Resource Adequacy Enhancements

Final Proposal - Phase 1

Redline

February 17, 2021

Updated March 23, 2021, to reflect changes to the Minimum State of Charge proposal

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1. Executive Summary

~~The~~Since October 2018, the California Independent System Operator Corporation (CAISO) ~~is performing a comprehensive review and~~ has been ~~leading an extensive stakeholder process since October 2018 to enhance~~reviewing the CAISO's Resource Adequacy (RA) tariff provisions comprehensively through the RA Enhancements stakeholder initiative. The ~~sole~~ objective of this on-going effort is to ensure the CAISO's resource adequacy rules and tools remain relevant and guide the procurement of capacity that can reliably and sustainably support the rapidly evolving needs of the grid all hours of the year. This comprehensive review has identified ~~important and non-trivial~~the need for several significant modifications to the CAISO's RA tariff provisions that affect System, Local, and Flexible RA needs, obligations, and requirements.

Throughout this initiative, the CAISO has highlighted key RA program features and elements that should change or be refined given the evolving needs of grid. ~~For some time, the CAISO has raised the specter of emerging reliability challenges.~~ The load-shed events of August 2020 illuminated ~~and highlighted~~ these challenges and support the CAISO's on-going comprehensive review of the resource adequacy program. To this end, the CAISO believes the set of elements in this initiative will help address these growing challenges and close important gaps in the existing RA program, and, once implemented, will help ensure a more stable and reliable transition to a decarbonized grid.

This ~~document parses key~~final proposal includes phase 1 elements of the resource adequacy enhancements initiative ~~into a draft final proposal- phase 1 and a sixth revised straw proposal~~.[1] The ~~draft~~ final proposal represents those key elements that are ~~close to final in the policy development phase, and will be concluded in a final proposal that is~~ finalized and scheduled for ~~release in February and~~ Board approval in March 2021. The ~~draft~~ final proposal includes ~~certain~~ refinements to the existing planned outage process, ~~RA import provisions,~~ a minimum state of charge requirement for storage resources, and ~~local~~ backstop procurement authority~~. The sixth revised straw proposal includes~~ for local energy sufficiency. Other RA enhancements elements ~~that~~ require additional vetting, including proposals on unforced capacity (UCAP) evaluations, minimum system RA requirements, system RA showings and sufficiency testing, must offer obligations, RA import provisions, local RA under a UCAP construct, and other backstop capacity procurement provisions. These elements ~~will be taken to the Board partly~~are not included in ~~May~~this final proposal and ~~also~~will be advanced in ~~September 2021~~future iterations.

~~Draft~~ Final Proposal- Phase 1

The ~~In this draft final proposal, the~~ CAISO is proposing several changes to the existing planned outage provisions and the planned outage process. Throughout this stakeholder process, the CAISO considered ~~numerous different~~various proposals ~~from both the CAISO and stakeholders~~ for modifying the planned outage process ~~with~~that had varying degrees of stakeholder support.

[1] ~~A follow~~Follow on draft final proposal ~~(~~for Phase 2~~) will be~~ elements are forthcoming as the policy elements in the sixth revised straw proposal are finalized.

In response to stakeholder feedback, the CAISO proposes several changes ~~are~~ intended to provide higher assurance that planned outages scheduled by 45 days prior to the month actually can be taken when scheduled. ~~The CAISO proposes to redesign the planned outage process to reflect system UCAP targets rather than reflect the traditional NQC targets.~~ This ~~draft~~ final proposal includes ~~a~~an interim planned outage process that requires substitution for all planned outages~~, to be implemented quickly~~. Under this proposal, the CAISO retains its full discretion to grant or deny all opportunity outages. Future proposals enhancements to the resource adequacy rules will ~~continue to develop~~consider a longer term solution that accounts for the need for planned outages in the upfront procurement and eliminates the need for all planned outage substitution. Based on feedback from stakeholders on the Draft Final Proposal, the CAISO has provided specific responses to several stakeholder objections and provided additional clarity to the proposal as requested.

The CAISO also ~~developed~~includes a proposal for a minimum state of charge requirement, which will ensure that on critical days, storage resources providing RA capacity are sufficiently charged in the real-time market to meet day-ahead discharge schedules when storage resources are needed to meet the evening net-load peak.

Finally, the CAISO is adding an element to its local capacity technical study criteria to capture local area energy sufficiency needs and expanding its backstop capacity procurement authority to ~~fulfill~~fill any identified uncured ~~local area energy sufficiency~~ deficiencies in meeting that new criterion.

2. Introduction and Background

The rapid transformation to a cleaner, yet more variable and energy limited resource fleet, and the migration of load to smaller and more diverse load serving entities requires re-examining all aspects of the CAISO's Resource Adequacy program. In 2006, at the onset of the RA program in California, the predominant energy production technology types were gas fired, nuclear, and hydroelectric resources. While some of these resources were subject to use-limitations because of environmental regulations, start limits, or air permits, they were generally available to produce energy when and where needed given they all had fairly dependable fuel sources. However, as the fleet transitions to achieve the objectives of SB 100,[2] the CAISO must rely on a very different resource portfolio to reliably operate the grid.

Further, grid conditions during the August 2020 heat wave demonstrate the RA program must be reformed to ensure ~~a reliable transition to a decarbonized grid~~ capacity is available during the net demand peak period when solar resources are absent. In this stakeholder initiative, the CAISO, in collaboration with the California Public Utilities Commission (CPUC) and

[2] The objective of SB 100 is "that eligible renewable energy resources and zero-carbon resources supply 100% of retail sales of electricity to California end-use customers and 100% of electricity procured to serve all state agencies by December 31, 2045." https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB100

stakeholders, explored reforms needed to the CAISO's resource adequacy rules, requirements, and processes to ensure continued reliability and operability under the transforming grid.

The CAISO has identified certain aspects within the CAISO's current RA tariff authority that, among other things, require refinement to ensure effective procurement, help simplify overly complex rules, and ensure resources are available when and where needed all hours of the year. The following issues are of growing concern to the CAISO:

- Current RA counting rules do not adequately reflect resource availability, and instead rely on complicated substitution and availability incentive mechanism rules;
- Flexible capacity counting rules do not sufficiently align with operational needs;
- Provisions for import resource adequacy resources should ~~need clarification to~~ ensure physical capacity and firm delivery from ~~such resources RA imports~~;
- Current system and flexible RA showings assessments do not consider the overall effectiveness of the RA portfolio to meet the CAISO's operational needs; ~~and~~
- Current planned outage substitution rules leave resource SCs and the CAISO unclear of substitution needs until after monthly RA showings;
- Increased levels of energy storage necessitate assurance of a minimum level of stored energy available during the net load evening peak to meet operational needs; and
- Growing reliance on availability-limited resources when these resources may not have sufficient run hours or dispatches to maintain and serve the system reliably and meet energy needs in local capacity areas and sub-areas.

The CAISO has conducted a holistic review of its existing RA tariff provisions to make necessary changes to ensure CAISO's RA tariff authority adequately supports reliable grid operations into the future. ~~Throughout~~Through the RA enhancements stakeholder process, the CAISO developed the proposals within this ~~draft~~ final proposal to address some of these concerns and ensure the CAISO's resource adequacy rules guide the procurement of capacity that can reliably meet system needs. Other elements within the RA enhancements initiative to be finalized in future iterations address the remaining concerns.

3. Resource Adequacy Enhancements Principles and Objectives

3.1 Principles

1. The resource adequacy framework must reflect the evolving needs of the grid

As the fleet transitions to a decarbonized system where fuel-backed resources are replaced with clean, variable, and/or energy-limited resources, traditional measures of resource adequacy must be revisited to include more than simply having sufficient capacity to meet peak demand. The RA products procured and the means to assess resource adequacy must be re-examined and refreshed to remain ~~relevant~~effective. Any proposed changes must assure that RA accounting methods effectively evaluate the RA fleet's ability to meet the CAISO's operational and reliability needs all hours of the year. The evolving fleet is altering the CAISO's

operational needs. As more variable supply and demand interconnects to the system, the CAISO requires resources that are more flexible and can quickly and flexibly respond to greater levels of supply and demand uncertainty. RA requirements and assessments must reflect the evolving needs of the grid and the RA framework must properly evaluate and value resources that can meet these evolving needs.

2. **RA counting rules should promote procurement of the most dependable, reliable, and effective resources**

Both RA and non-RA resources should be recognized and rewarded for being dependable and effective at supporting system reliability. If a non-RA resource has a higher availability and is more effective at relieving local constraints relative to other similar RA resources, then such information should be publicly available to enable load-serving entities (LSEs) to compare and contrast the best, most effective resources to meet their procurement needs. Having this information publicly available to load-serving entities will improve opportunities for the most dependable and effective resources to sell their capacity. Thus, in principle, RA counting rules should incentivize and ensure procurement of the most dependable, reliable, and effective resources.

3. **The RA program should incentivize showing all RA resources**

Modifications to the existing RA structure should encourage showing as much contracted RA capacity as possible and not create disincentives or barriers to showing excess RA capacity. Although it may be appropriate to apply additional incentive mechanisms for availability, CAISO must balance the impact that such incentives may have on an LSE's willingness to show all of its contracted RA capacity.

4. **LSE's RA resources must be capable of meeting its load requirements all hours of the year**

RA targets should be clear, easily understood and based on reasonably stable criteria applied uniformly across all LSEs. For example, to date, the CAISO has relied on a planning reserve margin that is met through a simple summation of the shown RA resources' Net Qualifying Capacity (NQC) values. Most Local Regulatory Authorities (LRAs) set a planning reserve margin at fifteen percent above forecasted monthly peak demand. However, some LRAs have set lower planning reserve margins. It is not possible to determine if those LSEs with lower planning reserve margins impair the CAISO system without comparing the attributes of the underlying resources in LSE's portfolios, relative to resources' attributes in other portfolios. In other words, the simple summation of NQC values in a LSE's portfolio ~~does not~~ does not guarantee there will be adequate resources and does not assure an LSE can satisfy its load requirements all hours of the year. As California Public Utilities Code section 380 states, "Each load-serving entity shall maintain physical generating capacity and electrical demand response adequate to meet its load requirements, including, but not limited to, peak demand and planning

and operating reserves (emphasis added)."[3] In other words, resource adequacy also encompasses LSEs meeting their load requirements all hours of the year, not just meeting peak demand.

