
# Flexible Resource Adequacy Criteria and Must-Offer Obligation

Market and Infrastructure Policy
Second Revised Straw Proposal

July 25, 2013

# Second Revised Straw Proposal

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# 1 Introduction

Integrating a 33 percent Renewable Portfolio Standard (RPS), maintaining local reliability, and meeting California's goals to eliminate generation using once-through-cooling and increased distributed generation creates several operational challenges for maintaining grid reliability. Among these challenges is ensuring that there is sufficient flexible capacity to address the added variability and uncertainty of variable energy resources. The ISO is working with the California Public Utilities Commission (CPUC) and other local regulatory authorities (LRAs) to meet these challenges. Moreover, with any challenge comes opportunity. Reliably operating the grid with a 33 percent RPS requires re-evaluating how resources are dispatched, as well as resources' operating capabilities. Consequently, this stakeholder initiative seeks to create opportunities for all types of flexible capacity, including demand response, storage, and renewable resources that are willing and able to adjust their output to meet system needs. Adding flexible capacity procurement targets to the CPUC's Resource Adequacy (RA) program and more widespread flexible capacity requirements that extend to all load serving entities (LSEs) participating in the ISO market will provide an opportunity for resources that are both able and willing to provide flexible capabilities needed to operate the grid to have those capabilities appropriately valued and compensated.[1]

Additionally, the ISO will, as part of its flexible capacity requirement assessment, use a study methodology that captures the flexible capacity needed to reliably operate the system while properly considering the resources that have the potential to modify the net-load curve such load modifying demand-side management (i.e. energy efficiency and demand response that is not bid into the ISO market).[2] To that end, the ISO, California Energy Commission and CPUC are working collaboratively to determine how demand-side management programs, such as energy efficiency, can be targeted towards reducing the need for flexible resources by modifying the net-load shape that is driving the ramping requirements. This holistic approach of using clean preferred technologies to either reduce the requirements for flexibility (e.g., modify the net-load curve) or count towards meeting those requirements will ensure that the reliability challenges of the California's clean energy policies are addressed to the maximum extent practical by the very clean technologies behind those policies.

The ISO and the CPUC are pursuing a more forward looking approach to ensure the flexible capacity needed to reliably integrate a large fleet of renewable resources is secured on a multi-year ahead basis and operationally available to the ISO markets. To be operationally available to the ISO markets, resources must submit economic bids, as opposed to self-scheduling. The ISO is also actively participating in both the CPUC's Resource Adequacy and Long-Term Procurement Plan proceedings to help inform decisions regarding the flexible capacity, both new and existing, needed to reliably operate

[1] The ISO is striving to coordinate with all LRAs so that the ISO's flexible capacity requirements are consistent with load serving entity's procurement obligation established by the applicable LRA.

[2] The specific assumptions that will be used in the flexible capacity needs assessment is beyond the scope of the Flexible Resource Adequacy Criteria and Must-Offer obligation stakeholder initiative. However, the ISO will conduct an annual stakeholder process, as is done with the Local Capacity Requirements, to discuss the appropriate assumptions to consider in determining the flexible capacity requirement.

the grid. In the ISO's real-time energy market, the implementation of the flexible ramping constraint has improved the ISO's ability to optimize the available resource fleet for ISO market operations by valuing the real-time ramping capabilities of resources. The proposed flexible ramping product should improve this further. The ISO is lowering the energy bid price floor in its markets and modifying its bid-cost recovery rules to encourage more economic bidding by all resources. Further, planned market changes in conjunction with FERC's Order 764 to better integrate renewable resources will increase the dispatch frequency at the interties by allowing intertie resources to bid and schedule in 15-minute intervals in the real-time market.

In summary, this stakeholder initiative, which is narrowly focused on how to consider and operationally utilize flexible capabilities in the ISO market, represents only a portion of the ISO's overall efforts to ensure California's energy policy mandates are reached while maintaining system reliability. The ISO is committed to a holistic solution to these challenges that includes both conventional and preferred resources in such a way that ensures state policy mandates are met and the reliability of the grid is maintained.

# 2 Overview

As outlined in this second revised straw proposal, the ISO proposes the equitable way to allocate monthly flexible capacity procurement requirements to each LRA under the interim requirements is in proportion to their jurisdictional LSEs' contribution to the 3-hour net-load ramp.[3] The ISO must also make other tariff changes to enable it to be able to effectively use this flexible capacity, such as establishing a bidding (or "must-offer") requirement and associated availability metrics.

The ISO began work on some of these issues as part of this stakeholder process, initiated in December 2012. Since then, these issues have been further developed and the proposal has been updated. In this stakeholder initiative, to implement the flexible capacity requirements for 2015 RA compliance, the ISO will work with stakeholders to implement the following measures:

- **Requirement Determination:** A methodology and process by which the ISO determines the overall flexible capacity requirement for the ISO system. The ISO proposes conducting an annual assessment of flexibility needs using the most current Renewable Portfolio Standard contracts and load forecasts to determine the ISO system's flexible capacity requirement for the upcoming year. The timeline of this study process will mirror that of the current Local Capacity Requirement (LCR) schedule.
- **Allocation Methodology:** A flexible capacity allocation methodology that applies to all LRAs in the ISO balancing area. The ISO will allocate the proportion of the system flexible capacity requirement to each LRA based on its jurisdictional LSEs' contribution to the ISO's largest 3 hour net-load ramp change each month. The ISO will calculate each LSE's contribution to the net-load change using forecast changes in load, wind output, solar output, and distributed

[3] Net-load is defined as load minus wind and solar output.

generation. The ISO will perform these calculations using, in-part, data provided by each LSE and will provide the results to each LRA at the same time as the annual LCR study results.

- **Flexible Capacity RA Showings:** Requirements for LSEs, through their SC, to provide RA showings to the ISO demonstrating adequate flexible capacity procurement. Similar to the current RA program, an SC for an LSE will include a showing of its flexible capacity procurement in its RA showing submitted to the ISO. Resources used by LSEs to meet their flexible capacity requirements will make submissions confirming they have agreed to supply flexible capacity. Both LSEs and resources will make annual and monthly submissions. Also, LSEs will be expected to demonstrate they have procured 90 percent[4] of their flexible capacity requirement for the year-ahead submission and 100 percent of their flexible capacity requirement in the month-ahead RA submission.

- **Showing Assessment and Resource Counting**: An assessment of the adequacy of an LSE's flexible capacity showing towards meeting its flexible capacity requirement, based on the allocation methodology used by the LSE's LRA. This assessment will use a flexible capacity counting methodology established in the ISO tariff. This counting methodology will be consistent with that recently established by the CPUC and will consider each resource's net qualifying capacity, minimum operating level, start-up time, and ramp rate.

- **Must-Offer Obligations:** Must-offer obligations for flexible capacity resources that generally require resources used to meet flexible capacity requirements to submit economic energy bids into the ISO's day-ahead and real-time markets for the time period from 5:00 AM through 10:00 PM, in addition to the existing must-offer obligations for generic RA capacity. The ISO anticipates that the majority of use-limitations for can be managed through constraints modeled in the ISO market or through appropriate energy bid prices and/or start-up costs that reflect these limitations, while still requiring submission of energy bids under the requirements of the must offer obligation.

- **Specific Requirements for Preferred Resources and storage:** The ISO's approach includes specialized must-offer requirements to account for the unique characteristics of preferred resources. These include:

    - A specific must-offer obligation for demand response resources that provide flexible capacity that allows these resources to submit economic bids for either the time period from (1) 5:00am – 10:00am, or (2) from 4:00pm – 9:00pm. For either of these periods, demand response resources providing flexible capacity would be required to provide a minimum of 3 hours of energy. The 3 hour energy requirement is necessary to meet either the morning or evening net load ramp. This is similar to the 6 hour energy requirement for hydro resources which are available to meet the needs of both the morning and the evening net load ramp.

    - A specific must-offer obligation for storage resources (excluding pump storage which would have the same obligation as hydro resources) that provide flexible capacity that allows theses storage resource to either (1) submit economic bids to provide regulation

[4] The ISO is proposing 90 percent at this time. However, as with local capacity requirements, future needs may require LSEs, in their year-ahead flexible capacity showings, to demonstrate that 100 percent of their flexible capacity has been procured.

for the time period from 5:00am – 10:00pm as a regulation energy management resource, or (2) select one of the time periods for a must-offer obligation as outlined above for demand response resources.

- A specific must-offer obligation for intermittent resources that provide flexible capacity that is consistent with the operational parameters of the resource type and the availability of the energy source for each resource.

- **Backstop Procurement:** ISO backstop procurement authority that allows the ISO to procure flexible capacity on a one-year forward basis based on deficiencies in LSE SC's annual of monthly flexible capacity procurement.

- **Availability Incentive Mechanism:** A flexible capacity availability incentive mechanism that maximizes the incentive to make flexible capacity resources used to meet flexible capacity forward procurement requirements available to the ISO markets. This mechanism will be designed to measure resources' compliance with the applicable must offer obligation. As such, the availability incentive mechanism will focus on the availability of economic bids from resources providing flexible capacity. The ISO plans to have this flexible capacity availability incentive in place no later than January 1, 2016.

The ISO plans to complete this stakeholder initiative by December 2013 and have these measures in place for 2015 RA compliance. The ISO will also remain active at the CPUC in the upcoming RA proceeding to establish counting flexible capacity counting provisions for preferred resources and storage. Finally, on July 10, the ISO and CPUC issued the Joint Reliability Framework.[5] Ultimately, the Joint Reliability Framework is aimed at establishing multi-year forward procurement commitments as the ISO develops a market-based backstop procurement mechanism. The must-offer obligation developed in this stakeholder initiative will be a critical component of the multi-year forward procurement mechanism.

## 2.1 Changes from the Revised Straw Proposal

The ISO has made the following revisions to the Revised Straw Proposal in this Second Revised Straw Proposal:

1) Demand response, storage, and variable energy renewable resources will have specialized must-offer requirements to account for the unique characteristics of these resources. These specialized must-offer requirements will enable these clean resources to help meet the systems flexibility requirements.

2) The ISO will allocate its flexible capacity requirement to LRAs , rather than to LSEs, as the ISO previously proposed. This approach acknowledges that an LRA may elect to use a different allocation methodology for its jurisdictional LSEs than the ISO's allocation methodology. In the event of ISO backstop procurement of flexible capacity, the ISO will use the applicable LRA's allocation methodology to allocate backstop procurement costs to the LRAs jurisdictional LSEs.

