



California ISO

Resource Adequacy Modeling & Program Design  
RAAIM and Outage Substitution (Track 2)  
**Straw Proposal**

May 11, 2026

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## Executive Summary

California's resource adequacy (RA) framework relies on a clear division of responsibilities: Local regulatory authorities (LRAs) set planning requirements and direct procurement, while the ISO ensures that those procured resources are available and perform in the energy markets. This proposal maintains that structure but works to address a growing gap between capacity counted in planning and capacity actually available in operations, particularly during stressed grid conditions.

Recent experience shows that this gap is widening. Forced outage rates have increased in recent years, and tend to exceed planning assumptions during extreme conditions. However, scheduling coordinators rarely provide substitute capacity to replace resources on forced outage. At the same time, the Resource Adequacy Availability Incentive Mechanism (RAAIM), the ISO's primary operational RA incentive tool, is not always effectively targeting the hours when reliability risk is highest. Its monthly charge/payment netting structure and relatively low penalties allow resources to underperform during critical periods without meaningful consequence.

Planning improvements alone are necessary but may not be sufficient. LRA adoption of a UCAP (unforced capacity) accreditation methodology, which better reflects expected availability on a resource-specific basis via historic outage rates, will improve the accuracy of assumptions in forward planning. However, it does not ensure that resources are offered into the market during the most critical hours. As the resource mix changes, ISO operational incentives should evolve to complement more comprehensive LRA planning frameworks.

To address this, the ISO recommends a significant reform of RAAIM based on stakeholder feedback. The redesigned mechanism would shift from static, pre-defined assessment hours to a structure that targets operational system conditions, with incentives triggered during periods of elevated reliability risk and true scarcity. This approach also provides clear signals in advance of tight conditions, encouraging resources to return from outages more quickly and secure replacement capacity. It sharpens accountability by directly linking financial consequences to availability during critical hours, rather than averaging performance over a month.

These reforms are paired with improvements to related tools. Clarifying must-offer obligations (MOO) will ensure that resources bid in their true operational capability, thereby increasing the ISO's visibility of available capacity. Enhancements to outage substitution processes and definitions aim to reduce inefficiencies that can delay maintenance and contribute to higher forced outage rates.

Together, this integrated package is designed to improve reliability during extreme conditions, strengthen incentives for generator availability and performance, and align operational tools with evolving LRA planning methodologies such as UCAP. It represents a necessary step toward ensuring that RA capacity is not only procured, but available and performing when the grid needs it most.

## 1 Background

All Regional Transmission Organizations and Independent System Operators (RTOs/ISOs) across North America have resource adequacy functions within their balancing authority areas, but the entity responsible for these functions is different in each RTO/ISO footprint. 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, local regulatory authorities (LRAs), load serving entities (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 for two of the key components identified by stakeholders as requiring reform to improve reliability and efficiency 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, and directing procurement of new and existing resources. The ISO, in turn, has the responsibilities in the shorter term to ensure resource adequacy capacity is available and performing reliably in ISO markets. Key responsibilities within the scope of the ISO's operational role in resource adequacy include:

1. Accounting for RA capacity via supply plans and RA plans
2. Imposing must-offer obligations in the ISO market
3. Assessing availability incentives
4. Coordinating and approving outages
5. Procuring backstop capacity to meet gaps or deficiencies in resource adequacy procurement

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

The ISO has determined that each of the design elements included in its scoped RA reform initiatives, including this proposal, is intended either to directly improve the ISO's

existing RA processes or to provide LRAs with the information they need to reliably and efficiently perform their planning functions. In this effort, the Resource Adequacy Modeling and Program Design (RAMPD) working group, the ISO is pursuing a path to allow the ISO balancing area to operate reliably while maintaining the current roles and responsibilities in resource adequacy. As such, this proposal—a part of Track 2 of RAMPD—focuses on reforms to RA availability incentives and outage processes for RA resources to address concerns raised by stakeholders and the ISO.

## 2 Availability Incentives

### History of the Resource Adequacy Availability Incentive Mechanism (RAAIM)

RAAIM is the ISO's primary mechanism to incent resources counted toward resource adequacy obligations to be actually available when system reliability depends on them. Resources compensated for providing RA capacity should be operationally available in all hours, but particularly during the hours when the system is most at risk. RAAIM provides that link by creating a measurable availability metric and associated financial consequences for underperforming.

RAAIM was created and enhanced as a part of a multi phase reform process and was designed to replace the Standard Capacity Product (SCP) framework. The SCP attempted to standardize RA capacity by attaching defined availability requirements and performance incentives to capacity counted toward RA. The SCP framework had both operational and policy challenges and was largely viewed as ineffective in targeting critical periods and created administrative complexity. RAAIM's key design was meant to simplify the process and make the design more effective in targeting availability incentives

Under the current RAAIM design, each year, the ISO designates a set of Availability Assessment Hours (AAH) intended to represent periods of elevated reliability risk for both system (also known as generic) and flexible resource adequacy. The hours are typically concentrated on peak demand hours on non-holiday weekdays and periods of high ramping need morning/evening ramp for meeting the flexibility needs. The ISO evaluates whether RA resources subject to RAAIM satisfied their must-offer obligations based on submitted bids. In order to avoid RAAIM penalties during outages, RA resources must provide substitute capacity during an outage period. The current evaluation focuses on availability (self-scheduled or economic bids) rather than dispatch or performance.

Each month, the ISO calculates an availability performance metric for each resource based on its availability across applicable availability assessment hours. This produces a monthly availability percentage compared against a defined performance standard, including applicable deadband provisions to allow minimal periods of unavailability without consequences. Resources performing below this standard incur non-availability charges tied to 60% of the CPM soft offer cap which, when collected, are used to fund payments to resources that are available more than the performance standard requires.

RAAIM serves several policy purposes to ensure the ISO's operational abilities and to align incentives with LSE contracts.

RAAIM is designed:

1. To encourage resource owners to plan and conduct maintenance to ensure resources are available
2. To incent timely return to service following unplanned outages, or procurement of replacement capacity, reducing the duration of RA deficiencies, and
3. To provide assurance to LSEs that RA capacity will be reliable

So, by giving RAAIM "teeth," the design was intended to support LRA's RA programs by providing a consistent method of penalizing non-availability. This allows for consistent incentives, which leads to more fungible capacity by reducing the complications that would come with each LSE and LRA needing their own availability incentives for capacity contracted to their respective programs.

Despite improvements, stakeholders have identified limitations in RAAIM as it exists today, partly by the design but also by limitations in the objectives:

From a design perspective, averaging availability across all AAH in a given month is seen to dilute accountability signals, as a resource could be unavailable during the most critical hours but still achieve an acceptable monthly average by performing well across lower-risk hours. This is further exacerbated by the deadband around the performance standard which can weaken incentives and a RAAIM incentive level that is tied neither to system conditions or the implicit reliability consequence costs of grid emergency conditions. Resources that are unavailable during grid emergencies or high stressed intervals face the same RAAIM settlement as those unavailable during lower risk hours.

The CAISO Department of Market Monitoring along with other stakeholders also highlighted a potential challenge with the RAAIM construct in examining only day ahead availability. DMM's and the ISO's analyses have showed a potential gap between resource availability da-ahead and actual real time performance. DMM recommended pairing a day ahead availability incentive with a complementary real time and

performance incentive mechanism, with similar functions where the real time performance incentive should be assessed specifically during tight grid conditions.

## Problem Statements and Objectives

As a part of the 2023-2024 RAMPD working groups, the following sub-issues related to RAAIM were identified as a part of the larger RA problem statement:

- *In light of a tight RA market, high RA prices, and market incentives, RAAIM may be an ineffective incentive mechanism to ensure capacity is bid into the market. For example, RAAIM is applied only to a fraction of the RA fleet, the current deadband provides insufficient incentive to be available and both the monthly netting process and carry-forward provisions mute incentives. In some cases this can result in incentivizing less reliable generation to be contracted and discouraging scheduling coordinators from showing all of their RA resources to the ISO. Additionally, when RAAIM does not incent capacity to be available, it creates operational backstop challenges for the ISO, as substitute capacity has not been shown, resulting in potential reliability risks.*
- *RAAIM should be assessed to see if it is meeting its intended objectives, what new objectives should be established, and if a new mechanism is needed to incent availability and/or performance. The need for either RAAIM reform or RAAIM elimination as well as any exploration of a new availability and performance mechanism should be done in concert/consideration of any counting rule changes to encourage all RA-eligible resources to be shown.*

To address these and other concerns, the ISO has embarked on this multi-part effort to evaluate reforms to its resource adequacy processes and tools. As part of Track 2 of this effort, the ISO seeks to address widespread stakeholder and ISO concerns about the current availability incentive mechanism, the resource adequacy availability incentive mechanism (RAAIM). Based on stakeholder feedback, the ISO seeks to design mechanisms that ensure resource availability and performance while aligning with California's hybrid regulatory structure. Maintaining this structure means that LRAs continue to play the primary role in setting resource accreditation and planning reserve margins, and the ISO, in turn, has the primary role in "operationalizing" RA capacity to ensure it is available in the energy markets when needed.

