Resource Adequacy and Flexible Capacity Procurement Joint Parties' Proposal

October 29, 2012

Proposal

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1 Background

In its 2013 resource adequacy decision, the Commission specified its intent to finalize a flexible capacity framework by the end of 2012 for implementation in the 2014 RA compliance year. The Commission recommended that "… parties work towards clearly defining flexibility in terms of specific operational characteristics of generators that the Commission should consider when authorizing new generation."[1] Accordingly, the ISO and IOUs have worked collaboratively for the past three months to craft an interim flexible capacity proposal that could

1) Be implemented by the 2014 RA compliance year
2) Minimize added complexity and modifications to the current RA program and
3) Start the process of adding flexibility to the forward procurement process, allowing a more comprehensive solution to be developed and implemented by 2017 RA compliance

The ISO, San Diego Gas and Electric (SDG&E), and Southern California Edison (SCE) reached agreement on nearly all elements in the following proposal. At this juncture, and with the exception of section 5.4, this proposal includes the ISO, SDG&E, and SCE (the Joint Parties) as signatories. As noted in section 5.4 (Procuring and Counting Hydro Resources), SCE is not yet prepared to sign on to that one part of the proposal. Pacific Gas and Electric (PG&E) declined being a signatory at this time.[2] Therefore the ISO, SDG&E, and SCE submit this proposal today for Energy Division staff consideration so that the Commission can craft a final interim flexible capacity solution that can be approved and implemented for the 2014 resource adequacy compliance year.

2 Introduction

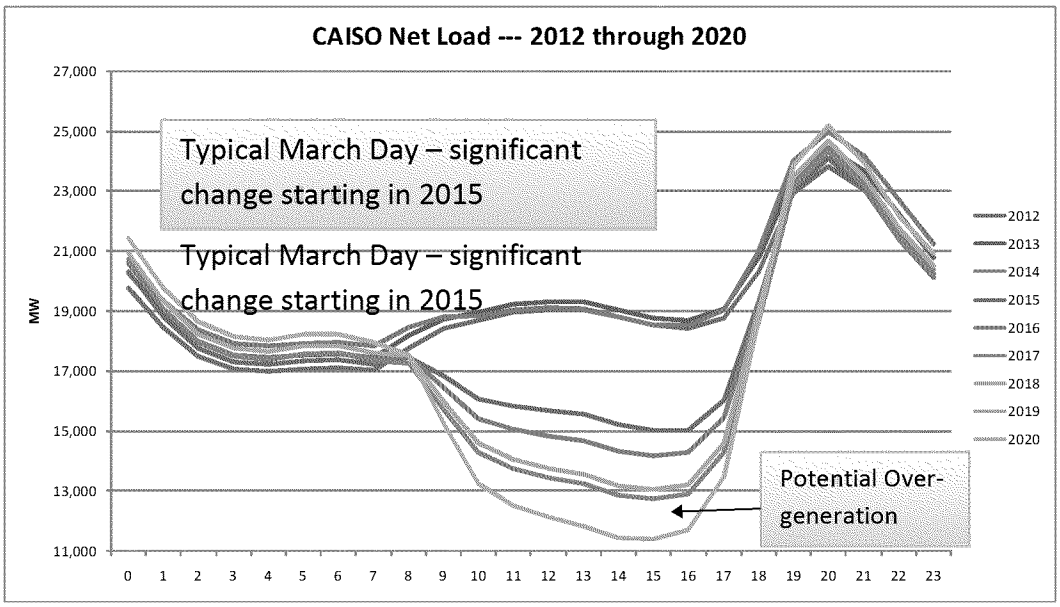
Given the growing intermittency of the supply fleet and the potential retirement of once-through-cooled resources, the ISO as the balancing area authority must consider its operational needs beyond what historically has been satisfied by system and local capacity, often termed "generic capacity." The ISO, in collaboration with the CPUC and other local regulatory authorities, must ensure that the supply fleet has sufficient flexibility, including ramping and load following capabilities, to satisfy ramping and intra-hour variability needs, including sufficient contingency reserves to ensure the security and safety of the grid. For these reasons, the Joint Parties recommend the Commission establish a monthly interim flexible capacity procurement obligation that is assessed based on ISO identified flexible capacity needs and contingency reserves as part of the CPUC's annual resource adequacy program.

[1] CPUC Decision 12-060025, June 21, 2012 at pg. 20-21.
[2] PG&E participated in the discussions that eventually lead to this proposal.

The Joint Parties recognize that the ISO, as the system operator and balancing authority, has the unique ability and expertise to ascertain flexible capacity needs, and it has the processes and data to perform the needed flexible capacity technical analysis. Therefore, similar to the ISO's local capacity technical analysis conducted, the ISO will likewise perform a flexible capacity study each spring to establish the flexible capacity need for each month of the upcoming resource adequacy compliance year. Following completion of the assessment of both local and flexible capacity needs, the ISO will submit its findings to the CPUC and other local regulatory authorities for their adoption as a flexible capacity procurement obligation.

At the August 13, 2012 resource adequacy workshop, the ISO presented how the flexible capacity attributes of maximum continuous ramping, load following, and regulation could be addressed for the interim 2014-2017 period as a single "dispatchability" attribute that could be woven into the existing bi-lateral resource adequacy procurement paradigm. The Joint Parties refined the ISO's original "dispatchability tag" concept to ensure a more accurate assessment of the flexible capacity needed based on how much ramp capability a resource can offer and sustain over a continuous 3-hour period. The 3-hour ramping period was assessed from 2011 1-minute net load data. It represents a reasonable ramping period that many resources can satisfy and still enable the ISO to meet its maximum continuous ramping and load following needs in the interim 2014-2017 period. This interim proposal is important given flexibility is being reduced to a single resource attribute, i.e. a continuous 3-hour ramping capability. Additionally, while the Joint Parties believe this is a critical first step, it is important to note that additional work is required. As noted in the ISO presentation at the August 13, 2012 CPUC workshop, the flexibility needs continue to evolve over time. As shown in Figure 1, the ISO will be managing a very different net load curve as soon as 2015 and more dramatic changes in 2017. Addressing these needs will require more precise and forward looking capacity procurement. For these reason, the Joint Parties believe this must be an interim solution to address the system's need for flexible capacity and a permanent solution is required.

