposal. SPP worked with potential participants and stakeholders to draft governing documents that set up a transparent structure for drafting a tariff and market protocols. During this process, Bonneville advocated for an independent governance structure with participant and stakeholder representation. Bonneville also provided input on market design elements, including resource adequacy, price formation, transmission, and GHG market design. The stakeholder process resulted in a market framework that was approved with broad consensus.

6. Bonneville Staff's Recommended Day-Ahead Market Option

Staff believes that the potential benefit to Bonneville and its customers outlined in the high-level business case above justifies further exploration toward participation in a day-ahead market. Of the utmost importance to Bonneville in evaluating the available day-ahead market options is ensuring operational control of the Federal Columbia River Power System (FCRPS) remains with Bonneville, the U.S. Army Corps of Engineers, and the Bureau of Reclamation, and that the Pacific Northwest continues to receive the benefits of the FCRPS. From Bonneville staff's current perspective, SPP's Markets+ is the preferred day-ahead market that could meet these objectives based on its governance structure and the market design features discussed below.

7. Governance

Paramount to Bonneville's participation in any day-ahead market is the requirement for independent market governance that is not obligated to any single state, entity or trade association. Bonneville staff believes that independent governance will ensure that decisions affecting the market are made with consideration of the interests of all market participants. In addition to the governance structure, potential market participants must evaluate the decision-making processes of each market offering. Bonneville must assess which processes are likely to result in the best market outcomes while providing for fair consideration of Bonneville's interests. Bonneville staff see important differences in these areas between CAISO's EDAM and SPP's Markets+ offerings.

Based on experience working with CAISO and SPP, Bonneville staff believes that Markets+ has developed a structure and process that is more likely to result in equitable market outcomes and fair consideration of Bonneville's interests. The structure of the Markets+ Executive Committee (MPEC), work groups, and task forces that developed the market design and initial tariff provided all participants an equal opportunity to weigh in on decisions. The work group and task force structure supported collaboration and negotiation to build consensus among stakeholders. Significantly, the process allowed Bonneville to propose and obtain consideration of its statutory and contractual obligations. The work group processes have been publicly accessible and considered perspectives from utilities, states, and independent organizations. Bonneville staff have

observed that SPP staff effectuate appropriate facilitation and technical support roles while respecting the decision-making roles of market participants. As Markets+ transitions from phase 1 to phase 2 and ultimately to an operational market, Bonneville staff expects the MPEC, work groups, and task forces to maintain the same level of decision-making and collaboration that crafted the tariff.

Markets+ has also demonstrated a successful independent governance model with the interim Markets+ Independent Panel (IMIP). The IMIP is comprised of three members of SPP's independent board of directors and serving in a transitional role. The Markets+ Independent Panel (MIP) is a fully independent board that will take over from the IMIP when Markets+ becomes operational. The MIP, or the independent SPP Board with advice of the MIP, will make final decisions for Markets+. Both boards are fully independent and will continue to consider the perspectives of market participants and independent organizations when making decisions.

In contrast, the CAISO stakeholder engagement process is a staff-driven model. Bonneville staff acknowledge the CAISO's efforts to develop a more participatory stakeholder engagement process. Bonneville appreciates and respects the professionalism and expertise that CAISO staff routinely display in their stakeholder process, but Bonneville staff believes the process is still lacking in stakeholder leadership and engagement in policy and implementation development, evaluation, and decision processes.

CAISO's governance model has presented challenges in resolving contentious regional issues. Bonneville staff observe that EDAM governance presents real problems for Bonneville's participation in a day-ahead market and could result in unbalanced outcomes, as it continues to operate under provision of California law. CAISO is governed by a Board of Governors appointed by the Governor of California with obligations to California ratepayers embedded in California laws and policies. Under California state law, CAISO is responsible for both serving the California retail load and operating the day-ahead and real-time markets. These dual responsibilities influence CAISO's market design and has resulted in Bonneville, and consequently its customers in the Pacific Northwest Region, being at a competitive and governance disadvantage. This continues to be a major concern for Bonneville staff and is a significant consideration for Bonneville's decision on day-ahead market participation.

