



# California ISO

## **Resource Adequacy Enhancements**

### **Straw Proposal – Part 2**

**February 27, 2019**

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## 1. Executive Summary

Under the Resource Adequacy Enhancements initiative, the California Independent System Operator (CAISO) is performing a comprehensive review of the CAISO's Resource Adequacy (RA) provisions and proposing enhancements that ensure effective procurement of capacity to reliably operate the grid all hours of the year. The straw proposal – part one included a discussion and proposed enhancements on the following items: (1) Rules for import RA; (2) RAAIM enhancements, outage and substitution rules, and review of must offer obligations; (3) Local capacity assessment with availability limited resources; and (4) Meeting local RA capacity needs with slow demand response.<sup>1</sup> This straw proposal – part two considers the rest of the items within the scope of the RA Enhancements initiative, including: (1) RA counting rules and assessments; (2) Backstop capacity procurement; and (3) RA import capability provisions.

The CAISO's straw proposal – part two considers potential enhancements to RA counting rules and assessments. This includes considering forced outage rates for system and flexible RA requirements. It is common practice among other ISOs to include an assessment of unforced capacity value that relies on the probability a resource will experience a forced outage at some point when it has been procured for RA capacity. The CAISO proposes to develop a methodology for calculating unforced capacity values and then conducting an assessment to ensure the unforced capacity values of the RA resource showings are collectively adequate to meet the CAISO's system operational needs in all hours. The proposal also considers the assessment of planned outages and substitution rules under an unforced capacity paradigm and the elimination of the substitution obligation for forced outages.

The proposal also considers potential modifications to the CAISO's backstop capacity procurement mechanism to align with the counting rules and adequacy assessments outlined above. These potential modifications include additional procurement authority to use the capacity procurement mechanism as an option to fulfill load serving entities unforced capacity deficiencies and system deficiencies as determined through a resource adequacy portfolio showing analysis. The CAISO also explores adding tariff authority to procure additional resources through the capacity procurement mechanism in response to planned outages that reduce capacity below requirements if no substitute capacity is provided.

Finally, the proposal reviews the RA Import Capability provisions. Each year, CAISO assesses the deliverability for imports using the Maximum Import Capability (MIC) calculation methodology. CAISO determines the MIC amount in MWs and allocates to LSEs through a 13 step Import Capability allocation process. Stakeholders requested review of the MIC calculation and allocation provisions in previous related initiatives. In response to this feedback, CAISO will review the Import Capability provisions, including; calculation methodologies, allocation process, and reassignment provisions.

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<sup>1</sup> <http://www.caiso.com/Documents/StrawProposalPart1-ResourceAdequacyEnhancements.pdf>

## 2. Introduction and Background

The rapid transformation to a cleaner, more variable and energy limited resource fleet requires re-examining all aspects of the CAISO Resource Adequacy program. In 2006, at the onset of the RA program in California, the dominant energy production technologies were gas fired, nuclear, and hydroelectric resources. While some of these resources were subject to use-limitations because of environmental regulations, start limits, or air permits, they were generally available to produce energy when and where needed. However, as the fleet transitions to achieve the objectives of SB 100,<sup>2</sup> the CAISO must rely on a very different resource portfolio to reliably operate the grid. In this stakeholder initiative, the CAISO, in collaboration with the California Public Utilities Commission (CPUC) and stakeholders, will explore reforms needed to the CAISO's resource adequacy rules, requirements, and processes to ensure continued reliability and operability under the transforming grid.

Currently, the CPUC is transitioning to a multiyear local RA framework as developed in its RA proceeding (R.17-09-020). The CAISO is an active participant in this proceeding and believes that much of what the CPUC is contemplating will require minimal or no CAISO tariff modifications. However, the CAISO will continue to assess the CPUC's multiyear RA framework and associated processes to determine if any new CAISO tariff provisions are needed to directly support the CPUC's efforts, and if so, these will be considered under this initiative.

Apart from the CPUC's proposed changes to its resource adequacy program, CAISO has identified certain aspects within CAISO's current RA tariff authority that, among other things, require refinement to ensure effective procurement, help simplify overly complex rules, and ensure resources are available when and where needed. The following issues are of growing concern to the CAISO:

- The current RA counting rules do not adequately reflect resource availability, and instead rely on complicated substitution and availability incentive mechanism rules;
- Flexible capacity counting rules may not sufficiently align with operational needs;
- The current calculation for available import capability and allocation may result in inefficient outcomes and withholding of import capabilities;
- The eligibility rules and must offer obligations for import resources may provide opportunities for economic withholding and/or non-delivery of energy;
- Current system and flexible RA showings assessments do not consider the overall effectiveness of the RA portfolio to meet CAISO operational needs; and

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<sup>2</sup> The objective of SB 100 is "that eligible renewable energy resources and zero-carbon resources supply 100% of retail sales of electricity to California end-use customers and 100% of electricity procured to serve all state agencies by December 31, 2045."

[https://leginfo.ca.gov/faces/billNavClient.xhtml?bill\\_id=201720180SB100](https://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB100)

- The growing reliance on availability-limited resources where these resources may not have sufficient run hours or dispatches to maintain and serve the energy needs in local capacity areas and sub-areas.

The CAISO proposes to conduct a holistic review of its existing RA tariff provisions to make necessary changes to ensure the above issues are addressed and the CAISO's RA tariff authority adequately supports reliable grid operations into the future.

Given the large scope of this initiative, the CAISO has issued the initial straw proposal in two sequential parts. The CAISO believes this approach allows for a thorough and manageable development and review of each of the items in scope for this initiative.

The CAISO included the following topics in part one of the straw proposal, issued on December 20, 2018:

- Rules for Import RA
- RAAIM Enhancements and Review of Must Offer Obligations and Outage and Substitution Rules
- Local Capacity Assessments with Availability Limited Resources
- Meeting Local Capacity Needs with Slow Demand Response

This part two of the straw proposal includes the rest of the items in scope for this initiative, covering the following topics:

- RA Counting and Eligibility Rules
- System and Flexible Capacity Assessments and Adequacy Tests
- RA Import Capability Provisions Review
- CPM and RMR Enhancements

In the next iteration of the proposal, the CAISO will post a revised straw proposal encompassing all issues in this initiative as part of a single proposal. Detailed below is the overall stakeholder initiative schedule.

### 3. Stakeholder Engagement Plan

Table 1 presents the schedule for this stakeholder initiative below. The CAISO plans to seek CAISO board approval in November 2019.

**Table 1: Stakeholder Engagement Plan**

<b>Date</b>	<b>Milestone</b>
<b>Feb 27</b>	Straw proposal (part two)
<b>Mar 6</b>	Stakeholder meeting on straw proposal (part two)
<b>Mar 20</b>	Stakeholder comments on straw proposal (part two) due
<b>Apr 8-9</b>	Working group meeting
<b>Apr 22</b>	Stakeholder comments on working group meeting due
<b>May 20</b>	Revised straw proposal
<b>May 28-29</b>	Stakeholder meeting on revised straw proposal
<b>Jun 10</b>	Stakeholder comments on revised straw proposal due
<b>Jul 8</b>	Second revised straw proposal
<b>Jul 16-17</b>	Stakeholder meeting on second revised straw proposal
<b>Jul 31</b>	Stakeholder comments on second revised straw proposal due
<b>Sep 9</b>	Draft final proposal
<b>Sep 24-25</b>	Stakeholder meeting on draft final proposal
<b>Oct-9</b>	Stakeholder comments on draft final proposal due
<b>Nov 13</b>	<b>Present proposal to CAISO Board</b>

## 4. Straw Proposal – Part 2

The CAISO developed this initial straw proposal in two sequential parts. Part one issues were addressed in the straw proposal published on December 20, 2018. The remainder of this section addresses the part two elements and updates to select part one elements. Unless specifically addressed below, the elements of the straw proposal - part one remain unchanged. The CAISO will solicit stakeholder feedback on the issues presented in this straw proposal part two document and hold a two day stakeholder working group in April 2019 to review all issues covered under both straw proposals - part one and two. Subsequent revised straw proposals will combine and incorporate all issues scoped under this initiative.

Straw Proposal part two includes the rest of the items in scope for this initiative, covering the following topics:

- RA Counting and Eligibility Rules
- System and Flexible Capacity Assessments and Adequacy Tests
- CPM and RMR Enhancements
- Review of RA Import Capability Provisions

The RA program is designed to ensure the CAISO has sufficient capacity available to reliably serve load all hours of the year. Any resource providing RA capacity to the CAISO has an obligation to bid that capacity into the CAISO market under a Must Offer Obligation (MOO). The MOO for various RA products and technology types is listed in the CAISO's Reliability Requirements BPM.<sup>3</sup> Additionally, under current rules, RA resources that wish to take planned outages may be required to provide substitute capacity or have that outage denied, and resources that go on forced outage, depending on the cause of the outage, may be subject to the RA Availability Incentive mechanism (RAAIM) if the resource does not provide substitute capacity. Resource owners that take planned outages requiring substitution but do not provide the required substitution may also be subject to RAAIM. RAAIM is designed to provide an incentive for resources on outage to provide substitute capacity for forced outages. RAAIM does not apply to all hours, instead applying only in the pre-defined Availability Assessment Hours (AAH). These hours and days differ depending on the RA product the resource is providing the CAISO. The 2019 Availability Assessment Hours (AAH) for each product are included in the Appendix to this document. While RAAIM provides an incentive to provide substitute capacity, it also provides an incentive to only show the bare minimum RA capacity types and amounts since all shown capacity that experiences an outage can be subject to RAAIM.

The above is a brief summary of the relationship between MOOs, RA substitution rules, and RAAIM. The reality of these relationships is that they combine to create a very complicated

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<sup>3</sup> See the Reliability Requirements BPM, pp. 77-82 for system and local RA obligations and pp. 93-96 for flexible RA obligations.

<https://bpmcm.aiso.com/BPM%20Document%20Library/Reliability%20Requirements/BPM%20for%20Reliability%20Requirements%20Version%2038.docx>

system of processes that differ vastly from other ISOs/RTOs. As part of this initiative, the CAISO will conduct a holistic review of all these concepts and these relationships. For example, the CAISO receives many questions regarding the differences between a resource's MOO and the AAHs, with questioners often using the two concepts interchangeably or incorrectly assuming a resource's RA MOO is only applicable during the AAHs.

As part of this initiative, the CAISO will assess other ISO/RTO approaches to resource adequacy. Specifically, the CAISO is reviewing how other ISO/RTOs establish installed capacity or ICAP values (similar to NQC values in California) for resources and how they are counted towards meeting a planning reserve margin. Then the CAISO will assess how these ICAP values convert to unforced capacity or UCAP values that account for resources' forced outage rates, thus ensuring an adequate operating reserve margin. For example, in some ISOs, the capacity that clears the capacity market is based on UCAP, but the market participation and must offer rules apply to the associated ICAP value. Finally, the CAISO will review how the RA requirements are set by those ISOs using both the ICAP and UCAP values, including what kind of reserve margins are considered and how ICAP and/or UCAP values are used to meet RA needs.

#### 4.1. Review of counting rules in other ISO/RTOs

The CAISO has reviewed the practices in other ISOs/RTOs to determine if the complexity of the CAISO's current RA rules are a) beneficial and b) necessary. More specifically, the CAISO has reviewed the outage and valuation and substitution rules of NYISO, PJM, MISO, and ISO-NE.<sup>4</sup> A high level review of these selected ISOs and RTOs is provided here to explain how they each meet resource adequacy standards and highlight commonalities and differences. Additional detail regarding specific counting rules are provided in the Appendix at section 8.1.<sup>5</sup>

##### **NYISO**

NYISO is responsible for managing its capacity market, which is known as the Installed Capacity Market. Each year, the New York State Reliability Council determines the annual Installed Reserve Margin necessary for the NYISO to sufficiently fulfil its Resource Adequacy criteria. The NYISO then determines the Minimum Installed Capacity Requirement (ICAP) for each LSE to meet their system and local needs which is the sum of the forecasted control area peak load in addition to the reserve margin plus 1. This ICAP value is adjusted for historic availability by multiplying the Minimum Installed Capacity Requirement times one minus a rolling monthly average Effective Forced Outage Rate of Demand (EFORd)<sup>6</sup> value which translates to the Minimum Unforced Capacity Requirement (UCAP) for each capacity zone.

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<sup>4</sup> The ISO still needs to conduct a review of practices in SPP.

<sup>5</sup> The ISO offers a special thank you to CAISO intern Madison Hoffacker for her research on this matter.

<sup>6</sup> EFORd is a measure of the probability the resource will be on a forced outage and unable to serve load if needed.

**PJM**

The centralized capacity market PJM relies on is called the Reliability Pricing Model (RPM). The process for estimating the Installed Capacity requirement and the use of an auction to procure capacity is similar to NYISO's ICAP market. First a Loss of Load Expectation (LOLE) study is used to determine the Installed Reserve Margin (IRM) which sets the ICAP requirement expressed as a reserve percent (e.g., 15%) based on historic peak load. The EFORD ratio is then applied to the ICAP obligation to establish the Forecast Pool Requirement (FRP) measured as an UCAP value (i.e.,  $FRP = (1 + IRM) * (1 - \text{Pool Wide Average EFORD})$ ). The FRP multiplied by the forecasted peak load for the upcoming year is used as the target in the capacity auction and is PJM's UCAP obligation known as the Reliability Requirement. Lastly, portions of the UCAP requirement are allocated to several zones served by a single utility. PJM procures resources on behalf of the LSEs unless LSEs opt out of the RPM capacity market to instead self-supply using the Fixed Resource Requirement Alternative.

PJM also has a non-performance assessment. The non-performance assessment evaluates performance of resources during emergency conditions. Resources that fail to perform are subject to non-performance charge. Resources that over-perform may be eligible for over-performance credit. The resource's expected performance is compared to actual performance for each real-time settlement interval for which an Emergency Action has been declared by PJM. "Emergency Actions" mean any emergency action for locational or system-wide capacity shortages that either utilizes pre-emergency mandatory load management reductions or other emergency capacity, or initiates a more severe action. Performance is assessed for Emergency Actions.

