Memorandum

To: ISO Board of Governors

From: Mark Rothleder, Vice President, Market Policy and Performance

Date: July 15, 2020

Re: **Decision on hybrid co-located resources proposal**

This memorandum requires Board action.

EXECUTIVE SUMMARY

Interest in energy storage is significant and continues to grow as state and federal policy makers and regulators promote energy storage development to help decarbonize the grid. Throughout the West, it is expected that energy storage paired with wind and solar resources will be pursued to accommodate the retirement of natural gas and coal fired generation. In particular, the ISO has identified a potential shortfall of capacity to meet projected system net load peaks over the next few years because of pending retirements of the once-through cooled natural gas generation fleet. To address this shortfall, storage resource developers have submitted a significant number of interconnection requests and are moving quickly to fill the 3,300 MW procurement mandate from the California Public Utilities Commission prior to 2023. To meet this need, the ISO anticipates a significant amount of new storage generation capacity in California alone in 2020, 2021 and 2022.

Management proposes a new policy to facilitate and manage strong developer interest to add storage resources to existing solar and other resource sites. Developers are adding storage to existing sites because adding resources at these locations can be done more quickly and at a lower cost than establishing new interconnections. Lower costs are achieved due to the existing infrastructure, such as step-up transformer equipment that is already a part of the existing facility. Siting at existing facilities takes less time to go through the ISO's interconnection process because the capacity addition can be considered through the material modification process, rather than the process of siting a new facility, which includes additional analysis and approvals.

Management is developing two different market models for generation with different technology types located behind the same interconnection. The first proposed option is a model for 'co-located' resources. Under this model the resources behind the

interconnection have separate resource IDs and are separately dispatched through the ISO market even though they may have a shared commercial interest. The second option is a model for 'hybrid' resources, where the generation resources are modelled under a single resource ID. The co-located model allows for the underlying resources to be modeled in a manner similar to existing resources today, but requires the ISO market to manage a constraint at the point of interconnection to ensure that the combination of resources does not receive market instructions beyond the interconnection limit. Enabling hybrid resources requires several new features for the resource operator to communicate to the ISO when portions of the generating facility is unavailable because of deviations in the variable output component of the hybrid resource.

Management is developing these policy changes as quickly as possible to facilitate the addition of new storage capacity at existing interconnection locations needed to address pending capacity shortfalls. Management proposes to implement the new market functionality in phases to manage its timely development and implementation. Co-located resources require less new functionality than hybrid resources given they participate in the market under existing generation models as two separate and operationally distinct resources. As a result, Management proposes to implement the co-located resource model in the fall of this year. The hybrid functionality requires additional time to vet with stakeholders and implement, thus, Management proposes to implement the hybrid model a year later in the fall 2021.

Management has completed the policy development for the co-located resources and brings that phase of the policy forward for a decision. The hybrid resources policy is still under development and Management plans to return to request a decision on that part of the initiative at the November 2020 Board of Governors meeting.

Management proposes the following motion:

> ***Moved, that the ISO Board of Governors approves the tariff revisions necessary to implement the proposal for the hybrid co-located resources proposal as described in the memorandum dated July 15, 2020; and***
>
> ***Moved, that the ISO Board of Governors authorizes Management to make all necessary and appropriate filings with the Federal Energy Regulatory Commission to implement the proposed deliverability methodology revisions, including any filings that implement the overarching initiative policy but contain discrete revisions to incorporate Commission guidance in any initial ruling on the proposed tariff amendment.***

DISCUSSION AND ANALYSIS

Today, the ISO market already has the concept of co-located resources. However, existing market rules preclude the aggregate values for the maximum output (Pmax) of each resource to exceed the total interconnection limit at the point of interconnection, leaving important capacity value on the table. Management proposes that co-located resources be allowed to register their maximum operating limit as their Pmax even if their aggregate Pmax values are greater than the point of interconnection limit. This is appropriate as many of the new storage resources will be located at existing solar generation sites. These two technologies complement each other, in that solar only operates during daylight hours and storage is incentivized to provide energy to the market when energy prices are the highest, which usually occurs during the evening net-load ramp and the evening net-load peak. Under the proposal, the ISO will limit market awards to, and dispatches from, co-located resources to be within the point of interconnection limit by employing a new aggregate capability constraint. The aggregate capability constraint will be modeled similar to other existing constraints in the ISO market. However, congestion from the interconnection constraint will only be used to determine the megawatt dispatch for each co-located resource and will not be used to set the price for the co-located resources. Management proposes that the co-located resources receive the locational marginal price at the point of interconnection. This allows co-located resources to receive the prevailing market prices at the point of interconnection.

Management believes that pricing co-located resources in this manner is appropriate. If congestion occurs on the ISO controlled grid, it will effect the dispatch and pricing of the co-located resources in a manner consistent with all other resources on the grid. Because the point of interconnection is not the ISO controlled grid, but a part of the generator's intertie, congestion at these locations should not be used for pricing resources there. However, if the production from the co-located resources at that point of interconnection could, in theory, exceed the point of interconnection limits, the constraint should be observed for economic dispatch purposes so that signals are not sent to these co-located resources beyond their interconnection limits. Importantly, pricing co-located resources at the point of interconnection maintains pricing parity between electrically identical facilities that happen to be modeled as hybrid resources instead of co-located resources.

