



# California ISO

## **Regional Resource Adequacy**

### **Issue Paper**

**December 9, 2015**

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## 1. Executive Summary

On October 7, 2015, California Governor Jerry Brown approved Senate Bill No. 350, the Clean Energy and Pollution Reduction Act of 2015. Chapter 547 of the bill states:

*(3) The existing restructuring of the electrical industry within the Public Utilities Act provides for the establishment of the Independent System Operator (ISO) and requires the ISO to ensure efficient and reliable operation of the electrical transmission grid. Existing law prohibits the ISO from entering into a multistate entity or regional organization unless the ISO receives approval from the Electricity Oversight Board. Existing law states the intent of the Legislature to provide for the evolution of the ISO into a regional organization to promote the development of regional electricity transmission markets in the western states. This bill would provide for the transformation of the ISO into a regional organization, with the approval of the Legislature, pursuant to a specified process.*

It is important for entities located outside of the California Independent System Operator Corporation's ("ISO") current balancing authority area ("BAA") that may be interested in joining a regional organization to know the ISO's rules for resource adequacy ("RA") because RA is integral to operating the electric power system reliably.

Through this issue paper, the ISO is starting a stakeholder initiative to explore what changes the ISO may need to make to its current RA tariff provisions to allow the ISO to transform into a regional organization. This issue paper describes the key elements of the ISO's existing RA construct and discusses certain tariff elements that the ISO has preliminarily identified as possibly needing to be revised. The ISO welcomes feedback from stakeholders on this preliminary list of elements, as well as comments on other elements of the RA framework that should be discussed during the stakeholder process. The ISO plans to engage with stakeholders over the next seven months, with this initiative culminating in a proposal that will be presented to the ISO's Board of Governors at its June 28-29, 2016 meeting.

The ISO does not intend to change the current RA program. The ISO assumes that many, if not most, of the ISO's current RA related tariff provisions will work under a regional organization. The ISO's intent is to change only those tariff provisions that require modification to work in the context of a regional organization. This initiative is focused on "need to have" items for an effective regional RA framework. The ISO does not intend for this initiative to explore broader changes to the general RA construct. The ISO conducts regular stakeholder initiatives to consider improvements to the RA sections of the ISO tariff, and any such changes are more appropriately addressed in those initiatives.

The ISO has preliminarily identified the following items as likely needing to be revised for regional RA:

- Make the ISO's RA related tariff language more generic so it can apply on a regional basis;
- Update the ISO's default tariff provisions so the provisions reflect the most recent RA conventions and are sufficiently comprehensive that an entity could adopt them as its RA program if it desires; and
- Decide how to do load forecasting and determine RA requirements under a regional organization.

The ISO has preliminarily identified the following items as possibly needing to be revised for regional RA:

- Revise the methodology the ISO uses to determine the maximum megawatt ("MW") amount of import capability on the various transmission branch groups in any expanded footprint;
- Add a provision to the ISO tariff to account for transfer capability constraints between large electric locations on electric system, i.e., "zonal constraints;"
- Possibly add new ISO default tariff provisions that determine how many MWs a resource can "count" towards meeting an RA obligation; and
- Determine how to develop and publish the annual lists that identify the qualifying MWs of capacity associated with all resources.

## 2. Plan for Stakeholder Engagement

This issue paper starts the stakeholder process for this initiative. The ISO will hold a stakeholder meeting on December 16, 2015 in Salt Lake City, Utah to discuss this issue paper. At that meeting, the ISO also will provide a briefing on how RA currently works in the ISO's BAA. Information on the December 16 meeting can be found at

<http://www.caiso.com/Documents/NewInitiativeRegionalResourceAdequacyMeeting121615inSaltLakeCityUT.htm>.

The ISO encourages stakeholders to submit written comments during each major step of the stakeholder process. The ISO will post a comments template before comments are due to facilitate the submission and categorization of stakeholder comments. The ISO will post all written comments to the website the ISO has established for this initiative. The website is at

<http://www.caiso.com/informed/Pages/StakeholderProcesses/RegionalResourceAdequacy.aspx>. The first set of written stakeholder comments, which will be on this issue paper, are due on January 7, 2016.

The ISO has scheduled two working group meetings, one prior to issuing the straw proposal and another prior to issuing the draft final straw proposal, to obtain stakeholder input as it develops the proposals. The ISO invites all interested stakeholders to attend the working group meetings. Stakeholders are not required to sign up or register as a participant for a specific working group meeting. At each working group meeting, the ISO will facilitate the discussion with a slide presentation that will be followed by a group discussion among the stakeholders. Stakeholders will have the opportunity to submit written comments regarding the issues covered at the working group meetings. The ISO intends the working group sessions to be less formal than typical ISO stakeholder meetings where the ISO issues a paper prior to the meeting and requests written comments from stakeholders following the stakeholder meeting.

The ISO plans to present a proposal to the ISO Board of Governors at its meeting on June 28-29, 2016.

Table 1 below shows the current schedule for this initiative.

**Table 1: Schedule for Stakeholder Engagement**

Date	Milestone
Dec 9, 2015	Post issue paper
Dec 16	Hold stakeholder mtg. on issue paper and how RA works (in Salt Lake City, UT)
Jan 7, 2016	Stakeholder comments due on issue paper
Jan 13	Hold working group meeting to discuss development of straw proposal (location TBD)
Feb 17	Post straw proposal
Feb 25	Hold stakeholder meeting on straw proposal (in Folsom, CA)
Mar 11	Stakeholder comments due on straw proposal
Mar 23	Hold working group mtg. to discuss development of draft final proposal (location TBD)
May 4	Post draft final proposal
May 12	Hold stakeholder meeting on draft final proposal (in Folsom, CA)
May 23	Stakeholder comments due on draft final proposal
Jun 28-29	Present proposal to ISO Board of Governors

### 3. Introduction

This stakeholder initiative is one of six regional expansion initiatives that the ISO identified in a briefing memorandum to the ISO Board of Governors for the September 17-18, 2015 Board of Governors meeting. The memorandum stated that the ISO would start this initiative in Q4 2015 and provided the following discussion regarding RA:

*Resource adequacy is a mandatory planning and procurement process to ensure resources are secured by load serving entities to meet the ISO's forecast system, local, and flexible capacity needs. Since the five new PacifiCorp states outside of California do not have RA programs, the ISO will need to evaluate regional RA program applicability. Our goal will be to have a forward planning and procurement process that ensures sufficient resources are available to the ISO to serve load under stressed and unstressed conditions, using a framework that is consistent with the RA program rules currently in place in the ISO balancing area. The rules should allow for regional differences, but ensure that individual load serving entities meet their respective requirements without "leaning" on other load serving entities.*

This issue paper provides a high-level summary of key elements of the RA program and identifies a limited number of tariff provisions that the ISO may need to revise for a regional organization. The ISO encourages stakeholders to provide input regarding which tariff provisions they believe the ISO needs to evaluate in connection with becoming a regional organization.

### 4. Goals and Principles

The ISO assumes that many, if not most, of its current RA-related tariff provisions will work under a regional organization. The intent of this initiative is solely to modify the RA-related tariff provisions so they will “work” for a regional organization that spans multiple states and accommodate different local regulatory authority (“LRA”) resource procurement programs.

The goal of this initiative is to implement a forward planning and procurement process that ensures sufficient resources are available to the ISO to serve load and maintain reliability under stressed and unstressed conditions.