**MISO**

MISO has a voluntary incremental central capacity market known as a Planning Resource Auction (PRA). It is the responsibility of LSEs to determine their forecasted coincident peak which MISO uses to establish the overall system Planning Reserve Margin (PRM). Each LSE is provided with a minimum ICAP responsibility and is given the choice to meet their PRM by participating in the PRA, or using bilateral contracts, similar to CAISO, which constitutes the majority of MISO's forward capacity procurement. However, there are several competitive retail zones within MISO's jurisdiction, accounting for roughly 10% of system load, that operate using the PRA process exclusively.

**ISO-NE**

ISO-NE uses a Forward Capacity Market which is a centralized market run every year to procure resources three years in advance for system and zonal needs. The Installed Capacity Requirement (ICR) is set based on a loss of load study accounting for the expected load forecasts and the projected installed resources necessary to meet the reliability standards. The ICR is converted to a Net Installed Capacity Requirement (NICR) which subtracts the Quebec Control Interconnection Credit. Unique to the other capacity markets, ISO-NE uses a purely financial obligation model where New England's system operator procures enough capacity and settles payments while it is LSEs that pay for their allocated share of resource needs. ISO-NE

also does not consider forced outage rates, unlike the other centralized markets, when calculating a resource's qualifying capacity. Generators instead are incentivized through the use of performance payments to recognize the outages they anticipate and to only offer an ICAP quantity that they are likely to perform. The Pay-for-Performance (PFP) tool is a monthly capacity performance payment (credit or charge) based on system conditions and resource performance during scarcity condition. A scarcity condition is defined as any five-minute interval when the system cannot meet its reserve requirement. The performance payment is an exchange between suppliers (*i.e.*, money collected from those who underperform is used to pay those that over perform), similar to the CAISO's RAIM.

Table 2: Survey of methodologies and factors determining capacity contribution for thermal, solar, wind, and hydro resources

Resource type	Attributes	NYISO	PJM	MISO	ISO-NE
Existing resources	Capability verification test	Capability period: summer (June 1 - Sept 15) and winter (November - April 15)	Seasonally: Summer (June - August) and winter (December - February)	Annual, 1 year prior to deliverability year	Seasonally: summer (June - September) and winter (October - May)
New or returning resources	Capability	DMNC is seasonal	ICAP is a summer net dependable capacity	Total Interconnection ICAP is seasonal	Seasonal claimed capacity
	Forced outage	Class average	Blend of class average and outage data	Class average	NA
Thermal	Equation	$UCAP = (DMNC) * (1 - AEFORd)$ ; $UCAP = (DMNC) * (1 - AOF)$	$UCAP = (ICAP) * (1 - EFORd)$	$UCAP = (Total\ Interconnection\ ICAP) * (1 - XEFORd)$	Summer and winter Qualified Capacity
	Summary	Based on 5 year average of DMNC test data which is a generators proven ability to generate power. AEFORd factor is used if full GADS data is provided, otherwise an Average Outage Factor (AOF) from GADS average production data is used	Summer net dependable capacity	Total Interconnection ICAP is equal to the lesser of its GVTC or its Total Capacity Tested	Seasonal claimed capacity (SCC) calculated using the median value of five years of summer and winter data
Solar	Equation	$UCAP = (Nameplate\ Capacity) * (Production\ Factor)$	$UCAP = ICAP$	$UCAP = (Total\ Interconnection\ ICAP) * (1 - XEFORd)$	

Resource type	Attributes	NYISO	PJM	MISO	ISO-NE
	<b>Summary</b>	Uses a derating factor that averages one year of historical production during peak hours 14:00 through 18:00 in summer (June, July, August) and 16:00 through 20:00 in winter (December, January, February) of the previous season (winter, summer)	The capacity rating of three years of historical operating data during hours 13:00 through 18:00 for months June, July and August or class average capacity factor	3 year historical average output during hours 15:00 through 17:00 EST in summer (June, July, and August)  Note: New or returning PV sources need 30 consecutive days of historical data during summer months for hours 15:00 through 17:00 EST	Five year median net output from 14:00 through 18:00 for summer months June - September and 18:00 through 19:00 during the winter months October - May
Wind	<b>Equation</b>	<b>UCAP = (Production Factor) * (Nameplate Capacity)</b>	<b>UCAP = ICAP</b>	<b>UCAP = (Total Interconnection ICAP) * (Wind Capacity Credit)</b>	
	<b>Summary</b>	Uses a derating factor that averages one year of historical production during peak hours 14:00-18:00 in summer (June, July, August) and 16:00-20:00 in winter (December, January, February) of the previous season (winter, summer)	The capacity rating of three years of historical operating data during hours 13:00 through 18:00 for months June, July and August or class average capacity factor	Historical wind availability is used to calculate system-wide ELCC value across all CPNodes with an 80% confidence level. This value determines a Wind Capacity Credit for each wind farm based on a maximum capacity at the highest 8 coincident peaks during summer. Ten years of averaged data is used and all hours are considered.	Five year median net output from 14:00 through 18:00 for summer months June - September and 18:00 through 19:00 during the winter months October - May

Resource type	Attributes	NYISO	PJM	MISO	ISO-NE
Hydro	Equation	UCAP = (Production Factor) * (Nameplate Capacity)	UCAP = ICAP	UCAP = (Total Interconnection ICAP) * (1 - XEFORD)	
	Summary	Run-of-River uses a derating factor based on a rolling average of the hourly net energy during the 20 highest load hours for the previous 5 summer and winter capability periods	Hydro summer net capability is determined using tests taken annually during summer period (June-August) based on expected head and streamflow under summer conditions	3 to 15 year historical median hourly integrated net output during hours 15:00 through 17:00 EST in summer (June, July, and August)	Five year median net output from 14:00 through 18:00 for summer months June - September and 18:00 through 19:00 during the winter months October - May

## 4.2. Capacity counting and availability best practices

Based on this review, ISO-NE is the only other ISO/RTO that relies strictly on an availability metric that resembles the CAISO's RAAIM. However, the ISO-NE mechanism measures actual performance, not just availability. Additionally, given the interconnection between the energy and capacity markets, ISO-NE can apply a performance element to their PFP tool that the CAISO cannot, given the CAISO does not run a capacity market. PJM relies on both unforced capacity and performance assessments. While numerous stakeholders expressed support for some sort of performance aspect to RAAIM, many parties speculated that such performance incentives were better provided by the CAISO's day-ahead and real-time markets, not through RAAIM. After additional consideration, the CAISO agrees that performance incentives should be not be part of RAAIM. Therefore, the CAISO will not seek to modify RAAIM to include a performance aspect. However, the review of MISO, NYISO, and PJM provides evidence that there may be alternatives to solely relying on the CAISO's RAAIM. More specifically, the CAISO believes that a review of resources' forced outage rates is warranted.

Another best practice identified in the CAISO's review is the use of ICAP Planning Reserve Margins (PRM) set using the expected UCAP. In fact, in the NYISO, the UCAP need is the driving element for capacity procurement and an ICAP PRM is imputed from the actual procurement.

## 4.3. RA counting rules and assessment enhancements

As noted in both the issue paper and straw proposal – part 1, the CAISO is reviewing NQC rules, forced outage substitution rules, and RAAIM provisions. These existing rules are intricately intertwined and require a holistic review and discussion. This review includes considering assessing the reliability and dependability of resources based on forced outage rates. Incorporating forced outages into the CAISO's RA assessment will help inform which resources are most effective and reliable as we transition to a low/no carbon grid.

In addition to reviewing the best practices of other ISOs, many stakeholders commented on the prospect of the CAISO transitioning to a forced outage accounting rule. The CAISO thoroughly reviewed stakeholder comments from the straw proposal – part 1, concluding that there was no clear consensus among commenters. However, there was a diverse group of stakeholders supporting further exploration of forced outage accounting, as a general matter.<sup>7</sup>

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

The CAISO's proposal intends to stay aligned with CPUC process. However, the CAISO notes that solely relying on an installed capacity based PRM as the basis for resource adequacy as is

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<sup>7</sup> For example, Calpine, Powerex, PG&E, and SCE submitted comments supportive of additional consideration for forced outage accounting,

done today is not sustainable. The CAISO must begin considering and evaluating the energy needs of the system as California transitions to greater reliance on more variable and energy limited resources. Therefore the CAISO is proposing to develop a new adequacy test. The expanded test will not only ensure there is sufficient capacity to meet peak load needs, but also ensure sufficient energy to meet demand in all hours.

As noted above, the current RA practice relies heavily on the existing NQC counting rules. The CAISO believes that NQC will continue to be an important aspect of the RA program that will still be utilized in the future. For example, the local RA assessments and studies rely heavily on NQC. The CAISO also envisions must offer obligations being tied to NQC values. However, the CAISO is considering how to incorporate resource forced outage rates in RA assessments. Similar to the current provisions of other ISOs, the CAISO proposes calculating and publishing both installed capacity (NQC) and unforced capacity (UCAP) values and utilizing both figures in the CAISO's RA process.

More specifically, the CAISO proposes to develop the following seven step process:

1. Calculating NQC, UCAP, and EFC values
2. Determining System, Local, and Flexible RA requirements
3. RA showings
  - a. Conduct individual adequacy tests
  - b. Conduct collective adequacy test
4. Planned outage assessment
5. Market participation and must offer obligations
6. Forced outage substitution
7. CPM authority

The remainder of this section provides greater detail of the CAISO proposal.

#### 4.3.1. Calculating NQC, UCAP, and EFC values

##### **General principles**

As a fundamental rule, resource deliverability under stressed system conditions is essential and an important determination of a resource's ability to support reliable grid operations. Therefore, the CAISO does not propose to change the NQC calculations for resources (*i.e.*, the NQC calculations would be done exactly as they are today, and the CAISO will continue to derate Qualifying Capacity values (QC) based on deliverability). **Leaving the NQC unchanged has the benefit of allowing the CAISO to maintain all the existing local capacity assessments.** These assessments have worked well over time and the CAISO does not see any reason to

implement significant changes to these processes beyond those proposed in the straw proposal – part 1.<sup>8</sup>

Although the NQC will remain unchanged, the CAISO has identified some potential issues with RAAIM as the single means of incentivizing capacity availability. These include:

- RAAIM creates a disincentive to show all RA capacity under contract in a given month.
- RAAIM applies to RA resources and does not incentivize non-RA resources to conduct maintenance to enhance availability.
- Current RA outage, substitution, and RAAIM rules are complicated
- RAAIM addresses complying with a resource's RA must offer obligation, but does not consider actual RA resource performance.

As a general principle, the CAISO believes it is necessary to develop an RA accounting methodology that incentivizes upfront procurement of reliable resources rather than creating incentives to procure the cheapest RA capacity regardless of a resource's operational reliability. Additionally, incentivizing availability and proper maintenance should apply to both RA and non-RA resources. If a non-RA resource provides more reliable capacity than other RA resources, there should be a means to reflect and understand that dependable capacity value in the up-front procurement process and improve opportunities for the most dependable resources to sell RA capacity in subsequent RA cycles. In short, RA counting rules should incentivize and ensure procurement of the most dependable, reliable, and effective resources.

As an additional principle, the CAISO believes modifications to the existing RA structure should encourage showing all RA capacity that is under a RA contract. Although it may be appropriate to apply additional incentive mechanisms for availability, the CAISO must balance the impact that such incentives may have on an LSE's willingness to show all of its contracted RA capacity.

RA requirements and obligations should reflect the CAISO's operational and reliability needs. The fleet is transforming to a low/no carbon system. This transition means that historic measures of adequacy need to be revisited. As such, the products procured and the means of assessing adequacy must be updated to remain relevant. Additionally, the CAISO's operational needs are evolving to address greater levels of uncertainty. RA requirements and assessments should reflect these needs.

A final principle the CAISO offers is that the RA targets should remain clear, easily understood and based on stable criteria applied uniformly across all LSEs. For example, to date, the CAISO has relied on a planning reserve margin based on adding up RA resources' NQC values. Most LRAs set a planning reserve margin that is met by adding up their RA resources' NQC values to ensure the cumulative NQC value is greater than or equal to 15 percent above forecasted peak demand. However, some LRAs have set lower planning reserve margins. It is

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<sup>8</sup> See section sections 4.3 (Local Capacity Assessments with Availability-Limited Resources) and 4.4 (Meeting Local Capacity Needs with Slow Demand Response) of the straw proposal – part 1 <http://www.aiso.com/informed/Pages/StakeholderProcesses/ResourceAdequacyEnhancements.aspx>.

not possible to determine if those LSEs' with lower planning reserve margins impair the CAISO's system without comparing the dependability of the resources in those LSE's portfolio relative to resources in other portfolios on an apples-to-apples basis. Thus the need identified in this initiative to assess resources on their UCAP value as a basis to assess the quality of resource's shown as RA capacity.

### **General methodology for UCAP**

The CAISO proposes to calculate and publish monthly unforced capacity, or UCAP, values for all resources each year. This calculation will limit UCAP at the resource's NQC value and will only consider forced outages in determining a resources UCAP value. The UCAP value will not incorporate CAISO approved planned outages.

The CAISO will calculate UCAP values for all resource types that do not rely on the CPUC's Effective Load Carrying Capability (ELCC) methodology for determining QC values. For resource's with ELCC values calculated using the CPUC's ELCC methodology, the CAISO will use the ELCC value as the UCAP value. Additional discussion regarding the basis for this proposal is provided below.

As a starting point, the CAISO proposes to adopt the standard UCAP calculation similar to the approach applied by PJM. Specifically, the CAISO proposes to calculate UCAP as:

$$\text{UCAP} = (\text{NQC}) * (1 - \text{EFORd})$$

Although the CAISO is proposing the above UCAP calculation, it also notes that it is doing so as an initial concept simply because it is a generally accepted methodology. The CAISO is still examining alternative variations of this calculation, such as the approach used by MISO. The CAISO is, therefore, seeking stakeholder input regarding the various UCAP options currently in use.

