RDRR Bidding Enhancements

Revised Straw Proposal

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1. Executive Summary

In this Revised Straw Proposal, the CAISO proposes select enhancements to real time bidding for the Reliability Demand Response Resource (RDRR) model by:

- Aligning RDRR real-time bidding with FERC Order No. 831 by proposing that RDRRs must bid at least 95% of the hard energy bid cap ($1,900/MWh) when the conditions are satisfied that raise the soft energy bid cap to $2,000/MWh.[1] To implement this, the CAISO proposes to automatically adjust the submitted RDRR bids based on the change in energy bid cap by maintaining the percentage of the bid cap originally submitted by the Scheduling Coordinator. This automatic adjustment will occur after the market close and will only apply if no action is taken by the close of each hour's real-time market by the Scheduling Coordinator.
- Addressing infeasible RDRR real-time dispatches through a market enhancement, recognizing known operational capabilities. The CAISO proposes a solution for RDRRs without a day ahead award, whereby the CAISO would re-rate the resource's Pmin below the upper economic limit and a formula will be used to represent to the market the resource's minimum load cost. This is to ensure that the resource is not viewed as "free" by the market, thus preventing a real time infeasible dispatch from occurring. This automatic adjustment will occur after the day ahead market, and will not require any action from Scheduling Coordinators.
- Not changing the current 50 MW discrete RDRR cap.

[1] The CAISO will develop cost justification methodology for demand response resources (including RDRRs participating economically in the day-ahead market) and energy storage resources bidding above $1,000/MWh through a separate stakeholder process.

2. Background

On June 24, 2010, in D.10-06-034 the CPUC approved a multi-party settlement in its demand response proceeding (R.07-01-041) that required investor-owned utilities to transition their CPUC-approved retail emergency-triggered demand response programs into a CAISO reliability demand response product.[2] The settlement specified the minimum operating and technical requirements for retail emergency-triggered demand response resources. The CPUC settlement also required these resources be made available for dispatch once a Warning notice is issued following actions under CAISO emergency operating procedures. [3]

Consistent with the terms of the CPUC settlement, the CAISO developed the RDRR product. On October 26, 2010, the CAISO Board of Governors authorized the RDRR product. The Board of Governors memorandum approving the RDRR product specifically noted that it would enable the CAISO "to dispatch these emergency-triggered programs when and where they are needed and, appropriately, reflect their value in the [CA]ISO market."[4]

Fast forward ten years to the August 2020 load shedding events, the Final Root Cause Analysis of these events found that RDRRs were manually dispatched out of market by the CAISO system operators versus through the "market" as originally envisioned.[5] As a result, in its 2021 Summer Readiness initiative, the CAISO modified its tariff to dispatch RDRRs in the real-time pre dispatch (RTPD) market run so that RDRRs could be more optimally dispatched through the market provided they have a longer dispatch horizon. Additionally, the CAISO updated its tariff to allow RDRRs to register as 5-, 15-, or 60-minute dispatchable resources to better elect and reflect an RDRR's operating parameters. Resources registered as 15-minute dispatchable are allowed to set the marginal energy price in the fifteen-minute market. Resources registered as 5- minute dispatchable are allowed to set the marginal energy price in RTD. These changes were accomplished by reflecting discrete RDRRs as discrete in the scheduling run, but treating them as continuous in the pricing run. Continuous RDRR's bid curve submitted by the scheduling and pricing runs allows RDRR to set the price. RDRRs registered as 60-minute dispatchable that clears in the hour-ahead scheduling process (HASP) will receive a fifteen-minute market schedule and will settle at the corresponding locational marginal price during each fifteen-minute market interval like all other HASP eligible resources.

[2] Details on the CPUC Reliability-Based Demand Response Settlement are available at https://docs.cpuc.ca.gov/publishedDocs/published/Graphics/119817.PDF and https://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/119815.PDF
[3] The CAISO's Operating Procedure 4420 outlines when RDRR can be enabled into the market http://www.caiso.com/Documents/4420.pdf
[4] The CAISO Memorandum. Decision on the Reliability Demand Response Product. October 26, 2010. http://www.caiso.com/Documents/101101DecisiononReliabilityDemandResponseProduct-Memo.pdf
[5] Final Root Cause Analysis: Mid-August 2020 Extreme Heat Wave, January 13, 2021, available at: http://www.caiso.com/Documents/Final-Root-Cause-Analysis-Mid-August-2020-Extreme-Heat-Wave.pdf

3. RDRR Bidding Enhancements Straw Proposal

3.1 RDRR Real-Time Bidding Alignment with FERC Order No. 831

In 2016, the Federal Energy Regulatory Commission (FERC) issued FERC Order No. 831, which required Independent System Operators and Regional Transmission Organizations (ISOs/RTOs) to revise their tariffs to raise the energy bid cap from $1,000/MWh to $2,000/MWh, and generally required suppliers that submit bids above $1,000/MWh to base those bids on verifiable costs. The rule changes in Order No. 831 created a structure where internal supply offers above $1,000/MWh are effectively mitigated to an amount equal to a supplier's expected or actual costs.

Order No. 831 required that ISOs verify the costs underlying these cost-based offers above $1,000/MWh before an offer could be used to calculate energy prices. If an ISO could not verify the costs underlying the offer before the market clearing process begins, then that offer may not be used to calculate energy prices.

Building on the CAISO's Order No. 831 Compliance Filing made in September 2019[6], the FERC Order No. 831 – Import Bidding and Market Parameters initiative[7] was the CAISO's formal stakeholder process to propose various tariff revisions and system updates to accommodate bidding flexibility above the $1,000/MWh soft energy bid cap. On February 22, 2021, the CAISO received FERC approval[8] for these changes that were activated in June 2021.

Within the Compliance Filing,[9] the CAISO proposed that RDRRs would maintain their bidding structure in the real-time market by bidding at least 95% of the soft energy bid cap ($950/MWh). Therefore, when the energy bid cap is raised from $1,000/MWh to $2,000/MWh, the hard energy bid cap, RDRRs are unable to submit bids above $1,000/MWh unless there is a pre-market manual reference level change request submitted indicating these resources have higher operating or fuel costs.