[5] http://www.caiso.com/informed/Pages/StakeholderProcesses/Multi-YearReliabilityFramework.aspx

3) The contribution to the net load requirement from changes in load has been changed from peak-load ratio share to monthly average load factor. The contribution of distributed generation has been changed to the contribution of variable distributed energy resources in each LRA.

4) A methodology has been developed to allow resources with annual, monthly, or other start-limitations to include the opportunity cost of using the resource's limited starts in start-up costs.

5) The ISO will not employ any bid validation or bid insertion rules for flexible capacity resources beyond those that currently exist for RA resources as the ISO previously proposed. Rather, as described in item 6), below, the ISO is proposing a flexible capacity availability incentive mechanism to ensure resources comply with the flexible capacity must-offer requirement to the maximum extent possible.

6) The ISO will develop a flexible capacity availability incentive mechanism that will measure flexible capacity resources' compliance with the applicable must-offer obligation. Resources that perform under the system availability target by more than 2.5 percent will be charged the applicable flexible capacity backstop procurement cost. All charges from these resources will be credited to those resources exceed the system availability target by more than 2.5 percent. Subject to the ISO confirming the implementation timeline, this mechanism will be in place no later than the 2016 RA year.

# 3 Background

ISO studies have shown the need for flexible capacity resources will increase as large amounts of intermittent renewable resources come online to meet California's 33 percent RPS.[6] In addition, the future retirement of significant amounts of once-through cooling generation units and the rapidly growing levels of distributed resources will further increase the need for flexible resources. Given the growing intermittency of the supply fleet and the potential retirement of once-through-cooled resources, the ISO as the balancing area authority must consider its operational needs beyond what historically has been satisfied by system, often termed "generic," capacity, and local capacity.

There are at least three key items that the ISO believes must be in place to ensure California is attracting and sustaining investment in the right type and mix of resources while meeting California's goal to increase energy efficiency, demand response, and renewable energy. These issues are:

1) Obligations for flexible capacity procurement.

2) New rules addressing the ability of use-limited resources like demand response, storage, renewable resources and resources with environmental restrictions to provide flexibility, local and system resource adequacy services.

[6] For a more detailed discussion of these studies, see http://www.caiso.com/Documents/SecondRevisedDraftFinalProposal-FlexibleCapacityProcurement.pdf.

3) Multi-year forward resource adequacy requirements.

This stakeholder initiative addresses the first two of these items.[7]

The ISO believes that reliably integrating intermittent resources depends on implementing explicit procurement requirements for multiple flexible capacity products. At the August 13, 2012 CPUC resource adequacy workshop, the ISO presented a conceptual proposal on how the flexible capacity attributes of maximum continuous ramping, load following, and regulation could be addressed for an interim 2014-2017 period as a single "dispatchability" attribute that could be woven into the existing bi-lateral resource adequacy procurement paradigm.[8] On October 29, 2012, the ISO, with co-signatories, San Diego Gas and Electric and Southern California Edison, submitted the Joint Parties Proposal to the CPUC's Energy Division in the RA proceeding (R.11-10-023).[9] The Joint Parties Proposal detailed an interim solution to addressing the ISO's flexible capacity needs while a long term solution is devised.[10] After submitting the Joint Parties Proposal to the CPUC, the ISO continued to work with parties in the RA proceeding to refine the treatment of hydro from the methodology originally proposed in the Joint Parties Proposal. As a result of this effort, the ISO, in collaboration with PG&E, SCE, and SDG&E, agreed to a revised methodology designed to address the hydro resources and submitted this proposal to the CPUC's Energy Division.[11] The revised Joint Parties' Proposal that included the new hydro proposal was supported by the ISO, PG&E, SCE, and SDG&E. Additionally, CPUC Energy Division used the Revised Joint Parties' proposal as the basis for their recommendation, which included additional refinements.

On June 27, 2013, the CPUC approved the final decision in its RA proceeding,[12] which establishes interim flexible capacity procurement obligations as part of the CPUC's RA program. The decision calls for CPUC jurisdictional load serving entities to meet a flexible capacity procurement target for RA compliance year 2014, with these targets becoming procurement obligations in RA compliance year 2015. The decision also outlines the rules the CPUC will use for counting conventional resources towards meeting flexible capacity procurement obligations and highlights outstanding issues to resolve in the upcoming RA proceeding. The ISO appreciates that these issues in the decision incorporated the ISO's recommendation to focus on establishing counting rules for use-limited resources such as demand response, storage, and resources with environmental restrictions.

The ISO supports the CPUC decision as an appropriate interim solution to address the system's need for flexible capacity while a more enduring and holistic solution that also accommodates alternatives to

[7] Additional work must also be done in the CPUC's RA proceeding as well as with other LRAs.
[8] The ISO believes future procurement must consider how to implement separate procurement requirements for multiple flexible capacity products.
[9] The documents and data the ISO submitted in CPUC Docket No. R.11-10-023 are available at http://www.caiso.com/Documents/R.11-10-023%20(Order%20instituting%20rulemaking%20to%20oversee%20RA%20program).
[10] The CPUC has included the Joint Parties Proposal in the Scoping Memo issues in R.11-10-023 on December 6, 2012.
[11] The proposed methodology for assessing hydro resources flexibility is included as an attachment to this revised straw proposal.
[12] The CPUC's RA Final Decision is available at http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M070/K423/70423172.PDF.

conventional generation is designed. In addition to the RA process underway at the CPUC, the ISO is working with other LRAs to implement workable flexible capacity programs. As more renewable resources come on line, not only will the net load curve look substantially different than it does today but so will the need for regulation and load following. Due to the intermittency of renewable resources the potential for inter-hour variations requiring load following and regulation will also increase. Addressing these needs will require more precise and forward looking capacity procurement that includes specific requirements for load following and regulation, in addition to the current requirement based on each day's maximum overall net-load ramp. For these reason, the ISO believes this must be an interim solution to address the system's need for flexible capacity while a permanent and more holistic solution is designed.

## 3.1 Schedule

The ISO plans to complete this stakeholder process by the end of the year so that the CPUC's upcoming RA proceeding can consider the outcome and all appropriate rules and systems can be in-place in time for the 2015 RA compliance year. As such, the ISO offers the following updated schedule for this stakeholder process:

| Date | Action |
|---|---|
| **December 14, 2012** | Draft straw proposal |
| **December 20, 2012** | Stakeholder Meeting |
| **January 9, 2013** | Stakeholder comments due |
| **June 13, 2013** | Revised Straw Proposal posted |
| **June 19, 2013** | Stakeholder meeting |
| **June 26, 2013** | Stakeholder comments on Revised Straw Proposal due |
| **July 25, 2013** | Second Revised Straw Proposal posted |
| **August 1, 2013** | Stakeholder Meeting |
| **August 15, 2013** | Stakeholder comments on Second Revised Straw Proposal due |
| **September 18, 2013** | Draft Final Proposal |
| **September 26, 2013** | Stakeholder call |

| Date | Action |
|---|---|
| **October 8, 2013** | Stakeholder comments on Draft Final Proposal due |
| **December 18, 2013** | Board decision |

# 4 Determining the Requirement: The ISO's Flexible Capacity Requirement Assessment

Each year, the ISO will determine the system's flexible capacity requirement for the upcoming RA compliance year. The ISO will undertake this flexible capacity requirement assessment on a schedule that mirrors its local capacity requirement study schedule. As discussed below, this process will be transparent and include numerous opportunities for stakeholder input. The process will include stakeholder meetings where the ISO will present and discuss the inputs and assumptions used in the assessment. Stakeholders will have an opportunity to provide comments on the specific methodology over the course of the process described.

Upon completion of this assessment, the ISO will use the results to allocate the flexible capacity shares of the system requirement to each of the LRAs responsible for load in the ISO balancing authority area. The ISO will determine this allocation to each LRA by summing the contribution to the maximum net load ramp of each LSE under the jurisdiction of the LSE. The ISO will include a breakdown of each individual jurisdictional LSE's contribution based on the allocation methodology described in section 5.

The ISO will provide the final results of its flexible capacity requirement assessment by May 1 to each LRA in the ISO balancing authority area. The ISO will provide each LRA with (1) the total system requirement, (2) the LRA's share of the total system requirement, and (3) each of the LRA's jurisdictional LSE's contribution to the net load ramp that were used to calculate the LRA's share of the total system requirement.

The ISO proposes the flexible capacity requirement assessment utilize the following process:

| Month/Timing | Event |
|---|---|
| January | Receive CEC load forecast used for Transmission Planning Process expansion plan |
| | Receive updated RPS build-out data from the IOUs |
| | Publish annual Flexible Capacity Requirements assumptions paper |
| February | ISO stakeholder meeting to discuss assumptions, stakeholder comments, and posting of comments with ISO response |
| March | Draft LCR and FCR study completed (including Effective Flexible Capacity list of eligible flexible capacity resources) followed by local & flexible capacity requirement stakeholder meeting |
| | Publish draft final LCR & FCR needs study |
| April | ISO stakeholder meeting to discuss LCR / FCR results followed by stakeholder comments |
| May/June | Final 2014 LCR & FCR study posted |
| | CPUC annual RA decision incorporating LCR and FCR procurement obligations |
| July | LSEs receive year-ahead flexible capacity procurement obligation |
| August | Revised load forecasts and renewable build-outs for following RA compliance year |
| September | LSEs receive revised RA and flexible capacity obligation |
| October | Year-ahead showing of system, local, and flexible capacity (show 100% local and 90% system and flexible) |
| Monthly | T-45 days: Month-ahead showings, including local and flexible true-up |
| | T-25 days: ISO notifies LSEs and suppliers of any deficiencies of system, local, and or flexible capacity |
| | T-11 days: Final opportunity for LSEs to demonstrate to the ISO that any identified deficiencies have been cured |

The proposed process for the flexible capacity requirement assessment methodology for determining each LSE's contribution to the flexible capacity requirement extends the method established by the CPUC's recent decision in its RA proceeding (R.11-10-023) in that the requirement is

based on each month's projected maximum daily three hour net load ramp. However, while the CPUC decision determines the overall requirement based on each month's maximum net load ramp, it allocates this overall requirement to LSEs based on peak load share. In contrast, the ISO is proposing to allocate the overall system requirement to LRAs in proportion to the sum of their jurisdictional LSEs contribution to the maximum net load ramp.

