

an interest in ensuring the Markets+ structure appropriately and fairly addresses the participation of western hydroelectric resources and their unique, multi-purpose nature.

Hydropower Entities submit these comments to endorse SPP's response to the Commission's questions specifically related to Resource aggregation and the application of the SHOC, and to provide additional background for the Commission's consideration.

I. COMMENTS

Hydropower Entities submit these comments to share their perspective on western hydro suppliers' participation in western electricity wholesale markets in general, and in organized markets in particular, which is dependent on the ability to meet multi-purpose goals of hydroelectric projects such as flood control, navigation, irrigation, and fish and wildlife management. Hydropower Entities support and concur with the clarifications and explanations provided in the SPP Response related to Markets+ Resource aggregation and the use of the SHOC for calculating Mitigated Offers for participating storage hydro resources. SPP's responses are consistent with Hydropower Entities' understanding of the Markets+ design, based on their own participation in the development of the Markets+ tariff.

A. UNIQUE ATTRIBUTES OF WESTERN HYDRO SYSTEMS

The generation mix in the Western Interconnection is unique relative to other regions in the United States and is notably characterized by the large proportion of electricity produced by hydroelectric generation facilities located on multiple river systems. These facilities have long provided the region with a backbone of reliable electricity supply, and are ideally suited to provide clean, flexible capacity to a transitioning western grid.

The operation of hydroelectric resources can differ significantly from the operation of other types of generation. For example, most conventional fossil-fueled facilities operate on a stand-alone basis, meaning the operation of one facility generally does not depend on or impact the operation of a different facility at a different location. Conventional fossil-fueled facilities are also typically operated for a single purpose: to produce electricity. The output of a conventional fossil-fueled facility is generally not limited by the availability of fuel, as fuel to operate the facility is available for purchase under most circumstances, and the cost of fuel typically comprises the main component of the facility's marginal cost.

In contrast, hydroelectric facilities are operated for a variety of project purposes, including flood control, irrigation, navigation, recreation, and ecosystem management. These non-power objectives generally take precedence over electricity production in driving operational decisions, which must also satisfy legal, regulatory, environmental, and other requirements. These factors can result in hydro systems being operated in a manner that might appear sub-optimal when viewed only through the lens of optimizing electricity production. The Pacific Northwest in particular includes hydro systems comprised of dozens of generating facilities and multiple, interdependent storage reservoirs of varying sizes. The operation of one facility generally can and will impact conditions at other facilities, and, in some cases, facilities owned and operated by other entities. Thus, hydro systems must coordinate operations across interdependent facilities and manage a number of non-electricity generation purposes. Another key distinction is that the total quantity of electricity that a hydro system can produce is limited by the amount of water inflows in a given period. It is not possible to simply purchase additional

“fuel,” so producing electricity in one period comes at the expense of being able to produce electricity in a different period.

B. REQUIREMENTS FOR HYDRO PARTICIPATION IN ORGANIZED MARKETS

The unique nature of hydroelectric system operations in the Pacific Northwest has important implications for the design of an organized market in which those resources can safely and beneficially participate. Specifically:

- The organized market must be designed to enable participation by hydro resources as coordinated systems where applicable, rather than requiring that each individual project participate on a stand-alone basis; and
- Market power mitigation provisions must provide a transparent methodology for calculating mitigated offer prices that appropriately recognizes the complexity and variability of determining marginal opportunity costs applicable to hydroelectric resources with storage capability. A transparent methodology avoids the unacceptable risk of applying unduly low mitigated offer prices that result in market dispatches and the corresponding depletion of limited water when it would be more efficient—or operationally necessary given the multi-purpose nature of hydro operations—to conserve water for future use.

As discussed below, the Markets+ tariff satisfies both critical requirements. In doing so, the Markets+ tariff enables and encourages suppliers of hydroelectric generation to participate in Markets+ with clean, fast-ramping resources in an efficient manner that will provide the greatest benefit to consumers.