Stakeholders have since raised concerns about their ability to accurately represent their RDRRs within the CAISO market. These concerns relate to their ability to bid greater than $1,000/MWh when the energy bid cap is raised to $2,000/MWh. This initiative seeks to explore solutions to resolve stakeholder concerns and maintain compliance with FERC Order No. 831 and be consistent with the terms of the CPUC settlement.[10]

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[6] The CAISO's September 2019 FERC Order No. 831 Compliance Filing is available at Microsoft Word - Tx letter for filing to comply with Order No. 831 (caiso.com)

[7] More information on the CAISO's stakeholder initiative on FERC Order No. 831 is available at California ISO - FERC Order 831 - Import bidding and market parameters (caiso.com)

[8] The FERC Letter accepting the CAISO's FERC Order No. 831 policy is available at Feb22-2021-LetterOrderAccepting-FERCOrderNo831-ER21-1164.pdf (caiso.com)

[9] Proposed tariff changes to sections 30.6.2.1.2.1 and 30.6.2.1.2.2 are available on page 37 of Microsoft Word - Tx letter for filing to comply with Order No. 831 (caiso.com)

[10] Details on the CPUC Reliability-Based Demand Response Settlement are available at https://docs.cpuc.ca.gov/publishedDocs/published/Graphics/119817.PDF and https://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/119815.PDF

Stakeholder Feedback

Stakeholders generally supported the CAISO's draft straw proposal to require RDRR's to bid at least 95% of the hard energy bid cap ($1,900/MWh) when the conditions are satisfied to raise the bid cap to $2,000/MWh. However, some stakeholders oppose this proposal. The Department of Market Monitoring (DMM) noted that when the bid cap is raised to $2,000/MWh, RDRR's should be allowed to bid between 95% of the soft energy bid cap and the hard bid cap ($950/MWh - $2,000/MWh). They explained that the current proposal may lead to setting prices greater than $1,900/MWh more frequently when RDRR's are dispatched which would result in an inefficient outcome if those prices are not representative of the resources' marginal costs. Additionally, California Large Energy Consumers Association (CLECA) opposed the proposal because there may not be enough time for Scheduling Coordinators to adjust their RDRR bids in real-time when the bid cap is raised to $2,000/MWh. Finally, both Western Power Trading Forum (WPTF) and Vistra recommend the CAISO focus its efforts on addressing price formation related to RDRRs through better scarcity pricing in a separate initiative.

During the stakeholder call on November 4, 2021, stakeholders raised a number of questions related to SIBR implementation of the CAISO's proposal and as such requested stakeholder's to provide feedback on the various implementation options outlined below[11]:

1. Re-run bid validation rules against all submitted real-time market RDRR energy bids when the bid cap is raised from $1,000/MWh to $2,000/MWh. Bids between $950/MWh-$1,000/MWh which were previously validated are rejected.
2. Take no action, let previously validated bids be passed to market. Allow Real-time market RDRR energy bids in the $950-$1,000/MWh to remain valid in the market along with passing bids re-submitted in the $1,900-$2,000/MWh range.
3. After market close, if there are real-time market RDRR energy bids which are priced outside the $1,900-$2,000/MWh range, adjust the bids so that they are within the range. Alternatively, adjust all bids up to the $1,900/MWh bid floor, or doubling the existing bid.

California Energy + Demand Management Council and SCE supported Option 3 because it represents a simple approach. Additionally, PG&E noted that Option 3 would introduce complexity, implementation challenges, and potential gaming opportunities. They explained that Option 3 would require a completely new SIBR rules to be created to adjust RDRR bids to be within the $1,900-$2,000/MWh range. Further they stated that the new SIBR rules may incentivize market participants to increase their import bids to be greater than $1,000/MWh to raise the bid cap to $2,000/MWh which would automatically increase the RDRR bids. This Option would result in increased compensation for an already awarded RDRR bid. Instead, PG&E supported Option 2 because RDRR bids within the range of $950/MWh-$1,000/MWh do not pose a reliability or operational risk and this approach would not require major system changes. Alternatively, PG&E suggested an option to allow Scheduling Coordinators to submit additional bids between 95%-100% of the hard energy bid cap to replace the originally

[11] Stakeholders were provided the following supplementary document outlining SIBR implementation options to comment on CommentsTemplateSupplement-OptionsforSIBRHandlingReal-TimeMarketReliabilityDemandResponseResourceEnergyBids.pdf (caiso.com).

submitted bids that are between 95%-100% of the soft energy bid cap, in case the energy bid cap does increase to $2,000/MWh. They suggested that if there was no change in the energy bid cap, then the additional bids would be rejected and would not replace the originally submitted bids. In the case the energy bid cap does increase, PG&E noted that the additional bids would overwrite the originally submitted bids and result in an approach that would not require new SIBR rules to be created.[12] Finally, WPTF supported a nuanced approach to Option 3 where the RDRR bids are automatically adjusted based on the change in energy bid cap by maintaining the percentage of the bid cap originally submitted by the Scheduling Coordinator. For instance, if the initial RDRR bid was 95% of the soft bid cap ($950/MWh) and the energy bid cap was raised to $2,000/MWh, the market would automatically increase the bid to be 95% of the hard bid cap ($1,900/MWh). This approach would also apply in the rare scenarios when the bid cap is lowered from $2,000/MWh to $1,000/MWh.

Response to Stakeholder Feedback

Based on consideration of all of these comments, the CAISO is proposing to maintain its approach to require RDRR's to bid at least 95% of the hard energy bid cap ($1,900/MWh) when the conditions are satisfied to raise the bid cap to $2,000/MWh. The CAISO acknowledges the DMM's concern that prices may be set at $1,900/MWh more frequently when RDRRs are dispatched. However, it is reasonable to assume that costs will not justify energy bids greater than $1,000/MWh and therefore the energy bid cap will be remain at $1,000/MWh the vast majority of the time. Further, this proposal reflects the need to uniquely position RDRRs in the market in response to the energy bid increase to $2,000/MWh in order to provide appropriate scarcity pricing signals to the market when they are conditionally released for dispatch.[13]

Additionally, the CAISO recognizes the concern raised by Vistra and WPTF to address price formation related to RDRRs through a separate initiative dedicated to scarcity pricing. The CAISO does not believe price formation related to RDRRs and scarcity pricing are mutually exclusive issues. The CAISO plans to begin the Price Formation Enhancements initiative in mid-2022. This initiative will explore scarcity pricing mechanisms and improve pricing provisions for efficient market pricing during tight supply conditions.