The principles that will guide policy development for a regional resource adequacy framework are:

1. Avoid changes to the ISO's RA rules that would misalign the ISO's RA rules with the California Public Utility Commission's (“CPUC”) and other LRA's current RA programs;
2. Accommodate different LRA procurement programs, such as the CPUC's Long-Term Procurement Proceeding (“LTPP”) and integrated resource planning (“IRP”) that many other LRAs use;
3. Develop RA rules to ensure that LSEs provide sufficient capacity to meet their allocation of forecast operating needs to avoid capacity leaning; and
4. Provide incentives for LSEs to provide resource portfolios to the ISO that are aligned with the operational needs that the ISO has communicated to stakeholders.

### 5. Overview of Resource Adequacy

RA is a planning and procurement process to ensure that capacity exists and is under contract so responsible LSEs can serve all of their load and ensure that the ISO can meet its operational needs and maintain reliability. The essential elements of an RA program include:

1. Planning reserve margin (“PRM”);
2. Established and standardized load forecast;
3. System, local and flexible capacity procured in advance;

4. Rules for “counting” resources, i.e., determining the maximum MW amount of capacity that a resource can be used for to meet a RA requirement;
5. Requirement to offer RA capacity into ISO markets;
6. Procured resources must be “deliverable” to load;
7. Formal process to review procurement showings; and
8. Clear ex ante consequences for noncompliance.

Each of the above elements is described in Section 6 below.

The RA tariff provisions require each load serving entity (“LSE”) to submit a year-ahead forward showing and month-ahead showings of the resources that it has procured to demonstrate that it has acquired sufficient capacity to meet its share of the peak load plus any applicable reserve margin, as well as local and flexible capacity requirements.

LRAs can establish RA programs. If a LRA establishes an RA program, the ISO will defer to the LRA for the RA requirements that the LRA has established. The ISO tariff has a “default” PRM and default qualifying capacity (“QC”) criteria applicable to LRAs that have not adopted such requirements.

The ISO has authority to establish local requirements and flexible capacity requirements and can procure “backstop” capacity if necessary to ensure that these requirements are met.

## 6. Issues to Consider

This section discusses the key elements of the ISO’s existing RA program. The issue paper describes the key elements at a high level and provides links that take the reader directly to the applicable provisions in the ISO tariff. The ISO’s Reliability Requirements Business Practice Manual also has details regarding the elements discussed in this section and can be accessed here:

<http://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Reliability%20Requirements>.

The ISO notes within the discussion herein those RA-related tariff provisions that the ISO has preliminarily identified as likely needing to be revised for a regional organization and those that possibly may need to be revised.

The ISO has preliminarily identified the following items as likely needing to be revised for regional RA:

- Make the ISO’s RA related tariff language more generic so it can apply on a regional basis;
- Update the ISO’s default tariff provisions so the provisions reflect the most recent RA conventions and are sufficiently comprehensive that an entity could adopt them as its RA program if it desires; and
- Decide how to do load forecasting and determine RA requirements under a regional organization.

The ISO has preliminarily identified the following items as possibly needing to be revised for regional RA:

- Revise the methodology the ISO uses to determine the maximum megawatt (“MW”) amount of import capability on the various transmission branch groups in any expanded footprint;
- Add a provision to the ISO tariff to account for transfer capability constraints between large electric locations on electric system, i.e., “zonal constraints;”
- Possibly add new ISO default tariff provisions that determine how many MWs a resource can “count” towards meeting an RA obligation; and
- Determine how to develop and publish the annual lists that identify the qualifying MWs of capacity associated with all resources.

### 6.1. Making the Tariff More Generic

The ISO tariff contains numerous references to CPUC and non-CPUC jurisdictional entities, as well as references to the CPUC and LRAs. The ISO established this convention to recognize the difference between CPUC jurisdictional and non-CPUC jurisdictional entities. To move to a regional organization,

the ISO will need to make the language in the ISO tariff more generic to accommodate additional entities beyond the current CPUC jurisdictional entities and non-CPUC jurisdictional entities. This item is an example of an ISO RA related tariff provision that will need to be revised for a regional organization. Examples of CPUC and non-CPUC references can be found throughout Section 40 of the ISO tariff at: [http://www.caiso.com/Documents/Section40\\_ResourceAdequacyDemonstrationForAllSchedulingCoordinators\\_asof\\_Jun3\\_2015.pdf](http://www.caiso.com/Documents/Section40_ResourceAdequacyDemonstrationForAllSchedulingCoordinators_asof_Jun3_2015.pdf).

## 6.2. Updating ISO Default Tariff Provisions

Section 40.8 of the ISO tariff, “CAISO Default Qualifying Capacity Criteria,” sets forth the criteria that will apply only if the CPUC or a LRA has not established and provided to the ISO, criteria to determine the types of resources that may be eligible to provide QC and for calculating the QC for such eligible resource types. The types of resources specified in Section 40.8 will be eligible to provide QC to the extent that the resources meet the criteria for each type of resource set forth in Section 40.8. The ISO tariff also has a default reserve margin for those entities that have not established a reserve margin in their RA program. Section 40.2.2.1 of the ISO tariff states that for a non-CPUC LSE for which the appropriate LRA or federal agency has not established a reserve margin, the reserve margin for each month will be no less than fifteen percent (15%) of the LSE’s peak hourly Demand for the applicable month. Section 40.8 of the ISO tariff can be found at: [http://www.caiso.com/Documents/Section40\\_ResourceAdequacyDemonstrationForAllSchedulingCoordinators\\_asof\\_Jun3\\_2015.pdf](http://www.caiso.com/Documents/Section40_ResourceAdequacyDemonstrationForAllSchedulingCoordinators_asof_Jun3_2015.pdf).

There are several places throughout Section 40.8 of the ISO tariff where the resource counting provisions should be updated to reflect the latest counting methodologies currently in use within the ISO’s BAA. For example, in the ISO default tariff provisions section, the counting rules for wind and solar resources reflect a methodology that was put in place over eight years ago, and the counting convention currently in use in the majority of the ISO’s BAA is an exceedance methodology, rather than the methodology that is currently in Section 40.8. The ISO’s default provisions for counting wind and solar resources should be updated. Another example is that the ISO’s default tariff provisions currently do not specifically state how energy storage resources will be counted because this is a relatively new technology, and default provisions have yet to be included in the ISO’s tariff. Updating the default provisions has not been a high priority to date because the ISO’s default tariff provisions have never been used, and essentially all of the current LRAs have created comprehensive RA programs that cover the key RA elements and the RA programs have been provided to the ISO.

Moving to a regional RA framework could include updating the ISO’s default tariff provisions. This would have several benefits. First, adding new entities to the ISO’s BAA may increase the possibility that the ISO would need to apply default provisions. For example, a new LRA could establish an RA program and provide it to the ISO, but neglect to address a key element of the overall RA construct. If that occurred, the ISO needs to be able to apply a default tariff provision for that individual RA element. Second, it may be appropriate to broaden the scope of the default tariff provisions to encompass all of the key elements of the overall RA program so an LRA could adopt the ISO’s default tariff provisions as its entire RA program if it desires, rather than developing its own unique RA program. Default tariff provisions are an example of an ISO RA related tariff provision that may need to be revised for a regional organization.

If the ISO updates its default tariff provisions, the ISO proposes to use the following principles to guide the effort:

- Avoid changes to the ISO’s RA rules that would misalign the ISO’s RA rules with the RA programs of the CPUC and other California LRAs; and
- Accommodate different LRA procurement programs such as the CPUC’s LTPP and IRP approach used by other regulatory commissions.

One issue that the ISO desires to raise with stakeholders is whether default tariff provisions still make sense in a regional organization, or whether under a regional structure the ISO needs a more standardized approach for establishing requirements and counting resources. Standardized

requirements could be used to ensure that all LSEs within the ISO's BAA provide an equal contribution of resources to meet the BAA's operational needs.