3.2 Objectives

In evaluating RA enhancements, CAISO has reviewed NQC rules, forced outage rules, adequacy assessments, and availability obligations and incentive provisions. These existing rules are inextricably linked and require a holistic review and discussion. This review includes considering assessing the reliability and dependability of resources based on forced outage rates. Incorporating forced outages into the CAISO's RA assessment will help inform which resources are most effective and reliable at helping California decarbonize its grid.

Based on the CAISO's review of best practices and the diverse stakeholder support for further exploration of these matters, CAISO is proposing a new resource adequacy framework to assess the forced outage rates for resources and conduct RA adequacy assessments based on both the unforced capacity of resources and the RA portfolio's ability to ensure CAISO can serve load and meet reliability standards.

The CAISO 's proposal seeks to remain aligned with the CPUC process. However, CAISO notes that solely relying on an installed-capacity-based PRM as the basis for resource adequacy, as is the case today, is not sustainable into the future given the transforming grid and the new resource mix and its operational characteristics of the new resource mix.

The CAISO must consider the express intent of the original legislated RA mandate: to ensure each load-serving entity maintains physical generating capacity and electrical demand response adequate to meet its load requirements. This is essential as California transitions to greater reliance on more variable, less predictable, and energy limited resources that may have sufficient capacity to meet a planning reserve margin, but may not have sufficient energy to meet reliability needs and load requirements all hours of the year. Given this growing concern, CAISO is proposing to develop a new resource adequacy test that will ensure there is sufficient capacity to not only meet both gross and net peak load needs, but, just as importantly, to ensure sufficient energy is available within the RA fleet to meet load requirements all hours of the year.

4. Stakeholder Engagement Plan

Table 1 outlines the schedule for this stakeholder initiative below. The CAISO plans to seek CAISO board approval on phase one elements in this RA Enhancements initiative in March 2021, and phase two elements in ~~May and September 2021.~~ July and September 2021. This schedule has been modified from the last iteration to provide additional time to engage with stakeholders and the CPUC and to align the schedule with the upcoming Maximum Import

[3] California Public Utilities Code Section 380: http://leginfo.legislature.ca.gov/faces/codes_displayText.xhtml?lawCode=PUC&division=1.&title=&part=1.&chapter=2.3.&article=6.

Capability Enhancements initiative for the RA import topic and provide additional analysis to support UCAP and the UCAP-related topics.

Phase 1 ~~(Fall~~

March 2021~~ for RA year 2022)~~

~~March~~ Board of Governors

- Planned outage process enhancements – phase 1 (Applicable prior to Summer 2021)
- ~~RA Import requirements~~
- Operationalizing storage (Applicable prior to Summer 2021)
- Backstop capacity procurement – CPM for local energy sufficiency (Fall 2021 for RA year 2022)

Phase 2 (Fall 2022 for RA year 2023)

~~May Board of Governors (Phase 2A)~~

September 2021 Board of Governors (Phase 2A)

- Unforced capacity evaluations
- Determining system RA requirements
- System RA showings and sufficiency testing – individual assessments
- Must offer obligations and bid insertion modifications
- UCAP for local studies
- Backstop capacity procurement – CPM modifications and availability penalty structure for RMR resources

~~September Board of Governors (Phase 2B)~~

- Planned outage process enhancements – phase 2
- System RA showings and sufficiency testing - portfolio assessment
- Flexible resource adequacy

November 2021 Board of Governors (Phase 2B)

- RA Import requirements -The timeline for this element of the RA Enhancements initiative will be aligned with the upcoming Maximum Import Capability (MIC) Enhancements initiative.

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Table 1: Stakeholder Engagement Plan

Date	Milestone

Feb 17 2021	**Final Proposal – Phase 1**
Feb 23 2021	Stakeholder meeting on Final Proposal – Phase 1
Mar 9 2021	Stakeholder comments on Final Proposal
Mar 24 – 25 2021	**Present proposal on Phase 1 elements to CAISO Board**
Apr 2021	**Seventh Revised Straw Proposal - Phase 2A & B**
Apr 2021	Stakeholder meeting on Seventh Revised Straw Proposal Phase 2 A & B
Apr 2021	Stakeholder comments on Seventh Revised Straw Proposal – Phase 2 A & B
June 2021	**Draft Final Proposal – Phase 2A**
June 2021	Stakeholder Meeting on Draft Final Proposal – Phase 2A
June 2021	Stakeholder Comments on Draft Final Proposal – Phase 2A
Aug 2021	**Final Proposal – Phase 2A**
Aug 2021	Stakeholder meeting on Final Proposal – Phase 2A
Aug 2021	Stakeholder comments on Final Proposal
Sept 2021	**Present proposal on Phase 2A elements to CAISO Board**
Sept 2021	**Draft Final Proposal – Phase 2B**
Sept 2021	Stakeholder Meeting on Draft Final Proposal – Phase 2B
Oct 2021	**Final Proposal – Phase 2B**
Oct 2021	Stakeholder meeting on Final Proposal – Phase 2B
Oct 2021	Stakeholder comments on Final Proposal
Nov 2021	**Present proposal on Phase 2B elements to CAISO Board**

5. RA Enhancements ~~Draft~~ Final Proposal – Phase 1

The following sections detail the CAISO's ~~draft~~ final proposal on Phase 1 enhancements to the resource adequacy program and provide the CAISO's rationale and supporting justification. The CAISO has organized the ~~draft~~ final proposal into sections covering System ~~and Local~~ RA and related sub topics, and a section covering proposed modifications to the CAISO's backstop procurement provisions. ~~For elements still in the straw proposal phase, see section 6 and 7.~~

The RA Enhancements ~~Draft~~ Final Proposal – Phase 1 covers the following topics. This list also includes a summary of major changes from previous proposals:

- System Resource Adequacy
  - Planned Outage Process Enhancements
    - Modifications – ~~Phase one will require substitute capacity for all planned outages. Phase two will implement a~~ Provides additional detail on planned outage substitution requirements.
  - Operationalizing Storage Resources
    - Modifications – ~~Modified~~States MSOC is a temporary solution with sunset date and commitment of new stakeholder initiative to develop storage enhancements to replace MSOC. Finalizes under what conditions the CAISO will impose the minimum charge requirement~~.~~ on RA storage devices.
- Backstop Capacity Procurement Provisions
  - Capacity Procurement Mechanism Modifications
    - Modifications – ~~Only seeking new CPM authority for~~Provides additional detail on information in the local capacity technical studies that inform local energy sufficiency ~~test. Other CPM and RMR proposals included in sixth revised straw proposal.~~evaluation.

5.1 System Resource Adequacy

5.1.1 Planned Outage Process Enhancements

The CAISO ~~considered modifying~~is proposing to modify its planned outage provisions ~~to correspond with the proposed modifications to its RA counting rules and assessments~~. The CAISO describes proposed changes to its planned outage provisions in the following section and provides relevant background on the current provisions.

Proposed Changes from the Previous Version

The CAISO has made several modifications and clarifications from the draft final proposal. Specifically, the CAISO has provided specific responses to stakeholder objections to the planned outage substitution requirement. Additionally, the CAISO has made the additional clarifications:

- The planned and forced outage definitions are the same as those currently used today;

- It will not propose grandfathering of conditionally approved planned outages or allowance for partial substitution;
- Substitution is the obligation of the resource SC (not the LSE showing the resource), will be required only for the MWs on outage and must come from a specified resource(s) ID(s), not the whole resources;
- The proposal applies to all months, starting Summer 2021, and sunsetting once the long-term solution is in place.

Stakeholder feedback

In the fourth revised straw proposal, the CAISO put forward two new planned outage processes based on stakeholder proposals[4] to facilitate outage coordination and provide the greatest certainty regarding the timing of planned outages to both the CAISO and resource SCs. Option 1 established a planned outage reserve margin for off-peak months. Option 2 established a replacement marketplace conducted by the CAISO. Stakeholder feedback on these options was generally divided between the two options.

Many stakeholders, including SCE, Calpine, MRP, CalCCA, and Wellhead offer some level of support for Option 1.[5] The basis for support includes the simplicity offered by Option 1, the fact that this option improves capacity price transparency by removing any embedded costs to cover planned outage replacement, and that Option 1 eliminates any incentive to withhold excess capacity from the bilateral capacity market. Alternatively, SDG&E, CPUC staff, DMM, and Public Advocates Office offered some level of support for Option 2. In their view, Option 2 applies more direct cost causation ~~to~~for the resources taking the planned outages and offers more of a market based solution.

In the fifth revised straw proposal, the CAISO proposed to develop a planned outage reserve margin. The stakeholder community was split on this matter. On an initial review, the CAISO determined that this division was indicative of general lack of support for the planned outage reserve margin. As a result, the CAISO, in the September 17, 2020 working group meeting foreclosed this option, instead focusing on rules that require substitution for all RA resources. In comments on the workgroup, several stakeholders' clarified their comments to note that their opposition to the planned outage reserve margin was based, in part, on the CAISO's proposed prohibition on planned outages during the summer months.

Based on the CAISO research and overall stakeholder feedback, the CAISO proposed a two-phase approach to planned outage substitution in the Draft Final Proposal. First, the CAISO proposes to implement an immediate requirement for summer 2021 that all planned outages for RA resources must bring full substitute capacity for the outage to be approved. In a second phase, the CAISO will consider a longer-term proposal for a planned outage resource pool

[4] In addition to these two proposals, the CAISO also explored numerous other options in prior straw proposals. However, given stakeholder feedback, the CAISO is currently only evaluating the two most recent options.
[5] SCE did not oppose the CAISO proposal, but had questions regarding the definition of a planned outage.

concept effective starting with RA year 2023. Also, in response to some stakeholders' concerns, the CAISO will explore the possibility of allowing planned outages during the summer months, when and if operationally appropriate in phase two of this initiative.[6] The details of the CAISO's phase one proposed process changes are provided below.

With the a few exceptions, including CPUC staff, Wellhead, and LS Power, stakeholders generally opposed the CAISO's planned outage substitution requirement. The basis for these objections fell into four general headings:

1) There is sufficient excess non-RA capacity and substitution is not needed
2) There is no substitute capacity available
3) Requiring planned outage substitution incentivizes capacity withholding
4) The proposal will not incrementally improve reliability

There were minor objections/preferences with respect to the CAISO's proposed treatment of planned outage extension requests, but virtually all those objections stemmed from the same arguments as the proposed replacement obligation.