The CAISO is assessing the benefits of calculating the EFORd seasonally as is done in NYISO and MISO. The EFORd would, for example, measure January through April and October through December as one season and May through September as another season. Once calculated, the EFORd would be set for each season for the upcoming RA year. Although seasonal calculations may add complexity, they likely better reflect resources' availability during peak and off-peak seasons. The CAISO is seeking stakeholder feedback on whether EFORd should be calculated seasonally. The CAISO proposes to utilize three to five years of historic data to determine these calculations, as is done in the other ISOs. In other words, a forced outage will impact a resource's UCAP value for the next three to five years. The CAISO also seeks stakeholder input as to whether each year should be weighted equally or if greater weigh should be applied to more recent years.

The CAISO will rely on the CPUC's ELCC methodology when applicable. Currently, the CPUC only applies this methodology to wind and solar resources, but could expand that to cover weather sensitive DR and storage technologies. The reason for the CAISO's reliance on the ELCC calculation is two-fold. First, as noted above in Table 2, other ISOs equate wind and solar UCAP values with a statistical assessment of resources' output. Second, the ELCC

already takes into account the probability of forced outages for wind and solar resources. Therefore, these technologies already have their QCs derated for expected forced outages.

The CPUC's ELCC calculation has two challenges as applied for this purpose. First, the CPUC calculates the average ELCC for the wind and solar fleet. This means that some resources will perform better than average, while others will perform worse. If all wind and solar resources are shown for RA, then there is no problem. However, if only a subset of solar and/or wind resources are shown as RA, then the average ELCC value of the RA wind and solar fleet may differ from the average ELCC value of the entire fleet. A second, but related issue, is that the CPUC calculates a diversity benefit that relies on the portfolios of wind and solar resources. If the showings have a different ratio of wind and solar resources, then the diversity benefit may not be reflected in the RA fleet. Either of these issues can result in over or under-procurement, depending on what resources are shown. However, the CAISO is looking to remove disincentives that discourage LSEs from showing all procured RA capacity. If the CAISO is successful in this effort, then all procured wind and solar will be shown and this issue can be eliminated. If there are still incentives to not show all procured RA then additional work may be needed.

The CAISO notes that there are additional resource types for which the CAISO is still assessing the applicability of the above proposed forced outage accounting or what other methods may need to be applied to develop UCAP values. The CAISO continues to explore options for DR, imports, hydro, QFs, and new resources. For example, as shown in Table 2, other ISOs have established practices for hydro resources. However, there is less consensus regarding the specific methodology. Therefore, at this time, the CAISO is not offering a specific proposal. Instead, the CAISO is seeking stakeholder feedback regarding methods for calculating UCAP values for these resource types. The CAISO will offer proposals in the revised straw proposal.

### **General methodology for Effective Flexible Capacity determination**

Similar to generic capacity, the CAISO proposes to use a variant of a UCAP methodology for flexible capacity counting purposes. The CAISO proposes to start with a general formula that incorporates economic bidding behavior into the UCAP calculations. Specifically, the CAISO proposes the following initial concept for consideration:

$$\text{EFC} = \text{UCAP} * (\text{Percent of available capacity economically bid into the CAISO's market})$$

This formulation for flexible capacity has several benefits. First, it provides similar incentives to procure reliable resources since it is a function of the resource's UCAP. Second, as opposed to the current methodology that relies on assumptions of ramping capability, this calculation relies on actual demonstrations of resources' willingness to ramp. The CAISO's goal is to align the operational needs with both forward procurement and market operations. This means aligning proposals made in the current initiative with those proposed in the Day Ahead Market Enhancements (Phases 1 and 2), specifically aligning with a day-ahead flexible ramping product.

### **Tracking forced outages and data sources**

The first and primary input needed to calculate the UCAP value is the EFORD. It is used to calculate the expected value (in terms of MWs) of a capacity resources available capacity. To determine the forced outage rate, the CAISO is currently exploring two potential data sources. The first option is NERC's Generation Availability Data System (GADS).<sup>9</sup> GADS compiles resource outage data for resources across the country. While fleet wide averages across NERC regions are readily and publically available, resource specific information is more difficult to access and compile. Additionally, GADS reporting is mandatory only for resources 20 MW and above. As small distributed resource penetration increases over time, GADS may miss a large number of resources and/or resource types.

Alternatively, the CAISO could rely on the information reported in its Outage Management System (OMS) to calculate forced outage rates. Currently, the CAISO has numerous outage cards in OMS designed to describe the nature of work for resource outages. These outage cards are also used to describe whether a resource is required to provide substitute capacity to avoid RAAIM charges or if the outage is beyond the resource's control and RAAIM exempt. A list of the current forced outage cards available in OMS is provided in Appendix 8.2.

Although the data is reported at the resource level in OMS, the CAISO has reviewed the current OMS outage cards and determined that they may not adequately cover the different types of forced outages or reflect the types of forced outages that would be exempt from forced outage calculations. In short, each of these options has pros and cons. **The CAISO is seeking stakeholder input to determine how best to collect the forced outage data needed to implement a forced outage accounting methodology.**

### **Determining the intervals of interest for force outage rate assessments**

The CAISO proposes a 16-hour window between 5:00 AM and 9:00 PM as the assessment window for calculating forced outage rates for both generic and flexible capacity. This will simplify existing availability assessment hours currently in use. The CAISO also considered a 24-hour assessment interval. However, using all hours reduces the impact of forced outages during peak needs by increasing the denominator in the forced outage calculation. The CAISO's 16-hour election focuses on the hours of greatest need and, as discussed below, mirrors the convergence between the hours of system, local, and flexible capacity needs. Further, as noted below, using the same windows allows the CAISO to calculate the same forced outage rate for both generic and flexible capacity.

The current CAISO RAAIM relies on different Availability Assessment Hours (AAHs) for determining the hours of greatest need for each capacity product, which adds complication. The AAH for generic capacity is for the five peak load hours on non-holiday weekdays. The AAHs for flexible capacity differ in both hours and duration. Category 1 flexible capacity has a 17 hour assessment interval for all days designed to cover both the morning and evening

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<sup>9</sup> [https://www.nerc.com/pa/RAPA/gads/Pages/GeneratingAvailabilityDataSystem-\(GADS\).aspx](https://www.nerc.com/pa/RAPA/gads/Pages/GeneratingAvailabilityDataSystem-(GADS).aspx)

ramps. Flexible capacity categories 2 and 3 have 5 hour assessment windows designed to cover the maximum net load ramp. Flexible capacity category 2 assessment hours covers all days and category 3 covers only non-holiday weekdays.<sup>10</sup> The AAHs can change annually for both generic and flexible capacity. The AAH for 2019 can be found in the Appendix at section 8.3.

The difference between the AAHs across generic and flexible capacity constructs creates confusion for market participants. Additionally, it complicates availability calculations since generic and flexible capacity products have different offer obligations. Finally, having different AAHs implies that flexible capacity and generic capacity needs differ significantly by day of the week or hours of the day. Although the needs differed at the onset of the flexible capacity program, this is simply not the case anymore. As noted in section 8.3, the peak load and the largest net load ramps are now occurring during the same hours. Additionally, the amount of uncertainty the CAISO must address between day-ahead and real-time markets with flexible capacity does not appear to differ dramatically across day-light hours.<sup>11</sup>

#### 4.3.2. Determining System, Local, and Flexible RA requirements

To recognize the importance of both the planning and reliability roles of the RA program, the CAISO proposes that RA requirements encompass both NQC and UCAP values. As such, the CAISO proposes that RA accounting should also reflect both values. The LRAs typically have held the role of establishing planning requirements (system RA), while the CAISO has oversight of reliability based needs (local and flexible). The CAISO therefore proposes to establish the following RA requirements:

- System RA with the following components:
  - System Planning Reserve Margin Requirement (based on NQC installed capacity and determined by LRAs)
  - System UCAP Requirement (based on Unforced Capacity needs and determined by CAISO)
- Flexible RA (based on EFC)
- Local RA

The CAISO is not proposing any changes to the frequency or timing of establishing these requirements relative to the schedule currently in place. For example, all system and flexible requirements will be established as different monthly values. Local RA requirements will still be

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<sup>10</sup> As noted in the ISO's FRACMOO2 proposal, monthly net load ramps frequently occur on weekends in the non-summer months. This misalignment indicates that Category 3 flexible capacity resources may not be available during the intervals of greatest need. See <http://www.caiso.com/Documents/SupplementalIssuePaper-FlexibleResourceAdequacyCriteria-MustOfferObligationPhase2.pdf> at p. 13.

<sup>11</sup> See <http://www.caiso.com/Documents/RevisedStrawProposal-DayAheadMarketEnhancements.pdf> at p.37-38.

calculated through the local capacity study process. Each of these requirements is discussed in greater detail below and RA showings and assessments are discussed in section 4.3.3, below.

As is the case today, the LRA is responsible for establishing installed capacity requirements. For example, the CPUC currently requires a minimum 15 percent planning reserve margin for all of its jurisdictional LSEs. The CAISO is not proposing any changes to that construct. The LRA can establish the appropriate PRM based on its planning standard and allocate that requirement to its jurisdictional LSEs. Additionally, the LRA can continue determining which CEC load forecast it will use for RA requirements (*i.e.*, 1:2, 1:5, or 1:10 year forecasted peak load peak). However, the CAISO notes that 1:2 forecasted peak load should be a minimum threshold.

In terms of operational needs and RA showings, the CAISO believes it is reasonable to expect that the amount of UCAP made available is sufficient to serve forecasted peak load and ancillary services requirements. For example, today the CAISO must carry reserves for three percent of load and three percent of generation or the Most Severe Single Contingency according to BAL-002. Additionally, the CAISO must have sufficient capacity to provide regulation and flexible ramping product. Therefore, the CAISO proposes to develop a minimum UCAP requirement that all LSEs must meet and show as RA. If the CAISO had perfect foresight, then this UCAP requirement would be, for example, equal to the forecasted peak plus all other ancillary services and flexible ramping needs, or about 109 percent of the 1:2 year peak load forecast. However, the CAISO does not have perfect foresight. Therefore, the CAISO is considering an additional factor for observed year-ahead forecast error (*i.e.*, if the 1:2 year peak load forecast was 40,000 MW, but observed was 42,000). The CAISO seeks stakeholder input about the need for such a factor and what the appropriate way to calculate such a factor.

To date, the CAISO has calculated the system flexible capacity needs based on historic three-hour net load ramps. However, the CAISO is currently in the process of developing a day-ahead flexible ramping product (DAFRP) in the Day-Ahead Market Enhancements – Phase 2 stakeholder process.<sup>12</sup> The CAISO proposes to maintain the current practice of calculating the flexible capacity requirements based on the three-hour net load ramp until there is at least one full year of data from the DAFRP. Once there is sufficient data available, the CAISO will combine the identified needs from the net load ramps, DAFRP, and current FRP to establish the flexible capacity needs defined by the CEC's IEPR (*i.e.*, scaled based on load growth) and expected growth in wind and solar (including behind the meter solar) as submitted by LSEs in the CAISO's annual flexible capacity needs assessment survey. As noted above, given the convergence of flexible capacity needs and the fact that flexible category 3 flexible capacity is not required to be available during the most significant ramps, the CAISO proposes to eliminate the existing flexible capacity categories. However, the CAISO continues to explore the need for greater levels of granularity with respect to ramping speed and capabilities.

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<sup>12</sup> See Day-ahead Market Enhancements stakeholder initiative webpage:  
<http://www.aiso.com/informed/Pages/StakeholderProcesses/Day-AheadMarketEnhancements.aspx>

The CAISO currently calculates local capacity needs through its annual study process.<sup>13</sup> This study process has worked well for over 10 years. As a result, the CAISO is not proposing any significant changes to this process at this time. More specifically, the CAISO proposes to assess the local capacity needs in terms of NQC needed to maintain reliable operation under various contingency conditions.

#### 4.3.3. RA showings, supply plans, and assessments

The CAISO is not proposing changes to the current annual and monthly LSE RA showings and resource supply plans. Annual demonstrations will still be due October 31 of each year and monthly demonstrations will still be due 45 days prior to the RA month. Additionally, the CAISO will continue notifying both the LSE SC and resource SC of any discrepancies between the RA showings and supply plans. However, because the CAISO is proposing additional RA enhancements, additional clarifications regarding the demonstrations and tests for adequacy are required.

##### **Individual assessments**

The CAISO will conduct system NQC assessments of LSEs RA showings to ensure the LRA's system planning reserve margin has been met. This assessment will be based strictly on resources' NQC and procurement requirements established by the LRA. If an LRA does not establish a planning reserve margin based on resources' NQC, then the CAISO will not conduct this assessment. The CAISO will notify LSEs of any identified deficiency and give them an opportunity to cure all deficiencies. If the deficiencies remain uncured, the CAISO will notify the LSE and its LRA of the deficiency, but will not undertake backstop procurement to resolve and enforce LRAs system planning reserve margin requirements based on NQC.

The CAISO will conduct an assessment of LSE RA showings and resource supply plans to ensure there is sufficient UCAP shown to meet the identified reliability based need identified above, in section 4.3.2. The CAISO is vetting the specific UCAP assessment implementation details, but at this time, the CAISO is proposing that LSEs need only submit and show their resources' NQC like today. Once shown, the CAISO will determine each resource's UCAP value as part of its UCAP assessment. Partial RA resources (shown for only a part of its capacity) will receive a proportional UCAP value reflecting the proportion shown for RA purposes (*i.e.*, A 100 MW resource with a 10 percent forced outage rate shown for 50 MW of NQC will be assessed as being shown for 45 MW of UCAP RA). Additionally, LSEs may not procure the "good part" of a resource (*i.e.*, LSEs cannot simply procure only the unforced capacity part of a resource and any amount shown for RA will be assessed considering the resource's forced outage rate). As an example, an LSE could not claim to buy 90 MW of both NQC and UCAP from a 100 MW resource with a 10 percent forced outage rate.