In the November 2024 RAMPD issue paper, the ISO discussed how to effectively balance LRA UCAP designs and other accreditation methods that can provide availability incentives with reforms to the ISO's availability and performance incentives. As the CPUC moves forward with its UCAP accreditation methodology, the ISO and stakeholders have discussed if, or the extent to which, an additional availability and

performance incentive is still needed to provide even a stronger incentive during critical periods or to align cost allocation with cost causation. Stakeholders recognized that there might be differences across the CAISO BAA with UCAP implementation, since it is likely that not all LRAs will adopt UCAP, and LRAs likely would not apply this QC methodology to all resources. While the newly proposed default methodology generally allows for a resource-specific adjustment to a class-based QC value based on individual resource performance, it is unclear which LRAs will adopt these default rules. In any case, FERC has recognized that having both a capacity performance/availability derate via accreditation and an availability incentive mechanism (like RAAIM) does not necessarily constitute a double penalty for capacity resources. The ISO's current RAAIM design provides an incentive to offer capacity that has been sold into the energy markets, whereas the capacity derate from methods such as UCAP reflects the quantity of dependable capacity going forward.<sup>1</sup>

The RAMPD Track 2 initiative also has the objective of aligning availability mechanism design with outage and substitution rules. In the recent past, the ISO's RAAIM penalty price has been far below the cost of finding substitute capacity. This means there has been little incentive to replace capacity that is subject to a forced outage. This initiative seeks to align incentives for availability so that there is sufficient capacity to operate a reliable grid.

Considering the various RA functions described above, the ISO believes a good design, between accreditation process and availability incentives, should incent RA resources to:

1. Reduce forced outage rates from all resource types particularly during stressed grid conditions
  - a. Perform planned maintenance and, as needed, invest in larger capital upgrades
  - b. Return quickly from forced and planned outages in advance of forecasted extreme conditions
2. Align shown RA shown values with the expected ability of those shown resources to bid and perform
3. Offer into the energy market day in, day out in accordance with their must-offer obligations; particularly during critical hours

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<sup>1</sup> For example, if a number of resources are close to retirement or in need of major capital upgrades, a UCAP only incentive might not be sufficient and "real time" penalties might be more appropriate.

These three behaviors could be encouraged by a combination of energy market price signals, a RAIM-like operational tool, and QC methodologies.

## Data Analysis

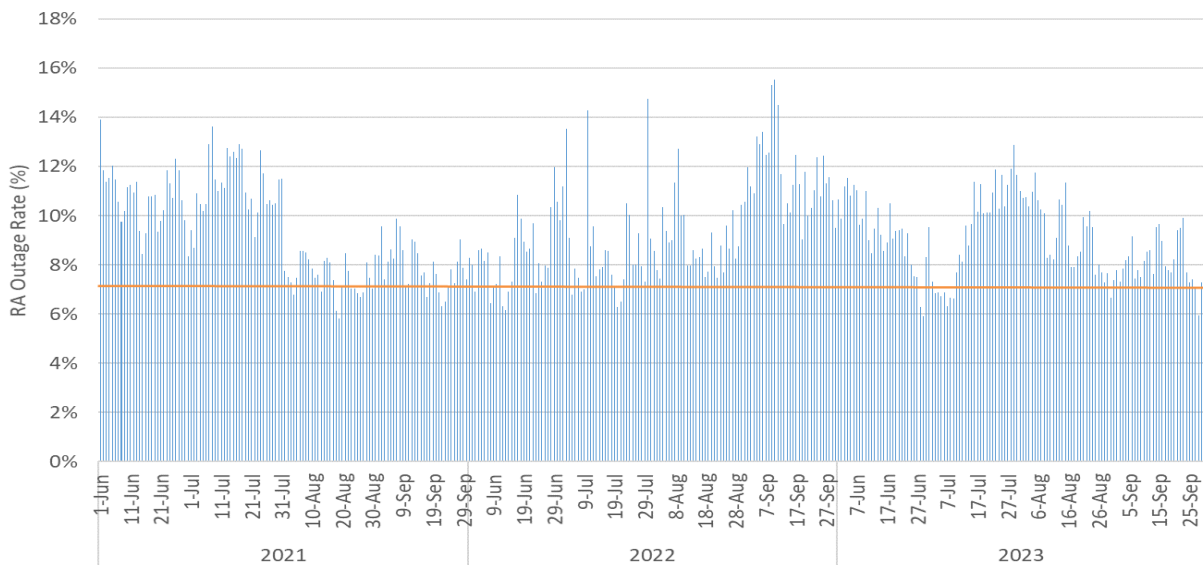
In the 2024 RAMPD Issue Paper, ISO staff analyzed recent historic RA capacity resource availability and performance data. At a high level, the takeaways from this analysis are:

1. The current RAIM penalty (\$4.40/kW-month) is far below bilateral trading prices
2. Forced outage rates for RA resources have increased

This section serves as a summary of that data analysis.

Regarding the increase in forced outage rates for RA resources, this could indicate that plants are choosing not to take planned outages and instead are accepting the RAIM penalty.

**Figure 1: Summer 2021-2023 Planned and Forced Outage Rates<sup>2</sup>**



In Figure 1, showing combined outage rates for planned and forced outages, forced outages account for 97-98% of all outages in summer months. The orange line indicates the 7.5% forced outage rate assumption made in the 2024 Summer Assessment. In

<sup>2</sup> <https://stakeholdercenter.caiso.com/InitiativeDocuments/Presentation-Resource-Adequacy-Modeling-and-Program-Design-Mar-03-2025.pdf>

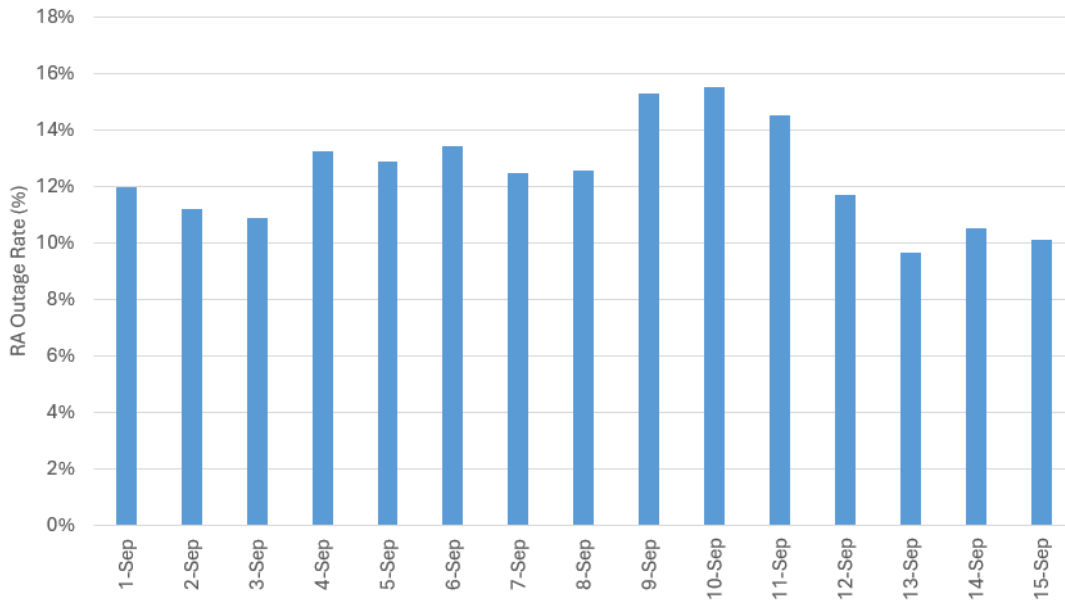
light of higher outage rates, this number has since been updated in both the 2025 and 2026 Summer Assessments and is now assumed to be higher than 7.5%. Figure 2 shows the assumptions used in the most recent ISO Summer Assessment.

**Figure 2: Resource-specific capacity-weighted average forced outage rate assumptions in 2026 Summer Loads & Resources Assessment (based on 2022-2025 data)<sup>3</sup>**

Capacity-weighted average forced outage rate (%)	Battery storage	Thermal combined cycle	Thermal gas turbine	Hybrid
	10.7%	5.3%	7.7%	11.4%

Figure 3 shows an even higher outage rate for RA resources during the first half of September 2022, a time when the ISO grid experienced extreme conditions from a late-summer heat wave.

