Flexible Resource Adequacy Criteria and Must-Offer Obligation

Market and Infrastructure Policy
Fourth Revised Straw Proposal

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Fourth 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 as 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

[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.

help inform decisions regarding the flexible capacity, both new and existing, needed to reliably operate 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 or further enhancing 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 has been working 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-

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

load change using historic changes in load and forecasted changes in wind output and solar output, and distributed generation. The ISO will incorporate data provided by each LSE into these calculations 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, each 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 each month in 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 ISO's allocation of its overall requirement to an LSE's LRA and the LRA's allocation of its share to the LSE. 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 a.m. through 10:00 p.m., in addition to the existing must-offer obligations for generic RA capacity. The ISO anticipates that the majority of use-limitations can be managed through constraints modeled in the ISO market or through appropriate energy bid prices, minimum load costs, 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) 7:00 a.m. – 12:00 p.m., or (2) from 3:00 p.m. – 8:00 p.m. For either of these periods, demand response resources providing flexible capacity would be required to provide a minimum of three hours of energy. The three hour energy requirement is necessary to meet either the morning or evening net load ramp. This approach, although requiring a shorter limited must-offer obligation, is similar to the six hour

[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.

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 that elect to provide flexible capacity through the ISO market's regulation energy management functionality that requires these resources to (submit economic bids to provide regulation for the time period from 5:00 a.m. – 10:00 p.m. as a regulation energy management resource.

- 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.

- **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 currently plans to have this flexible capacity availability incentive in place no later than January 1, 2016.

- **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's annual or monthly flexible capacity procurement.

The ISO plans to complete this stakeholder initiative by February 2014 and have these measures in place for 2015 RA compliance unless otherwise noted. The ISO will also remain active at the CPUC in the current RA proceeding to establish counting flexible capacity counting provisions for preferred resources and storage. Finally, on July 10, 2013, 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 Third Revised Straw Proposal

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

1) The ISO is proposing to determine change in load as part of the flexible capacity requirement allocation during the maximum 3-hour net-load ramp by using an LSE's average contribution to load change during top five daily maximum three-hour net-load ramps within a given month from the previous year x total change in ISO load.

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

2) Included a more complete description of the ISO's proposed methodology to allow gas-fired use-limited resources to reflect use-limitations in their bid inputs to the market so that these resources can submit bids for all the hours required by the flexible capacity must-offer requirements .

3) The ISO is proposing that demand response resources would be eligible to establish an effective flexible capacity through a test event that would occur during the demand response resource's selected window of 7:00am – 12:00pm or 3:00pm – 8:00pm.

4) The ISO is proposing that energy storage resources would elect one of two options for providing flexible capacity and for determining their effective flexible capacity: Regulation Energy Management or fully flexible capacity. The effective flexible capacity for energy storage resources electing to use the ISO market's Regulation Energy Management functionality would be set at the lesser of the resources 15 minute output capability or the resource's NQC. Resources that select the regulation energy management option will be required to submit economic bids for regulation for the time period from 5:00 a.m. – 10:00 p.m. as a regulation energy management resource. Resources selecting the full flexible capacity option would be measured based on the resource's three hour capability up to the resource's NQC. Resources that select the full flexibility option will be required to submit economic bids for the full amount of effective flexible capacity from 5:00 a.m. to 10:00 p.m. Once an energy storage resource selects a particular bucket it may not switch for the duration of the RA year.

5) The ISO has dropped the option for energy storage resources to select one of the demand response bidding windows.

6) The ISO is proposing a revised price for the Standard Flexible Capacity product. The new price, $30.10/kw-yr is based on the average price of the flexible ramping constraint during the time intervals between 5:00 a.m. and 10:00 p.m. in which the constraint was binding over the past 18 months. The ISO proposes to freeze this price at this level until 1) are excessively low (the ISO requests stakeholder input as to what these levels would be, 2) a market based pricing mechanism for forward procurement of flexibility has been established or 3) three years, at which time the adder price will be reexamined.

7) The ISO proposes that real-time economic bids be weighed 80 percent towards the SFCP calculation and day-ahead economic bids be weighed at 20 percent. This modification will increase the incentive to submit economic bids into the real-time market.

8) The ISO proposes that use-limited resources that reach their use-limitation within a month will be required to provide substitute capacity or be subject to SFCP availability charges. Thresholds exempting use-limited resources from SFCP penalties have been removed.

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 Authority Area operator, 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.

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

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

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. 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,[11] 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 the issues highlighted 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.[12]

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 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 February 2014 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:

[11] The CPUC's RA Final Decision is available at http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M070/K423/70423172.PDF.

[12] The CPUC has issued a proposal for demand response and storage resources providing flexible capacity. This proposal was sent to the service list of R.11-10-023 on September 13, 2013.

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
October 3, 2013	Third Revised Straw Proposal posted
October 9, 2013	Stakeholder Meeting
October 16, 2013	Stakeholder comments on Third Revised Straw Proposal due
November 6, 2013	Fourth Revised Draft Straw Proposal Posted
November 13, 2013	Stakeholder Meeting
November 27, 2013	Stakeholder Comments Due on Fourth Revised Draft Straw Proposal
December 20, 2013	Draft Final Proposal
January 6, 2014	Stakeholder call
January 13, 2014	Stakeholder comments on Draft Final Proposal due
February 5, 2014	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 and assumptions over the course of the process described below.

Upon completion of this assessment, the ISO will use the results to allocate shares of the system flexible capacity requirement to each of the LRAs responsible for load in the ISO balancing authority area. The ISO will determine the allocation to each LRA by summing the contribution to the maximum 3-hour net-load ramp of each LSE under the jurisdiction of each respective LRA. The ISO will also provide each LRA with a breakdown of each of its individual jurisdictional LSEs' 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 LSEs' 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 followed by local & flexible capacity requirement stakeholder meeting
	Publish draft final LCR & FCR needs study (including determination of the error term)

April	ISO stakeholder meeting to discuss LCR / FCR / error term 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 from LRA
August	Revised load forecasts and renewable build-outs for following RA compliance year
September	LSEs receive revised RA and flexible capacity obligation. Final effective flexible capacity (EFC) list of eligible flexible capacity resources issued by the ISO.
October	SCs for LSEs provide Year-ahead showing of system, local, and flexible capacity to ISO and LRA (show 100% local and 90% system and flexible)
Monthly	T-45 days: Month-ahead showings, including local and flexible true-up capacity to ISO and LRA
	T-25 days: ISO notifies SCs for LSEs and suppliers of any deficiencies of system, local, and or flexible capacity or discrepancies in showings
	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 (D.13-06-024) 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.[13]

- 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 dynamically scheduled or pseudo-tied intermittent resources from each non-ISO CREZ are provided by an another 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 LSEs 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 three-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 during the year 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.

The ISO will issue the draft EFC list by September 1. In determining what resources make the draft EFC list, the ISO will apply a very low threshold test. The test requires the resource to have placed at least one economic bid in the real-time market for ten or more days in the previous year. If the resource passes this test, then its EFC is calculated using the relevant counting conventions discussed in section 6.

[13] Until there is a multi-year forward procurement obligation, the data for years two through five will be used to provide advisory procurement requirements. There will only be binding procurement requirements for the upcoming year.

If an SC for a resource believes that they should be included on the list but are not or that the EFC provided in the draft EFC list is incorrect, they will have two weeks after the draft EFC is released to notify the ISO. The ISO will review all requests and either grant the correction or provide the SC with the reason that the request was declined.

4.1 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 for each month using the following formula:

$$Flexibility\ Requirment_{MTH_y=}\ Max\left[\left(3RR_{HR_x}\right)_{MTH_y}\right] + Max\left(MSSC, 3.5\% * E\left(PL_{MTH_y}\right)\right) + \varepsilon$$

Where:

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 utilized the renewable resource profiles used in the base case scenario from the CPUC's 2012 Long Term Procurement Planning proceeding to conduct this assessment, not individual profiles submitted by LSEs. The ISO will update the RPS build-out data annually based the contracted RPS capacity data collected from all LSEs in the ISOs Balancing Area Authority as discussed above.[14] 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.

[14] 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 and adopted by the CPUC, the ISO will determine the maximum forecasted 3-hour net-load ramp for each month. The ISO will calculate the 3-hour net-load ramp as the quantity of MWs the ISO must ramp generation resources and/or demand response across a 3-hour period.

4.2 Results of the ISO's Flexible Capacity Requirement Assessment for 2014

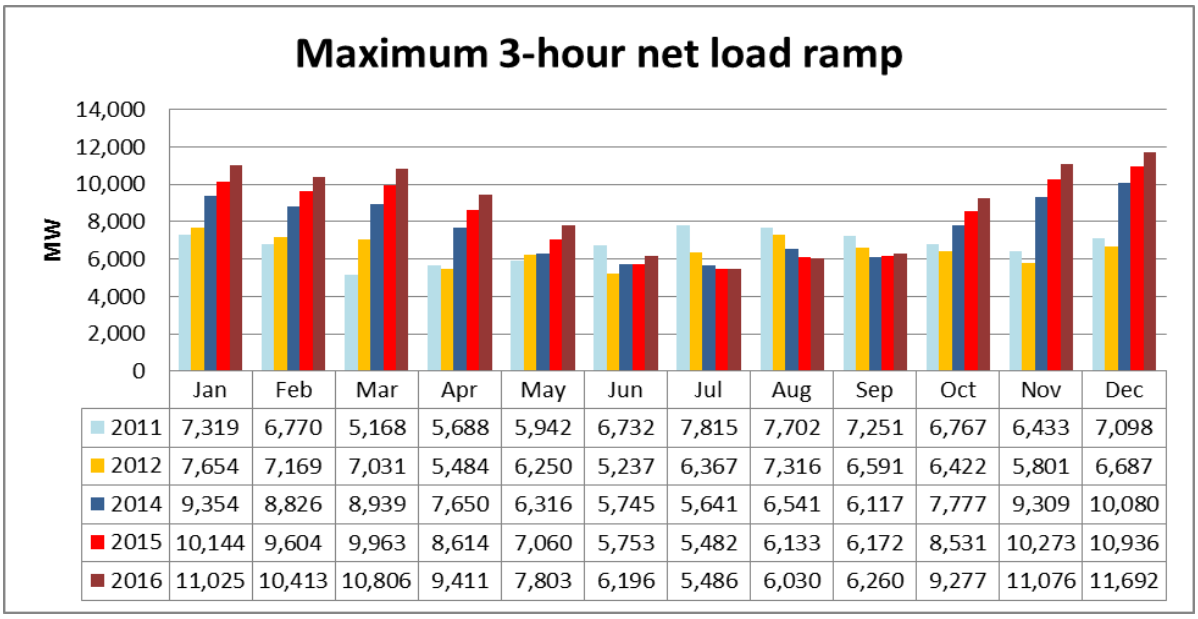
The maximum 3-hour net load ramps produced using the methodology described above are shown in Figure 1. In addition to assessing forecasted ramps, the ISO used this methodology to determine what the flexibility needs would have been for 2011 and 2012. As shown in Figure 1, in the ISO expects to see an 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[15] for 2014-2016 using the formula descibed in section 4.1, above. The results of this calculation are shown in Figure 2. Flexible capacity

[15] 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.