### 6.3. Establishing the RA Requirement

LRAs define QC and require their jurisdictional LSEs to procure QC. LSEs must secure the following three types of capacity and make it available to the ISO:

- System capacity, which is capacity from a resource that is qualified for use in meeting system peak demand and planning reserve margin requirements;
- Local capacity, which is capacity from a resource that is located within a Local Capacity Area capable of contributing toward the amount of capacity required in a particular Local Capacity Area; and
- Flexible capacity, which is capacity from a resource that is operationally able to respond to dispatch instructions to manage variations in load and variable energy resource output.

Each type of capacity is different, and the amount of capacity needed in each category is derived from a different technical study. The specifics for each type of capacity requirement are discussed below.

#### 6.3.1. System Capacity Requirement

The RA system capacity requirement varies monthly. Each month an LSE must provide sufficient capacity to meet its load forecast plus a PRM. The PRM percentage can vary based on the particular LRA's established RA program. The default PRM in the ISO tariff is fifteen percent (15%). The CPUC has a PRM of fifteen to seventeen percent (15-17%).

The system RA requirement is developed using a system coincident peak demand forecast study. The California Energy Commission ("CEC") develops the forecast for the current ISO BAA through its Integrated Energy Policy Report ("IEPR") proceeding, and the forecast includes detailed assumptions regarding load modifiers such as energy efficiency and demand response. The CEC process allows for an independent third party to collect and review load forecast information and vet it with the entities that will ultimately use the forecast.

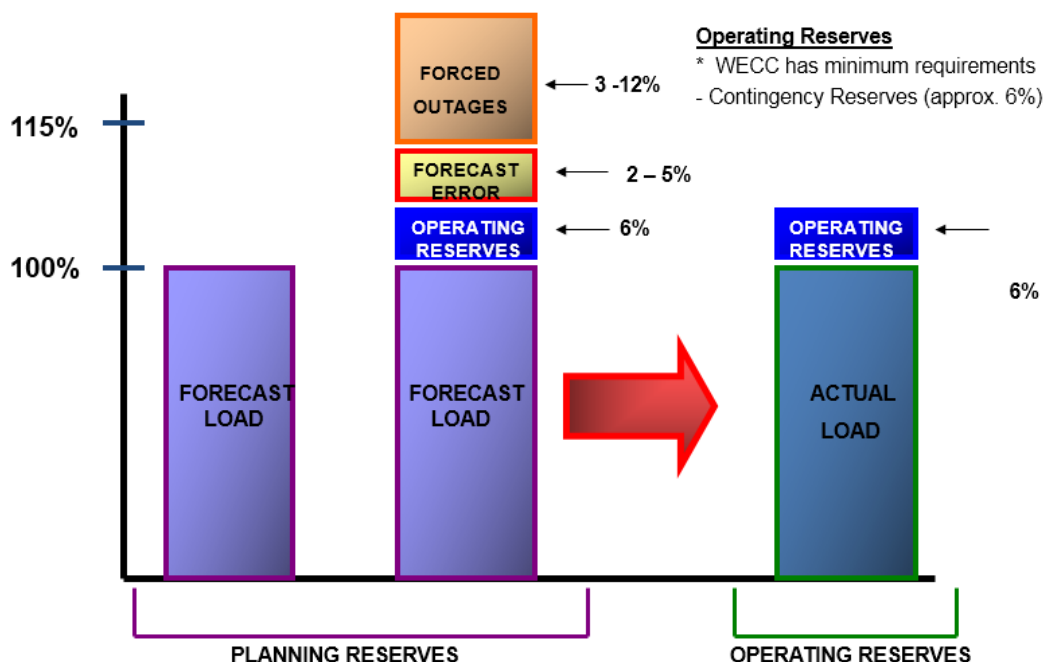
The load forecast is a key element in determining the RA system requirement. LSEs within the ISO's BAA submit load forecasts to the CEC, including assumptions for load modifying demand response and energy efficiency. The RA requirement for the system forecast is a "1-in-2 year" calculation. Each LSE's load forecast is adjusted by the CEC for system coincidence by month. The total RA system requirement is based on coincident peak load. The total RA system requirement is allocated to LSEs, *pro rata*, based on their respective load share of the total system coincident peak load.

The CPUC's procurement rules require a PRM of 115-117% (15-17% reserves above the system coincident peak load). This is a requirement for the entities that are under the CPUC's jurisdiction.

The forward PRM is different than the real-time operating reserves that are required to reliably operate the ISO system. A comparison of a PRM of 15-17% and an operating reserve of 6% is shown in Figure 1 below.



Figure 1: Illustrative Planning Reserve Margin of 15-17%



One issue that the ISO desires to raise with stakeholders is whether default tariff provision for a reserve margin still make sense in a regional organization, or whether under a regional structure the ISO needs a more standardized approach for establishing requirements such as the system capacity requirement. Standardized requirements could be used to ensure that all LSEs within the ISO’s BAA provide an equal contribution of resources to meet the BAA’s operational needs and minimize the potential for some entities to “lean” on other entities.

### 6.3.2. Local Capacity Requirement

The ISO determines the RA local capacity requirement annually. An LSE has a local requirement in each Transmission Access Charge (“TAC”) area in which it serves load. The local requirement is the same MW amount for all the months of the year. The ISO’s tariff requirements for local capacity are in Section 40.3 at [http://www.caiso.com/Documents/Section40\\_ResourceAdequacyDemonstrationForAllSchedulingCoordinators\\_asof\\_Jun3\\_2015.pdf](http://www.caiso.com/Documents/Section40_ResourceAdequacyDemonstrationForAllSchedulingCoordinators_asof_Jun3_2015.pdf).

The ISO conducts a local capacity technical study to determine the local requirement. The study uses a “load pocket” concept, where load within the local area may exceed transmission capacity available to deliver resources into that local area. The current methodology, assumptions and criteria can be viewed in the latest available LCR manual at: <http://www.caiso.com/Documents/2017LocalCapacityRequirementsDraftStudyManual.pdf>.

The RA local requirement is a subset of system RA requirements and represents the minimum resource capacity that needs to be procured and be made available to the ISO in specific local areas as determined in the annual technical study in order to reliably operate the grid.

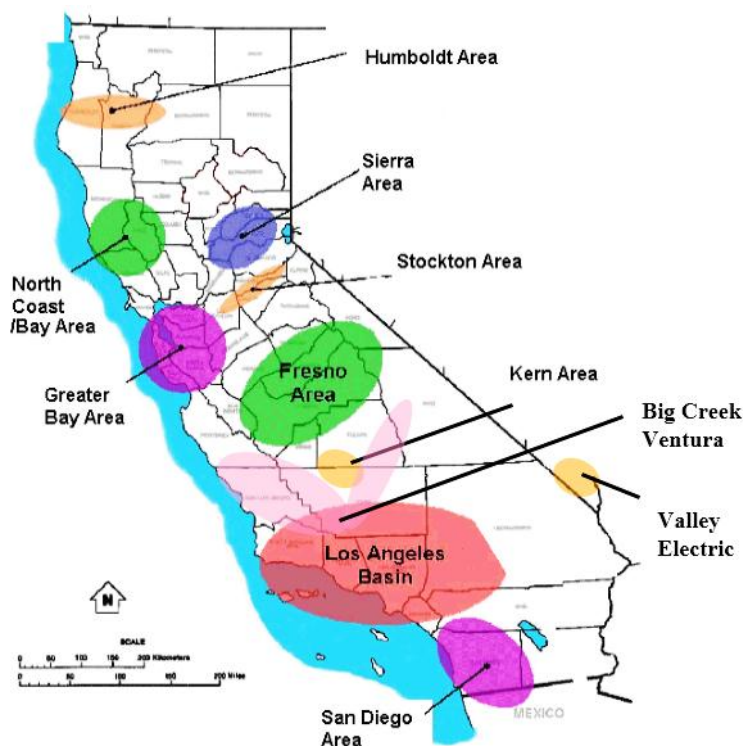
FERC has granted the ISO authority to determine the minimum local resource requirements. If LSE procurement falls short of the ISO’s identified needs, the ISO may procure additional capacity through its backstop capacity procurement authority to ensure reliability standards are met in the local areas.