The ISO's flexible capacity requirement assessment will use the most current full year of actual load data and the most current California Energy Commission (CEC) approved load forecast to produce a data set of minute-by-minute load forecast for the year upcoming RA compliance year.

Additionally, all LSEs, through their SC, will submit to the ISO two lists detailing existing contracts with intermittent resources for the RA compliance year in question as well as details about additional intermittent resources that they expect to come on line in the next five years.

- The first list, which will be made publically available, will include aggregated data regarding all contracts with intermittent resources, both existing and planned. This list shall include the total contracted installed capacity (not Net Qualifying Capacity) in each Certified Renewable Energy Zone (CREZ) by technology type. The LSE will be required to state whether the resources are existing or include the expected on-line date of each resource. If an LSE has confidentiality concerns they will be allowed to aggregate multiple adjacent CREZs to mask confidential information. Additionally, the LSE will be required to inform the ISO how much of the balancing services for intermittent resources from each non-ISO CREZ are provided by an adjacent balance area authority and if there any special provisions associated with contracted resource (i.e. any curtailment or dispatch provisions).

- The second list, which the ISO will consider to be confidential, will be used to validate the aggregated figures. This list will be based on the same information as the aggregated list, but should provide the data on a resource-by-resource basis. The ISO will use these data to generate minute-by-minute net load data that will be used to determine the maximum 3-hour net load curve for each month.

The accuracy of the data submitted by each LSE will be critically important because the contractual information will be used by the ISO to determine the flexible capacity requirement and the allocation of this requirement. If an LSE submits inaccurate data, it may result in an inaccurate calculation and allocation of flexible capacity requirements. If an LSE submits inaccurate data, the ISO, upon discovering the inaccuracy, may rerun the flexible capacity requirement assessment and recalculate flexible capacity requirement for the entire year to determine the impact of the inaccuracy. The LSE that submitted the inaccurate data will be charged the applicable backstop price for flexible capacity for any flexible capacity allocation they would have received under the corrected flexible capacity requirement assessment. The ISO will allocate the proceeds to SCs for LSEs that procured too much flexible capacity because of the inaccurate data. If the inaccurate data result yields a lower flexible capacity requirement allocation, for the LSE, then no change in the flexible capacity allocation will be made and no additional charges imposed.

### 4.1.1 *The ISO's Proposed Study Methodology*

The ISO conducted a study to determine the flexible capacity requirement for the entire ISO footprint for 2014-2016 as part of the CPUC's RA proceeding. The ISO proposes using a similar methodology for the annual flexible capacity requirement assessment. The methodology used in that proceeding is outlined here. Additionally, the inputs and results of the 2014 assessment are discussed to provide an example of the proposed methodology.

First, the flexible capacity requirement is calculated using the following formula:

$$\text{Flexibility Requirement}_{MTHy} = \text{Max}[(3RR_{HRx})_{MTHy}] + \text{Max}(MSSC, 3.5\% * E(PL_{MTHy})) + \varepsilon$$

Where:

$\text{Max}[(3RR_{HRx})_{MTHy}]$ = Largest three hour contiguous ramp starting in hour x for month y

E(PL) = Expected peak load

MTHy = Month y

MSSC = Most Severe Single Contingency

ε = Annually adjustable error term to account for load forecast errors and variability methodology

The ISO will utilize the renewable resource profiles used in the base case scenario from the CPUC's 2012 Long Term Procurement Planning proceeding to conduct this assessment. The ISO will update the RPS build-out data annually based the contracted RPS capacity data used in the investor owned utilities' (IOUs') December 2012 RPS Compliance Reports to the CPUC.[13] A breakout of the RPS build-outs and load assumptions used by the ISO for the 2014 flexible capacity requirement assessment is provided in Table 1. The RPS build-out data shown in Table 1 is listed by IOU, however, the ISO also received the CREZ for each project. This allowed the ISO to use a locationally representative energy profile for each project. As noted above, the ISO will look to collect that data from all LSEs for future assessments.

[13] The ISO will also include all non-IOU data in the 2015 Assessment.

Table 1: RPS Build out by IOU and technology 2014-2016

| R.12-03-014 (Replicating Base Case) Load | | **Existing (2012)** | **2013** | **2014** | **2015** | **2016** | **2017** |
|---|---|---|---|---|---|---|---|
| Load (Replicating Base Case Scenario from R.12-03-014) | | | 48,870 | 49,577 | 50,240 | 50,951 | 51,625 |
| | | | | | | | |
| | **Total by Technology** | | **2013** | **2014** | **2015** | **2016** | **2017** |
| PG&E | Solar PV | | 1,026 | 1,646 | 1,929 | 2,131 | 2,202 |
| PG&E | Solar Thermal | | 373 | 748 | 968 | 1,718 | 1,918 |
| PG&E | Wind | | 29 | 29 | 42 | 52 | 52 |
| Subtotal of PG&E New Additions | | | 1,428 | 2,423 | 2,940 | 3,901 | 4,173 |
| Incremental PG&E Additions | | | 1,428 | 995 | 517 | 961 | 272 |
| | | | | | | | |
| SCE | Solar PV - Ground mount | | 0 | 381 | 468 | 578 | 1,378 |
| SCE | Solar PV - Rooftop | | 0 | 43 | 43 | 43 | 43 |
| SCE | Wind | | 0 | 0 | 270 | 270 | 270 |
| Subtotal of SCE New Additions | | | 0 | 423 | 780 | 890 | 1,690 |
| Incremental SCE Additions in Each Year | | | 0 | 423 | 357 | 110 | 800 |
| | | | | | | | |
| SDGE | Solar PV | | 619 | 1,123 | 1,288 | 1,454 | 1,454 |
| SDGE | Wind | | 1,195 | 1,373 | 1,373 | 1,373 | 1,373 |
| Subtotal of SDG&E New Additions | | | 1,814 | 2,496 | 2,661 | 2,827 | 2,827 |
| Incremental SDGE Additions in Each Year | | | 1,814 | 682 | 165 | 166 | 0 |

| R.12-03-014 (Replicating Base Case) Load | | **Existing (2012)** | **2013** | **2014** | **2015** | **2016** | **2017** |
|---|---|---|---|---|---|---|---|
| Total Small PV (Demand Side) 2010 LTPP Assumptions* | | 367 | 733 | 1,100 | 1,467 | 1,833 | 2,200 |
| Solar PV* | | 1,345 | 1,645 | 3,193 | 3,727 | 4,205 | 5,076 |
| Solar Thermal* | | 419 | 373 | 748 | 968 | 1,718 | 1,918 |
| Wind* | | 5,800 | 1,224 | 1,402 | 1,685 | 1,695 | 1,695 |
| ***Subtotal of Intermittent Resources*** | | ***7,931*** | ***11,906*** | ***14,374*** | ***15,779*** | ***17,382*** | ***18,821*** |
| ***Incremental New Additions in Each Year*** | | | 3,975 | 2,468 | 1,405 | 1,603 | 1,439 |

* Shows incremental annual additions after 2012.

** After 2012, equal previous year subtotal plus incremental additions in that year

Once the updated RPS data is added into the base case scenario, the ISO will generate minute-by-minute load and net load forecasts for the upcoming five years. In accordance with the methodology proposed in the Joint Parties Proposal, the ISO will determine the maximum forecasted 3-hour net load ramp for each month. The ISO will calculate the 3-hour ramp as the quantity of MWs the ISO must ramp across a three hour period.

### 4.1.2 *Results of the ISO's Flexible Capacity Requirement Assessment for 2014*

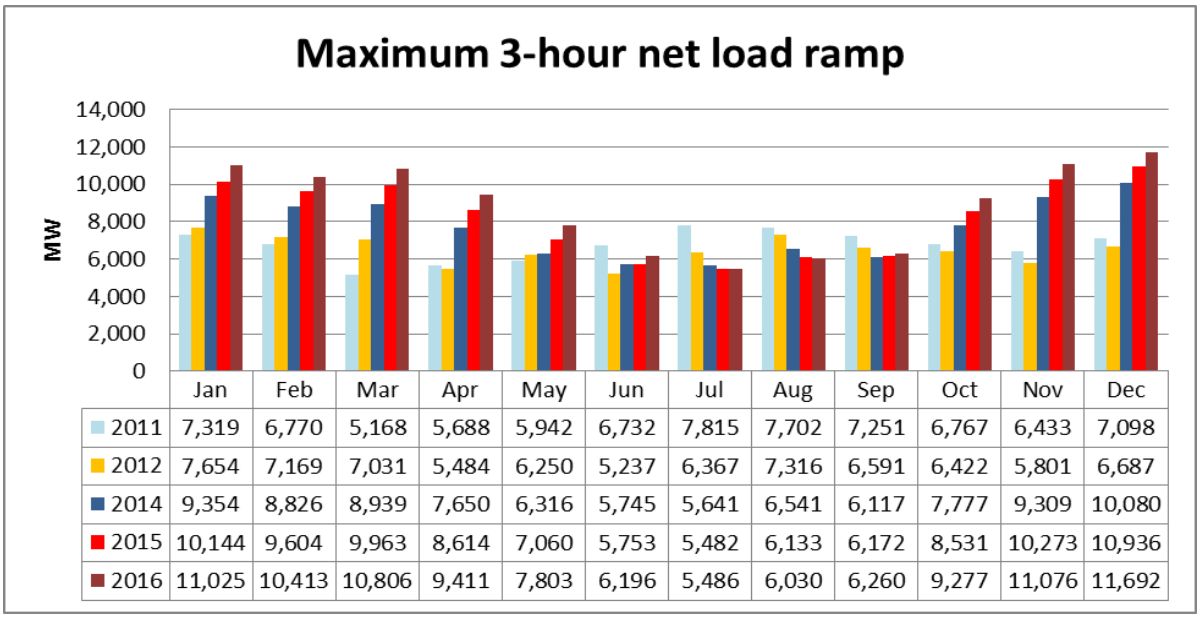
The maximum 3-hour net load ramps produced using the methodology described above are shown in Figure 2. In addition to assessing forecasted ramps, the ISO used this methodology to determine what the flexibility needs for 2011 and 2012 would have been for 2011 and 2012. As shown in Figure 2, in the ISO expects to see an increase in the amount of net load that must be met by flexible resources in non-peak months. This is particularly evident in January through March and November and December. The ISO expects the 3-hour net load ramp in non-peak months to increase by about 800 – 1,000 MW year-over-year through 2016.