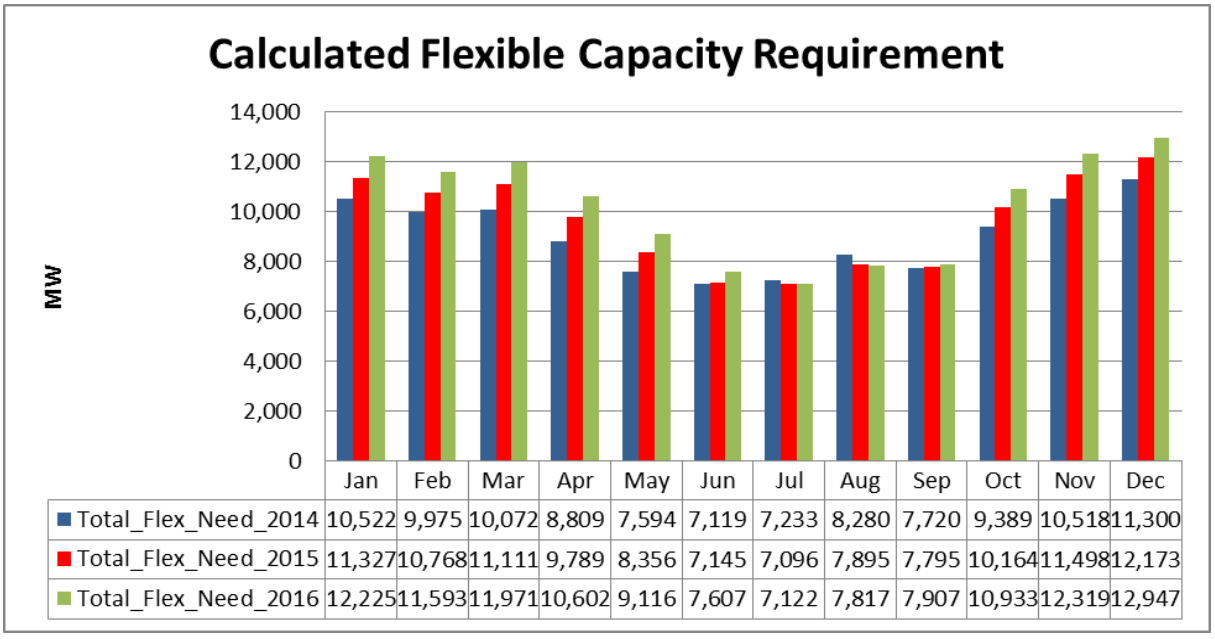
requirments are greatest in the non-peak months and consistent with the increase in the maximum 3-hour net load ramps.[16]

Figure 1: 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 2: 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

[16] 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.

5 Proposed Allocation of Flexible Capacity Requirement

The ISO proposes to allocate the ISO systems overall flexible capacity requirement to each LRA with jurisdiction over load in the ISO's balancing authority area. The amount it will allocate to each LRA will be the sum each LRA's jurisdictional LSEs' contribution to the overall system flexible capacity requirement. The ISO will provide to each LRA its jurisdictional LSEs' individual contribution and the total requirement for all its jurisdictional LSEs. Allocating procurement obligations to individual LSEs is the responsibility of each LRA. 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 when allocating flexible capacity resource adequacy backstop costs in the event of a shortfall. This section describes the methodology the ISO will use to determine each LSE's contribution to the system flexible capacity requirement as part of determining each LRA's allocation.

The flexible capacity allocation requirement for MSS load-following LSEs will follow the current resource adequacy allocation requirement rules. 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 match their generation with their load in each settlement interval. If capacity they have contracted with produces variable energy, they are responsible for ensuring their load is met with flexible resources under their control. MSS load-following LSE's allocation portion will be subtracted from the total allocation for purposes of backstop procurement.

5.1 LSE share of system flexible capacity requirement

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 three 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
3. The ε or error term

The specific allocation of each of these components to LRAs is discussed in greater detail in the following sections.

5.1.1 *Allocating the Maximum of the Most Severe Single Contingency or 3.5 Percent of Forecasted Peak Load*

The ISO proposes to calculate the maximum of the most severe single contingency or 3.5 percent of forecasted peak load for each LSE based on its peak load ratio share. Some stakeholders have asserted that is not necessary to include this component in the flexible capacity. The ISO proposed, and the CPUC approved, the inclusion of the maximum of the most severe single contingency or 3.5 percent of forecasted peak load in the flexible capacity requirement in the RA proceeding. The reason for including

this component is to account for the fact that much of the same capacity that provides contingency reserves will be the same capacity that the ISO will need to meet ramping needs. If the contingency reserves are not included in the flexible capacity requirement, then the ISO would not be assured of having access to sufficient flexible capacity to both maintain required contingency reserves and address flexibility needs. For example, assume the flexible capacity requirement is set at only the maximum 3-hour continuous net-load ramp of 10,000 MW and there is a forecasted peak load is 35,000 MW. In this instance then the ISO would be required to maintain 1,225 MW of contingency reserves. This 1,225 MW of capacity would almost certainly be flexible capacity. However, if 1,225 MW of flexible capacity is committed to meeting these contingency reserves, then the ISO would not be assured of having sufficient flexible capacity to meet the other ramping needs, including a 10,000 MW ramp.

5.1.2 *Allocating the Maximum 3-hour Net Load Ramp*

The maximum 3-hour net-load ramp will be broken out to capture each 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 – LSE's average contribution to load change during top five daily maximum three-hour net-load ramps within a given month from the previous year x total change in ISO load.
2) Δ Wind Output – LSE's contracted percentage of total installed wind x ISO total change in wind output
3) Δ Solar PV – LSE's contracted percentage of total installed solar PV x total change in solar PV output
4) Δ Solar Thermal – LSE's contracted percentage of total installed solar thermal x total change in solar thermal output

The proposed allocation methodology Δ Wind Output, Δ Solar PV, and Δ Solar Thermal solar thermal components have been largely agreed to by stakeholders. However, a similar consensus has not yet been reached for the allocation for the Δ Load component.

The ISO's current proposal for allocating the Δ Load component is a slight modification to the previous proposal in two ways. First, the current proposal is based on each LSE's average percent contribution to load change during the daily peak net-load ramps for the five largest daily three-hour net-load ramps in a month,[17] not maximum load ramps. Based on the ISO's assessment of the data, this change did not result in a significant change in the flexible requirement allocation because the peak load ramps and peak net-load ramps occurred at similar times. However, this may not be the case over time as more intermittent resources come on line. Second, the ISO has moved from using an LSE's average contribution to using the LSE's contribution during the five maximum 3-hour net-load ramps. Just as resource adequacy requirements are based on an LSE's contribution to the peak load (i.e. peak-load ratio share), so should flexibility requirements. However, the ISO believes that using an average contribution of an LSE to five largest daily maximum 3-hour continuous net-load ramps will help address uncertainty in forecasting and anomalous load changes. The ISO believes this is consistent with causation principles.

In comments to the third revised straw proposal, PG&E proffered an alternative to the ISO allocations method for the Δ Load component. However, the ISO observes that the PG&E proposal uses a methodology that is not consistent with the methodology used to allocate system level RA requirements. Unlike generic RA requirements that are based on a coincident adjusted peak-load ratio share, PG&E proposes the ISO use a non-coincident peak-ramp ratio share to allocate the Δ Load component. This peak-ramp ratio share would be based on an LSE's maximum historic load change over a month. Specifically, the ISO would use historic load data to determine each LSE's largest 3-hour load ramp in a month. Then these ramps would be aggregated into a non-coincident peak load ramp and the percent contribution of each LSE to this ramp would be calculated. This percentage would become the LSE's ramp adjustment. Finally, under PG&E's proposal the ISO would calculate the flexible capacity requirements based on load change by multiplying the total Δ Load component and the ramp adjustment for each LSE. Example 1 shows how PG&E's proposed this calculation would occur.

[17] Methodologically, this similar to the CEC's use of the median coincidence factor of the top 1% of system peak hours when determining generic RA peak-load ratio share.

Example 1: Example of PG&E's proposed allocation of Δ Load component

	LSE's maximum 3-hour load change in month (non-coincident)	LSE's share of total LSE load ramps in month	System's load ramp coincident with system's maximum 3-hour net-load ramp in month	LSE's monthly allocation of load for flexible requirement	LSE's monthly contribution to system's maximum 3-hour net-load ramp in month (coincident)	Difference Between PG&E proposal and ISO's proposal
LSE 1	2,000 MW (Day 2, HE 14-HE17)	2,000 MW/8,000 MW = 25%	5,000 MW (Day 6, HE 15-HE 18)	25% * 5,000 MW = 1,250 MW	1,250 MW or 25%	0 MW
LSE 2	3,000 MW (Day 6, HE 15-HE18)	3,000 MW/8,000 MW = 37.5%		37.5% * 5,000 MW = 1,875 MW	3,000 MW or 60%	-1275 MW
LSE 3	1,000 MW (Day 15, HE 14-HE17)	1,000 MW/8,000 MW =12.5%		12.5% * 5,000 MW = 625 MW	-150 MW or -3%	775
LSE 4	2,000 MW (Day 30, HE 14-HE17)	2,000 MW/8,000 MW = 25%		25% * 5,000 MW = 1,250 MW	900 MW or 18%	450 MW
Total	8,000 MW					

PG&E's proposal looks to shift the ramping requirement to address load ramps that occur in non-peak ramping times, asserting that such a shift eliminates a free-ridership problem. However, the ISO believes that such a proposal actually encourages a free-ridership problem. In the example above, LSE 2 is contributing significant amounts to the monthly peak 3-hour net-load ramp, while LSE 3 is actually helping to mitigate this ramp. Under the PG&E proposal, LSE 2 would be free riding on its contribution to the peak 3-hour net-load ramp while LSEs 2 and 3 would be picking up the additional burden.

The ISO's above proposed allocation methodology allocates the flexible capacity requirement caused by change in load to each LSE based on its peak-ramp ratio share (i.e. the percent contribution of

an LSE to load change during historic five monthly maximum three hour net load ramp x total change in ISO load during the historic maximum 3-hout net-load ramp). The ISO's proposed methodology is also consistent with how generic RA is currently allocated and reasonably reflects general cost causation principles. As a result, ISO will not adopt the PG&E proposal and proposes to allocate will instead allocate the Δ Load component based on an LSE's percent contribution to load change during historic top five daily maximum three hour net load ramp in a month as described above.

In the previous straw proposals for this stakeholder initiative, the ISO proposed using contribution to 3-hour maximum load ramps, peak-load ratio share, and monthly load factors to allocate changes in load. By using historic 3-hour net-load data, the ISO will be able to allocate changes in load based on empirical data that is more statistically robust and yields an allocation metric that is specifically designed to measure each LSE's contribution to load variability. Additionally, the ISO has eliminated the use of the Δ Distributed Energy Resources variable from the allocation methodology that was included in previous straw proposals. The reason for deleting this component of the allocation methodology is directly tied with the use of historic metered load. The ISO will capture the impact of distributed energy resources by using actual metered load because distributed energy resources are behind the meter so their variability is reflected in load variability. For the calculations used for Δ Wind, Δ Solar PV, and Δ Solar Thermal Output, 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.[18] The ISO believes that this is the appropriate level of granularity.

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

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.

The ISO is currently proposing to determine a LSE's contribution to each component monthly. However, some stakeholders have suggested that seasonal contributions may work as well as monthly and would simplify the allocation process. If there is little variation in the contribution to each component, then another potential benefit of such an approach would be larger and more robust data sets that would improve the confidence regarding the causation of the factors considered. The ISO is considering such an approach and seeks stakeholder input as to its merits.

Example 2 demonstrates how this methodology would allocate flexible capacity procurement when the forecasted monthly maximum 3-hour net load ramp occurs in the evening.