**Figure 3: September 1-15, 2022 Daily RA Resource Outage Rates (both planned and forced)**

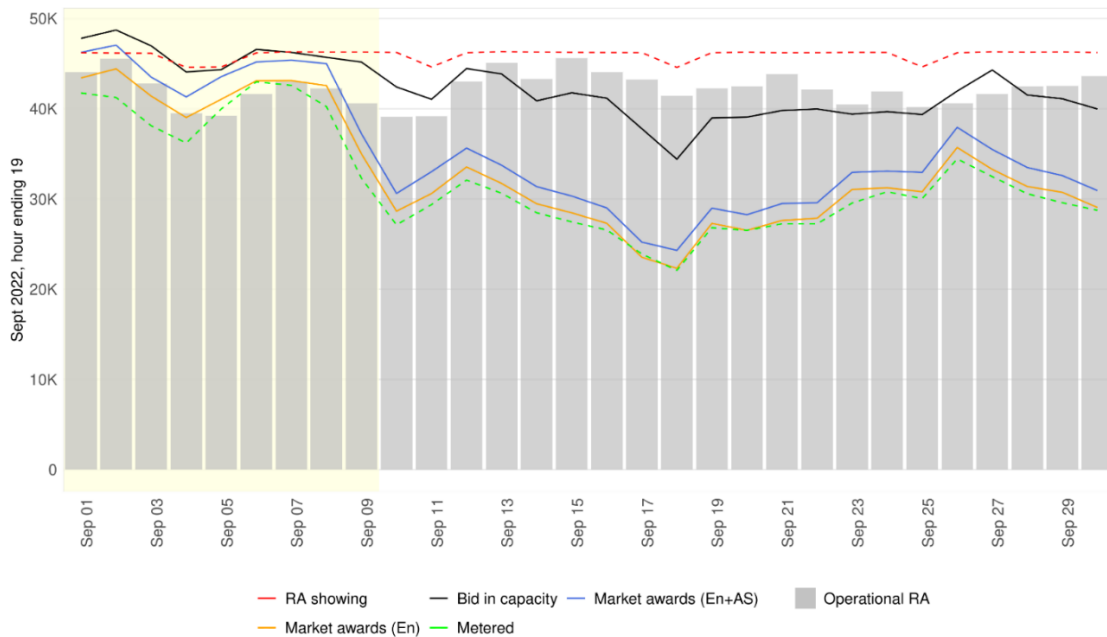


<sup>3</sup> Does not include ambient derates due to temperature

In the November 2024 RAMPD issue paper,<sup>4</sup> CAISO staff reviewed performance (metered output relative to market award) and availability (forced outages and bids) of RA resources during September 2022. Note that there was only about 2,500 MW of energy storage capacity on the ISO grid during this period, but it represents the most recent period of significant capacity constraints during a CAISO EEA.

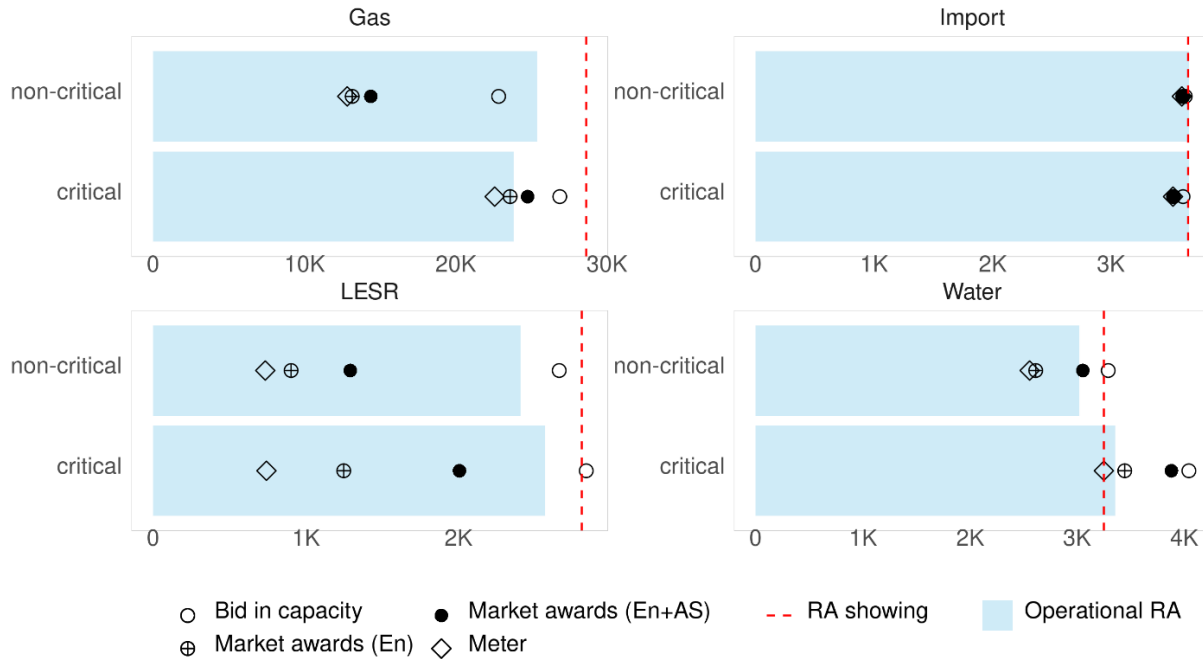
Below are two key data visualizations from this time period, including the September 2022 heat wave.

**Figure 4: September 2022 Daily RA Availability and Performance**



<sup>4</sup> See pages 53-62: <https://stakeholdercenter.caiso.com/InitiativeDocuments/Issue-Paper-Resource-Adequacy-Modeling-and-Program-Design-Nov-07-2024.pdf>

**Figure 5: September 2022 RA Availability and Performance for Gas, LESR, Import, and Water Resources**



The ISO summer market performance report for September 2022 indicated that “on average, resource adequacy resources performed to their expected output, including new resources on the grid such as battery storage.” In figures 4 and 5, bid-in capacity generally matched RA showings at the system level on critical days (early in the month of September 2022), though for gas resources, there was a gap between bid-in capacity and shown RA for critical periods. However, operational RA was below shown RA for thermal and storage resources during both critical and non-critical periods, which was likely caused by forced outages. Additionally, actual metered performance fell below energy awards, with thermal and storage showing weaker performance than hydro and imports on a relative basis.

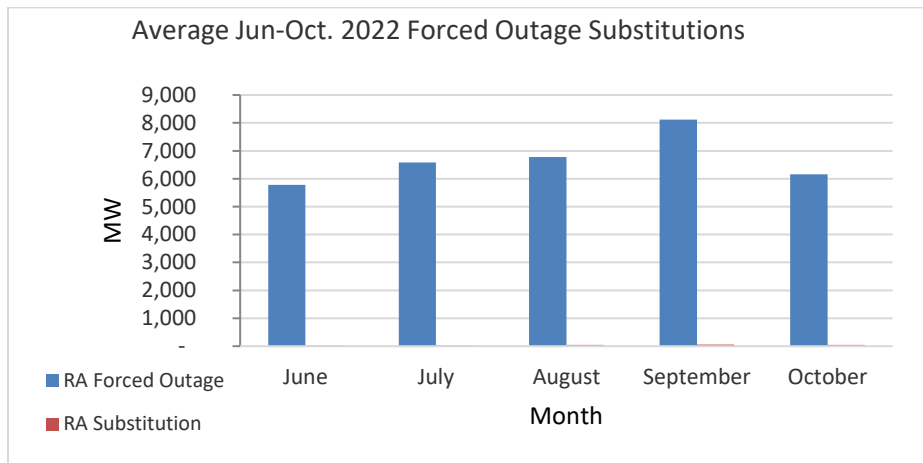
This data also shows that a meaningful share of system RA resources *did* in fact operate inside the current RAAIM deadband (94.5 – 98.5% availability during AAH) across the *entire* month of September 2022. In this case, RAAIM’s incentive signal is diluted during extreme conditions, which generally last days, not the whole month. If a resource were available for 95% of the month’s availability assessment hours, it would not be subject to RAAIM charges. However, it may have been on a forced outage during the five hours of the month that were the most critical for the grid.

Beyond September 2022, RAAIM non-availability charges have been rising on a monthly basis over time, especially for thermal resources. This may reflect broader

trends of difficulties in taking maintenance outages or a preference to suffer the RAAIM penalty rather than find higher-priced substitute capacity in the bilateral market.

Regarding replacement of RA capacity on outage, forced outages were not replaced with substitute RA capacity in the summer months of 2022 and 2023.<sup>5</sup> For June to October 2022 the average substitution for forced outages ranged between zero to one percent. For June to October 2023 the average substitution ranged from one to 11 percent. However, when only looking at the summer months of June, July, and August in 2023 the substitution rate averaged one to three percent. It appears that RAAIM is either not providing enough of an incentive for resources to provide substitute capacity during forced outages, or there was simply not enough excess capacity to provide replacement for forced outages during these periods.

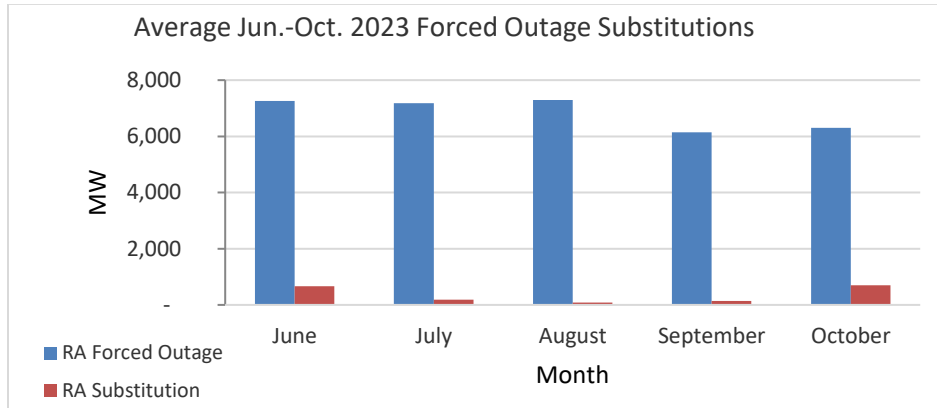
**Figure 6: Average June - October 2022 Forced Outage RA Substitutions**



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<sup>5</sup> The forced outage data on the page above represents the worst outage of the day for a resource minus what was substituted on a daily basis which was later averaged over the number of days in that month.