Figure 1: Net load pattern changes 2012 through 2020



The following proposal provides further details as to how the Joint Parties recommend assessing the balancing area's flexible capacity needs, how this need would be translated into a flexible capacity procurement obligation by local regulatory authorities, the amount of flexible capacity a resource can provide, and how a must offer obligation would apply to designated flexible capacity resources.[3]

3 Establishing the Requirement

The Joint Parties recommend the CPUC establish an interim flexible capacity requirement that integrates into the CPUC's existing bi-lateral resource adequacy program and is modeled after the ISO's existing annual local capacity needs assessment. As such, the Joint Parties propose a process whereby the ISO studies and notifies local regulatory authorities (both CPUC and non-CPUC jurisdictional entities) of its flexible capacity needs for the upcoming RA compliance year, and the CPUC sets a flexible capacity procurement obligation for its jurisdictional load-serving entities.

3.1 Flexible Capacity Terms

Before describing the process by which flexible capacity needs are determined, it is important to define two terms that distinguish the ISO's role to study and identify the flexible capacity need and the local regulatory authority's role for setting a flexible capacity requirement. Specifically, the Joint Parties define these two terms:

[3] Specific must offer obligations for flexible capacity resources will be developed through an ISO stakeholder process, but they are discussed in this proposal at a high level to provide a framework for future discussion and thinking thus far on the issue.

a) Flexible Capacity Need – The quantity of flexible capacity identified as needed by the ISO to meet ramping and contingency reserves

b) Flexible Capacity Procurement Obligation – The amount of flexible capacity an LSE is required to procure per the local regulatory authority's resource adequacy rules.

3.2 Determination of Flexible Capacity Need

As the number of energy policy objectives expand, the existing practice of procuring only generic resource adequacy capacity with no consideration of special resource attributes can no longer ensure the balancing area will have an adequate supply of ramping capability and contingency reserves. There is a need to expand the resource adequacy program to specifically focus on procuring resources that are able provide these services. Additionally, it is important to note that the 3-hour ramping need outlined in this interim proposal will not fully address all of the ISO's flexible capacity needs (i.e. additional ramping, load following and regulation) in the future. Addressing these needs will require more precise definition ramping need and of the obligation of capacity being procured. Thus, a longer-term solution must be developed over this interim period to address the balancing area's ramping needs and the must offer obligations associated with flexible capacity.

Currently, the ISO maintains contingency reserves of approximately seven percent of "load responsibility," with 50 percent of reserves required to be spinning, or synchronized to the grid.[4] To meet WECC and NERC reliability needs, the ISO must have contingency reserves equal to the greater of 1) the most severe single contingency (MSSC) (at least half of which must be spinning reserve) or 2) the sum of five percent of the load responsibility served by hydro generation and seven percent of load responsibility served by thermal generation (at least half of which must be spinning reserve). Currently, the ISO MSSC is the loss of one of the Diablo Units. Following a disturbance, the ISO must also meet other control performance standards such as restoring its area control error (ACE) within 15 minutes, restoring any system operating limit violation to established reliable limits within 30 minutes and replenishing operating reserves within 60-minutes.

There is an important interaction between flexible capacity and contingency reserves. The Joint Parties, therefore, are incorporating a portion of the contingency reserves need into the flexible capacity procurement obligation. The capacity held as contingency reserves can only be exercised for emergencies and cannot be dispatched to provide ramping capability. For example, consider a day where the largest 3-hour ramp is 5,000 MW and the MSSC is 3,500 MW. Simply setting a flexible capacity procurement requirement at 5,000 MW would mean the

[4] Spinning reserve is the portion of unloaded capacity from units already connected or synchronized to the grid and that can be delivered within 10 minutes of notification and run for at least two hours. Non-spinning reserve is capacity that can be synchronized and ramped to a specified load within 10 minutes of notification.

ISO could not be assured of meeting both the ramping capability and the MSSC. For example, the ISO would not be assured of having any contingency reserves during that ramp. Once provided with a pool of resources capable of providing both flexible capacity and contingency reserves, the ISO would be responsible for dispatching those resources to meet system needs in real-time.

Finally, the ISO must account for intra-hour load following needs in the real-time market. The methodology used by the Joint Parties to establish the 3-hour ramp begins with actual 2011 1-minute net-load data that had a significant amount of variability and uncertainty already included in the data. Significant portions of variability and some level of uncertainty for subsequent years were already built into the 1-minute profiles making additional procurement to address variability and uncertainty difficult to quantify. Therefore, the Joint Parties recommend including an error factor (called "ε") [5] when establishing the flexible capacity need.[6] For the 2014 compliance year, this error factor will be set to zero, but would be subject to annual review and potential modification based on historic system performance measurements such as adherence to control performance standards, exceptional dispatches, etc. Therefore, the ISO must consider ramping, contingency reserves, regulation and load following needs, and calculate a single flexible capacity need as a function of all attributes.[7] Given these considerations and challenges, the Joint Parties recommend that the flexible capacity need for a given month be determined using the following formula:

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

Where,

- $\text{Max}[(3RR_{HRx})_{MTHy}]$ = Largest three hour contiguous ramp starting in hour x for month y
- E(PL) = Expected peak load
- MTHy = Month y
- MSSC = Most Severe Single Contingency
- ε = Annually adjustable error term to account for uncertainties such as load following

Note: 3.5% of the monthly maximum load ensures the ISO gets at least 100 percent of the spinning reserve capacity that's needed to cover the MSSC.

The ISO will determine the multi-hour ramp need using a 1-in-2 year load forecast and

[5] While this error term will primarily focus on accounting for intra-hour variations, it can also be used for deficiencies found in procurement of the ramping or contingency components if necessary.

[6] It is recognized that in order to provide some level of certainty for procurement purposes, the error factor will need to be bounded. However, the level of that bounding will need to be considered in light of the overall need and availability of resources. It is expected that these details will be developed as the proposal works through the stakeholder process.

[7] The ISO markets will be responsible for efficient dispatch instructions to ensure all real-time ramping and contingency needs are addressed using this pool of resources.

estimate the largest ramping need for each month.[8] The ISO will then forecast the expected peak load for the month to determine the capacity needed for contingency reserves and add the capacity need for ramping and contingency reserves for each month. Lastly, while the above proposed method for establishing flexibility requirements should provide the balancing area with sufficient flexibility in the short term, it is not designed as a long term solution. As the build out of intermittent resources continues and the ramping needs become clearer, specific products and better methods for determining and allocating the flexible capacity procurement obligation must be developed.

