

I. MOTION TO INTERVENE

DMM respectfully requests that the Commission afford due consideration to these comments and motion to intervene, and afford DMM full rights as a party to this proceeding. Pursuant to the Commission's Order 719, the CAISO tariff states that "DMM shall review existing and proposed market rules, tariff provisions, and market design elements and recommend proposed rule and tariff changes to the CAISO, the CAISO Governing Board, FERC staff, the California Public Utilities Commission, Market Participants, and other interested entities."² As this proceeding involves CAISO tariff provisions that affect the efficiency and potential for market power in the CAISO markets, it implicates matters within DMM's purview.

II. COMMENTS

Background

As discussed in the Transmittal Letter, and throughout the CAISO's Hybrid Resources stakeholder process, there is extensive interest in the development of energy storage projects in the western United States.³ In addition to standalone energy storage projects, a large number of storage projects under development are paired with a renewable generation source, with over 30,000 MW of such capacity currently in the CAISO interconnection queue.⁴ The development of these projects is widely understood to be driven by tax incentives, and various other technical, regulatory, and economic drivers.

Energy storage projects in the CAISO market that are paired with another generation type can choose to be modeled as either co-located resources, or as a hybrid resource.

² CAISO Tariff Appendix P, Section 5.1.

³ Transmittal Letter, p. 2.

⁴ Ibid.

Both options involve multiple generators located at a single point of interconnection to the CAISO grid. However, co-located resources are modeled as separate resources and separate market entities, whereas hybrid resources are modeled as a single generating resource that generally uses different fuel types or technologies. Co-located resources are fully optimized by the CAISO market optimization, whereas hybrid resources require optimization and management of various components by the resource operator to meet CAISO dispatch instructions.

The concept of co-located resources is not new to the CAISO market. Such resources exist today, but are comprised of generators of the same technology type. For instance, two solar generators operating as separate resources may share a common point of interconnection. In the future, many co-located resources are expected to be of different technology types as developers seek to add energy storage to existing generation resources.

Current CAISO market rules for separate resources sharing a common point of interconnection limit the sum of the maximum operating levels (“P_{MAX}”) for the resources to the shared interconnection service capacity. This can result in stranded capacity which cannot be utilized from the co-located resources when one co-located resource is capable of producing more than the stated P_{MAX}, while the other is producing less than the P_{MAX}. A more efficient outcome would allow the resource that is capable of producing more to produce up to the difference between the interconnection service capacity and the dispatch of the other co-located resource. However, this outcome may not be possible when the P_{MAX} of each resource is limited, and a portion of the interconnection rights may go unused. Addressing the inefficiency of this outcome becomes increasingly important when

the co-located resources are of different technologies that may be able to produce different values at different times of the day - such as the case of a solar generator paired with a storage resource.

Hybrid resources are also not new to the CAISO market. However, until very recently, the only hybrid resources in the CAISO market were natural gas peaking resources paired with energy storage. Within the last 6 months, new hybrid resources have come online which consist of storage resources paired with renewable generation.

Although the total capacity is still low, in this short time the lack of visibility into the real-time capability of these resources has already presented operational challenges. These new hybrid resources have also brought to light the challenges of monitoring the behavior of these resources after the fact, and estimating their costs of operation at a point in time. These challenges highlight the importance of CAISO's access to data that fully informs the operational capabilities of these resources, even when such data is not used as part of the market optimization.

Aggregate capability constraint will improve efficiency of co-located resource dispatch

The CAISO's proposal of an aggregate capability constraint for co-located resources intends to improve the efficiency of dispatch for co-located resources. The proposed constraint improves efficiency by eliminating the stranded capacity that results when the sum of co-located resource P_{MAX} values is constrained by the interconnection service capacity, rather than the physical capability of each resource.