Bonneville acknowledges that there are efforts underway to establish a more independent governance structure for the CAISO in the West-Wide Governance Pathways Initiative, which is discussed in section 14. Bonneville will continue to participate in CAISO's governance and stakeholder engagement processes. Regardless of our final day-ahead market decision, Bonneville staff will continue to coordinate with CAISO on operations, transacting with CAISO, and serving preference customer loads located in WEIM and EDAM participating BAAs.

Based on the considerations above, staff strongly favors the Markets+ governance structure as the preferred governance model for day-ahead market participation.

8. Ensuring Adequate Supply

If it participates in a day-ahead market, Bonneville's primary goal would be to provide a firm power supply for its long-term power sales contract customers in the most economical, efficient, and reliable manner. Bonneville will continue to plan for its long-term firm power load service obligations by managing its federal and non-federal resources and acquiring non-federal resources in advance based on forecast need. Bonneville does this in its Pacific Northwest Loads and Resources Study (also known as the White Book) and its Resource Program.⁵

Bonneville also demonstrates long-term planning through its participation in the WRAP, which accounts for Bonneville's load and identifies resources used by its customers. WRAP is a regional resource adequacy program that increases transparency into resources and transmission needed to reliably supply power to meet existing and future load demands within WRAP's footprint. WRAP provides common resource adequacy planning metrics, and the binding program requires accountability from each WRAP participant. Through its short-term planning practices (reflected in a resource sufficiency or must-offer obligation, and WRAP Operations Program) and long-term planning (reflected in the WRAP Forward Showing program and Bonneville's White Book), Bonneville would ensure that its long-term firm power sales contract obligations are satisfied as part of the WRAP operations program. Participation in WRAP would require the same planning from all participants to prevent some participants from leaning on other participants. WRAP participants include most Western utilities outside the state of California.

In the status quo, Bonneville Power Services works in all timeframes to preserve and maximize the value of the FCRPS for customers through prudent operational planning and marketing practices. As discussed above, these timeframes include long-term planning, mid-term planning, short-term planning, and real-time. Bonneville sets the system up to deliver the most economic and reliable energy to customers while planning for contingencies and required operations such as those for fish and wildlife. Bonneville also plans the system to make economic purchases and high-value surplus sales to bring added value to our preference customers. Bonneville's loads and resources planning for its long-term power customers would be reflected in the required day-ahead market showing that Bonneville meets the resource sufficiency tests or must-offer obligation.

In a day-ahead market, Bonneville will continue to plan for a reliable supply to ensure customers ultimately receive the most economical supply from market dispatches. Bonneville would have flexibility to make resource offers that reflect its operational and commercial objectives. Bonneville would also have the ability to self-schedule or self-supply resources to meet those objectives when necessary to ensure specific operations. Bonneville believes that the ability to submit economic offers that reflect the value of its resource flexibility would provide Bonneville with more tools to ensure that value is delivered to customers. This is because the market would take into consideration generation bid curves and transmission constraints to determine the most economical and reliable dispatch of electric power to supply customer loads, without specifically tracing which resources are dispatched to load.

⁵ Information on Bonneville's Resource Planning is available at <https://www.bpa.gov/energy-and-services/power/resource-planning>

One market design element that staff assessed is long-term resource adequacy. As a prerequisite to join Markets+, utilities that are Load Responsible Entities (LREs) for resource adequacy planning purposes must participate in the WRAP. WRAP has become the dominant resource adequacy program outside of California. The EDAM proposal does not propose a uniform adequacy metric or require EDAM entities to participate in a resource adequacy program. Bonneville staff supports and prefers the clear and consistent requirement that all Markets+ LREs must participate in WRAP, which better supports regional reliability.

By leveraging the WRAP Forward Showing Program, Markets+ simplifies and solidifies each market participant's requirements to bring sufficient resources to the market to serve its loads, known in Markets+ as the day-ahead and real-time must-offer obligations. In contrast, EDAM's design, similar to the WEIM design, uses resource sufficiency tests evaluated prior to the market run to assess whether each participating BAA has sufficient resources to cover anticipated demand in that area. The analogous Markets+ must-offer obligation and the EDAM Resource Sufficiency Tests serve a similar purpose, which is to evaluate whether each entity has procured enough resources to support its anticipated demand for the coming day, but the Markets+ integration of WRAP helps ensure equal and prudent planning and resource acquisition.