Some stakeholders sought additional clarity. Requests for clarity include questions about what entity is responsible for showing the substitute capacity and when that information must be submitted. Additionally, CDWR asks the CAISO if the substitution obligation is for 100 percent of the planned outage or if there is room for partial substitution. This additional clarity is provided in the body of the CAISO's proposal.

In response to stakeholder comments, the CAISO does not believe that the presence of non-RA capacity or the lack of substitute capacity should relieve an RA resource of its obligation to be available to the CAISO. To the contrary, to avoid leaning on and/or over-reliance on non-RA capacity, and potential CPM designations, an RA resource should provide substitute capacity when it takes a planned outage. The planning reserve margin is 15 percent above 1-in-2 forecasted peak load for all months,[7] and the current planning reserve margin does not account for capacity unavailable due to planned outages. To ensure there is sufficient capacity available to maintain adequate RA capacity in each month, substitution is necessary.

Additionally, if there is another resource available when an RA resource wants to take a planned outage, then that resource should be the one shown for RA or at least compensated for stepping in for another resource. Ultimately, providing RA is a commitment to be available to the CAISO. If a resource is unable to do so, it should have an obligation to find another resource that will, or not be shown as RA in that month. If, as many stakeholders have pointed out, there is abundant capacity available during off-peak months, then finding substitute capacity should be fairly straightforward and relatively inexpensive. Similarly, the lack of

[6] Details regarding other options the CAISO considered, including the CAISO creating a planned outage replacement market, and the reasons the CAISO is no longer considering those options are contained in prior straw proposals.
[7] Other ISO's allow for RA resources to take planned outage in off-peak months without substitution requirements because there is excess RA capacity relative to forecasted needs due to the seasonal or annual nature of those RA programs.

available substitute capacity suggests that the resource's SC either submitted the request after other resources had submitted planned outages or that forecasted load conditions dictate that the resource is needed and should try to schedule the outage at a different time. As California learned in August and September 2020, demand can change significantly between the current POSO assessment window and actual operations. Other ISO's hold to a similar principle for RA resources during peak load months. For example PJM prohibits planned outages for RA resources during peak months to ensure adequate RA capacity is always available.

The CAISO understands that both POSO and RAAIM create incentives to hold capacity out of the bilateral capacity market to mitigate potential penalties and denied planned outages. As noted in the "Objectives and Principles" section below, the CAISO's ultimate policy goal is to eliminate bad incentives. However, in the interest of immediate reliability needs, the CAISO must balance these incentives against the probability that a planned outage without substitute capacity could leave the CAISO with insufficient capacity. At this time, and on balance, the CAISO believes that ensuring adequate RA capacity is always available outweighs any potential more incremental withholding beyond that which already exists. However, the CAISO will continue developing the long term solution as part of Phase two of this stakeholder process that will eliminate these incentives.

Finally, some stakeholders have asserted that the CAISO's proposal will not provide any incremental reliability benefit for the summer of 2021. The CAISO disagrees. Even though some of the outages for summer 2021 have been requested and conditionally approved, the POSO process has not taken place. The CAISO's proposal provides significant clarity to those resources wanting to take planned outages that they should line up substitute capacity now or consider rescheduling those outages. The CAISO, through this proposal, is signaling to these resources that they now know that substitute capacity will be needed. Instead of 20 days of notice, the CAISO is providing several months of notice to find substitute capacity.

In addition to considering stakeholder feedback, the CAISO looked to other ISOs/RTOs for guidance on how they have approached this issue. Based on the CAISO's review of other ~~ISO~~ISOs/RTOs, CAISO is uniquely situated. More specifically, the CAISO's planned outage options are constrained by the monthly nature of the RA program. All other ISOs/RTOs conduct RA procurement annually, with some having seasonal differentiation. Additionally, other ~~ISO~~ISOs/RTOs can require up to two years of notice for planned outages. This allows the ~~ISO~~ISOs/RTOs to include those planned outages in its LOLE studies when conducting annual capacity procurement. Because other LSEs have much greater visibility into the RA obligations of resources, the planned outage procedures are much cleaner. In contrast, the CAISO does not know which resources will be RA resources until 45 days prior to the RA compliance month. This timeline creates a complicated overlap between the CAISO's planned outage and RA processes. To the greatest extent possible, the CAISO will attempt to mitigate this overlap.

~~Based on the CAISO research and stakeholder feedback, the CAISO proposes a two-phase approach to planned outage substitution. First, the CAISO proposes to implement an immediate requirement for summer 2021 that all planned outages for RA resources must bring full substitute capacity for the outage to be approved. In a second phase, the CAISO will vet in~~

~~subsequent revised straw proposals, a longer-term proposal for a planned outage resource pool concept effective for RA year 2023 and beyond. Also, in response to some stakeholder's concern's, the CAISO will explore the possibility of allowing planned outages during the summer months, when and if operationally appropriate.[8] The details of the CAISO's proposed process are provided below.~~

Stakeholders continue to comment on the CAISO's view that, depending on circumstances, a generator can violate the tariff if it submits a forced outage after the CAISO has already rejected the same outage previously submitted as a maintenance outage. This topic of "planned-to-forced" outage reporting has been the subject of even more attention given the recent appeal to the CAISO executive appeals committee of a CAISO revision to the business practice manual for outage management.[9] The committee's decision directed staff to consider the following as expeditiously as practicable:

> What amendments are necessary in the outage reporting sections of the ISO tariff to further clarify when planned-to-forced outage reporting is prohibited and when it is permitted. Such amendments to consider include, but are not limited to, amendments to the definitions of planned and forced outages, as appropriate. This process also should consider resolving any other potential ambiguities in section 9 of the tariff, as well as consideration of further illumination of the factors used in determining whether to approve or reject a planned outage, whether in the tariff or BPM, as appropriate.[10]

As a result of stakeholder feedback and the appeals committee's decision, the CAISO will address the planned-to-forced outage reporting issue within this RA Enhancements stakeholder process. Specifically, the outage definitions proposed in section ~~6.1.1~~6.1.1 of the Sixth Revised Straw Proposal for Phase 2 will clarify the planned and forced outage definitions and a properly designed UCAP construct will likely eliminate the incentive for market participants to engage in problematic planned-to-forced outage reporting, which in turn, may influence the relevant outage reporting tariff provisions.[11] Due to the relationship between outage reporting and the rest of the RA Enhancements proposal, it is most appropriate to address this issue within this initiative in Phase 2 under the UCAP proposal.

~~[8] Details regarding other options the CAISO considered, including the CAISO creating a planned outage replacement market, and the reasons the CAISO is no longer considering those options are contained in prior straw proposals.~~

[9] Details of that appeal, which related to proposed revision request 1122, are available at: http://www.caiso.com/Pages/documentsbygroup.aspx?GroupID=D8E40756-EA62-4851-B528-3F2D6DD04728

[10] http://www.caiso.com/Documents/ExecutiveAppealsCommitteeDecision-PRR1122-Mar112020.pdf

[11] http://www.caiso.com/InitiativeDocuments/DraftFinalProposal-SixthRevisedStrawProposal-ResourceAdequacyEnhancements.pdf

Background

The CAISO's Planned Outage Substitution Obligation (POSO) process is codified in CAISO tariff sections 9.3.1.3 and 40.9.3.6 and the Outage Management BPM.[12] RA resources currently enter planned outages into the CAISO Outage Management System (OMS). The CAISO's Customer Interface for Resource Adequacy (CIRA) system runs a daily POSO report and determines the planned outage substitution need. The POSO process is currently conducted on a first-in, last-out basis.[13] Therefore, resources submitting planned outages earliest will have the greatest likelihood of taking their planned outages without substitution requirements. The POSO process compares the total amount of operational RA capacity to the total system RA requirement.

As noted previously, LRAs establish system RA requirements based upon CEC monthly peak forecasts, which are updated 60 days prior to the start of each delivery month. If, after removing all planned outages, available capacity is less than the RA requirement, the CAISO assigns substitution obligations for resources seeking to take planned outages.

Objectives and Principles

The CAISO lists the following objectives and principles that inform changes to its planned outage provisions. Modifications to the CAISO planned outage provisions should:

- Encourage resource owners to enter outages as early as possible
- Avoid cancellation of any approved planned outages to the extent possible
- Identify specific replacement requirements for resources requiring replacement
- Allow owners to self-select, or self-provide, replacement capacity
- Include development of a CAISO system for procuring replacement capacity
- Minimize or eliminate the need to require substitute capacity to greatest extent possible

Current Planned Outage Substitution Obligation Timeline

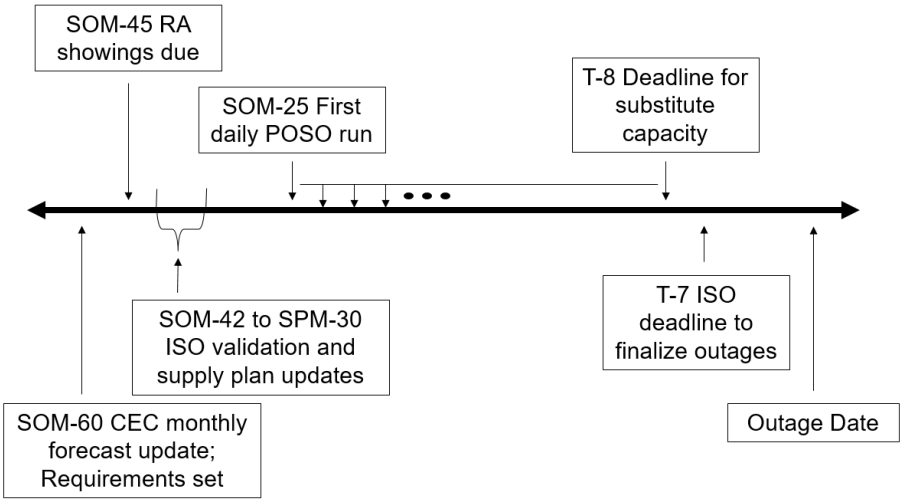
The current POSO timeline is provided in Figure 1 below. The current timeline provides the first POSO assessment at T-22, or 22 days prior to the start of the RA delivery month, for all outages submitted prior to T-25. This is the first instance when resource owners are provided with indication of any POSO replacement obligations. Resource owners are allowed to provide

[12] Outage management BPM: https://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Outage%20Management

[13] CAISO will first request the resource providing RA Capacity with the most-recently-requested outage for that day to provide RA Substitute Capacity and then will continue to assign substitution opportunities until the ISO has sufficient operational RA Capacity to meet the system RA requirement for that particular day.

replacement capacity through the T-8 timeframe, and the CAISO finalizes replacements and outages at T-7.