3.3 Allocation of Flexible Capacity Requirement

The Joint Parties considered three primary methodologies to allocate flexible capacity procurement needs:

1. LRA's share of system peak;
2. LSE's relative monthly load factor; and
3. LSE's load characteristics *and* the composition of its RA resource portfolio.

For each option, the Joint Parties evaluated the impact of each option on the quantity of flexible capacity each LSE must procure, the reason/causation that would support using a given allocation methodology, and the challenges associated with implementing each option. These are outlined in Table 1.

Table 1: Outline of Allocation Methodology Assessments

Allocation Methodology	Impact	reason/causation	Implementation challenges
LSE's relative size share of system peak	The higher the relative size share of system peak, the higher the flexible capacity procurement obligation	System flexible capacity need is assumed to be directly attributable to monthly peak in most months during time period of interest	Same data and method used to allocate System RA
LSE's relative monthly load factors	The lower the load factor, the higher the flexible capacity	As a measure of load change, monthly Load factor may be a	Requires monthly or hourly energy forecasts for each

[8] Using a 1-in-2 largest ramping need is appropriate given the changing ramping needs of the grid as more intermittent resources are added to the grid. Using 1-in-5 year ramping needs at this time would not yield accurate results.

	procurement obligation	better indicator than peak load of a an LSE's relative contribution to system flexible capacity need	LSE, new analysis and validation and CEC reconciliation processes
Combination of an LSE's load characteristics *and* the composition of its RA resource portfolio	The higher the percentage of intermittent RA resources, the higher the flexible capacity procurement obligation	Incorporates both drivers that contribute to system flexible capacity need	Requires new forecasts of future LSE loads and RA portfolios, addition of new validation and reconciliation processes, changes to month-ahead forecast true-up and load migration processes, and likely significant changes to RA showing timelines

On balance, and given the interim nature of this proposed solution, the Joint Parties recommend the Commission allocate flexible capacity procurement obligations to LSEs based on each LSE's relative share of monthly system peak. Resource adequacy obligations are currently allocated in this manner, thus eliminating the need to develop a separate allocation methodology for the flexible capacity procurement obligation. While the correlation between system peak and the need for ramping/flexibility will decrease as the amount of intermittent resources on the system increases, system peak-to-ramping should remain correlated for the interim period for which this solution is designed.

In the long-run, establishing obligations based on load factors may yield flexible capacity needs more in line with causation. However, designing an allocation methodology using LSE monthly load factors would require, at minimum, monthly (and perhaps even hourly) load forecasts for each LSE. Additionally, the CEC would have to analyze, validate, and reconcile this process. Attempts to determine the individual LRA's obligation based on a load and RA portfolio will require significant assumptions about the RA portfolios within a particular LRA and then disaggregation to allocate to the LSEs under the LRA. Determining the appropriate assumptions is a worthwhile, but time consuming process. Therefore, the Joint Parties do not

recommend allocation based on load factors.

Allocating flexible capacity procurement requirements using relative share of monthly system peak to its jurisdictional load serving entities also allows the CPUC to avoid many of the complications outlined above. Therefore, the Joint Parties recommend the Commission allocate flexible capacity procurement requirements to its jurisdictional load serving entities based on an LSE's contribution to system peak.

3.4 Annual and Monthly Flexible Capacity Showings

The Joint Parties propose the Commission require both year ahead and month-ahead showings for flexible capacity similar to the requirement to show system resource adequacy capacity. Each load serving entity would be required to demonstrate it has procured 90 percent of each monthly flexible capacity procurement obligation in its year-ahead showing. Additionally, each LSE would be required to show 100 percent of its flexibility capacity procurement obligation has been procured in its monthly showing. Any CPUC jurisdictional LSE that is deficient in its flexible capacity showing would be subject to penalties of 50 percent of the applicable system level RA penalties and potentially costs associated with the ISO backstop procurement.[9] Based on ISO studies, there is not currently a need for local flexible capacity. In other words, flexible capacity provides system level benefits and can be replaced by other flexible capacity that exists in the system.

4 Flexible Capacity Must-Offer Obligations

While a specific flexible capacity must-offer obligation is ultimately a matter for an ISO stakeholder initiative, it is import to understand, if only as an initial proposal, that flexible capacity resources will be subject to a more stringent must-offer obligation than is currently required for generic capacity in the ISO market. The Joint Parties expect the ISO's stakeholder process will be coordinated with the current CPUC RA proceeding and will include CPUC staff and ISO stakeholders.[10]

In addition to the must-offer obligations that currently apply to RA resources, the flexible capacity must-offer obligation would likely require resources to submit economic bids into the ISO's real-market between a predetermined set of hours (e.g. 5:00 am and 10:00 pm), unless otherwise explicitly exempted. While the current RA must-offer obligation ensures the ISO has a sufficient resource pool to meet peak-load, it does not fully address the steep ramps that the

[9] Penalties caused by deficiencies in procuring adequate flexible capacity would be in addition to any penalties caused by other procurement deficiencies (i.e. system or local deficiencies).

[10] The ISO is planning to initiate a stakeholder process in late November to establish the specific details of a flexible capacity must-offer obligation. This stakeholder process is scheduled for consideration by the ISO Board of Governors in March 2013

balancing area will experience, particularly in the non-summer months. Because current RA resources can meet their must-offer obligation by self-scheduling, they may not actually be available for dispatch by the ISO, and, therefore, are not "flexible." Requiring flexible capacity resources to submit economic bids during a set of hours gives the ISO the ability to economically dispatch resources and meet ramping and contingency requirements at least cost. The ISO will consider what, if any, additional obligations should be imposed in the day-ahead market on flexible capacity resources.

5 Procurement and Counting

One of the primary goals of the Joint Parties is to incorporate an interim flexible capacity requirement into the existing RA framework without significant dislocation to the program or existing RA contracting practices. To achieve this goal, the Joint Parties propose flexible capacity procurement obligations and counting conventions are much more simplistic than the ISO's or Energy Division's previous proposals,[11] can be implementable under the existing RA program, and can be implemented for the 2014 RA compliance year.

This section describes the core concepts and principles of the proposed flexible capacity resources as applied to different resource types, including eligibility requirements, bundling flexible capacity with the underlying generic capacity, determining the conversion of NQC to flexible capacity, and the counting conventions for determining a resource's contribution to and LSE's flexible capacity procurement obligation. It is important to recognize that special considerations are required for hydro resources, which are discussed below (see section 5.4). Finally, while the counting conventions may differ slightly based on the resource type, the LSE would have the ultimate ability to manage the associated risks and obligations of flexible capacity resources based on the resources they elect to use in the flexible capacity procurement showings.