California utilities have state-mandated resource adequacy requirements. EDAM participants outside of California may be participants in WRAP, but they are not required by state law to participate in a resource adequacy program. The EDAM proposal's lack of a common resource adequacy metric makes it difficult to assess whether the footprint as a whole will be resource adequate in the planning horizon. Further, failure to adequately plan in advance to meet demand by the day-ahead timeframe could undermine the ability of the market to find adequate supply to serve load in the short day-ahead timeframe. While the EDAM resource sufficiency tests attempt to prevent leaning, there are limited options in the day-ahead timeframe for maintaining reliability while preventing leaning and/or fairly compensating other participants for providing additional resources. Bonneville staff prefers the Markets+ design because it combines a common long-term resource adequacy metric with short-term resource sufficiency obligations, and integrates the resource adequacy program into the resource sufficiency obligation, which should better ensure and fairly compensate for the planning of adequate supply.

Another market design element that staff assessed is short-term resource sufficiency. For the Markets+ real-time balancing market, market participants are required to bring a minimum resource capacity to cover its obligations. This includes the day-ahead market energy awards, flexibility reserve product awards, incremental market commitments from the reliability unit commitment results, adjustments to the WRAP real-time holdback requirements, and incremental changes to the net positions for purchases and sales. For EDAM, real-time resource sufficiency tests are only required if the Balancing Authority fails the day-ahead resource sufficiency tests. Bonneville staff prefers the Markets+ requirement that holds individual participants responsible for covering their day-ahead awards on a consistent basis.

Bonneville would maintain the firmness of power supply in a day-ahead market context through prudent planning to meet Bonneville's operations, while the market framework would ensure other participants are responsibly planning to meet their own loads. Bonneville would retain flexibility

to make resource offers that fall within the range of hydro operations and would make its own decisions about reserves needed to ensure reliable supply to customers within the BAA and to transfer service customers in other BAAs. As part of its hydro operational planning, Bonneville would continue to ensure a firm power supply for customers in long-term, mid-term, and short-term planning horizons, and in real-time. Bonneville views the Markets+ WRAP requirement for LREs to follow the same resource adequacy program as more straightforward, providing for an even distribution of obligations from all participants, and likely to enhance reliability. Bonneville staff believes it is a significant advantage of the Markets+ design.

9. Price Formation and Market Power Mitigation

Cornerstones of organized markets are transparent price formation and market monitoring to ensure economic efficiency, incentivize resource participation and protect against market power and potential manipulation. It is essential for resource operators to be able to reflect both production and economic opportunity costs in their bids. In turn, locational marginal prices must reflect the true cost of power required to serve demand. It is also critical that market rules provide the appropriate framework for accurate price signals, which will ensure compensation for resources at prices that reflect the value of the service provided to the system, ultimately resulting in prices that are accurate and transparent.

In EDAM, the Market Power Mitigation (MPM) assessment is an extension of the existing WEIM methodology, which looks to address structural market power in participating BAAs. BAA-level MPM uses a dynamic competitive path assessment to evaluate whether the available generation within the participating BAA can competitively meet its own demand without additional transfer imports. If the dynamic competitive path assessment conditions are deemed non-competitive, then all participating resources in the affected BAA are adjusted to the competitive locational marginal price or a lower value of their submitted bid or applicable default energy bid (DEB).

Under the pivotal supplier assessment for MPM, large entities flowing on constrained paths are more likely to be considered a pivotal supplier and face price mitigation measures, by the nature of their structural location, leading to potential over-mitigation. Given the geographical structure of western BAAs, the mitigation assessment based on the pivotal supplier is determined on the participant's potential ability to exercise market power, rather than on the participant's observed behavior. Bonneville appreciates that CAISO is reviewing this aspect of the market design in its Price Formation Enhancements initiative.

In contrast, the Markets+ design leverages the conduct and impact framework for MPM which is used in other organized markets. The conduct test evaluates whether a resource offer is significantly higher than the reference cost of energy, and the impact test determines whether that offer would significantly impact the market prices. If suppliers have been found to fail both conduct and impact tests, then mitigation measures can be applied. Essentially under this framework, resource offers must be actively assessed to result in a negative outcome to the market in order to be considered an exercise of market power. Bonneville staff believes that EDAM's unnecessary mitigation assessments based on the perceived potential to exert market power, particularly during times of scarcity, creates misaligned incentives and market signals which can

prevent appropriate market outcomes. Bonneville staff views the Markets+ conduct and impact approach as more effective because it does not mitigate based on the potential for market power, rather on the exercise of observed market power.

