Resource Adequacy
Modeling, Default Rules, and Ambient Derates (Track 1)
Straw Proposal

June 6, 2025

Contents

Executive Summary

The Resource Adequacy Modeling & Program Design (RAMPD) Track 1 Straw Proposal addresses two key topics: revising default qualifying capacity (QC) methodologies and the default planning reserve margin (PRM) and improving the accounting of capacity resource capabilities during peak load conditions to ensure an accurate reflection of real-world resource performance.

During RAMPD working groups, stakeholders questioned whether either current local regulatory authority (LRA) resource adequacy programs or CAISO default PRM and counting rules would meet a 0.1 loss of load expectation (LOLE). CAISO proposes to update the default RA qualifying capacity and reserve margin methodology in order to ensure that updated counting rules reflect the relative contribution of different resource types to reliability, and result in load serving entity (LSE) portfolios that meet a 0.1 LOLE reliability metric.

Specifically, the proposal replaces the current 15% default PRM with a PRM that is updated periodically based on the results of an LOLE study. Additionally, it updates the default qualifying capacity methodology (default counting rules) based on the same study. The updated methodology uses average effective load carrying capability (ELCC) for accreditation of most resource types since it incorporates both capacity and energy contributions of different resources through probabilistic modeling. This holistic RA framework can be adopted by LRAs in the balancing area if they chose to do so.

Stakeholders also expressed that the availability of resources based on varying seasonal ambient derates was not consistently reflected in resource net qualifying capacity, which can create reliability challenges. To ensure that resource performance assumptions match actual resource capabilities, the proposal creates a set of monthly "capability values" as part of the existing Net Qualifying Capacity (NQC) process. This is a proxy for a resource testing program which stakeholders indicated could be difficult to administer. These capability values are based on historical outage data and will represent each RA resource's capabilities during the peak load conditions that are often associated with high ambient temperatures in the CAISO BAA.

This proposal balances maintaining appropriate deference for LRA decision-making with the ability for CAISO to develop analytical tools and metrics to evaluate the adequacy of the CAISO BAA. Stakeholders should weigh in on these topics and suggest refinements to the proposal to maintain reliability and efficiency across the California grid. Based on stakeholder feedback, this proposal does not include an unforced capacity (UCAP) mechanism as a part of the NQC process, which was discussed during the working groups.

Background

All Regional Transmission Organizations and Independent System Operators (RTOs/ISOs) across North America have similar resource adequacy functions within in their balancing authority areas. Some RTOs/ISOs have a stronger role in forward planning and procurement including the direct procurement of resources multiple years forward. Others defer more to their constituent regulatory authorities (state public utility commissions, etc.) in conducting integrated resource planning and procurement.

In California today, LRAs, LSEs, scheduling coordinators (SCs), and CAISO all perform critical roles in ensuring a well-functioning resource adequacy program. This straw proposal is intended to enhance that framework while maintaining the current roles and responsibilities. In general, the LRAs have the primary roles in setting system requirements and counting rules, conducting integrated resource planning (IRP), and directing procurement of new and existing resources. CAISO, in turn, has the responsibilities in the shorter term to efficiently and reliably operationalize resource adequacy. Key provisions within the scope of CAISO's operational role in resource adequacy include:

1. Must offer obligations
2. Availability and performance incentives
3. Outage coordination
4. Backstop procurement processes

Given CAISO's unique role in operating the grid, it is appropriate for the CAISO to stay closely coordinated with LRA program designs and provide insight into the operational needs of the system.

Each of the design elements included in CAISO's scoped RA reform initiatives, including this proposal, is intended to either directly improve existing RA processes at CAISO or, in the case of updated default RA rules, to provide LRAs with the information they need to reliably and efficiently perform their planning functions. In this effort, CAISO is pursuing a path to allow the CAISO balancing area to operate reliably while maintaining the current roles and responsibilities in resource adequacy.

1 Updating CAISO's Default Resource Adequacy Rules

Problem Statements

As a part of the 2023-2024 RA Modeling & Program Design working groups, the following sub-issues were identified as a part of the larger RA problem statement:

- *There is a need for additional information regarding the sufficiency of the LRA RA programs to meet 0.1 LOLE.*
- *The CAISO default PRM should be assessed in light of changes in the RA resource mix and evolving reliability needs within the CAISO BAA. CAISO's default PRM and default counting rules should meet at least a 0.1 LOLE at the CAISO BAA level.*
- *CAISO needs consistent, transparent, and timely information on the sufficiency of the RA fleet in the CAISO BAA. Without this information, the ISO faces challenges in assessing and communicating the system-wide sufficiency of the CAISO BAA in light of the contracted RA fleet.*
- *A stakeholder initiative should evaluate how well current LRA-established PRMs and counting rules reflect forced outage rates, performance, and availability. In response to potentially changing regulatory structures at the California Public Utilities Commission (including the scoping of UCAP), CAISO has an opportunity to establish alternatives to the current resource counting design and eliminate/redefine availability and performance incentives while acknowledging LRA authority to establish counting rules.*