DMM agrees that the proposed aggregate capability constraint could allow more efficient dispatch than the current approach and can help avoid the potential for stranded capacity. Under the CAISO proposal, the combined output of the co-located resources will

be limited by a single constraint, which will replace the static constraints placed on each individual resource under the current approach. With this new constraint, the market software can co-optimize the output of each co-located resource without exceeding the total transmission rights or capacity at their point of interconnection.

During the CAISO stakeholder process, DMM raised a concern about the pricing rules being proposed for co-located resources. When the aggregate capability constraint becomes binding, the negative shadow price on this constraint will not be included in the price paid to the co-located resources. Normally, under locational marginal pricing, resources behind a binding constraint are paid the lower price that reflects this congestion.

In the Transmittal Letter, the CAISO states that pricing co-located resources at their point of delivery is appropriate because the CAISO models congestion on the CAISO controlled grid, which does not include interconnection facilities. However, DMM's understanding is that this congestion results from a limit between the co-located resource and the CAISO grid, rather than on interconnection facilities between the co-located resources and the point of interconnection. This understanding led to an earlier suggestion by DMM that the CAISO consider pricing co-located resources at their individual nodes, and reflecting the negative shadow price from the aggregate capability constraint in the prices paid to these resources.

Since negative shadow prices for the aggregate capability constraint are not included in the price paid to co-located resources, when this constraint is binding, these resources will receive system level market prices. System level market prices can be significantly higher than the bid prices (and marginal costs) of additional capacity from the co-located resources that remains undispached by the market software. Under these conditions, co-located

resources could have a strong economic incentive to deviate above their dispatch instructions, which are constrained by the aggregate capability constraint.⁵ This in turn would create a reliability issue and/or require manual intervention by ISO system operators to limit the combined output of the co-located resources.

As discussed in the Transmittal Letter, and supported by the tariff language, the CAISO plans to address this concern in two ways. First, the CAISO has confirmed that co-located resources should not be able to exceed interconnection service capacity. This is because the CAISO currently requires generating facilities with generating capability exceeding interconnection service capacity to install generator limiter controls to ensure output does not exceed interconnection service capacity. The CAISO has confirmed to DMM that this same standard would apply to newly developed co-located resources of the type contemplated by the Hybrid Resources initiative. Additionally, the CAISO has clarified that a generating facility whose co-located resources do not comply with market dispatch instructions will become ineligible to use the aggregate capability constraint, and will revert to the existing process which limits the sum of P_{MAX} values to the interconnection service capacity.

The CAISO also notes in the Transmittal Letter and tariff language that the use of the aggregate capability constraint by EIM participating resource will be subject to the prior written approval of the applicable EIM Entity Balancing Authority that enforcing the constraint does not create a threat to safety or reliability. DMM supports this element of the CAISO's proposal.

⁵ DMM provided an example of this scenario in January 14, 2020 comments on the *Hybrid Resources Revised Straw Proposal*, pp. 3-4. <http://www.caiso.com/InitiativeDocuments/DMMComments-HybridResources-RevisedStrawProposal.pdf>.

The CAISO's Hybrid Resources market design was developed in the context of CAISO's interconnection rules, without contemplation of potentially heterogeneous rules across EIM transmission operators. However, the provision to require written approval by EIM Entities added in the final development of the tariff language affords these entities an element of control and review before agreeing to the use of the aggregate capability constraint within their Balancing Authority Area. Further, as the CAISO notes in the Transmittal Letter, the same generator controls should exist under EIM Entities' interconnection rules, consistent with good utility practices and Commission Order No. 845.⁶

Implementation of these provisions should effectively mitigate the potential for over generation that would otherwise exist under the pricing provisions proposed for co-located resources. DMM therefore supports the CAISO's proposal as an improvement that should allow more efficient dispatch and usage of co-located resource capacity.

DMM further notes that the language of Order 845 appears to recognize the need for penalties, in addition to control technologies, to ensure that generating facilities do not exceed interconnection service capacity.⁷ The CAISO proposal has not proposed penalties for co-located resources that generate in excess of interconnection limits.