When a resource bid is assessed for mitigation, the calculation of the reference price is an important consideration, as it aims to represent the cost of power to the energy supplier, inclusive of opportunity costs. In EDAM, CAISO will employ the DEB model for hydroelectric resources, which we have found to be a measured approach to the treatment of storage hydro. The DEB utilizes a formulaic methodology to estimate the opportunity cost of hydro, focused on three main pricing components: a gas-price floor, short-term energy prices, and a long-term geographic floor. This approach specifically tailors the DEB of a participating resource to its geographic location. CAISO developed this novel design in close collaboration with Pacific Northwest hydro entities, reaching consensus on a difficult issue not previously addressed in other organized markets.

In Markets+, the Seasonal Hydroelectric Offer Curve (SHOC) framework acknowledges that not all hydro projects have the same storage horizon and therefore not all projects have the same opportunity cost horizon. The design accounts for the flexibility of the system, allowing participants to preserve the value of hydro for future months when appropriate for their resource, which helps other market participants benefit from the flexible nature of these resources. Bonneville prefers the SPP Markets+ SHOC approach because it distinguishes between hydro resources with and without significant storage availability.

CAISO has actively engaged in stakeholder initiatives, such as the Day-Ahead Market Enhancements and Price Formation Enhancements, to review and address changes to products and prices within its market. During its Day-Ahead Market Enhancements effort, CAISO created the imbalance reserve products, which recognized the need to procure additional flexible products that could be economically awarded to help provide additional capacity and reduce out-of-market actions by the market operator. In the Price Formation Enhancements effort, scarcity pricing and fast-start pricing are critical elements because they can ensure resources are appropriately incentivized and compensated for the attributes they bring to a market dispatch, while minimizing the need for out-of-market actions. In addition to ensuring accurate prices in the short-term, price formation can help send better price signals for developing supply to meet future demand. CAISO has mechanisms for implementing a level of scarcity pricing when the system is low on reserves and network modeling needs to solve for tighter bid-supply conditions, but it does not currently have a design that includes compensation for fast-start pricing. In contrast, Markets+ incorporates fast-start and scarcity pricing into its day-ahead market design, which Bonneville staff believes helps to ensure accurate, fair compensation for all suppliers of flexible and reliable generation.

CAISO is currently reviewing these topics as part of its Price Formation Enhancements initiative, in which Bonneville is actively engaged. However, based on current market design, Bonneville staff believes that SPP's design is more aligned with Bonneville's philosophy on MPM and price formation more broadly. Bonneville staff believes that these design elements ensure that resources can efficiently respond to market signals and be appropriately compensated, while avoiding over-mitigation and ensuring transparent market pricing.

10. Transmission and Congestion Rent

Both day-ahead market frameworks will rely upon transmission made available by market participants, transmission service providers, and transmission customers to facilitate the transfer of energy across the market footprint. Market participants in EDAM and Markets+ must make their transmission available for market use as a condition of participation, yet both recognize market participants' existing transmission rights. CAISO and SPP will only act as the market operator for their respective DAMs and participating balancing authorities. Transmission service providers, transmission owners and transmission operators will retain their existing BAA and transmission owner/operator functions and responsibilities. In addition, transmission service providers will continue to provide service under existing tariffs, including through the administration of the Open Access Same-Time Information System, and the sale of firm and non-firm transmission in both markets.

Generally, the overall transmission design between EDAM and Markets+ is similar. As stated above, transmission will be made available to the day-ahead markets, but the market operator will be informed of transmission that will not be made available for the market's use according to the respective market's rules. As a requirement for participation, transmission service providers will be required to pause processing transmission service requests during the day-ahead market run but may resume sales after day-ahead market awards are published. Market participants will have the ability to "self-schedule," which would be to submit a fixed generation level incorporated into the market dispatch. The primary difference between EDAM and Markets+ is the physical congestion modeling and congestion rent design, including the congestion rent allocation methodology.