Objectives

In updating the default RA qualifying capacity and planning reserve margin methodology in the tariff, CAISO seeks to model counting rules and a PRM that balance the following objectives:

- Counting rules included in the CAISO tariff should reflect the relative contribution of different resource types—and individual resources—to maintain BAA-wide and local reliability
- The PRM methodology in the CAISO tariff should be designed alongside such counting rules to create a coherent set of RA standards
- If these standards were adopted by all LRAs within the BAA, the resulting compliant LSE capacity portfolios could reasonably be expected to meet at least a 0.1 LOLE

These objectives were outlined in the November 2024 RAMPD issue paper.

Stakeholder Feedback

In February 2025, CAISO held a workshop[1] to discuss different counting rule options in more detail based on the needs and challenges shared in its RA issue paper published in November 2024. At the workshop, stakeholders recognized the purpose of CAISO's default rules: LRA representatives continue to indicate that they have the responsibility to determine their own RA qualifying capacity rules and PRM and provide them to be included in the CAISO's NQC list and showings process. Indeed, qualifying capacity is the maximum RA capacity that an RA resource may be eligible to provide. The criteria and methodology for calculating the QC of resources is established by the California Public Utilities Commission (CPUC) or other LRAs and provided to CAISO. Then, a resource's eligibility to provide RA capacity may be reduced *below* its QC through the CAISO's assessment of Net Qualifying Capacity. CAISO Tariff Section 40.4 outlines how QC values can be reduced, as applicable, based on: (1) testing and verification; (2) application of performance criteria; and (3) deliverability restrictions.

LRA representatives generally supported the current policy where CAISO's default rules would only be applied in the case that an LRA did not provide a QC methodology and PRM as described in the tariff. However, Six Cities and California Department of Water Resources (CDWR) indicated that updated default rules could serve a tool for LRA reference in developing and revising their own RA programs. Below is a summary of the various default counting rule and PRM options offered by CAISO at the February 2025 workshop. Each proposal utilized a PRM assessed against the median peak load forecast for the BAA, except for proposal 4 which indicated a PRM set based on a "worst day" across all 24 hours of the day.

[1] Workshop materials for reference can be found on the stakeholder initiative website: https://stakeholdercenter.caiso.com/StakeholderInitiatives/Resource-adequacy-modeling-and-program-design

Figure 1: Assorted Proposals from CAISO February 2025 RAMPD Workshop

<table>
<tr><th></th><th>Proposal 1</th><th>Proposal 2</th><th>Proposal 3</th><th>Proposal 4</th></tr>
<tr><td>Description</td><td>Reasonably expected output</td><td>Average ELCC for all resources</td><td>Marginal ELCC based on critical hours</td><td>24-hour monthly peak-day stack</td></tr>
<tr><td>Thermal</td><td rowspan="3">Availability of resources in at-risk hours</td><td rowspan="6">Average ELCC</td><td rowspan="6">Marginal ELCC</td><td rowspan="2">Ambient derates combined with UCAP</td></tr>
<tr><td>Renewable Thermal</td></tr>
<tr><td>Storage (includes hybrid and collocated)</td><td>Predefined dispatch hours with charging sufficiency</td></tr>
<tr><td>Hydro</td><td>(High/Mid/Low) ELCC based on expected hydro</td><td rowspan="3">Exceedance Values</td></tr>
<tr><td>Wind</td><td rowspan="2">Average ELCC</td></tr>
<tr><td>Solar</td></tr>
</table>

Northern California Power Agency (NCPA) expressed support for Proposal 1 from the February 2025 workshop, which included a mix of average ELCC and resource-specific UCAP QC methodologies.

CPUC-jurisdictional LSEs and several RA suppliers noted that they are subject to the QC methodologies and PRM determined by the CPUC. However, they have indicated support for a set of CAISO default rules and PRM that achieve a 0.1 LOLE. These stakeholders recommended consistency with the CPUC's rules, but they did not detail the extent to which interoperability is necessary. Pacific Gas & Electric (PG&E) noted that Proposals 1 and 4 might align best with CPUC's Slice of Day program.