Finally, based on comments received regarding the SIBR implementation of this proposal, the CAISO agrees with WPTF's nuanced approach to Option 3 and proposes to automatically adjust RDRR bids based on the change in the energy bid cap by preserving the percentage of the bid cap originally submitted by the Scheduling Coordinator. This approach resolves CLECA's concern that there is not enough time for Scheduling Coordinators to adjust their RDRR bids in real-time when the bid cap is raised to $2,000/MWh. SIBR will automatically adjust the submitted RDRRs accordingly. This approach ensures that RDRR real-time energy bids are considered by the market at or above bids submitted by non-RDRR resources

[12] PG&E's proposal would in fact require new SIBR functionality to be created to recognize which bids should be passed through to the market and which bids should be overwritten and rejected.
[13] RDRRs are conditionally released for dispatch when the CAISO has issued a Warning Notice. The operating produce 4420 outlines when RDRR's are conditionally released for dispatch in the real-time market System Emergency (caiso.com).

approved for bid prices higher than the soft cap. The CAISO believes that Option 3, while adding complexity through SIBR, maintains the positioning of RDRRs in the market as intended consistent with the terms of the CPUC settlement and compliant with FERC Order No. 831.

Proposal

To address concerns that RDRRs are restricted from bidding greater than $1,000/MWh when the energy bid cap is raised to $2,000/MWh, the CAISO proposes that RDRRs must bid at least 95% of the hard energy bid cap ($1,900/MWh) when the conditions are satisfied to raise the bid cap to $2,000/MWh.[14] The CAISO believes this proposal is consistent with the intent of the RDRR settlement and the CAISO's RDRR design, which dispatches RDRRs under emergency conditions with little supply remaining. Without enabling RDRRs to bid close to the hard energy bid cap, RDRRs may suppress real-time prices during scarcity events, thereby interfering with the economic signal the CAISO would otherwise send to supply.

As illustrated in the Business Practice Manual (BPM) for Market Instruments, the CAISO communicates to Scheduling Coordinators in the bidding platform SIBR, when the energy bid cap has been raised from $1,000/MWh to $2,000/MWh for each hour. Likewise, Scheduling Coordinators are notified through SIBR in the rare situations when the energy bid cap is revised down from $2,000/MWh to $1,000/MWh.[15] To alleviate stakeholder concerns that there is not enough time for Scheduling Coordinators to revise their bids to reflect the change in energy bid cap, the CAISO proposes to automatically adjust the submitted RDRR bids based on the change in energy bid cap by maintaining the percentage of the bid cap originally submitted by the Scheduling Coordinator. This automatic adjustment will occur after the market close and will only apply if no action is taken by the close of each hour's real-time market by the Scheduling Coordinator.[16] The CAISO believes this proposal ensures that no real-time market RDRR energy bids are dispatched ahead of non-RDRRs which may have high bid prices. Further, this proposal recognizes the need to uniquely position RDRRs in the market in response to the energy bid cap increasing to $2,000/MWh, in order to provide appropriate scarcity pricing signals to the market when they are dispatched.

The following examples illustrate the CAISO's proposal for SIBR implementation:

- Example 1:
    - A real-time market RDRR bid has been submitted at 95% of the soft energy bid cap ($950/MWh). If the conditions are satisfied to raise the bid cap to $2,000/MWh and the Scheduling Coordinator who submitted the $950/MWh

[14] The conditions to raise the energy bid cap from $1,000/MWh to $2,000/MWh are outlined on pages 14 and 15 FinalProposal-FERCOrder831-ImportBidding-MarketParameters.pdf (caiso.com).
[15] BPM for Market Instruments Attachment P https://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Market%20Instruments
[16] The automatic adjustment of RDRR bids will occur immediately after the close of the real-time markets at 75 minutes before the start of each applicable hour when the conditions are satisfied to raise the bid cap to $2,000/MWh and there is no action taken by the Scheduling Coordinator to resubmit their bid at least at 95% of the hard energy bid cap.

RDRR bid takes no action to resubmit their bid, SIBR will automatically increase their bid to 95% of the hard energy bid cap ($1,900/MWh) after market close.

- Example 2:
    - The conditions have been satisfied to raise the bid cap to $2,000/MWh in the real-time market for a specific trade date. A real-time market RDRR bid has been submitted based on this information at 98% of the hard energy bid cap ($1,960/MWh). In the rare instance the energy bid cap is lowered from $2,000/MWh to $1,000/MWh at a later time during the market, and the Scheduling Coordinator takes no action or is unable to take action, SIBR will automatically decrease the Scheduling Coordinators bid to 98% of the soft energy bid cap ($980/MWh) after market close.

This proposal provides alignment with FERC Order No. 831 and maintains that in the real-time market, RDRRs are treated as emergency response resources with limited availability and are only released for dispatch when a Warning Notice is issued.[17] This underscores the intent of the proposal to value RDRRs when the conditions are satisfied to raise the soft energy bid cap to $2,000/MWh without requiring additional cost-justification support to substantiate their bids. Additionally, this proposal maintains the positioning of RDRRs in the market consistent with the terms of the CPUC settlement. Further, the CAISO proposes to preserve the existing bidding structure for RDRRs when the $1,000/MWh soft energy bid cap is in place.

[17] Ibid.,12.

3.2 RDRR "Infeasible Dispatch" and Minimum Load Costs

The minimum load cost is the "$/hour" for a resource to operate and provide energy at its minimum load. For a generator, minimum load—commonly referred to as Pmin—is the generator's minimum sustained operating level at which it can operate continuously. For an RDRR, minimum load is the smallest discrete load reduction possible. An RDRR's minimum load cost, therefore, is the cost in $/hour at which the RDRR can provide its minimum load reduction.