EDAM and Markets+ are broadly similar in the way they model constraints and manage transmission, with some key differences. EDAM models an Energy Transmission System Resource (ETSR) constraint for each border between EDAM BAAs. This is modeled as a transmission constraint irrespective of whether there is a physical transmission constraint between two BAAs. EDAM's commercial model also includes physical constraints, but ETSR's are where EDAM models transmission and congestion for its two categories of congestion rent, as described below. This can create a disconnect between the commercial model and the physical transmission system, which is particularly notable in the Pacific Northwest, where there are a multitude of overlapping BAAs that do not correspond to distinct transmission elements or constraints that may cause congestion. Markets+ has the ability to model ETSR-style constraints but does not institute one for each BAA border.

The congestion rent design and allocation methodologies for the proposed day-ahead markets are quite different. In EDAM, congestion revenue is allocated to the balancing area where the constraint is modeled. First, EDAM breaks all congestion rents into two categories: transfer revenue and congestion revenue. Transfer revenue is associated with congestion modeled at the scheduling point between two EDAM BAAs (i.e., ETSRs), while congestion revenue is any other transmission congestion. The EDAM design only provides for the direct allocation of congestion revenue associated with transfers over ETSRs (a.k.a. transfer revenue). Transfer revenue is congestion revenue that is produced and collected specifically at the interface between two BAAs,

and is allocated equally between the two balancing authorities that made the transmission available, inclusive of transmission customers that make transmission available at the interface, prior to the day-ahead market. Customers who voluntarily provide transmission on the ETSR path may receive direct allocation of congestion revenue. Otherwise, participating EDAM BAAs will account for the distribution of congestion revenue collected within their BAA directly in their tariff. All other congestion is considered to be “inside” a BAA (even if that BAA is not a TSP that manages transmission associated with the constrained path) and is subject to the individual rules of the EDAM Entity BAA. This can present undue complexity for customers by producing a diverse set of outcomes.

The Markets+ congestion rent design takes a different constraint-level approach by using a common methodology across all participating BAAs, with allocations based on constraint-level congestion. In Markets+, congestion rents will be allocated to the rights holders of firm and conditional firm point-to-point transmission service, network integration transmission service and legacy transmission service of monthly or longer service increments, who have not opted these rights out of Markets+. Similar to the EDAM design, if a participating BAA requires a coordinated interchange scheduling limit, the associated congestion is allocated proportionally across the constraint. Staff believes that the Markets+ constraint-level congestion rent design better recognizes the topology of the market footprint and aligns directly with how Bonneville transmission models and manages transmission constraints. Bonneville staff prefers the Markets+ transmission design because it better models physical congestion in Bonneville’s transmission system, allocates congestion rents according to constraint-level congestion, and allocates congestion rents directly to long-term transmission right holders, which provides consistency for transmission customers across the entire footprint.

As an overall observation, Bonneville staff expects that day-ahead markets would not impact certainty of delivery. Bonneville would continue to schedule contract deliveries in advance of the market operation based on existing transmission rights. Transmission customers would continue to be entitled to the same North American Electric Reliability Corporation priority and redispatch in curtailment scenarios as they are today. In addition, the market dispatch would account for transmission constraints and attempt to redispatch around them, which should improve certainty of delivery. Some aspects of day-ahead market design may acknowledge that resources may be assigned to specific loads based on forward contracts.

11. Greenhouse Gas Accounting

With respect to environmental attributes, Bonneville staff is aware of the challenges facing utilities today regarding evolving state requirements for emission reduction and clean energy procurement. Bonneville is not subject to these requirements but understands that they significantly impact many of its customers. As a result, Bonneville is participating in development of market designs to advocate for the best outcome for customers who purchase from Bonneville’s mix of federal and non-federal resources. Bonneville will continue to coordinate with customers on developments related to greenhouse gas market design.

Both CAISO and SPP designed their markets to include a dispatch-based solution for state carbon pricing programs (e.g., a cap-and-trade/invest program like in Washington state). In addition, both market operators are facilitating conversations with stakeholders on how to address other types of state programs, including clean energy targets, emission reduction standards, and reporting and tracking needs. Bonneville is an active participant in both the CAISO and SPP stakeholder processes on GHG accounting, working with the market operators and other stakeholders to develop market designs that work across a variety of state programs.

Both markets are designed to attribute specific resources to states with carbon pricing programs (such states would be a “GHG area” or “GHG zone”). However, there are foundational differences in how the CAISO and SPP designs will 1) account for resources contracted to load in a GHG area, and 2) determine what resources and energy amounts from outside the GHG area can be attributed to the GHG area.