Figure 1: Current POSO timeline



Proposed Modifications to the Planned Outage Process

Based on recent events and stakeholder comments, the CAISO is proposing a two-phase process to enhance its planned outage process. The immediate phase 1 provisions will be applicable for summer 2021 through RA year 2022, and the longer-term phase 2 enhancements will be applicable for RA year 2023 and beyond. The goal in both phases is to ensure planned outages can be taken with minimal cancellation risk after the CAISO initially approves them. Additionally, the CAISO's ultimate goal is to remove obligations for outage replacement, and the associated negative incentives, to the greatest extent possible. The CAISO proposes to redesign the planned outage process in phase 2 to reflect the proposed system UCAP/NQC targets. This proposed change will better align with the counting rules and RA assessments proposal to incorporate forced outage rates in capacity valuation and assess resource adequacy on a UCAP basis.

The first phase of the CAISO's proposed planned outage process would require all RA resources requesting planned outages to provide substitute capacity. This stage is designed to be very focused and easily implemented for summer 2021 and is included in the ~~draft~~ final proposal. The goal is to implement this policy promptly, to reduce reliability risks during ~~future~~the upcoming summer and all other months until phase 2 is implemented.

The second phase of this process will continue to be vetted in revised straw proposals. In the second phase, the CAISO will continue to work with stakeholders to develop a planned outage

pool. The CAISO is targeting RA year 2023 to implement this "planned outage capacity pool" concept.

Phase one: Planned Outage Replacement Requirement – Summer 2021

As noted above, the current planned outage process allows RA resources to submit planned outage requests months in advance, but the CAISO does not provide its notification regarding the need for the resource to provide substitute capacity until 20 days prior to the month. During the time between the planned outage request and the CAISO's study, the resource does not know if substitution will be required. Though infrequent, the result of this process can be that a resource is required but unable to provide substitute capacity. The CAISO analyzed denied planned outages and found approved planned outages are subsequently denied less than two percent of the time. All subsequently denied planned outages were due to failure to provide substitute capacity.

~~In phase one, the CAISO's proposes to eliminate this uncertainty by requiring all RA resources requesting planned outages to submit substitute capacity.~~ In phase one, the CAISO's proposes to require all RA resources requesting planned outages to submit substitute capacity for the portion of the resource on planned outage. This requirement will be in place for all months and will sunset upon implementation of the long-term solution outlined for phase 2 of this stakeholder process. Reliability Must Run (RMR) resources under contract for 2021 will be subject to the new planned outage substitution rules like RA resources.

All resources must provide a quantity of substitute capacity equal to the amount of RA capacity that would be on outage because of the planned outage request.[14] Resources taking outages due to transmission outages and off-peak opportunity outages are exempt for this replacement obligation. The substitution must come from a specified resource ID or IDs for a given day. However, the substitution need not come from the same resource(s) for every day of the requested outage. As an example, the substitution for a two week outage can come from Resource A for the first week and Resource B for the second. Once a resource has been shown as substitute RA capacity, it will be subject to all of the same obligations as any other RA resources. This includes both planned and forced outage substitution requirements. However, if the planned outage is cancelled, the resource providing substitute capacity can be relieved of all RA-based obligations (i.e. the existing rules for cancelled planned outages still apply). The substitution will be made into CIRA by the SC for the resource taking the planned outage and will not impact the LSE SC's RA showing. LSEs with a resource taking a planned outage are not required to provide additional reporting beyond their RA showings. All obligations for substitution are on the resource SC.

The specific timing of the substitute capacity submission depends on the timing of the planned outage request relative to the RA showings. ~~Outages~~Planned outages conditionally approved ~~in long and mid-range outage windows, which occur~~ prior to RA showings, will be conditionally

[14] The CAISO considered allowing less than 100 percent, but allowing for a range would degrade the RA showing and would be counter to the overall objective of the policy.

approved subject to RA status and substitution obligation.[15] The substitution must be made at the time of the RA showing or the CAISO will automatically deny the planned outage request. Even if the resource provides substitute capacity, the outage may still be denied if the CAISO's reliability assessment shows that the requesting resource is uniquely needed for reliability. ~~Outages requested in the mid- or short-range window~~Planned outage requests made after RA showings have been made must provide substitute capacity at the time the outage request is submitted, otherwise, the CAISO will automatically deny the outage. ~~As with the long and mid-range requests, short range outage may still be denied subject to a reliability assessment. All outage requests submitted after the short range study window submission deadline will be treated as forced, urgent,~~As with the requests made prior to the RA showings, these outage may still be denied subject to a reliability assessment. Some stakeholders requested that the CAISO provide some form of grandfathering provisions for outages that have already been conditionally approved, such that that replacement obligation would not apply. However, as these outage requests are conditionally approved subject to the POSO process, which has not yet been run for any of months for which this policy would be effective. Grandfathering resources would require the CAISO to maintain both the new and existing processes. This has the potential for causing unnecessary confusion to the planned outage process. Instead the CAISO's proposed process simply clarifies that the substitute capacity is required, which may have been the outcome of the current POSO process anyhow. Therefore, the CAISO believes there is no need for any grandfathering provisions at this time. All outage requests submitted after eight days prior to the outage will be treated as forced or opportunity outages.

The CAISO also proposes changes to how it handles requests for extending planned outages. Currently resources on planned outages that request an outage be extended are typically granted. The basis for this is that denying the outage does not change the fact that the resource will still be on outage. However, this practice does not ~~require~~accurately reflect the fact that the new extension needs to be restudied for reliability and reevaluated for substitution ~~or~~just like a new outage. Operators and engineers need time to study such changes and submitting them as new outages would provide ~~adequate incentives to accelerate completion of the maintenance~~clarity and consistency to that timeline.

The CAISO proposes that the following objectives must be achieved by the proposed policy changes:

- Objective 1: Classify planned/forced outage correctly because this classification gets posted publicly
- Objective 2: Encourage SCs to replace RA when they can still replace the RA Capacity

The CAISO reviewed two different planned outage scenarios to illustrate the potential outcomes of different requests to extend planned outages based on various options for addressing these requests.

[15] The outage definitions have been modified from the Draft Final Proposal to mirror the current planned and forced outage definitions.

Example: Resource 1 has a planned outage that is scheduled for 3 weeks.

> **Scenario 1**: Once the outage starts, on the beginning of that outage the SC identified that they cannot return the plant and will need extension of that outage for another 4 weeks.
>
> **Scenario 2**: The outage starts as well, however, in the last day of the outage, the SC identified that they cannot return the plant and will need extension of that outage for another 4 weeks.

To address the requested outage extensions, the CAISO considered three different options:

Option 1: Do not allow outage card extension – Require SC to always create a new outage card for extension

Consequence for Scenario 1:

- That outage extension will be classified as planned outage because they notify the CAISO ahead of time (beyond short term window)
- That outage will have an RA substitution obligation
- That outage extension will be denied if RA substitution is not provided
- There is no guarantee that SC will submit Forced outage card on-time for the CAISO's pre-day ahead processes – This will give this back to Real Time

Consequence for Scenario 2:

- That outage extension will be classified as Forced outage because they tell the CAISO at the last minute
- That outage will have an RA substitution obligation

Option 2: Do allow outage card extension (status quo)

Consequence for both Scenario 1 and 2:

- That outage extension will be classified as planned outage because the original card is a "Planned outage"
- That outage will have a substitution obligation
- That outage extension cannot be denied if RA substitution is not provided because it is one outage card

Option 3: Do allow outage card extension – But extensions are only allowed if they provide substitution

- OMS will check if the units are shown as RA

- If the units are shown as RA, it will only allow the outage extension if there is substitution
- The mechanics of this are still not certain because an outage can extend beyond the RA showing time frame.
    - i.e. SC can extend an outage for 4 weeks and it ended up extending to a month that has no RA showing timeline deadline yet.

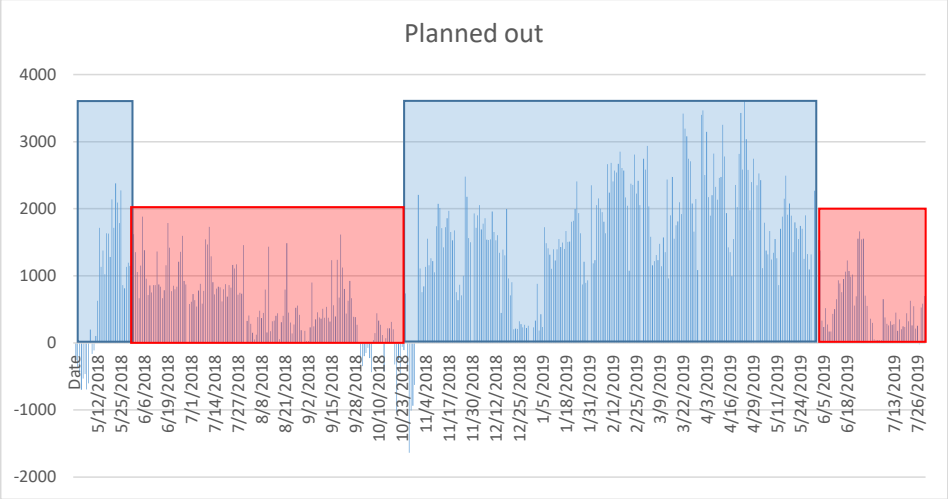
~~At this time, the~~The CAISO proposes Option 1. This option is consistent with the rest of the CAISO's proposal to require substitution and provides the CAISO and resources with clear rules regarding how extensions will be handled and ensure the CAISO has adequate capacity to maintain reliability when resources cannot return to service consistent the originally approved outage.