CPUC Energy Division (ED) staff commented in support of Proposal 4 from the February 2025 CAISO RAMPD stakeholder workshop. This proposal would align

CAISO's default rules with CPUC's Slice of Day program. However, CAISO has not proposed a 24-hour showings verification process. In light of this, other LRAs such as Six Cities and NCPA supported a continuation of CAISO's single monthly value approach to the default counting rules. CPUC ED staff expressed concerns with CAISO's Proposals 1-3 for default rules, noting a mismatch between the hours used to calculate resource adequacy requirements (the PRM) and the resource contribution during peak risk periods (such as net peak) when VERs are not contributing significant capacity. If CAISO proceeds with Proposals 1 or 2, CPUC ED staff recommended developing two QC values for resources: one for the managed peak and another for hours of highest loss of load expectation, using an exceedance methodology for wind and solar to maintain consistency with CPUC rules. CAISO acknowledges that the assumptions in the probabilistic model will dictate the resulting PRM and ELCC values. The proposal includes stakeholder involvement opportunities as CAISO works to continue evolving the modeling process.

Overall, LRA stakeholders expressed apprehension about CAISO applying a UCAP derate through the NQC process. However, they were less concerned about developing a resource-specific UCAP mechanism as a default QC methodology. LSEs and suppliers continued to support alignment between CPUC and CAISO UCAP designs.

Proposal Overview

In light of the problem statements, initiative objectives, and stakeholder comments above, CAISO is proposing an updated set of tariff default qualifying capacity methodologies and a corresponding default planning reserve margin for stakeholder consideration and feedback. CAISO has not updated the current default rules since the inception of resource adequacy in California twenty years ago.

While the current CAISO tariff contains a 15% default planning reserve margin, CAISO intends to revise the appropriate default PRM after running a periodic (annual or otherwise) LOLE study process with the best available, stakeholder-guided inputs and assumptions. Due to this, the CAISO proposes not including a numeric default PRM in the tariff itself but instead allowing for relatively frequent LOLE studies to inform the default rules. This would also allow for LRAs, as a part of an annual process, to adopt class-based and resource-specific QC values from CAISO's default methodologies (and corresponding PRM) for their capacity accreditation program if they wish. This could be provided on an informational basis through a "CAISO default QC list." Such a reference document could be issued concurrently with the draft NQC list in the year preceding the RA year. This would allow for LRAs to draw from the CAISO default QC list as a part of their annual engagement in the current tariff Section 40.4 NQC list process.

CAISO proposes to:

- Revise CAISO Tariff Section 40.8 to include an overview of the process by which CAISO shall set the default PRM and default qualifying capacity methodologies
- Develop the CAISO Business Practice Manuals to detail the probabilistic study methodology and more specific details regarding QC methodologies
- Establish a CAISO process which would, annually or as necessary, allow stakeholders to provide feedback into the loss of load expectation study process, inputs, and assumptions

In the February 2025 workshop materials, CAISO included a conceptual framework for a UCAP mechanism as a part of the NQC process to ensure forced outages are incorporated into resource accreditation in a consistent manner across all LRA programs. The proposed concept would have only applied if LRAs had not already implemented a probabilistic or performance-based QC methodology in their own process. LRA stakeholders were not supportive of this concept, as discussed in the previous section, and recommended against CAISO proposing any change to accreditation authority in such a manner. Additionally, the CPUC Energy Division staff have proposed a UCAP mechanism that would impact nearly the entire thermal and storage fleet.

Thus, this proposal only includes a UCAP mechanism as a part of the default QC methodology and not as a mandatory step in the NQC process. CAISO anticipates that as the CPUC finalizes its UCAP design, opportunities will emerge to better align CAISO's default rules with the CPUC's UCAP. At the same time, it is important to ensure that any chosen accreditation approach is compatible with the program designs of other LRAs. While there are clear benefits to an effective and standardized UCAP methodology—one that captures an appropriate counting value and provides an incentive for availability—it is also important to recognize that different LRAs may ultimately adopt varying approaches to capturing resource-specific historical availability through accreditation.

Below is a high-level comparison of CAISO's current and proposed new default QC methodologies for various resource types.

Figure 2: Current and Proposed CAISO Default QC Methodology

Resource type	Current CAISO Default	Proposed CAISO Default
Wind & solar	Based on monthly historic performance over a three-year rolling average from noon to 6pm. These hours were intended to represent gross peak hours, i.e. the peak energy demand in the CAISO BAA. Today, these hours of the day do not correspond with the system net peak hours	Average effective load carrying capability (ELCC) – includes solar thermal resources
Energy storage	Based on CAISO testing of a resource's sustained output over a four-hour period (and not to exceed that resource's maximum instantaneous discharge capability)	Average ELCC (applies to standalone limited energy storage resources, hybrid, and co-located resources), with pumped hydro resources assessed using a supply cushion UCAP method
Thermal	Based on "net dependable capacity" defined by NERC Generating Availability Data System information (GADS)	Supply cushion, resource specific UCAP based on three years of historic outage data (applies to thermal resources of all fuel types, including gas, biomass, geothermal, and nuclear)
Dispatchable hydro	Based on net dependable capacity defined by NERC GADS minus variable head derated based on an average dry year reservoir level	Average ELCC with assumed average hydro year conditions
Demand response	Based on a resource's average monthly historic demand reduction performance during that same month during the RAAIM Availability Assessment Hours	Performance-based UCAP, utilizing a factor based on performance relative to dispatch in lieu of forced outage data

Below is more information on the initial proposed default QC methodologies specified in Figure 2.