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

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

ISO flexible capacity requirement assessment	
Δ load	4,500
Δ wind	-2,000
Δ solar PV	-2,500
Δ solar thermal	-1,000
Total flexible capacity need	10,000

LSE	LSE's percent contribution to load change during historic top five daily maximum three hour net load ramp in a month
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
LSE 1	40%	30%	70%
LSE 2	20%	35%	20%
LSE 3	25%	15%	0%
LSE 4	15%	20%	10%

LSE	Load contribution	Wind contribution	Solar PV contribution	Solar Thermal contribution	Total contribution
LSE 1	.35 x 4,500 = 1,575 MW	.40 x -2,000 = -800 MW	.30 x -2,500 = -750 MW	.70 x -1,000 = -700 MW	3,825
LSE 2	.30 x 4,500 = 1,350 MW	.20 x -2,000 = -400 MW	.35 x -2,500 = -875 MW	.20 x -1,000 = -200 MW	2,825
LSE 3	.20 x 4,500 = 900 MW	.25 x -2,000 = -500 MW	.15 x -2,500 = -375 MW	.00 x -1,000 = 0 MW	1,775
LSE 4	.15 x 4,500 = 675 MW	.15 x -2,000 = -300 MW	.20 x -2,500 = -500 MW	.10 x -1,000 = -100 MW	1,575
Total	4,500	-2,000	-2,500	-1,000	10,000

While Example 2 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 3 demonstrates how this methodology would be used for a maximum net load ramp set in the morning

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

ISO flexible capacity requirement assessment	
Δ load	7,500
Δ wind	-2,000
Δ solar PV	2,500
Δ solar thermal	1,000
Total flexible capacity need	6,000

LSE	LSE's percent contribution to load change during historic top five daily maximum three hour net load ramp in a month
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
LSE 1	40%	30%	70%
LSE 2	20%	35%	20%
LSE 3	25%	15%	0%
LSE 4	15%	20%	10%

LSE	Load contribution	Wind contribution	Solar PV contribution	Solar Thermal contribution	Total contribution
LSE 1	.35 x 7,500 = 2,625 MW	.40 x -2,000 = -800 MW	.30 x 2,500 = 750 MW	.70 x 1,000 = 700 MW	1,975
LSE 2	.30 x 7,500 = 2,250 MW	.20 x -2,000 = -400 MW	.35 x 2,500 = 875 MW	.20 x 1,000 = 200 MW	1,575
LSE 3	.20 x 7,500 = 1,500 MW	.25 x -2,000 = -500 MW	.15 x 2,500 = 375 MW	.00 x 1,000 = 0 MW	1,625
LSE 4	.15 x 7,500 = 1,125 MW	.15 x -2,000 = -300 MW	.20 x 2,500 = 500 MW	.10 x 1,000 = 100 MW	825
Total	7,500	-2,000	2,500	1,000	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.

5.1.3 *Determining the Error Term (ε)*

Several stakeholders have requested details regarding the criteria the ISO will use to determine the error term. The ISO has agreed to set this term to zero for the 2014 RA compliance year. As the ISO conducts the flexible capacity requirement assessment each year based on the formula presented in section 4, the ISO will determine how well the first two components in the formula for determining the ISO's flexible capacity requirement results in a requirement that reflects the actual 5-minute and 3-hour ramping experienced by the ISO system. Based on this assessment, the ISO may adjust the error term up or down so the requirement determined by the formula more accurately reflects the ISO system flexible capacity needs. If the ISO's assessment points to a need for modification to the flexible capacity requirements (i.e. ε different than 0), then it will, as part of the annual assessment, explain why modification flexible capacity procurement is justified and provide as much detail as possible regarding this cause and allocation of this changed need. Stakeholder will have an opportunity to ask questions of the ISO and discuss and comment on this addition or reduction to the requirement based on the error term in greater detail in the ISO's annual flexible capacity requirements assessment stakeholder process.

The error term, by definition, is not known. However, there may be several factors that contribute to the need for additional procurement. For example, the current RA program allows for a 15 percent planning reserve margin. This margin is designed to include seven percent reserves, and approximately an eight percent system outage rate. The current flexible capacity requirement does not have a similar cushion built-in to account outages of flexible capacity. Alternatively, the ISO's assessment may show there was more than enough flexible capacity available to address flexible capacity needs and flexible capacity needs could be reduced.

It is not possible to pinpoint all of the specific factors that could contribute to the error term. However, the ISO also understands that stakeholders may have to manage procurement risk. For example, if the error term exceeds the other two components or varies too widely from year-to-year, it may be creating excessive procurement risk for LSEs. Therefore, the ISO is seeking stakeholder comments regarding appropriate bounds for the error term. Specifically, the ISO is seeking comments regarding appropriate bounds for the maximum and minimum for the error term as well as how to address year-to-year variability. Finally, the ISO is seeking stakeholder comment regarding appropriate actions of such bounds are reached.

6 RA Showings and Replacement

Currently, the ISO conducts an annual and monthly RA process in which 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 SCs for the same capacity and would require complicated and time consuming resource capacity tracking solutions.

LSEs, through their SC, would be required to submit a showing to the ISO listing 90 percent of their allocated flexible capacity requirement for each month 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. Prior to 2015 implementation, the ISO will update its RA templates to include flexible capacity showings. LSEs will be permitted to replace resources from their year ahead flexible RA showing with other resources in their month-ahead showings. The ISO will notify SCs for LSEs at least 25 days prior to the start of the month if there are any deficiencies or if replacement flexible capacity is needed to address a planned or approved outage. The scheduling coordinator for the LSE will have until 11 days prior to the month to cure any deficiencies or resolve any irregularities in the RA showing. If the SC does not resolve all issues, then the ISO may exercise backstop procurement authority for flexible capacity deficiencies, discussed in detail in section 9, below. The ISO will then verify and validate that each LSE has met its flexible capacity showing requirements for the 2015 RA compliance year. Additionally, for 2015 RA compliance, the ISO will not propose to require flexible capacity to be replaced due to intra-month outages of. However, the ISO will include functionality to substitute flexible capacity to address forced outages as part of the 2016 RA compliance year when the flexible capacity availability incentive mechanism is put in place. This is discussed in greater detail in section 8, below. Finally, the ISO may issue backstop procurement for deficiencies for the 2015 RA compliance year. The ISO will not implement backstop procurement for planned and approved outage replacement (i.e. the ISO's recently approved replacement rule) flexible capacity starting in the 2016 RA compliance year.[19]

The ISO will use the following formulas for counting the flexible capacity resources[20] used by an LSE in its showings in evaluating the showing against the flexible capacity requirement:

<u>If start-up time of a resource is 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 of a resource is 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)

[19] Existing rules for replacing capacity on planned outage will still apply. The ISO is continuing to assess the need to implement a rule for replacing flexible capacity on planned outage.

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

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

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

A hydro resource will qualify as flexible capacity for the amount of output its physical storage capacity allows it to provide as energy equivalent to output for 6 hours. Flexible capacity must be able to respond five-minute dispatch instructions. Therefore, intertie resources and imports that are not pseudo-tied or dynamically scheduled into the ISO are not eligible to provide flexible capacity at this time.[21] Currently, multistage generating resources' EFC is calculated assuming the resource is at a cold start and in a 1x1 configuration.[22] 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.

The ISO has also reviewed the counting criteria for combined heat and power or similar resources that a primary industrial process of which electricity is a byproduct. Some of these resources have a "reliability must take" amount of capacity listed in the ISO's master file. The ISO believes that the reliability must take portion of these resources' capacity should be treated the same way as a PMin with greater than a 90 minute start-up time. This will reduce the EFC some qualifying facilities, but ensure that the resources are better able to maintain flexibility consistent with their underlying industrial processes.

The ISO proposes to determine the EFC of demand response resources through the use of a test event during the demand response resource's selected flexible capacity must-offer obligation window. The CPUC foresaw the possibility of the need for such an option in D.10-06-036.[23] The ISO sees this as an opportunity to move demand response resources into the ISO's marketplace by providing an effective flexible capacity counting methodology that matches the resource's must-offer obligation. The test event would occur randomly and would use the previous ten days load data for the PDR resource to measure the load reduction. The ISO recognizes that it will need to coordinate with the CPUC and other LRAs to coordinate this with their counting rules for demand response providing "generic" RA capacity. For example, the CPUC's current RA counting conventions for demand response resources allows demand response resources to demonstrate their ability to drop load between the hours of 1:00 p.m. and 6:00 p.m. These hours obviously do not correspond with the ISO's proposed flexible capacity must-offer obligation windows.

[21] The ISO will continue to assess the ability of imports to provide flexible capacity once we have had experience with 15 minute intertie schedules and individual flexible capacity products that allow for separation of the ISO's ramping and load-following needs.

[22] The ISO is working with the CPUC to determine if different counting criteria should be considered in the current RA proceeding and may revise these assumptions as appropriate based on the determination of this work.

[23] On p.38 of D.10-06-036 the CPUC states "with proper economic incentives for accuracy, it is reasonable that DR resources that act like a dispatchable supply resource may appropriately have QC evaluated via a test, similar to dispatchable conventional generators."

Currently, the ISO is working with the CPUC and other parties in the RA proceeding to establish a qualifying capacity counting methodology to allow energy storage resources to count towards an LSE's generic RA requirements. With the intent of moving expeditiously to establish the framework for energy storage resources to provide flexible capacity, the ISO is proposing as part of this stakeholder initiative to establish an effective flexible capacity methodology specific to energy storage resources. Specifically, the ISO proposes that storage elect one of two options: Regulation Energy Management or fully flexible capacity. Each of these options would have a separate Effective Flexible Capacity counting criteria and associated must-offer obligations (the must-offer obligations are detailed in section 7.1.5). The effective flexible capacity for energy storage resources electing the regulation energy management would be set at the lesser of a resource's 15 minute output capability or the resource's NQC to maintain consistency with the bundling principle. Resources selecting the full flexible capacity option would be measured based on the resource's three hour capability up to the resource's NQC. Once an energy storage resource selects a particular option it may not switch for the duration of the RA year. The ISO will continue to monitor the pool of resources in each bucket to determine if there is any need to include any limitations regarding the amount of capacity provided in either or both buckets the future.

7 Flexible Capacity Must-Offer Obligation

The ultimate 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 must-offer obligations for RA and Capacity Procurement Mechanism capacity ensure the ISO has sufficient capacity to meet peak-load and local requirements, but do not fully address system flexibility needs. 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 economic dispatch.

Therefore, the ISO proposes a must-offer obligation for flexible capacity resources that can be summarized as follows:

- Except for the exceptions that are described, it requires the submission of economic bids for the period from 5:00 a.m. through 10:00 p.m. every day (including all holidays and weekends) in the real-time and day-ahead market. These are the hours in which significant ramps and intra-hour variability are most likely to occur. [24] In the event a resource has a day-ahead schedule for their entire effective flexible resource adequacy capacity output shown, the resource is still required to rebid in the amount in real-time.

- The ISO understands that not every resource is capable of providing flexibility from 5:00 a.m. through 10:00 p.m. every day. Thus, the ISO has, when appropriate, developed more specific must-offer obligations for some resource types such as hydro, 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.

- 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 for the period from 5:00 a.m. to 10:00 p.m., but must also be available to the ISO through at least a self-schedule from 10:00 p.m. through 5:00 a.m. as required by section 40 of the ISO's tariff (assuming the resource is listed as an RA resource for these hours). This requirement would be effective beginning for 2015 RA compliance.

- The ISO envisions the rule to offer in all hours from 5:00 a.m. through 10:00 p.m. will apply to most flexible capacity resources, including most gas-fired resources that have use-limitations that limit their allowable starts, operating hours, and/or energy production. As described further below, the ISO believes there are mechanisms for the ISO market to

[24] 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.

respect these use-limitations while still requiring the resource to submit economic bids for all days for all hours from 5:00 a.m.to 10:00 pm.

- However, the ISO recognizes that the requirement to offer in all hours from 5:00 a.m. through 10:00 p.m. 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.

The following sections describe the ISO's proposed must-offer obligations for each resource type.

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 to both the day-ahead and real-time markets for flexible capacity rather than allowing resources to self-schedule. Thermal resources with no use-limitations will be required to submit economic bids for their RA capacity for the period 5:00 a.m. through 10:00 p.m. for every day (including all holidays and weekends). 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 ISO's day-ahead and real-time markets.

Further, the ISO proposes 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 for each ancillary service for which they are certified. Currently, RA resources may bid as a contingency only ancillary service product. However, flexible capacity resources may still be used to self-provide ancillary service.

7.1.2 *Flexible Capacity Must-Offer Obligation – Dispatchable Gas-Fired Use-Limited Resources*

Many dispatchable gas-fired resources that the ISO relies on to meet flexible reliability requirements are subject to environmental use-limitations mandated by a regulatory entity. The ISO and market participants must manage resources that have monthly or annual use-limitations in order to efficiently allocate the available energy from use-limited resource over time. Physical use-limitations may prevent use-limited resources from operating during all the hours covered by the proposed must-offer obligation for flexible capacity resources. Without provisions to accommodate use-limited resources, a requirement to submit economic bids during these hours could result in these resources being dispatched too often and therefore unable to continue meeting the bidding requirement. This would subject these resources to potentially high incentive mechanism penalty risk and therefore most use-limited resources would not feasibly be able to participate in the flexible resource adequacy program.

In order to accommodate use-limited resources that are desirable to the ISO for the purpose of meeting flexible ramping needs, the ISO considered several options:

1. Dispatchable gas-fired use-limited resources would be exempted from the flexible capacity requirement to submit economic bids in all of the flexible capacity hours and not be included in the incentive mechanism.