RDRRs are currently prohibited from having a non-zero minimum load cost.[18] Without the ability to register a minimum load cost, all RDRRs have a Pmin registered at zero. As a result RDRRs appear to have zero commitment costs.[19] Stakeholders indicate that RDRRs operate in a discrete manner, meaning they are either operating at their upper economic limit or not operating at all. As a result, it is likely that if RDRRs were able to register a Pmin, it would be at or very near their upper economic limit. The complicating factor is that the Pmax of most RDRRs fluctuate due to variation in the underlying load, and there is not a variable PMax concept in the CAISO market.

The CAISO in its Summer Readiness initiative modified its tariff to dispatch RDRRs in Real time Pre-Dispatch (RTPD) so they could be optimally dispatched within a longer time horizon to increase the efficiency of the market dispatch. Market dispatch is impacted by the Pmin registration of a RDRR coupled with its minimum load costs. If the Pmin of an RDRR is at or near the Pmax, and minimum load costs are zero, the resource is viewed as a zero cost resource available for start-up to their Pmin at no cost. Alternatively, if the Pmin of a RDRR is set at zero, the resource can also be committed as a zero cost resource at Pmin which could result in dispatch instructions that toggle between from Pmin to their upper economic limit and back to Pmin multiple times under a single start-up instruction, which may be "infeasible" for the resource to respond. From the CAISO's perspective, a resource with zero pmin and zero commitment costs is considered to be on-line, even at zero, unless it operates at zero for the entire period.

This initiative started by examining minimum load costs as a means of correcting the issue that RDRRs are receiving real time dispatches that may be infeasible, not from a market perspective but from the perspective of a resource. The CAISO's hypothesis was that allowing resources to represent their minimum load cost could enable resources that have also represented the operational capabilities of their resource as their Pmin near their Pmax, to receive compensation and appropriate dispatch. This was also investigated as RDRR operators have identified challenges to appropriately define minimum load costs.

[18] CAISO Tariff Section, 30.6.2.1.2. Real-Time Dispatch Options. "A Reliability Demand Response Resource that is subject to either the Marginal Real-Time Dispatch Option or the Discrete Real-Time Dispatch Option shall have a Default Minimum Load Bids of zero (0) dollars registered in the Master File."
[19] Commitment costs consist of start-up and minimum load costs.

Stakeholder Feedback

Stakeholders generally supported reflecting minimum load costs, with the exception of CLECA. Stakeholders suggested various approaches to reflecting minimum load costs without any specific examples of the costs reflecting how they reach minimum load. Responses fell into four categories: 1.) minimum load costs based on defaults or negotiated options 2.) minimum load costs based on program costs 3.) minimum load costs as applicable only in the day ahead market or 4.) not including minimum load costs.

1. For the first category, SCE suggested default minimum load costs as equal to the bids at 95% of the soft energy bid cap when applicable and 95% of the hard energy bid cap when applicable. PG&E suggested developing a stakeholder survey to gather documentation to develop a default RDRR minimum load cost. The CAISO's DMM supported the proposal to allow RDRR to submit commitment costs as long as the ISO had a process in place for assessing the reasonableness of these submissions. They also recommended the CAISO consider developing guidelines for RDRRs similar to the current development of commitment costs guidelines for PDR that are under development.
2. For the second category, PG&E suggested negotiated minimum load costs that could be based on the programmatic opportunity costs of dispatching a resource for an additional hour.
3. A third category focused on day ahead minimum load costs. The California Efficiency and Demand Management Council (CEDMC) recommended that minimum load costs only be included if the design was simple and suggested they only be considered in the day ahead market on the basis that the efficiency of resource scheduling is of greater importance under less stressed conditions. Vistra recommends that the pieces of CCDEBE "consistent with the board direction at the March 2018 BOG meeting" to reflect RDRR minimum load costs when it participates in the day ahead market. Western Power Trading Forum supported reflecting RDRR minimum load costs in the day ahead market. WPTF also requested information on the existing RDRR fleet's operating and dispatch characteristics and specifically requested that the CAISO: 1.) provided data on the percentage of MW of RDRRs with a non-zero Pmin value and 2.) discuss how energy prices should reflect scarcity pricing.
4. Lastly, CLECA suggested that rather than focus on a minimum load cost, the CAISO should focus on the "infeasible dispatch issue".

Response to Stakeholder Feedback:

Based on consideration of all of these comments and internal review, the CAISO in this revised straw proposal is clarifying that this issue pertains to real time RDRR minimum load costs and focuses on CLECA's proposal related to "infeasible dispatch" of RDRRs. The CAISO embarked on this effort to address stakeholder concerns about real time "infeasible dispatches" and started from the perspective of addressing if RDRR had minimum load cost.

In reviewing stakeholder responses, there was not clear evidence on what represented the actual costs of reaching the resources Pmin. While today the requirement is to have a $0/hr minimum load cost for RDRRs the CAISO observes that today all RDRRs have registered a Pmin of zero— understandably as the resource is unable to reflect a minimum load cost. Stakeholders have historically raised concerns regarding setting a Pmin close to Pmax in light of fluctuations in available load curtailment. Additionally, the CAISO observes challenges in representing RDRR costs as they are set at 95-100% of the bid cap in the CAISO's tariff to meet the intent of the RDRR Settlement Agreement that RDRR be used as a last resort resource.

The only two recommendations the CAISO received on specific costs to represent the cost to get to minimum load included representing bids as the minimum load cost and reflecting program costs as the minimum load costs. For the former, rationale was not provided to explain why this represents the cost for RDRR to operate at minimum load. In reflecting opportunity program costs as minimum load the CAISO notes opportunity cost is separate from minimum load. Additionally, it is not clear how program costs are not already reflected in bids or how they could reflect minimum load. In light of a lack of proposals on what costs represent the cost of reaching minimum load, the CAISO is shifting to CLECA's proposal to address the "infeasible" dispatch issue.

Additional clarification is addressed for specific questions raised in comments below:
Day Ahead Minimum Load Costs and CCDEBE Implementation

Vistra has requested the policies from CCDEBE be leveraged in this initiative. The CAISO notes it is pivoting from minimum load costs to addressing the infeasible dispatch issue. In addition, the issues developed for RDRR for minimum load and minimum load costs in in the Second Revised Draft Final Proposal for CCDEBE were removed from scope prior to board approval and the proposal being filed at FERC.