~~*Phase two: Planned Outage Replacement Pool – RA Year 2023 and Beyond*~~

~~Phase two of the CAISO's efforts to improve the outage replacement process will focus on improving transparency and ensuring a pool of resources is available to provide substitute capacity. Additionally, the CAISO will seek to reduce any incentives to withhold capacity. To facilitate outage coordination and provide the greatest certainty regarding the timing of planned outages to both the CAISO and resource SCs, the CAISO will develop a planned outage replacement pool. Although the CAISO originally proposed to establish a pool only for non-summer months, in response to stakeholder comments, the CAISO will explore opportunities to develop a planned outage pool for summer months as well. The most significant challenge for developing a summer planned outage pool will be finding sufficient non-RA capacity to participate in the pool.~~

~~As can be seen from Figure 2 below, the vast majority of planned outages occur during off-peak months. Additionally, the off-peak months also provide the greatest opportunity to procure low cost capacity to ensure adequate capacity is available to the CAISO.~~

~~**Figure 2: Approved Planned Outages (Both with and Without Substitution)**~~[16]



~~The CAISO will continue developing this planned outage pool proposal in a future revised straw proposal, and will use many of the elements of the planned outage reserve margin provided in the fifth revised straw proposal as a starting point for this proposal. There are several potential benefits to load from developing a planned outage resource pool. First, the CAISO can eliminate all planned outage substitution. This removes both the incentive for LSEs to withhold capacity from the market to provide substitute capacity and the need for resources to include a risk premium in capacity contracts to cover any potential costs of replacement capacity. As a result, the supply of capacity in the bilateral market should increase and hidden costs included in the contracts should decrease. Instead, all excess capacity should be more readily available for sale in the bilateral capacity market, maximizing LSEs' opportunities to find capacity when needed at a lower price. These benefits can be captured in both peak and off-peak months. Under the existing rules, substitution may be required in all months. Eliminating substitution rules in their entirety should free up additional capacity during summer months, increasing overall supply and lowering costs.~~

~~In its phase 2 proposal, the CAISO seeks to offer greater visibility into how much resource adequacy capacity is shown relative to the resource adequacy requirements. The goal is to provide resources greater transparency regarding available capacity well in advance of when they plan their outages. Specifically, CAISO will develop a calendar that shows in advance and on a daily basis, the potential availability of additional system RA headroom or capacity in the planned outage pool. This transparency should allow resources to identify potentially superior calendar dates in advance of requesting planned outages. If the calendar shows no available~~

[16] ~~Observations with negative values represent days when the quantity of substitute capacity exceed the quantity on approved planned outage.~~

~~headroom, then any RA resource requesting a planned outage will be required to show substitute capacity.~~

~~The CAISO will approve and deny outages through the planned outage tool discussed above. The CAISO will continue to evaluate and accept outages and substitute capacity[17] and adjust the outage calendar on a first-in, last-out basis. Thus, resources submitting outage requests will be assessed first, making it less likely the CAISO will deny their outage request.~~

~~Figure 3 demonstrates the conceptual planned outage outlook calendar. The CAISO proposes to publish this type of calendar including daily MW values for UCAP headroom in excess of system RA requirements. The specific content of this calendar will ultimately be driven by the structure of the planned outage resource pool.~~

~~Figure 3: Example substitution availability calendar~~

2 Headroom: 25 MW	3 Headroom: 205 MW	4 Headroom: - MW	5 Headroom: - MW	6 Headroom: - MW	7 Headroom: 350 MW	8 Headroom: 7 MW
9 Headroom: 30 MW	10 Headroom: 712 MW	11 Headroom: 145 MW	12 Headroom: 320 MW	13 Headroom: 200 MW	14 Headroom: - MW	15 Headroom: - MW

Opportunity Outages

The CAISO currently allows both short-term opportunity and off-peak outages. The CAISO proposes to maintain both of these options as opportunity outages~~ described in section 6.1.1, regardless of which planned outage option is ultimately selected. Further, as noted in section 6.1.4, the CAISO is proposing to modify the RA must offer obligation after the end of the transition period proposed in the day-ahead market enhancements. After this transition, with limited exceptions, if resources do not receive any day-ahead awards, the resource will be eligible to take a single day opportunity outage. These opportunity outages may be requested after the day-ahead market closes and are subject to CAISO review and approval. If approved, no replacement capacity is required for these outages. However, because no replacement is required, these outages are only permitted for a single day and resources must participate in the subsequent day-ahead market.~~.

~~[17] The CAISO will consider the ability of substitute capacity to provide "like-for-like" capabilities.~~

5.1.2 Operationalizing Storage Resources

The CAISO has a rapidly growing number of storage resources operating on the grid today. This trend will continue over several more years in response to replacement capacity needed to allow gas and nuclear facilities to retire. Storage resources are different from other resources in that they do not produce energy, and they must first charge from the grid to discharge and provide energy back to the grid later. The CAISO's current real-time 5-minute market looks ahead 65 minutes, but most storage resources take several hours to fully charge. Further, this short time horizon does not allow market runs, when prices are lowest and energy availability is greatest ~~the ability,~~ to account for the most stressed system market conditions that will occur during the evening net-load peak. This timing discontinuity means that the real-time market does not allow sufficient lead-time to optimize the use of storage resources over full charge and discharge cycles.[18] Thus, being unable to charge a storage resource for anticipated future discharge needs can create reliability issues for the CAISO.

Since storage resources can qualify as resource adequacy resources, it is important that the CAISO can access and confidently rely on sustainable energy output from shown resource adequacy storage devices in the real-time market to ensure reliable operations. In this initiative, the CAISO has proposed a framework that will give the CAISO this confidence. This framework includes using resource adequacy must offer obligations outlined in this paper, market power mitigation, combined with restrictions on state of charge managed through a new tool called the minimum state of charge requirement.[19]

Figure 2: Market rules for storage resources

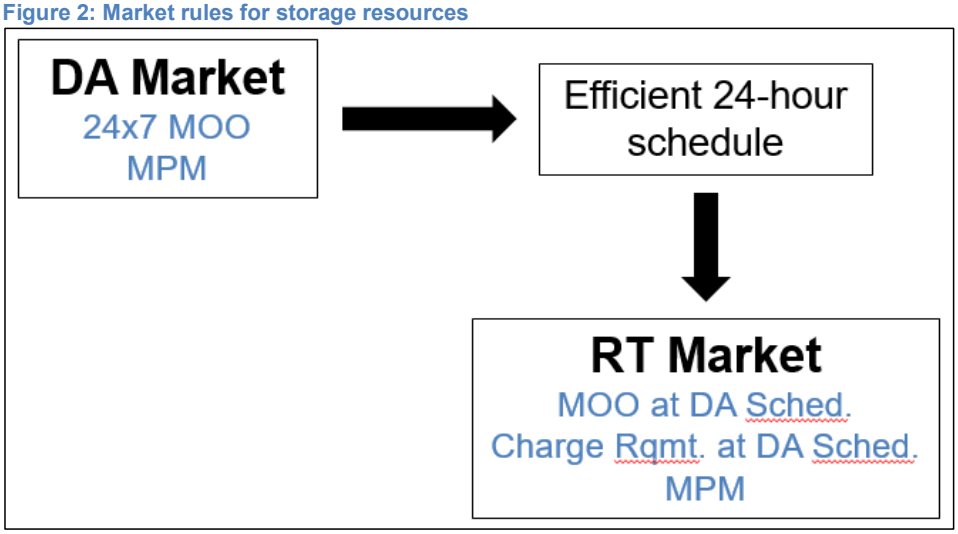


Figure ~~13~~2 is a sketch of the rules that will apply to shown resource adequacy storage resources and how the CAISO will ensure that the storage resources are charged and available in the real-time market for grid reliability. Like most resource adequacy resources, storage

resources have a 24x7 must offer obligation in the day-ahead market. The resource adequacy program is designed to ensure that loads can always be met with the resource adequacy fleet in the day-ahead market. On peak summer days, this will likely include charging most of the resource adequacy storage fleet during the peak solar hours and discharging these resources during the evening hours ~~during~~over the evening ramp and net load peak. The day-ahead market optimizes over a 24-hour period, and will optimally schedule all resources on the grid to ensure a least cost solution to address market needs given market constraints. As described in this paper, the must offer obligation is a necessary feature so that the market software can derive a least cost solution given the bid-in resources available to meet load. For storage resources, this includes bidding both the charging or discharging components of their resource, and not restricting CAISO from charging and discharging ~~their~~the battery (i.e. allowing the market software to freely adjust the state of charge based on submitted bids). The CAISO also ensures that the market solution is least-cost and includes measures that preclude resources, including storage resources, from exercising market power during intervals when they are marginal and could exercise market power.

The real-time market optimization is fundamentally different than the day-ahead market, primarily in that the real-time market only looks out 65 minutes in advance of the current interval versus the day-ahead market optimizing over 24 hour period. This could lead to a number of inconsistencies between the day-market and real-time market results when optimizing resources like batteries that have ~~fuel~~energy availability constraints. For example, real-time prices during the lowest priced hours of the day may materialize at higher prices than in the day-ahead market and may result in storage resources not being charged. Another situation that could result in inconsistencies ~~could be~~is high prices prior to the peak net-load hours causing the real-time market to discharge the limited energy available from storage earlier than anticipated. These situations can occur on the CAISO system today given ramping needs spike as solar generation wanes toward sunset. These high prices could cause storage resources to be discharged prior to the peak net-load period, when these resources are critical for the CAISO to meet system needs.

The solution to the day-ahead market results in charge and discharge schedules for storage resources and supply that meets load requirements over a 24-hour period. However, those day-ahead commitments are not immutable and can be adjusted and undone by the real-time market optimization, because the real-time market is sending dispatch instructions to resources based on prevailing market prices and resource bids and does not consider day-ahead schedules. To address this issue, the CAISO proposes that a minimum state of charge be observed in the real-time market, called a minimum state of charge requirement. This minimum state of charge requirement will set the minimum state of charge needed to preserve the amount of energy that the shown resource adequacy battery was scheduled to discharge in the day-ahead market solution. This will result in a storage resource shown for resource adequacy

[18] Nearly all of the storage resources in the fleet today are 4-hour duration batteries. This means that fully charged resources can discharge in 4-hours, and take just over 4 hours to charge due to round-trip efficiencies.
[19] Market power mitigation for storage resources is a proposal in the ESDER 4 initiative: http://www.caiso.com/StakeholderProcesses/Energy-storage-and-distributed-energy-resources.

to always have state of charge to achieve the day-ahead discharge schedule. This will aid grid reliability because day-ahead schedules may have storage online and charged to meet load that must be served by storage resources. This is an essential resource adequacy market enhancement that will allow the CAISO to operate the system reliably with a ~~fast~~rapidly growing fleet of use and energy-limited resource adequacy qualifying storage devices.

In the future, the CAISO ~~may~~will look at other market enhancements to address this concern and allow for additional real-time market participation flexibility, noting that shown resource adequacy battery storage devices will still have flexibility under this proposal to re-bid in real-time any capacity not ~~already~~ committed in the day-ahead market.