Figure 7: Average June – October 2023 Forced Outage RA Substitutions



Taken together, this evidence indicates potential concerns where the price and timing of incentives might not align well with reliability needs during the hours and days that matter most for the grid. While it appears that those resources that were *not* experiencing a forced outage generally had bidding behavior and performance that met planning assumptions, forced outage rates for thermal and storage RA resources in September 2022 were higher than shown RA values. To some extent, this is to be expected due to current LRA QC methodology, which currently does not account for forced outages or performance for these resource types at all, but it also reveals potential questions about market tools to incentivize performance at the resource-specific level.

### Stakeholder Feedback

Throughout 2025 and in March 2026, the ISO held stakeholder meetings and received feedback to review design options at a conceptual level for reforming or replacing RAIM.

Generally, stakeholders were in agreement regarding RAIM’s shortcomings. This is apparent in the RAMPD working group’s final problem statements listed in the beginning of this section.

Several stakeholders, including the CPUC Energy Division, Calpine, and PG&E, were supportive of significant reforms to RAIM with a goal of focusing the tool on resource availability during stressed grid conditions. The ISO discussed a concept called Measuring Unavailable Resource Adequacy, or MURA, to represent this idea. This proposal is designed to reflect that feedback and support for this goal. However, several other stakeholders expressed either qualified support for this approach, or simply recommended exploring solution concepts further. This proposal serves as a straw

person to allow participants to discuss and reflect on key details as well as high-level design choices.

The Department of Market Monitoring noted that RA resources were only available at a 91-92% rate during critical conditions, but also that of the 71% of RA resources that received a market award, only 66% actually met their schedules. DMM expands upon this analysis to discuss the need for performance incentives to complement an availability incentive.

CalCCA indicated the promise of a reformed RAIM to complement a UCAP methodology by focusing on availability during extreme grid conditions in addition to incentivizing routine maintenance over the long term. Calpine and PG&E also noted support for focusing RA incentive tools on a narrower set of stressed hours. The Six Cities did not express conceptual support for a certain RAIM reform path, but did note their qualified support for assessing resources particularly during critical system hours and a limit on penalty cost exposure.

WPTF, Vistra, and CESA expressed the need to consider the interactions of these potential reforms with the Flexible RA program, describing how RAIM applies to flex RA resources today and how the concepts discussed with stakeholders might merit revisiting the flex RA program design accordingly.

The ISO appreciates the detailed feedback stakeholders provided. It has reflected this input in the development of the RAIM reform proposal below but welcomes further feedback on this first iteration of reforms.

## Proposal

There are a variety of methods to reflect the availability of plants in modeling, accreditation and incentives. Until UCAP is approved and implemented at the CPUC, neither the ISO nor the CPUC account for the impact that forced outages and unit derates have on system reliability at a resource-specific QC level.<sup>6</sup> Instead, the ISO

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<sup>6</sup> The CPUC is considering party proposals to apply UCAP to thermal and storage resources for RA counting purposes in Rulemaking (R.) 25-10-003. As of the publishing of this straw proposal, no CPUC decision has been made to adopt UCAP for RA counting purposes, though a CPUC decision is expected in July 2026. As part of R.25-10-003, the CPUC is also considering whether to send CAISO a QC that reflects a derate due to UCAP RA counting or to maintain the status quo in which QCs for thermal and storage resources do not reflect such a derate. For the purposes of this straw proposal, the CAISO will refer to any derate to counting values – whether they apply in CPUC’s RA program, CAISO’s RA processes, or both – as “UCAP accreditation values”.

relies on LRA PRMs to account for forced outages at a portfolio-wide level. It also relies on operational tools such as planned outage substitution rules and RAAIM to discipline capacity in the operational timeframe. However, the introduction of a UCAP QC methodology at the CPUC will eventually capture some of the variability in availability in the forward planning period.

However, even a resource-specific UCAP accreditation methodology is not a silver bullet to quantify all facets of RA resource availability. By itself, resource-specific UCAP will not recreate the benefits of a layered approach that combines QC methodology with availability and performance incentives. Other ISOs/RTOs also combine up-front availability in resource accreditation with penalties assessed in the operational timeframe if resources do not bid or perform. Any RAAIM reform option will have to consider how UCAP is adopted by each LRA, which resources it applies to, and if there is still a need to incentivize capacity through an availability or performance mechanism.

Reforms to RAAIM could take a multitude of approaches. If CAISO were to remove the current RAAIM tool, it could be replaced with, on one end of the spectrum, a reliance on market prices or, on the other end, with strict non-performance penalties. A middle ground could look like a more focused availability incentive, which the ISO proposes here.

**Overview: proposed RAAIM reforms**

<b>Design Element</b>	<b>Today's RAAIM</b>	<b>Proposed RAAIM Reform</b>
Criterion	Status quo: assess <b>availability</b> by comparing a resource's shown RA to its day-ahead (and in some cases, real-time) energy offers and outage status	
Assessment period	AAH (5 consecutive clock hours on each weekday – hours determined for each season based on CAISO annual study)	Two assessment triggers: Tier 1 – an energy reliability assessment Tier 2 – capacity scarcity conditions (CAISO BAA day ahead RSE failure)
Price	\$4.40/kW-month (set to 60% of CAISO's CPM soft offer cap)	Tiered pricing: Tier 1 – day ahead LMP Tier 2 - \$2,000/MWh
Assessment frequency	Netted across each calendar month – resources that are bidding between 94.5% and 98.5% of intervals are not paid or penalized	"Per event" – assess energy offers in each day-ahead hourly or real-time interval individually

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Exemptions	Numerous (resource-based; contract-based; outage-based; MOO-based; and flex-only capacity)	See Section 3: Bidding Requirements. Alter categorical exemptions of several resource type and outage type exemptions, and instead allow management of RAAIM exposure via exempt outage natures of work to ensure resources meeting their MOO are not subject to RAAIM. Eliminate exemption for resources smaller than 1 MW
Allocation of non-availability charge funds	Charges collected from unavailable resources is allocated back to resources that demonstrate a reasonable level of availability and to load	

The ISO proposes key reforms to RAAIM based on stakeholder feedback and the challenges with RAAIM’s current design as described above. RAAIM should remain an availability assessment tool that compares offers and outage status to a resource’s shown RA capacity. The ISO proposes that the revised RAAIM framework replace any categorical carve outs with a obligation assessment that measures each resource against what it should be physically capable of delivering during reliability-critical intervals. The result is an availability incentive structure that is both more rigorous and more equitable, while aligned with LRA RA programs.

This approach shifts the framework from categorical RAAIM eligibility rules to a resource-specific obligation evaluation. Every RA resource would have an assessment calibrated to its expected capability. For thermal and storage resources, the RAAIM assessment would generally reflect the full shown RA value as it does today. For wind and solar resources, availability would be determined based on applicable availability factors and the resource’s demonstrated operating characteristics. If a wind resource is not producing due to a lack of wind, or if critical hours occur after sunset for solar resources, those resources could avoid RAAIM assessment through bidding or scheduling obligations consistent with their expected availability. However, if such resources are unavailable due to a forced outage related to plant trouble, those outages should remain subject to exposure to the revised RAAIM incentive structure and not be categorically exempt.

In addition, for battery storage and dispatchable thermal resources, the proposed assessment framework would generally rely on the resource’s shown RA value as the basis for the associated availability assessment. The ISO recognizes that a performance benchmark or more granular capability-based metric like the performance benchmark MW (PBMW - described in Figure 9 and discussed with stakeholders on March 2, 2026) could, in some cases, provide a more precise measure of resource

availability. Given the complexity associated with translating between differing accreditation methodologies, counting conventions, and LRA-specific qualification structures, the ISO believes that the shown RA value continues to provide a reasonable and administratively functional approximation for purposes of the revised RAAIM framework. However, the ISO understands that more discussion with the CPUC and other LRAs is warranted particularly if the LRAs show the ISO a derated capacity value but believe a higher value for the RAAIM assessment is necessary.

Under this approach, there may be limited circumstances where an incremental portion of a resource's operational capability falls outside the revised RAAIM assessment construct. However, for the vast majority of outage events and availability risks, we believe the shown RA value is sufficient to provide a strong and meaningful incentive for resource availability during reliability-critical periods while maintaining a transparent and implementable framework across resource types.

As discussed above, storage resources' RAAIM assessment would consider the potential effects of foldback, also referred to as nonlinearity. This would be made possible via the nonlinearity modeled solution currently being discussed as part of the ISO's Storage Design and Modeling (SDM) initiative. With the modeled solution, the market will consume the bid curves submitted by resources for the full Pmin to Pmax range and the optimization will limit dispatch instructions to feasible levels given the state-of-charge. As a result, market participants will be able to fulfill their must-offer obligations regardless of whether nonlinearity manifests and impacts their charging or discharging capabilities.

In this context, the ISO does not expect that the modeled solution's ability to limit dispatch instructions to feasible megawatt values will have interactions with RAAIM as it is currently defined. Given that bids can be submitted to fulfill the must-offer obligation and no outage is recorded, the modeled solution would not carry RAAIM implications. The modeled solution will also allow the ISO to collect all necessary data to ensure that LRAs seeking to set their qualifying capacity values on the range unaffected by nonlinearity can do so.