Finally, the ISO calculated the total flexible capacity requirement[14] for 2014-2016 using the formula descibed in section 4.1.1, above. The results of this calculation are shown in Figure 3. Flexible capacity requirments are greatest in the non-peak months and consistent with the increase in the maximum 3-hour net load ramps.[15]

[14] Note that the Joint Parties Proposal refers to this as the "flexibility need." The terminology is changed here to consistent with the language used in the CPUC's LTPP.

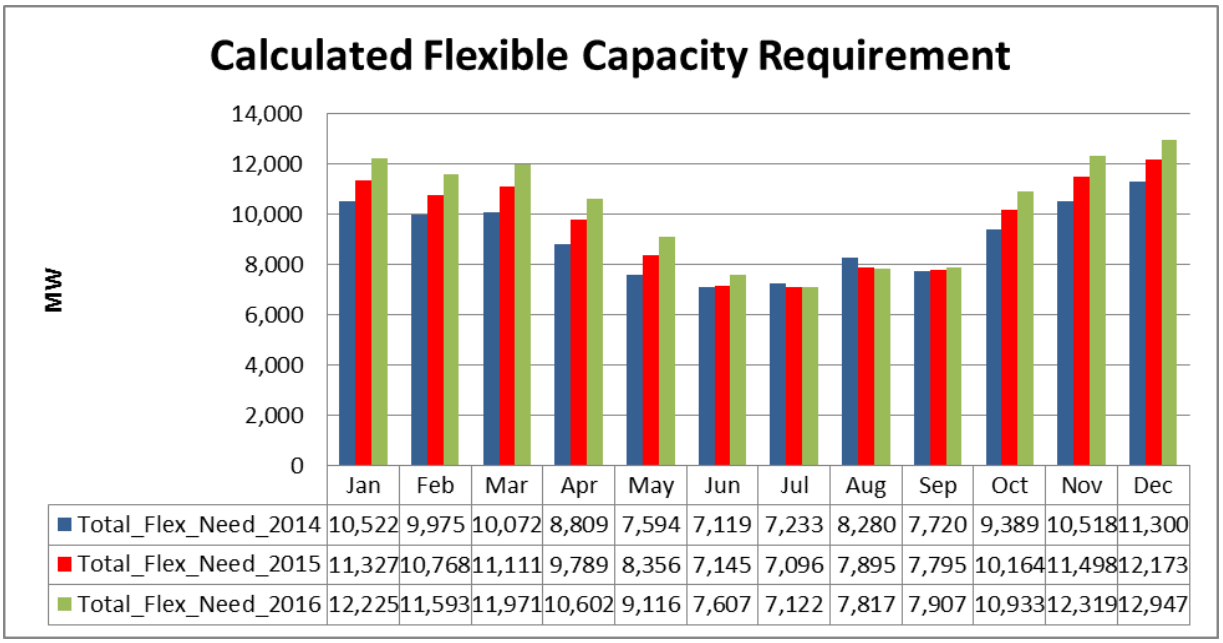
[15] This indicates that much of the increase in flexibility requirements is driven by the increase in the 3-hour net load ramp and not by load growth.

Figure 2: Maximum 3-hour Ramps: 2011, 2012, and 2014-2016




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2011 | 7,319 | 6,770 | 5,168 | 5,688 | 5,942 | 6,732 | 7,815 | 7,702 | 7,251 | 6,767 | 6,433 | 7,098 |
| 2012 | 7,654 | 7,169 | 7,031 | 5,484 | 6,250 | 5,237 | 6,367 | 7,316 | 6,591 | 6,422 | 5,801 | 6,687 |
| 2014 | 9,354 | 8,826 | 8,939 | 7,650 | 6,316 | 5,745 | 5,641 | 6,541 | 6,117 | 7,777 | 9,309 | 10,080 |
| 2015 | 10,144 | 9,604 | 9,963 | 8,614 | 7,060 | 5,753 | 5,482 | 6,133 | 6,172 | 8,531 | 10,273 | 10,936 |
| 2016 | 11,025 | 10,413 | 10,806 | 9,411 | 7,803 | 6,196 | 5,486 | 6,030 | 6,260 | 9,277 | 11,076 | 11,692 |

Figure 3: Forecasted Flexible Capacity Requirement 2014-2016




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total_Flex_Need_2014 | 10,522 | 9,975 | 10,072 | 8,809 | 7,594 | 7,119 | 7,233 | 8,280 | 7,720 | 9,389 | 10,518 | 11,300 |
| Total_Flex_Need_2015 | 11,327 | 10,768 | 11,111 | 9,789 | 8,356 | 7,145 | 7,096 | 7,895 | 7,795 | 10,164 | 11,498 | 12,173 |
| Total_Flex_Need_2016 | 12,225 | 11,593 | 11,971 | 10,602 | 9,116 | 7,607 | 7,122 | 7,817 | 7,907 | 10,933 | 12,319 | 12,947 |

# 5 Proposed Allocation of Flexible Capacity Requirement

The allocation of the flexible capacity procurement obligations will be done at the LRA level and based on each LRA's jurisdictional LSE's contribution to the overall system flexible capacity requirement. The ISO will allocate flexible capacity requirements to each LRA by summing their jurisdictional LSE's

contribution to the flexibility requirement. This section describes the methodology the ISO will use to determine each LSE's contribution to the system flexible capacity requirement.

If an LRA allocates the flexible capacity requirement to its jurisdictional LSEs using a different allocation methodology, then the ISO will respect that allocation methodology for allocating flexible capacity resource adequacy backstop costs. This is particularly important for allocating any backstop procurement costs for flexible capacity deficiencies. The ISO will provide to each LRA its jurisdictional LSEs individual contribution and the total requirement for all its jurisdictional LSEs. While MSS load-following LSEs will receive an allocation from the ISO, they will not be required to provide a flexible capacity showing to the ISO. The ISO tariff already requires MSS load-following LSE's to follow their load. If capacity they have contracted with produces variable energy, they are responsible for ensuring their load is met with flexible resources under their control.

The ISO's proposed method for determining each LSE's share of the system flexible capacity requirement reflects the various components creating the overall requirement. As noted above, the flexible capacity requirement is comprised of two parts:

1. The maximum of the Most Severe Single Contingency or 3.5 percent of forecasted peak load.

2. The maximum 3-hour net load ramp.

The ISO proposes to calculate the maximum of the MSSC or 3.5 percent of forecasted peak load for each LSE based on its peak load ratio share.

The maximum 3-hour net load ramp will be broken out to capture the LSE's contribution. The ISO must assess the proper level of granularity to use when determining the allocation to each LSE. The ISO has considered several levels of granularity, including a single measurement such as peak load ratio share as well as very detailed measurement that looks at each LSE's specific portfolio of load and resources. In the RA proceeding, the ISO released multiple data sets that show five individual components of the maximum 3-hour net load ramp at a system level. These components are measured over the three hour period and include:

1) Changes in load
2) Changes in wind output
3) Changes in solar PV
4) Changes in solar thermal
5) Changes in distributed energy resources

These five components, when combined, yield the total 3-hour net load change used in the ISO's flexibility capacity requirement assessment. In order to allocate the total flexible capacity requirement, it is important to determine each LSE's relative contribution to each of these components. The ISO proposes to use the following methodology to establish each LSE's contribution to each component.

1) Δ Load – Monthly Average Load Factor x total change in load

2) Δ Wind Output – Percent of total wind contracted x total change in wind output
3) Δ Solar PV – Percent of total solar PV contracted x total change in solar PV output
4) Δ Solar Thermal – Percent of total solar thermal contracted x total change in solar thermal output
5) Δ Distributed Energy Resources – Percent of total intermittent DG x total change in DG output

For item 1, above, the ISO proposes to allocate changes in load by monthly average load factors. For the calculations used for items 2 through 4, the ISO understands that these calculations assume that all resources of a given technology type are treated the same for allocation purpose, but not for modeling purposes.[16] Finally, the ISO collects data on distributed generation resources for the DG deliverability study. However, not all DG resources produce variable energy. Therefore, the ISO proposes to allocate item 5 based on each LSE's contribution to the intermittent distributed energy resources. The ISO believes that this is the appropriate level of granularity. While the flexibility needs are calculated using a single metric, the ISO will have to address flexibility needs outside of this three hour period. The ISO also looked at the daily maximum 3-hour ramps from the 2015 forecast used in the CPUC's RA proceeding and compared this average with the maximum 3-hour ramp for the month. This assessment showed that the relative contribution of each of the component parts in the monthly maximum 3-hour ramps is representative of the monthly averages. Therefore, at this time, the ISO is not proposing any weighting of the component parts to account for differences over the month because the single observation appears to be sufficiently representative. Additionally, the flexible capacity requirement is a forecast and attempting to determine each contracted resource's contribution is unlikely to yield a more accurate estimate of an LSE SC's actual after the fact contribution to the flexible capacity need. However, the ISO continues to seek stakeholder input as to whether this proposed allocation methodology provides the right allocation, level of detail, or other specific options need to be considered.

Finally, these changes are combined using the equation below to determine to determine an LSE SC's contribution to the flexible capacity requirement.

Contribution = Δ Load – Δ Wind Output – Δ Solar PV – Δ Solar Thermal – Δ Distributed Energy Resources

Example 1 demonstrates how this methodology would allocate flexible capacity procurement when the forecasted monthly maximum 3-hour net load ramp occurs in the evening.

[16] Solar and wind resources that are firmed outside of the ISO balancing area will not be included in the allocation calculation.