1. Participation as a Resource Aggregation Reflects the Coordinated Nature of Hydro Systems

It is longstanding industry practice for hydro suppliers to participate in wholesale electricity markets at an aggregate or “system” level, rather than at the level of an individual generating unit. This reflects the reality that the operation of an individual unit within a coordinated system is inseparable from the operation of that system as a whole. Aggregated or coordinated participation also reflects the reality that, in some cases, the marketing entity authorized to commit to wholesale electricity transactions is separate from the entity responsible for operational decisions that include determining the specific quantity of electricity that will be produced by each individual facility comprising the coordinated system. For example, a power marketing entity may have the authority to commit to a sale of 100 MW from the collective resources of the hydro system, but does not have the authority or ability to commit that the 100 MW be produced at any particular facility.

The Resource aggregation provisions in the Markets+ tariff enable participation by hydro suppliers whose market activity represents discrete hydroelectric resources that must be operated in a coordinated fashion. Resource aggregation has already been fundamental to enabling the participation of the West’s coordinated hydro systems in the Western Energy Imbalance Market (“EIM”). Entities that participate with the output of hydro systems, such as Powerex and Bonneville Power Administration,³ do not submit

³ See *Cal. Indep. Sys. Operator Corp.*, California Independent System Operator Corporation Filing of CAISO Rate Schedule No. 6035, Docket No. ER20-536-000 (filed Dec. 6, 2019); *Cal. Indep. Sys. Operator Corp.*, California Independent System Operator Corporation Filing of CAISO Rate Schedule No. 92 Powerex EIM Implementation Agreement, Docket No. ER17-1796-000 (filed June 9, 2017); see also *Cal. Indep. Sys. Operator Corp.*, 170 FERC ¶ 61,168 (issued Feb. 28, 2020) (accepting BPA’s EIM Implementation Agreement); *Cal. Indep. Sys. Operator Corp.*, 160 FERC ¶ 61,058 (issued Sep. 7, 2017) (accepting Powerex’s EIM Implementation Agreement).

offers to increase or decrease the output of individual projects, but rather to increase or decrease the aggregate output of a group of projects, thus retaining the ability of the hydro operator to ensure that river flows are managed among the projects to meet interdependent basin management objectives.

The Markets+ Resource aggregation framework is fully consistent with the market operator's need to accurately model generation. The Markets+ tariff only permits Resource aggregation for projects that have a similar impact on the rest of the network. In addition, distribution factors are shared to inform the market operator of the expected share of output from each individual project within an aggregation in response to market awards, as well as real-time data on the actual output of each project. This framework has been successful in enabling large hydro systems to participate in the Western EIM since at least 2018.

2. The Complex, Variable and Subjective Nature of Hydro Opportunity Costs Require a Workable Mitigated Offer Framework

Organized markets include market power mitigation provisions that, under certain conditions, limit offer prices to a mitigated offer that reflects the marginal cost of the resource.

For storage hydro resources, the marginal cost is driven primarily by the value of future opportunities that must be forgone when limited water is used to produce electricity. Any evaluation of the future opportunities that may be forgone, and the value of those specific opportunities, is highly complex due to, among other things, the multiple purposes for which a hydro system is operated, the ever-changing forecasts of future hydro conditions and restrictions, and the uncertainty regarding future electricity prices. Given this complexity and uncertainty, estimating opportunity costs for storage hydro systems

necessarily requires the application of subjective judgment developed over years of experience. This is in contrast to the calculation of mitigated offers for other resource types in organized markets, which typically involves relatively simple calculations based on a limited number of inputs.

An overarching concern for storage hydro suppliers is that the market power mitigation measures of an organized market should not result in an undue risk that their own estimates of opportunity costs will be replaced by an inaccurately low mitigated offer. Doing so could result in market dispatches—and the associated need to release limited water—even when the hydro supplier sought to conserve water for a higher-value use in the future. Requiring inefficient depletion of limited water has the potential to not only cause economic harm to the hydro supplier, but also fails to provide all consumers in the market with the benefit of additional supply in the most valuable periods. In addition, depleting water during relatively low-value periods creates the risk that the hydro operator will have insufficient water in future periods to meet non-power requirements and/or to provide for local system reliability. Market power mitigation measures that create the potential for such unacceptable outcomes pose a barrier to participation in organized markets by storage hydro suppliers.