RA local capacity can count for RA system capacity, but system capacity does not necessarily count for local capacity. A resource can qualify to meet the local requirement if it is physically located within the defined local capacity area and the ISO has verified that it is “deliverable” to the aggregate of load under peak load conditions. The resource in that local area can count against an RA local requirement up to the NQC value that has been established for that resource.

The local areas within the ISO’s BAA are shown in Figure 2 below. See Section 40.3 of the ISO tariff for details on local capacity requirements:

[http://www.caiso.com/Documents/Section40\\_ResourceAdequacyDemonstrationForAllSchedulingCoordinators\\_asof\\_Jun3\\_2015.pdf](http://www.caiso.com/Documents/Section40_ResourceAdequacyDemonstrationForAllSchedulingCoordinators_asof_Jun3_2015.pdf).

**Figure 2: LCR Areas within the ISO**



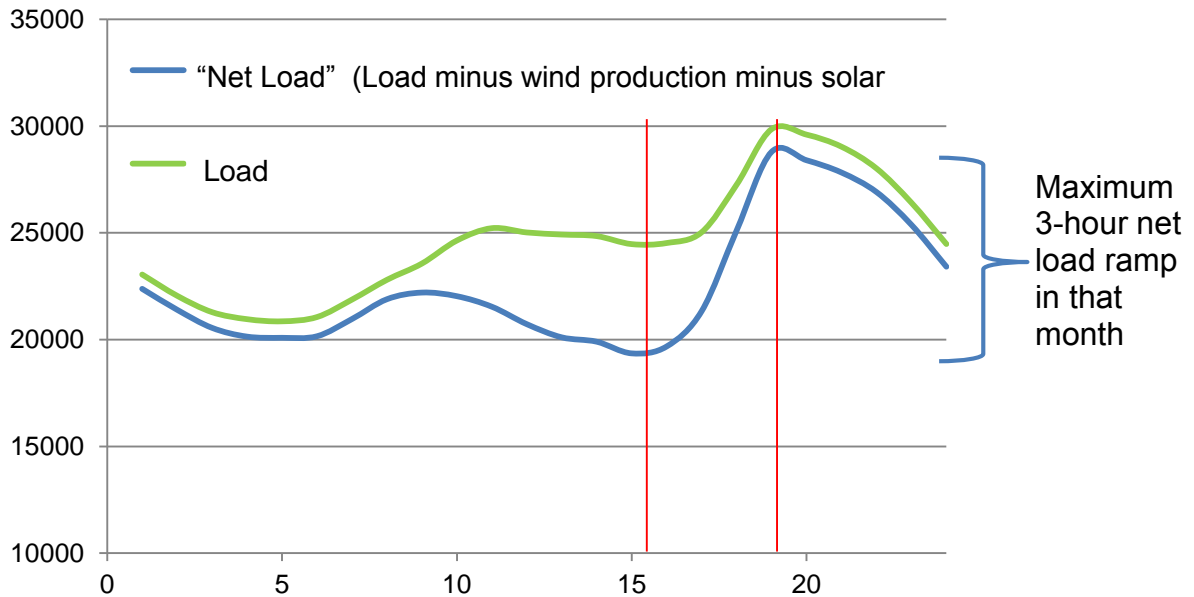
### 6.3.3. Flexible Capacity Requirement

The ISO determines its flexible capacity need through an annual flexible capacity technical study. The flexible capacity requirement varies by month. The requirement is based on a system requirement. At this time the ISO does not have a local flexible requirement. The ISO assigns the flexible capacity need to LRAs, and the LRA then allocates the flexible capacity requirement to its LSEs. The LSE ends up with a MW requirement that varies by month. The ISO’s flexible capacity requirements are in Section 40.10 at: [http://www.caiso.com/Documents/Section40\\_ResourceAdequacyDemonstrationForAllSchedulingCoordinators\\_asof\\_Jun3\\_2015.pdf](http://www.caiso.com/Documents/Section40_ResourceAdequacyDemonstrationForAllSchedulingCoordinators_asof_Jun3_2015.pdf).

The ISO implemented flexible capacity requirements to ensure that it has enough flexible capacity to meet net load changes. LSEs must annually demonstrate sufficient capacity to cover their share of the net load changes. Flexible RA resources must submit economic bids in the ISO’s market. The ISO has authority to procure additional flexible capacity through its backstop procurement mechanism if needed to address flexibility deficiencies.

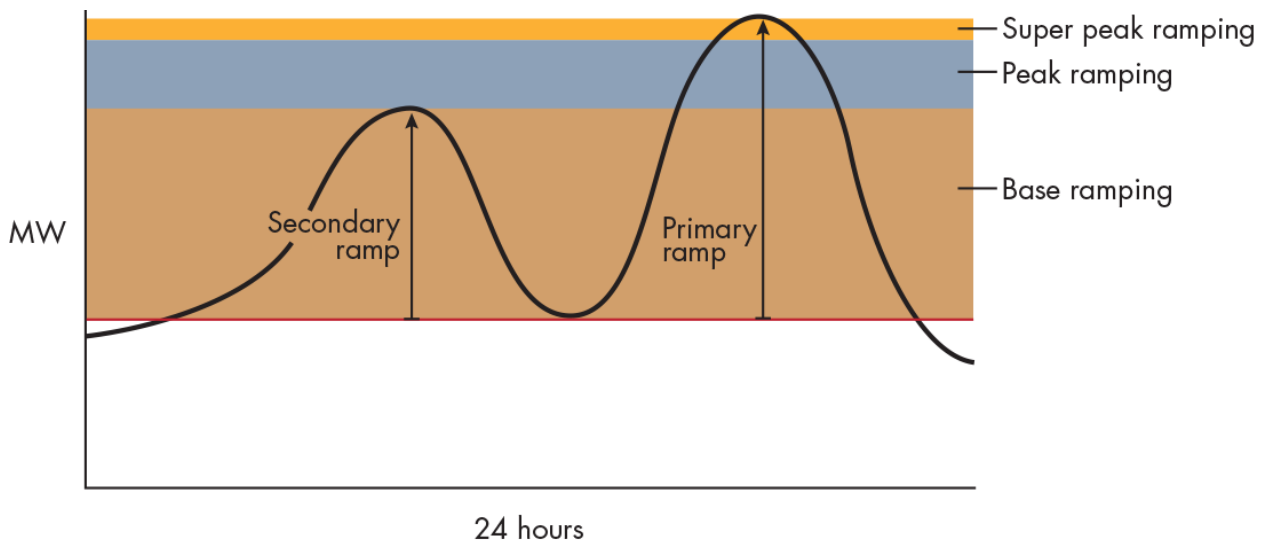
The flexible capacity needs assessment is based on largest three-hour net load ramp for system in the month. This concept is shown in Figure 3 below.

**Figure 3: Flexible Capacity Requirements**



The ISO allocates flexible RA capacity needs to LRAs based on their LSEs' contribution to the net load ramp. The flexible MW value of a resource is defined by the amount that the resource can ramp in three hours. Figure 4 below shows the concepts of the primary ramp and the secondary ramp and the three flexible capacity categories of base ramping, peak ramping, and super peak ramping.

**Figure 4: Flexible Capacity Categories**



The three categories of flexible capacity allow use-limited and other resources with limited availability to meet some flexible capacity needs. The three different categories of flexible capacity and the attributes of each category are shown in Table 2 below.