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<sup>13</sup> See Local Capacity Technical Analysis webpage:  
<http://www.caiso.com/Pages/documentsbygroup.aspx?GroupID=79FFE725-5A24-4A98-8B94-286AD3F4D5C5>

LSEs that fail to meet the UCAP requirement will be notified of the deficiency and provided an opportunity to cure. The CAISO is considering three options, outlined in section 4.4 below, for backstop procurement triggers and cost allocation in the event the LSE does not cure.

The CAISO believes there is no need to modify local RA showings and will continue using NQC values and listed local designations.

### **System and Flexible Collective sufficiency assessments**

The CAISO will conduct a portfolio assessment of only the resources shown for RA to determine if the portfolio is adequate to serve load under various load and net load conditions. This assessment is similar in concept to the collective deficiency test the CAISO conducts for local RA. The increased penetration of energy and availability limited resources means that some resources may be more “effective” than other resources in ensuring reliable operations across the months and year. As with local, the CAISO is looking to maintain a consistent definition for capacity to facilitate transacting a homogeneous product. However, the CAISO must assess how the shown RA fleet works collectively to meet system needs. This production simulation will use only the shown RA fleet in a production simulation to determine if the CAISO is likely to serve, for example, forecasted peak plus all reserves. If the portfolio is adequate then no additional actions will be taken. If the portfolio is unable to serve load under given load or net load conditions, then the CAISO will declare a collective deficiency and will conduct backstop procurement using the CPM competitive solicitation process to find the least cost solutions to resolve the deficiency. Costs will be allocated based on load ratio share to all LSEs.

The CAISO considered additional assessments of individual RA showings, however, the CAISO believes it is not feasible to adequately develop individual LSE load profiles and determine that a specific LSE’s RA portfolio contributed to the collective deficiency and, therefore, subject to LSE specific cost allocation.

### **Market participation obligations**

Resources shown for RA capacity will continue to have a must offer obligation. The CAISO proposes, consistent with the practice in certain other ISOs, that a resource’s must offer obligation must be consistent with the resource’s NQC value.<sup>14</sup> More specifically, if a resource is shown for 100 MW of NQC, it must bid 100 MW of capacity into CAISO’s markets. This bidding rule is required to ensure the underlying UCAP availability is met. As an example, the UCAP requirement is set with the expectation that some portion of the RA fleet is on forced outage. Setting must offer obligations at the UCAP means that all forced outages would require substitute capacity to ensure reliability. Alternatively, and as proposed here, setting the must offer obligation at the shown NQC value allows the CAISO to dramatically simplify forced outage

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<sup>14</sup> See <https://www.aeso.ca/assets/Uploads/CRA-AESO-Capacity-Market-Design-Report-03302017-P1.pdf> at p. 22. “In all the reviewed markets except California and ISO-NE, the capacity of these facilities is procured and settled as UCAP. In California and ISO-NE, the capacity obligation is denominated as installed capacity (ICAP). Notwithstanding that, in most markets, capacity is procured and settled as UCAP, the resulting performance obligation on conventional controllable generation is to offer all of the ICAP except on recognized outages.”

substitution. By establishing a UCAP-based RA construct with an associated must offer obligation at the NQC value, the RA fleet effectively provides its substitute capacity upfront, eliminating the need for complex resource substitution rules. For this reason, the CAISO is exploring eliminating the existing RA forced outage substitution rules in favor of UCAP-based resource RA counting and NQC-based resource bidding. This concept is addressed in greater detail below.

The CAISO continues to review the must offer obligations in both the tariff and Reliability Requirements BPM for all capacity resource types. Currently, the CAISO tariff contains provisions regarding must offer obligations and bidding and bid insertion rules. Although the CAISO requires RA resources to economically bid or self-schedule into the market, it also supplements those bidding obligations with bid insertion provisions for non-use limited resources. Additionally, the CAISO is preparing to implement the Commitment Cost Enhancements – Phase 3 (CCE3) policy. This policy allows resources with certain use limitations to include approved opportunity costs in their market bids. The policy is designed to ensure the more effective and efficient use of resources in the market and to facilitate regular and consistent market participation from resources with certain use limitations.

As part of this RA enhancements initiative, the CAISO is contemplating revisions to the bid insertion rules. At this time, the CAISO is contemplating two potential bid insertion options. These options are as follows:

- 1) Apply bid insertion to all non-use-limited resources and use-limited resources with eligible use-limitations (*i.e.*, those with an opportunity cost per CCE3 policy). This would ensure that resources have bids in the market and would need to report outages to avoid the market dispatching the resource. Having bids in the market would enhance the CAISO's ability to identify forced outages. As a result, the CAISO would dramatically reduce its application of RAAIM to select instances (described below).
- 2) No bid insertion for any resources. However, to incentivize market participation, the CAISO would either a) apply RAAIM to RA resources or b) treat all intervals without bids as a forced outage for purposes of the UCAP calculation.

Given the complications associated with RAAIM to date, the CAISO prefers option 1 because it would significantly reduce the application of RAAIM and associated complexity. Additionally, option 1 is preferable because option 2 creates disincentives to showing RA capacity – one of the problems that CAISO is hoping to address. As a result, the CAISO is seeking stakeholder input regarding preferences for the above options or an alternative approach.

### **Planned outages**

In the straw proposal part one, the CAISO proposed a new planned outage substitution concept. The CAISO's initial proposal is to conduct a planned outage assessment of all system RA resources using a first in last out approach. More specifically, all planned outages submitted will be assessed based on the order in which they were received. Any outages submitted while the unforced capacity requirement exceeds the minimum UCAP threshold for any LSE will not be

required to provide substitute capacity. However, once outages dip below a given threshold of the required UCAP need, substitution would be required. A LSE may procure the needed substitute capacity on its own. However, as noted in the straw proposal – part one, the CAISO will explore allowing LSEs to utilize the CAISO's existing competitive solicitation process to procure substitute capacity. Additional discussion regarding this proposal is provided in the backstop procurement section below.

### **Forced outages and RAIM application**

As noted above, by assessing resource adequacy on UCAP values and requiring bidding at the NQC value, the CAISO believes it is possible to eliminate forced outage substitution. The reliance on UCAP for RA capacity value should provide incentives for timely maintenance and expeditious repairs. Further, the CAISO will not allow for substitution of capacity for forced outages to shift obligations or mitigate the impact on UCAP. No other ISO allows a resource to reduce its EFORD through substitution. Doing so would mask the true reliability value of the resource. The greatest risk to reliability the CAISO faces by removing forced outage substitution is maintaining reliability in local capacity areas when a resource goes on a forced outage. Even so, in certain instances, there may not be substitute capacity available. However, when substitute capacity is available, the CAISO will rely on CPM designations to meet its capacity needs.

In the straw proposal – part one, the CAISO stated it may continue to rely on an availability incentive mechanism. At this time, the CAISO is assessing the need for both the RAIM and a UCAP assessment tool. An important consideration and present criticism of RAIM is it creates a disincentive for LSEs to show all their RA capacity under contract in a given month. Saying this, the CAISO has identified certain instances when RAIM may be helpful, e.g., as a transitional tool and for new resources. If the CAISO transitions to assessing the RA fleet based on UCAP values, it anticipates certain enhancements will be needed to the CAISO's outage management system to ensure sufficient and quality outage data is readily available for calculating UCAP values. If the CAISO's outage management system is the appropriate data source, then it will take the CAISO up to three years to capture the full data set the CAISO requires to perform a full and robust UCAP calculation. As a transition, a declining RAIM charge might provide availability incentives while the CAISO collects the new OMS data. The CAISO is contemplating a combination of RAIM and UCAP for the first three years of implementation. For example, the CAISO would calculate a resource's UCAP and RAIM as follows:

**Example:** 100 MW resource with 33 percent forced outage rate

	Year 1	Year 2	Year 3	Year 4
<b>UCAP</b>	$(100 \cdot 100 \cdot 100) / 3 = 100 \text{ MW}$	$(67 \cdot 100 \cdot 100) / 3 = 89 \text{ MW}$	$(67 \cdot 67 \cdot 100) / 3 = 78 \text{ MW}$	$(67 \cdot 67 \cdot 67) / 3 = 67 \text{ MW}$
<b>RAAIM charges</b>	1 * (RAAIM price)	0.67 * (RAAIM price)	0.33 * (RAAIM price)	0.0 * (RAAIM price)

This concept would allow for a transition from the existing RAAIM incentives to the UCAP calculations over time as the necessary data is collected.

Another instance in which RAAIM may be particularly helpful is for new resources. In this context, the CAISO would consider any resource without three years of OMS data as a new resource. This would ensure that resource IDs that may not be tied to a specific physical resource cannot create new resources to avoid a UCAP reduction from a forced outage. Similar to the transition to UCAP, this limited use of RAAIM would only apply to resources until adequate data was compiled to calculate a UCAP value.

As an alternative, the CAISO is also contemplating using technology averages for resources in calculating UCAP values for both the transition to UCAP values and for new resources. As highlighted in section 4.1, this is fairly common practice in other ISOs. Although the CAISO is not strictly opposed to this approach, there are reasons to question its applicability to the CAISO, at least for new resources. As a transitional tool, it means the CAISO would have to treat different resources similarly for the first year, but then the more reliable resources would start to differentiate themselves by the second and third year. As such, class average UCAP values may provide at least as smooth a transitional tool as RAAIM. However, there is a significant difference between the CAISO and, for example, PJM when it comes to new resources. PJM requires import resources that sell capacity into PJM's capacity market to be resource specific. This is not the case in the CAISO. In the CAISO, imports could simply create a new resource ID to mask a high forced outage rates on an existing resource (the same tactic could be used with demand response resources).<sup>15</sup> This means that it may be difficult to establish a class average for imports to begin with and that the class average could be higher than a calculated UCAP, leading the resource to simply create a new resource ID. Therefore, if the CAISO were to use this approach, at least one of the following would need to occur: 1) the CAISO establishes a class average forced outage rate for imports, 2) new resources for imports receive a UCAP value less than the class average (to disincentivize changing resource IDs), or 3) RA imports have to be resources specific. These considerations related to the applicability to imports will also be assessed in conjunction with any proposals regarding import RA rules in future revised straw proposals.

<sup>15</sup> Other resource types can utilize similar strategies. For example, demand response and distributed resources could also transfer customers to a new resource id.

The CAISO is seeking stakeholder input regarding the use of RAAIM moving forward and if needed, what the appropriate applications might be.

#### 4.3.4. Backstop capacity procurement

This proposal includes changes to the backstop procurement authority for the capacity procurement mechanism (CPM) and reliability must-run (RMR) mechanisms in a number of ways. These changes include additional procurement authority for the capacity procurement mechanism for LSEs with unforced capacity deficiencies, and system deficiencies determined through a resource adequacy portfolio showing analysis. Additionally, the authority to procure for flexible capacity will be modified to align with new flexibility requirements, outlined above in section 4.3.2. Finally, the CAISO proposes to create tariff authority to procure additional resources through the competitive solicitation process when planned outages reduce an LSE's shown capacity below requirements and no substitute capacity is provided.

The CAISO notes that the February 21, 2019 Decision from the California Public Utilities Commission states that the RA program will be modified to allow RA procurement for three future years, instead of the current single future year procurement.<sup>16</sup> Currently, the CAISO does not envision any changes to the backstop authority to procure additional resources or set new targets for resources more than 1-year into the future. All changes included in this portion of the document only refer to annual and monthly procurement, for a single upcoming RA year and each month of the upcoming RA year.

#### **Reliability Must-Run modifications**

In the CAISO's RMR and CPM enhancements initiative, the CAISO took steps to update existing incentive mechanisms for RMR resources so that the old mechanisms were no longer applicable and that these resources are subject to RAAIM, which aligns with current RA resources and CPM resources.<sup>17</sup> This proposal contemplates possible changes for use of the RAAIM mechanism. If the CAISO considers such changes, the CAISO might also consider revising the applicability of RAAIM to RMR resources.

As noted above, RAAIM may be useful for certain resource adequacy resources, particularly those without historic forced outage rates. Thus, it may be appropriate to apply to RMR resources. One option would be to consider establishing seasonal availability targets, with penalties that can be assessed if the resource fails to meet the specified targets.

Currently, the RMR mechanism is used to maintain operations from resources that are needed for reliability that would otherwise retire or mothball. Outside of the potential changes regarding RAAIM discussed above, the CAISO is not contemplating any other changes to the RMR mechanism in this initiative.

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<sup>16</sup> See CPUC proceeding: R.17-09-020

<sup>17</sup> See RMR and CPM Enhancements Stakeholder Initiative webpage: [http://www.caiso.com/informed/Pages/StakeholderProcesses/ReliabilityMust-Run\\_CapacityProcurementMechanismEnhancements.aspx](http://www.caiso.com/informed/Pages/StakeholderProcesses/ReliabilityMust-Run_CapacityProcurementMechanismEnhancements.aspx).

**Capacity Procurement Mechanism modifications**

The CAISO has authority to procure resources using CPM in the seven circumstances listed below. The CAISO is proposing modification to existing authority to procure additional capacity when comparing shown unforced capacity with LSE specific requirements for unforced capacity, and authority to procure for aggregate portfolio deficiencies that may prevent the CAISO from operating the grid reliably.

1. System annual/monthly deficiency – Addresses insufficient system RA capacity in year-ahead or month-ahead RA showings;
2. Local annual/monthly deficiency – Addresses insufficient local RA capacity in year-ahead or month-ahead RA showings for one specific entity making showings;
3. Local collective deficiency – Addresses insufficient local RA capacity in year-ahead RA showings to meet the reliability needs for one specific local area;
4. Cumulative flexible annual/monthly deficiency – Addresses insufficient flexible RA capacity in the year-ahead or month-ahead showings for system needs;
5. A “Significant Event” occurs on the grid;
6. The CAISO “Exceptional Dispatches” non-RA capacity; or
7. Capacity is at risk of retirement that is needed for reliability in a future year.