Markets+ overcomes this concern by enabling eligible hydro suppliers to calculate Mitigated Offers based on a Seasonal Hydroelectric Opportunity Cost (“SHOC”). The SHOC formula and eligibility requirements are based on the California Independent System Operator Corporation’s (“California ISO”) Hydro Default Energy Bid (“DEB”), which the Commission approved in 2019.⁴ The Markets+ SHOC, like the Hydro DEB,

⁴ *Cal. Indep. Sys. Operator Corp.*, 168 FERC ¶ 61,213 (issued Sep. 30, 2019).

begins with the registration of a resource and demonstration of its maximum storage horizon. Like the Hydro DEB, the SHOC calculates Mitigated Offers from forward price data across the storage horizon; the longer the registered maximum storage horizon, the farther into the future that forward prices are included in the calculation.

The Hydro DEB was an important innovation developed in a collaborative fashion through the California ISO stakeholder process to enable storage hydro suppliers to participate in organized markets by reflecting opportunity costs associated with complex storage hydro systems. Acknowledging that such costs “can vary day-to-day, and even intra-day” and can therefore be “highly subjective,” the California ISO explained that the Hydro DEB “does not attempt to precisely model each resource’s operation or costs; rather, it is based on the typical operation of a typical hydroelectric resource.”⁵ In finding the Hydro DEB to be just and reasonable, the Commission noted that it “represents a transparent . . . option that will allow hydroelectric resources with storage to reflect their opportunity costs in their DEBs, and in turn will ensure that hydroelectric resources will be dispatched when they are most needed.”⁶

The California ISO and storage hydro suppliers have successfully employed the Hydro DEB in the Western EIM since 2020. The participation in the Western EIM by additional utilities with storage hydro is key indication of its success in overcoming what had been a critical challenge to participation in organized markets by storage hydro suppliers.

⁵ *Cal. Indep. Sys. Operator Corp.*, CAISO Tariff Amendments to Enhance Local Market Power Mitigation and Reflect Hydroelectric Resource Opportunity Costs in Default Energy Bids, at 32, Docket No. ER19-2347-000 (filed July 2, 2019).

⁶ *Cal. Indep. Sys. Operator Corp.*, 168 FERC ¶ 61,213, at P 36 (issued Sep. 30, 2019).

While the Commission previously found the Hydro DEB to be just and reasonable, and it has been successfully implemented in the Western EIM, the Markets+ SHOC provides an important refinement to the Hydro DEB methodology. Specifically, it excludes forward electricity prices (*i.e.*, beyond day-ahead) in circumstances when the hydro operator expects the system to have no useable storage, as may occur on some days during the spring snowmelt. This refinement makes the SHOC more restrictive and results in a lower Mitigated Offer than under the Hydro DEB design during specific conditions where there is a high degree of confidence that the lower Mitigated Offers will not be below market participants' own evaluation of their opportunity cost. Outside these periods with a lower Mitigated Offer, the Markets+ SHOC makes available a calculation framework like the DEB that the Commission found to be just and reasonable for use in the Western EIM in all periods.

II. CONCLUSION

The Markets+ provisions to enable the use of Resource aggregation and the SHOC mitigation framework offer workable approaches to overcoming two important past challenges to participation by storage hydro resources in organized markets. Markets+ does not attempt to reinvent the wheel, but rather builds on the same approaches that have been approved by the Commission and successfully implemented in the Western EIM and that will be available in the California ISO's Extended Day-Ahead Market ("EDAM"). Hydropower Entities strongly support the Markets+ Resource aggregation and SHOC design elements, believe they build upon Commission-approved approaches in the Western EIM and EDAM, and respectfully request that the Commission approve the Markets+ tariff submitted by SPP.

Respectfully submitted,

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CERTIFICATE OF SERVICE

Pursuant to Rule 2010 of the Commission's Rules of Practice and Procedure, I hereby certify that I have this day served a copy of the foregoing on all persons designated on the official service list compiled by the Secretary in this proceeding.

Dated at Washington, D.C., this 11th day of October 2024.

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