Characteristics of RDRR as of November 18, 2021:

In response to WPTF's questions on current RDRR operating characteristics, the CAISO notes that as of November 18, 2021, all RDRRs have their Pmin registered at zero and of the 1,440.64 MW of RDRR MW approximately 53% (770.3 MW) are registered as continuous and ~47% (670.34 MW) are registered as discrete.

Discussion of scarcity pricing:

As previously mentioned, the CAISO recognizes the concern raised by Vistra and WPTF to address price formation related to RDRRs through a separate initiative dedicated to scarcity pricing. The CAISO plans to begin the Price Formation Enhancements initiative in mid-2022.

Proposal:

In order to prevent an infeasible dispatch (e.g., movement up and down between the upper economic limit of the bid and a 0MW Pmin) of discrete RDRRs from occurring as a result of the resource appearing free as well as limitations in the current discrete dispatch functionality, the CAISO proposes a solution to raise the Pmin to just below the upper economic limit. In this proposed solution, while there would still be movement between the upper economic limit to the re-rated Pmin, the difference would be small enough to be negligible. This fully solves the infeasible dispatch issue but creates an issue where the resource appears to be very cheap (free) for a large number of MW. To solve that issue, the CAISO plans to calculate a minimum load cost adder based on the bid.

The process will use the CAISO's systems and will not require additional action on behalf of the participant:

1. For resources without day ahead schedules, the CAISO will set the minimum operating limit to a value just below the upper economic limit of the bid (i.e., the maximum megawatt limit of the bid), using existing Pmin-rerate functionality
2. The CAISO will add the value of the product of (bid price)*(upper economic limit) to the existing minimum load cost

This will enable the market to commit discrete RDRRs like a generator with a non-zero Pmin and recognize that the resource is not "free" from a startup perspective. The market would then publish the Pmin re-rate and minimum load cost to pre-settlement systems for Bid Cost Recovery purposes.

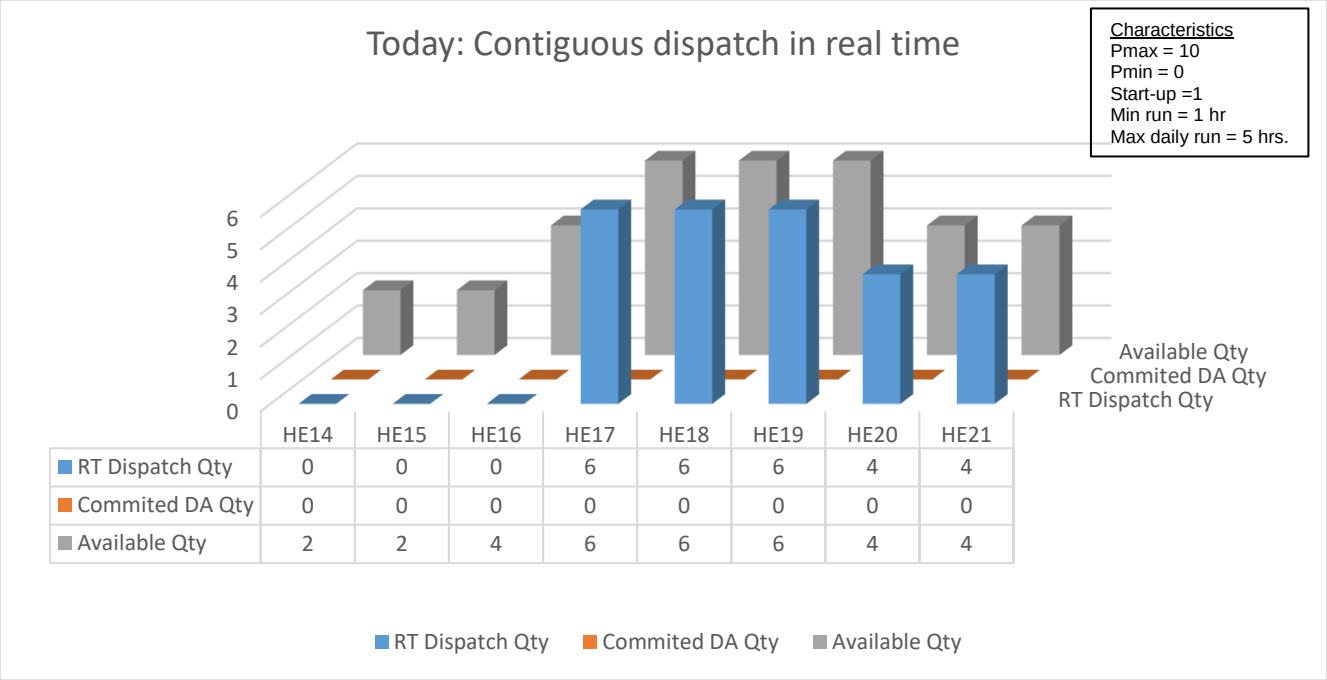
Examples:

Example A: State of the world today

Figure 1 and 2 below illustrate the situation RDRRs face today where in real time they can be dispatched either contiguously or non-contiguously (also referred to as "infeasible" by market participants).