5.1 Eligibility Criteria

Flexibility can take many forms and be provided by many different types of resources. As such, the Joint Parties support a "technology agnostic" approach in determining a resource's eligibility to be a flexible capacity resource. After analyzing various possible flexible characteristics, the Joint Parties determined that three-hour ramping capabilities offered the best single characteristic to ensure the ISO could meet its ramping and contingency needs and enable a large pool of resources to qualify as flexible capacity resources. Therefore, the Joint Parties recommend that a resource must be able to ramp *and* sustain energy output for a

[11] The ISO submitted its Supplemental Information to Proposal on March 2, 2012 in the current proceeding. Energy Division released its proposal on March 23, 2012.

minimum of three hours.[12] Resources willing to provide flexible capacity would not be subject to the flexible capacity must-offer obligation unless it has been submitted to the CPUC and ISO as part of an LSE's flexible capacity procurement obligation showing. This is similar to how, under the ISO's new replacement rule for RA resources, LSEs include in their RA showing only those resources they require to meet their monthly RA showing, and only these resources are subject to the must-offer and other RA obligations.

5.2 Bundling Capacity Attributes

The Joint Parties propose that resources able to ramp within three hours *and* sustain either their ramping capabilities or output for the three hours may be listed as "dispatchable" in the ISO masterfile. This dispatchable tag identifies the resource as flexible and makes the resource eligible to sell flexible capacity. The specific counting conventions are discussed in sections 5.3.3 and 5.4, below.

For procurement purposes, the flexible capacity a resource offers must remain "bundled" with the generic capacity for the specific megawatt. In other words, in this interim proposal, flexible capability of that megawatt of capacity cannot be stripped off and sold as a separate product. For example, a resource, for the same megawatt, may not sell the system capacity to one LSE and its flexible capability of that megawatt of capacity to another. Allowing unbundling of flexible capability of that megawatt of capacity and generic capacity for each megawatt will lead to numerous implementation complexities that will likely require complicated and time consuming resource capacity tracking solutions. For example, as discussed above, the Joint Parties propose flexible capacity resources have stricter must offer obligations in the ISO markets (see section 4 above). Thus, the Joint Parties recommend flexible capability of a megawatt of capacity must be bundled with the underlying generic capacity consistent with the counting conventions detailed below, or not at all (i.e. the resource either has a flexible capacity or it does not). This requirement prevents a resource from selling a megawatt of generic capacity to one LSE and the flexible capability of that same megawatt of capacity to another LSE. Allowing this would lead to conflicts between both the LSEs that could be the scheduling coordinator for the same megawatt. For example, the LSE that procured the generic capacity may wish to self-schedule the generic capacity into the ISO market, while the LSE that has bought the flexible capacity may be required to submit an economic bid. Requiring both the flexibility and generic capacity to remain bundled for procurement purposes does not mean that an LSE must submit all of the flexible capacity range from a resource as part of its flexible capacity procurement obligation. In fact, an LSE should look to provide the Commission and the ISO with a balanced portfolio of flexible resources that spread non-performance and outage

[12] Resources that are not able to sustain output for three hours may create additional ramping challenges for the ISO. For example, meeting a steep three hour ramp could be exacerbated by relying on a resource that is only able to produce energy for 60 minutes and no longer.

risks over many resources. For example, an LSE that shows a resource with 300 MW of generic RA capacity (50 MW of PMin) and 250 MW of flexible capacity, is not obligated to offer all 250 MW as flexible capacity to satisfy its flexible capacity procurement obligation. It could show all 300 MW as generic RA capacity and only 100 MW as flexible capacity. It is the LSE's choice.

5.3 Thermal Resource Contribution Toward Flexible Capacity Procurement Obligations

This section focuses on counting thermal resources toward an LSE's flexible capacity procurement obligation and their treatment under a flexible capacity must-offer obligation. In Section 3 above, the Joint Parties described the methodology for the flexible capacity needs determination. However, not every megawatt of a resource is actually flexible or dispatchable. For example, the Pmin of a resource may not be flexible. Thus, it is necessary to establish counting conventions to determine the Effective Flexible Capacity (EFC) of resources relative to a resource's NQC.

5.3.1 *Converting Net Qualifying Capacity into Effective Flexible Capacity*

To provide flexible capacity, a resource must first have a NQC and be eligible to sell generic RA capacity. This requirement is based on the capacity "bundling" principle previously described above. A non-dispatchable resource is eligible to sell generic capacity. However, it is not possible to offer flexible capacity without being specifically identified as a dispatchable resource in the ISO masterfile. Additionally, a resource is not able to offer more flexible capacity than its rated NQC. For example, a combustion turbine selling flexible capacity that can fully ramp in 10 minutes can offer up to its full NQC as generic or flexible capacity.

5.3.2 *Flexible Capacity Counting Conventions*

Joint parties evaluated three options for counting how a resource's flexible capacity quantity would satisfy a flexible capacity procurement obligation. The three options are:

1) **Pro-rata Option**: Pro-rata sharing of flexible and generic capacity;

2) **Differentiated Capacity Option**: Distinguish flexible capacity from generic capacity; and

3) **Count-all Option**: Count all capacity from "dispatchable" generators as flexible.

5.3.2.1 Defining the Options

It is easiest to understand each option through the use of an example. Therefore, all options will use the following example:

Example 1: Resource A

NQC	300 MW

Pmin	50 MW
EFC (NQC -Pmin)	250 MW
RA capacity sold	100 MW

Additionally, all options assume the flexibility and generic capacity are bundled. However, the options may account for the bundling in a slightly different manner.

Pro-rata –The amount of flexible capacity is based on the ratio of a resource's effective flexible capacity to NQC. The flexible capacity procurement obligation would also be based on this same ratio. For example, Resource A has an EFC of 250 MW and an NQC of 300 MW. Therefore, Resource A has an EFC to NQC ratio of 250/300, or 0.833. Every MW of generic RA capacity sold from this resource would count as 0.833 MW of flexible capacity. Additionally, this resource would have to submit bids under a must offer obligation for 0.833 MW for every megawatt of generic capacity used as part of an LSE's flexible capacity procurement showing, regardless of the resources Pmin. Therefore, Resource A, which sold 100 MW of RA capacity, including 83 MW of flexible capacity, would be required to make 133 MW of capacity available to the ISO in order to meet its flexible capacity obligation if the LSE used all of the capacity in its flexible capacity procurement showing (50 MW of Pmin plus 83 MW of flexible capacity).