Based on this proposed methodology, the ISO recognizes that certain exemptions may be required. However, thousands of MW of acquired resources are shown as RA and receive an exemption from RAAIM today. Though the ISO does not intend to force long-term legacy contracts to be reopened, for example, it may be worth considering removing the acquired resource exemption in the spirit of the original exemption. This exemption was established over ten years ago, and requires an annual election to allow for contracts that existed when RAAIM was initiated to run through their terms.

With this in mind, the ISO proposes the following high-level RAAIM and resource type alignment in Figure 8.

**Figure 8: Alignment Between Resource Types and RAAIM Exposure**

<b>Resource Type</b>	<b>Current RAAIM Assessment or Exemption</b>	<b>Potential Enhanced RAAIM Assessment</b>
<b>Variable Energy Resources</b>	Exempt based on variability	Satisfied through bidding or scheduling obligations consistent with DA commitments; RAAIM applied only if on forced outage based on ELCC or exceedance methodology used by the LRA
<b>Demand Response</b>	Exemptions based on program and dispatch limitations	Exemptions based on program and dispatch limitations
<b>Storage Resources</b>	Obligation based on shown RA	DA obligation remains based on shown RA value
<b>CHP / QFs</b>	Exemptions based on must-run or contractual limitations	Eligible outage card if contractual limitations apply
<b>MSS / Load-Following Resources</b>	Portfolio scheduling constraints	Eligible outage card
<b>Run-of-River Hydro</b>	Exemption if uses ELCC methodology	Evaluation based on the MOO
<b>Dispatchable Hydro</b>	Exemption for certain outage natures of work relative to QC	Evaluation based on the MOO, exempt for water limitations
<b>Small Resources (&lt;1 MW)</b>	Exempted for administrative simplification	Evaluation based on shown RA MW
<b>Thermal Resources Natural Gas</b>	Shown RA	Evaluation based on shown RA MW

## Assessment Period

Instead of an assessment across the same static, annually-updated weekday availability assessment hours, RAIM should be triggered only during key system conditions when the grid is stressed.

Based on stakeholder feedback, the ISO moved away from the concept of using Energy Emergency Alert conditions to trigger penalties. These conditions occur very rarely, and sometimes without any advance notice. Instead, the Tier 1 and 2 penalties would be activated *before* scarcity conditions occur, giving generators some time to take action that could result in additional capacity becoming available. Additionally, the ISO does not see merit, at this time, in using the EDAM RSE failure surcharge as a way to establish RAIM penalties. There is too much variability in the surcharge level for RA capacity resources to receive a reasonable signal to meet their must-offer obligation.

Instead, RA resources would only be subject to RAIM during either (or both) of the following “tier” conditions:

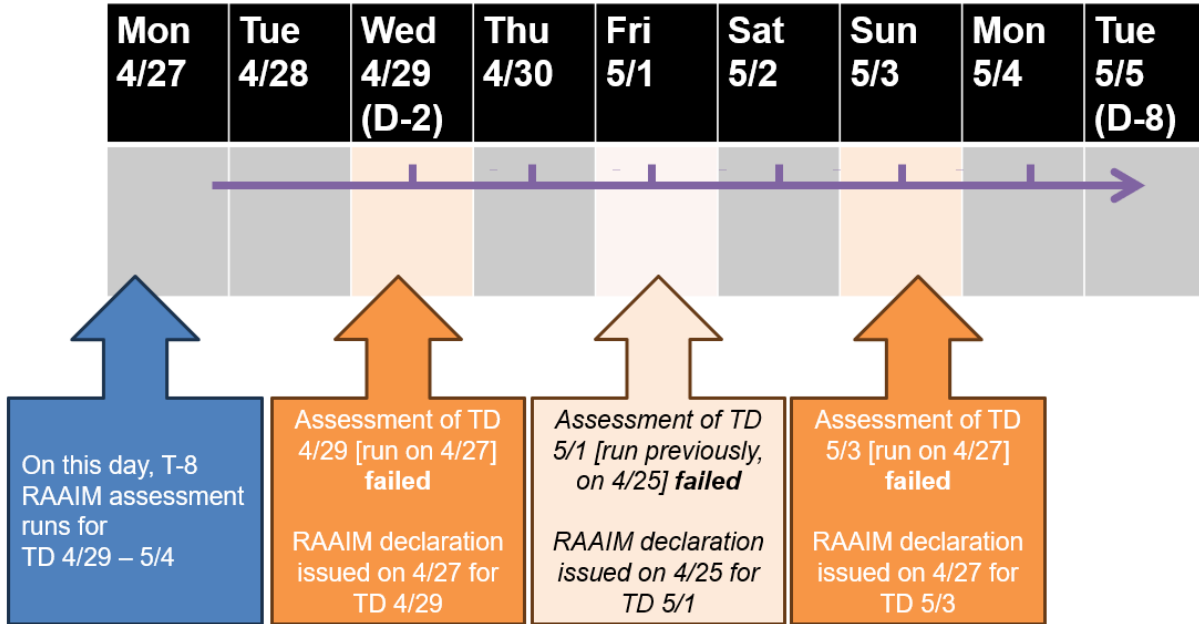
### Tier 1 – Elevated Reliability Risk Condition

- Purpose: identify periods with any significant level of risk of resource inadequacy several days before scarcity occurs
- Trigger: via an operational study occurring every day on a rolling eight-day look-ahead basis (T-8 through T-2) and refreshing daily as load forecast and outage information changes
- Variables in this study could include:
  - Current forced outage levels – if above a certain MW threshold
  - Load forecast vs shown RA – if load forecast is greater than MW of RA capacity
  - A buffer representing an error term to account for uncertainty including renewable production, outage status, and load changes between the time the study is performed and the trade date
- Penalty price: Day-ahead hourly LMP prices for the trade date

The primary goal of Tier 1 is to provide an incentive for plants to be available across all hours, but with a focus on conditions where the grid is stressed. Activating Tier 1 will be determined based on a daily evaluation of future grid conditions between two days out and eight days out. On the day of the study, if certain conditions based on the above variables were met for any of these seven days, a public notice would be issued that RAIM will be assessed on those days. If system conditions change, and supply becomes less scarce (via reduced forced outages or decreased load forecast) as each

of those days approach, RAAIM would continue to be in effect regardless. This would provide some advance notice (2-8 days) for plants to return from outage quickly enough to be operational during upcoming critical periods.

**Figure 9: Tier 1 illustrative example - assessment is run daily, for each day looking 8 days out (D minus 2 through D minus 8)**



Again, if conditions were to improve significantly, e.g., forecasted temperatures drop and the load forecast is reduced or a large number of plants end their forced outages, the Tier 1 declaration would remain in effect regardless. Figure 9 shows an example of this on May 1, where the ISO made a previous RAAIM declaration on April 25. The goal of Tier 1 is for resources to be prepared to be available and mitigate stressed system conditions. Additionally, Tier 1 could provide an incentive to procure replacement capacity for resources on outage that is stronger than RAAIM today, especially for short duration capacity scarcity periods. This structure would apply an incentive to prepare to become available *before* the EDAM resource sufficiency evaluation is performed.

The penalty price for Tier 1, which is determined by day-ahead locational marginal prices for the trade date upon which Tier 1 is declared, is set based on a suggestion from CPUC Energy Division comments. In effect, this design would apply the existing energy market price signal in the day-ahead market as an unavailability period for resources that are not available during the identified at risk hours.

**Tier 2 - Critical Capacity Insufficiency Condition**

- Purpose: incentivize RA resources in the CAISO BAA to offer their energy during the tightest periods

- Trigger: when the CAISO BAA fails the EDAM resource sufficiency evaluation, where the CAISO BAA does not demonstrate sufficient capacity to meet its obligations in EDAM
- Evaluation: compare each resource's shown RA against bids into the deficient day-ahead interval
- Penalty price: \$2,000/MWh

Tier 2 provides an incentive for resources to be available so that the CAISO balancing area has sufficient bid-in capacity to pass the EDAM RSE. It provides stronger incentives than Tier 1 to ensure RA resources are subject to necessary routine maintenance in advance of scarcity conditions. Because Tier 1 is persistent (it cannot be deactivated after being declared), Tier 2, if declared, would be applied instead of Tier 1 if both were activated for the same trade date. However, the ISO welcomes feedback on the need to apply Tier 1 and Tier 2 simultaneously.

### Charges and Payments

Regarding non-availability charge levels, the ISO proposes setting the price for Tier 1 equivalent to the day-ahead LMP on all hours of the trade date and for Tier 2 at \$2,000/MWh, applied to RA resources based on resource adequacy capacity (shown RA). If RA resources are available for less than their resource adequacy capacity during a Tier 1 or Tier 2 period, they will be charged based on the difference between their shown RA for the month in which RAAIM is assessed and their bids.

The ISO proposes maintaining the self-funding element of the availability incentive payment process and allocating collected non-availability charges to resources that are eligible for an availability incentive payment. However, the availability standard will no longer be set between 96.5% and 98.5% of a given period. Instead, any non-availability charges will be allocated on a per-event basis to RA resources that met their must-offer obligation and are not on an unreplaced outage as well as to load. The charges should be allocated on a load- and resource-share basis proportional to MW of available resources and load during a given RAAIM event.