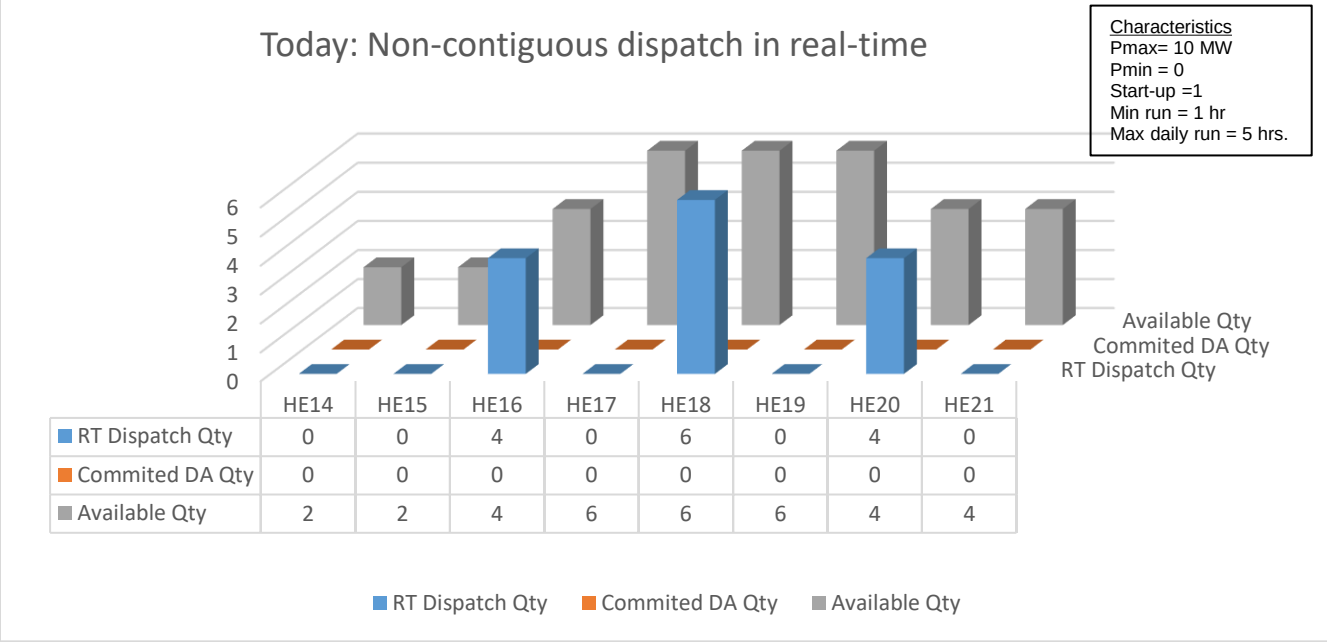
Figure 1 and Figure 2 represent a resource with a Pmax of ten, Pmin of zero, a start-up of one, a minimum runtime of one hour, and a maximum daily run time of five hours. Both figures demonstrate how the CAISO's optimization views both scenarios as respecting the max daily run time parameter. In general, a resource with zero Pmin and zero commitment costs will be considered on-line, even at zero, unless at zero for the entire period. In Figure 1 the resource is dispatched at HE 17 and contiguously on for five hours, which respects the max run time parameter. In Figure 2, the resource is dispatched starting in HE 16 and is moved between its upper economic limit and Pmin over the course of five hours and is an example of also respecting the max daily run time parameter.

Figure 1: Contiguous dispatch in the real-time market



	HE14	HE15	HE16	HE17	HE18	HE19	HE20	HE21
RT Dispatch Qty	0	0	0	6	6	6	4	4
Commited DA Qty	0	0	0	0	0	0	0	0
Available Qty	2	2	4	6	6	6	4	4

Figure 2: Non-contiguous dispatch in the real-time market



	HE14	HE15	HE16	HE17	HE18	HE19	HE20	HE21
RT Dispatch Qty	0	0	4	0	6	0	4	0
Commited DA Qty	0	0	0	0	0	0	0	0
Available Qty	2	2	4	6	6	6	4	4

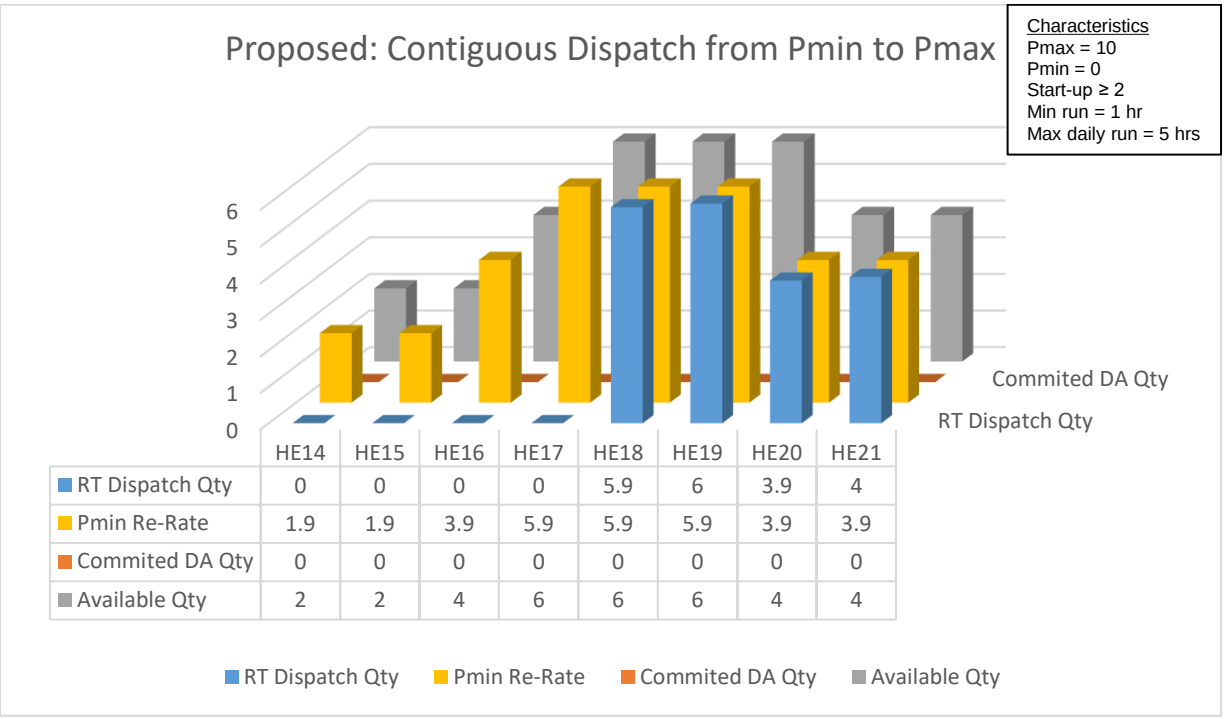
Example B: Proposed solution

This example demonstrates how the CAISO's proposed solution of a Pmin re-rate and value for minimum load cost help resolve the infeasible dispatch issue. In this example the RDRR has a Pmax of ten, Pmin of zero, a start up of one, a minimum runtime of one hour, a maximum daily run time of five hours, and a minimum load cost of zero. The resource has submitted real time bids for $950 for all real time intervals. The resource does not have any day ahead awards. As a result, the CAISO will automatically:

- Re-rate the minimum operating level (Pmin, reflected as the yellow bar in Figure 3) to below the upper economic limit (bid, reflected as the grey bar in Figure 3). As a result, the market will now view the re-rated Pmin as the resources Pmin in real time.
- Set the minimum load cost to ($950/MWh) * (5.9 MW) = $5,605/hour. The CAISO will consider this value the resource's commitment costs.