2. Dispatchable gas-fired use-limited resources could manage their use-limitations by economically bidding in the day-ahead and using SLIC cards (or "hard stops") to manage their dispatch in real-time. This way the ISO would get full flexibility in the day-ahead market, but the resource is able to manage their real-time dispatch other than through adjusting their real-time bid. A real-time adjustment would not prevent the resource from being dispatched at minimum load and therefore at times a hard stop would still be necessary to prevent a dispatchable gas-fired use-limited resource from being sub-optimally dispatched.

3. Dispatchable gas-fired use-limited resources could manage their use-limitations through the market and only certain ISO actions would exempt the resource from the must-offer requirement and incentive mechanism.

Option 1 and 2 are counter to one of the primary purposes of this initiative – to ensure flexible resources are available when needed. These options rely on the resource to predict when it will be needed for flexible capacity and to submit bids in these hours. By exempting resources from the requirement to submit bids for all hours from 5:00 a.m. through 10:00 p.m., the resources lose the price signal to operate during periods of potential high flexible energy needs. Option (3) on the other hand, uses the ISO market to dispatch resources in the appropriate hours rather than the relying on the resource to solely predict the system needs. Therefore, the ISO proposes to create market rules for use-limited resources that allow these resources to be bid in such a way that the market respects its use-limitations.

The ISO proposes to implement option (3), above, through an opportunity cost methodology where the ISO would calculate a resource specific start-up, minimum load, and energy opportunity cost as applicable. The following rules summarize the ISO's proposal for use of the opportunity cost and must-offer requirements for dispatchable gas-fired use limited resources.

For gas-fired use-limited resources providing flexible capacity, the ISO proposal can be summarized as follows:

1. There will be a requirement to submit economic bids into both the day-ahead and real-time markets in all hours for the time period from 5:00 a.m. through 10:00 p.m.

2. Gas-fired use-limited resources will still be able to submit a SLIC card or "hard stop" in real time to modify a day-ahead schedule that would over-use the resource in the scheduling coordinators opinion even with the inclusion of opportunity costs in the bid.

3. Gas-fired use-limited resources will be given additional control over their default energy bid, start-up, and minimum load costs in order to manage monthly and annual use-limitations through the market. This approach is described in more detail below.

To provide gas-fired use-limited resources additional control over their bid costs, the ISO proposes to allow the opportunity cost of operating a resource to be incorporated into its energy bids, and into its start-up, and minimum load costs. The ISO would define the opportunity cost of a resource starting up and being dispatched by the ISO as the profit the resource would have received in the hours with the highest profit for that month or year, as applicable. The specific method of calculating the opportunity cost is discussed in more detail below in section 7.1.2.1. This section describes the conceptual proposal for incorporating the opportunity cost into current market bidding rules.

In order to determine how bid costs would need be adjusted to incorporate opportunity costs, the ISO reviewed the current use-limit plans to see what aspects of a resources' dispatch are limited by use plans currently on file. Use-limitations vary widely across resources; there are a wide range of time based limitations, quantity based limitations, and quality based limitation types. As examples of the range of use-limitations, some resources have limited run hours set by the applicable Air Quality Management District for a month, whereas others have limitations set by the California Department of Fish and Game during a striped bass entrainment period. Despite this variation, most use-limits can be respected by restricting resources' run hours, number of starts, and/or total energy output on a daily, monthly, or annual basis.

These use-limitations, for the most part, correspond to the three major components that make up a resource's bid cost in the ISO optimization; the energy bid, the start-up cost, and the minimum load cost. By allowing scheduling coordinators additional control over these bid costs, the majority of run hour, start-up, and energy output use-limitations should be able to be efficiently managed through the market. These costs are defined in the following sections.

*7.1.2.1 **Energy Bid Cost***

The ISO allows a resource to bid energy up to a bid cap of $1,000/MWh. In the event of local market power, the bid is mitigated to its default energy bid. Current rules allow a resource to establish a default energy bid that reflects the resource's opportunity cost of being dispatched given a limited number of run hours. The ISO proposes to revise and add transparency to the opportunity costs calculation. This is covered in more detail in the next section, Opportunity Cost Methodology.

*7.1.2.2 **Start-up and Minimum Load Cost***

In addition to energy bid costs, the market software uses a resource's start-up and minimum load cost in the energy market optimization. Even if a use-limited resource bids energy at a high price, it is still possible the resource will be started up if the resource's cost to start up and run at minimum load is economic. This is because energy bids are for energy above minimum load and do not affect a resource's cost to run at minimum load. Therefore, ISO proposes to allow use-limited resources to have greater control over their start-up and minimum load bid costs.

Currently, the ISO calculates a "proxy" daily start-up and minimum load cost using resources' fuel usage, O&M costs, and a daily fuel price. A scheduling coordinator also has the option of registering a

resource's start-up and minimum load costs at up to 150% of the ISO calculated proxy cost, projected for the upcoming month.[25] A resource is not required to have a registered cost that are the same percentage of the calculated proxy cost for both cost types and can register a cost less than their proxy cost.

The ISO considered two possible methods of allowing a use-limited resource more flexibility in their start-up and minimum load cost. In both methods the ISO would propose to allow a resource to bid-in their start-up and minimum load cost daily, as opposed to the current approach in which the ISO inserts a cost daily or the resource registers a cost fixed for the month.

- Method A: Allow a resource to include up to the ISO calculated opportunity cost adder in their daily bid-in proxy minimum load cost and start-up cost. Cap the monthly registered cost start-up and minimum load option to 150% of a projected proxy cost that includes the opportunity cost adder.

- Method B: (1) Allow resources to daily bid-in their start-up and minimum load cost with a higher cap and (2) mitigate start-up and minimum load bids to proxy cost (that does not include opportunity cost) in the event the market's local market power mitigation process is triggered. This would be a change as the current local power mitigation process only mitigates bids for energy above minimum load.

The ISO's proposes to adopt Method A and not attempt rule changes involving market power mitigation at this time. This method avoids the potential for the local power mitigation process to reduce a resource's start-up and or minimum load below the calculated opportunity cost allowing the scheduling coordinator more control the amount a use-limited resource is scheduled or dispatched. At the same time, the cap of 150% of projected proxy cost including opportunity cost should provide reasonable protection against market power through bid prices that exceed reflecting a resource's use-limitations. However, this methodology does require the opportunity cost calculated by the ISO to be more accurate.

*7.1.2.1 **Use-limited Resources – Opportunity Cost Methodology***

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. As mentioned above, including an opportunity cost in the energy bid will not prevent a resource from being committed at minimum load if the resources start-up and minimum load costs are economic. However, this general concept can be leveraged to manage physical limitations in a way to maximize a resource's ability to provide flexible capacity to the ISO. The ISO proposes to revise the default energy bid opportunity cost procedure for dispatchable gas use-limited resources and construct a holistic model that incorporates three use-limitations, start-up, run hours, and total output, into the opportunity cost calculation.

[25] 150% cap as of the 2013 fall release.

As described in the Third Revised Straw Proposal, the ISO is proposing to use a profit maximizing unit commitment decision model to quantify energy, start-up, and run hour opportunity costs for dispatchable gas-fired use-limited resources. The fundamental principle is that the foregone profit to a unit from using up one more unit of a binding limitation is the opportunity cost of that limitation, and should be added as a cost to the appropriate objective function term for that resource. If more than one limitation on start-ups, hours of operation, or energy generation over a time period is binding, there will in general be more than one such opportunity cost that will have to be considered. For start-ups and hours of operation, where the affected variables in the optimization are binary variables (0-1), the opportunity cost is calculated as the difference between the profits of two model runs: a base run, and run in which the start-up or running hour limitations are tightened by one unit. The difference in the objective function (the generating unit's profit) will be the opportunity cost of that resource's limitation. For MWh energy limitations, the optimization automatically yields a shadow price on that constraint, which is its opportunity cost. This is possible because that constraint is limiting continuous variables rather than binary variables.

The ISO plans to develop a unit commitment optimization model based on the proposed methodology presented by the Market Surveillance Committee to calculate the opportunity cost for the set of limitations in each resource specific use-limitation plan. The model will optimally commit and dispatch each resource given its constraints and use limitations against forecasted real time prices over a given time period. The time period will cover a month for resources with monthly limitations and a year (or relevant portion of a year) for resources with yearly limitations. For each limitation defined in its use limitation plan, the resource will be re-dispatched tightening the limitation by one unit, i.e., one start or one operation hour. (As noted, this is not necessary for MWh limitations.) The model will use forecasted prices and applicable costs for start-up, minimum load, and energy bid.

An opportunity cost will be calculated for each constraint each resource has defined in the use limitation plans. At a minimum, if a limitation is monthly, the opportunity cost will be updated each month; or updated each year for annual limitations. More frequent updates are anticipated if the resource's usage differs appreciably from what was projected in the model run, or if energy or fuel prices deviate appreciably from what was assumed in the original model run. The opportunity cost associated with each limitation a resource has will then be incorporated into the start-up costs, minimum load costs, or energy bid costs, as appropriate. As noted in the previous straw proposal, all limitations being modeled can generally be categorized as either start up, operation hours, or energy limitations. How the model will be used to determine the opportunity cost for each of those categories is below.

Start-up

Resources with limited starts per month or year will have a startup opportunity cost calculated for each applicable time period, i.e., each month or each year. To determine what the value is of having one more start, one can compare the profit maximizing profits with all starts available to the profits with one less start. This will be done by running the optimization model, for a given month or year, for each resource with a start limitation twice; first it will be run with all starts and then again with one less start.

The difference in the maximized profits from the two runs will be the start up opportunity cost for that resource and time period. This cost will then be added to the current start-up cost and used in the markets for the corresponding time period. As noted above, updating is possible during that time period.

Operation hours

Resources with a limitation on operation hours per time period will have a run time opportunity cost calculated for each applicable time period, i.e., each month for monthly limitations or each year for yearly. Similar to the start-up opportunity cost, the run time opportunity cost will be determined by comparing maximized profits from having all run hours to having one less run hour. This opportunity cost will be added to the minimum load cost for the given time period. If a resource has both start-up and run time limitations, the calculation of each opportunity cost will be done independently of one another setting the other limitation to its original value.

Energy generation

Resources with a maximum generation level per time period will have an opportunity cost calculated for the last megawatt of generation. Since this is not a binary decision in the optimization model, the shadow value on this constraint is the opportunity cost of the last megawatt. Therefore this will only require one model run. The opportunity cost associated with a maximum energy generation limit will be incorporated into the resource's DEB. The shadow value on this constraint is in $/MWh, therefore this cost will be added on to the energy bid cost component used in calculating the DEB, shifting the entire curve upward by the $/MWh shadow value.

Forecasted energy prices

As noted above, the opportunity cost of each limitation will have to be calculated in advance of the time period. The model will need to use a set of forecasted prices to optimally dispatch each resource and calculate the opportunity cost for a given time period.[26] The ISO proposes to forecast real time energy prices to use in the model. The reasoning for real time prices is 1) resources are dispatched based on real-time prices because the real-time market is a complete re-optimization and 2) under the must offer obligation, scheduling coordinators must submit real time economic bids. Therefore using forecasted real time energy prices aligns with the dynamics of the market and proposal.

In general, the ISO will forecast the real time prices by determining an implied heat rate for each resource based on real time energy prices from the same time period the previous year. This will allow the implied heat rate to inherently contain real time price volatility which will then be used to forecast prices for the current given time period. For example, if the ISO is estimating November 2013 prices, they will use November 2012 real time energy prices, greenhouse gas costs, and daily natural gas prices.

[26] The given time period is either a future month for monthly limitations, or the following year for yearly limitations.

This will generate an implied heat rate for every five minute real time interval, which will then be used to forecast November 2013 real time energy prices for a given resource.

Once the implied heat rate is calculated, the forecasted energy prices for the given time period can be determined. The implied heat rate will be multiplied by the applicable natural gas futures price. To that, an estimated greenhouse gas cost will be added back in to create forecasted 5 minute real time energy prices for the resource for the given time period. The specific formulations are provided below.