Example 1: Allocation when the forecasted monthly maximum 3-hour net load ramp occurs in the evening

| ISO flexible capacity requirement assessment | |
|---|---|
| Δ load | 4000 |
| Δ wind | -2000 |
| Δ solar PV | -2500 |
| Δ solar thermal | -1000 |
| Δ DG output | -500 |
| Total flexible capacity need | 10000 |

| LSE | Monthly Average Load Factor |
|---|---|
| LSE 1 | 35% |
| LSE 2 | 30% |
| LSE 3 | 20% |
| LSE 4 | 15% |

| LSE | Percent of total wind contracted | Percent of total Solar PV contracted | Percent of total Solar Thermal contracted | Percent of total intermittent DG contribution |
|---|---|---|---|---|
| LSE 1 | 40% | 30% | 70% | 35% |
| LSE 2 | 20% | 35% | 20% | 30% |
| LSE 3 | 25% | 15% | 0% | 20% |
| LSE 4 | 15% | 20% | 10% | 15% |

| LSE | Load contribution | Wind contribution | Solar PV contribution | Solar Thermal contribution | DG contribution | Total contribution |
|---|---|---|---|---|---|---|
| LSE 1 | .35 x 4,000 = 1,400 MW | .40 x -2,000 = -800 MW | .30 x -2,500 = -750 MW | .70 x -1,000 = -700 MW | .35 x -500 = -175 MW | 3,825 |
| LSE 2 | .30 x 4,000 = 1,200 MW | .20 x -2,000 = -400 MW | .35 x -2,500 = -875 MW | .20 x -1,000 = -200 MW | .30 x -500 = -150 MW | 2,825 |
| LSE 3 | .20 x 4,000 = 800 MW | .25 x -2,000 = -500 MW | .15 x -2,500 = -375 MW | .00 x -1,000 = 0 MW | .20 x -500 = -100 MW | 1,775 |
| LSE 4 | .15 x 4,000 = 600 MW | .15 x -2,000 = -300 MW | .20 x -2,500 = -500 MW | .10 x -1,000 = -100 MW | .15 x -500 = -75 MW | 1,575 |
| Total | 4,000 | -2,000 | -2,500 | -1,000 | -500 | 10,000 |

While Example 1 uses an evening 3-hour ramp, the proposed methodology also holds for morning ramps. The methodology would appropriately reflect that an LSE SC's contracted solar resources would reduce a morning's 3-hour net-load ramp. Example 2 demonstrates how this methodology would be used for a maximum net load ramp set in the morning.

Example 2: Allocation when the forecasted monthly maximum 3-hour net load ramp occurs in the morning

| ISO flexible capacity requirement assessment | |
|---|---|
| Δ load | 8,000 |
| Δ wind | -2,000 |
| Δ solar PV | 2,500 |
| Δ solar thermal | 1,000 |
| Δ DG output | 500 |
| Total flexible capacity need | 6,000 |

| LSE | Monthly Average Load Factor |
|---|---|
| LSE 1 | 35% |
| LSE 2 | 30% |
| LSE 3 | 20% |
| LSE 4 | 15% |

| LSE | Percent of total wind contracted | Percent of total Solar PV contracted | Percent of total Solar Thermal contracted | Percent of total intermittent DG contribution |
|---|---|---|---|---|
| LSE 1 | 40% | 30% | 70% | 35% |
| LSE 2 | 20% | 35% | 20% | 30% |
| LSE 3 | 25% | 15% | 0% | 20% |
| LSE 4 | 15% | 20% | 10% | 15% |

| LSE | Load contribution | Wind contribution | Solar PV contribution | Solar Thermal contribution | DG contribution | Total contribution |
|---|---|---|---|---|---|---|
| LSE 1 | .35 x 8,000 = 2,800 MW | .40 x -2,000 = -800 MW | .30 x 2,500 = 750 MW | .70 x 1,000 = 700 MW | .35 x 500 = 175 MW | 1,975 |
| LSE 2 | .30 x 8,000 = 2,400 MW | .20 x -2,000 = -400 MW | .35 x 2,500 = 875 MW | .20 x 1,000 = 200 MW | .30 x 500 = 150 MW | 1,575 |
| LSE 3 | .20 x 8,000 = 1,600 MW | .25 x -2,000 = -500 MW | .15 x 2,500 = 375 MW | .00 x 1,000 = 0 MW | .20 x 500 = 100 MW | 1,625 |
| LSE 4 | .15 x 8,000 = 1,200 MW | .15 x -2,000 = -300 MW | .20 x 2,500 = 500 MW | .10 x 1,000 = 100 MW | .15 x 500 = 75 MW | 825 |
| Total | 8,000 | -2,000 | 2,500 | 1,000 | 500 | 6,000 |

These calculations will be made using the data provided by each LSE for use in the ISO's annual flexible capacity requirement assessment and provided to each LRA at the same time as the annual LCR study results.

# 6 RA showings and Replacement

Currently, the ISO conducts an annual and monthly RA process wherein both LSEs and suppliers, through their scheduling coordinators, submit RA plans and supply plans, respectively. These RA plans identify the specific resources that the LSE is relying on to satisfy its forecasted monthly peak demand and reserve margin for the relevant reporting period.

The ISO will integrate the flexible capacity requirement allocations into the existing annual and monthly RA processes. As discussed in section 5.2 of the Joint Parties Proposal and Appendix A of the CPUC's June 27, 2013 Final Decision, both flexible and generic capacity will remain "bundled" in the annual and monthly RA process. In other words, flexible capability of a MW of capacity cannot be partitioned off and counted as flexible capacity without also counting as system or local capacity. Allowing such a partition could lead to conflicts between different scheduling coordinators for the same capacity and would require complicated and time consuming resource capacity tracking solutions.

As in the current RA framework, LSEs, through their SC, would be required to submit a showing to the ISO listing 90 percent of their allocated flexible capacity requirement by the last business day of October. Additionally, they must submit to the ISO a demonstration that they have fulfilled 100 percent of their flexible capacity requirement by 45 days prior to the compliance month. LSEs will be permitted to substitute resources from their year ahead flexible RA showing with other resources in their month-ahead showings. Prior to 2015 implementation, the ISO will update its RA templates to include flexible capacity showings. The ISO will then verify and validate that each LSE has met its flexible capacity showing requirements.

The ISO will use the following formulas for counting the flexible capacity resources[17] provided by an LSE to determining if an LSE has provided sufficient flexible capacity to meet its flexible capacity requirements:

<u>If start-up time greater than 90 minutes:</u>

EFC is limited to the MW range between Pmin and Net Qualifying Capacity (NQC) as limited by ramp rate

**EFC = minimum of (NQC-Pmin) or (180 min * RRavg)**

<u>If start-up time less than or equal to 90 minutes:</u>

EFC is limited to the MW range between zero and NQC as limited by start-up time and ramp rate

**EFC = minimum of (NQC) or (Pmin + (180 min – SUT) * RRavg)**

Where: SUT = Longest (cold) RDT start-up time in minutes

RRavg = average MW/min ramp rate between Pmin and NQC

[17] This counting convention will be used for all resources except storage resources that are meeting the must-offer obligation by providing regulation services.

A hydro resource will qualify as flexible capacity if it has physical storage capacity to provide energy equivalent to output at Pmax for 6 hours. With the exceptions outlined below in sections 7.1.4 through 7.1.6, the ISO is not proposing to impose any additional energy limitations at this time. However, the ISO will continue to monitor the pool of resources that used to provide flexible to determine if there is any need to include any additional minimum energy limitations in the future. Additionally, for 2015 RA compliance, the ISO will not propose a mechanism to manage replacement of intra-month outages of flexible capacity resources. However, the ISO will monitor outages of flexible capacity resources to determine if such a mechanism is required to manage intra-month outages.

# 7 Flexible Capacity Must-Offer Obligation

The primary goal of implementing flexible capacity procurement obligations is to ensure that sufficient flexible capacity resources are available to the ISO for dispatch when needed. To ensure this occurs, the ISO proposes flexible capacity must-offer obligations for resources providing flexible RA capacity. These flexible capacity must-offer obligations will be in addition to the ISO's existing must-offer obligations for system and local RA resources and for capacity procured under the ISO's Capacity Procurement Mechanism.

The current RA and Capacity Procurement Mechanism must-offer obligation ensure the ISO has a sufficient resource pool to meet peak-load, but does not fully address the steep ramps that the balancing area will experience, particularly in the non-summer months, or the increasing amount of intra-hour net-load variability. A resource can fulfill its RA must-offer obligations by either self-scheduling or economically bidding into the ISO's energy markets. However, many of these resources self-schedule in the day-ahead market, real-time market, or both. When RA resources meet their must-offer obligation by self-scheduling, they are not actually available for dispatch by the ISO without adjusting the self-schedule, and, therefore, are not "flexible." This can hinder the ISO's ability to meet its operational needs through optimizing the dispatch of flexible resources to help integrate variable energy resources. Thus, self-scheduling can lead to higher costs and inefficient market dispatch. However, requiring flexible capacity resources to submit economic bids will allow the ISO to efficiently dispatch flexible resources in the optimal manner. Therefore, increasing the pool of resources with economic bids in the ISO markets will improve the ISO's ability to maintain grid reliability through the efficient dispatch of flexible resources.

## 7.1 The Flexible Capacity Must-Offer Obligation for Different Resource Types

The decision in the RA proceeding recently issued by the CPUC proposes an interim solution designed to simultaneously meet the longest continuous upward ramps and load following needs. The ISO's flexible capacity must-offer obligations include reducing resource self-scheduling as a means of increasing the pool of resources available for dispatch.

Therefore, the ISO proposes a must-offer obligation for flexible capacity resources that generally requires the submission of economic bids from 5:00 AM through 10:00 pm for every day (including all holidays and weekends). These are the hours in which significant ramps and intra-hour variability are

most likely to occur. [18] However, the ISO understands that not every resource is capable of providing flexibility during this entire time frame. Thus, the ISO has, when appropriate, developed more specific must-offer obligations for some resource types such as demand response, storage, and variable energy resources. These specific must-offer obligations are designed to more closely align the flexible capabilities of these resources while still addressing on some portion of the ISO's flexibility needs. Further, the ISO believes the flexible capacity must-offer obligation should, at a minimum, include all of the same must-offer obligations as a generic RA resource. Therefore, resources used to meet both generic RA and flexible RA requirements will be subject to both must-offer obligations. For example, a flexible RA resource also used for generic RA will be required to submit economic bids from 5:00 AM to 10:00 PM, but must also be available to the ISO from 10:00 PM through 5:00 AM as required by section 40 of the ISO's tariff (though the resource may self-schedule between 10:00 PM through 5:00 AM). This requirement would be effective beginning for 2015 RA compliance.