Bonneville staff believes that SPP’s design (for “Type 1A” attribution of power to a state) will result in greater assurance that energy from the federal system will be attributed to Washington for Bonneville’s customers that have contracted for that power. In contrast, CAISO’s design would attribute the federal system to Washington only when it is the most economical solution for the entire market footprint. This outcome of CAISO’s design would adversely impact Bonneville because, at times when the system is not attributed to Washington, Bonneville may not be able to recover the difference between the price it receives for system resources and the cost it pays for load in the GHG area. SPP’s design minimizes this concern and ensures attribution of the low-carbon attributes of the federal system to Washington loads.

In addition, SPP’s design gives Bonneville the ability to manage how much energy from the federal system can be attributed to a GHG zone (Washington’s or California’s). SPP’s design includes market mechanisms that largely limit the amount of energy that can be attributed to a GHG zone to energy that is surplus to a market participant’s total load obligations. CAISO’s design does not include these key features, which could result in energy that is contracted to utilities outside of Washington or California being attributed to Washington or California. In the event this occurs, it could undermine the ability for Bonneville’s customers in other states, like Oregon, to claim energy from the federal system for GHG reporting purposes.

For these reasons, Bonneville staff believes that Markets+ design makes significant improvements in GHG accounting. Staff believes that SPP’s design best honors forward contractual commitments for clean energy and affords critical flexibility to market participants to manage the attribution of energy to a particular state. Staff believes the Markets+ design provides greater assurance to customers that they will be able to claim low-carbon attributes comparable to today. Work is still underway on GHG accounting and staff expect the market design will evolve in coming years. Staff have confidence that the SPP stakeholder process will result in fair GHG accounting outcomes across all states and market participants, which is an issue of the utmost importance to many Bonneville customers.

12. Seams

Bonneville is focused on choosing the market that it believes would best meet its obligations and provide benefits to its customers and the Pacific Northwest region. While Bonneville staff anticipate many benefits of pursuing day-ahead market participation in Markets+, staff recognizes that the existence of two day-ahead markets in the West would present coordination challenges. The term “seams” refers to a wide range of transmission and power market rules that may vary among entities, such as congestion management procedures, bidding rules, reservation practices, and communications protocols.

Both CAISO and SPP have experience managing seams. CAISO and its neighbors have managed seams at the border since the market’s inception. SPP has continued developing interoperability at seams with adjacent RTOs since 2004. Bonneville encourages a robust conversation with all regional entities about the seams impact of each entity’s decision to join a different day-ahead market than their neighbor.

Bonneville has a long history of proactively working to manage market seams and will continue to take a leadership role in finding solutions to seams issues. During CAISO’s development of the WEIM, Bonneville worked closely with CAISO and early WEIM entrants to manage seams across Bonneville’s transmission system and major regional interfaces, well before Bonneville even considered WEIM participation. Bonneville and CAISO entered into a Coordinated Transmission Agreement to establish constraints to manage the impact of WEIM flows on the Bonneville transmission system and the exchange of operational and WEIM data. The constraints include those to manage how quickly market flows can dynamically change on the system (rate of change) as well as incremental and total flow constraints. The agreement created a coordinating committee forum for discussion of seams issues. While day-ahead market seams will certainly have impacts, Bonneville staff believes they can be effectively addressed, and encourages CAISO and SPP to develop coordination agreements to proactively manage and mitigate the impacts of market-to-market seams.

13. Potential Regional Transmission Organization Formation

While Bonneville is only considering day-ahead market participation in this process, it is important to recognize that SPP Markets+ may offer more potential for further integration into a Regional Transmission Organization (RTO). SPP is a fully independent entity that would not require any legislative changes to meet FERC’s requirements for RTO operation. Bonneville has not seen a similar pathway for CAISO to support a full, west-wide RTO, including BAA consolidation. SPP has decades of experience operating a multi-state RTO, and its stakeholder-driven governance framework effectively navigates complex issues, while building trust among stakeholders. In the event that Western utilities begin to contemplate RTO formation in the future, Bonneville would conduct a transparent public process to evaluate the potential impacts of joining an RTO.