~~*Stakeholder Feedback*~~

~~Some stakeholders raised concerns about the minimum state of charge requirement (MCR) tool and presented other potential options to address this reliability need in the real-time market. One alternate proposal would be to extend the look ahead in the real-time market to include the net-load period and other periods when storage resources are critical for grid reliability. Another would be to develop a tool similar to short-term unit commitment (STUC) to look ahead and assign minimum state of charge values to storage resources based on expected needs. Today, the real-time market solutions are time and computationally intensive, and forecast accuracy degrades over longer time horizons, jeopardizing the operational integrity and dispatch efficiency of the real-time market. Thus, this solution is technically and operationally infeasible at this time, but the CAISO will continue to consider how greater flexibility can be provided in the real-time market in the future as technology and forecasting techniques progress. CAISO also acknowledges that a tool in the real-time market, similar to the short term unit commitment tool, could also be used to set minimum charge requirements. These minimum requirements may be a better basis for decision making and could be done regularly throughout the day with more accurate load and renewable forecast data available. Although this technology may seem similar to existing tools the CAISO has, it would still need to look out several hours to view the entire evening peak, and would need to interface with nearly all of the real-time market systems. Implementing such a feature is non-trivial, but the CAISO may consider such tools and methods in the future.~~

~~Finally, stakeholders also requested that the CAISO develop a tool more similar to an exceptional dispatch tool, which would only dispatch storage resources to charge during critical periods when it was absolutely essential. Certain stakeholders advocated for this approach as it would have less impact than the proposed minimum state of charge requirement for each individual resource throughout the day. Such an approach may be possible to manage storage resources and ensure the grid is situated to meet evening peak net-load periods, however there are several challenges to implementing an exceptional dispatch solution. First, like the solution discussed previously, this would also require that either the real-time market or a tool running in parallel with the real-time market be developed with the capability to look out and forecast with accuracy several hours in advance. This tool would likely require at least an eight hour look ahead function to include the full evening peak, particularly any hours when net load exceeds traditional generation, plus additional hours to allow time to charge a battery prior to the peak and the critical ramping period when additional generation is available. Finally, such a tool~~

would need to be run each 5-minute interval or set lower threshold of state of charge threshold applied each interval for the resource, so that the real-time market does not 'undo' the instructions sent to the storage resources from this new tool. Development of a tool like this would be difficult and possibly as computationally burdensome as expanding the real-time market look out horizon. This tool could also significantly increase bid cost recovery, as storage resources would generally be procured in the most expensive periods at times when they could be far out of the money. Possibly the most serious concern is around reliability. In the event that this tool does not perform perfectly, it may allow a situation where CAISO is unable to serve load because a battery cannot be charged sufficiently prior to periods of need. Furthermore, running a market with frequent exceptional dispatch is not preferable as it could result in more market inefficiencies and increased burden during tight ramp or system conditions.

Stakeholders also asked about additional compensation for storage resources for providing a 'state of charge' or 'potential energy' service. The ISO does not necessarily disagree with these arguments and asks that entities building or contracting for storage consider these costs when negotiating resource adequacy compensation. One topic discussed in the ESDER 4 initiative was to consider implementing a market product for such a service, however, this was not developed further during that policy. The ISO may consider such a product for local and system use in the future.

Settlement rules for the minimum state of charge requirement would be consistent with other settlement rules that the ISO has in place today. If a storage resource is charged on a schedule per the ISO's dispatch (including the minimum charge requirement) and the actual costs are above bids, this resource will remain eligible for bid cost recovery for the day. The ISO believes that negative revenues resulting in bid cost recovery payments will likely be infrequent, as the minimum state of charge requirement will charge resources during the lowest cost periods of the day or in the same hours that they were economically scheduled to charge in the day-ahead market.

Proposed Changes from the Previous Version

To address stakeholder comments, the ISO proposes several changes from the previous proposal. First, the ISO proposes to not impose the minimum state of charge requirement every day, but rather only on days when there is specific need. The ISO proposes a test for review after the day-ahead market is complete comparing load and non-storage resource availability.[20] If non-storage resources are able to meet the 110% of the load, no constraint will be imposed. Otherwise, the ISO will plan to impose the minimum charge requirement, as storage resources may be needed to meet the evening peak load.

Second, the ISO intends to relax the requirement that a resource begin charging at the period in the day-ahead schedule when the resource has state of charge to meet discharge schedules. Instead the resource will be required to charge at the later of that time or the time when day-ahead prices are lowest at that resources location. This will prevent instances when a resource starts the day at a high state of charge in the day-ahead market, and is then precluded from

[20] The metric would include any resources committed through the residual unit commitment process.

~~participating in the real-time market until the discharge hour. Instead, the resource would only begin to have a minimum state of charge requirement imposed during the lowest priced hours of the day-ahead market.~~

~~Finally, the ISO also acknowledges that some storage may be dispatched to attain a certain state of charge to maintain reliability in a local area in the event of an N-1 or an N-1-1 contingency. The ISO intends to impose minimum state of charge requirements on these resources as well, to ensure reliability in local areas in the real-time market.~~

Proposed Changes from the Previous Version

To address stakeholder comments, the ISO proposes several changes from the previous proposal. First, the ISO acknowledges comments from stakeholders and recognizes that a market based solution is needed to procure energy from storage resources. At the same time it is essential that the ISO maintain grid reliability, and with the expected proliferation of storage, a tool is necessary for ensuring that resource adequacy storage resources are available with state of charge to meet evening net-loads. The ISO does not have sufficient time to deliver a market based solution, but agrees with the principle that this should be done through a market mechanism. The ISO therefore proposes the minimum state of charge (MSOC) requirement as a temporary solution to address this issue. The ISO that this tool would sunset two years after implementation. Further, the ISO commits to begin a new stakeholder initiative, called the energy storage enhancements initiative, to address concerns for procuring state of charge from storage resources. A primary goal of this new initiative will be to develop a market based solution to replace the minimum state of charge requirement prior to the proposed sunset date that would be available to all storage resources including those under resource adequacy requirements.

Second, the ISO flags the urgency of this tool as it expects potentially more than 1,800 MW of storage available on the system prior to the start of summer 2021. This large influx of storage will likely require that storage be used to address peak net-loads, and a tool to ensure that storage resources are available to meet those net loads. In light of this, the ISO proposes to implement the minimum state of charge tool prior to the peak summer months, instead of during the fall 2021 software release.

The ISO continues to suggest that the minimum state of charge requirement only be used on specific days and not applied to storage resources on all days. This proposal includes a final definition of the days that the ISO will trigger the minimum state of charge requirement based on infeasibilities in the residual unit commitment process. Using this metric, the ISO estimates that during a year with weather similar to 2018 or 2019, the tool would be used as rarely as a single day per year, while during a very hot year, like 2020, it may be triggered on around 23 days. Nearly all of the days the ISO anticipates triggering the minimum state of charge would be during the summer months, when daily net peak loads are highest.

Fourth, the ISO intends to only apply the requirement in the hours immediately prior to discharge schedules. This will mean that the requirement will be applied for the minimum

number of intervals possible and will not hold storage resources at very high state of charge values for prolonged periods of time.

Minimum Charge Requirement

The ISO proposes that the minimum state of charge requirement tool ~~would operate~~be implemented in the real-time market ~~and would set a required~~that sets a minimum threshold state of charge ~~such that~~for each resource adequacy storage resource ~~would have a minimum state of charge set at its cleared day-ahead schedule. This requirement would be imposed at the later time either when charging occurs based on day-ahead market awards or during the least cost periods hours in the day-ahead market that could sufficiently charge the storage resource to meet its~~with a day-ahead discharge award. ~~Several examples of the mechanics of this tool work were provided in the fifth revised straw proposal~~This requirement would be observed and maintained by the real-time market, which may optimally schedule storage resources to charge or hold state of charge to meet these requirements.

The ISO does not intend to impose the minimum state of charge requirement every day. ~~After the day-ahead market runs, the ISO will compare the total net-load period and the availability of all other non-storage resources to meet load. If the non-storage resources are able to meet 110% percent of net-load, then the minimum state of charge requirement will not be imposed on any storage resources. If, however the non-storage generation is unable to meet that target, then the ISO will~~ The ISO will only impose the minimum ~~online constraint during those days. The ISO chose to select~~ state of charge if the residual unit commitment (RUC) process results in an ~~additional 10% to account for some variability in forecasts from the day-ahead market to the real-time market and potential unavailability of resources between the two markets.~~

~~Storage resources may be charged specifically in the day-ahead market for local area reliability concerns.~~infeasibility. These ~~requirements are set by the ISO's operation engineering team on specific days when local~~infeasibilities are very infrequent and an indicator of tight system conditions~~ are particularly tight in local areas and generation~~. In 2018, there ~~is required to ensure reliability in the event of~~ was only a ~~contingency. If these imposed requirements result in charging storage resources in the day-ahead market, the minimum state of charge requirement will also maintain this state of charge~~ single day (July 25) when a residual unit commitment process infeasibility occurred, and only a single day in 2019 (June 7). There was very hot weather in 2020 and infeasibilities occurred during 23 days including: August 13-21, August 24, September 5-7, September 28-October 3, October 5, and October 14-16. Infeasibilities represent days when the system is stressed and there may be challenges meeting load in the real-time market.

~~The charge requirements will~~ The ISO noted in previous papers that storage could be ~~smoothed over~~ essential to operating the grid on days outside of the ones with the most critical needs. The minimum state of charge requirement does not cover all days, and there likely will be some days when storage (and state of charge from the storage fleet) is essential to ensuring the grid operates reliably. The ISO operators will continue to have access to exceptional dispatch tools, which may be applied to storage resources on these days to ensure state of charge availability if necessary.

The charge requirements will be implemented as targets for the end of the hour, ~~so they are achievable within~~ which the 5-minute ~~dispatch instructions.~~market will ensure through the optimization. For example, if the minimum state of charge requirement is ~~zero MWh in the prior hour and~~ 12 MWh for the current hour, say hour ending 12, then the ~~minimum~~ state of charge requirement for the ~~first five minute~~11:55-12:00 interval ~~would be one MWh, then two~~will 12 MWh for each time the ~~second~~optimization runs and includes this as an interval~~, increasing by one MWh with each successive interval and ending with a requirement of 12 MWh for the final 5-minute interval~~ within the binding or advisory time horizons.