Should physical controls to limit the output of co-located resources prove inadequate, DMM believes that penalties of sufficient magnitude could be a valuable complement to physical generation controls. These penalties could provide a further deterrent to exceeding interconnection limits, and could also address co-located resources that do not operate under the aggregate capability constraint and choose to operate above P_{MAX}.

⁶ *Reform of Generator Interconnection Procedures and Agreements*, Order No. 845, 163 FERC ¶ 61,043 at PP 367 *et seq.* (2018)

⁷ *Ibid.*

Meteorological and other data requirements for hybrid resources will enhance operational visibility and monitoring capabilities.

Hybrid resources operate as single generating resources with multiple underlying technologies or fuel types. The CAISO market does not manage or optimize the underlying generation components of hybrid resources. When hybrid resources contain a renewable generation component, the CAISO also does not currently have access to forecast data for the renewable component to assess operational capability at a point in time. Similarly, when hybrid resources contain a storage component, CAISO does not have visibility of the state-of-charge to assess the operational capability of that portion of capacity.

The CAISO proposes to require hybrid resources containing a wind or solar component to provide to the CAISO the same meteorological and forecast data as if they were a standalone wind or solar resource in CAISO. CAISO plans to use these data to predict renewable generation capabilities at specific electrical locations. The Transmittal Letter states that the CAISO will also use these data to enhance CAISO's operational awareness and support ex post analysis of market performance.

DMM supports the CAISO's proposal to require hybrid resources containing a wind or solar component to provide meteorological and forecast data comparable to that required of standalone resources of the same technology. This is an important step in gaining visibility to the operation and capabilities of these resources. However, in order to gain complete assessment of hybrid resources, the CAISO will need to require additional data, such as the state-of-charge for hybrid resources that contain a storage component. Such requirements are currently under consideration in the ongoing phase of CAISO's Hybrid Resources initiative. These additional requirements will serve as important complements to

the meteorological and forecast data requirements of the current proposal to maximize operational awareness and support ex post monitoring and analysis of market performance.

III. CONCLUSION

DMM supports the CAISO's proposed tariff modifications to improve efficiency in modeling separate resources co-located at a single generating facility, and to strengthen data requirements for hybrid resources that include a wind or solar generation component.

The CAISO has proposed multiple measures to address concerns of resources using the aggregate capability constraint operating in excess of interconnection service limits. Because of this, DMM believes the proposed aggregate capability constraint will allow for more efficient dispatch of co-located resources using the constraint.

DMM supports the proposed requirements for hybrid resources containing wind or solar components to submit meteorological and forecast data to CAISO. These data are an important first step to improving operational visibility of these resources while also facilitating ex post monitoring and analysis. Additional data requirements, such as the state-of-charge requirements currently under contemplation in the CAISO's ongoing Hybrid Resource stakeholder initiative will further enhance operational visibility of hybrid resources.

DMM respectfully requests that the Commission afford due consideration to these comments as it evaluates the proposed tariff provisions before it.

Respectfully submitted,

By: /s/ Adam Swadley

Eric Hildebrandt, Ph.D.
Executive Director, Market Monitoring

Ryan Kurlinski
Manager, Market Monitoring

Adam Swadley
Lead Market Monitoring Analyst

California Independent System
Operator Corporation
250 Outcropping Way
Folsom, CA 95630
Tel: 916-608-7123
ehildebrandt@caiso.com

Independent Market Monitor for the California
Independent System Operator

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CERTIFICATE OF SERVICE

I hereby certify that I have served the foregoing document upon the parties listed on the official service lists in the above-referenced proceedings, in accordance with the requirements of Rule 2010 of the Commission's Rules of Practice and Procedure (18 C.F.R. § 385.2010).

Dated at Folsom, California this 7th day of October, 2020.

/s/ Candace McCown

Candace McCown