If committed the resource could be dispatched to 5.9 MW (re-rated Pmin) or 6 MW (bid). If we look at a single interval, in HE 18 when the resource is dispatched to 5.9 MW, their minimum operating limit of 5.9 MW and minimum load cost of $5,605/hour will be eligible for Bid Cost Recovery consideration.

Figure 3: Pmin re-rate and value for minimum load cost



	HE14	HE15	HE16	HE17	HE18	HE19	HE20	HE21
RT Dispatch Qty	0	0	0	0	5.9	6	3.9	4
Pmin Re-Rate	1.9	1.9	3.9	5.9	5.9	5.9	3.9	3.9
Commited DA Qty	0	0	0	0	0	0	0	0
Available Qty	2	2	4	6	6	6	4	4

Interaction with Summer Readiness

In the CAISO's Summer Readiness initiative the CAISO created two additional options for RDRR bidding and settlement:

- 60-minute: Energy schedule is committed for a clock hour (i.e. from top of hour to top of hour)
    - Dispatch notification is communicated 52.5 minutes before the flow of energy to align with existing HASP process.
        - In real time the startup and ramp rate is disregarded to meet this 52.5 minute notification
    - Resource is a price taker for the full hour
    - Not eligible for bid cost recovery
- 15-minute: Bids submitted in FMM
    - Dispatch notification is communicated 22.5 minutes before flow of energy to align with existing 15-minute hourly inter-tie process.
        - In real time the startup and ramp rate is disregarded to meet this 22.5 minute notification
    - Resource is dispatched at the FMM price
    - Eligible for bid cost recovery

The CAISO's proposed solution, to automatically re-rate the Pmin and input a default minimum load cost, would be automatic and compatible with all RDRR bidding options (5, 60 or 15-minute dispatch options).

3.3 RDRR Registration

RDRRs may register as either continuous or discrete, depending on their abilities. Discrete registration indicates the resource has one bid segment and when dispatched will generate to its Pmax. Continuous (non-discrete) registration indicates that a resource can operate anywhere between its Pmin and Pmax, based on the cleared bid quantity, similar to other resources. The CAISO has capped the RDRR discrete registration size to 50 MW. There is no cap on the size of an RDRR that is registered as continuous. The designation in the CAISO's Masterfile as continuous or discrete may be updated once per RDRR season.[20]

Today, a subset of RDRRs participate economically in the day ahead market and as a reliability product in real time. The CAISO requires that any resource that participates economically must register as continuous. As a result, some RDRRs representing 50MW or greater are registered as continuous as a result of bidding as economic in DA. The CAISO is concerned that some of these continuous resources do not have continuous capabilities. This conflict can result in infeasible dispatches in real-time when the CAISO is reliant on RDRRs' ability to meet their dispatch schedules.

The CAISO has received stakeholder feedback that the 50MW cap on discrete registration poses challenges for some RDRRs. These RDRRs are located within a sub-LAP, are larger than 50MW, and when dispatched operate together but due to the 50 MW cap are forced to be represented separately to the CAISO. The CAISO previously sought feedback on if changing the discrete cap on RDRR would better represent RDRR capabilities.

Stakeholder Feedback

The CAISO solicited feedback from stakeholders to understand if increasing the cap would enhance RDRR representation. In response, a majority of stakeholders recommended the cap for resources registering as discrete RDRR should either be increased or removed. The California Efficiency + Demand Management Council supported an increase but did not recommend a new cap. Three parties suggested the cap be eliminated including SCE, CLECA, and Enchanted Rock. Municipal Water District of Southern California proposed a specific cap of 150 MW. A few of the commenting parties were unclear on why the cap existed at all.

DMM recommended that the CAISO and stakeholders consider the impacts of increasing the cap before deciding to increase the 50 MW cap. DMM cautioned that increasing the 50 MW cap on discrete RDRR could exacerbate the detrimental impacts that allowing discrete resources to set price has on incentives for other, continuous resources to follow ISO dispatch. DMM also requested two areas of feedback: 1.) additional details about the issues that Scheduling Coordinators face today in splitting RDRRs into multiple discrete resources, sized 50MW or less 2.) clarity on why discrete RDRRs cannot participate economically in the day ahead market today.

[20] A season is a six month period (summer and winter). Once selected, the status shall be maintained throughout the season.

Response to Stakeholders:

Rationale for the current cap:

The current cap exists to mitigate the discrete-to-continuous treatment. As described in the Market Enhancements for Summer 2021, the move towards minimizing exceptional dispatch of RDRRs and increasing the market dispatch included making changes to allow 15-minutue and 5-minute dispatchable discrete RDRR to set market prices. To allow discrete resources to set the prices, the CAISO reflects these resources as discrete in the scheduling run, but treats them continuous in the pricing run.[21]

Every resource that uses the discrete option it has to potential to create an imbalance. For example, the market may need to dispatch a resource at 25MW when in reality the resource can be at 50MW. The delta creates an inconsistency in the market which will drive some pricing problems and can also create an imbalance between what the market does and what the actual system sees. When this results in an imbalance (i.e. energy generated does not equal energy consumed), area control error (ACE) could increase or decrease from zero, which can result in frequency deviations. If a discrete-continuous imbalance occurs it has to be absorbed in the CAISO's system through ACE or regulation, the larger it is the more meaningful it becomes to impact the operation of the system and the CAISO may have to procure more regulation or take more frequently outside the market actions like load conformance.[22]

In addition, from a pricing perspective when a discrete resource sets prices in the pricing run it will most often set a higher price than the price that the final and most expensive continuous resource dispatched in the scheduling run would have set. Coupled with a $0/hr min load cost, any final continuous resources in the bid stack will be dispatched to a point on their bid curve where their bid cost is less than the price set by the discrete resource. Thus the final continuous resource, whose costs are less than the price they could receive from the market have an incentive to deviate from dispatch instruction. The delta creates an inconsistency in the market which will drive some pricing problems and can also create an imbalance between what the market does and what the actual system sees.