Differentiated Capacity – This option requires a resource keep its generic and flexible capacity bundled, but capacity that is inflexible, such as megawatts associated with Pmin, must be sold as generic capacity, not flexible capacity. Using the above example, Resource A could sell 50 MW of generic capacity and 250 MW of flexible capacity. Any flexible capacity must-offer obligation would only apply to the flexible portion of the capacity, i.e. 250 MW for Resource A. A resource may not elect another flexible-to-generic capacity composition. In other words, Resource A could not sell 100 MW of generic capacity and 200 MW of flexible capacity; it can only sell up to 50 MW of generic capacity and up to 250 MW of flexible capacity. Further, if a resource sells flexible capacity it is assumed that this capacity will meet the flexible capacity must-offer obligation even if the resource has not sold the inflexible capacity. In Example 1, Resource A sold a portion of its RA capacity. Thus, there are at least two ways to account for the 100 MW of capacity sold by Resource A. The first is that Resource A could have sold 50 MW of generic capacity, which is subject to the current standard RA must-offer obligation and 50 MW of flexible capacity, which would be subject to a more stringent flexible capacity must offer obligation. Alternatively, it is possible that Resource A sold all 100 MW as flexible capacity. This requires the generator to meet the flexible capacity must offer requirement for 100 MW,

which implies that the 50 MW of capacity below Pmin is obligated to be scheduled or bid even though it is not being counted as generic capacity by any LSE. In other words, there is no other way to make the flexible capacity available for dispatch by the ISO if the Pmin is not also scheduled. Finally, under this option, LSEs and generator owners buying or trading capacity must make explicit what "type" of capacity they transacted, either flexible or generic.

Count-all – This option identifies a resource as either dispatchable or not. In other words, if a resource is dispatchable in the ISO's masterfile, then it counts toward meeting an LSE's flexible capacity procurement obligation, regardless of the resource's Pmin. The flexible capacity must-offer obligation, however, would only apply to the flexible portion of the capacity. For instance, Resource A, because it sold 100 MW, will count for 100 MW of flexible capacity. Resource A will be subject to the generic RA must-offer obligation for 50 MW, for the Pmin, and to a specific flexible capacity must-offer obligation for the 50 MW of flexible capacity (the difference between the RA quantity sold and the resource's Pmin.) The ISO's flexible capacity procurement need would account for the inflexible range of resources, which accounts for the difference between a resource's NQC and EFC.[13] In other words, if the flexible capacity need is 10,000 MW, 12,000 MW of dispatchable resources would need to be procured to account for the "inflexibility" in the overall portfolio, such as the aggregation of Pmin from all dispatchable RA resources. In this example, 2000 MW of flexible capacity "margin" would have to be procured to account for the inflexibility in the overall fleet of flexible capacity RA resources. Table 2 below outlines pros and cons of each option discussed above.

Table 2: Pros and Cons of Each Counting Convention.

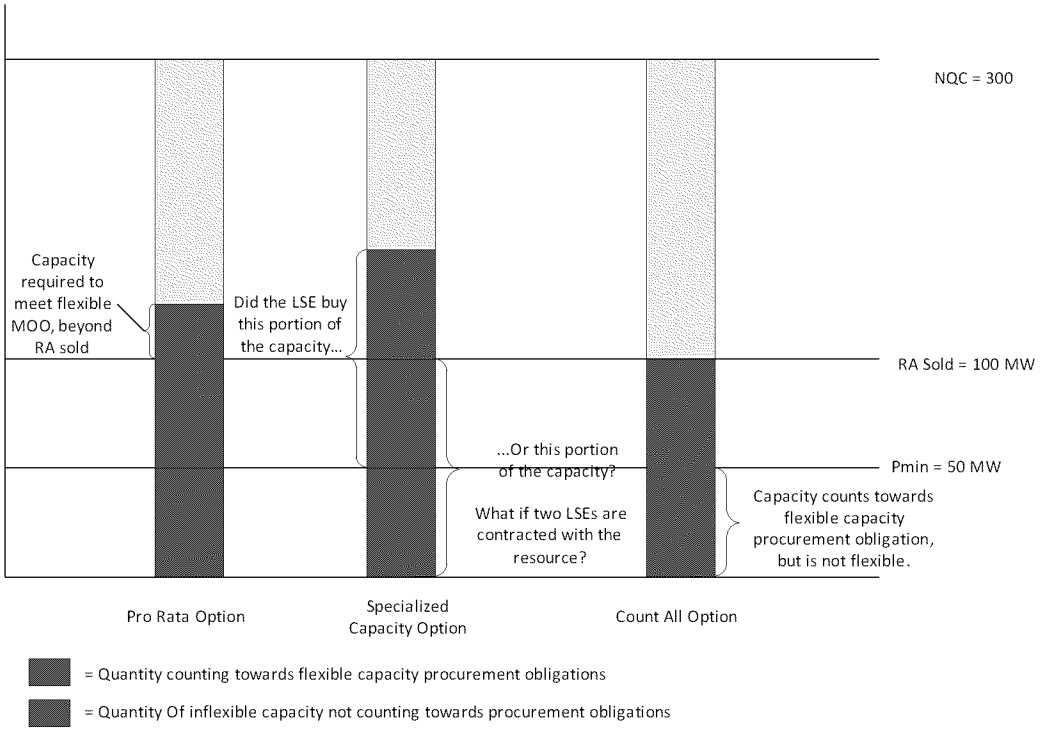
Option	**Pros**	**Cons**	**Comparison to other options**
Pro-rata	Flexibility need = Procurement obligation. Pre-determined quantity of flexible capacity assigned to each resource.	Flexibility MOO may be greater than quantity of RA MOO. Where a partial RA resource, requires generator to make more capacity available than RA sold. Not likely to be a durable product after the interim period	Differentiated Capacity option may also have flexibility must-offer obligation that is greater than RA must-offer obligation
Differentiate d Capacity	Flexibility need = Procurement obligation.	Flexibility MOO may be greater than quantity of RA	Possible LSE and generator conflict

[13] The flexible capacity need would be the same as in the pro-rata and differentiated capacity options, but in the count-all option a reserve margin would be included in flexible capacity procurement obligations allocated to LSE to account the fleet's inflexibility.