The ISO envisions these rules will apply to almost all flexible capacity resources, including most use-limited resources. As described further below, the ISO believes there are mechanisms for the ISO market to respect most use-limitations while still requiring the resource to submit economic bids from 5:00 am to 10:00 pm. However, the ISO recognizes that this requirement will not work for all use-limited resources, particularly preferred resources such as demand response that simply have no flexible capabilities during certain hours of the day, and therefore the ISO is proposing a more limited offer obligation for these types of resources that is described below.

### 7.1.1 *Flexible Capacity Must-Offer Obligation – Thermal Resources with No Use-Limitations*

As noted above, in addition to the current RA must-offer obligations, the ISO proposes requiring flexible capacity resources to submit economic bids in both the day-ahead and real-time energy markets for their flexible capacity used to meet RA requirements. For example, if a resource is listed on an RA supply plan as providing 50 MW of flexible capacity, the resource would be required to submit economic bids for at least 50 MW in both the day-ahead and real-time energy markets. Requiring flexible capacity resources to submit economic bids during this set of hours gives the ISO the ability to economically dispatch resources and meet ramping and contingency requirements at least cost. Having an adequate supply of economic bids will reduce the frequency with which the ISO is forced to uneconomically curtail self-schedules.

Further, all flexible capacity resources that are certified to provide ancillary services must bid or self-schedule into ancillary service markets on a non-contingent dispatch basis[19] for ancillary service for which they are certified. However, flexible capacity resources certified to provide ancillary service may still be used to self-provide ancillary service.

[18] While the basis of the flexible capacity requirement is based on the maximum 3-hour upward ramp, the data the ISO presented at the March 20, 2013 CPUC RA workshop shows downward ramping needs are a quickly growing concern. The ISO will continue to assess the need for an explicit downward flexibility requirement.
[19] Currently, RA resources may bid as a contingency only ancillary service product.

### 7.1.2 *Flexible Capacity Must-Offer Obligation – Use-limited Resources*

Peaking and hydro units typically are fast ramping resources that can meet flexibility needs. However, many of them are subject to daily, monthly, or annual limits to energy production or start-ups, or subject to other environmental or operational limitations. These limitations require the ISO to consider if there is a need for separate performance and must-offer obligations for resources with use limitations. After careful consideration of each type of use-limitation, the ISO believes that, in the majority of circumstances, these limitations can be properly managed through the ISO markets. However, as noted above, specific must-offer obligations have been developed for demand response, storage, and variable energy resources. As such, the ISO proposes that most use-limited resources will also be required to submit economic bids into both the day-ahead and real-time markets for all hours for the time period from 5:00 AM through 10:00 PM. The following sections outline each of the use limitations and how the ISO proposes to manage each within the context of the proposed economic must-offer obligation.

#### *7.1.2.1 Flexible Capacity Must-Offer Obligation – Daily Energy, Environmental, or Start Limited Resources*

The ISO markets ensure resources are dispatched efficiently and in a manner that ensures grid reliability while also ensuring resources daily operational limits are respected. For example, the ISO markets will not dispatch a resource with a maximum run-time of six hours beyond that time. Similarly, the ISO markets will not start a resource twice in a day if it is limited to a single start. This approach is fully consistent with the treatment of hydro resources described above and the ISO recommended the CPUC ultimately adopt in its RA proceeding. Specifically, all hydro capacity that is used as flexible would have to demonstrate the capability of producing a six hour energy equivalent and must submit economic bids for the time period from 5:00 AM through 10:00 PM. Once the resource reaches its use limitation, it is no longer subject to the flexible capacity must-offer obligation.

Similar requirements will apply to other types of resources with daily operational limitations that can be respected by the ISO market. This approach allows the ISO to manage the flexible capacity resources with daily use-limitation consistently and in a manner that ensures efficient dispatch and maintains grid reliability.

#### *7.1.2.2 Flexible Capacity Must-Offer Obligation – Monthly or Annual Energy or Environmentally Limited Resources*

The ISO and market participants must manage resources that are limited to operating for a limited number of hours per month or year. This is to avoid excessively operating the resource early in the month or year, and consequently having it not available later. For example, the ISO does not want to exhaust a resource's run-time by the end of March, only to later discover the resource was needed in July.

Fortunately, the ISO currently has a mechanism in place that it can leverage to allow the ISO and the flexible capacity resource to manage these monthly or annual limitations. Currently, the ISO allows a resource to establish a default energy bid, used in local market power mitigation, that reflects the

resource's opportunity cost of being dispatched because it can only run in a limited number of hours over a year. The opportunity cost reflects its potential earnings in the hours with the highest prices.

This approach can be leveraged to manage energy limits while requiring a use-limited flexible capacity resource to bid in all hours covered by the flexible capacity must-offer obligation. Allowing an SC to include the opportunity cost of a use-limitation will limit the dispatch to the number of hours comprising the limitation. For example, if a resource is limited to 500 hours of operation per year, the resource can work with the ISO or the independent entity that establishes default energy bids for the ISO to forecast the 500$^{th}$ highest LMP at the resource's node for the upcoming year and include this opportunity cost in day-ahead market bids. A similar method can be used based on LMPs in dispatch intervals to determine appropriate bid amounts for the real-time market. In addition, monthly or daily limits, or "hard stops" on the amount a resource can be dispatched can be established to account for errors in forecasting prices. Also, the calculated bid price can be refreshed periodically throughout the year, also to account for errors in forecasting prices.

This mechanism allows the SC to bid the resource into the ISO market all for all hours covered by the flexible capacity must-offer obligation while managing concerns that the resource will be dispatched more frequently than is optimal. The ISO markets would then only dispatch the resource in the hours with the greatest need as reflected in the LMP. This same mechanism can be applied to resources with annual energy or environmental resources that are flexible capacity resources.

#### *7.1.2.3 Flexible Capacity Must-Offer Obligation – Monthly or Annual Start Limited Resources*

Some flexible capacity resources may be limited by the number of times it may be started per month or per year due to environmental rules or other constraints. Similar to the method discussed above in which the opportunity cost of operating in a limited number of hours per year can be reflected in default energy bids, the ISO believes the opportunity cost of limited starts per year can be incorporated into the resource start-up costs used by the ISO market.

Therefore, the ISO proposes to allow resources with start limitations to include the opportunity cost of these starts as a means of helping the resource's SC manage the resource's use limitation as well improving the efficient dispatch of the resource through the ISO markets. Further, a transparent price is most likely to result in the consistent use of a resource that maximizes the benefits. Use plans could complement the price, to be sure that the pattern of use is not far off base (e.g., resulting in no starts or way too many starts in, e.g., June). A consistent price helps to ensure consistent valuation of use of a short-start resource to meet ramps and peaks. Finally, LSEs, in their RA showing will have the ability to manage what resources are used to meet ramps by showing them as flexible and what resources are best used for only meeting peak load.

The calculation of the opportunity cost would be done by the ISO or the independent entity that establishes default energy bids for the ISO t. The ISO proposes that the opportunity cost be calculated using a four step process as follows:

1) For each day's set of 24 hours of prices and variable costs, determine the optimal commitment and dispatch for each day in the pertinent time frame (i.e. week, month, or year).

2) Given the optimal commitment and dispatch in each day, calculate the gross margin (revenue minus cost, excluding opportunity cost) for each day.

3) Order the days in decreasing order of gross margin.

4) The gross margin on Day M in the order is the opportunity cost of a start. That is, one more start would mean that the unit could not be operated on Day M.

The example 3 is designed to help illustrate this process. While this is a somewhat stylized example, the ISO believes that the concepts can be generalized to address other resource start limitations.

Example 3:

This example considers a 60 MW resource with a Pmin of 25 MW and two additional ranges above Pmin.

| **Generator Data: 1 start per day and 50 starts per year** | | | | | | |
|---|---|---|---|---|---|---|
| Pmin MW | Pmax Region 1 (MW) | Pmax Region 2 (MW) | Start Up Cost $ | Pmin Cost PMINC ($/hr) | Variable Fuel Cost Operating Region 1 ($/MWh) | Variable Fuel Cost Operating Region 2 ($/MWh) |
| 25 | 45 | 60 | $800 | $1500 | $50 | 70 |

Using historic pricing data, the ISO or the independent entity that establishes default energy bids for the ISO would determine the optimal dispatch instruction for each day and calculate the gross margin for each dispatch. For example, using the following prices, the ISO or the independent entity that establishes default energy bids for the ISO would be able to determine when it is optimal to start the resource, at what levels the resource should operate, and when the resource should be turned off.

| Hour h | Price $/MWh | Commitment decision u(h) | Start-up decision s(h) | MW output decision g2(h) | MW output decision g2(h) | Revenues | Costs |
|---|---|---|---|---|---|---|---|
| 1 | 30 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 32 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 34 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 36 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 38 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 55 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | 70 | 1 | 1 | 45 | 15 | $4,200 | $4,350 |
| 8 | 90 | 1 | 0 | 45 | 15 | $5,400 | $3,550 |
| 9 | 80 | 1 | 0 | 45 | 15 | $4,800 | $3,550 |
| 10 | 80 | 1 | 0 | 45 | 15 | $4,800 | $3,550 |
| 11 | 80 | 1 | 0 | 45 | 15 | $4,800 | $3,550 |
| 12 | 80 | 1 | 0 | 45 | 15 | $4,800 | $3,550 |
| 13 | 80 | 1 | 0 | 45 | 15 | $4,800 | $3,550 |
| 14 | 70 | 1 | 0 | 45 | 0 | $3,150 | $2,500 |
| 15 | 40 | 1 | 0 | 25 | 0 | $1,000 | $1,500 |
| 16 | 60 | 1 | 0 | 45 | 0 | $2,700 | $2,500 |
| 17 | 70 | 1 | 0 | 45 | 15 | $4,200 | $3,550 |
| 18 | 90 | 1 | 0 | 45 | 15 | $5,400 | $3,550 |
| 19 | 100 | 1 | 0 | 45 | 15 | $6,000 | $3,550 |
| 20 | 85 | 1 | 0 | 45 | 15 | $5,100 | $3,550 |
| 21 | 70 | 1 | 0 | 45 | 15 | $4,200 | $3,550 |
| 22 | 55 | 0 | 0 | 0 | 0 | ,0 | 0 |
| 23 | 40 | 0 | 0 | 0 | 0 | 0 | 0 |
| 24 | 35 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | **Total** | **$65,350** | **$49,900** |
| | | | | | **Gross Margin** | **Revenues - Costs** | **$15,450** |

In this example, the resource would be turned on in hour 7 and run through 21. Given the costs and revenues for this dispatch, the gross margin is calculated as shown above. The same process is run for the remaining 364 days and the gross margins sorted to identify the 50$^{th}$ highest gross margin. This would be the opportunity cost of starting using one of the resource's starts and could be included in the resource's start-up costs.