Determining the cap requires examining the system impact to the CAISO and is a result of the total number of discrete resources and the total number of MW that are registered as discrete.

The CAISO's understanding on challenges SCs face in splitting RDRRs

The CAISO has received stakeholder feedback that some RDRRs operate together from a dispatch standpoint. For example, one resource may be 200 MW but represented as four discrete 50 MW RDRRs to the CAISO. However, from a utility dispatch perspective, they are only able to dispatch all 200MW together. Previously this was less of an issue as at or near a

[21] Market Enhancements for Summer 2021 Readiness Final Proposal, California ISO, March 19, 2021, p. 33: http://www.caiso.com/InitiativeDocuments/FinalProposal-MarketEnhancements-Summer2021Readiness.pdf

[22] Load conformance refers to the process of updating the load forecast to account for observed system conditions.

system emergency all RDRR was exceptionally dispatched together. However, now that the market is able to granularly define when and where RDRR needs to be dispatched, not all RDRR needs to be dispatched together.

The CAISO observes that not all utility demand response dispatch systems have evolved along with the RDRR model, which has always had a 50MW cap for discrete resources. Utility dispatch systems need tools to be able to granularly dispatch their programs. Rather than update their dispatch systems, some stakeholders have recommended that the CAISO eliminate the discrete RDRR cap.

The CAISO seeks feedback on two items:

1. The CAISO is interested to hear stakeholder feedback on why updates to utility dispatch systems is not an alternative approach to raising the discrete dispatch cap, which is an option that does not provide market benefits, only risks at the expense of all market participants.
2. The CAISO has attempted to accurately represent the feedback it has received on challenges some stakeholders have faced in dispatching their RDRR programs, and welcomes feedback from stakeholders to elaborate on what challenges they face in splitting their resources.

<u>Clarity on why discrete RDRR cannot participate economically in the day-ahead market today:</u>

It is a product of the RDRR settlement agreement that the CAISO allows RDRR to bid as a discrete resource. In general, blocky discrete resources do not promote efficient market outcomes. It is an exception afforded to RDRR enabling their participation in the real time market as a discrete resource.

The CAISO seeks feedback on:

1. Are any RDRRs registered as continuous when their capabilities are discrete? If so the CAISO would like to understand why the resources are not better represented as either discrete RDRRs or as separate Proxy Demand Response resources. While dual enrollment (e.g., one location with two DR resources) is prohibited, the CAISO would like a better understanding of why these resources are not better suited for PDR participation or being characterized as discrete RDRR.

Proposal:

Based on comments, internal analysis, the limited applicability of the use of this enhancement, and the opportunity for SCs to address this through IT dispatch systems, the CAISO does not plan to modify the discrete RDRR cap above its current 50MW cap.

- The discrete to continuous issue can result in imbalance and pricing problems in the CAISO's market. While there are a limited number of resources that have stated they would use this option, the size of the resources that seek to use this option could pose

detrimental impacts, and there are unknown future consequences if additional resources use this option in the future.

- This issue only applies to one Scheduling Coordinator, which highlights the ability for SC IT systems to accommodate this change as opposed to the market changing.
- The limited use of this change today if increased to 100MW, as we have been made aware of only four resources that would benefit from the increase of the cap to 100MW. To resolve the currently understood issue completely, a five-fold increase to the 50MW cap would be needed.

In light of the limited benefits and potential for future risks, the CAISO proposes to maintain the current discrete RDRR cap of 50MW.

The CAISO seeks feedback on this proposal not to change the discrete RDRR cap from 50MW.

4. EIM Governing Body Role

This initiative proposes changes to two separate elements of RDRR: options for bidding RDRR in the real-time market and cost representation of RDRR. The CAISO staff believes that the EIM Governing Body has joint authority with the Board of Governors over each of these elements.

The role of the EIM Governing Body with respect to policy initiatives changed on September 23, 2021, when the Board of Governors adopted revisions to the corporate bylaws and the Charter for EIM Governance to implement the Governance Review Committee's Part Two Proposal. Under the new rules, the Board and the EIM Governing Body have joint authority over any proposal to change or establish any CAISO tariff rule(s) applicable to the EIM Entity balancing authority areas, EIM Entities, or other market participants within the EIM Entity balancing authority areas, in their capacity as participants in EIM. This scope excludes from joint authority, without limitation, any proposals to change or establish tariff rule(s) applicable only to the CAISO balancing authority area or to the CAISO-controlled grid. Charter for EIM Governance § 2.2.1.

The tariff changes to implement the two elements of this initiative would be "applicable to EIM Entity balancing authority areas, EIM Entities, or other market participants within EIM Entity balancing authority areas, in their capacity as participants in EIM." EIM balancing authority areas may use the RDRR model assuming they have approval from their local regulatory authority and meet the requirements of RDRR participation. Accordingly, the proposed changes to the RDRR model fall within the scope of joint authority.

This proposed classification reflects the current state the initiative and could change as the stakeholder process moves ahead. The CAISO did not receive any comments in response to its issue paper and straw proposal on the EIM GB role.

5. Stakeholder Engagement Plan

Date	Milestone
12/14/2021	Publish revised straw proposal
12/22/2021	Stakeholder conference call on revised straw proposal
1/7/2022	Stakeholder comments due on revised straw proposal
1/24/2022	Publish draft final proposal
2/1/2022	Stakeholder conference call on draft final proposal
2/11/2021	Stakeholder comments due on draft final proposal
3/2/2022	Publish final proposal and draft tariff language
3/9/2022	Stakeholder conference call on draft tariff language
3/16/2022	Stakeholder comments due on final proposal and draft tariff language
April 2022	EIM Governing Body
April 2022	Board of Governors Meeting

6. Next Steps

In this revised straw proposal, the CAISO has tried to capture and describe the open issues stakeholders want resolved and the enhancements stakeholders would like to see made to the CAISO RDRR model. The CAISO will hold a stakeholder call on December 22, 2021 to review the revised straw paper and seek clarity on the issues or enhancements that stakeholders believe were not fully addressed or captured. The CAISO encourages all stakeholders to submit comments on the revised straw proposal and any additional items that should be considered as part of RDRR Bidding Enhancements by January 7, 2022.