~~It is important for resource owners to understand how~~Operators will have the ability to cancel the minimum state of charge in the real-time market. If real-time conditions are anticipated to be milder than day-ahead conditions, the ISO operations team will have the ability to cancel the minimum state of charge requirements. If the operators take this action, they will have the ability to do so at some point between 8:00am and 11:00am. ~~Further, should a real-time situation evolve while operations is evaluating the market between 8:00am and 11:00am where an hourly infeasibility is likely to occur later in the day – similar to what would have been projected by the residual unit commitment process – operators will have the ability to impose the minimum state of charge in the real-time market even when one was not triggered through the residual unit commitment process.~~

This minimum state of charge requirement will ~~work for bidding into the real-time market and state of charge management. This tool will~~ only stipulate a ~~minimum~~threshold state of charge that a resource needs to maintain based on day-ahead market discharge schedules. These minimums will be determined at the conclusion of the day-ahead market run process and will be known to scheduling coordinators in advance of the real-time market. Knowing these minimums and how actual state of charge values develop in the real-time market may encourage resource operators to adapt bids in the real-time market to increase state of charge for resources so that they have more availability to respond to unexpected high real-time market prices.

~~*RA Implications*~~

~~As discussed above, storage resources providing RA capacity are subject to a must offer obligation that includes~~ Minimum charge~~,~~ requirements will be calculated based on the discharge schedules and ~~energy bids. When storage resources do not make these available to the CAISO, because of outages,~~will be imposed on the ~~RA capacity value for~~ hours immediately preceding the discharging schedules. For example, if a storage resource ~~is reduced in the UCAP process. Because the CAISO is maintaining a state of charge for these resources through~~ was scheduled to discharge during hours 18, 19, and 20, the minimum charge requirement~~, there will~~ would be ~~no reduction~~applied in the hours immediately prior to these hours: 17, 16 and 15.[21]

[21] The charging schedule will include round trip efficiencies to ensure that the resource charges sufficiently to ensure state of charge to meet day-ahead schedules. If the storage resource has a Pmax = -1 * Pmin, and a discharge schedule at Pmax for hours 18-20, then the minimum state of charge would be imposed for hours 15-17, and for hour ending 14 because the storage resource will take more time to charge than to discharge.

The ISO previously expressed concern about charging storage resources during the peak ramping periods, immediately prior to the evening net-load peak. To allay these concerns the ISO will develop a parameter that will spread the charge over additional time. The parameter will initially be set at 1.0, to represent an assumed charging speed of 1.0*Pmin of the resource or essentially assuming that the resource will charge as much as possible immediately prior to discharge schedules. The parameter can be reduced if the operations team believes that charging the resources immediately prior to discharge schedules would be overly burdensome on the system.

The minimum state of charge will not be applicable for all hours of the day. The operations team will be able to specify critical hours for each day, which would generally be in the evening surrounding the peak net-load, where the minimum state of charge will be applied.[22] If the storage resource receives a discharge schedule during the hours specified, then the minimum state of charge will be set prior to hours with discharge schedules.

The ISO will report on how frequently the minimum state of charge is used, when it was triggered, and may report on the estimated impact that the requirement has on the storage resources on the system. In the event that the ISO ~~triggers the minimum state of charge requirement in the real-time market (that was not initially triggered in RUC), or~~ rescinds a minimum state of charge requirement in the real-time market, the ISO will include those details in the report as well.

Examples

In the fifth revised straw proposal the ISO outlined two examples of how the minimum state of charge would work given example bids and market prices.[23] These two examples have been updated are presented here. The market prices and bids were left unchanged from the original examples and the only changes were to the minimum charge requirement and the resulting dispatch instructions to the storage resource.

These examples assume a highly simplified system that includes one +/-50 MW storage resource with 200 MWh of storage capability that bids into the day-ahead and real-time markets. This resource has a perfect round-trip efficiency (no losses from charging) and has no parasitic losses while charged.

Example 1:

For this example the scheduling coordinator bids the resource to charge any time prices are below $30/MWh and discharge anytime prices are above $60/MWh. Assume that the storage resource is fully charged, either in the market or prior to the day-ahead market, prior to hour

[22] These hours may correspond to hours that the market is anticipated to require storage resource availability to operate.
[23] Resource adequacy enhancements, fifth revised straw proposal: https://stakeholdercenter.caiso.com/StakeholderInitiatives/Resource-adequacy-enhancements.

ending 9. This implies that the storage resource cannot be charged when prices are low in the morning, and only receives discharge schedules in the afternoon when prices are above the $60/MWh bid price in the market. This results in the resource discharging a total of 180 MWh in the day-ahead market and retaining 20 MWh state of charge at the end of the day-ahead market process.

If this is a critical day where there is an infeasibility in the RUC process, and the ISO assigns hours 19 through 23 as critical hours then a minimum state of charge would be imposed on this storage resource immediately prior to the charging hours, in hours ending 15 through 18. These requirements will only require that the storage resource be fully charged at 180 MWh at the end of hour ending 18, and will decrease to 130 MWh for hour ending 17, and continue back through previous hours. These requirements would then be observed by the real-time market optimization.

In the 5-minute market assume there are high prices, spiking to $1,000/MWh, in hour ending 17. In this example the minimum state of charge requirement previously proposed in the draft final proposal required that the storage resource be fully charged at 180 MWh in the real-time market for the shown morning hours and therefore would prevent the storage resource from fully discharging in the real-time during the price spike in hour ending 17. The new formulation proposed here will not require a 180 MWh state of charge from the storage resource to until hour ending 18, which allows the storage resource to discharge fully (50 MW) during hour ending 17.

The current proposed requirement still requires that the storage resource charge to 180 MWh, or the total of the discharge schedule at hour ending 18 and requires significantly less state of charge in previous hours. In this case hours 15, 16 ad 17 have a minimum state of charge of 30, 80 and 130 MWh respectively. These requirements are significantly lower than the requirements imposed from the previous proposal.

Figure 3: MSOC Example 1

Hour	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Load	190 MW	190	190	200	215	235	255	280	300	330	335	345	350	340	280	210
DA Bid ↓	$30/MWh	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30	$30
DA Bid ↑	$60/MWh	$60	$60	$60	$60	$60	$60	$60	$60	$60	$60	$60	$60	$60	$60	$60
DA Price	$50/MWh	$50	$50	$50	$50	$52	$55	$58	$60	$60	$80	$80	$100	$100	$80	$60
DA Sched	0	0	0	0	0	0	0	0	0	0	20	30	50	50	30	0
DA SOC	200 MWh	200	200	200	200	200	200	200	200	200	180	150	100	50	20	20
RT Bid ↓	$50/MWh	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50
RT Bid ↑	$100/MWh	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100
RT Price	$60/MWh	$60	$60	$60	$60	$60	$60	$60	$1,000	$60	$100	$100	$100	$100	$100	$70
RT Sched	0 MW	0	0	0	0	0	0	0	50	-30	20	30	50	50	30	0
RT SOC	200 MW	200	200	200	200	200	200	200	150	180	160	130	80	30	0	0
Min Chrg	0 MW	0	0	0	0	0	30	80	130	180	160	130	80	30	0	0

Example 2:

In the second example, the storage resource is charged to 80 MWh in the morning and discharged by 30 MW and 50 MW in hours ending 20 and 21 in the day-ahead market. In the real-time market the storage resource has a minimum sate of charge requirement imposed at 50 MWh at hour ending 20, 80 MWh at hour ending 19, and 30 MWh at hour ending 18. Low prices in the real-time market result in the storage resource being charged to 130 MWh, beyond the minimum charge requirement. This resource is able to respond to high prices in hour ending 18, when prices spike to $200/MWh. Price later in the day never materialize at levels higher than the bids and the resource does not receive instructions to discharge below 80 MWh for the remainder of the day, and always has enough energy to meet state of charge requirements.

Figure 4: MSOC Example 2

Hour	9	10	11	12	...	17	18	19	20	21	22	23	24
Load	190 MW	190	190	200	...	300	330	335	345	350	340	280	210
DA Bid ↓	$30/MWh	$30	$30	$30		$30	$30	$30	$30	$30	$30	$30	$30
DA Bid ↑	$60/MWh	$60	$60	$60		$60	$60	$60	$60	$60	$60	$60	$60
DA Price	$50/MWh	$50	$25	$50		$60	$60	$60	$70	$70	$60	$60	$60
DA Sched	0	0	-50	0		0	0	0	30	50	0	0	0
DA SOC	30 MWh	30	80	80		80	80	80	50	0	0	0	0
RT Bid ↓	$25/MWh	$25	$30	$25		$25	$25	$25	$25	$25	$25	$25	$25
RT Bid ↑	$70/MWh	$70	$75	$72		$72	$72	$72	$72	$72	$72	$72	$72
RT Price	$60/MWh	$20	$27	$60		$60	$200	$60	$60	$60	$60	$60	$60
RT Sched	0 MW	-50	-50	0		0	50	0	0	0	0	0	0
RT SOC	30 MWh	80	130	130		130	80	80	80	80	80	80	80
Min Chrg	30 MWh	0	0	0		0	30	80	50	0	0	0	0

5.2 Backstop Capacity Procurement Provisions

In this ~~draft~~ final proposal, the CAISO proposes to ~~seek new~~ expand existing local CPM authority to procure resources when the CAISO identifies a need ~~to procure~~for additional local RA capacity after an area or sub-area fails to meet the energy sufficiency ~~test~~evaluation. Stakeholder comments generally support this extension of CPM authority.

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The CAISO uses ~~CPM~~its capacity procurement mechanism to backstop ~~the RA program. Specifically, when there is insufficient capacity shown in the RA process to reliably operate the grid, the CAISO may make CPM designations to procure resources that have not been shown in the RA process so that sufficient capacity is available to reliably operate the system. RA is shown on a~~ capacity needs under the resource adequacy provisions of its tariff. Based on year-ahead and ~~a~~ month-ahead ~~basis, and CPM can be used to backstop in either timeframe or in a more granular timeframe.~~ resource adequacy showings made by load serving entities in its balancing authority area, the CAISO may exercise this authority for system, local or flexible

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resource adequacy. Resource owners with additional non-RA capacity can participate in the CPM competitive solicitation process ~~(CSP) for their bids to be considered if and when the CAISO makes~~to receive a CPM designation. ~~Generally, in any timeframe the CAISO makes a designation~~In making CPM designations, the CAISO considers all options for procurement and selects the least cost option that meets the reliability need ~~is selected~~. Additionally, when the CAISO makes any CPM designation, it posts information about the designation and supporting documentation outlining why the CAISO needs the resource.