### 7.1.3 *Flexible Capacity Must-Offer Obligation – Long-start Resources*

While a long-start resource may not be able to provide flexible capacity for zero through its Pmin, it may be able to supply flexible capacity from its Pmin to its NQC. However, if a long start resource is not dispatched to at least Pmin in the day-ahead market, then it will not be able to provide its flexible capacity in the real-time. Therefore, the ISO has two options when considering long-start units.

1) Impose a start time cap for flexible capacity resources. For example, if a resource cannot start in less than 4 hours, then it is not eligible to provide flexible capacity. This would ensure that the ISO is able to rely on a full fleet of resources excluding resources that are not available in real-time if they were not committed by the day-ahead market.[20]

2) Consider a resource's must-offer obligation fulfilled if it not scheduled in the IFM. If the resource is not scheduled in the IFM, then the resource is presumed to have fulfilled its must-offer obligation and would not be required to bid into the real-time market. Though, this is similar to the current treatment for long start RA resources it may leave the ISO with fewer resources to resolve real-time flexibility needs, potentially leading to increased exception dispatch.

The ISO proposes that option 2, with modifications, presents the superior option. Resources with long start times must be available to the ISO up until the ISO's dispatch instructions cannot place the resource at Pmin. For example, a resource with a four hour start time could still be set to Pmin through the ISO's short-term unit commitment process. However, if this resource does receive an instruction to start in the short-term unit commitment process then the ISO will consider the resource to have fulfilled its must-offer obligation for that time interval. The ISO will continue to assess its ability to meet flexible capacity procurement obligations using long-start resources. It may be necessary to consider limitations in the future if the ISO is not able to address flexibility needs because too much flexible capacity is not available in real-time due to start limitations.

### 7.1.4 *Flexible Capacity Must-Offer Obligation – Demand Response Resources*

As noted above, flexible capacity must be bid into the ISO market to be fully operationally available. Demand response that can provide flexible capacity is able to bid into the ISO markets as participating load (PL) and proxy demand resource (PDR).[21] Demand response resources, like many resources, are subject to daily and annual use-limitations including number of dispatches, maximum length of event per day, and hours available. As discussed in 7.1.2, above, the ISO believes that most applicable use-limitations can be addressed.

The ISO is committed to working with demand response providers to ensure that reasonable use-limitations of demand response resources are identified and properly addressed. Some demand response resources may be use-limited based on the hours in which they can be called. A demand

[20] If such an approach is used, the ISO would work with LRAs to facilitate parallel changes to their flexible capacity requirements.

[21] Reliability Demand Response Resources are available to the ISO only to allow the ISO to avoid issuing a stage 1 or greater emergency. As such, the ISO believes this type of resource is best suited for emergency dispatch rather than meeting day-to-day flexibility needs.

response resource may not be able to be called upon until the underlying load has sufficient discretionary load to reduce or cannot be called during certain hours.

For example, the same PDR may only be able to drop 5 MW when the underlying demand is operating at minimum load levels but 10 MW when the underlying demand has increased and includes more discretionary load. The ISO does not want to constrain demand response resources based on their ability to drop load from baseline levels (i.e. at 5:00 AM or 10:00 PM). Therefore, the ISO proposes that demand response resources be subject to a specialized must-offer obligation that allows them to select either a morning or afternoon must-offer obligation consistent with the morning and afternoon system ramping needs. Specifically, a flexible capacity demand response resource would have the option of selecting a must-offer obligation and submit economic bids into the ISO market for all non-holiday weekdays for either (1) 6:00am through 11:00am or (2) 4:00pm through 9:00pm.

Setting the must offer obligation in this manner should allow demand response resources to provide flexible capacity to the ISO based on the resource's underlying load and provide the ISO with flexible capacity during the time ISO is most likely need the greatest quantity of flexible capacity. Additionally, a flexible demand response resource would have to be able to provide at least three hours of load reduction as the ISO's maximum ramping have a three hour duration. As with any other resources, the ISO markets will manage the flexible demand response capacity resource consistent with the identified use-limitations. Further, the ISO believes demand response resources with annual energy or start limits can manage these limitations while meeting the must-offer requirements by submitting bid prices that reflect these limitations and setting the price using the opportunity cost methodology described in sections above.

A PDR or PL resource counted as flexible capacity would provide the ISO with the resource's use-limitations by specifying the limitations, such as inter-temporal constraints, as part of registering the resource in the ISO's master file. This is similar to how generating resources report these constraints. In addition, the supplier would be responsible for managing use-limitations by bidding only the amount of demand response that is physically available to reduce load in each hour. For example, a PDR may be comprised of 50 demand resources (grocery stores, warehouses, etc.). The SC for the PDR could call 10 customers one day and 10 different customers on another day. This should help the SC for that PDR from over-burdening a single enrollee.

### 7.1.5 *Flexible Capacity Must-Offer Obligation – Storage Resources*

As with demand response resources, storage resources have unique operating characteristics. Additionally, energy storage can take many forms. For example, some storage resources may be able to provide very rapid responses for short periods of time by carefully managing the charging and discharging of the resource. Therefore, the ISO is proposing a flexible capacity resource must offer obligation designed for storage resources. Specifically, the ISO proposes that storage resources (excluding pump storage) that provide flexible capacity either (1) submit economic regulation bids for the time period from 5:00am – 10:00pm as a regulation energy management resource, or (2) select one of the must-offer obligations outlined above for demand response resources. These options are

designed to allow the SC of the resource to select the must-offer obligation that works best with the specific storage technology.

### 7.1.6 *Flexible Capacity Must-Offer Obligation – Flexible Variable Energy Resources*

While the impetus of the current stakeholder initiative is to ensure the ISO has sufficient resources offered into its markets to manage load variation and the intermittency from variable energy resources, the ISO believes that there is also an opportunity for variable energy resources to be a real part of the solution. For example, if a PV resource bids in a willingness to be scheduled at some level below its full output capability, the ISO would be able to reduce the output of the resource based on its bid and consequently reduce the net load ramp. Therefore, the ISO is proposing a flexible capacity must-offer obligation that would apply to variable energy resources that are listed by an LSE as using all or a portion of their qualifying capacity in meeting an LSE's RA flexible capacity requirement.[22] However, much like demand response not all dispatchable variable energy resources are able to provide flexibility during all hours. For example, a dispatchable solar PV can only provide flexible capacity during the daytime hours. This, in winter months particularly, would make setting a flexible capacity from 5:00am – 10:00pm unworkable for these resources.

The ISO proposes following separate flexible capacity must-offer obligations for dispatchable variable energy resources based on the specific energy source and technology:

| Month | Solar PV | Solar Thermal | Wind |
|---|---|---|---|
| January | 8:00am – 5:00pm | 8:00am – 6:00pm | 5:00am – 10:00pm |
| February | 7:00am – 6:00pm | 7:00am – 7:00pm | 5:00am – 10:00pm |
| March | 7:00am – 7:00pm | 7:00am – 8:00pm | 5:00am – 10:00pm |
| April | 7:00am – 7:00pm | 7:00am – 8:00pm | 5:00am – 10:00pm |
| May | 6:00am – 8:00pm | 6:00am – 9:00pm | 5:00am – 10:00pm |
| June | 6:00am – 8:00pm | 6:00am – 9:00pm | 5:00am – 10:00pm |
| July | 6:00am – 8:00pm | 6:00am – 9:00pm | 5:00am – 10:00pm |
| August | 6:00am – 8:00pm | 6:00am – 9:00pm | 5:00am – 10:00pm |
| September | 7:00am – 7:00pm | 7:00am – 8:00pm | 5:00am – 10:00pm |

[22] This must-offer obligation would not apply to variable energy resources not listed as flexible RA capacity.

| | | | |
|---|---|---|---|
| October | 7:00am – 6:00pm | 7:00am – 7:00pm | 5:00am – 10:00pm |
| November | 7:00am – 5:00pm | 7:00am – 6:00pm | 5:00am – 10:00pm |
| December | 7:00am – 5:00pm | 7:00am – 6:00pm | 5:00am – 10:00pm |

The individual must-offer obligations have been designed to correlate with the availability of the energy source for each resource. For example, the flexible capacity must-offer obligation for solar thermal is one hour longer than the must-offer obligation for solar PV to reflect the storage capabilities of the solar thermal resources. The must-offer obligation for wind resources reflects the fact the wind resources potentially have their wind energy source all day. Ultimately, the variable energy resource has the ability to select the amount of flexible capacity it wishes to provide, thereby controlling the amount of capacity it makes available to the ISO market to be dispatched to meet operational needs. A variable energy resource that has contracted to provide flexible resource adequacy capacity will be expected to be able to respond to all dispatch instructions for the portion of the resource that has been contracted as flexible. The ISO will continue to assess its ability to meet flexible capacity procurement obligations using variable energy resources. It may be necessary to consider limitations in the future if the ISO is not able to address flexibility needs.

### 7.2 Bid Validation Rules

The ISO has reviewed several potential bid validation methodologies and the feasibility of implementing the necessary changes for 2015 RA compliance year. Ultimately, the ISO believes that imposing bid validation rules is not necessary. Instead, the ISO believes that compliance with the applicable must-offer obligation is better addressed through a flexible capacity availability incentive mechanism that is based on a flexible capacity resource's compliance with its must-offer obligation. Additional details regarding the flexible capacity availability incentive mechanism is provided in section 9, below.

## 8 Backstop Procurement

The ISO proposes including a provision in its backstop procurement authority that would allow the ISO to procure flexible capacity in the event an LSE did not procure sufficient flexible capacity in its annual of monthly flexible capacity procurement relative to the system requirement. Currently, the ISO has the authority to issue a capacity procurement mechanism designation for the following reasons:

1. Insufficient Local Capacity Area Resources in an annual or monthly Resource Adequacy Plan;
2. Collective deficiency in Local Capacity Area Resources;
3. Insufficient Resource Adequacy Resources in an LSE's annual or monthly Resource Adequacy Plan;

4. A CPM Significant Event;
5. A reliability or operational need for an Exceptional Dispatch CPM; and
6. Capacity at risk of retirement within the current RA Compliance Year that will be needed for reliability by the end of the calendar year following the current RA Compliance Year.