### RAAIM reform as complement to LRA QC methodologies

Given that UCAP may apply as the QC methodology for a substantial portion of RA resources in the near future (thermal and standalone storage resources under CPUC jurisdiction), the key question becomes what, if any, incremental incentives are necessary to ensure availability. Particularly, even if LRAs adopt UCAP, there are gaps in incentives that will remain, either due to limitations in the UCAP design for resources not fully subject to accreditation-based adjustments or where market prices are

constrained from providing an appropriate availability incentive in the operational timeframe due ISO market bid caps.

RAAIM should be reformed to fill these gaps through the application of targeted penalties during key hours when the grid is stressed. From an economic perspective, the RAAIM reform design seeks to fill at least part of the gap between the market price and the real value of an incremental MW by imposing penalties that reflect the reliability value of availability during stressed conditions. In some cases, this could be the value of curtailing load or the cost of operating without full reserves. While RAAIM penalties are not expected to reach the full value of lost load or the value of cutting reserves, this proposal is designed to materially increase penalties above existing RAAIM non-availability charges.

In doing so, this proposal aims to create stronger incentives for resources to take actions that improve availability, including performing maintenance (both normal short-term maintenance and capital upgrades) in advance of tight conditions, returning from outages more quickly, and avoiding what could be discretionary outages during periods of system stress.

#### Benchmarking RAAIM against other ISO approaches

Experience in other ISO and RTO markets suggests that sufficiently strong penalties can drive meaningful changes in resource behavior, including efforts to restore availability during emergency conditions. Representatives from other system operators discussed with the RAMPD working group and with CAISO staff and shared how they saw an impact of their similarly designed “pay-for-performance” mechanisms.

The “pay-for-performance” frameworks in PJM and ISO New England have penalties (and payments) for resources depending on if they are or aren’t available, and if they under or overperform during reserve shortage conditions. The call-option structure effectively produces a scarcity price signal to all resources with RA resources having a call-option of \$2,000 in the market. PJM representatives indicated to the RAMPD working group that while they thought the incentive level should be increased over time based on observed behavior, they still saw plant owners take a variety of actions to mitigate risk, including ensuring fuel sufficiency and performing timely maintenance. ISO-NE representatives also indicated to ISO staff that they saw instances of

generators taking beyond-normal actions to return from outages, which they attributed to the pay for performance incentives.<sup>7</sup>

### Other Implications of Reformed RAAIM Design

At the same time, there are acknowledged limitations to a tool like RAAIM, even with reforms. The proposed new design applies primarily to a limited set of hours, and proposed penalty levels may not fully reflect the true value of reliability. As a result, while reformed RAAIM is expected to improve incentives at the margin during critical hours, it may not achieve the theoretically optimal level of resource availability and performance during normal conditions. The design relies on a combination of resource accreditation and market prices to provide an incentive to be available in most hours. However, the structure would allow for potential future adjustments to penalty levels if stronger incentives are needed. Stakeholders have indicated a reasonable starting point: a desire to continue with availability incentives while avoiding significantly altering the price of RA capacity itself.

RAAIM also differs from designs implemented in other systems, such as the PJM and ISO New England programs mentioned above, where performance penalties are typically triggered during reserve shortage events and are based on performance relative to other resource adequacy capacity. In contrast, the proposed new RAAIM framework is more closely tied to CAISO-specific operational conditions and evaluates availability relative to shown RA capacity. It also expands accountability to a broader set of resource types than today, including those that may not have historically been subject to availability incentives during the RAAIM availability assessment hours.

When a tool like RAAIM does *not* succeed at providing an incentive for capacity to be available, it creates operational backstop procurement challenges for CAISO when capacity is short of LRA-determined requirements. If SCs are withholding capacity to avoid exposure to RAAIM penalties or for substitution purposes, this could result in potential reliability risks by limiting CPM options for the ISO and could result in LSEs showing only the required capacity to meet the RA obligation. By contrast, a performance-oriented penalty based on a call-option-like design could provide a backstop before the ISO needs to utilize its capacity procurement mechanism (CPM).

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<sup>7</sup> In ISO-NE, for the three Capacity Commitment Periods beginning June 1, 2018 and ending May 31, 2021, the initial Capacity Performance Payment Rate was \$2000/MWh. The rate was increased to \$3500/MWh and \$5455/MWh in 2024. For the Capacity Commitment Period beginning on June 1, 2025 and ending on May 31, 2026 and thereafter, the Capacity Performance Payment Rate is set to be \$9337/MWh.

## Flexible Resource Adequacy and RAAIM

Throughout the RAMPD working group process and policy development, the ISO has recognized that reforms to its various program elements, including potential changes to RAAIM, should be evaluated in the broader context of both System (generic) and Flexible (flex) RA. Today, these frameworks collectively define how RA capacity is procured, shown, and ultimately bid into the market through must-offer obligations and availability incentives. Today, RAAIM applies to both System and Flexible RA capacity. There are different Availability Assessment Hours for the System RA and Flexible RA products, with some Flexible RA resources being subject to up to sixteen daily availability assessment hours vs the five hours for System RA.

ISO staff is currently developing analysis to inform the future of Flexible RA. Consideration of longer-term design options include retiring the program or implementing significant modifications to better align accreditation with actual resource capabilities and strengthen performance incentives. These efforts reflect growing recognition that existing Flexible RA constructs may not fully capture evolving system needs or the operational characteristics of the current resource mix. Additionally, there is broad stakeholder feedback on the commercial and procurement challenges associated with the current Flex RA design. The ISO understands these concerns and intends to design any future Flex RA reforms based on stakeholder input.

If the ISO ultimately moves forward with RAAIM reforms for system RA, it will be important to consider corresponding Flexible RA reforms that can be effectively paired with that design. Absent such alignment, there is a risk that the combined framework may not deliver the intended reliability outcomes, potentially necessitating further reconsideration of either the Flexible RA construct or the newly proposed RAAIM approach itself.

## Performance Assessment

Conceptually, ISO staff agree with the DMM and other stakeholders that an effective RA framework should provide incentives for resource *performance* (i.e., metered output vs schedules). In particular, if the ISO adopts a refined *availability* (i.e., bids and outage status vs shown capacity) construct such as the RAAIM reforms in this proposal, the ISO should consider evaluating a paired performance incentive to ensure that resources cannot simply avoid RAAIM charges by bidding into the markets without ultimately performing to any schedules they receive. Historical assessments by both ISO staff and the DMM indicate that a non-de minimis amount of RA capacity fails to perform as expected in real time, particularly during tight system conditions. The DMM's analysis of

recent grid stress events further suggests that availability shortfalls and real-time underperformance are not isolated issues.

At the same time, the ISO recognizes that variability in performance across resource types and system conditions implies that any framework must be carefully designed to achieve policy objectives in a manner that is implementable and accounts for practical limitations (such as deliverability constraints) that may affect a resource's ability to perform, while still maintaining meaningful accountability for non-performance. Accordingly, if reforms to the availability incentive mechanism are adopted, the ISO recognizes the need to work with stakeholders to evaluate whether such a design should be paired with a performance framework, and to define the appropriate design objectives. This analysis would include assessing whether real-time unavailability or non-performance should be treated equivalently under the reformed RAIM construct and the feasibility of implementation. We seek feedback from stakeholders on how such an additional performance layer should be designed. Questions include:

- Would a real time performance structure that mirrors RAIM be appropriate?
- What considerations should be considered in terms of resources' abilities to meet their MOO in real time?
- Should the performance incentives apply only to RA resources or any resource that receives a market award?

### 3 Bidding Requirements for System RA Resources

At a stakeholder meeting on March 2, 2026, ISO staff reviewed the bidding requirements for system RA resources in the context of a UCAP qualifying capacity methodology, also known as the must-offer obligation (MOO). The purpose of the discussion was to seek feedback on possible must-offer obligation clarifications or refinements, raise questions on what value RAAIM or other incentive mechanisms should be based on (e.g., the resource's MOO or a different value), prepare for possible future adoption of a UCAP accreditation methodology at the CPUC, and to ensure the ISO's bidding requirements continue to function across all LRA resource adequacy programs in the BAA.

This discussion was timely because the CPUC is considering adopting a UCAP-based QC methodology for thermal and standalone storage resources, and the ISO's default QC methodology for these resource types will be based on UCAP and ELCC according to new rules approved by the ISO Board of Governors in 2025. This means that resources that may currently have a QC value that is equivalent to their Pmax will likely soon have a new accreditation value that is lower than their Pmax.

It is important to note that not all LRAs in the CAISO BAA currently use or plan to use a UCAP QC methodology, and even the CPUC has not yet officially adopted such a methodology in its ongoing RA proceeding (see note 6).

At the March 2, 2026 stakeholder meeting, the ISO reviewed a number of alternative possible relationships between a resource's QC value, its NQC value, its must-offer obligation, and the value at which RAAIM is assessed. Figure 10 shows a table from that discussion at the March 2 stakeholder meeting for reference. Under current ISO rules, RAAIM non-availability penalties are assessed based on a resource's must-offer obligation, which is set based on RA capacity, also known as shown RA. In addition, RAAIM is assessed during periods when resources take outages without providing substitute capacity. Today, dispatchable RA resources such as generating resources and NGRs have a bidding requirement to offer all RA capacity (i.e., shown RA) when physically available, or in other words, not on outage. At the March 2 meeting, the ISO introduced a new concept for discussion purposes called the performance benchmark megawatt (PBMW), which is designed to represent the physical energy capabilities of a resource, as opposed to a UCAP-based accreditation value which is derived from a resource's historic forced outage rate over time.