Supply Cushion UCAP

Supply cushion UCAP will be used as a default QC methodology for pumped hydro resources and all thermal resources, including biomass, gas, geothermal, and nuclear, but not including solar thermal. These resources are largely available throughout the day with few or no energy limitations that impact the daily dispatch of the resources. Where energy limitations exist, the affected resources generate at a high enough capacity to allow for full dispatch during the hours with the greatest reliability concern, specifically, the hours with a small supply cushion (discussed below). The RA supply cushion represents how much shown RA (in megawatts) remains available after taking into account outages, serving net demand, and covering contingency reserves. The RA supply cushion, measured in megawatts, is defined in the below equation:

RA Supply Cushion = Daily Shown RA (excluding wind and solar) – Planned Outages – Opportunity Outages – Urgent Outages – Forced Outages – Net Load – Contingency Reserves

Where "contingency reserves" represents regulation up, spin and non-spin reserves. These supply cushion values are calculated as an hourly value, which requires taking the mean of the 12 5-minute measured interval data to aggregate into an hourly average.

The supply cushion hours will be identified in the peak and non-peak months, which will result in a peak month UCAP value and an off-peak month UCAP value. CAISO is reviewing how to best split months into peak and off-peak months, but expects the peak season to include June through September at a minimum. The final supply cushion hours used in the UCAP calculation will be the 20% "tightest" (lowest) supply cushion hours in the peak and non-peak months.

The UCAP values will be calculated for each season for each of the past three years, with heavier weighting towards the most recent year.

$$UCAP = 0.45\left(UCAP_{y-1}\right) + 0.35\left(UCAP_{y-2}\right) + 0.20\left(UCAP_{y-3}\right)$$

Where the UCAP value for each year will be determined by the following equation:

$$UCAP_{year} = P_{max} \cdot \left(1 - \frac{1}{SCH} \sum_{i=1}^{n} \frac{\left(P_{out,i}\right)}{P_{max}}\right)$$

Where,

$$SCH = Total\ number\ of\ Supply\ Cushion\ Hours$$

$$P_{out,i} = Average\ capacity\ unavailable\ during\ hour\ i$$

$$P_{max} = Installed\ capacity$$

Outage data will be sourced from CAISO's outage management system.

Performance-based UCAP for Demand Response

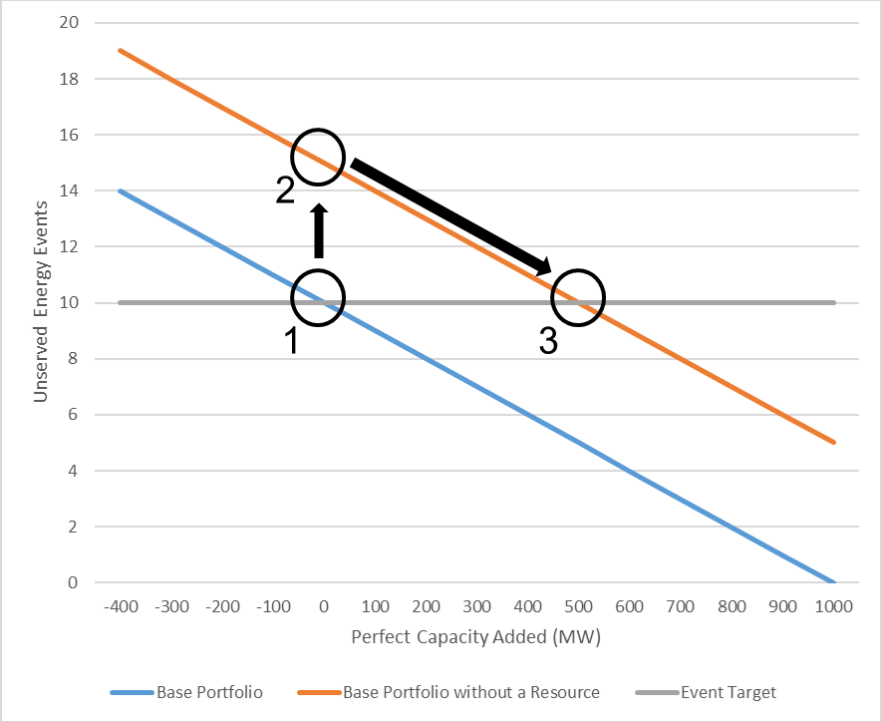
Performance-based UCAP accreditation is proposed for supply side demand response resources. CAISO will base this calculation on the historical performance over the prior three years and compare DR resource dispatches and tests to actual performance to establish the UCAP value. This will be done at the DR provider level, rather than at an individual resource-specific level. This level of analysis will discourage changing or creating new resource IDs to reset an aggregation's qualifying capacity calculation. It will also ensure greater availability of an accurate historic performance record.