Further the ISO tariff specifies that the ISO may issue a capacity procurement mechanism designation if

> [A] Scheduling Coordinator fails to demonstrate in an annual or monthly Resource Adequacy Plan, submitted separately for each represented LSE, procurement of sufficient Resource Adequacy Resources to comply with each LSE's annual and monthly Demand and Reserve Margin requirements under Section 40.

The ISO proposes to include a provision for LSEs that fail to demonstrate sufficient flexible capacity, as per annual and monthly requirements, to the list reasons the ISO may issue a capacity procurement mechanism designation. As with other types of RA deficiencies, the ISO will only seek authority to issue a backstop designation if there is a cumulative deficiency. The ISO will measure a cumulative deficiency relative to the ISO's flexible capacity requirement. If the ISO does issue a capacity procurement mechanism designation, then the costs of the capacity procurement mechanism designation would be allocated to all LSEs, through their SC's, that are deficient in procuring flexibility capacity. The ISO would determine the allocation of backstop costs by first determining the LRA(s) that is short based on the ISO's flexible capacity requirement allocation methodology. The ISO would then allocate the backstop costs to the LRA's jurisdictional LSEs that are short as determined using the allocation methodology specified by the LSE's LRA.[23]

Finally, the ISO's backstop Capacity Procurement Mechanism expires in February 2016. On July 10, the ISO and CPUC issued the Joint Reliability Framework.[24] Ultimately, the Joint Reliability Framework is aimed at establishing multi-year forward procurement commitments as the ISO develops a market-based backstop procurement mechanism to replace or supplement the existing Capacity Procurement Mechanism.

# 9 Flexibility Capacity Availability Incentive Mechanism

The ISO's existing availability incentive mechanism that applies a charge or incentive payment based on an RA resource's availability relative to the RA fleet average (i.e. standard capacity product) during the peak periods of the day. However, the ISO's greatest demand for flexible capacity may not be during the times of peak demand. Therefore, the ISO must establish a new availability incentive

[23] As discussed in section 5, above, the ISO will allocate to LRA using a causation based methodology. The ISO will work with LRAs to ensure that any backstop procurement cost allocations are done using the methodology applied by the LRA. For example, if the ISO's assessment shows an LRA's LSE flexible capacity requirement is 5,000MW and the LRA allocates that 5,000MW based on peak-load ratio share to its jurisdictional LSEs, then the ISO will allocate backstop costs to that LRA's LSE based on peak-load ratio share.

[24] http://www.caiso.com/informed/Pages/StakeholderProcesses/Multi-YearReliabilityFramework.aspx

mechanism and measurements for flexible capacity resources that expands the current parameters established in the existing availability standards for generic RA capacity.

The ISO believes that much of the existing availability incentives can be modeled to address the availability of flexible capacity. One of the fundamental differences between generic capacity and flexible capacity is the requirement to submit economic bids into the ISO day-ahead and real-time markets. As noted above, the ISO is not proposing any bid validation rules. As such, there will not be an automated system that will replace self-schedules or fill in bids for flexible capacity resources that fail to do so.

The ISO believes that a flexible capacity availability incentive mechanism should provide the incentives for resources to submit bids that comply with the applicable must-offer obligation. Therefore, for purposes of the flexible capacity availability incentive mechanism, "available" is defined as having economic bids in the ISO's day ahead and real-time markets for the amount of flexible capacity that the resource is contracted to provide. Subject to confirming the implementation timeline, the ISO will implement the flexible capacity availability incentive mechanism no later than the 2016 RA compliance year.

## 9.1 Funding for the Flexible Capacity Availability Mechanism

As with the existing SCP, the ISO believes this mechanism should be self-funded. As such the ISO will design a mechanism that will look at flexible capacity resources' performance in submitting economic bids to the ISO markets and compare this measurement to the system average of all flexible capacity resources. In order to avoid double counting, the ISO will evaluate a flexible capacity resource's availability using the flexible capacity availability incentive mechanism during the hours of the resource's must-offer obligation, and will use the existing availability incentive mechanism for all other hours. For example, a resource with no use limitations would be evaluated using the flexible capacity availability incentive mechanism from 5:00am through 10:00pm.

## 9.2 Evaluation of Compliance with Must-Offer Obligation

A flexible capacity availability incentive mechanism must recognize that an outage of a flexible resource is different from the outage of a generic capacity resource. Therefore, as part of the flexible capacity availability incentive mechanism, the ISO believes that it is appropriate to compare flexible capacity resources with other flexible capacity resources. For example, the ISO would not compare the availability of a generic capacity resource against a flexible capacity resource.

The must-offer obligation for flexible capacity requires the resource to submit economic bids into both the day-ahead and real-time markets. This means that the flexible capacity availability incentive mechanism must measure the compliance of a resource providing flexible capacity in both markets. Compliance in each of these markets is important for different reasons. The ISO makes a substantial amount of unit commitments in the day-ahead market. This will impact the pool of resources available for dispatch in real-time. However, it is in the real-time market that the ISO must balance actual supply and demand. Thus having a deep pool of economic bids will enhance the ISO's ability reach a market

based dispatch. Because of the importance of each of these markets, the ISO proposes to place equal weight on each market.

The flexible capacity availability incentive mechanism will measure how compliant a resource is with its must-offer obligation. For each hour of its must-offer obligation, a resource must submit economic bids for the total amount of flexible capacity that it has sold. For example, a 100 MW resource that has is providing 20 MW of flexible capacity must submit 20 MW of economic bids for all hours within the must-offer obligation. Failure to submit a bid for the resources flexible capacity quantity for any reason (Forced outage, self-scheduling, derates, etc.) will be considered non-compliant for purposes of the flexible capacity availability incentive mechanism even if the resource is on-line and operational.

Based on the above concepts, the ISO proposes to measure a resource's compliance with the flexible capacity must-offer obligation using the following formula:

$$FSCP = \frac{[(\Sigma \text{ Hourly MW economically bid in DA Market from Resource j in month n}) + (\Sigma \text{ Hourly MW economically bid in RT Market from Resource j in month n})]}{(\text{Total MW of flexible capacity provided by resource j}) * (\text{Total DA compliance hours in the Month})}$$

The following examples are simplified, but designed to help clarify this calculation.

Example 4: Short-start resource #1

| Total Capacity: 100 MW | RA Capacity: 100 MW | Flexible Capacity: 40 MW |
|---|---|---|
| Hour | DA Economic bid quantity | RT Economic Bid Quantity |
| 1 | 40 | 20 |
| 2 | 40 | 20 |
| 3 | 40 | 20 |
| 4 | 40 | 20 |
| 5 | 40 | 20 |
| 6 | 40 | 20 |
| 7 | 40 | 20 |
| 8 | 40 | 20 |
| 9 | 40 | 20 |
| 10 | 40 | 20 |
| Total MW bid in | 400 | 200 |
| Total MW Required | 400 | 400 |
| Total Hours | | 800 |
| Total Compliance | | 0.75 |

Example 5: Short-start resource #2

| Total Capacity: 100 MW | RA Capacity: 100 MW | Flexible Capacity: 40 MW |
|---|---|---|
| Hour | DA Economic bid quantity | RT Economic Bid Quantity |
| 1 | 20 | 20 |
| 2 | 20 | 20 |
| 3 | 20 | 20 |
| 4 | 40 | 20 |
| 5 | 40 | 20 |
| 6 | 40 | 20 |
| 7 | 40 | 20 |
| 8 | 40 | 20 |
| 9 | 20 | 20 |
| 10 | 20 | 20 |
| Total MW bid in | 300 | 200 |
| Total MW Required | 400 | 400 |
| Total Hours | | 800 |
| Total Compliance | | 0.625 |

Example 6: Long-start resource not scheduled in Day-Ahead Market

| Total Capacity: 100 MW | RA Capacity: 100 MW | Flexible Capacity: 40 MW |
|---|---|---|
| Hour | DA Economic bid quantity | RT Economic Bid Quantity |
| 1 | 40 | 0 |
| 2 | 40 | 0 |
| 3 | 40 | 0 |
| 4 | 40 | 0 |
| 5 | 40 | 0 |
| 6 | 40 | 0 |
| 7 | 40 | 0 |
| 8 | 40 | 0 |
| 9 | 40 | 0 |
| 10 | 40 | 0 |
| Total MW bid in | 400 | 0 |
| Total MW Required | 400 | 0 |
| Total Hours | | 400 |
| Total Compliance | | 1 |

The ISO proposes to cap the resources total compliance at the resources flexible capacity obligation. For example, even if a 100 MW resource that has provided 40 MW of flexibility submitted economic bids for the full capacity of the resource for all hours, the flexible capacity availability mechanism would not calculate the resource as being 250 percent compliant. Instead, the resource would be assessed as 100 percent compliant. This also allows the ISO to manage partial RA resources that provides economic bids beyond its quantity of flexible capacity.

### 9.3 Incentives

The ISO proposes to use an incentive structure that mirrors the existing SCP incentive mechanism. The ISO will calculate a monthly target flexible capacity availability value using historic availability data for the existing availability incentive mechanism for generic capacity. However, there is currently no historic data that can be used to calculate the monthly target flexible capacity availability value. Therefore, the ISO proposes to supplement the calculation with historic data from the existing availability incentive mechanism. Once the ISO has three years of monthly target flexible capacity availability values, then it will no longer include data from the existing availability incentive mechanism. Further, consistent with the existing availability incentive mechanism, the ISO proposes a 5 percent dead-band around the monthly target flexible capacity availability value (2.5. percent above and 2.5 percent below). Resources with flexible capacity availability measurements less than 2.5 percent of the monthly target flexible capacity availability value will be charged the applicable backstop procurement price for flexible capacity. Resources that exceed monthly target flexible capacity availability value plus 2.5 percent will be credited from these charges based on their performance.

## 10 Next Steps

The ISO will host a stakeholder meeting on meeting on August 1, 2013 to discuss the contents of this straw proposal. Stakeholder comments on this straw proposal will be due August 15, 2013. The ISO anticipates seeking ISO Board approval at the December 2013 Board Meeting.