Energy Storage and Distributed Energy Resources Phase 4 (ESDER 4)
Final Proposal

Comments by Department of Market Monitoring
September 16, 2020

Summary

DMM appreciates the opportunity to comment on the ISO's *Energy Storage and Distributed Energy Resources Phase 4 (ESDER 4) Final Proposal*.[1] DMM provides comments on the following proposals which will be presented to the ISO Board in September:

1) End-of-hour state-of-charge (EOH SOC) bid parameter for storage resources

2) Maximum daily run time parameter for demand response resources

3) Calculating capacity values for variable-output demand response resources

The ISO will continue to stakeholder its proposal for applying market power mitigation to energy storage resources in a separate effort (ESDER-DEB).[2] DMM is not providing comments on the ISO's storage default energy bid (DEB) proposal here, but continues to recommend refinements to the ISO's DEB proposal as detailed in prior comments.[3]

DMM supports the ISO's proposal to introduce a biddable end-of-hour state-of-charge (EOH SOC) parameter for storage resources. Under the ISO's proposal, a supplier would have the option to submit maximum and minimum state of charge values as a part of real-time bids. DMM agrees with the ISO and other stakeholders that the EOH SOC feature could provide battery operators with a more flexible option to manage real-time schedules as opposed to using self-schedules.

DMM also supports the ISO's efforts to address potential swings in schedules between 15-minute and 5-minute markets and to apply bid cost recovery (BCR) eligibility rules in the hour preceding a self-schedule and when the EOH SOC parameter is used. The ISO's proposals would significantly limit BCR gaming opportunities and help prevent potentially large swings in schedules between real-time market runs when EOH SOC constraints are used. More nuanced approaches may better preserve battery flexibility and BCR eligibility while still preventing

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[1] *Energy Storage and Distributed Energy Resources Phase 4 Final Proposal*, California ISO, August 21, 2020: fhttp://www.caiso.com/InitiativeDocuments/FinalProposal-EnergyStorage-DistributedEnergyResourcesPhase4.pdf

[2] *Energy Storage and Distributed Energy Resources Phase 4 – Final Proposal Update*, California ISO, August 27, 2020, Slide 4 (August 27 ESDER Presentation): http://www.caiso.com/InitiativeDocuments/Presentation-EnergyStorage-DistributedEnergyResources-Aug27-2020.pdf

[3] *Comments on ESDER 4 Draft Final Proposal*, Department of Market Monitoring, June 18, 2020 pp. 3-7: http://www.caiso.com/InitiativeDocuments/DMMComments-EnergyStorage-DistributedEnergyResourcesPhase4-DraftFinalProposal.pdf

gaming opportunities. [4] Therefore, DMM recommends that the ISO continue to consider refinements to these bid cost recovery provisions in future initiatives.

DMM supports the ISO's proposal to allow demand response resources to submit a maximum daily run time parameter in master file. Stakeholders have indicated that this parameter would better reflect that many demand response programs are designed with limited run hours per day. While DMM supports the ISO's proposal, it will be important for the ISO to work with stakeholders to ensure that this parameter accurately reflects underlying resource characteristics. For resource adequacy capacity, the ISO should also consider factoring unavailability driven by use of the maximum daily run time and other master file constraints into its Resource Adequacy Availability Incentive Mechanism (RAAIM) calculations and proposed UCAP calculations under the ISO's RA Enhancements initiative.

Finally, DMM supports the ISO's efforts to more accurately determine variable-output demand response resources' contributions towards meeting resource adequacy requirements. DMM has observed that bidding patterns of several demand response resources which are not subject to must-offer obligations have reflected underlying load profiles. These resources' availability often does not align with the ISO's availability assessment hours, or hours where the ISO relies on resource adequacy capacity the most. To the extent that these demand response resources are counted towards meeting resource adequacy requirements, these resources' contributions to reliability in peak net load hours should accurately reflect curtailable load available in those hours.

More detailed comments on the ISO's final proposal are provided below.

II. End-of-hour state-of-charge parameter

DMM supports the ISO's proposal to introduce a biddable end-of-hour state of charge (EOH SOC) parameter for storage resources. Under the ISO's proposal, a supplier would have the option to submit maximum and minimum state of charge values as a part of real-time bids. DMM agrees with the ISO and other stakeholders that the EOH SOC feature could provide battery operators with a more flexible option to manage real-time schedules as opposed to using self-schedules.

DMM also supports the ISO's efforts to address potential swings in schedules between 15-minute and 5-minute markets and to apply bid cost recovery (BCR) eligibility rules when the EOH SOC parameter is used in order to minimize potential gaming opportunities. However, the ISO's proposals could be refined in the future to better preserve battery flexibility in the 5-minute market and also ensure resources remain eligible for BCR when EOH SOC constraints are used but do not cause schedules to deviate from what the market would have otherwise determined.

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[4] *Comments on ESDER 4 Draft Final Proposal*, Department of Market Monitoring, June 18, 2020 pp. 7-9.