	Separates flexible and generic capacity, potentially durable product after interim period.	MOO (depends on contractual terms). Requires explicit consideration of who has bought what type of capacity. Likely requires rule to determine how to handle existing contracts, e.g., did flexibility come with the existing contract or not?	as to what RA capacity type was sold under existing contracts.
"Count all"	No need to distinguish between MW (Pmin or flexible) of a resource. Easy transition with little need to consider grandfathering provisions.	Flexibility need ≠ Procurement obligation, Requires an estimated "flexibility reserve margin"	Setting the level for flex reserve margin will be controversial and is avoided in the other options

Distinctions between options are most obvious for partial RA resources with existing RA contracts or resources with RA contracts with multiple LSEs. Assume that Resource A has an existing RA contract for 100 MW of the 300 MW resources. Figure 2 shows the counting challenges with each of the three options under these two scenarios.

Figure 2: Counting Convention for Partial RA Procurement and with Existing RA contracts



This diagram demonstrates the challenges with each option. The Pro-rata option may require generators to increase their flexible capacity asking price to account for the additional capacity they will have to bid under the must offer obligation to account for a portion of the inflexible Pmin. The challenge with the Differentiated Capacity option, particularly for existing contracts, is determining what type of capacity, flexible or generic, has been procured and by whom. Lastly, the Count-all option requires the establishment of a "flexible capacity margin" be added to the flexible capacity procurement obligation to account for inflexible capacity, like Pmin, that exists in the pool of flexible capacity resources.

5.3.2.1 Joint Parties Recommend the Differentiated Capacity Option

Given that there is no perfect option, on balance, the Joint Parties recommend the Commission adopt the Differentiated Capacity option. While the Count-all option originally presented by the ISO at the August 13 workshop provides consistency between the amount of capacity and flexibility sold by a resource, the added complexity of determining a "flexibility capacity margin" makes this an infeasible interim solution. Additionally, while there may be inconsistencies between the generic RA must-offer obligation and the flexible capacity must-offer obligation in the Pro-rata option and the Differentiated Capacity option, the straightforward nature of counting capacity towards the flexible capacity need make these superior options relative to the Count-all option.

Comparing the Pro-rata and the Differentiated Capacity options, the Differentiated Capacity

option provides superior incentives for resources to enhance their ability to provide flexible capacity. For example, if Resource A was able to lower its Pmin by 10 MW (from 50 MW to 40 MW), then its EFC-to-NQC ratio would increase from 0.833 to 0.867 (i.e. 260 MW/300 MW) using the Pro-rata option. Meaning the 10 MW decrease in Pmin would allow Resource A to increase its flexible range 10 MW, from 250 MW to 260 MW. Instead, under the Pro-rate option, Resource A's 100 MW RA contract would only see its flexible capacity increase by 3.4 MW given the application of the EFC-to-NQC ratio (i.e. 100 MW of generic capacity equals 83.3 MW of flexible capacity at Pmin of 50 MW compared to 86.7 MW, or 3.4 MW with a Pmin of 40 MW). In contrast, the Differentiated Capacity option allows Resource A to count all 10 MW as incremental flexible capacity. Further, the Differentiated capacity option will only create inconsistencies between the RA must-offer obligations and a flexibility must-offer obligation if the generator chooses to sell flexible capacity without first selling the generic capacity associated with the inflexible portion of the resource. Additionally, the Differentiated Capacity option is likely more durable than the Pro-rata option. For example, the development of a long-term solution is more likely to include greater separation of flexible capacity attributes, not a Pro-rata accounting of attributes. Therefore, the Joint Parties recommend using the Differentiated Capacity option for determining a resources' contribution to meeting a flexible capacity procurement obligation.

5.3.3 *Resource Eligibility and Counting Conventions*

To meet the ISO's flexible capacity needs, a resource must be able to ramp within a three-hour window. A resource that requires three hours to start-up and reach its Pmin does not provide flexibility during this 3-hour start-up time. This resource may provide a fixed ramp rate as it moves to its Pmin, but is not dispatchable and cannot support variations within a contiguous three-hour period. However, this same resource may be able to provide flexible capacity once it reaches Pmin. A resource that is able to ramp quickly to Pmin would be capable of providing flexibility within the three-hour ramp period. Therefore, a balance must be struck between a resource's start-up time and its effective flexible capacity amount within a three-hour period.

5.3.3.1 Resource Eligibility and Counting Conventions for Non-Use-Limited Thermal Resources

The Joint Parties examined the fleet of dispatchable resources and determined that resources with start-up times greater than 90 minutes would be eligible to offer flexible capacity between PMin and NQC. In other words, resources with a start-up time greater than 90 minutes could not offer flexible capacity that includes its Pmin. Conversely, a resource with a start-up time of 90 minutes or less would be permitted to provide flexible capacity for the entire range of the resource, including the resource's Pmin, e.g. a quick start combustion turbine.

The Joint Parties also believe that it is necessary to cap a resource's flexible capacity at its NQC, not its Pmax. Allowing a resource to sell flexible capacity up to its Pmax versus its NQC would violate the "bundling" principle outlined above. It is not reasonable to presume, for planning purposes, that a resource could provide a given level of generic capacity, but could somehow provide flexible capacity in excess of its generic capacity.[14] Given the requirements and limitations outlined above, the Joint Parties propose a thermal resource's EFC contribution be calculated as follows:

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

EFC is limited to the MW range between Pmin and NQC as limited by ramp rate

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

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

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

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

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

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

If a dispatchable resource sells capacity up to its NQC, then it has also sold all of its EFC. However, as noted above, partial resource procurement raises unique EFC counting consideration. The Differentiated Capacity option requires LSEs and generators to be explicit about what capacity type, flexible or generic, is being bought, sold, or traded. While future transactions should be able to easily account for differentiated capacity, existing contracts pose unique challenges because the type of capacity sold is not explicitly stated. For existing RA contracts that are silent on the issue, it seems unreasonable that an LSE would have procured only the flexible capacity and not the Pmin of a resource. Therefore, if a resource with an existing RA contract is eligible to provide flexible capacity, an LSE may only count the flexible portion above Pmin towards its flexible capacity procurement obligation. In the event a resource has a contract with multiple LSEs then the generic and flexible capacity would be apportioned based on the respective contract amounts held by each party relative to the total amount of RA capacity sold, unless explicit contract terms dictate otherwise. If existing contracts explicitly discuss this, or the parties are able to renegotiate to address this issue, the contract would be used as the basis for deciding which entities have which capacity. Because a resource's flexible capacity is a function of its NQC, updates to a resource's available flexible capacity would occur at the same time as adjustments to its NQC are made. Resource owners would have an opportunity to negotiate changes to EFC similar to process available for NQC.