In the RMR and CPM enhancements initiative, the CAISO proposed to remove the capability to use CPM for capacity at risk of retirement (number 7 above), and to effectively transfer that capability to CAISO’s RMR authority. The RMR and CPM enhancements initiative is on track for board approval in March 2019 and implementation in the fall of 2019.

Above, the CAISO outlined that it will seek additional CPM authority based on individual LSE’s shown UCAP. However, there are three distinct ways the CAISO can exercise this authority. The CAISO would not exercise this authority until after LSEs complete resource showings and the period to cure any individual LSE deficiencies is closed. There are pros and cons to each option.

- 1) LSE specific UCAP test – Under this option, if the CAISO determines a LSE has an unresolved UCAP deficiency, the CAISO will procure backstop capacity on behalf of the LSE to resolve the deficiency, and then allocate costs directly to that deficient LSE. This option has the benefit of providing a strong incentive for LSEs to meet obligations and mitigates the potential for leaning on other entities that procure excess capacity relative to the minimum threshold. However, it could result in the CAISO exercising backstop procurement when the system as a whole may not be deficient.
- 2) System UCAP test – The CAISO will assess if the system as a whole has adequate UCAP shown. If the system is adequate, then no additional action is taken, even if specific LSEs show less capacity than required. However, if a system deficiency is identified, then the CAISO will conduct backstop procurement sufficient to resolve

the system level deficiency and allocate costs to all deficient entities on a deficiency ratio share basis. This option may allow some entities to lean on others, but may result in less backstop procurement by the CAISO than the LSE specific UCAP test.

- 3) Capacity incentive option – Under this option the CAISO will create a mechanism that determines all entities that procured less than the UCAP target and charges those LSEs for each MW of deficient capacity. This fee may be set at the capacity procurement mechanism soft offer cap or similar construct,<sup>18</sup> which would be an effective incentive for all entities to procure the threshold amount of UCAP. These charges would then be placed into a pool and reallocated to entities that exceed their minimum unforced requirements, which would incentivize entities to show as much resource adequacy capacity as possible. This option provides an incentive for LSEs to meet minimum requirements and potentially exceed them on their RA showings. However, this option may be the most challenging to implement.

Additionally, if the CAISO identifies a collective system level deficiency, it will conduct backstop procurement to cure the identified deficiency. The CAISO is currently exploring the relative timing of this assessment compared to individual deficiencies, but would likely procure to satisfy individual deficiencies first, then collective deficiencies. The order in which these processes occur is critical in determining cost allocation for capacity procurement mechanism designations. The CAISO will also make capacity procurement designations for shortages in flexible showings in a similar manner to shortages for system unforced capacity.

### **Competitive Solicitation Process modifications**

In the straw proposal – part one, the CAISO proposed allowing LSEs to utilize a CPM competitive solicitation process (CSP) to help scheduling coordinators find substitute capacity for planned outages. Using the CPM CSP would be voluntary for scheduling coordinators with resources going on planned outage; they could choose to provide the CAISO with substitute capacity to avoid CAISO backstop procurement. Further, the CAISO would only use this authority to backstop for differences between showings and LSE requirements when resources are on planned outages and the remaining UCAP is below requirements. However, the current CSP is designed to make capacity designations for at least 30 days. Therefore, if the CAISO were to pursue this proposal, changes to the CSP tool will be required. Specifically, updates would be needed so that capacity could submit bids for designations as RA for as little as one day. The CAISO would also update the tool to make designations for durations less than 30 days to match submitted outages.

The CAISO notes that FERC previously rejected CAISO proposals for CPM designations of less than one month.<sup>19</sup> However, in this instance, the CAISO is not mandating awards of less than 30 days or requiring resources to submit CSP bids for less than 30 days. The CAISO is simply exploring whether the CSP tool should include optionality for resources to submit bids for

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<sup>18</sup> The capacity procurement mechanism soft offer cap is a term that applies to net qualifying capacity and may need to be adjusted to account for unforced capacity.

<sup>19</sup> *California Independent System Operator Corporation*, 141 FERC ¶ 61,135 (2012); *California Independent System Operator Corporation*, 123 FERC ¶ 61,229 (2008).

designations and payments spanning less than 30 days to procure substitute capacity for planned outages. As part of this proposal, the CAISO would require three additional criteria for resources submitting single day bids into the CSP. First, resource owners must submit single day bids at the same time it submits bids for monthly capacity procurement mechanism designations. Second, these bids would be in place for the entire month. Allowing resources to change capacity bids throughout the month is not justifiable because it could present gaming opportunities and the incremental cost to provide capacity should not change for a resource within a single month. Third, over any month, the sum total of all capacity procurement designations to a single resource under this mechanism could not exceed the value bid for a full month CPM designation.

The CSP tool is the mechanism the CAISO uses to receive bids for capacity not already procured through the bilateral resource adequacy process, and are resources available for designation through the CPM. Resource owners may submit bids into the CSP for up to the full capacity of a resource, at prices they are willing to sell capacity.<sup>20</sup> This proposal contemplates three types of bids in the CSP tool: annual; monthly; and intra-monthly. The annual and monthly processes are for annual and monthly RA deficiencies, respectively. The intra-monthly process would be for significant event designations and exceptional dispatch designations. Each CSP includes an offer period and an offer adjustment period. Currently there is no way for a resource to differentiate between potential one day designations and 30 or 60 day designations. The CAISO proposes to include a new daily provision offering.

Based on this discussion, the CAISO is seeking stakeholder input regarding whether or not the CAISO should seek to modify the CSP to provide optionality (and associated rule changes) for resources to submit, and for the CAISO to accept, bids for CPM designations of less than 30-days.

#### 4.4. Review of RA Import Capability provisions

Each year, the CAISO establishes maximum import capability (MIC) values for import paths, The CAISO tariff defines maximum import capability to mean “a quantity in MW determined by the CAISO for each Intertie into the CAISO Balancing Authority Area to be deliverable to the CAISO Balancing Authority Area based on CAISO study criteria.”<sup>21</sup> Once these values are calculated, the capacity is allocated to scheduling coordinators for LSEs in the CAISO BAA for resource adequacy purposes.

The CAISO has received requests from stakeholders regarding the need to review both the MIC calculation and allocation provisions. Some stakeholders have indicated that the CAISO should consider alternative calculation methods, and have also asserted that there are numerous

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<sup>20</sup> Any capacity bid into the competitive solicitation process has the obligation to accept any designation made through this mechanism. All resources that do not submit bids have bids inserted into the competitive solicitation process at \$7.31/KW-month, and are compensated at the soft offer cap of \$6.31/KW-month if a designation is made. However, resources that do not submit bids may decline any designations that are made. Further, resources that bid above the soft offer cap are required to justify their costs at FERC.

<sup>21</sup> See Appendix A to the CAISO tariff.

challenges presented by the current 13 step Import Capability Assignment process. In response to stakeholder input and feedback, the CAISO will conduct a comprehensive review of the CAISO's Import Capability provisions, including; calculation methodologies, allocation process, and reassignment/trading provisions.

#### 4.4.1. Resource Adequacy Import Capability background

The CAISO assesses the deliverability for imports using the MIC calculation methodology. The CAISO calculates the MIC MW amount mainly based on a historic methodology that utilizes the actual schedules into the CAISO's BAA for highest imports obtained simultaneously during peak system load hours over the last two years. The CAISO examines the prior two years of historical import schedule data during high load periods. Sample hours are selected by choosing two hours in each year, and on different days within the same year, with the highest total import level when peak load was at least 90% of the annual system peak load. The CAISO then calculates the historically-based MIC values based on the scheduled net import values for each intertie, plus the unused Existing Transmission Contract (ETC) rights and Transmission Ownership Rights (TOR), averaged over the four selected historical hours. This concept is an important fundamental principle of the MIC framework, intended to ensure that existing ownership rights and pre-existing RA commitments and contracts should be recognized and honored.

MIC values for each intertie are calculated annually for a one-year term and a 13-step process is used to allocate MIC to LSEs. MIC allocations are not assigned directly to external resources, rather LSEs choose the portfolio of imported resources they wish to elect for utilization of their MIC allocations. This is also an important principle underlying the MIC framework. The reason that MIC is allocated to LSEs is the fundamental concept that LSEs pay for the transmission system so they should receive the benefits from it, and this is the reason that MIC is allocated to LSEs and not all market participants. Once the allocation process is complete, LSEs can use their MIC allocations on each intertie to support their procurement of RA capacity from external resources. The 13 step MIC allocation process is detailed further below.

RA showings designating import MWs to meet RA obligations across interties using either Non-Resource-Specific System Resources, Pseudo-ties, or Dynamically Scheduled System **Resources are required to be used in conjunction with a MIC allocation and are considered a firm monthly commitment to deliver those MWs to the CAISO at the specified interconnection point with the CAISO system.**

#### 4.4.1. Maximum Import Capability Calculation review

For most interties, the CAISO calculates MIC values based on historical usage of a given intertie. This historically-based MIC methodology establishes a baseline set of values for each intertie. As noted above, this calculation is based on the maximum amount of simultaneous energy schedules into CAISO BAA, during select CAISO coincident peak system load hours over last two years. The CAISO also performs a power flow study in the CAISO's TPP to test MIC values to ensure each intertie's MIC can accommodate all state and federal policy goals; if

any intertie is found deficient, the CAISO establishes a forward looking MIC for that intertie and plans the system to accommodate this level of MIC in the TPP and RA.

Some stakeholders provided feedback indicating they believe the MIC calculation methodology should be modified to be a forward looking approach for all MIC values, in contrast to continuing to use only the forward looking MIC approach that is currently utilized in limited circumstances along with the current historic methodology used for most interties. The CAISO has observed declines in MIC values determined in recent years that are reflective of the historic import data during the selected study period. The data provided in Table 3, above, provides relevant MIC values calculated over time using the current methodology.

Table 3: Historic MIC data

MIC RA Year	2014	2015	2016	2017	2018	2019
Maximum Import Capability (MWs)	17,486	16,228	15,755	15,221	14,852	15,208
ETC and TOR held by non-CAISO LSEs (MWs)	4,090	4,090	4,090	4,211	4,511	5,015
Available Import Capability for CAISO Resource Adequacy purposes (MWs)	13,396	12,138	11,665	11,310	10,341	10,193
Total Pre-RA Import Commitments & ETC (MWs)	6,047	5,426	5,256	4,736	4,628	4,306
Remaining Import Capability - less all ETC and TOR (MWs)	7,348	6,712	6,409	6,574	5,713	5,888

The CAISO’s initial review of the MIC calculation process indicates that the current MIC calculation methodology is still appropriate. The CAISO believes the calculation methodology is still working as intended without significant impact to reliability or LSE’s ability to utilize imports for RA purposes. As such, the CAISO is not proposing to make any modifications to the calculation methodology at this time.

Although the CAISO’s initial position on the MIC calculation approach is that modification to the current approach is not necessary, the CAISO acknowledges the stakeholder feedback and the need for additional review of the methodology and alternative approaches. For this reason the CAISO is open to considering additional feedback on the MIC calculation methodology position and seeks input on potential analysis or alternative calculation methodology proposals for further review.

#### 4.4.2. Available Import Capability allocation process review

After calculating the MIC, the ETC and TOR amounts held by LSEs are protected for and removed from the MIC figure to determine the amount of remaining MIC that is available for allocation to the LSEs. The remaining available MIC is referred to as the Available Import Capability. The process for allocating this MIC to LSEs is referred to as the Available Import Capability allocation process.

The CAISO received feedback from stakeholders asserting concerns presented by the current Import Capability Assignment process. For instance, feedback indicated that the existing MIC allocation framework allocates the vast majority of intertie capability to the largest California LSEs, and commenters claim that historically some LSEs have not utilized their full allocation to support import RA contracts. The concern raised is there is currently no mechanism to ensure unused intertie capability is made available to other LSEs to support RA contracts, and they assert intertie capability is effectively “stranded” to the detriment of both smaller LSEs and external suppliers who are unable to obtain the intertie capability necessary to support an import RA contract.<sup>22</sup>

Based on this feedback the CAISO is also reviewing the Available Import Capability allocation process to determine if there are enhancements that would improve the use and efficiency of the Available Import Capability. The CAISO believes it may be necessary to modify the allocation process to address these concerns and provides a review of the current process below. Additionally, the CAISO also believes there may be a need to revisit the current Import Capability reassignment and bilateral trading provisions.

##### **Available Import Capability Assignment process background**

The CAISO assigns the total Available Import Capability on an annual basis for a one-year term to LSE SC serving Load in the CAISO BAA and, in limited circumstances, to Scheduling Coordinators representing Participating Generators or System Resources, through the 13 step allocation process detailed in the CAISO tariff, Section 40.4.6.2.1, Available Import Capability Assignment process.

This multi-step process for assignment of import capability does not guarantee or result in any actual transmission service being assigned, and it is only used for determining the import capability that can be credited towards satisfying the Reserve Margin of a LSE under CAISO tariff Section 40. Following the 13 step Available Import Capability allocation process, LSEs have the opportunity to trade their assigned Import Capability with other entities bilaterally. This trading opportunity is detailed in the CAISO tariff Section 40.4.6.2.2, Bilateral Import Capability Transfers and Registration Process.