End-of-hour SOC interaction between 15 and 5-minute markets

In comments on the Revised Straw Proposal, DMM noted that because the 5-minute market may not look out far enough to capture the same end-of-hour state of charge (EOH SOC) constraints considered by the 15-minute market, the 5-minute market may unwind 15-minute market awards driven by EOH SOC constraints. If a significant amount of storage capacity uses the EOH SOC feature, large swings in schedules between the 15-minute market and 5-minute market could occur.[5]

To address the potential for the 5-minute market to unwind 15-minute market awards impacted by EOH SOC constraints, the ISO proposes to enforce end-of-horizon SOC constraints in the 5-minute market based on 15-minute market advisory schedules. The ISO will apply end-of-horizon SOC constraints to the end of 5-minute market horizons based on a resource's EOH SOC bids, adjusted for 15-minute market advisory schedules in intervals beyond the 5-minute market horizon. The ISO's proposed solution would help prevent potentially large swings in schedules between real-time market runs and increase the likelihood that EOH SOC targets will remain feasible through the real-time market.

However, as described in previous comments, the ISO's proposal may limit battery flexibility in the 5-minute market, particularly when EOH SOC constraints do not impact a resources' dispatch.[6] Under the ISO's proposal, whenever the EOH SOC feature is used, the ISO would enforce end-of-horizon SOC constraints in the 5-minute market which would put resources on trajectories to meet 15-minute market advisory schedules. The ISO's proposal could therefore limit a resource's ability to deviate from 15-minute market advisory schedules, even when such movement would be beneficial to the market and would not impact the resource's ability to meet EOH SOC targets.

To better preserve the flexibility of battery resources in the 5-minute market, DMM suggested that the ISO consider determining if EOH SOC constraints were actually binding in 15-minute market runs that first see the EOH SOC constraints (i.e. determine whether EOH SOC constraints exhibited positive shadow prices). DMM suggested that the ISO consider only enforcing end-of-horizon constraints in the 5-minute market to maintain 15-minute market trajectories when EOH SOC constraints were actually binding in the 15-minute market.

The ISO's proposal could also be made less restrictive if the ISO set end-of-horizon SOC constraints to minimum or maximum state of charge values instead of exact state of charge targets. Using the ISO's first example on page 11 of the Final Proposal, instead of setting the end-of-horizon SOC value for the 5-minute market run at 8:30 (which looks out to 9:35) at exactly 25.83 MWh, the ISO could set the end-of-horizon SOC constraint to a minimum of 25.83 MWh. This change could allow the resource to charge further if economic in the 5-minute

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[5] *Comments on ESDER 4 Revised Straw Proposal*, Department of Market Monitoring, November 25, 2019, p. 7: http://www.caiso.com/InitiativeDocuments/DMMComments-EnergyStorage-DistributedEnergyResourcesPhase4-RevisedStrawProposal.pdf

[6] *Comments on ESDER 4 Draft Final Proposal*, Department of Market Monitoring, June 18, 2020 pp. 7-8.

market while still positioning the resource to be able to meet the EOH SOC target by 10:00. Further, suppose the resource in the ISO's first example set an EOH SOC range between 30 MWh and 40 MWh for 10:00 and was instead predicted to discharge 5 MWh in advisory intervals between 9:35 and 10:00. Instead of setting the end-of-horizon SOC value for the 5-minute market run at 8:30 at exactly 35 MWh, the ISO could set the end-of-horizon SOC to a minimum of 30 MWh (or the minimum EOH SOC). This change could prevent the ISO from holding additional charge on the resource if it would no longer be economic to discharge the resource between 9:35 and 10:00 in subsequent 5-minute market runs, while still positioning the resource to be charged between 30 MWh and 40 MWh by 10:00.

Ultimately, DMM supports the ISO's general approach to maintaining alignment between 15 and 5 minute markets when EOH SOC constraints are used. However, a more precise approach to enforcing end-of-horizon SOC constraints in the 5-minute market could better preserve flexibility on battery resources and result in more efficient use of battery resources in the real-time market.

Bid cost recovery rules when EOH SOC constraints are used

DMM supports the ISO efforts to enforce BCR eligibility rules when EOH SOC parameters or self-schedules are used to manage battery resource schedules in real-time. DMM has noted that use of EOH SOC parameters could cause resources to be dispatched uneconomically, presenting potential BCR gaming opportunities.[7] To address these concerns, the ISO proposes to exclude revenue *shortfalls* in the hour adjacent to an EOH SOC constraint and prior hour from real-time BCR calculations. The ISO also proposes that revenue surpluses incurred in these two hours would not be removed from the real-time BCR calculation. The ISO's revised proposal would significantly limit potential gaming opportunities in hours preceding the hour with the EOH SOC constraint.