The real time energy prices will be forecasted as follows:

$$\mathrm{LMPi,t} = \mathrm{ImpHR_{i,t\text{-}1}} * (\mathrm{NatGas_{l,t}} + (\mathrm{GHGasF_t} * \mathrm{EmRate}))$$

Where $LMP_{i,t-1}$ is the forecasted real time price at pnode *i* for interval *t*

$\mathrm{Im}\, pHR_{i,t-1}$ is the calculated implied heat rate at pnode *i* from a base period, *t-1*

$NatGas_{l,t}$ is the estimated natural gas price for region *l* and time period *t* based on the average daily gas price from the most recent 30 day set of prices available.

$GHGasF_t$ is the greenhouse gas allowance price for time period *t*.

EmRate is the emissions rate per MMBtu of gas, which is $.0530731 mtCO_2e / MMBtu$

The implied heat rate, $\mathrm{Im}\, pHR_{i,t-1}$, will be determined as follows:

$$\mathrm{Im}\, pHR_{i,t-1} = \frac{LMP_{i,t-1}}{NatGasP_{l,t} + (GHGas_{t-1} * EmRate)}$$

Where

$LMP_{i,t-1}$ is the real time energy price at pnode *i* from the previous year's period, *t-1.*

$GHGas_{t-1}$ is the greenhouse gas allowance price from the previous year's period, *t-1*.

EmRate is the emissions rate per MMBtu of gas, which is $.0530731 mtCO_2e / MMBtu$

$NatGasP_{l,t}$ is the daily natural gas price from the region *l* of pnode *i* and the previous year's period, *t-1*

Next steps

The ISO has already started developing a model to test a few resources with use limitation plans on file. Once the model is completed, we intend to use the model and determine the optimal dispatch and

opportunity cost of each constraint for a few resources over recent months. Then the model will be run again using actual real time energy prices and compare the two optimal dispatches. This will provide insight into how accurate the methodology is for 1) forecasting energy prices and 2) calculating the opportunity cost of each limitation. The ISO will share these results with stakeholders separately from this document once they are available.

*7.1.2.2 **Use-limited Resources – Use Plans***

The ISO will revise its use- plans that must be submitted for use-limited resources in several ways in order to allow the ISO to calculate a more accurate opportunity cost for each resource. First, the ISO will require information as applicable to the resource. For example, the resource will only have to fill out an annual or monthly limitation as applicable. Currently, if a resource has an annual use-limitation, the scheduling coordinator must still submit a monthly limitation; in the future, the ISO will only require a monthly limitation if the resource has an actual physical monthly limitation. Similarly, the resource will be asked to provide information on limitations related to MW, MWh, Hours, or start-up limitations, as applicable. Second, the ISO will only accommodate use plans for verified current limitations. The revised use-plans will require verifiable dates. Finally, the ISO will require an accurate and full description of the resource's use limitations. In the event a resource's limitations do not fall within the requested categories, the resource will be required to provide a written description, rather than converting their limitation into a specific category.

*7.1.2.3 **Economic Withholding***

Some market participants have expressed concerns that allowing resources to manage their use-limitations through the incorporation of an opportunity cost is tantamount to economic withholding. Fundamentally, economic withholding is when a resource artificially increases its bid price above variable costs to avoid being dispatched for the purpose of forcing the market to dispatch higher-priced bids and establish a higher market clearing price to benefit the remainder of that supplier's portfolio that was dispatched by the market. While it is likely that including opportunity cost in the startup and minimum load cost of use-limited resources will impact unit commitment and dispatch, the presumption in the comments likening this to economic withholding is that opportunity costs are not valid variable costs of production[27] and therefore distort dispatch.

It is the use limitation that creates the opportunity cost and also legitimizes it as a variable cost of production. A limited resource is most efficiently used when the value of its output is highest. This not only benefits the resource owner through greater profit, but also benefits load in that the use of that resource during relatively scarce periods will result in lower prices on (presumably) a higher volume transacted. Including accurate representation of opportunity cost in the three production activities that are bid by use-limited resources results in more efficient dispatch and pricing from all perspectives.

[27] The term "variable cost of production" is used here to reflect variable cost relative to any of the operating activities that comprise the three-part bids for generation in the California ISO: startup, operating at minimum load, and operating above minimum load. While startup and operating at minimum load are not price-setting activities in the Cal ISO market, they do have costs associated with them that must be accurately reflected in the optimization for efficient dispatch and pricing.

The general concern then must be with the accuracy of the calculated opportunity cost that will be used in the startup and minimum load bids. The inaccuracy can emanate from two general sources: (1) methodology and data underlying the calculation or (2) misinformation from the supplier about the nature and magnitude of the opportunity cost. Inaccuracy can introduce inefficiency; however it can only be economic withholding if the estimate is sufficiently high *and* is controlled by the supplier *and* is leveraged to benefit the remainder of the supplier's portfolio.

In the proposal, the ISO will be calculating the opportunity cost on behalf of each use-limited resource in order to provide an estimate of legitimate costs to include in the resource's bid. This calculation will be based on an imperfect prediction of the future; therefore, the ISO is allowing a resource to incorporate its own estimate of the opportunity cost within an ISO calculated bid cap specific to the resource. Incorporating these costs into a resource's minimum load, start-up, and/or energy bid cost is therefore not artificially increasing the bid to avoid being dispatched- rather, it is legitimately adjusting the bid in order to be dispatched in the intervals where the output has the highest value to both the resource and load.

Finally, under the existing requirements for use-limited RA resources there is obligation to offer in specific hours, only an obligation to offer when a resource is available consistent with its use-limitation, which effectively allows for 100% physical withholding from the spot market. The current proposal trades a small potential inefficiency (via the resource-specific cap which may be marginally above the actual opportunity cost) for eliminating up to 100% physical withholding.

7.1.3 *Flexible Capacity Must-Offer Obligation – Hydro Resources*

Hydro resources, similar to use-limited with the gas-fire use limited resources, will be required to submit economic bids into the day-ahead and real-time markets from 5:00 a.m. through 10:00 p.m. The ISO will honor the use-limitations, however the resource must be able to provide at least six hours of energy for the amount of flexible capacity it is obligated to serve.

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).[28] 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. The ISO has developed an approach that reflects these limitations.

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

[28] 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 and any other demand response resource that requires notice prior to the day-ahead market 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 a.m. or 10:00 p.m.). 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) 7:00 a.m. through 12:00 p.m. or (2) 3:00 p.m. through 8:00 p.m.

Some stakeholders raised concerns about the timing of the must-offer obligation for demand response resources in comments to the third revised straw proposal. These stakeholders were concerned that the demand response resources would be asked to be available for peak-load reduction and flexibility at the same time. However, to the extent that a demand response resource is being used for a both flexible capacity and peak load shaving, then, just as has been proposed for other use-limited resources, the ISO market will honor the use-limitations of the resource through modeled start limitations. For example, if a PDR resource is used for peak shaving on a given day, then it will not also be required to be available to provide flexibility for an evening ramp. 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 has a 3-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 for gas-limited use-limited. Additionally, as discussed in section 8.5, demand response resources that have reached some minimum availability thresholds in a month would not be subject to SFCP non-availability charges.

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 resource 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.). Once dispatched, the PDR resource could call 10 customers one day and 10 different customers on another day. This should help the PDR resource from over-burdening a single enrollee.

Several parties have suggested the ISO allow PDR to be aggregated and dispatched at DLAP level if it is providing flexible capacity. The ISO has considered this possibility but believes changing PDR goes beyond the scope of this initiative and, if addressed, should be done as part of a separate initiative.

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. No LRAs have a methodology for assessing the qualifying capacity of energy storage resources for generic RA. The ISO continues to work with the CPUC in the current RA proceeding to develop both a qualifying capacity criteria and effective flexible capacity counting provisions for energy storage resources.

As noted in section 6, the ISO proposes that storage resources would have the option to be either a regulation energy management resource or a full flexible capacity resource. Resources that select the regulation energy management option will be required to submit economic bids for regulation for the time period from 5:00 a.m. – 10:00 p.m. as a regulation energy management resource. Resources that select the full flexibility option will be required to submit economic bids for the full amount of effective flexible capacity sold from 5:00 a.m. to 10:00 p.m. 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. Finally, in the third revised straw proposal the ISO proposed that energy storage resources be permitted to select one of the demand response bidding windows. This option was included to facilitate thermal storage technologies. However, upon further review, the ISO believes that these technologies may be better suited to provide their flexibility under PDR. Therefore, including such an option for energy storage is not necessary.

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. If a variable energy resource submits economic bids that allow it to be scheduled or dispatched at less than its forecast output, the ISO markets will 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.[29] 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 5:00 a.m. – 10:00 p.m. unworkable for these resources.

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

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 and Solar Thermal	Wind
January	7:00 a.m. – 5:00 p.m.	5:00 a.m. – 10:00 p.m.
February	7:00 a.m. – 5:00 p.m.	5:00 a.m. – 10:00 p.m.
March	7:00 a.m. – 6:00 p.m.	5:00 a.m. – 10:00 p.m.
April	7:00 a.m. – 7:00 p.m.	5:00 a.m. – 10:00 p.m.
May	6:00 a.m. – 8:00 p.m.	5:00 a.m. – 10:00 p.m.
June	6:00 a.m. – 8:00 p.m.	5:00 a.m. – 10:00 p.m.
July	6:00 a.m. – 8:00 p.m.	5:00 a.m. – 10:00 p.m.
August	6:00 a.m. – 8:00 p.m.	5:00 a.m. – 10:00 p.m.
September	7:00 a.m. – 7:00 p.m.	5:00 a.m. – 10:00 p.m.
October	7:00 a.m. – 6:00 p.m.	5:00 a.m. – 10:00 p.m.
November	7:00 a.m. – 4:00 p.m.	5:00 a.m. – 10:00 p.m.
December	7:00 a.m. – 4:00 p.m.	5:00 a.m. – 10:00 p.m.

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 and solar PV resources reflect daylight hours. 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.[30] It possible that a variable energy resource providing 10 MW of flex capacity

[30] Variable energy resources will have to manage risks associated with energy source limitations (i.e. cloud cover or loss of wind).

for which the forecast is 0 MW in an hour could count as providing 0 MW in that hour of flex capacity. The ISO is considering treating such instances by counting the variable energy resource's availability at the lower of the bid or the resource's forecast. The ISO is seeking stakeholder input to determine if this is the appropriate treatment. But there would potentially be a 10 MW bid in the market that the real-time market just won't dispatch. 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 that would generate economic bids for flexible capacity if not submitted by a resource and the feasibility of implementing the necessary changes for 2015 RA compliance year. The ISO believes that imposing bid validation rules is not the best approach. 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 8, below.

8 Flexible Capacity Availability Incentive Mechanism

The ISO's existing availability incentive mechanism (i.e. standard capacity product) applies a charge or incentive payment based on an RA resource's availability relative to the RA fleet average 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. In addition, the standard capacity product only measures availability as measured by forced outage rates while the ISO needs economic bids for flexible capacity. Therefore, the ISO must establish a new availability incentive 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 leveraged to help develop an availability incentive mechanism for flexible capacity. The ISO is currently planning to implement the flexible capacity availability incentive mechanism no later than the 2016 RA compliance year.

8.1 The Flexible Capacity Availability Incentive Mechanism

The ISO believes that a flexible capacity availability incentive mechanism should provide the incentives for resources to submit economic bids in compliance with the applicable must-offer obligation. Therefore, for purposes of the flexible capacity availability incentive mechanism, or Standard Flexible Capacity Product (SFCP), "available" is defined as having economic bids in the ISO's day ahead and real-time markets for the amount of a resource's RA flexible capacity. 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.[31] Therefore, the structure and design of the SFCP is important to ensure flexible capacity resources provide their RA flexible capacity to the ISO markets.

The ISO has considered three primary approaches for the SFCP:

- First, as proposed in the second revised straw proposal, the ISO is considering an approach that evaluates the availability of generic capacity and flexible capacity in completely separate "buckets." This approach is referred to as the "bucket method."
- The ISO is also considering using an approach that leaves the existing SCP for generic capacity intact[32] and considers a resource's flexible capacity made available through economic bidding as an additional availability measurement. This second approach is referred to as the "adder method." This is the ISO's preferred approach.
- Finally, the third approach like the adder approach would calculate the SCP and SFCP independently, but would charge the resource the worse of the SCP or the SFCP for under-performance relative to the system target. This last approach is referred to as the "worse-of method."