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<sup>22</sup> See Powerex and PGP’s stakeholder comments on Issue Paper:  
<http://www.aiso.com/Pages/documentsbygroup.aspx?GroupID=745AB919-BC59-4679-87C7-AB18C236D9B1>

The following table lists the 13 steps of the Available Import Capability Assignment Process. This process and the associated schedule for the process is also described in further detail in the appendix at section 8.4 (details) and section 8.5 (posting and submittal dates).<sup>23</sup>

**Table 4: Available Import Capability Assignment process overview**

<b>Step #</b>	<b>Process description</b>
<b>Step 1</b>	Determine Maximum Import Capability (MIC)
	- Total ETC
	- Total ETC for non-ISO BAA Loads
<b>Step 2</b>	Available Import Capability
	- Total Import Capability to be shared
<b>Step 3</b>	Existing Contract Import Capability (ETC inside loads)
<b>Step 4</b>	Total Pre-RA Import Commitments & ETC
	- Remaining Import Capability after Step 4
<b>Step 5</b>	Allocate Remaining Import Capability by Load Share Ratio
<b>Step 6</b>	CAISO posts Assigned and Unassigned Capability per Steps 1-5
<b>Step 7</b>	CAISO notifies SCs of LSE Assignments
<b>Step 8</b>	Transfer [Trading] of Import Capability among LSEs or Market Participants
<b>Step 9</b>	Initial SC requests to ISO to Assign Remaining Import Capability by Intertie
<b>Step 10</b>	CAISO notifies SCs of LSE Assignments & posts unassigned Available Import Capability
<b>Step 11</b>	Secondary SC Request to ISO to Assign Remaining Import Capability by Intertie
<b>Step 12</b>	CAISO Notifies SCs of LSE Assignments & posts unassigned Available Import Capability
<b>Step 13</b>	SCs may submit requests for Balance of Year Unassigned Available Import Capability

<sup>23</sup> Also see Section 40.4.6.2.1 of the ISO Tariff.

**Available Import Capability Assignment process analysis and options**

As noted above, the CAISO received stakeholder feedback that there may be challenges presented by the current Import Capability Assignment process. Stakeholders that provided feedback along these lines indicate the CAISO should consider how to modify the process to provide improvements that address fairness, efficiency, and ease of understanding and implementation. The CAISO is open to reviewing the current allocation approach to understand if there are any enhancements that could improve the use and efficiency of the Available Import Capability that is allocated to LSEs. The CAISO believes modifications to the allocation process may be needed and that the current Import Capability reassignment and bilateral trading provisions should be revisited.

Some stakeholders raised the concern that LSEs may not fully utilize the MIC they are allocated on each intertie for all RA months. These stakeholders express concerns that those LSEs were not making that MIC available for others to buy or trade, essentially hoarding some of the MIC that has been allocated. The CAISO has not yet developed analysis to assess the validity of these hoarding concerns, but believes that the efficient use of MIC for RA imports is an important consideration in this review. The CAISO seeks feedback from stakeholders regarding the type of analysis needed to better understand the efficacy of the current Available Import Capability Assignment process.

The CAISO is also interested in evaluating if the current allocation process timing could cause barriers for new LSEs just beginning operations and commencing their own RA compliance. Because new LSEs can begin operations during various periods of the year the RA related provisions that are applicable to these new parties are important to consider. In particular the timing of the Available Import Capability Assignment process may need to be evaluated to understand if it presents any unnecessary barriers to new LSEs receiving shares of the Import Capability for use in RA compliance. The ISO plans to review the CPUC's RA guidelines for new LSEs in conjunction with this evaluation of the timing of the Available Import Capability Assignment process. A full breakdown of the schedule for this process is provided in the Appendix section 8.5.

The CAISO is considering including the following potential enhancements to the Import Capability Assignment process in subsequent proposals and wishes to provide initial options for stakeholder consideration. These options include:

- Consider modifications to allow for the release and reallocation of unused import capability after initial monthly RA showings:
  - Subject any unused import capability to an appropriate release mechanism. Stakeholders have suggested that intertie capacity not used to support an RA contract within a respective RA procurement timeframe should be released and made available to other LSEs and market participants to support RA contracts.
  - Maintain the fundamental principle that entities that fund the costs associated with intertie facilities, *i.e.*, internal LSEs that pay the Transmission Access Charge ("TAC") should have priority access to the use of import capability to support their own RA

contracts, similar to the current process. In other words, the entities funding the embedded cost of the CAISO interties should be given the first opportunity to use that intertie capacity to support an RA contract in each RA procurement timeframe.

- Incorporate an auction or other market based mechanism into the Available Import Capability Assignment process:
  - Provide alternative or additional opportunities for procurement of import capability by LSEs that may need to secure more than their pro rata load ratio share of MIC on any given branch group/intertie to support a particular RA contract. Alternative mechanisms could allow for more efficient procurement of import capability by those LSEs that place a greater value on the Import Capability for various reasons.
  - Allocate only a portion of the remaining Available Import Capability through a mechanism similar to the current process but retain a portion of the remaining Available Import Capability to be auctioned or otherwise procured by LSEs. Additional auction revenues could potentially be used to reduce the TAC Transmission Revenue Requirement.
- Enhance the provisions for reassignment, trading, or other forms of sales of Import Capability among LSEs:
  - Consider the potential enhancements included above and determine if any proposed modifications would address this issue.
  - Modification of this aspect of the process may still be needed to provide alternative approaches to bilateral transfers to better facilitate the transfer of Import Capability among LSEs and improve the efficient utilization of Import Capability if extensive changes described above are not pursued.

The CAISO seeks additional stakeholder feedback on the Available Import Capability Assignment process and the provisions for Import Capability reassignment and trading.

## 5. Implementation plan

The CAISO is currently targeting a 2020 implementation for this initiative, meaning application to the 2021 RA compliance year. The CAISO understands this is challenging and comprehensive initiative. The CAISO seeks stakeholder feedback about how these policies must roll out and an appropriate and feasible implementation schedule once the policy details are further understood and developed.

## 6. EIM Governing Body Role

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

authority area. The ISO did not receive any initial feedback from stakeholders regarding the initial proposed EIM classification for this initiative. The CAISO continues to seek stakeholder feedback on this proposed decisional classification for the initiative.

## 7. Next Steps

The CAISO will discuss this issue paper with stakeholders during a stakeholder meeting on March 6, 2019. Stakeholders are asked to submit written comments by March 20, 2019 to [initiativecomments@caiso.com](mailto:initiativecomments@caiso.com). A comment template will be posted on the CAISO's initiative webpage here:  
<http://www.caiso.com/informed/Pages/StakeholderProcesses/ResourceAdequacyEnhancements.aspx>

## 8. Appendix

### 8.1. RA counting practices in other ISOs

Incorporating forced outages RA assessments is a common practice in other markets. The CAISO is currently reviewing best practices from other ISO/RTOs from across the country. A summary of the CAISO's preliminary review of ISO-NE, MISO, NYISO, and PJM is included below.

#### **Review of existing calculation methodologies**

Each year, PJM, MISO, and ISO-NE set their expected annual capacity requirements and resources are designated an ICAP value reflecting its year-round capability. Across these markets, a facility's capability is generally measured during the summer peak load times, aligning with when system conditions are most stressed. NYISO has adopted a two-season approach to account for distinct peak capacity needs and recognizing generator's unique seasonal capabilities.

Once ICAP values are established, historical performance data during those peak demands are used to adjust for the probability a unit will not meet its demand (EFORd) within NYISO, PJM, and MISO jurisdiction. NYISO and MISO use class averages for EFORd ratings and PJM applies a blend of class averages and actual operating history. ISO-NE does not assign UCAP values to generators and therefore EFORd ratings are not applied to resource capacity capabilities. Instead, expected outages are accounted for in the minimum Installed Capacity Requirement and quantity of ICAP procured.

#### ***Conventional generation (thermals):***

Here we review the assumptions used in determining ICAP and UCAP values for each market and resource type with additional details regarding thermal generators specifically.

All resources within the NYISO jurisdiction are initially tested and assigned a Dependable Maximum Net Capability (DMNC) or DMGC for behind the meter: net generation resources, defining the generator's maximum proven output for a specific month. The DMNC rating is adjusted to determine the deliverable portion of the unit's capacity for both capability periods in summer (May-October) and winter (November-April). Conventional generators, energy limited resources, and capacity limited resources are the only resource types that use EFORd as a derating factor when determining UCAP values. Performance factors are applied instead to other resources. Thermal generators offering more than 10 MW of nameplate capacity are expected to submit full GADS data and use an averaged seasonal forced outage rate. Otherwise, resources submitting equivalent GADS data or are 10 MW or less, base their UCAP on the unit's average production, similar to a capacity factor method. UCAP values are calculated for each month on a rolling 12 month basis for each resource type.

PJM determines an ICAP value of a generation resource based on the summer net dependable rating (June through August), also referred to as the Summer Net Capability. Any new internal dispatchable resource other than hydro, solar, and wind must test and verify its performance

based on the net capability during both summer (June, July, and August) and winter (December, January, and February). Once the resource's ICAP is set, PJM then calculates UCAP values to establish sufficient Reliability Pricing Model UCAP commitments. If GADS data is unavailable for generators, a blend of historical class averages is used with actual generator unit outage events. A new seasonal capacity performance framework will take effect for the delivery years 2020/2021 where UCAP values will vary for summer (June-October and May) and winter periods (November-April).<sup>24</sup>

To calculate a resource's UCAP for the MISO market, a generator must use an approved Total Interconnection ICAP value. This value is equal to the lesser of its Generation Verification Tested Capacity (GVTC; pmax) or its Total Capacity Tested (based on its deliverability). The required real time power test determining a resource's GVTC assesses the maximum energy output that a resource can sustain over the specified period (*i.e.*, between September 1<sup>st</sup> through August 31<sup>st</sup> of the previous planning period). If a generating resource meets all the qualification requirements in section 4.2.1 of BPM-011-r18<sup>25</sup> and it is capable of delivering energy, a forced outage rate is applied to derive its qualifying UCAP. If a resource has a GVTC of less than 10 MWs or less than one year of GADS generator data is available, an average class EFORD is applied instead. Once the UCAP is established, a final step is necessary to allocate capacity needs based on its type of Interconnection Service (Appendix H BPM-011-r18).<sup>26</sup>

To qualify in ISO-NE's Forward Capacity Auction, resources must be a minimum of 100 kW and expected to register with ISO-NE to determine both a summer Qualified Capacity and winter Qualified Capacity. Non-intermittent resource's summer and winter Qualifying Capacity are equal to the median of the five most recent years of seasonal claimed capacity (SCC) ratings for summer (as of the fifth business day in October) and winter (as of the 5<sup>th</sup> business day in June). Only positive summer and winter ratings are included in the median calculation. For new resources or resources with missing data, the median of all the existing generating capacity resource's previous seasonal claimed capability rating is substituted.

Conceptually, the EFORD performance index evaluates the total hours of full and partial forced outages for the purpose of estimating a generator's unit's availability frequency. IEEE sets the standard methodology to calculate the generating unit's availability using GADS historical event and performance data (see standard equation below).<sup>27</sup> The defined methods are commonly adjusted by system operators to accommodate for unique reliability needs, but generally the metric accounts for those hours and months of greatest demand and excludes planned or maintenance outages. Similarly, most RTOs and ISOs use the EFORD metric, but others such as MISO, use XEFORD which adjusts the EFORD metric to remove outages outside of

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<sup>24</sup> (State & Member Training Dept.) PJM, "RPM 301 Performance in Reliability Pricing Model Disclaimer .," in *RPM 301 Performance in Reliability Pricing Model*, 2017, <https://www.pjm.com/-/media/training/nerc-certifications/markets-exam-materials/rpm/rpm-301-performance-in-reliability-pricing-model.ashx?la=en>.

<sup>25</sup> MISO, 2018)

<sup>26</sup> MISO, 2018)

<sup>27</sup> IEEE Power Engineering Society, *IEEE Standard Definitions for Use in Reporting Electric Generating Unit Reliability, Availability, and Productivity*, 2006, <https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=4135890>.

management control. NYISO, PJM, and ISO-NE all use the net dependable capacity in lieu of the net maximum capacity.

$$EFOR_d = \frac{FOH_d + EFDH_d}{FOH_d + SH} \times 100\%$$

Comparing across the centralized capacity markets, NYISO accounts for forced outages most distinctively. The EFOR<sub>d</sub> is calculated by averaging six of the most recent 12-month rolling average periods of all resources within a specified locality. This averaged derating factor (AEFOR<sub>d</sub>) blends both summer and winter GADS data which eliminates the ability to distinguish resource's performance characteristics by season.<sup>28</sup> Furthermore, NYISO includes all hours of the day which does not penalize resources inability to perform during high stress hours. Analogous to the IEEE and NERC methods, unplanned forced outages, unplanned forced derates, and startup failures impact the EFOR<sub>d</sub> value, however unlike the standard, NYISO omits OMC events related to transmission system problems. As stated above, the net maximum capacity is replaced by the net dependable capacity which is defined as:

“The gross power level a unit can sustain during any period of time when there are no equipment, operating or regulatory restrictions and after adjusting for station service and auxiliary loads and ambient conditions. Average ambient temperature should reflect the average of the daily high temperatures for the month at the plant location. Only one Net Dependable Capacity for each Resource shall be reported for each month. That value may be either the Resource's DMNC for the Capability Period containing that month or that Resource's average Net Dependable Capacity for that month, at the discretion of the owner of the Resource.”

An additional subtlety is NYISO's adjustment of extending weekend times to include Friday from 22:01 through 7:00 on Monday compared to NERC's Friday 24:00 through Sunday 24:00 schedule.<sup>29</sup> This adjusted timeframe allows generators to declare maintenance outages instead of forced outages events. As discussed in Section 4, solar, wind, and run-of-river resources do not apply the EFOR<sub>d</sub> but have a comparable derating factor (*i.e.*, production factor).