14. West-Wide Governance Pathways Initiative

Bonneville continues to monitor the West-Wide Governance Pathways Initiative (Pathways) which seeks to establish an independent governance structure for CAISO’s WEIM and EDAM. Bonneville’s view is that achieving the objective of Pathways likely requires modification of

California legislation, which has not gained traction in the past. Bonneville is tracking the effort's legal analysis for indicators regarding the viability and potential timeline for governance updates. Throughout its decision-making process, Bonneville will continue to consider the progress of Pathways. Key considerations may include whether California legislation is required, whether a particular path is prioritized for development, and how that path aligns with Bonneville's principles. Bonneville appreciates the significant work by many contributors to advance Pathways.

15. West-Wide Market Formation

Several studies demonstrate that a single West-Wide market may yield significant benefits. Bonneville staff acknowledges that a single market could be of value if benefits are equitably distributed. There has been significant discussion in Bonneville's DAM evaluation process on the potential to create a day-ahead market that encompasses the majority of the West. Some stakeholders believe the value of this possibility should be the primary driver for Bonneville's decision process. Bonneville staff fully acknowledges the potential benefits that could be realized from most of the West being in a single day-ahead market footprint. However, staff does not believe that this can be the primary driver for Bonneville's decision process because independent governance and design elements are important considerations for the assessment of a market's benefits to Bonneville's customers, constituents and the Pacific Northwest region. Both SPP's Markets+ and CAISO's EDAM offer the possibility of operating a market with a significant footprint that will provide substantial benefits for participants.

There are many potential benefits to consider in evaluating day-ahead markets and market footprint is certainly a large driver of many potential benefits. While it is important to discuss the concept of a single market that encompasses the majority of the West, all potential participants need to make their own determinations as to which option is in the best interest of their customers, constituents, and ratepayers. While a larger footprint is projected to produce more benefits in total, those benefits would not be spread equitably among participants, and the benefits that flow to an individual participant must be weighed against the other issues discussed in this recommendation. Staff's assessment is that both market options show the potential to deliver significant benefits.

Bonneville staff is concerned that the vast majority of the benefits realized from creating a West-wide market would flow to California. Bonneville staff's analysis further shows that while Bonneville stands to potentially enjoy a larger annual day-ahead market benefit when in a market with California, those benefits are dependent on Bonneville continuing to enjoy a surplus of generation, and this scenario results in higher energy prices and price volatility for the Pacific Northwest. Bonneville staff does not view a West-wide market operated by CAISO as the most advantageous day-ahead market option at this time, due to the concerns discussed above about governance, the stakeholder process and market design elements. Although staff recognizes that the formation of a West-wide market deserves further consideration, Bonneville will continue to consider the aggregate benefits as well as the distribution of benefits when considering day-ahead market participation.

16. Conclusion & Public Process

Bonneville staff recommends that Bonneville join a day-ahead market and select Markets+ as the best path forward. Bonneville intends for this recommendation to provide transparency regarding the staff analysis at this stage of the process. Bonneville will further consider the recommendation through calendar year 2024. Bonneville plans to release a draft policy in August 2024 for public comment. Bonneville will hold a series of workshops during this process:

- A May workshop will focus on a public discussion on this staff recommendation and begin discussions on the technical evaluation of Bonneville transmission in a day-ahead market.
- A June workshop will discuss power and transmission scenarios to provide more information about how Bonneville and customer processes may be impacted by participation in a day-ahead market.
- At an August workshop, Bonneville will review its day-ahead market business case.
- Finally, a September workshop will be a question-and-answer session on the draft policy.

Bonneville plans to conduct additional analysis and engage in these public discussions prior to releasing its draft policy in August. In the draft policy, Bonneville will evaluate options, provide support for the proposed decision, and respond to stakeholder feedback. After a formal comment period, Bonneville anticipates it will make a final decision regarding market participation in late 2024. If Bonneville determines that it should participate in a day-ahead market, such a decision would be dependent on implementation in rate and tariff proceedings.

Bonneville welcomes additional feedback from stakeholders and the public as we continue to evaluate this staff recommendation. The staff recommendation does not foreclose consideration of the other market option, and we encourage continued comment on the merits of both market options. We thank those who have engaged with us in workshops and provided insights to make this a robust, effective process. Bonneville looks forward to ongoing public review and input as it considers day-ahead market participation.