**Table 2: Flexible Capacity Category Attributes**

Parameter	Category 1 (Base Ramping)	Category 2 (Peak Ramping)	Category 3 (Super-Peak Ramping)
<b>Must-Offer Obligation</b>	5:00 a.m. – 10:00 p.m.	5 hour block	5 hour block
<b>Energy Requirement</b>	Minimum 6 hours	Minimum 3 hours	Minimum 3 hours
<b>Daily Availability</b>	7 days/week	7 days/week	Non-holiday weekdays

### 6.3.4. Load Following Metered Subsystem

An LRA can establish a load following metered subsystem (“MSS”) as its RA program. Section 40.2.4 of the ISO tariff describes the information requirements for an MSS RA program (see [http://www.caiso.com/Documents/Section40\\_ResourceAdequacyDemonstrationForAllSchedulingCoordinators\\_asof\\_Jun3\\_2015.pdf](http://www.caiso.com/Documents/Section40_ResourceAdequacyDemonstrationForAllSchedulingCoordinators_asof_Jun3_2015.pdf)).

Under a load following MSS a Scheduling Coordinator (“SC”) for a load following MSS must provide an annual RA plan showing that sets forth, at a minimum, the local capacity area resources, if any, procured by the load following MSS. The annual RA plan showing is to use the annual coincident peak demand determination provided by the CEC for the load following MSS using demand forecast data submitted to the CEC by the load following MSS, or, if the CEC does not produce coincident peak demand forecasts for the load following MSS, the annual coincident peak demand forecast produced by the ISO for it in accordance with the ISO’s business practice manual using demand forecast data submitted to the ISO by the load following MSS. The local capacity area resources identified in the annual RA plan showing are subject to the ISO’s resource performance incentives mechanism (see Section 6.7 of this issue paper for a description of the incentives mechanism).

## 6.4. Counting Resources to Meet Requirements

This section discusses how resources can count towards meeting an RA requirement. This section also discusses certain tests of the QC values that are performed by the ISO to assess the deliverability of resources.

### 6.4.1. Qualified Capacity

To count towards meeting an RA requirement, resources must be established as QC and have their MW values published on a list of capacity that is qualified to be used for RA. Capacity that is to be used to fulfill an RA requirement must appear on a list of QC. During the third quarter of each year, the ISO publishes the following two lists of capacity that LSEs can procure for RA.

- Net Qualifying Capacity (“NQC”) list that show the resources that are eligible to be included on year-ahead and month-ahead RA showings. Section 40.4.2 of the ISO tariff discusses the NQC posting.
- Effective Flexible Capacity (“EFC”) list that shows all of the flexible resources that are eligible to be included on year-ahead and month-ahead RA showings.

LRAs determine the methodology that is used to count resources as QC for RA. The counting rules vary by LRA and by resource technology. Examples of the types of technologies that can qualify as RA capacity are:

- Thermal resources;
- Qualifying facilities;
- Combined heat and power facilities;

- Wind resources;
- Solar resources;
- Hydroelectric power resources;
- Energy-limited resources;
- Energy storage resources;
- Demand response resources;
- Participating load resources;
- Dynamic system resources and pseudo ties; and
- Intertie resources.

LRAs use different methods to count resources and establish QC values. For example, the CPUC calculates the QC of wind, solar photovoltaic, and solar thermal facilities based on an exceedance methodology. This approach measures the minimum amount of generation produced by the resource in a certain percentage of included hours. The exceedance level used to calculate the QC of wind and solar resources is 70%. In other words, a 70% exceedance level means a resource's production profile is the MWh of generation that the resource produces at least 70% of the time. The included hours vary seasonally and are based on the time of system peak demand.

Another example of an LRA counting rule is the rule used by the CPUC for dispatchable generation resource types. Dispatchable generation resources receive NQC values based on their available capacity, subject to a deliverability test. The Scheduling Coordinator ("SC") of the resource submits a proposed QC value to the ISO, along with a reference to the resource's most recent maximum power plant output test (i.e., a "PMax" test) that is in the ISO's master file. The ISO then checks the submitted value for consistency with the resource's PMax and deliverability status. If the proposed QC value is less than or equal to the PMax and the maximum deliverable capacity, it is accepted as the NQC value. If not, the PMax or maximum deliverable amount is accepted as the NQC value. Additional information on the tests the ISO uses to establish an NQC value is provided in Section 6.4.5 of this issue paper.

As discussed in Section 6.2 of this issue paper, Section 40.8 of the ISO tariff sets forth resource counting criteria that will apply if the CPUC or a LRA has not established and provided to the ISO criteria to determine the types of resources that may be eligible to provide QC and for calculating the QC for such eligible resource types. The types of resources specified in Section 40.8 will be eligible to provide QC to the extent that the resources meet the criteria for each type of resource set forth in Section 40.8 of the ISO tariff. Section 40.8 can be found at:

[http://www.caiso.com/Documents/Section40\\_ResourceAdequacyDemonstrationForAllSchedulingCoordinators\\_asof\\_Jun3\\_2015.pdf](http://www.caiso.com/Documents/Section40_ResourceAdequacyDemonstrationForAllSchedulingCoordinators_asof_Jun3_2015.pdf).

One issue that the ISO desires to raise with stakeholders is whether ISO default tariff provision for counting rules still make sense in a regional organization, or whether under a regional structure the ISO needs a more standardized approach for establishing rules such as counting rules for determining QC values. Standardized rules could be used to ensure that all LSEs within the ISO's BAA provide an equal contribution of resources to meet the BAA's operational needs and minimize the potential for some entities to "lean" on other entities.

## 6.4.2. Establishing Deliverability

This section of the issue paper discusses how the ISO establishes deliverability requirements for RA resources within the ISO's BAA, imports, and distributed generation.

### **Deliverability for Resources within the ISO's BAA**

The ISO performs system studies to determine the deliverability of resources. The study methodology considers deliverability at peak load condition. The study uses a "generation pocket" concept where generation in an area may exceed transmission capacity available to deliver resource outside the area. The ISO determines the generation deliverable MW amount based on studies with deliverable imports

represented. The ISO determines the import deliverable amount based on average of highest recent historical usage during peak conditions. Being identified as “deliverable” conveys no scheduling priority rights in the day-ahead or real-time markets when a resource uses the ISO controlled grid. Details on the methodology for deliverability for resources within the ISO’s BAA can be found in Section 40.4.6.1 of the ISO tariff at

[http://www.caiso.com/Documents/Section40\\_ResourceAdequacyDemonstrationForAllSchedulingCoordinators\\_asof\\_Jun3\\_2015.pdf](http://www.caiso.com/Documents/Section40_ResourceAdequacyDemonstrationForAllSchedulingCoordinators_asof_Jun3_2015.pdf).

### **Deliverability for Imports**

The ISO assesses the MW amount of import deliverability using the maximum import capability (“MIC”) methodology. The ISO calculates the MIC MW amount mainly based on the actual schedules into the ISO’s BAA for highest imports obtained simultaneously during peak system load hours over the last two years. The MIC MW value on each intertie is available to ISO LSEs for procuring RA capacity from external resources, and it is not assigned directly to external resources. The ISO calculates the MIC MW values for each intertie annually for a one-year term. The ISO uses a 13-step process to allocate MIC to LSEs. Details on the MIC methodology can be found in Section 40.4.6.2 of the ISO tariff at

[http://www.caiso.com/Documents/Section40\\_ResourceAdequacyDemonstrationForAllSchedulingCoordinators\\_asof\\_Jun3\\_2015.pdf](http://www.caiso.com/Documents/Section40_ResourceAdequacyDemonstrationForAllSchedulingCoordinators_asof_Jun3_2015.pdf).