Below displays the EFOR<sub>d</sub> equation used in the calculation of AEFOR<sub>d</sub> which is applied to resources that submit GADS data and base their UCAP production levels using equivalent GADS data. The AEFOR<sub>d</sub> for a given month will equal the average of the EFOR<sub>d</sub> values for the months within the capability period that precede the month being calculated. This is February through July for winter and August through January in summer. In this equation, the IST

<sup>28</sup> Paul Hibbard, Todd Schatzki, and Sarah Bolthrunis, *Capacity Resource Performance in NYISO Markets: An Assessment of Wholesale Market Options*, 2017, [https://www.nyiso.com/public/webdocs/markets\\_operations/committees/bic\\_icapwg/meeting\\_materials/2017-11-06/Analysis Group Draft Capacity Resource Performance 10-31-17 rev.pdf](https://www.nyiso.com/public/webdocs/markets_operations/committees/bic_icapwg/meeting_materials/2017-11-06/Analysis%20Group%20Draft%20Capacity%20Resource%20Performance%2010-31-17%20rev.pdf).

<sup>29</sup> (North American Electric Reliability Corporation) NERC, *Appendix M – Differences Between NERC-GADS and ISO-GADS Data Collection and Uses*, 2018, [https://www.nerc.com/pa/RAPA/gads/DataReportingInstructions/Appendix\\_M\\_Differences.pdf](https://www.nerc.com/pa/RAPA/gads/DataReportingInstructions/Appendix_M_Differences.pdf).

captures the number of months a resource was in service and the CEFORd is representative of the class-equivalent EFORd of the resource.

$$EFORd_{gn} = \frac{IST_{ge}}{12} \times \frac{f_{gbe}FOH_{gbe} + f_{pgbe}(EFOH_{gbe} - FOH_{gbe})}{(SH_{gbe} + f_{gbe}FOH_{gbe})} + \left(1 - \frac{IST_{ge}}{12}\right) CEFOR_{Dg}$$

Currently, PJM uses three forced outage rate metrics, EFORd, XEFORd, and EFORp, in their capacity markets. As of the 2018/2019 delivery year, XEFORd and EFORp, which are used for non-performance charges under the capacity performance market, will no longer apply to the new capacity market rules.<sup>30</sup> This adjustment will incentivize units to minimize all forced outages, including OMC outages. Five years of averaged GADS data are used to calculate EFORd for each unit based on all hours from October through September.<sup>31</sup> If a unit has less than one full year of data available, the 5-year pool-wide Average EFORd is used instead.<sup>32</sup> The metric accounts for unplanned outages and all forced outages, regardless of the reason for being inoperable as well as unapproved maintenance outages that occur during critical peak periods. These periods occur from 15:00 through 19:00 for months June through August in addition to 8:00 – 9:00 and 19:00 – 20:00 for months January and February but exclude weekends and federal holidays.<sup>33</sup> Approved maintenance outages are also limited to a maximum of 9 days during the summer months.<sup>34</sup> Another distinction from the IEEE standard is the way the Equivalent Forced De-rated Hours (EFDH) is reported and calculated using the Net Dependable Capacity instead of the Net Max Capacity.<sup>35</sup> Lastly, similar to NYISO, the EFORd unit for solar and wind resources is not collected but is assigned 0 instead of a substitute factor.

$$EFOR_d(\%) = \left( \frac{(f_f * FOH + f_p * EFDH)}{SH + f_f * FOH} \right) * 100\%$$

MISO applies the IEEE standard XEFORd outage parameter to determine generator unit capacity and only uses the EFORd factor as an input into the LOLE study. Unlike the other ISOs and RTOs, the 5 year averaged metric excludes OMC events such as generator outages from transmission system problems and weather conditions (see BPM-011-r18 BPM - Appendix B for full list of OMC events).<sup>36</sup> If there are less than 12 months of GADs data, a class average EFORd is used instead. Like ISO's/RTOs discussed, MISO also uses the Net Dependable Capacity instead of the NERC defined Net Max Capacity, influencing the total size of the reduction.<sup>37</sup> Additionally, for the full forced outage factor, the average demand time exclusively

<sup>30</sup> Monitoring Analytics LCC, *State of the Market Report for PJM*, 2016,

[http://www.monitoringanalytics.com/reports/PJM\\_State\\_of\\_the\\_Market/2016/2016q1-som-pjm.pdf](http://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2016/2016q1-som-pjm.pdf).

<sup>31</sup> PJM Capacity Market Operations, *PJM Manual 18: PJM Capacity Market (Revision 40)*, 2018, <https://www.pjm.com/-/media/documents/manuals/m18.ashx>.

<sup>32</sup> PJM Resource Adequacy Planning, *PJM Manual 20: PJM Resource Adequacy Analysis (Revision 09)*, 2018, <https://www.pjm.com/-/media/documents/manuals/m20.ashx>.

<sup>33</sup> PJM Capacity Market Operations, *PJM Manual 18: PJM Capacity Market (Revision 40)*.

<sup>34</sup> NERC, *Appendix M – Differences Between NERC-GADS and ISO-GADS Data Collection and Uses*.

<sup>35</sup> Ibid.

<sup>36</sup> MISO, 2018)

<sup>37</sup> Ibid.

accounts for service hours, but MISO also includes synchronous hours in this factor. Lastly, all reserve shutdown hours are excluded. Apart from these alterations, the XEFORd is calculated using the IEEE standard EFORd shown above.

Unique from the other ISOs and RTOs, New England incorporates EFORd into the assumptions to establish the Installed Capacity Requirement, Local Resource Adequacy Requirements, Maximum Capacity Limits, Marginal Reliability Impact values, and the Transmission Security Analysis Requirements.<sup>38</sup> ISO-NE uses a 5-year rolling average EFORd weighted by a generator's qualified capacity.<sup>39</sup>

### **Variable generation: solar and wind**

Variable generation facilities are commonly quantified individually to reflect the extent each resource type can provide reliable energy during times of peak stress or can contribute in reducing loss of load. None of the jurisdictions analyzed apply a nameplate capacity as a variable resource's qualifying capacity. Instead, a variable generator's UCAP is equal to its ICAP which is based on either a generator's capacity credit (e.g., MISO) or its actual historical generation during a specified time (e.g., PJM).

For NYISO, UCAP values are calculated the same way for all intermittent generation types. Solar and wind capability values are equal to a resource's nameplate capacity for a specified month multiplied by a production factor which takes into consideration actual production data during peak periods of the previous year. This includes one year of historical averages for a summer capability period running during the 14:00 to 18:00 hours in June, July, and August and a winter capability period running during the 16:00 and 20:00 in December, January, and February.

### **Solar and Wind UCAP = (Nameplate Capacity) \* (Production Factor)**

PJM also applies similar methods for treating solar and wind technologies but only assesses resource capability for one season. The ICAP value is evaluated during peak summer hours running from 13:00 through 18:00 for June, July, and August. Three single years of historical data are averaged individually as capacity factors, averaged together and then multiplied by the current net maximum capacity. Class average capacity factors take place of years with incomplete data for new solar or wind resources.

### **Solar and Wind UCAP = ICAP**

The Unforced Capacity value for MISO's intermittent and dispatchable intermittent generators are based on the historical performance, availability, and type and volume of interconnection services (**Error! Reference source not found.**). For solar PV units, three years of historical

<sup>38</sup> (Independent System Operator - New England) ISO-NE, *Section III 13- Market Rule 1 - Forward Capacity Market*, 2018, [https://www.iso-ne.com/static-assets/documents/regulatory/tariff/sect\\_3/mr1\\_sec\\_13\\_14.pdf](https://www.iso-ne.com/static-assets/documents/regulatory/tariff/sect_3/mr1_sec_13_14.pdf).

<sup>39</sup> Manasa Kotha, "Assumptions for Calculating the Installed Capacity Requirement (ICR) Values for the 2021-2022 Forward Capacity Auction (FCA #12)," in *PSPC Meeting No.325* (Holyoke, MA, 2017), [https://www.iso-ne.com/static-assets/documents/2017/06/pspc\\_6\\_22\\_2017\\_ICR\\_assumptions.pdf](https://www.iso-ne.com/static-assets/documents/2017/06/pspc_6_22_2017_ICR_assumptions.pdf).

data are averaged and new or returning solar units require a minimum of 30 consecutive days of historical data during the months of June, July, or August for hours 15:00 through 17:00 EST. If a unit has less than one month of data, a class average generation output of 50% is used for the first year instead.

MISO uses a different strategy for quantifying wind resources. A wind capacity credit is used to determine the Uninstalled Capacity for a wind farm based on CPNodes throughout the MISO system. The wind credit is calculated using an Effective Load Carrying Capability (ELCC) and the credit is distributed to each wind farm determined by MISO's top 8 highest coincident peaks occurring during summer months, June through August. The ELCC method uses a LOLE assessment to examine the MISO system with and without the wind resources.<sup>40</sup>

$$\text{Solar UCAP} = (\text{Total Interconnection ICAP}) * (1 - \text{XEFORd})$$

$$\text{Wind UCAP} = (\text{Total Interconnection ICAP}) * (\text{Wind Capacity Credit}_{\text{CPNode}})$$

ISO-NE calculates its summer and winter Qualified Capacity for intermittent resources using each of the previous five summers and winters. The median net output of each year is determined and then averaged. Summer periods include hours from 14:00 through 18:00 from June through September in addition to all summer period hours when a system-wide shortage event is declared. This also applies to winter periods for hours 18:00 through 19:00 for months October through May.

Using PJM again as an example, a wind energy resource with a nameplate capacity of 100 MW will receive an ICAP capacity rating of 5 MW based on a wind generator's average capacity factor between 3:00-6:00 PM during summer months (June through August). Both wind and solar resources are not penalized for forced outages and therefore the resource receives an EFORd rate of 0% resulting in an ICAP of 5 MW.<sup>41</sup>

### ***Run-of-river hydroelectric***

NYISO uses the same UCAP equation for run-of-river hydro as solar and wind resources but incorporates appropriate assumptions when determining a generator specific operational capability. Instead of using one year of historical data, 5 years of actual data are averaged for the 20 highest load hours using rolling averages for winter and summer periods.

Hydroelectric generators in the PJM territory are required only to submit summer (June, July, and August) verification tests and one test period for the year. The summer net capability is determined using the annual test which is taken during the summer period under summer conditions.

<sup>40</sup> (Midcontinent Independent System Operator) MISO, *Planning Year 2013-2014 Wind Capacity Credit*, 2014, [https://cdn.misoenergy.org/2018 Wind Capacity Report97278.pdf](https://cdn.misoenergy.org/2018%20Wind%20Capacity%20Report97278.pdf).

<sup>41</sup> AESO, "Comparison of Installed Capacity (ICAP) & Unforced Capacity (UCAP) Capacity Value Calculation Methods."

MISO considers the 3 most recent years and up to 15 years of run-of-river hydro data for hours 15:00 through 17:00 EST for all summer days (*i.e.*, June, July, and August).

ISO-NE uses the same methods for hydro resources as solar and wind resources described above.

## 8.2. OMS forced outage cards

Outage Type	Nature of Work/Opportunity Status	Is substitution required?
Forced	Ambient Due to Temperature	Y
Forced	Ambient Not Due to Temperature	N
Forced	Ambient due to Fuel insufficiency	Y
Forced	AVR/Exciter	N
Forced	Environmental Restrictions	N
Forced	Short term use limit reached	N
Forced	Annual use limit reached	N
Forced	Monthly use limit reached	N
Forced	Other use limit reached	N
Forced	ICCP	N
Forced	Metering/Telemetry	Y
Forced	New Generator Test Energy	Y
Forced	Plant Maintenance	Y
Forced	Plant Trouble	Y
Forced	Power System Stabilizer (PSS)	Y
Forced	Ramp Rate	Y
Forced	RTU/RIG	N
Forced	Transitional Limitation	N
Forced	Transmission Induced	N

Forced	Technical Limitations not in Market Model	N
Forced	Unit Supporting Startup	N
Forced	Unit Testing	N
Forced	Off Peak Opportunity	N
Forced	Short Notice Opportunity	N
Forced	RIMS testing	Y
Forced	RIMS Outage	Y

### 8.3. Availability Assessment Hours

#### **2019 System and Local Resource Adequacy Availability Assessment Hours**

Summer: April 1 – October 31

Availability Assessment Hours: 4pm – 9pm (HE17 – HE21)

Winter: November 1 – March 31

Availability Assessment Hours: 4pm – 9pm (HE17 – HE21)

#### **2019 Flexible Resource Adequacy Availability Assessment Hours and must offer obligation hours**

Flexible RA Capacity Type	Category Designation	Required Bidding Hours	Required Bidding Days
<b>January – April, October – December</b>			
Base Ramping	Category 1	05:00am to 10:00pm (HE6-HE22)	All days
Peak Ramping	Category 2	2:00pm to 7:00pm (HE15-HE19)	All days
Super-Peak Ramping	Category 3	2:00pm to 7:00pm (HE15-HE19)	Non-Holiday Weekdays*
<b>May – September</b>			

Base Ramping	Category 1	05:00am to 10:00pm (HE6-HE22)	All days
Peak Ramping	Category 2	3:00pm to 8:00pm (HE16-HE20)	All days
Super-Peak Ramping	Category 3	3:00pm to 8:00pm (HE16-HE20)	Non-Holiday Weekdays*

This information can also be found in the CAISO Reliability Requirements BPM in Section 7.1.1, here: <http://www.caiso.com/rules/Pages/BusinessPracticeManuals/Default.aspx>.