Average ELCC

The average ELCC of each resource type (see Figure 1) will be found by first finding the amount of perfect capacity (PCAP) that is equivalent to the reliability contribution of the entire fleet of that resource type, by replacing the resource with "perfect" capacity (a modeled capacity resource that is always 100% available to meet energy needs) needed to achieve the same reliability. This will be done on a monthly basis. The process is shown in the below figure for a month that has ten outage events in the base resource mix.

1. Start with the base resource mix
2. Remove the capacity associated with a particular resource type on the NQC list, which increases the number of unserved energy events
3. Add "perfect" capacity to the system until the number of unserved energy events returns to the initial number of events. The added perfect capacity is the PCAP value of the entire resource type

Figure 3: Illustration of average effective load carrying capability calculation process



This "PCAP" value will be found for each ELCC-based resource (at a class level) individually, and then repeat the process for all ELCC based resource classes together as a whole. This final step of removing all solar, wind, batteries, and hydro in a single simulation set enables the calculation of a PCAP value for the entire set of assessed resources. The purpose of this final calculation is to account for interactive effects between different ELCC resources. To achieve this, the PCAP of each resource type will be scaled such that the individual QC values do not exceed the PCAP value of all the ELCC resources combined.

This will be done by calculation of a scaling factor, specifically α:

$$\alpha = \frac{PCAP_{solar} + PCAP_{wind} + PCAP_{LESR} + PCAP_{hydro}}{PCAP_{ELCC}}$$

Then the individual ELCC of each resource class will be calculated in the following manner, using solar as the example:

$$ELCC_{solar} = \frac{PCAP_{solar}}{\alpha \cdot ICAP_{solar}}$$

Where:

$$PCAP_{ELCC} = the\ total\ PCAP\ from\ all\ ELCC\ resources$$

$$\alpha = scaling\ factor$$

$$PCAP_{solar} = Perfect\ capacity\ needed\ to\ replace\ the\ solar$$

$$ICAP_{solar} = Installed\ capacity\ of\ Solar$$

$$ELCC_{solar} = Effective\ load\ carrying\ capability\ of\ solar$$

Additional default methodologies for new resource types will be developed as necessary through the recurring stakeholder process outlined above.

The default planning reserve margin would be measured against the managed peak load forecast and set monthly to achieve an annual 0.1 LOLE. CAISO's proposal includes differing PRMs for each month because this approach allows a capacity portfolio that meets the margin requirements to achieve an annual 0.1 LOLE target.

Specifically, the PRM for each month is a function of the UCAP for thermal, pumped hydro, and demand response resources included in the calibrated model, the total QC provided by the ELCC resources, and the modeled import capacity. The set of monthly PRMs, along with the QC values, would result in a capacity portfolio that could achieve a 0.1 LOLE threshold across the year.

$$PRM_{month} = \left(\frac{\sum QC\ of\ the\ monthly\ portfolio\ \ (\sum_i^n UCAP_i\ , QC_{ELCC}, DR)}{Peak_{month}} - 1\right) \times 100\%$$

Where,

$$Peak_{month} = \ Maximum\ monthly\ managed\ peak\ 1-in-2\ load\ forecast$$

$$\sum_i^n UCAP_i = Sum\ of\ the\ UCAP\ of\ \ all\ resources\ included\ in\ the\ model$$

$$PRM_{month} = The\ planning\ reserve\ margin\ for\ the\ month$$

Additional materials on the details of the loss of load expectation study process such as the model inputs, assumption, and settings can be found on CAISO's seasonal

assessments webpage.[2] The annual modeling process that informs the proposed assessments above will be based on the most recent CAISO Summer Loads & Resources Assessment model.

Proposal Advantages and Tradeoffs

CAISO presented various accreditation methodologies with stakeholders during the November 2024 and February 2025 RAMPD workshops. Based on stakeholder feedback and with an objective of a set of default rules that meets a 0.1 LOLE, CAISO is proposing this methodology, which largely aligns with Proposal 1 as presented in the February workshop.

This proposal is designed with both stakeholder feedback and CAISO's current showings process in mind, which utilizes a single monthly showing value for each resource. LRA representatives indicated a preference for a set of default rules that applies to today's single monthly value showing process. It is worth noting, however, that CAISO has scoped the consideration of an energy sufficiency verification, and potentially a second showing verification in the net peak hour, for a future phase of Track 3 in the RAMPD stakeholder process.