In addition to the model restricting dispatch of co-located resources to levels at or below the interconnection limit, the ISO also takes additional precautions to ensure that these limits are not violated by actual generation at the facility. Upon resource interconnection, new resources are required to demonstrate that a limiting "run-back" scheme is in place that will prevent the combined flow from the resources from ever exceeding point of interconnection limits in real-time. These run-back schemes are electronic and are implemented at the control center that monitors electricity flow onto the ISO controlled transmission system. These schemes are an existing requirement for resources integrating into the ISO grid and not a new proposal specific to co-located resources.

POSITIONS OF THE PARTIES

Stakeholders are generally supportive of the policy provisions for the co-located resources within the hybrid resources initiative. Some stakeholders expressed concern that the policy development is moving too fast. However, most stakeholders that have storage capacity coming on-line in 2020 or early 2021, do not share these concerns. As noted above, given the need for new capacity additions, Management feels that moving quickly to get these rules in place is essential to meet procurement targets set for the next few years.

The ISO Department of Market Monitoring and the California Public Utilities Commission expressed concern about the proposed pricing model for co-located resources. For the reasons discussed above, Management feels that it is important to price co-located resources in the manner described, which maintains pricing parity between co-located and hybrid resources, and without would cause pricing disparity between electrically identical resources. Additionally, including congestion from the point of interconnection would mean pricing non-ISO transmission into the price of the resource, which creates new and unprecedented issues. The Department of Market Monitoring also asserted that the proposed pricing paradigm could cause prices to be inconsistent with dispatch instructions from the ISO. Management maintains that co-located storage will continue to have a tariff obligation to follow dispatch instructions received by the market. In the event that individual resources do not follow dispatch instructions, the proposal includes a provision that would enable the ISO to limit the summation of the resources' Pmax values to be less than the point of interconnection limit constraint. Furthermore, as with all tariff obligations, resources that do not follow these rules can be referred to FERC.

Late in the stakeholder process, a number of stakeholders requested additional authority and functionality to absorb the difference in generation between variable energy resource production and forecast values. Today, variable energy resources, wind and solar, are allowed to deviate from their dispatch instructions and produce "as capable." Variable resources are not permitted to produce as capable when not receiving dispatch below forecasts from the ISO, when receiving explicit instructions to follow dispatch instructions from the ISO, or receiving exceptional dispatch instructions from the ISO. Management recently implemented improved controls that require variable resources to comply directly with dispatch and operator instructions under certain circumstances.

Management believes the concept has merit is seriously considering this request from stakeholders to implement such functionality. Although this functionality may be easy to conceptualize, without limitations on the scope of how this authority would be managed, implementation could present significant challenges. First, this would require real-time communication between the co-located resources and it is unclear how this would work or what the protocols for this data sharing would be, and whether they are possible or legal, especially if the scheduling coordinators are different for the co-located resources. Second, allowing a storage resource to deviate from dispatch instructions would preclude it from providing regulation, as the resource would be incapable of following four-second automatic generation control signals from the ISO. It also could be problematic for storage resources providing other kinds of ancillary services or other products that require maintenance of a

particular state of charge since the state of charge may be constantly changing based on the dynamic output of the variable energy resources. Details surrounding the interaction of ancillary service and other market products must be considered together prior to implementation. Third, allowing storage resources to deviate from their state of charge could impact unit commitment in the real-time market. If the state of charge deviates from what is expected by the real-time market optimization, it could result in reliability concerns because the state of charge available could actually be less than what was predicted by the market optimization software. Finally, it is unclear how this would be handled by the ISO settlement system. Today, the settlement system calculates statements for each resource individually. The system cannot settle net deviations among a set of resources. New policy and system enhancements would need to be developed to assess whether energy produced and consumed by this behavior should be accounted for as instructed or uninstructed imbalance energy. Management commits to continue work with stakeholders in the ongoing hybrid resources initiative to develop a policy proposal to enable such authority in a way that does not adversely impact the market optimization or present significant implementation challenges. Management plans to present this proposal as part of the hybrid resources proposal to the Board at the November Board of Governors meeting.

Until and whether these issues and level of flexibility can be resolved for co-located resources, market participants are not left without options. Market participants can elect to operate as a hybrid resource – versus as a co-located resource – which allows for employment of their own on-site optimization between their hybridized variable energy resources and storage devices.

FUTURE POLICY

The ISO intends to collect performance data for hybrid and co-located resources as they integrate into the system after this policy is implemented. This information will include 1) how unique features of the hybrid and co-located models are functioning, 2) if co-located or hybrid resources are exceeding their point of interconnection capacity, 3) if there are any unintended consequences from the addition of co-located or hybrid resources, and 4) if the co-located resources are not following dispatch instructions when prices are particularly high. Some of this data may be included in monthly reports published by the ISO, and some may be included in regular market planning and performance forum meetings hosted by the ISO.

In addition to providing the ISO and the public with additional insight into how these resources are functioning, the ISO intends to use this collected data to inform future policy for hybrid resources. Currently, the ISO is planning to address additional considerations for hybrid and co-located resources in a policy initiative set to begin in the fourth quarter of 2021.

CONCLUSION

Management requests Board approval of the co-located components of the hybrid resources initiative as described in this memorandum. It is critical that the ISO implement the provisions outlined in this proposal to facilitate the addition of new storage resources paired with other resource technologies behind a single interconnection. The near-term need for the new policy is being driven by the California Public Utilities Commission's prescribed procurement of 3,300 MW of new resources in response to the retirement of the once-through cooled gas resources.