However, as detailed in prior comments, the ISO's proposal is a conservative approach and could result in excluding hours from BCR calculations where the end-of-hour SOC constraint may not have had any impact on a resource's dispatch.[8] In line with DMM's suggestion for managing resource schedules between 15 and 5-minute markets, DMM suggested that the ISO only exclude hours from the real-time BCR settlement if EOH SOC constraints were actually binding in the 15-minute market.

DMM supports the ISO also applying BCR eligibility rules to the hour preceding a battery resource's self-schedule. However, like the proposed BCR rules when EOH SOC constraints are used, the ISO proposal to address BCR under self-schedules is a conservative approach. Since

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[7] *Comments on ESDER 4 Issue Paper and Stakeholder Working Group Meeting*, DMM, April 2, 2019, pp. 5-6: http://www.caiso.com/InitiativeDocuments/DMMComments-EnergyStorage-DistributedEnergyResourcesPhase4WorkingGroup-Mar18-2019.pdf

[8] *Comments on ESDER 4 Draft Final Proposal*, Department of Market Monitoring, June 18, 2020 p. 9: http://www.caiso.com/InitiativeDocuments/DMMComments-EnergyStorage-DistributedEnergyResourcesPhase4-DraftFinalProposal.pdf

the ISO proposes to define minimum SOC constraints in 5-minute market runs in order for resources to meet self-schedules in the following hour, DMM suggested that the ISO identify whether minimum SOC constraints needed to support self-schedules are binding, and use this distinction to determine BCR eligibility when self-schedules are in place. DMM has also recommended that the ISO review how existing residual imbalance energy rules will impact storage resources submitting EOH SOC constraints or self-schedules and to consider appropriate enhancements to residual imbalance energy rules to address potential BCR gaming in a more targeted fashion.[9]

While DMM supports the ISO's general approach to enforce BCR rules when EOH SOC constraints and self-schedules are used, more precise approaches to determining BCR eligibility could help ensure that resources remain eligible for cost recovery when use of EOH SOC constraints or self-schedules did not cause resource schedules to deviate from how the market would have otherwise scheduled the resources.

Exemptions to bid cost recovery eligibility in the hour preceding a self-schedule described in August 27 presentation

DMM supports the ISO's August 21 Final Proposal to exclude the hour preceding a self-schedule from real-time BCR calculations in order to minimize potential gaming opportunities. In its slides for the August 27 stakeholder meeting, the ISO listed two exemptions to this general rule that the ISO had not included in the Final Proposal.[10] After the meeting, DMM discussed with CAISO staff BCR gaming opportunities that these exemptions could create. Therefore, DMM supports CAISO's subsequent decision to revert to the Final Proposal and to not propose the exemptions that CAISO listed on Slide 7 of its August 27 Proposal.

III. Demand response maximum daily run time parameter

DMM supports the ISO's proposal to allow demand response resources to submit a maximum daily run time parameter in master file. Stakeholders have indicated that this parameter would better reflect that many demand response programs are designed based on limited run hours per day rather than a limited amount of energy per day. While DMM supports the ISO's proposal, it will be important for the ISO to work with stakeholders to ensure that this new master file parameter accurately reflects underlying resource characteristics.

The ISO should also factor resource adequacy unavailability driven by use of the maximum daily run time and other master file constraints into its Resource Adequacy Availability Incentive Mechanism (RAAIM) calculations and proposed UCAP calculations under the ISO's RA Enhancements initiative. Demand response resources could use the maximum daily run time

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[9] *Comments on ESDER 4 Second Revised Straw Proposal*, Department of Market Monitoring, March 27, 2020, pp. 1-2: http://www.caiso.com/InitiativeDocuments/DMMComments-EnergyStorage-DistributedEnergyResourcesPhase4-SecondRevisedStrawProposal.pdf

[10] August 27 ESDER 4 Presentation, Slide 7.

parameter itself or in combination with other master file constraints to significantly limit resource availability outside of submitting outages.

IV. Capacity values for variable-output demand response resources

DMM supports the ISO's efforts to more accurately determine variable-output demand response resources' contributions towards meeting resource adequacy requirements. DMM has observed that bidding patterns of proxy demand response resources which are not subject to must-offer obligations generally reflect underlying load profiles.[11] Several of these underlying resources are counted towards meeting resource adequacy obligations from the demand side.

The availability of these resources often does not align with the ISO's availability assessment hours, or peak net load hours where the ISO relies on resource adequacy capacity the most. To the extent that these demand response resources are counted towards meeting resource adequacy requirements, these resources' contributions to reliability in peak net load hours should accurately reflect curtailable load available in those hours.

DMM has expressed concerns about the cumulative impacts of various energy-limited or availability-limited resources which are being relied upon to meet an increasing portion of resource adequacy requirements and supports the ISO's efforts to work with the CPUC and other LRAs to more accurately account for the variable nature demand response availability in qualifying capacity calculations.

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[11] *2019 Annual Report on Market Issues and Performance*, Department of Market Monitoring, June 2020, p. 54:
http://www.caiso.com/Documents/2019AnnualReportonMarketIssuesandPerformance.pdf