Thus, average ELCC is proposed for accreditation of most resource types, since it incorporates both capacity and energy contributions of different resources into a single value through probabilistic modeling. CAISO's goal is to align its UCAP design with the design proposed by the CPUC Energy Division.[3] Notably, for the resources accredited using an average ELCC methodology, we are not proposing a resource-specific availability incentive at this time in order to simplify the methodology. However, CAISO is interested in stakeholders' input on a potential resource-specific adjustment to incentivize better performance depending on the LRA needs in their RA program.

As proposed above, CAISO intends to publish an annual default qualifying capacity list so that LRAs could choose to utilize those values for capacity accreditation. A key consideration here is the challenges around resources partially shown by multiple LSEs that are subject to different LRA accreditation programs. This challenge, which exists today, is highlighted in the November 2024 RAMPD Issue Paper. This concern could be exacerbated if an LRA were to adopt CAISO's default QC methodology and PRM and

[2] See: https://www.caiso.com/library/seasonal-assessments

[3] See CPUC Energy Division's most recent proposal here: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M553/K679/553679249.PDF.

submit a showing that includes a portion of a resource, while at the same time, a CPUC-jurisdictional LSE also submits a showing that includes a portion of the same resource. In this case, CAISO accounts for a partially shown resource using the highest of the LRA QC values provided. The extent of the impact of this is unknown, but CAISO RA processes could be implicated if the LRA programs diverge dramatically, including substitution requirements and CAISO's determination to utilize the capacity procurement mechanism.

Finally, the default QC methodology for demand response was selected for simplicity and accuracy. In 2024, CAISO staff engaged in a working group facilitated by the California Energy Commission and the CPUC with the goal of developing a revised demand response capacity accreditation methodology for the CPUC to replace the current load impact protocol process. The working group has concluded; agency staff are still developing the final proposal. CAISO's default methodology is not intended to replace this process, particularly since nearly all demand response resources on RA supply plans are already subject to CPUC's LRA jurisdiction and accreditation.

CAISO is open to stakeholder feedback on the importance of these tradeoffs and the merit of considering alternative approaches.

2 Accounting for RA Resource Capabilities during Peak Conditions

Problem Statement

As a part of the RA Modeling & Program Design working groups that began in fall 2023, the following sub-issue was identified as a part of the greater RA problem statements:

> *The availability of resources based on varying seasonal ambient derates is not consistently reflected in resource net qualifying capacity (NQC) today which creates challenges in reliably operating the grid.*

Objectives

To address the problem statement above, CAISO aims to ensure that resources can perform in a way that matches with baseline assumptions about their availability.

- Minimum requirements should be adopted such that CAISO can rely on capacity to perform consistent with its RA value during peak load conditions in a given season, i.e., resources' NQC values should reflect their expected ability to perform in peak load conditions.
- Such requirements should account for ambient derates due to temperature and thereby minimize the difference between shown capacity and available capacity during peak load conditions.

Capacity accreditation, which has traditionally been the purview of local regulatory authorities in the CAISO BAA, "provides the link between resource adequacy—measuring overall system reliability—and the reliability contributions of individual resources."[4] The objective of this element of the proposal is not to determine contribution of RA resources to the reliability of the whole system, but to verify that those resources have the physical capability to perform during a reasonable set of conditions.

Stakeholder Feedback

In February 2025, CAISO held a workshop to discuss different policy options in more detail based on the needs and challenges shared in its RA issue paper published at the end of 2024. The workshop explored the idea of a testing program similar to MISO's

[4] ESIG-Design-principles-capacity-accreditation-report-2023.pdf

Generator Verification Test Capacity program or the Western Resource Adequacy Program's Capability and Operational Testing programs. Such a program could make use of CAISO's existing tariff authority under Section 40.4.4. This section allows RA resources' QC values to be reduced if "a CAISO testing program determines that it is not capable of supplying the full Qualifying Capacity amount."

In the workshop, CAISO discussed the challenges of implementing such a resource testing program. Staff compared this concept to an alternative approach driven by historic outage data suggested by stakeholders in comments. Such an approach would be designed to achieve the same outcome as a testing program: capturing resources' impacts from ambient derates due to temperature during recent peak load conditions. Regardless of the methodology (testing or operational data-based), the results of the assessment should ensure that resource capabilities are accurately represented during such conditions.

Stakeholders discussed concerns around the possibility of double counting of ambient derates in both a proposed CAISO NQC modification *and* in LRA UCAP programs. They also shared concerns related to modification to the must-offer obligation in light of accounting for ambient derates due to temperature, and interactions with RAAIM (current design or otherwise). Stakeholder feedback from the workshop and comments is summarized here.