**Figure 10: Possible differentiation between MOO and RA Performance Benchmark for RAAIM (from discussion slides at March 2, 2026 stakeholder meeting)**

Resource Type	LRA RA Counting	MOO Qty	RA Performance Benchmark MW	Rationale
Thermal	UCAP	PMAX <sup>8</sup>	PMAX – Ambient derate	UCAP reflects statistical availability across the year, not a daily operating limit. Thermals can physically provide PMAX each day, so the MOO is based on PMAX. Should assessment of performance account for ambient derates?
Stand-Alone Storage	UCAP	PMAX	PMAX – foldback	UCAP reflects physical energy limits (duration, SOC). Storage has structural/physical limits that impact what it can provide, resulting in a MOO based on UCAP. Should assessment of performance account for foldback?

Note that Figure 10 is included here as a citation from materials the ISO presented at a March 2026 stakeholder meeting. Includes open questions that were initially posed to stakeholders in advance of the ISO publishing this straw proposal.

The PBMW could be the value at which RAAIM is assessed, instead of assessing RAAIM based on shown RA as it is today. In general, the ISO seeks to coordinate with the CPUC and other LRAs regarding UCAP and how it affects the QC values sent to CAISO in the development of the NQC list.

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<sup>8</sup> This table for simplicity, assumes a PMAX for a fully shown and fully deliverable resource

## Bidding Requirements: Next Steps

Under today's rules, dispatchable RA resources are required to offer only shown RA capacity into the market. If their QC values are reduced based on a statistical (e.g. UCAP) or probabilistic (e.g. ELCC) methodology, their MOO will end up being reduced accordingly. However, the ISO's goal is to retain the effective status quo regarding bidding requirements (MOO) for RA dispatchable resources, regardless of QC methodology: they are required to offer all available capacity contracted and shown as RA to the ISO. The MOO for system RA resources should be set to reflect operational capacity, or in other words, whatever capacity is available.

### Focus: Partially Shown Resources and PCDS Resources

Within this conceptual MOO framework, if a dispatchable resource has full capacity deliverability status, has contracted its full capacity to a single LSE, and has shown all of its capacity, then its must-offer obligation would be equivalent to its Pmax. A simple method to achieve the result proposed above would require dispatchable RA resources to have an obligation to bid to their Pmax or a Pmax-equivalent value. However, in the March 2, 2026 stakeholder meeting, the ISO recognized that not all resources are fully shown to a single LSE and have full capacity deliverability status. Some resources have partial capacity deliverability status (PCDS), or have sold a portion of their capacity to an LSE in the CAISO BAA and have sold the remainder outside of the CAISO BAA. In addition, some resource owners choose to show their resources at a value that is lower than their NQC value to account for self-identified resource limitations such as seasonal ambient derates. In comments on the March 2, 2026 stakeholder meeting, PG&E indicated that the use of the term "Pmax" to mean a value representing a plant's operational or installed capacity was confusing because of the above cases.

To address these cases, the bidding requirements could consider the relationship between shown RA, NQC, and Pmax. The ratios between these values would allow a resource's shown RA value, reflected in any of the cases above, to adjust that resource's bidding requirement accordingly. This would ensure that resources are not required to offer more than they are physically or contractually able, but that they are still offering their available capacity regardless of QC value. QC values are set by LRA-determined QC methodologies. For example, a UCAP-based QC value, which reflects statistical availability across the year, is not equivalent to a plant's daily operating limit. The ratio could be used to determine a resource's must-offer obligation through the formula below:

$$\text{must-offer obligation (MW)} = \text{shown RA (MW)} \times \frac{\text{Pmax (MW)}}{\text{NQC (MW)}}$$

The table below provides three illustrative example resources to demonstrate this relationship.

<b>Resource</b>	<b>NQC (MW)</b>	<b>Pmax (MW)</b>	<b>Shown RA (MW)</b>	<b>MOO (MW)</b>
Plant 1	100	100	100	100
Plant 2	80	100	80	100
Plant 3	80	100	40	50

The shown RA value for these resources would continue to be limited by a UCAP-based QC value, which will include ambient derates, plant trouble, and other forced and urgent outages. The MOO cannot be directly set at shown RA if the goal is for RA resources to offer their operational capacity. The goal of this concept is to ensure that RA resources meet their responsibilities to offer their capacity into ISO markets. They should not commit the incremental capacity value that exists between their UCAP accreditation value and their Pmax to another non-ISO RA purpose such as contracting that capacity outside of the CAISO BAA. These resources should instead be offering what is physically available into the ISO market to meet their responsibilities as resource adequacy capacity.

## 4 Outage Substitution Enhancements for RA Resources

### Problem Statements and Objectives

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 ISO’s existing outage substitution mechanisms should be reassessed. Both initial analysis and working group feedback indicate that the current processes and procedures likely result in:*

- *Inefficiencies as multiple SCs hold back RA capacity for outage substitution for a partial-month outage.*
- *Artificial tightness in the RA bilateral market due to holding back capacity for outage substitution.*
- *Potential maintenance delays if substitute capacity is not available.*
- *Higher forced outage rates because planned outages cannot be scheduled and the resource ultimately experiences a forced outage.*

To address the problem statement above, CAISO aims to enhance the RA capacity substitution process to meet the following attributes:

**Efficient:** The process should be efficient so that capacity is available to substitute without significant effort by participants or exceptions to the RA substitute capacity process.

**Reliable process for resources:** The process should promote reliability by allowing resources to perform needed maintenance to reduce future forced outages and reliability events at the ISO.

**Reliable process for CAISO:** After factoring in resources on planned outage, there should be sufficient capacity to reliably operate the grid.

**Incent showing resources:** CAISO's process should not incentivize individual scheduling coordinators to hold back substitute capacity for their own needs as it creates a tighter RA market, limited substitution opportunities for other scheduling coordinators, and reduces the visibility CAISO operators have to available capacity. Similarly, the RAIM and MOO requirement should not create risks or uncompensated burdens to an LSE showing resources beyond what is needed for reliability. LSE contracted resources should be visible and operational to the market. There should be efficient processes for potential non-contracted resources to be available as substitute capacity.

**Alignment with LRA programs:** The ISO seeks alignment with LRAs on any outage and substitution policies. The ISO would also like better insight into whether any LRA planning reserve margins account for planned outages.

## Stakeholder Feedback

In August 2025, the ISO issued a straw proposal related to outage substitution reforms for RA resources. ISO stakeholders are generally in agreement that the current outage substitution management processes need to be improved. The goal is to have outage management processes that are more efficient and reliable, particularly given a recently tight RA market and the importance of timely maintenance so resources can remain dependable and fully operational.

The August 2025 straw proposal, consistent with stakeholder feedback in the working group, explored options for an outage substitution pool, and included a recommended approach for a decentralized substitute capacity pool that functions like an open marketplace for peer-to-peer transactions of substitute capacity between scheduling coordinators. The proposal also reviewed two alternative approaches to enhance the substitute capacity procurement process that the ISO did not recommend. Both of these involved the ISO matching buyers and sellers by clearing bids in an auction and, in the

absence of a standardized substitute capacity product with defined duration and MW value, prioritizing either the highest bid price for capacity (Alternative 1) or the largest outages by MW (Alternative 2).

Stakeholder feedback on the August 2025 straw proposal varied. Some stakeholders, including CDWR, Six Cities, and SCE, were supportive of the ISO-recommended approach—a decentralized substitute capacity pool, referred to as the “shopping cart” approach. SCE indicated that “for a centrally cleared marketplace to work, the product needs to be essentially uniform, but what is being sought through this process is not uniform.” CPUC Energy Division staff commented that they are “supportive of the concept of an enhanced bulletin board to facilitate transactions for capacity substitution between parties” but that they do not support the development of a more optimized centrally-cleared substitute capacity market approach like the one described in alternatives 1 and 2.<sup>9</sup>

However, other stakeholders commented that this enhancement would not be valuable compared to the status quo. They compared the approach to the ISO’s existing Power Contracts Bulletin Board that goes largely unused for substitute capacity procurement purposes. ACP-California, the Department of Market Monitoring, PG&E, SDG&E, PCE, CalCCA, AReM, MRP, and CESA expressed a preference for a more optimized approach that matches buyers and sellers through a centralized tool. There was various support for the alternatives in the paper, with CalCCA supporting Alternative 1 and SDG&E preferring Alternative 2. DMM suggested its previously-proposed concept for allowing supply to meet demand through a reverse second price auction tool to clear substitute capacity offers.

In addition, PCE and CESA submitted their own proposals, which resembled the alternative options in the August 2025 straw proposal. These proposals optimized for price and megawatt value via a daily auction to procure to a reliability target. After publishing the straw proposal, ISO staff met with CESA, PCE, MRP, and WPTF to better understand these stakeholders’ proposals and preferences.