~~Authority to make CPM designations for capacity currently includes the following designation types:~~

1. ~~System annual/monthly deficiency – Addresses insufficient system RA capacity in year-ahead or month-ahead RA showings~~
2. ~~Local annual/monthly deficiency – Addresses insufficient local RA capacity in year-ahead or month-ahead RA showings for one specific entity making showings~~
3. ~~Local collective deficiency – Addresses insufficient local RA capacity in year-ahead RA showings to meet the reliability needs for one specific local area~~
4. ~~Cumulative flexible annual/monthly deficiency – Addresses insufficient flexible RA capacity in the year-ahead or month-ahead showings for system needs~~
5. ~~A "Significant Event" occurs on the grid~~
6. ~~CAISO "Exceptional Dispatches" non-RA capacity~~

~~The CAISO proposes modifying its existing~~

As a part of the resource adequacy program, the CAISO performs studies each year to ensure load serving entities have secured adequate capacity in local areas to mitigate potential local reliability issues. This requirement currently reflects a capacity value in MWs without full consideration of resource availability needs, such as limits on energy duration or calls. Increasingly, load serving entities are procuring availability-limited resources[24] to meet local capacity area and sub-area needs, which has necessitated the need for the CAISO to evaluate these resources' availability limitations to help guide the effective procurement of local resource adequacy resources.

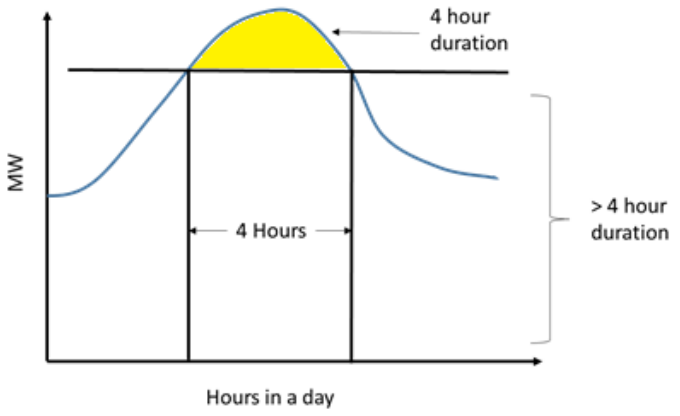
Today, availability-limited resources have a minimum duration requirement of four hours to qualify as resource adequacy capacity. A10 MW resource that is capable of producing for 4 hours, or 40 MWhs has the same resource adequacy capacity value as a 10 MW resource capable of producing for 8 hours, or 80 MWhs. However, if a local capacity area requires 10 MW of capacity for an eight-hour period during a contingency event, only the latter is capable meeting this reliability need. Yet, from a resource adequacy counting perspective, these hypothetical resources receive the same value because resource adequacy rules do not consider the availability limitations of the resources when determining their capacity values. As

[24] CAISO considers availability-limited resources as those that have significant dispatch limitations such as limited duration hours (e.g., per year, season, month, or day) or event calls (*e.g.*, per year, season, month or consecutive days) that would limit the resources' ability to respond to a contingency event within a local capacity area

a result, the CAISO may have sufficient capacity in MWs to meet peak demand in a local capacity area but insufficient energy in MWhs to meet needs across all hours of the day and year. Figure 5 below demonstrates how the CAISO can use availability-limited resources to meet the peak, but may need other resources with a longer duration to meet energy needs in other hours of the day. The black vertical lines reflect a four-hour minimum availability threshold. Below the black horizontal line is load that still will need to be served with resources that have greater than four hours of availability.

In recent transmission planning studies, specifically studies related to the Moorpark and Santa Clara local capacity sub-areas in central California, the CAISO developed and performed detailed hourly load and resource analyses to assess binding availability limits in these local capacity sub-areas.[25] The CAISO determined that local capacity procurement needs must reflect both the capacity and energy needs in these local areas. These studies demonstrate that availability-limited resources with a four-hour minimum duration were insufficient to meet energy needs (*i.e.*, total MWhs) for contingency events identified in the CAISO's local capacity criteria. Currently, the CAISO does not have the tariff authority to use its local CPM backstop in order to fulfill the energy needs identified through these local energy sufficiency studies, because these studies are not covered under the tariff-defined study criteria.

Figure 5: Hourly Load Shape with Four-Hour Minimum Availability Threshold



[25] CAISO, Moorpark Sub-Area Local Capacity Alternative Study, August 16, 2017, http://www.caiso.com/Documents/Aug16_2017_MoorparkSub-AreaLocalCapacityRequirementStudy-PuentePowerProject_15-AFC-01.pdf; and Santa Clara Sub-Area Local Capacity Technical Analysis, June 18, 2018, http://www.caiso.com/Documents/2023LocalCapacityTechnicalAnalysisfortheSantaClaraSub-Area.pdf

The CAISO is proposing to modify its tariff rules for local capacity technical studies to reflect this energy sufficiency evaluation as well as its CPM authority to designate a local deficiency to procure additional capacity ~~if the CAISO identifies a need to procure local RA~~ after a local area or sub-area fails to meet ~~the energy sufficiency test. The CAISO proposes additional backstop authority to ensure that procured local resources can meet energy needs in each local area and sub-area during the upcoming year.~~ an energy sufficiency evaluation. If the CAISO identifies any capacity and/or energy shortfall, it will provide a cure period for entities to clear any deficiencies before exercising its backstop procurement authority.

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The ~~rest~~CAISO plans to request these changes take effect for the 2022 resource adequacy year.

Stakeholder Comments:

While most parties did not comment on this element in the draft final proposal, of the ~~proposals modifying the~~ nine entities that did offer comments, a majority of commenters supported this policy as a common sense expansion of the CAISO's backstop authority ~~are included in the sixth revised straw proposal.~~ to ensure local reliability needs in the face of increased reliance on availability limited resources. CalCCA supports the proposal and noted that any resource procured through this CPM should also be available to meet system RA requirements. DMM, Middle River Power, Six Cities were also supportive. SCE, although supportive, requested further clarity on whether ensuring sufficient energy for local areas is pertinent to all local areas, or just a smaller subset of local areas, and whether it would be more efficient to address the issue on an area-by-area basis without applying the requirement to all local areas. CPUC Energy Division staff were also supportive as long as the Local Capacity Requirement Technical Studies clearly identify what use-limitations exist in each local area and sub-area so that LSEs and the new Central Procurement Entity could utilize this information to direct procurement upfront. The CAISO will continue to outline the requirements for all applicable local areas and sub-areas, and these will be clearly described in the LCR Reports by charts and graphs with the energy needs during peak as well as year round conditions, before LSE procurement begins. These graphs will also show transmission capability during emergency conditions for the applicable local areas and sub-areas.

PG&E requested additional details on how this energy sufficiency evaluation would be conducted to identify the need for this local CPM. The CAISO supplied additional details about this evaluation above (for additional details see footnote 19). PG&E also asked how this energy sufficiency test proposed in phase 1 differs from the System RA Showings and Sufficiency Testing proposed for phase 2B implementation. The sufficiency test proposed in phase 2B is meant to evaluate the overall portfolio of RA resources to meet the energy needs across all hours at the system level, whereas the local energy sufficiency evaluation proposed for phase 1 implementation would only apply to local area and sub-areas to ensure that local reliability needs are covered in terms of both capacity and energy, and to ensure that the procurement of availability limited resources is sufficient to cover the identified needs. PG&E also raised

concerns about misalignment with CPUC requirements. The CAISO has submitted a proposal in the Track 3B.1 of the CPUC proceeding to request that the CPUC ensure central procurement entities and/or LSEs procure sufficient resource adequacy resources in each local area and sub-area accounting for availability-limited resource characteristics, and leverage the CAISO's hourly load and resource analysis from its Local Capacity Technical studies to better direct availability-limited resource procurement for it's jurisdictional LSEs.[26]

SDG&E supports the general concept of the CAISO's backstop authority to ensure grid reliability, but thought the energy sufficiency evaluation and cure period was ambiguous, and was unclear how the CAISO or LSEs would be able to identify resources to cure the deficiencies. They recommended that the CAISO provide information on how the procured resource is able to cure the deficiency vs. another equivalent or lower offer priced resource does not to increase transparency. The CAISO will continue to use the RA Deficiency report that is published in mid November to describe how each local area and sub-area capacity as well as energy needs were not met and to inform load serving entities of how much from each resource is not shown as RA capacity, as is done today.

6. Implementation Plan

Given the comprehensive nature of this initiative, the CAISO is planning a phased implementation. The first phase includes stand-alone elements that can be implemented relatively quickly. The second phase includes full implementation of foundational elements, including system requirements and UCAP counting rules, the portfolio assessment, and elements that are needed to align with the day-ahead market enhancements and the extended day-ahead market initiatives. These targeted dates are tentative and subject to change.

Phase One: (Prior to Summer 2021 or Fall 2021 for RA year 2022)

- ~~RA import provisions~~
- Planned outage process enhancements – phase 1 (Prior to Summer 2021)
- Operationalizing storage (Prior to Summer 2021)
- Local studies with availability limited resources CPM clarifications (Fall 2021 for RA year 2022)
- ~~Operationalizing storage~~

Phase Two: (2022 for RA year 2023)

- RA import provisions
- UCAP
- Minimum System RA Requirements
- Portfolio assessment
- Planned outage process enhancements – phase 2

[26] See Track 3B.1 Proposal: 362887738.PDF (ca.gov)

- Must offer obligations and bid insertion rules
- Availability Penalty Structure for RMR
- Flexible resource adequacy

7. EIM Governing Body Role

For this initiative, the CAISO will seek approval from the CAISO Board only. This initiative falls outside the scope of the EIM Governing Body's advisory role because the initiative does not propose changes to either real-time market rules or rules that govern all CAISO markets. This initiative is focused on the CAISO's RA planning, procurement, and performance obligations. This process applies only to LSEs serving load in CAISO's BAA and the resources procured to serve that load, and does not apply to LSEs outside CAISO's BAA. The CAISO received comments from CalCCA, NCPA, SCE, and the Six Cities in support of this determination.

8. Next Steps

The CAISO will discuss this ~~draft~~ final proposal ~~and sixth revised straw proposal~~ with stakeholders during a stakeholder meeting on ~~January 5-7~~February 23, 2021. Stakeholders are asked to submit written comments by ~~January 21~~March 9, 2021 through the commenting tool. A comment template will be posted on the CAISO's initiative webpage here: http://www.caiso.com/informed/Pages/StakeholderProcesses/ResourceAdequacyEnhancements.aspx