#### 8.4. Additional details on the Available Import Capability Assignment Process<sup>42</sup>

MIC Allocation Step		Process Description
<b>Step 1</b>	Determination of Maximum Import Capability on Interties into the CAISO BAA	The CAISO will establish the Maximum Import Capability (MIC) for each Intertie into the BAA, and will post those values on the CAISO Website in accordance with the schedule and process set forth in the BPM.
<b>Step 2</b>	Determination of Available Import Capability by Accounting for Existing Contracts and Transmission Ownership Rights Held by Out-of-Balancing Authority Area LSEs	For each Intertie, the Available Import Capability is determined by subtracting the import capability on each Intertie associated with Existing Transmission Contracts (ETCs) and Transmission Ownership Rights (TORs) held by LSEs that do not serve Load within the CAISO BAA from the MIC established in Step 1. The remaining sum of all Intertie Available Import Capability is the Total Import Capability. Total Import Capability is used to determine the Load Share Quantity for each LSE that serves Load within the CAISO BAA.
<b>Step 3</b>	Determination of Existing Contract Import Capability by Accounting for ETCs and TORs Held by CAISO Balancing Authority Area LSEs	The Existing Contracts and Transmission Ownership Rights held by LSEs that serve Load within the CAISO BAA will be reserved on the Available Import Capability remaining on each Intertie after Step 2 above, and will not be subject to reduction under any subsequent steps. The import capability reserved pursuant to this Step 3 is the Existing Contract Import Capability.
<b>Step 4</b>	Assignment of Pre-RA Import Commitments	The CAISO assigns LSEs serving Load within the CAISO BAA Pre-RA Import Commitment Capability on a particular Intertie based on Pre-RA Import Commitments in effect (where a supplier has an obligation to deliver the Energy or make the capacity available) at any time during the

<sup>42</sup> Tariff Section 40.4.6.2.1

MIC Allocation Step		Process Description
		<p>Resource Adequacy Compliance Year for which the Available Import Capability assignment is being performed.</p> <p>The Pre-RA Import Commitment will be assigned to the Intertie selected by the LSE during the Resource Adequacy Compliance Year 2007 import capability assignment process, which was required to be based on the Intertie upon which the Energy or capacity from the Pre-RA Import Commitment had been primarily schedule. For a Pre-RA Import Commitment without a scheduling history at the time of the Resource Adequacy Compliance Year 2007 import capability assignment process, the primary Intertie upon which the Energy or capacity was anticipated to be scheduled will be used.</p> <p>(2007 is the date used for Pre-RA Import Commitments for participants in the current CAISO BAA; the CAISO will need to establish a new “cut-off” date for new CAISO participants.)</p> <p>To the extent a particular Intertie is over requested with Pre-RA Import Commitments under Step 4, due to either Pre-RA Import Commitments not included in the Resource Adequacy Compliance Year 2007 import capability assignment process or changes in system conditions that decrease the MIC of the Intertie, such that the MW represented in all Pre-RA Import Commitments utilizing the Intertie exceed the Intertie’s Available Import Capability in excess of that reserved for ETCs and TORs under Steps 2 and 3, the CAISO will assign Pre-RA Import Commitments Pre-RA Import Commitment Capability based on the Import Capability Load Share Ratio of each LSE submitting Pre-RA Import Commitments on the particular Intertie. To the extent this initial assignment of Pre-RA Import Commitment Capability does not fully assign the Available Import Capability of the particular over requested Intertie, the remaining Available Import Capability on the over requested Intertie will be assigned until fully exhausted based on the Import Capability Load Share Ratio of each LSE whose submitted Pre-RA Import Commitment has not been fully satisfied by the previous Import Capability Load Share Ratio assignment iteration. The Available Import Capability assigned pursuant to this Step 4 is the Pre-RA Import Commitment Capability.</p>
<b>Step 5</b>	Assignment of Remaining Import Capability Limited by Load Share Quantity	<p>The Total Import Capability remaining after Step 4 will be assigned only to LSEs serving Load within the CAISO BAA that have not received Existing Contract Import Capability and Pre-RA Import Commitment Capability under Steps 3 and 4, that exceed the Load Serving Entity’s Load Share Quantity. Only the MW quantity of any Pre-RA Import Commitment Capability assigned to Existing Contract Import Capability under Step 4 that exceeds the Existing Contract Import Capability on the particular Intertie will be counted for purposes of this Step 5. This Total Import Capability will be assigned until fully exhausted to those LSEs eligible to receive an assignment under this Step based on each LSE’s Import Capability Load Share Ratio up to, but not in excess of, it’s Load Share Quantity. The quantity of Total Import Capability assigned to the LSE under this Step is the LSE’s Remaining Import</p>

MIC Allocation Step		Process Description
		Capability. This Step 5 does not assign Remaining Import Capability on a specific Intertie.
<b>Step 6</b>	CAISO Posting of Assigned and Unassigned Capability	<p>Following the completion of Step 5, the CAISO will post the following information to the CAISO website:</p> <ul style="list-style-type: none"> <li>(a) The Total Import Capability;</li> <li>(b) The quantity in MW of Existing Contracts and Transmission Ownership Rights assigned to each Intertie, distinguishing between Existing Contracts and Transmission Ownership Rights held by LSEs within the CAISO BAA and those held by load serving entities outside the CAISO BAA;</li> <li>(c) The aggregate quantity in MW, and identity of the holders, of Pre-RA Import Commitments assigned to each Intertie; and</li> <li>(d) The aggregate quantity in MW of Available Import Capability after Step 4, the identity of the Interties with Available Import Capability, and the MW quantity of Available Import Capability on each such Intertie.</li> </ul>
<b>Step 7</b>	CAISO Notification of LSE Assignment Information	<p>Following the completion of Step 5, the CACAIISO will notify the Scheduling Coordinator for each LSE of:</p> <ul style="list-style-type: none"> <li>(a) The LSE’s Import Capability Load Share;</li> <li>(b) The LSE’s Load Share Quantity; and</li> <li>(c) The amount of, and Intertie on which, the LSE’s Existing Contract Import Capability and Pre-RA Import Commitment Capability, as applicable, has been assigned; and</li> <li>(d) The LSE’s Remaining Import Capability.</li> </ul>
<b>Step 8</b>	Transfer of Import Capability	LSEs are then allowed to transfer some or all of their Remaining Import Capability to any other LSE or Market Participant. The CAISO will accept transfers among LSEs and Market Participants only to the extent such transfers are reported to the CAISO through the CAISO’s Import Capability Transfer Registration Process, by the entity receiving the Remaining Import Capability who must set forth (1) the name of the counter-parties, (2) the MW quantity, (3) term of transfer, and (4) price on a per MW basis. The CAISO will post the information on transfers of Remaining Import Capability received under this Step 8 to the CAISO website.
<b>Step 9</b>	Initial Scheduling Coordinator Request to Assign Remaining Import Capability by Intertie	The Scheduling Coordinator (SC) for each LSE or Market Participant then notifies the CAISO of its request to assign its post-trading Remaining Import Capability on a MW basis per available Intertie. Total requests for assignment of Remaining Import Capability by a SC cannot exceed the sum of the post-traded Remaining Import Capability of its LSEs. The CAISO will honor the requests to the extent an Intertie has not been over requested. If an Intertie is over requested, the requests for Remaining Import Capability on that Intertie will be assigned based on each LSE’s Import Capability Load Share Ratio in the same manner as set forth in Step 4. A Market Participant without an Import Capability Load Share will be assigned the Import Capability Load Share equal to

MIC Allocation Step		Process Description
		the average Import Capability Load Share of those LSE from which it received transfers of Remaining Import Capability.
<b>Step 10</b>	CAISO Notification of Initial Remaining Import Capability Assignments and Unassigned Capacity	The CAISO will notify the SC for each LSE or Market Participant of the accepted request(s) for assigning Remaining Import Capability under Step 9. The CAISO publishes the aggregate unassigned Available Import Capability, if any, and identifies the Interties with unassigned Available Import Capability, and the MW quantity of Available Import Capability, on each such Intertie on the CAISO Website. The CAISO will issue a Market Notice to advise the SC for each LSE or Market Participant that Step 10 is complete and to specify the time at which the CAISO will begin accepting requests for the Remaining Import Capability for Step 11.
<b>Step 11</b>	Secondary Scheduling Coordinator Request to Assign Remaining Import Capacity by Intertie	To the extent Remaining Import Capability remains unassigned as disclosed by Step 10, SCs for LSEs or Market Participants will notify the CAISO of their requests to assign any Remaining Import Capability on a MW per available Intertie basis. Step 10 must be completed before a SC may submit a request under this step for any Remaining Import Capability. Any requests received prior to the time stated in the Market Notice issued at the completion of Step 10 will not be honored by the CAISO. The CAISO will honor the timely requests received to the extent an Intertie has not been over requested. If an Intertie is over requested, the requests on that Intertie will be assigned based on each LSE or Market Participant's Import Capability Load Share Ratio, as used in Steps 4 and 9.
<b>Step 12</b>	Notification of Secondary Remaining Import Capacity Assignments and Unassigned Capacity	The CAISO will then notify the SC for each LSE or Market Participant of the accepted request(s) for assigning Remaining Import Capability under Step 11. The CAISO will publish any unassigned aggregate Available Import Capability on the CAISO website and identify the Interties with Available Remaining Import Capability, and the MW quantity of Availability Import Capability on each such Intertie. The CAISO will issue a Market Notice to advise the SC for each LSE or Market Participant that Step 12 is complete and to specify the time at which the CAISO will begin accepting requests for the Balance of Year Unassigned Available Import Capability for Step 13.
<b>Step 13</b>	Requests for Balance of Year Unassigned Available Import Capacity	<p>To the extent total Available Import Capability remains unassigned as disclosed by Step 12, SCs for LSEs or Market Participants may notify the CAISO of a request for unassigned Available Import Capability on a specific Intertie on a per MW basis. Step 12 must be completed before a SC may submit a request under this step for any remaining unassigned Import Capability. Any requests received prior to the time stated in the Market Notice issued at the completion of Step 12 will not be honored by the CAISO. Each request must include the identity of the LSE or Market Participant on whose behalf the request is made.</p> <p>The CAISO will honor timely requests in priority of the time that requests from SC were received until the Intertie is fully assigned and without regard to any LSE's Load Share Quantity. Any honored request shall be for the remainder of the Resource Adequacy Compliance Year;</p>

MIC Allocation Step	Process Description
	<p>however, any notification by the CAISO of acceptance of the request in accordance with this Section after the 20th calendar day of any month shall not be permitted to be included in the LSE's Resource Adequacy Plan submitted in the same month as the acceptance.</p> <p>The CAISO notifies the SC of the time the request was deemed received by the CAISO and whether the request was honored within seven days of receipt of the request. If the request is not honored because the Intertie requested was fully assigned, the request will be deemed rejected and the SC will be required to submit a new request for unassigned Available Import Capability on a different Intertie if it still seeks to obtain unassigned Available Import Capability. The CAISO will update the list of unassigned Available Import Capability by Intertie on its website.</p>
<p><b>Please note:</b> This multi-step process for assigning Total Import Capability determines the import capability that can be credited towards satisfying the Reserve Margin of a LSE under this Section 40. Upon the request of the CAISO, SC's must provide the CAISO with information on Pre-RA Import Commitments and any transfers or sales of assigned Total Import Capability.</p>	

## 8.5. Import Capability Posting and Submittal Dates

Only those steps of the Available Import Capability Process that have postings or submittals are shown in the table.

Item	Posting Date	Submittal Date	Frequency
Market Notice requesting Import Commitment Data and contact person		1 <sup>st</sup> week in June	Annual
LSE to submit Data requested		2 weeks after previous Market Notice	Annual
Step 1: Posting of Maximum Import Capability on Interties	1 <sup>st</sup> of July or next business day if 1 <sup>st</sup> falls on a weekend		Annual
Step 6: Posting of Assigned and Unassigned Capability	9 <sup>th</sup> of July or next business day if 9 <sup>th</sup> falls on a weekend		
Step 7: Notification of LSE Assignment Information	9 <sup>th</sup> of July or next business day if 9 <sup>th</sup> falls on a weekend		Annual

Item	Posting Date	Submittal Date	Frequency
Step 8: Transfer of Import Capability		18 <sup>th</sup> of July, or next business day if 18 <sup>th</sup> falls on a weekend	Annual
Step 9: Request to assign Remaining Import Capability		19 <sup>th</sup> of July, or next business day if 19 <sup>th</sup> falls on a weekend	Annual
Step 10: CAISO Notification of Initial Remaining Import Capability Assignments and Unassigned Capability	26th of July, or next business day if 26th falls on a weekend. The CAISO will begin accepting requests for Step 11 at the date and time indicated in the market notice published after Step 10.		Annual
Step 11: Secondary request to assign Remaining Import Capability		1st of August, or next business day if 1 <sup>st</sup> falls on a weekend. The CAISO will begin accepting requests for Step 11 at the date and time indicated in the market notice published after Step 10.	Annual
Step 12: Posting of Assigned and Unassigned aggregate Import Capability	8 <sup>th</sup> of August or next business day if 8 <sup>th</sup> falls on a weekend. The CAISO will begin accepting requests for Step 13 at the date and time indicated in the market notice published after Step 12.		Annual
Step 13: Requests for Unassigned Available Import Capability		9 <sup>th</sup> of August, or next business day if 9 <sup>th</sup> falls on a weekend. The CAISO will begin accepting requests for Step 13 at the date and time indicated in the market	Annual

Item	Posting Date	Submittal Date	Frequency
		notice published after Step 12.	
Step 13: Publish list of Unassigned Available Import Capability	5 <sup>th</sup> day of September, or next business day if 5 <sup>th</sup> falls on a weekend		Annual
Registration for Bilateral Import Capability Transfers		Anytime	One time
Reporting Bilateral Import Capability Transfers occurring outside of Step 8		Anytime. To be counted on an RA Plan, must be submitted on or before the 20 <sup>th</sup> of the Month, two months prior to the Compliance Month ( <i>i.e.</i> , 9/20/2008 to count on Nov 2008 RA Plan)	Upon transfer of Import Capability
Posting of Eligible Import Capability Trading Parties	5 <sup>th</sup> day of each month, or next business day if 5 <sup>th</sup> falls on a weekend		Monthly
Posting of Import Capability Transfers	Within 5 business days of receiving a transfer request.		On Event
Posting of Interties and holders of Import Allocation per Intertie	5 <sup>th</sup> day of each month, or next business day if 5 <sup>th</sup> falls on a weekend		Monthly
Posting of Import Allocation usage on Annual RA Plans	15 business days after Annual RA Plans are due		Annual