Finally, in the 2024 RAMPD issue paper, the ISO introduced the concept of conditional outages. Receiving a conditional outage approval would have meant the resource did not have to provide substitute capacity. However, if closer to the operating day, reliability conditions changed, the ISO would go back to the SC and indicate substitute capacity must be provided. Many stakeholders indicated support for this concept,

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<sup>9</sup> <https://stakeholdercenter.caiso.com/Comments/AllComments/4f0bef9a-392a-4089-8925-76626f9af90f#org-14f8cc77-5a9d-4f1c-b62c-755c1214054a>

particularly during periods where there is not a reliability risk. The August 2025 straw proposal explained why the ISO cannot accommodate with certainty a structure where SCs taking outages will never require substitute capacity. Many stakeholders asked for the ISO to reconsider this position. Due to the monthly nature of RA supply plans and ongoing forced outages, it is a reliability risk to unconditionally approve planned maintenance outages that are not accompanied by substitute capacity. Additionally, local regulatory authorities' planning reserve margins do not account for planned maintenance outages. Instead, they generally assume that substitute capacity will be provided to replace them consistent with the ISO's rules today.

## Outage Substitution Enhancements: Next Steps

The ISO proposes to adopt the recommended approach in the August 2025 straw proposal and further the recommended approach of a scheduling coordinator outage substitution procurement pool. This "shopping cart" concept would provide an enhanced substitution process for SCs looking to procure substitute capacity in order to have a planned maintenance outage approved through the RA Substitute Capacity (RASC) process.

The August 2025 straw proposal described several key challenges with a more optimized ISO-administered substitute capacity pool. First, buyers and sellers would lose direct control over transactions in a centralized exchange. This means SCs offering substitute capacity may not have their offers selected unless matched by CAISO's optimization. Additionally, the matching process would have to occur at fixed intervals in advance of the RA month. Though not impossible, the ability to provide capacity for a period of less than 24 hours would be difficult. SCs looking to purchase substitute capacity would likely need to be willing to purchase capacity for longer periods than their outage requires. For example, for a 36-hour outage, SCs may need to purchase a week-long strip of substitute capacity for the sake of simplifying the optimization. Alternatively, a daily product could be offered, where SCs looking to buy capacity could have their substitution needs met down to the nearest day, but this would require a complicated optimization and may not be feasible without significant policy and solution development.

Given the comments from the CPUC, and the ISO's numerous open items in the RAMPD initiative suite, the ISO recommends moving forward with the decentralized approach in the August 2025 straw proposal, which will add some value for SCs looking to procure substitute capacity. However, the ISO recognizes the value of a more optimized approach to increase reliability and more efficiently match substitute capacity with SCs looking to submit maintenance outage requests. As the other issues in the various RAMPD initiatives move forward, it will be worth revisiting this approach in

future years particularly if an optimized approach that can be coordinated with potential backstop reforms.

## 5 Outage Definitions

In the RAMPD working group process, the ISO received questions and feedback from stakeholders about the need to update the ISO's outage definitions. Stakeholders suggested there is insufficient clarity with the timing requirements for the submittal of different outage types and the rules regarding outage types related to the status of a plant. Based on this feedback, this proposal includes changes to outage type definitions to align them with operational conditions for a plant and specify the timing for submitting each outage type. Generally, the proposed definitions align with the definitions in the RC West outage coordination processes.

### Planned outages

Today, planned (also known as maintenance) generation outages are defined as a period of time during which a generation operator limits the capability of a plant or takes it out of service for the purposes of carrying out routine planned maintenance, or for the purposes of new construction work.

This proposal would change the definition of a planned outage to include a reference to the planned study window timelines and submission deadlines in the RC West outage coordination procedure. The new definition would also include a specific requirement that the purpose of the outage is to carry out routine planned maintenance or undertake new construction work. Planned outages should be submitted in alignment with the planned study windows, with enough advance notice to at least meet the short-range study window submittal deadline and requirements. For example, in order for planned outages to meet the current short-range study window submission deadline, they must be submitted on a rolling weekly basis by the Monday prior to the week of the outage start date.

This proposal retains off-peak opportunity outages as a subset of planned outages that provides a route for RA resources to take a planned outage without needing to provide replacement capacity. Off-peak opportunity outages help preserve flexibility for maintenance of RA resources during CAISO-determined low-risk hours since these outages do not require substitute capacity and can be submitted with enough advance notice to be studied. Today, the low-risk hours include weekdays from hour ending 23 to hour ending 06 and all day on Saturdays, Sundays, and holidays.

## Urgent outages

This proposal introduces a new type of outage called an urgent outage. Urgent outages are definitionally very similar to a forced outage, but they are submitted with some advance notice. An SC that submits an urgent outage is indicating its plant is known to be operable, yet carries an increased risk of a forced outage occurring. Facility/equipment remains in service until personnel, equipment and/or system conditions allow the outage to occur.

As soon as an SC is aware of an anticipated outage that needs to occur in the immediate future, it should be submitted as an urgent outage. Under current rules, if an outage is submitted within one week of the outage start date, that outage is classified as a *forced* outage. In this proposal, if an SC is aware of *any* imminent need to take a plant offline, they would submit an *urgent* outage.

Urgent outages could be submitted before or after planned outage study window deadlines. The timing of the outage submission is not the determining factor in distinguishing between urgent and planned outages; the purpose of the outage is. Urgent outages would be prioritized similar to forced outages for conflict resolution purposes.

An urgent outage should have a justification of its urgency documented in the balancing authority/transmission operator comments section of the outage submission. Under the ISO's default qualifying capacity methodology, urgent outages would count towards a unit's UCAP-based QC value just as forced outages do. A plant on an urgent outage would also be subject to RAAIM penalties, as urgent outages would be considered equivalent to forced outages for availability purposes. Thus, urgent outages would not require replacement substitute capacity.

This proposal also introduces the elimination of short-notice opportunity outages. A short-notice opportunity outage is a forced outage on an RA resource that can be accommodated on short notice without providing substitute capacity. Short-notice opportunity outages must be requested no more than seven days prior to the outage start date and cannot last for more than five days. Today, short-notice opportunity outages requested three days or less in advance of the start of the outage must be necessary to undertake repairs that are needed to maintain system or resource reliability and that require immediate attention to prevent equipment damage or failure. This timeline is duplicative of the urgent outage definition proposed in this section. Finally, short-notice opportunity outages are not subject to the same RAAIM provisions that other forced outages are.

Short-notice opportunity outages can undermine the purpose of the resource adequacy program because they provide relief from penalties that are designed to encourage generation owners to plan ahead and undergo planned outages to perform the maintenance required to minimize forced outages. Generators should utilize planned maintenance within the outage study windows to ensure availability in the RA month. In addition to being redundant with the urgent outage definition, short-notice opportunity outages have the added complication of causing challenges with the outage study window timelines.

## Forced outages

This proposal includes a new forced outage definition to clarify and distinguish the timelines for forced outages, urgent outages, and planned outages.

Today, a forced outage is defined as outage for which sufficient notice cannot be given to allow the outage to be factored into the day-ahead market or real-time market bidding processes. Today, any request for a maintenance outage that is submitted seven days or less prior to the outage start date is classified as a forced outage.

The ISO proposes a new forced outage definition to reflect that a plant needs to be removed from service in real time with very limited or no notice. Forced outages should be submitted as soon as the SC becomes aware that the unit is or will about to be offline. Today, the ISO sets requirements for notifying the control center in advance of a forced outage beginning, depending on how much notice the SC can give the control center. In a future with urgent *and* forced outages, the ISO would need to establish new outage notification and coordination guidelines to distinguish between forced and urgent outages consistent with the needs of CAISO BA operators.

## 6 Governing Body Role

This straw proposal includes proposed amendments to three categories of tariff rules: RAAIM, must offer and outage reporting. While it is too early in this initiative process to propose exactly how the ultimate proposal will be decided, ISO staff has the following observations about the how the decisional classification rules in the Charter for WEIM and EDAM Governance would apply.

Amendments to RAAIM rules have generally been a decision for the CAISO Board only, because they do not apply to WEIM or EDAM, but to the CAISO Balancing Authority only. Moreover, because RAAIM involves settlement rather than market rules, it has also fallen outside the advisory role of the WEM Governing Body.

The must offer rules, on the other hand, cannot be classified at this time, because it is too early to know whether there will be substantive changes or instead just a clarification in how the current rules are expressed. To the extent the proposed changes involve substantive changes to bidding rules, they might fall within the advisory role of the Governing Body. Another possible complication is that the proposed changes to must offer rules may be intertwined with proposed changes to RAIM – i.e., not severable – and thus require a single classification. Rather than propose a complex classification at this point, ISO staff proposes to defer the classification of the RAIM and must offer amendments until the next stakeholder paper, which is expected to include a specific proposal about must offer rule changes.

We note that at least some of the proposed changes to outage rules will apply to WEIM and EDAM balancing authority areas, and for that reason would fall within the primary authority of the WEM Governing Body if considered on their own, apart from the other proposed amendments.

These observations reflect the current preliminary state of this initiative and will be explained in more details as the stakeholder process moves ahead. Stakeholders are encouraged to submit a response in their written comments to the proposed classification of as described above if they have concerns or questions.

## 7 Next Steps

Please submit comments on this Straw Proposal and the May 15, 2026 workshop by June 3, 2026 using the comment template on the ISO stakeholder website.