### **Deliverability for Distributed Generation**

Each year the ISO performs an annual deliverability assessment to determine MW quantities of potential distributed generation deliverability (“DGD”) at specific nodes of the ISO controlled grid for purposes of assigning deliverability status to distributed generation facilities interconnected or seeking interconnection to the distribution system of a utility distribution company (“UDC”) or a MSS pursuant to the interconnection procedures of the UDC or MSS, where the interconnection and potential deliverability status can be provided without:

- Any additional delivery network upgrades;
- The need for the ISO to conduct any further deliverability assessment; and
- Degrading the deliverability status of generation in commercial operation, proposed generating facilities in the ISO Interconnection queue, or the distributed generation facilities of interconnection customers who have previously requested full capacity or partial capacity deliverability status.

Following the ISO’s publication of the nodal potential DGD quantities resulting from the deliverability assessment, applicable UDCs and MSSs will assign full capacity deliverability status or partial capacity deliverability status to specific distributed generation facilities.

This tariff provision supplements, and does not preclude or limit, the ability of an interconnection customer for a distributed generation facility to seek and receive full capacity deliverability status or partial capacity deliverability status through applicable interconnection procedures. It is intended to relieve the interconnection customer for a distributed generation facility from the requirements to request and achieve interconnection to the distribution system through the applicable interconnection procedures. The amount of RA capacity that a distributed generation facility may provide in any given RA compliance year is subject to the ISO’s annual NQC determination.

The methodology for deliverability for distributed generation resources can be found in Section 40.4.6.3 of the ISO tariff at

[http://www.caiso.com/Documents/Section40\\_ResourceAdequacyDemonstrationForAllSchedulingCoordinators\\_asof\\_Jun3\\_2015.pdf](http://www.caiso.com/Documents/Section40_ResourceAdequacyDemonstrationForAllSchedulingCoordinators_asof_Jun3_2015.pdf).

### 6.4.3. Zonal Transfer Constraints

There are transmission paths in the ISO's BAA where there is limited transfer capability. In Decision D.07-06-029, the CPUC adopted the Path 26 counting constraint as part of its RA program requirements applicable to LSEs under its jurisdiction. The Path 26 counting constraint accounts for the limited transmission transfer capability across Path 26 and relies on information regarding existing contracts for its implementation. The counting constraint currently applies only to CPUC-jurisdictional LSEs because the Path 26 counting constraint has not yet been incorporated into the ISO tariff.

Similar transmission transfer constraints may exist elsewhere if the ISO footprint expands to encompass multiple states. The ISO tariff may need revise its tariff to incorporate this element into the regional RA construct. The ISO will discuss this topic in more detail in upcoming working group discussions with stakeholders.

### 6.4.4. Net Qualifying Capacity

As discussed above, resources that want to be counted towards meeting an RA requirement must establish a QC MW value. Once a QC value has been determined, the ISO takes the QC value and tests it to arrive at a NQC MW value for the resource. The ISO determines the NQC values annually and creates and publishes an NQC list for the RA compliance year. The ISO tests the QC value against the MW values below and establishes an NQC at the lower MW value of the following:

- Calculated QC;
- MW value in Interconnection Agreement;
- Latest unit testing information;
- "PMax" value in ISO Master File of resource values;
- Resource deliverability status (Energy Only, Full Capacity, Interim Deliverable, Partial Deliverable); and
- Resource performance (currently not used to adjust NQC MW values; however, see Section 6.7 below regarding the ISO's resource performance incentive mechanism).

Section 40.4.3 of the ISO tariff discusses the determination of NQC and can be found at:

[http://www.caiso.com/Documents/Section40\\_ResourceAdequacyDemonstrationForAllSchedulingCoordinators\\_asof\\_Jun3\\_2015.pdf](http://www.caiso.com/Documents/Section40_ResourceAdequacyDemonstrationForAllSchedulingCoordinators_asof_Jun3_2015.pdf).

### 6.4.5. Effective Flexible Capacity

The ISO determines the flexible capacity MW value of a resource based on the counting rules listed below.

**Start-up time greater than 90 minutes**

$$\text{EFC} = \text{Minimum of (NQC-Pmin) or (180 min * RRavg)}$$

**Start-up time less than 90 minutes**

$$\text{EFC} = \text{Minimum of (NQC) or (Pmin + (180 min - SUT) * RRavg)}$$

Where:

EFC: Effective Flexible Capacity  
 NQC: Net Qualifying Capacity  
 SUT: Start up Time  
 RRavg: Average Ramp Rate

Section 40.10.4.1 of the ISO tariff discusses in detail the calculation of the EFC for flexible resources at:

[http://www.caiso.com/Documents/Section40\\_ResourceAdequacyDemonstrationForAllSchedulingCoordinators\\_asof\\_Jun3\\_2015.pdf](http://www.caiso.com/Documents/Section40_ResourceAdequacyDemonstrationForAllSchedulingCoordinators_asof_Jun3_2015.pdf).

## 6.5. Resource Showings and Compliance

Section 40.2 of the ISO tariff discusses the showings requirements for RA at [http://www.caiso.com/Documents/Section40\\_ResourceAdequacyDemonstrationForAllSchedulingCoordinators\\_asof\\_Jun3\\_2015.pdf](http://www.caiso.com/Documents/Section40_ResourceAdequacyDemonstrationForAllSchedulingCoordinators_asof_Jun3_2015.pdf).

The ISO tariff requires resource “showings” to demonstrate RA capacity. LSEs and suppliers submit showings in both the year-ahead and month-ahead time frames. There are two kinds of showings: (1) RA plans, and (2) supply plans. These showings provide the basis for the “hand-off” of resources from the supplier to the ISO, and procured capacity is committed to the ISO under a must offer obligation. The must-offer obligation is described in Section 6.6 below.

Resource showings are the mechanism the ISO uses to enforce RA obligations. There are year-ahead and month ahead showings. Summarized below, at a high level, is the process for the year-ahead and month-ahead RA showings.

1. LRA mandates procurement of target of next year’s RA requirement;
2. LSEs engage in bilateral procurement of capacity to meet this requirement;
3. LSEs demonstrate procurement to LRA and ISO;
4. Suppliers demonstrate to ISO sale of RA capacity to LSE;
5. LRA ensures LSE compliance; and
6. ISO ensures suppliers corroborate LSE showings and met needs.

The RA compliance year is based on a calendar year, i.e., January 1 to December 31 of each year. Year-ahead RA showings are due approximately two months before the start of the next RA compliance year. Month-ahead RA showings (RA plan showings and supply plan showings) are due approximately 45 days prior to the start of the next RA compliance month.

LSEs use the RA plan template to demonstrate the capacity that the LSE has procured. LSEs must provide an RA plan showing. There is a \$500/day penalty for each day the RA plan showing is late. LSEs upload the template through the ISO’s system, and the ISO then reviews and validates the showings to ensure that the RA plan showings and the supply plan showings match and that the LSE has met the system, local and flexible requirements.

Suppliers submit supply plan showings to demonstrate that their resources are to be used by the ISO as RA capacity. Suppliers must provide a supply plan showing. There is a \$500/day penalty for each day the supply plan showing is late. By submitting a supply plan, the supplier commits a resource and its corresponding amount of RA capacity to the ISO. The committed resource will then be subject to the applicable must-offer obligation requirement and resource performance incentives. The must-offer obligation is described in Section 6.6 below. The resource performance incentives are described in Section 6.7 below.

Suppliers use the supply plan template to demonstrate their RA resources. Suppliers upload the template through the ISO’s system to the ISO, and the ISO then reviews and validates the showing.

Why does ISO need supply plan showings?