[14] It is not possible to procure more of a specialized capacity than the underlying generic product.

5.3.3.2 Resource Eligibility and Counting Conventions for Multi-stage Generation Resources

Multi-stage Generation (MSG) resources can be highly flexible, but it difficult to calculate the flexibility that these resources provide due to their multiple configurations. As such, it is necessary to specify how MSG resources will count towards an LSE's flexible capacity procurement obligation. The Joint Parties recommend combined cycle units base their flexibility on the resource's 1 x 1 configuration. A combined cycle resource will have a Pmin defined for the 1 X 1 configuration (even if they are 2 X 1 or 3 X 1). This assumes that at times of maximum flexibility need, the resource will be at its 1 X 1 configuration at the start of the maximum ramp period. This counting convention is likely appropriate only for the interim period proposed here and will need to be reassessed as part of a longer term solution.

5.3.3.3 Resource Eligibility and Counting Conventions for Use-Limited Thermal Generation Resource

Use-limited thermal resources may have air permit restrictions that limit a resource's run-time. Many of these resources are peaking resources that are flexible. The Joint Parties do not recommend special consideration for use-limited thermal resources included in an LSE's RA showing. Use-limited thermal resources, like all resources providing flexible capacity will be subject to more stringent bidding requirements, as outlined in Section 4. However, specific market rules to deal with use-limited resources will be addressed in the ISO stakeholder process, such as substitution provisions for units that reach a limitation during an operating month. Further, as is the case today, use-limited resources will have the opportunity to place economic bids that reflect the cost (including opportunity cost) of each dispatch, in addition to listing a resource as flexible in any given month. If a use-limited resource reaches its run-time limits during a month and a substitute resource is not provided, it will be treated as a forced outage and, like generic capacity, will be subject to standard capacity product non-availability charges.

5.4 Procurement and Counting Hydro Resources

Unlike thermal resources, the effective flexible capacity of hydro resources can differ month-to-month. Further, the EFC may not have as clear connection with NQC as with a thermal resource. This is based, in part, on the methodology used to calculate the NQC of a hydro resource. Hydro resources' NQC are set conservatively, using a 1-in-5 low hydro year. This means the NQC of a hydro resource is set at a low level relative to expected availability. However, a low hydro year may actually allow a hydro resource to be more flexible because of lower spill concerns.

In spite of these differences, it is still desirable to apply many of the same flexible capacity concepts and principles that apply for thermal resources. As such, the ISO and SDG&E

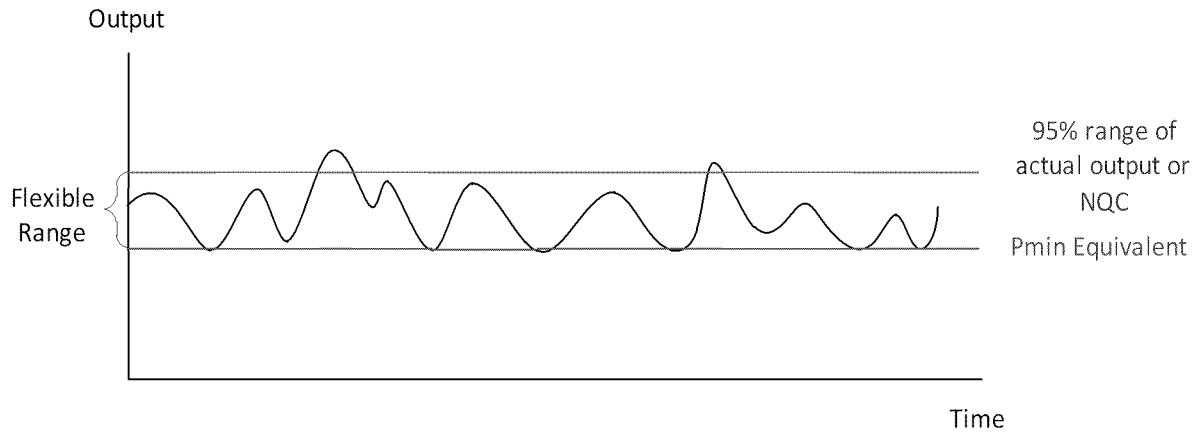
recommend using a variation of the Differentiated Capacity option to determine a hydro resource's effective flexible capacity and potential contribution towards meeting and LSE's flexible capacity procurement obligation. Also, as noted in Section 1, SCE is not yet prepared to sign on to this one part of the proposal.

When applying any type of must-offer obligation on a hydro resource, a less strict offer obligation should be used. Additionally, because hydro resource's flexibility may differ month to month, the ISO and SDG&E recommend the effective flexible capacity of a hydro resource be calculated monthly. In other words, a hydro resource would have a different effective flexible capacity each month. The ISO and SDG&E recommend an effective flexible capacity counting convention and must-offer obligation that would apply only to hydro resources to account for non-electricity generating obligations, such as run-of-the-river constraints and environmental water release. The ISO and SDG&E recommend that the ISO establish a baseline output for hydro resources using the average hydro output over the previous five years.[15] As noted above, a hydro resource may actually be much more flexible in low hydro years than in high hydro years. Using the average of the previous five years allows a hydro resource to provide more effective flexible capacity and potentially contribute more towards meeting flexible capacity procurement obligation than using a conservative approach like a 1-in-5 high hydro year. It is the responsibility of the LSE to manage its potential exposure to penalties associated with non-performance of a flexible capacity resource. Therefore, an LSE must consider how much of the flexible capacity it designates in its flexible capacity procurement obligation showing.

To establish the effective flexible capacity of hydro resources, the ISO would use energy bids and available capacity from the reference period (i.e. 5 years) to establish a Pmin equivalent for each hydro resource. The Pmin equivalent is based on the lowest output from a resource in a given month from the reference year. The upper end of a hydro resources flexible range would be the higher of the resource's 95th percent of the actual output or NQC. Figure 3 depicts a hypothetical hydro resource during the evaluation month. If this hydro resource is submitted by an LSE to provide flexibility, it would be required to submit economic bids for the flexibility range specified in the LSE's flexible capacity procurement obligation showing. The resource may self-schedule for as much output as it wishes, so long as it provides economic bids for a quantity greater than or equal to its flexible capacity contribution.