American Clean Power – California, NCPA, and Six Cities all expressed concerns about counting historic ambient derates twice and encouraged CAISO to ensure that such impacts not be incorporated in UCAP-based QC reductions by LRAs *and* the NQC process.

CalCCA, PG&E, and the Western Power Trading Forum all leaned toward an approach using a historical lookback (as opposed to a testing program). CalCCA recommended allowing SCs to submit unit capability testing results when historical data is disputed or otherwise insufficient. PG&E supports an NQC-based approach but wanted clarity on how peak conditions would be determined. WPTF described a "maximum possible capacity" value based on performance during a small sample of highest load days over recent prior years. PG&E indicated a concern that using too narrow a set of peak days for assessing resources' ambient derates could result in a value that is too conservative.

Generally, stakeholders viewed the potential benefits of a testing program as providing limited value compared to the administrative costs of such a program.

Finally, CAISO staff asked stakeholders to give feedback on the connection between an RA resource's hypothetical capability-tested value (similar to an installed capacity (ICAP) value as defined in other markets), its UCAP value as defined by an LRA's QC

methodology, and its must-offer obligation. PG&E and CPUC Energy Division indicated support for *not* reducing an RA resource's must offer obligation based on any accounting for ambient derates, and Calpine shared that other markets place an expectation on RA resources to offer their full installed capacity value. However, Six Cities pointed out challenges with changing the must offer obligation to a greater value than the NQC value.

Proposal Overview

Based on stakeholder feedback, this proposal focuses on a method that utilizes performance data to produce a proxy for the results of a testing verification program. This proposal discusses a method consisting of verifying QC values based on historic outage data to ensure RA resources' operational capabilities during peak load conditions are reflected in NQC values. Given the challenges and administrative burden of developing an NQC testing program in accordance with CAISO Tariff Section 40.4.4, CAISO is not moving forward with a testing-based proposal.

Based on the conceptual feedback above, CAISO is putting forth a proposal to create a set of monthly "capability values" as a part of the existing Net Qualifying Capacity process. These values are intended to represent each RA resource's capabilities during peak load conditions which often correlate with high ambient temperatures in the CAISO BAA.

Today, there is no CAISO testing program that exists specifically to verify the qualifying capacity value of an RA resource. CAISO's Operating Procedure 5330, "Resource Testing Guidelines," provides guidelines for Ancillary Services Certification Tests, PMax or PMin tests, and other resource tests. After these tests are carried out, a resource's PMax may be revised based on the results, if necessary. When the generator's Resource Data Template is updated based on new test results, if the resource is listed in CAISO's NQC list, its NQC will be updated the following year based on the resulting updated Master File values if the PMax value in the Master File is updated to be lower than the resource's NQC value from the previous year. However, as mentioned above, no testing program exists for verifying NQC values specifically.

In order to create a proxy for the results of a capability verification testing program, this proposal focuses on a resource-specific assessment as opposed to any use of generator class average. This proposal would only apply to thermal resources (gas, oil, coal, nuclear, biomass, geothermal, and biogas fuel types). The steps of the proposed assessment process concept are as follows:

1. Examine peak load conditions in recent years to determine assessment days (for all resources)

2. On a resource-specific basis, review impacts from the "ambient derates due to temperature" forced outage nature of work during conditions identified in step 1
3. Produce a "capability value"
4. Compare capability value to each month's QC value
5. Take the lower of the two values for each month (between the capability value and QC value)
6. If the resource is not subject to full capacity deliverability status, reduce for deliverability through the existing Section 40.4.6 process
7. Result: NQC value

As mentioned in the previous section, some stakeholders expressed interest in reviewing the relationship between a resource's capability-verified installed capacity value, its QC value (potentially reduced via an LRA's UCAP accreditation), and the must offer obligation. The CPUC Energy Division indicated a desire to explore a scenario where resources' must-offer obligations (MOO) would not be limited to their UCAP factor (as would be the case under current rules) but instead would want to avoid "discouraging the resource from offering up to its Pmax provided the capacity is available." At this time, this proposal does *not* include a change to the MOO rules as described in Section 7.1.1 in CAISO's Reliability Requirements BPM. However, CAISO is interested in further stakeholder discussion on this topic and is willing to refine the proposal based on feedback.

The first two steps listed above encompass the methodology through which CAISO is attempting to produce a proxy for a resource capability verification testing program. There are various methodologies that could be used to achieve this capability value on a resource specific basis.

CAISO is proposing an approach based on stakeholder suggestions during workshops in early 2025: first, examine peak load conditions in recent years to determine assessment days (the same days for every resource). This will be based on the days with the highest CAISO BAA net load (the historic system-wide load for a given recorded from the 5-minute market with twelve real-time dispatch load intervals averaged to represent an hourly value).