The following sections detail each these approaches, including the interaction with the existing SCP, and provides examples of how each structure would be applied. The section concludes with a discussion explaining why the ISO believes the adder method is the preferred option.

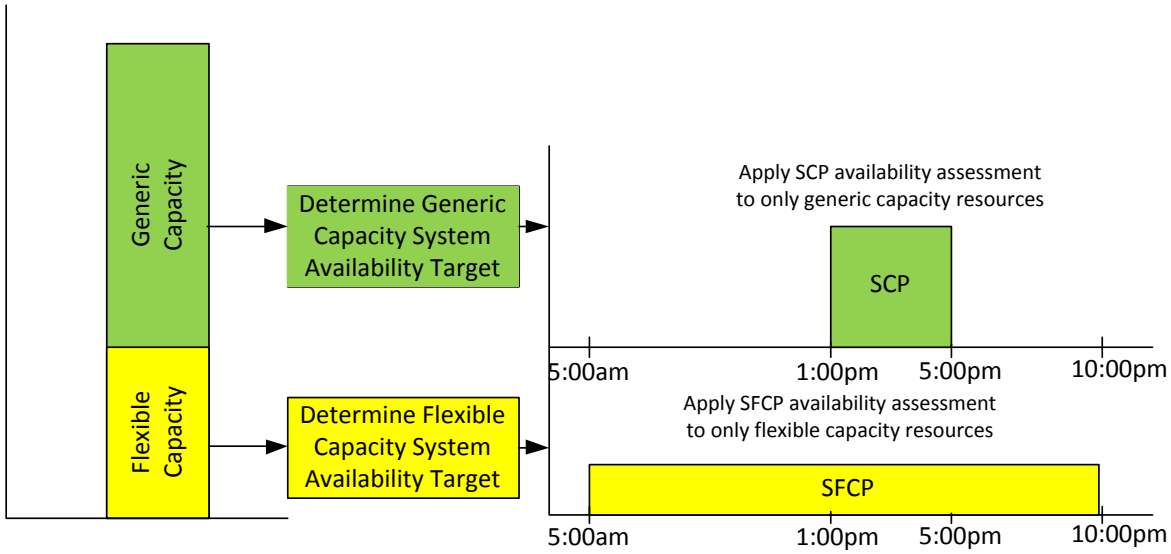
8.1.1 *The Bucket Method*

The primary premise behind the bucket method is that generic capacity and flexible capacity are put into separate categories and compared only with other capacity in the same category. For example, when measuring availability, the ISO would split the pool of the system's RA capacity into a generic pool and a flexible pool. Once the two pools are split, the ISO would establish availability targets for generic capacity and another target for flexible capacity. The ISO would only consider generic capacity's performance to determine the generic capacity target. Similarly, it would set the flexible capacity target using only flexible capacity's performance meeting its must-offer obligation. Then, once the targets are set, each resource would be assessed to determine the compliance with the applicable must-offer obligation. Generic capacity's availability would be based on the existing SCP criteria (definition of "available" and the required hours of availability). Flexible capacity would be measured based on the definition and measurement of availability for flexible capacity (compliance with the applicable must-offer obligation as defined in Section 7, above). Figure 3 is a graphic representation of the splitting of

[31] However, standard RA bid validation rules will still apply.
[32] The ISO is planning to address the SCP for DR soon.

the two different types of capacity into separate pools and the assessment of each type relevant to the availability criteria.[33]

Figure 3: The Bucket Method



8.1.2 *The Adder Method*

The adder method considers a MW of capacity providing RA flexible capacity as both flexible and generic. The adder method recognizes the bundling principle of generic and flexible capacity outlined in the appendix of the CPUC's most recent RA decision.[34] Briefly, it is not possible to have access to the flexible capability of a MW of capacity without also having access to the underlying generic capacity. The adder method would allow the ISO to recognize the value of the availability of the generic capacity and then the added value of the availability of the flexible capabilities.

The adder method would work as follows:

1. The ISO would calculate a system wide SCP availability target based on the pool of all RA capacity (both flexible and generic) using historic system wide availability. All resources' availability for purposes of the existing SCP mechanism would be assessed relative to this target. Under this method, a flexible capacity MW that self-schedules but is available (i.e. not on forced outage) during the SCP assessment hours would be considered available for the purpose of the existing SCP. All SCP charges and credits would then be calculated.

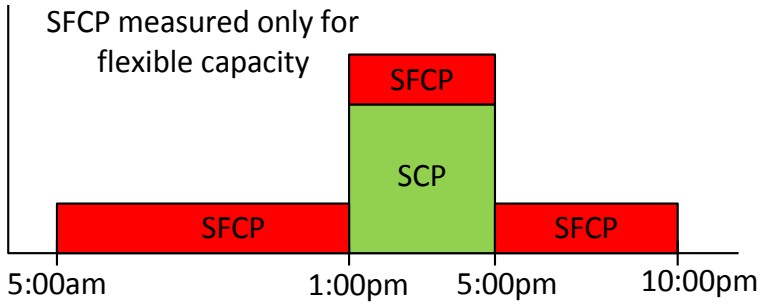
2. Next, the ISO would calculate a system flexible capacity availability target using historic system wide availability of only flexible resources. Availability would be defined as

[33] Resources on outage that submit bids will not receive credit towards their SFCP availability measurement.
[34] This decision was issued by the CPUC on June 27, 2013 and is available at http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M070/K423/70423172.PDF. See the Appendix at A-5

submission of an economic bid for the flexible capacity and the flexible capacity not being on forced outage. Then, the ISO would calculate the availability of flexible capacity resources and compare this to the system target. A flexible capacity resource that self-schedules would be considered un-available under this assessment. All SFCP charges and credits would then be calculated.

3. Finally, the two availability mechanisms, SCP and SFCP, would be summed to create the total availability compensation or charge. Figure 4 illustrates an example of how the ISO would "layer" the value of the availability of the flexibility (i.e. economic bid) on top the availability of the resource during peak hours. This shows that a flexible capacity resource that is on forced outage will be subject to the SCP and the SFCP non-availability charges. Figure 4 also shows that the ISO will still assess the availability of the flexible capacity during all hours of the flexible capacity must-offer obligation.

Figure 4: Assessing availability using the adder method



8.1.3 *The Worse-of Method*

The worse-of method is similar to the adder method in that system targets and availability assessments are conducted for both SCP and SFCP independently. Once the assessments are completed, the ISO would look at the availability of each resource relative to both the SCP and SFCP system targets and calculate the penalty for resources below the system availability target and calculate the availability penalties for both. Then, the ISO would apply the larger monetary penalty to the resource. For example, if a resource had penalties for SCP of $100 and SFCP penalties of $150, then the resource would be assessed a $150 penalty. All penalties assessed would stay in the pool for which the non-availability was assessed. In the above example, the $150 penalty would be placed into the SFCP non-availability charge pool and would be allocated to the resources that exceeded system the SFCP target.

8.1.4 *Comparison Three Methods: Why the Adder Method is Appropriate*

While on the face, the bucket approach seems to be an easiest method to implement, the ISO has assessed each of these methods extensively and believes the adder method is the best option. The primary reason is that the adder method most accurately reflects the relative values of generic capacity and the additional value of flexible capacity and is subject to less overlap and feedback, as described further below, in the availability assessment.

The definition of "available" differs between SCP and SFCP. The definition of "available" for SCP and SFCP is important in understanding the mechanics of each of the above methods. For example, if the ISO uses the bucket approach, then flexible capacity that is self-scheduled would be treated the same as a flexible capacity completely unavailable because of an outage. However, the adder approach would consider a resource that is self-scheduled to be available as generic capacity under the assessment for SCP but not available as flexible capacity under its separate assessment for SFCP. The examples provided on the appendix of this document demonstrate the treatment of a) how a resource that self-schedules into the market and b) a resource that is on outage are considered under these three approaches.[35]

The bucket method would require counting rules to determine if an outage or derate affected flexible or generic capacity. If a 100 MW resource has 100 MW of RA capacity and 60 MW of this is flexible capacity, then, under the bucket approach, the resource would be split into two buckets. If the resource is derated to 75 MW, then the ISO would have to design a methodology to account for how this derate is attributed to each bucket. The options for how this could work include a) a pro-rata split, b) the derate would be allocated to one bucket or the other or c) the SC could choose how the derate is allocated. Further, the approach selected would feedback into the system availability target for both buckets. If the pro-rata approach is selected, then the resource would be set at 75 percent compliant for each bucket. However, if either options b) or c) are selected, the resource could be as much as 100 percent compliant with one standard and much lower in the other. The use of each of the above options would also have a different impact on the system availability target in future years because is set based on all resources availability.

Without explicit provisions that address how outage and derates are counted, the ISO also believes that the bucket method provides an adverse incentive to report as many outages as possible as flexible capacity outages. The reason for this is based on the number of hours over which availability is measured. The SCP uses an incentive price equal to the CPM rate. The ISO, in the second revised straw proposal, recommended that the SFCP price mirror the current CPM rate. The SCP is measured over five hours during weekdays. However, the SFCP is measured over 17 hours and 7 days per week. If the incentive rate for SCP and SFCP are set at the CPM rate (assume $67.50/kw-yr), then one hour of non-availability under the SCP would be slightly more than five times more costly than one hour of non-

[35] The examples shown in the appendix assume 18 hours of availability to create symmetry between the five day all day self-schedule and the 10 day partial day outage examples. The ISO has posted the spread sheet used to generate these examples at http://www.caiso.com/Documents/FlexibleSCPoptions_Bucket_Adder_Worst-of.xls.

availability under the SFCP.[36] If the ISO where to propose a rate different from the existing CPM rate for flexible capacity, it would have to be more than $300/kw-yr per-hour non-availability charge to be comparable to the existing CPM rate.

Such considerations would be unnecessary using the adder and worse-of methods. Under the adder and worse-of methods the ISO would utilize both the existing SCP and new SFCP assessment methodologies and apply charges and credits accordingly. In the above example, the ISO would calculate that the resource to be 75% available under the SCP assessment and then, assuming the resource economically bids in 60 MW into both the day-ahead and real-time market, 100 percent available under the SFCP assessment. By calculating both the SCP and the SFCP separately, the ISO would not have any feedback from one availability target into the other based on how an outage is reported. The ISO would also not have to make any determination regarding whether the capacity on outage is flexible or generic. The resource, through its bidding activity would demonstrate what portion of the capacity is out.

The "worse-of" method provides incentives to be compliant with both the SCP and SFCP availability requirements. However, it will only apply charges for not providing one service, not two. For example, if a resource was on forced outage from 1:00 p.m. through 10:00 p.m., the "worse-of" method would only apply non-availability charge for the SCP capacity. It would not recognize the loss of flexible capacity from 1:00 p.m. through 10:00 p.m. Additionally, splitting the pool of non-availability charges into two pools also reduces the incentives for resources to over-perform relative to the system target for either SCP or SFCP. Muting such performance incentives may reduce the effectiveness of the SCP or SFCP in ensuring resources are available.

The adder approach allows the ISO to recognize the value of generic capacity availability separately from the additional value provided by that capacity economically bidding into the market. The ISO

[36] As an example, if the SFCP was in place for June 2013, the cost of one hour of outage under the SCP would be calculated as follows:

$$SCP\ hourly\ cost = \frac{CPM\ rate\left(\left(\$/_{kwyr}\right)\right) * 1000}{Months * Compliance\ Days * Compliance\ hours}$$

$$SCP\ hourly\ cost = \frac{\$67.50\ kwyr * 1000}{12 * 20 * 5} = \$56.25$$

The cost for one hour of outage under the SFCP would be calculated as follows:

$$SFCP\ hourly\ cost = \frac{CPM\ rate\left(\$/_{kwyr}\right) * 1000}{Months * Compliance\ Days * Compliance\ hours}$$

$$SFCP\ hourly\ cost = \frac{\$67.50\ kwyr * 1000}{12 * 30 * 17} = \$11.10$$

believes that a flexible capacity resource is providing *more* value by economically bidding than if it were to self-schedule. However, it is not reasonable to say that a flexible capacity resource is not providing any benefit unless it is economically bidding. The adder method splits the capacity and provides a superior approach for valuing generic and flexible capacity than the bucket method.[37]

8.1.5 *Pricing the flexible capacity availability adder*

The ISO believes the benefits of the adder method make it the best option. However, the primary challenge with this option is determining the correct price to use for non-availability charges. The ISO has considered three options for setting the flexible capacity adder:

1) The CPM rate,

2) The average $/kw-yr equivalent for the flexi-ramp constraint, and

3) The limited CPUC data for RA contract prices that is publically available

In the third revised straw proposal, the ISO proposed an adder price, $23.25/kw-yr based on the difference between the average and the 85th percent capacity contract price as reported by the CPUC plus an additional incremental price to account for the time delay in the CPUC's RA reporting.[38] Based on stakeholder comments on the third revised straw proposal, the ISO reexamined all of these options.