Figure 3: Hypothetical example of evaluation of a hydro resource

[15] Special consideration may be required for hydro resources that are subject to modified operations due to the Bay Delta Water Quality Control Plan currently being considered by the State Water Resources Control Board.



As with thermal resources, an LSE is not required to include the hydro resource's entire range of flexible capacity in its flexible capacity showing. Additionally, in the monthly showings, an LSE may substitute another resource for a hydro resource used in the annual showings if hydro conditions necessitate. Both of these options allow the LSE to manage the level of risk it may face of having to either provide replacement capacity or be subject to availability charges. However, even using an average calculation for flexible capacity estimate and the risk management tools outlined, it is important to provide provisions for hydro resource that are forced to run at levels that prohibit it from providing economic bids for its flexible range on a day to day basis. The specific provisions will be determined as part of an ISO stakeholder initiative. However, The ISO is currently examining the possibility of allowing a certain amount of ambient derates without substitution or availability charges for hydro resources to account for day to day changes in water conditions as one such provision. A hydro resource would be granted a hydro derate of some percent of its flexible capacity must offer obligation (e.g. 10 percent) if water requirements prohibit the resource from submitting economic bids for the full amount of their flexible range. However, the LSE utilizing a hydro resource as part of their flexible capacity showing that exceeds this derate range would have to offer substitute capacity or be subject to availability charges.

5.5 Procurement and Counting of Intertie Resources

The Joint Parties acknowledge that intertie resources add flexibility and ramping benefits. Flexible pseudo-tie and dynamically scheduled capacity resources can count toward meeting an LSE's flexible capacity procurement obligations in the same way as internal resources. However, as part of the interim solution, the Joint Parties believe it is sufficient to account for the flexibility and ramping provided by non-resources specific intertie resources through the needs determination, and the Commission need not address counting conventions for these resources as part of the current proceeding. In fact, the methodology described in Section 2.1, above, is one example of how the interties are taken into account in the needs determination.

The Joint Parties have proposed a low end measurement for flexible capacity needs. A long-term solution will have to determine the best manner to address non-unit specific intertie flexible capacity.

5.6 Procurement and Counting of Storage and Other Preferred Resources

As noted above, the Joint Parties believe that providing flexible capacity should be technology neutral. Therefore, flexible capacity capabilities of resources like distributed generation, demand response, and storage should ultimately count towards an LSE's flexible capacity procurement obligation. However, in order to expedite the implementation of flexible capacity procurement obligations, the Joint Parties believe more time and consideration are needed to design a flexible capacity counting convention applicable to preferred resources. As such, the Joint Parties recommend that preferred resources use the counting convention proposed in Sections 5.2, 5.3.3.1, and 5.3.3.3, above. If preferred resources can provide flexible capacity consistent with the counting conventions in this interim flexible capacity proposal, then they should be eligible to count toward an LSE's flexible capacity procurement obligation. To the extent necessary, the Joint Parties recommend the Commission explore this issue and develop a record on the flexible capacity counting conventions of preferred resources in a subsequent RA proceeding.

6 Standard Capacity Product, Replacement Capacity, and Non-Performance

The standard capacity product (SCP) serves two primary purposes: 1) to improve the fungibility of capacity and, 2) to establish a performance metric to assess whether capacity resources are providing the capacity to the ISO at the times when it is most needed. As part of this interim proposal, the Joint Parties recommend the Commission only address the need for fungibility and comparable treatment for like resource in the immediate proceeding. Specifically, it is important to distinguish what type capacity (generic or flexible) is being bought, sold, traded and used in RA showings. An LSE is not required to use the same resources in its month-ahead RA showings as it used in its year-ahead showings. The Joint Parties recommend continuing this practice. It is important that any substitution of resources in the RA showings not leave an LSE deficient in any of its capacity procurement obligations, including flexibility. Additionally, this requirement is broad enough that it could be used to apply to longer solutions that may have more granular levels of flexibility. However, at the onset of this interim solution, SCP availability charges and payments, based on forced outages, would still apply.

Lastly, the Joint Parties recognize that not having SCP availability and performance metrics

does not mean that there should not be penalties for resource performance that is inconsistent with the applicable must-offer obligation or ISO dispatch instructions. Therefore, the Joint Parties recommend the Commission rely on the ISO, as part of the ISO stakeholder process discussed in Section 4, to design tariff language to address non-performance in the ISO market.

7 Other Implementation Details

The Joint Parties are proposing a simplified solution for integrating a flexible capacity requirement into the RA process. However, as with any modification to the RA process, there are implementation details that must be worked out.

First, in order to facilitate the flexible capacity procurement showings, the Commission and ISO will amend RA showing and supply plan templates (respectively) to adequately reflect the addition of new flexible capacity procurement obligations and associated values. The addition of the flexible capacity procurement obligation will not change the current RA showing and supply plan timelines. Further, the flexibility requirements should be updated annually and should follow system RA timelines. For example:

- ISO produces study results and monthly system flexibility requirements in Q2
- CEC does LSE-to-system forecast load reconciliation on existing timeline as the basis for flexibility allocation (assuming Option 1)
- CPUC publishes preliminary flexibility allocations in early Q3
- Final flexibility allocations adopted mid-late Q3

Second, as noted above, the ISO will conduct a stakeholder process to determine the necessary modifications to its tariff necessary to implement new flexible capacity must-offer obligations and backstop procurement authority.[16] The ISO will also make the requisite changes to its market and operating systems necessary to flag the resources that are designated as dispatchable resources eligible to offer flexible capacity and fulfill any associated must-offer obligation.

8 Outstanding Issues

It is not feasible for the Commission to determine rules for intra-year load migration as part of the present proceeding. The Joint Parties recommend this be considered as part of a subsequent RA proceeding.

[16] The ISO will need to extend backstop authority to include deficiencies in LSE's flexible capacity showings.

9 Conclusion

The Joint Parties are proposing, as an interim solution, a simplified methodology to include flexible capacity procurement obligations as part of the Commission's annual RA program. The proposal outlines the determination of need, allocation of that need, the counting conventions to determine various resources' contribution towards meeting an LSE's flexible capacity procurement obligation, and outstanding issues to be resolved in future Commission proceedings. Determination of the final must-offer obligations and performance obligations will be determined through collaboration with the Commission and other parties as part of an ISO stakeholder initiative. The Joint Parties recommend the Commission adopt this proposal for flexible capacity procurement obligations for implementation and procurement for the 2014 RA compliance year.