This proposal is designed to represent resource capabilities during median peak load conditions. Other CAISO and LRA processes exist to account for tail risk from extreme conditions. In order to exclude such events, the assessment period will first determine the twenty days with the highest hourly peak load over the past two years, and then only use the lowest ten of those twenty days. Then, on a resource-specific basis, review impacts from the "ambient derates due to temperature" forced outage nature of work during the days identified in the method described above. This assessment will result in

a capability factor that can be multiplied by a resource's Pmax to create a capability value.

$$C_f = 1 - \frac{1}{i}\sum_{h=1}^{i}\frac{ADT_h}{P_{\max}}$$

$$C = C_f \times P_{\max}$$

Where:

- P_{max}: RA resource's P_{max} value in MW
- i: Number of assessment hours over the two-year period (10 x 24)
- ADT_h: Magnitude (in MW) of ambient derate due to temperature outage during hour h
- C_f : capability factor
- C: capability value

Then, the resulting capability value can be compared to the resource's QC value as described in steps 4 through 7 above.

Proposal Advantages and Tradeoffs

This method of calculating capability values is straightforward and can be done by CAISO on a resource-specific basis through analysis of resource-level CAISO outage management system data. However, it has a notable drawback: forced outages are not consistently reported by resource SCs when a resource is experiencing multiple overlapping outages. For example, if a resource is subject to a forced outage with the "plant trouble" nature of work that puts its entire capacity value on outage, it may not report a concurrent "ambient derate due to temperature" nature of work forced outage even though it would have been subject to this nature of work contemporaneously. This could cause the assessment method to undercount ambient derates due to temperature. CAISO is interested in stakeholder feedback on this element.

An **alternative methodology** may avoid the issue above. To establish monthly capability values for thermal resources, SCs could adjust proposed QC values based on site-specific generator performance information under typical peak system conditions.

The generator capability would be normalized to reflect ambient conditions observed during past peak demand events. Specifically, the generating unit's monthly capability value would be determined by the SC by correcting the QC to the unit's capabilities during average ambient conditions (e.g., temperature, barometric pressure, humidity)

recorded at or near the generator's location during recent monthly coincident peak events, dates which could be published by CAISO.

If on-site weather data is unavailable, SCs could reference the most accurate local data available—such as from nearby weather stations—to determine average conditions for each month's peak. MISO, for example, publishes the dates and times of these historical coincident peaks to support this as a part of its Generation Verification Test Capacity process.

Using these average conditions, SCs would identify, from the generator's manufacturer-provided capability curve, the maximum output (in MW) achievable while maintaining the minimum and/or maximum power factor as required under the CAISO Tariff. This value could establish the monthly capability value and would be used to ensure alignment between NQC values and the generator's likely performance under typical peak system conditions.

Governing Body Role

CAISO staff believe that this initiative should be presented only to the CAISO Board of Governors (the Board) for decision, because any proposed tariff amendments will be limited to CAISO's balancing authority area's resource adequacy rules. For these reasons, the initiative falls outside the scope of authority of the Western Energy Markets (WEM) Governing Body.

The WEM Governing Body has joint authority together with the Board over any proposal to change or establish any CAISO tariff rule(s) applicable to the EDAM or WEIM Entity balancing authority areas, EDAM or WEIM Entities, or other market participants within the EDAM or WEIM Entity balancing authority areas, in their capacity as participants in either the WEIM or EDAM. This scope excludes from joint authority, without limitation, any proposals to change or establish tariff rule(s) applicable only to the ISO balancing authority area or to the ISO-controlled grid. Charter for WEIM Governance § 2.2.1. None of the tariff rule changes contemplated in this initiative would be "applicable to WEIM Entity balancing authority areas, WEIM Entities, or other market participants within WEIM Entity balancing authority areas, in their capacity as participants in WEIM." Rather, the proposed tariff rules would be applicable "only to the ISO balancing authority area or to the ISO-controlled grid." Accordingly, the matters scheduled for decision fall outside the scope of joint authority. While the WEM Governing Body "may provide advisory input over proposals to change or establish tariff rules that would apply to the real-time market but are not within the scope of joint authority," no aspects of this

initiative would establish rules for the real time market. Accordingly, this initiative falls outside of the WEM Governing Body's advisory role as well.

Stakeholders are encouraged to submit a response in their written comments to the proposed classification of as described above, particularly if they have concerns or questions.

Next Steps

Please submit comments on this Straw Proposal and the June 11 workshop by June 25, 2025 using the comment template on the CAISO stakeholder website. After the June 11 workshop, CAISO plans to release illustrative default QC and PRM values based on the proposed default methodologies so that stakeholders can assess concrete examples of the resulting program.