The objective of the flexible capacity availability adder is to value the additional benefit of the flexible capacity. The ISO examined the first three of the identified options in the third revised straw proposal. Each of these options resulted in a wide array of prices depending on the assumptions made in calculating the value of flexible capacity. For example, the use of the flexible ramping constraint offered an extremely wide spread of values depending on the assumptions about how a non-zero shadow price in the flexible ramping constraint.

As noted above, using the CPUC's 2011 RA report, which is the most recent report published by the CPUC,[39] resulted in the ISO proposing flexible capacity adder is $23.25.[40] However, in comments, many stakeholders pointed out that there are numerous reasons why the spread between the average price for system capacity with the 85th percentile for ISO system capacity exists and that the ISO should not assume that the difference has anything to do with the flexibility of resources. The ISO has had further

[37] The adder method could easily be transitioned to use a price signal received from a reliability services auction.
[38] The ISO compared the difference between the average price for system capacity with the 85th percentile for ISO system capacity. The assumption here is that lower quality capacity will have a lower price, while newer and higher quality capacity (i.e. more flexible capacity) will receive a slightly higher capacity price. The difference between these two values is $19.44/kw-yr. The same data from the 2010 RA report showed a difference of $18.48/kw-yr. This is an increase of $0.96/kw-yr from the 2010 report to the 2011 report. The ISO proposes to start with the 2011 RA data and add a consistent growth factor to account price increases from 2011 to present.
[39] Available at http://www.cpuc.ca.gov/PUC/energy/Procurement/RA/
[40] This assumes a starting point of $19.44 and adds 4 years of increase in price at $0.96/kw-yr per year for four years to account for the fact that the first year in which the flexible capacity availability adder will be in place will be 2014. The actual amount would be $23.28, but the ISO rounded this down to the nearest $0.25/kw-yr

discussion with the Office of Ratepayer Advocates regarding the use of confidential RA contract data. While use of this data would help the ISO better understand the historic prices being paid for capacity, it does not address the concerns raised by stakeholders regarding the causes of these price differences.

In reviewing the prospect of using the flexible ramping constraint to establish the SFCP adder, the ISO narrowed the assumptions about how to convert the flexible ramping constraint price into a forward capacity price ($/kw-yr). Based on the definition of the flexible capacity needs, the ISO looked only at time intervals between 5:00 a.m. and 10:00 p.m. Additionally, the ISO had to determine if it was appropriate to use only the intervals in which the constraint was binding or to use all time intervals. Reasonable arguments can be made for either. For example, one could argue that the ISO should only look at the hours in which the constraint binds because that is the reflection of the value of additional flexible capacity. Alternatively, one could argue that the resources must be available at all hours and therefore the ISO should include all hours. The ISO believes the goal of the SFCP adder is to provide sufficient incentive for flexible capacity resources to be available during the hours in which the resources are most needed. As such the ISO proposes to use average flexible ramping price from only the time intervals in which the flexible ramping constraint was binding. The resulting price is $30.10/kw-yr as the adder price.[41]

However, after calculating these prices, the ISO took an even deeper look into the implications of using the flexible ramping constraint to set the SFCP adder price. Basing SFCP adder price on the flexible ramping constraint would lead to circular pricing signals between the SFCP and flexible ramping constraint. For example, the SFCP price would have a direct impact on the flexible ramping constraint price and vice versa. Therefore, the ISO proposes to freeze the adder price at this level until 1) resource flexible capacity availability levels are excessively low (the ISO requests stakeholder input as to what these levels would be, 2) a market based pricing mechanism for forward procurement of flexible capacity has been established or 3) three years, at which time the adder price will be reexamined.

Given the lack of historical data on the value of flexible capacity, it may not be feasible to find an empirically based price beyond the price provided by the flexible ramping constraint at this time. The ISO has considered the prospect of applying an administrative price, but views this as a vastly inferior option relative to using the flexible ramping constraint prices. The ISO will also seek input regarding the method used to derive the proposed flexible capacity adder as well as on other methods that could be used to determine the value for the flexible capacity availability adder if they believe the proposed method is not correct.

[41] Using all time intervals between 5:00 a.m. and 10:00 p.m., including the intervals in which the flexible ramping constraint was not binding, produced an average price of $3.83/kw-yr. However, the ISO does not believe this price accurately represents the value of flexible capacity availability.

8.2 Self-funded Incentive Structure for the Standard Flexible Capacity Product

The ISO proposes to use an incentive structure that mirrors the existing SCP incentive mechanism. As with the existing SCP, the ISO believes this mechanism should be self-funded. As such the ISO will design a mechanism that looks only 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. As noted in section 8.1.3, above, the ISO will calculate the SCP and the SFCP independently of one another.[42]

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. The rate at which resources will be credited with SFCP availability credits will be based on 1) the amount of available funds resources that where available at less than the system availability target minus 2.5 percent and 2) the quantity of MWs that exceed the system flexible capacity availability target plus 2.5 percent. As with the SCP, flexible capacity resources that fall below 50 percent availability will be considered unavailable for 100 percent of the month.

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. Given this difference, the ISO proposes to allow an initial dead-band of 7 percent (3.5 percent above and 3.5 percent below) around the system flexible capacity availability target. Once all years in the assessment have historic flexible capacity availability data the ISO will reduce the dead-band to 5 percent as noted above.

8.3 Evaluation of Compliance with Must-Offer Obligation

Using the adder method described in section 8.1.2 allows the ISO to recognize that an outage of a flexible resource is different from the outage of a generic capacity resource. Therefore, the flexible capacity availability incentive mechanism will only compare flexible capacity resources with other flexible capacity resources. The flexible capacity availability incentive mechanism will only consider a

[42] The ISO has developed a tool to allow markets to understand the charges and credits for both the SCP and SFCP availability. This tool can be found at http://www.caiso.com/Documents/Example_of_SCP_and_SFCP_calculations.xls.

flexible capacity resource's compliance with the applicable must offer obligation (excluding planned outages and monthly use-limitations as discussed below).

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 in both markets. Because of the importance of each of these markets, the ISO proposes to assess availability based on a resource submitting economic bids into both markets.

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 is providing 20 MW of flexible capacity must submit 20 MW of economic bids for all hours within the must-offer obligation into both the day ahead and real-time markets.

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:

$$SFCP\ Availability_{MTH_y} = \frac{\sum_{i,j}\begin{bmatrix} 0.2 * (MW\ bid\ into\ hour\ i\ on\ day\ j\ into\ DAM) + \\ 0.8 * (MW\ bid\ into\ hour\ i\ on\ day\ j\ into\ RTM) \end{bmatrix}}{Compliance\ hours\ in\ the\ month * Flexible\ capacity\ provided}$$

This is a change from the third revised straw proposal designed to provide an incentive for resources that may have self-scheduled into the day-ahead market to submit economic bids into the real-time market. The "compliance hours in a month" term will include both the day-ahead and real-time hours.

The ISO proposes to cap the resource's 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.

8.4 Substitution for Forced Outages

The current SCP allows RA resources that are force out to provide the ISO with substitute capacity to maintain compliance with the SCP. This allows RA resources to mitigate the risks of non-availability charges while ensuring the ISO has access to sufficient capacity despite the forced outage. The ISO believes that having a similar tool in place for flexible capacity that is forced out will provide similar

benefits. Therefore, the ISO will allow resources that are forced out during a month to provide substitute capacity to cover the flexible capacity lost due to the outage. As with the SCP, any substitute capacity provided to account for a flexible capacity outage must be received and approved by the ISO prior to the close of the IFM. It is also important to note that the resource on outage would have to provide substitute capacity to address both the outage of generic capacity and the flexible attribute to avoid SCP and SFCP non-availability charges. The substitution for flexible capacity need not come from the same resource that provides the generic capacity. However, if the resource on outage is providing local capacity, it will still be required to replace the local capacity with another local capacity resource to ensure local reliability is maintained. Additionally, if a resource has flexible capacity, but is only shown as generic, and goes on forced outage, then the resource would only be responsible for finding substitute capacity to replace the generic capacity. Unlike local, there is no preapproval process required for substituting flexible capacity. The amount of flexible capacity a resource can substitute for another resource is determined by the resources EFC.

8.5 Additional Considerations in the Standard Flexible Capacity Product

For most flexible capacity resources failure to submit a bid for the resource's flexible capacity quantity for any reason not approved by the ISO (Forced outage, self-scheduling, derates, etc.) will be considered non-compliant for purposes of the SFCP even if the resource is on-line and operational. However, the ISO also recognizes that there some instances where a flexible capacity resource is not available, but that unavailability should not count against its SFCP availability calculation. Specifically, the ISO believes following exceptions should be made:

1)Long-start resource not scheduled in the IFM would not have to economically bid into the ISO's real-time market to fulfill its must-offer obligation

2)Resources on an ISO approved planned outage

3)Resources that have reached daily or monthly use-limitation, subject to meeting an availability threshold

8.5.1 *Long-start resource not scheduled in the IFM*

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 scheduled 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.[43]

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. Currently long start RA resources not scheduled in the IFM are not required to be available in the real-time market to fulfill their must-offer obligation. However, 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.

8.5.2 *Resources on an ISO approved planned outage*

In calculating a resource's actual availability, planned and ISO approved outages will not count against a resource. For example, a resource that has a planned outage will be assessed based on the hours the resource was not on planned outage.[44] If the month has 510 hours of must-offer obligation, but a resource is on a planned and ISO approved outage for 255 hours (i.e. half the month), the SFCP would calculate the resource's availability based on the compliance with the economic must-offer obligation for the remaining 255 hours. In other words, if the ISO has approved the outage, then that outage should not count against the resource. However, any hours of non-availability in the remaining 255 hours will have a greater impact on the resource's SFCP calculation than if it were not on planned outage. This is slightly different than the existing treatment of planned outages under the SCP. Under SCP, a planned outage is does not impact the number of hours the resource needs to be available. In the above example, the resource would still be measured against 510 hours. The resource would be considered available for the 255 hours of approved outage. However, the ISO's proposed treatment of planned outages in this proposal provides a more accurately reflection of a resource's contribution to flexible capacity over the month.[45]

[43] If such an approach is used, the ISO would work with LRAs to facilitate parallel changes to their flexible capacity requirements.
[44] Examples of how planned outages impact the counting of flexible capacity availability of the resource and the system availability target are included in the ISO tool referenced in footnote 41.
[45] The ISO is considering is a similar change is required for the SCP.

8.5.3 *Resources that have reached daily or monthly use-limitation*

As noted above, the ISO will honor daily use limitations. The ISO is responsible for ensuring reliable daily dispatches. If a resource is operationally constrained, then the ISO will provide dispatch instructions that consider these limitations. If the resource, in operating consistent with ISO dispatch instructions, reaches an operational limit, then the hours for which that resource is constrained will not count towards the resource's SFCP calculation. Operational considerations will include daily start or run limits as well as minimum down times. For example, a resource that has one start per day and receives a dispatch to start at 8:00 a.m. and shut down at 5:00 p.m. would not have to submit economic bids from 5:00 p.m. through 10:00 p.m. The resource's availability would be calculated based on the availability of economic bids in the real-time market until the time the resource turns off and its availability of economic bids in the day-ahead market. Using the same example, if the resource had submitted economic bids into the real-time market through 5:00 p.m. and nothing after the resource was turned off, and economic bids for all hours in the day-ahead market, then it would be measured as 100 percent available. However, the minimum of the quantity of the day-ahead economic bids and the real-time economic bids holds until the use limit is hit (i.e. the resource could not self-schedule in either the day-ahead or real-time markets).