- Without a supply plan, the LSE will not get credit toward meeting its RA obligations.
- A supply plan confirms that the SC for the supplier is committed to scheduling and/or bidding the RA capacity that has been reported to the ISO.
- A supply plan establishes the formal business commitment between the ISO and the RA resource by confirming the status of the resource as an RA resource.



What is cross validation?

- Cross validation is the first thing the ISO does after the showing due date.
- The ISO checks the RA plan showing against the supply plan showing to ensure that the LSE’s records and the supplier’s records match.
- The ISO’s validation tool generates basic errors and warnings that flag potential items for further review by the ISO and LSEs/suppliers.

Error-free capacity becomes committed RA capacity. Once the “designated” capacity records on RA plans and supply plans pass individual validation and cross validation, resources and their associated capacity are established as RA capacity for the duration of time indicated in the RA plan and the supply plan.

### 6.6. Bidding and Scheduling Requirements

RA resources have specific bidding and scheduling requirements. Resources participating in ISO markets under an RA contract have an RA must-offer-obligation to the ISO. System and local RA have explicit 24 hour must-offer requirements. RA capacity that is contracted for as RA capacity for even one hour in a day is considered RA for an entire day. In addition to having a must-offer obligation, RA capacity is (1) ineligible to receive payments under the ISO’s backstop capacity procurement mechanism (“CPM”), and (2) ineligible to receive residual unit commitment (“RUC”) payments and must bid in to RUC at \$0.

There are different requirements for system, local and flexible RA capacity. System and local RA capacity must economically bid in or self-schedule in the ISO market to fulfill their RA obligation.

Flexible RA capacity must economically bid to fulfill its RA obligation. The must-offer obligations for flexible capacity are described in Section 40.10.6.1 of the ISO tariff at: [http://www.caiso.com/Documents/Section40\\_ResourceAdequacyDemonstrationForAllSchedulingCoordinators\\_asof\\_Jun3\\_2015.pdf](http://www.caiso.com/Documents/Section40_ResourceAdequacyDemonstrationForAllSchedulingCoordinators_asof_Jun3_2015.pdf). Tables 3, 4, and 5 below summarize the three categories of flexible capacity and their respective RA requirements.

**Table 3: Flexible Capacity Must-Offer Obligation for Category 1, Base Ramping**

Economic Bid – Must offer obligation	•5:00 am – 10:00 pm
Energy Requirement	•Minimum 6 hours at Effective Flexible Capacity (EFC)
Daily Availability	•7 days/week
Minimum quantity of capacity allowed	•Set monthly based on largest secondary net load ramp
Daily start-up capability	•Minimum of 2 starts per day or the # of starts allowed by operational limits as determined by min up and down time
Other limitations	•No limitations that translate to less than the daily requirements
Examples of types of resources	•Conventional gas fired resources, wind, hydro, storage with long discharge capabilities

**Table 4: Flexible Capacity Must-Offer Obligation for Category 2, Peak Ramping**

Economic Bid – Must offer obligation	•5 hour block (determined seasonally)
Energy Requirement	•Minimum 3 hours at EFC
Daily Availability	•7 days/week
Maximum quantity of capacity allowed	•Set based on the difference between 100% of the requirement and category 1
Daily start-up capability	•At least 1 start per day
Other limitations	•No limitations that translate to less than the daily requirements
Examples of types of resources	•Use-limited conventional gas fired generation, solar, conventional gas fired peaking resources

**Table 5: Flexible Capacity Must -Offer Obligation for Category 3, Super-Peak Ramping**

Economic Bid – Must offer obligation	•5 hour block (determined seasonally)
Energy Requirement	•Minimum 3 hours at EFC
Daily Availability	•Non-holiday weekdays
Maximum quantity of capacity allowed	•Maximum of 5% per month of the total requirement per month
Daily start-up capability	•At least 1 start per day
Other limitations	•Must be capable of responding to at least 5 dispatches per month
Examples of types of resources	•Short discharge battery resource providing regulation and demand response resources

Use-limited RA resources (“ULR”) have unique must offer requirements. The tariff defines a ULR as a resource that “due to design considerations, environmental restrictions on operations, cyclical requirements, such as the need to recharge or refill, or other non-economic reasons, is unable to operate continuously.” A resource cannot meet this requirement solely on the basis of contractual or economic limitations. Several resource types, including hydroelectric units, automatically receive ULR status under the tariff. Other resource types, including wind, solar, and thermal units, must apply to the ISO for ULR

status. An RA resource that is a ULR has an obligation to bid into the ISO markets consistent with its registered use limitations.

### 6.7. Resource Performance Incentives

The ISO’s resource performance incentives, the Resource Adequacy Availability Incentive Mechanism (“RAAIM”), are discussed in Section 40.9 of the ISO tariff. FERC approved the RAAIM tariff provisions in 2015 and the new provisions go into effect on March 1, 2016. The ISO’s RAAIM filing to FERC is at: [http://www.caiso.com/Documents/May29\\_2015\\_TariffAmendment\\_Implement\\_Phase1A\\_ReliabilityServicesInitiative\\_ER15-1825.pdf](http://www.caiso.com/Documents/May29_2015_TariffAmendment_Implement_Phase1A_ReliabilityServicesInitiative_ER15-1825.pdf).

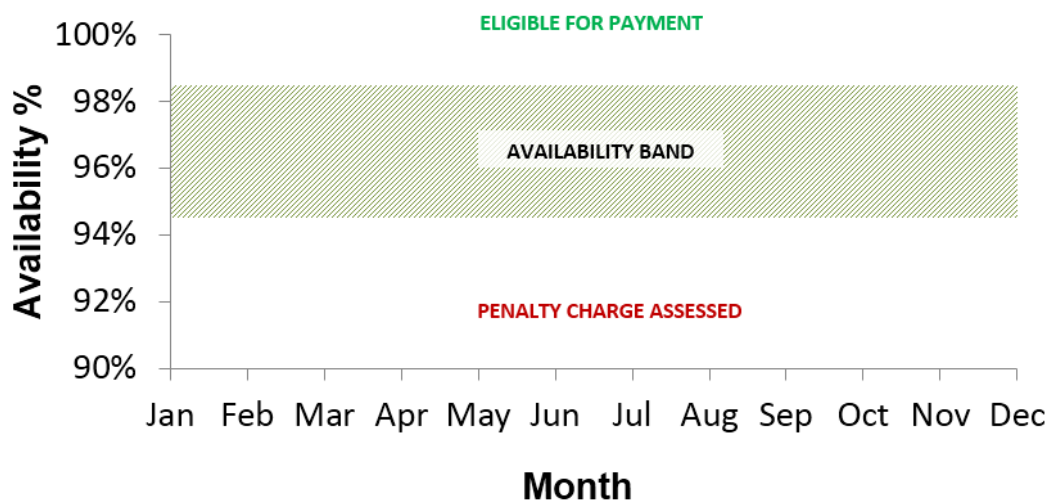
The RAAIM incents RA capacity to perform or provide substitute capacity to take their place when unable to meet their specific offer requirements. The RAAIM mechanism creates an incentive structure that rewards resources more for being availability in months where the ISO may see lower availability. The RAAIM mechanism charges resources, through a non-availability charge, that have a monthly average of availability below the fixed availability percentage and deadband. This charge rewards resources that have monthly average availability higher than the fixed availability percentage and deadband. Resources that perform better than the standard can receive bonus payments.

The key features of the RAAIM mechanism are:

- Assesses availability by comparing bids to applicable must-offer requirement to determine resource-specific availability percentage;
- Availability is assessed on the specific set of hours that are applicable for the specific type of RA capacity;
- Compares resource-specific percentage against standard percentage range to determine MWs to charge or receive payment;
- Penalizes low performers at a \$3.79/kW-month penalty price and pays high performers a pro-rata share of the penalty pool of funds up to three times the incentive price (ISO will reassess the price in 2019); and
- Some resource types are exempt from RAAIM, including wind, solar and combined heat and power resources.