The ISO is proposing an opportunity cost calculation methodology that should allow use-limited resources to manage monthly use-limitations. However, it is still possible that a resource could hit its monthly constraint before the month ends. In fact, the optimal dispatch of the resource relying on opportunity costs would dictate that the resource should always hit its use limitation by the end of the month.[46] While, resources should not be deterred from providing flexible capacity based on use-limitations, the ISO also believes it is prudent to require use-limited resources that are shown as flexible capacity and reach their use-limitation before the end of the month should be required to provide substitute capacity or be subject to SFCP availability charges. This is a significant change from the third revised straw proposal where the ISO proposed thresholds that would exempt use-limited resources providing substitute capacity and SFCP availability charges. However, the ISO believes that eliminating these thresholds will provide at least three important benefits:

1) Allowing resources to not provide substitute capacity could leave the ISO with insufficient flexible capacity by the end of the month. The times in which flexible capacity are extremely variable and are equally likely to occur in the final ten days of the month as in the first ten days.

2) It ensures comparable treatment for resources availability. For example, a use-limited resource that goes on a forced outage for the first week of a month should not be treated differently than another use-limited resource that reaches its use limitation in the final week of the month simply because of when the events occur during the month.

[46] If a resource does not use all of its dispatches would be relying on an opportunity cost that is too high. This is particularly true for the last dispatch of the resource. Theoretically, a resources opportunity cost for the final dispatch would be extremely high and would not likely be used. This would mean there would always be one dispatch that should have been used in the month, but was not.

3) Requiring use-limited resources to provide substitute capacity should provide an incentive to limit the amount flexible capacity resources that are at high risk of hitting their use-limitation before the end of the month.

Given these benefits, the ISO believes that all resources should be required to provide substitute flexible capacity or they will be subject to SFCP availability charges.

9 Grandfathering Provisions

The ISO has given additional consideration to the need for grandfathering provisions for the SFCP. While the ISO provided grandfathering provisions for existing generic RA contracts in the development of the SCP, it does not appear that such a provision is required in the case of the SFCP. For example, the SCP was developed well after the original RA construct. As such, many contracts already had performance requirements and associated penalties included prior to the development of the SCP. If grandfathering provisions were not designed, then a resource would be charged twice for the same outage. However, because of the timing of the flexible capacity requirements and the development of the SFCP, it is unlikely that similar performance obligations exist for flexible capacity. Therefore the ISO does not believe that any grandfathering provisions are necessary. Any specific provisions regarding the performance provisions for flexible capacity should be resolved between the procuring LSE and the supplying resource.

10 Backstop Procurement

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.

The ISO believes that above listed reasons do not currently provide the ISO the tariff authority to issue back stop procurement for deficiencies in year-ahead or month-ahead flexible RA showings. Therefore, 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.[47] If all LRAs are sufficient in their flexible capacity showings, then the ISO will not issue a CPM designation.

The ISO believes it is appropriate that SFCP and backstop procurement to cure flexible capacity deficiencies of monthly-ahead and year-ahead showing is appropriate.[48] Therefore, any deficiencies in monthly-ahead and year-ahead flexible capacity will use a method similar to the adder method described in section 8.1.2, above. Using this adder method to cure flexible capacity deficiencies will provide at least two benefits. First having a slightly higher price for flexible capacity backstop procurement should provide a greater incentive for LSE's to ensure annual an monthly flexible capacity RA showings have sufficient flexible capacity. Secondly, and perhaps more importantly, using the adder method the ISO is proposing may actually reduce the cost of backstop procurement for flexible capacity.

As with procurement under the CPM criteria identified above, the ISO will look to procure only as much flexible capacity as is needed to resolve the identified deficiency. If there is a deficiency in both generic capacity and flexible capacity, then the ISO will issue backstop procurement in such a way as to minimize the total costs of curing both deficiencies. In determining which resource to offer a Flexible Capacity Procurement Mechanism designation, the ISO will use the following criteria in the order listed:

1) An RA resource that is not listed on RA plans has having fully providing all of its eligible flexible capacity

2) A resource that is not fully procured for RA resource and a) is not listed on RA plans has having fully providing all of its eligible flexible capacity or b) has additional capacity available that is eligible to provide flexible capacity

3) A non-RA resource which the ISO determines best satisfies the remaining need while considering resource's Pmin, ramp rate, and start-up time that is able to provide flexible capacity

[47] 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.

[48] As with deficiencies in the month-ahead and year-ahead RA showings, an LSE will have 30 days to cure the deficiency.

In order to adhere to the bundling criteria identified in section 5.2 of the Joint Parties' Proposal criteria 1 requires additional detail. The ISO will allow SCs, including LSE's, to provide uncommitted flexible capacity (i.e. flexible capacity that is not shown on any LSE's flexible RA showing) to meet backstop procurement needs. If LSE 1 has a contract for with a resource for both generic and flexible but only shows the generic capacity and LSE 2 is deficient of flexible RA capacity, then LSE 1 could provide the flexible attribute to cure the deficiency. In return, LSE 2 would be charged the flexible capacity backstop price for the deficiency and LSE 2 would be paid the flexible capacity backstop price for curing the deficiency.

In order for the ISO to determine if there is uncommitted flexible capacity available, the ISO is proposing to allow LSE to submit a list with their RA showings that details all uncommitted flexible capacity they have under contract. The submission of an uncommitted flexible capacity list is voluntary and any submissions will be treated as confidential information. Additionally, capacity on the uncommitted flexible capacity list will not be subject to the flexible capacity must-offer obligation or the RA must-offer obligation unless it is in the LSE's RA showing. The purpose of this list is to inform the ISO of the flexible capacity that is available and already receiving an RA contract before looking to resources that do not have an RA commitment. Because there are only potential benefits for the LSE, the ISO believes that such a mechanism will provide strong incentives for LSEs to show available flexible capacity, allowing the ISO to minimize the cost of backstop procurement.

Additionally, non-RA resource or partial RA resources are also eligible to offer flexible capacity as well. However, based on the bundling principle of flexible capacity discussed in section 6, the ISO will not allow a resource to that has already received an RA contract with an LSE (whether or not that resources is shown in monthly RA showings does not matter) to sell its contracted flexible attribute to the ISO to resolve a deficiency. The resource may not be under contract for having sold the either the generic or flexible portion to another party. If a resource has a partial RA contract, then the flexible capacity provided will be for capacity in addition to the capacity already contracted. For example, if a 150 MW resource has a partial RA contract for 100 MW, then the additional capacity procured using backstop procurement would be for the additional 50 MW. However, because it is not possible to procure the flexible attribute without also procuring the supporting generic capacity, the resource would only be eligible to receive the full CPM rate plus the adder for the flexible capacity component. This policy should ensure that LSE's is able to minimize the cost of backstop procurement.

Finally, the ISO's backstop Capacity Procurement Mechanism expires in February 2016. On July 10, the ISO and CPUC issued the Joint Reliability Framework.[49] 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.

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

11 Next Steps

The ISO will host a stakeholder meeting on meeting on November 13, 2013 to discuss the contents of this straw proposal. Stakeholder comments on this straw proposal will be due November 27, 2013. The ISO anticipates seeking ISO Board approval at the February 2014 Board Meeting.

12 Appendix

Example 4: A Flexible Capacity Resource Self-Schedules for 5 full days in June

Assumptions

Monthly SCP Avail Percentage	0.97	Adder: CPM Price	$67.50	Bucket: CPM price	$67.50
Monthly FSCP Avail Percentage	0.97	Adder: Flex Adder	$20.00	Bucket: FCPM price	$67.50

Bucket Accounting

	SCP	DA/RT SFCP
Lower Bound of Dead Band	94.50%	94.50%
Upper Bound of Dead Band	99.50%	99.50%
Monthly Eligible Capacity	0	100
5 days MW	2,500	0
25 days MW	12,500	45,000
Total MW Availability	15,000	45,000
Monthly Hours	150	540
Monthly Average Available Capacity	0.00	83.33
Incentive	0.00	0.00
Payment	0.00	11.17
Monthly charge rate	$5,625	$5,625
% contribution to charge	100%	100%
Incentive	**$0**	**$0**
Charge	**$0.00**	**-$62,813**
Total Charge	**-$62,813**	

Adder Accounting

	SCP	DA/RT SFCP
Lower Bound of Dead Band	94.50%	94.50%
Upper Bound of Dead Band	99.50%	99.50%
Monthly Eligible Capacity	100	100
5 days MW	2,500	0
25 days MW	12,500	45,000
Total (F)SCP Availability	15,000	45,000
Monthly Hours	150	540
Monthly Average Available Capacity	100.00	83.33
Incentive	0.50	0.00
Payment	0.00	11.17
Monthly charge rate	$5,625	$1,667
% contribution to charge	100%	100%
Incentive	**$2,813**	**$0**
Charge	**$0**	**-$18,611**
Total Charge	**-$15,799**	

Worse-of Accounting

	SCP	DA/RT SFCP
Lower Bound of Dead Band	94.50%	94.50%
Upper Bound of Dead Band	99.50%	99.50%
Monthly Eligible Capacity	100	100
5 days MW	2,500	0
25 days MW	12,500	45,000
Total (F)SCP Availability	15,000	45,000
Monthly Hours	150	540
Monthly Average Available Capacity	100.00	83.33
Incentive	0.50	0.00
Payment	0.00	11.17
Monthly charge rate	$5,625	$1,667
% contribution to charge	100%	100%
Incentive	**$2,813**	**$0**
Charge	**$0**	**-$18,611**
Total Charge	**-$15,799**	

Example 5: A Flexible Capacity Resource is forced out for 10 days in June from 1:00 p.m. through 10:00 p.m.

Assumptions					
Monthly SCP Avail Percentage	0.97	Adder: CPM Price	$67.50	Bucket: CPM price	$67.50
Monthly FSCP Avail Percentage	0.97	Adder: Flex Adder	$20.00	Bucket: FCPM price	$67.50

Bucket Accounting

	SCP	DA/RT SFCP
Lower Bound of Dead Band	94.50%	94.50%
Upper Bound of Dead Band	99.50%	99.50%
Monthly Eligible Capacity	0	100
10 days MW	0	9000
20 days MW	10000	36000
Total MW Availability	10000	45000
Monthly Hours	150	540
Monthly Average Available Capacity	0.00	83.33
Incentive	0.00	0.00
Payment	0.00	11.17
Monthly charge rate	$5,625	$5,625
% contribution to charge	100%	100%
Incentive	**$0**	**$0**
Charge	**$0.00**	**-$62,813**
Total Charge	**-$62,813**	

Adder Accounting

	SCP	DA/RT SFCP
Lower Bound of Dead Band	94.50%	94.50%
Upper Bound of Dead Band	99.50%	99.50%
Monthly Eligible Capacity	100	100
10 days MW	0	9000
20 days MW	10000	36000
Total (F)SCP Availability	10000	45000
Monthly Hours	150	540
Monthly Average Available Capacity	66.67	83.33
Incentive	0.00	0.00
Payment	27.83	11.17
Monthly charge rate	$5,625	$1,667
% contribution to charge	100%	100%
Incentive	**$0**	**$0**
Charge	**-$156,563**	**-$18,611**
Total Charge	**-$175,174**	

Worse-of Accounting

	SCP	DA/RT SFCP
Lower Bound of Dead Band	94.50%	94.50%
Upper Bound of Dead Band	99.50%	99.50%
Monthly Eligible Capacity	100	100
10 days MW	0	9,000
20 days MW	10,000	36,000
Total (F)SCP Availability	10,000	45,000
Monthly Hours	150	540
Monthly Average Available Capacity	66.67	83.33
Incentive	0.00	0.00
Payment	27.83	11.17
Monthly charge rate	$5,625	$1,667
% contribution to charge	100%	100%
Incentive	**$0**	**$0**
Charge	**-$156,563**	**-$18,611**
Total Charge	**-$156,563**	