The RAAIM availability metric is shown in the Figure 5 below.

**Figure 5: RAAIM Availability Metric**



The RAIM assessment process is as follows:

1. Determine hourly target MWs a resource was supposed to have offered into energy market;
2. Assess bids hourly to determine total available MWs;
3. Compute resource-specific monthly percentage by dividing total hourly available MWs by total hourly target MWs;
4. Compare percentage against availability threshold; and
5. Assess penalty charge and payments:
  - a. If within threshold - do nothing;
  - b. If above threshold - determine MW value for payment; and
  - c. If below threshold - determine MW value for charge.

## 6.8. Substitution Rules for RA Resources on Outage

SCs for participating generators in the ISO's BAA must report to the ISO both planned and forced outages. SCs for participating generators must submit planned outages in advance of the planned outage, and the ISO must approve them prior to the outage being taken.

If the SC for an RA resource submits a planned outage that impacts the RA capacity, the ISO may require substitute RA capacity if the ISO determines that the overall ISO reserve margin is insufficient for the period that the RA capacity will be on outage. The ISO undertakes this assessment prior to final approval of the planned outage. If the SC for the RA capacity declines to provide substitute capacity when required by the ISO, the ISO will deny the planned outage, and if the SC takes the outage the ISO will treat the outage as a forced outage and the resource will be subject to potential non-availability charges under the RAIM resource performance incentive mechanism.

If the SC for an RA resource reports a forced outage, the SC may elect to provide substitute capacity for the forced outage if it is concerned that the forced outage may result in non-availability charges under the RAIM because the resource is unable to comply with the applicable must-offer obligation. A forced outage impacts the determination in the RAIM tool of whether the capacity was available or not to the ISO. If an outage occurs, substitution of capacity from another resource can be a valuable tool that SCs can use to minimize their exposure to RAIM non-availability charges. There are limited exemptions from the RAIM mechanism for use-limited resources such as wind and solar resources.

For additional details on substitution and outage reporting, please refer to Sections 9 and 40.9 of the ISO tariff at: [http://www.caiso.com/Documents/Section9\\_Outages\\_Dec1\\_2014.pdf](http://www.caiso.com/Documents/Section9_Outages_Dec1_2014.pdf) and [http://www.caiso.com/Documents/Section40\\_ResourceAdequacyDemonstrationForAllSchedulingCoordinators\\_asof\\_Jun3\\_2015.pdf](http://www.caiso.com/Documents/Section40_ResourceAdequacyDemonstrationForAllSchedulingCoordinators_asof_Jun3_2015.pdf).

## 6.9. Backstop Provisions

The ISO has authority to procure "backstop" capacity to meet reliability needs through the CPM. The ISO may use backstop authority in the following situations:

- Resolve RA capacity deficiencies in the year-ahead and month-ahead timeframes;
- Resolve a collective deficiency in a local capacity area after accounting for all procured RA capacity;
- Supplement RA procurement by LSEs to address reliability needs caused by significant events, or when the ISO exceptionally dispatches a non-RA resource; and
- Designate capacity from resources needed to meet needs in the next RA year that have indicated that they will shut down because it is uneconomic for them to remain in service.

The ISO's CPM backstop procurement authority is in Section 43 of the ISO tariff. FERC approved the CPM tariff provisions in 2015 and the new mechanism goes into effect on March 1, 2016. The ISO's CPM filing to FERC is at:

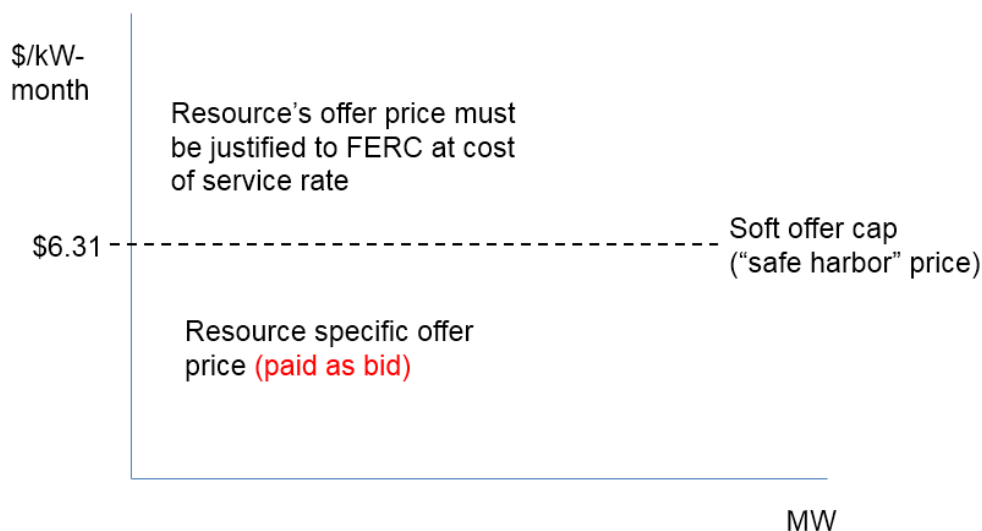
[http://www.caiso.com/Documents/May26\\_2015\\_TariffAmendment\\_CapacityProcurementMechanism\\_Revisions\\_ER15-1783.pdf](http://www.caiso.com/Documents/May26_2015_TariffAmendment_CapacityProcurementMechanism_Revisions_ER15-1783.pdf)

Under the CPM mechanism, suppliers can offer local, system, and flexible capacity into a competitive solicitation process. The ISO will conduct three types of competitive solicitations to meet reliability needs: annual; monthly; and intra-monthly. The ISO will use the annual competitive solicitation process to make CPM designations to address insufficient cumulative system, local, or flexible capacity in annual resource adequacy plans, as well as collective deficiencies in local areas. The ISO will use the monthly competitive solicitation process to make CPM designations to address insufficient cumulative, system, local, and flexible capacity in monthly resource adequacy plans, and insufficient cumulative system capacity due to planned outages. The ISO will use the intra-monthly competitive solicitation process to make CPM designations to address significant events and exceptionally dispatch resources.

The ISO will pay capacity it designates the resource-specific offer price. The CPM mechanism addresses potential market power concerns by employing a soft offer cap where any accepted offer prices above cap are subject to cost justification to FERC. The ISO will update the soft offer cap at least every four years pursuant to the process set forth in the tariff. All resource types may participate in solicitation, including, *inter alia*, demand response, storage, and imports.

The soft offer cap allows CPM prices to reflect market conditions. This concept is illustrated in Figure 6 below.

**Figure 6: Capacity Procurement Mechanism Soft Offer Cap**



Additional detail on the CPM mechanism can be found in the ISO tariff in Section 43 at: [http://www.caiso.com/Documents/Section43\\_CapacityProcurementMechanism\\_Nov1\\_2014.pdf](http://www.caiso.com/Documents/Section43_CapacityProcurementMechanism_Nov1_2014.pdf).

## 7. Next Steps

The ISO will discuss this issue paper with stakeholders during a meeting on December 16, 2015 in Salt Lake City, Utah. At that meeting the ISO also will provide a briefing on how RA currently works in the ISO's BAA. The ISO requests that stakeholders submit written comments by January 7, 2016 to [initiativecomments@caiso.com](mailto:initiativecomments@caiso.com). Please use the template at the following link to submit your comments: <http://www.caiso.com/informed/Pages/StakeholderProcesses/RegionalResourceAdequacy.aspx>.