Reliability Services

Addendum to the Draft Final Proposal

February 27, 2015

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1. Addendum to the draft final proposal

Besides the below changes, minor clarifying changes have also been made to this addendum.

Part 2: Availability incentive mechanism:

- The ISO will have a two month advisory period for the availability incentive mechanism that will begin with the implementation date. All availability incentive mechanism penalties and payments will be advisory only. The ISO decreased the period from three months to two months to limit the gap in availability assessment. Two months will still allow time for market participants and the ISO to make any final adjustments needed to accommodate the new mechanism.
- Use-limited resources may use the availability incentive mechanism exempt outage, "short-term use-limit reached" in the period between the incentive mechanism implementation and opportunity cost methodology implementation. The outage was previously titled "non-environmental use-limit reached," but has been changed to better fit the outage circumstance.
- Use-limited resources, including use-limited resources automatically deemed use-limited, must register through the use-limited capacity registration process. This will make the resources eligible to take short-term use-limit reached outages and allow the resources to remain on the registered cost option for start-up and minimum load.
- Although the opportunity cost methodology portion of Commitment Cost Enhancements phase 2 has been delayed, the new definition for use-limited resources in Commitment Cost Enhancements Phase 2 and new RA RUC and bid insertion rules for use-limited resources in this proposal shall be implemented concurrently.
- The ISO would like to clarify a typo in the previous draft. Wind, solar, and CHP are exempted from the generic RAAIM assessment, not the generic must-offer obligation.
- The ISO has added an example in section 6.6 that describes further the ISO's proposal for assessment of multiple categories within a single resource.

Part 3: RA process, replacement, and substitution sections

- In the monthly and annual resource adequacy process, the ISO proposes to cap a load serving entity's local capacity requirement at that load serving entity's system requirement. The ISO clarifies in section 10.4.2 that if an LSE has requirements in multiple TAC areas, the ISO will cap each local requirement at the LSE's system requirement for that TAC area (i.e. based on load in each TAC area relative to their total load).
- Figure 19 has been corrected to follow the described replacement policy timelines.

2. Executive summary

The Reliability Services initiative is a two-phase, multi-year effort to address the ISO's rules and processes surrounding resource adequacy (RA) resources. California's resource planners are preparing for unprecedented changes to the bulk power system resulting mostly from the significant and growing amount of variable energy and other resources that present new operational challenges. Although the current reliability framework has provided for reliable operation of the grid, there is an acknowledged gap in future forward procurement processes to effectively address changed grid conditions. This initiative will propose necessary changes to ensure sufficient resources with the right capabilities are available and offered into the ISO markets to meet local, flexible, and system capacity requirements.[1]

The existing RA framework has developed and evolved over several years based on the collaboration of the ISO, the California Public Utilities Commission (CPUC), and the other local regulatory authorities (LRAs). The Reliability Services initiative continues this collaboration and works in conjunction with the CPUC's *Order Instituting Rulemaking to Consider Electric Procurement Policy Refinements* under the *Joint Reliability Plan* (JRP) (CPUC Docket No. R.14-02-001).

The Reliability Services initiative has two phases. In the first phase, the initiative will focus on RA rules and processes that must be updated for reliability or regulatory reasons. These relate to (1) enhancements to further integrate preferred resources into the grid, (2) rules for integrating flexible resource adequacy resources into the energy market, (3) an update to the availability incentive mechanism price based on the Capacity Procurement Mechanism price that expires on February 16, 2016, and finally, (4) revisions to RA outage management rules that will serve as a platform to develop flexible RA outage rules in phase two.

Phase one proposes significant policy changes that will affect how RA resources are treated and assessed as available while on outage. Because certain changes will require significant implementation work, affect contracting, and involve coordination with the CPUC, the ISO proposes a staged implementation approach. Although the ISO will seek ISO Board of Governors' approval for all phase one items in March 2015 to give market participants certainty that the policy changes will move forward, the ISO will stage the FERC filing and eventually the implementation of some of the larger outage management rule changes. The FERC filing is discussed further in section 3.3 and outage management implementation is further discussed below.

The second phase of the Reliability Services initiative will begin in the first half of 2015. The ISO anticipates the second phase will be split into several parts. Initially, the ISO will conduct and use transparent studies to propose durable flexible RA requirements. This will include an

[1] The resource adequacy provisions of the ISO tariff work in conjunction with resource adequacy requirements adopted by the California Public Utilities Commission and other provisions of California law applicable to non-CPUC jurisdictional Load Serving Entities.

assessment of the ability of intertie capacity to participate as flexible RA capacity. The ISO's studies will look more closely at the need to address operational concerns associated with over-generation, including a review of the associated minimum operating levels run times that come with many resources and the need for ramping capabilities for time intervals less than three hours.

Then, using these studies the ISO will propose flexible RA planned outage rules and make any updating changes needed to accommodate the new flexible RA requirements.

Finally, the ISO will assess current RA rules, and the ISO will propose changes where necessary. This will likely include:

- Assessing how flexible RA and non-flexible RA resources are performing under the revised must-offer obligations and new availability incentive mechanism;
- Addressing any updating changes to outage rules needed due to changes to the Maximum Import Capability (MIC) allocation methodology; and
- Evaluating how the ISO could separate local and system RA showings so a MW could be physically in a local area, but not count toward the local monthly requirement.

The ISO will include more details on the second phase of this initiative in an issue paper in the first half of 2015.

This paper culminates the first phase of the Reliability Services initiative and is broken into four parts. **Part I** describes potential enhancements to resource adequacy criteria and must-offer requirements for resources not accounted for in section 40 of the ISO's tariff. The section also resolves RA policy gaps in the must-offer requirements for energy, ancillary service, and RUC bids from RA resources that occur due to the change in the use-limited definition.

As newer technologies produce and deliver energy onto the grid, the ISO must adapt RA rules to a more diverse set of resource types. As a start to this broader effort, the ISO proposes to:

- Enhance or establish the default qualifying capacity minimum eligibility criteria for system, local, and flexible resource adequacy (RA) capacity where needed, and
- Modify must-offer rules where required, in particular for use-limited resources, to standardize must-offer requirements, as is feasible.

The ISO has identified three areas targeted for improvement in the current tariff related to minimum eligibility criteria. These areas deal with distributed generation facilities, non-generation resources, and proxy demand resources. In summary, the ISO proposes to:

- Clarify that a distributed generation facility must be a participating generator or a system resource, and the default qualifying capacity rules will follow current rules for thermal generation,
- Establish default qualifying capacity counting rules based on the non-generator resources output measured over a four hour period, and

- Modify the existing criteria for proxy demand resources in order to more closely align with CPUC criteria.

The ISO finds that the current must-offer rules can be improved by applying them in a more standardized manner, and making them more universally accessible, across all resource types, including use-limited resources. The ISO also has determined that must-offer obligations for distributed generation facilities and non-generating resources require additional clarification. Specifically, the ISO proposes:

- Distributed generation resources will have the same offer obligations as thermal generation,
- A non-generator resource should be non-use-limited unless the ISO approves the resource's application for use-limited resource status, but will not be subject to bid insertion rules.

Three additional items are identified in the FRAC-MOO stakeholder initiative that require resolution. The first two issues require the ISO to determine rules and requirements for intertie resources and block dispatchable pumping resources that want to provide flexible capacity. The third issue is a reassessment of the MCC buckets, with existing availability hours covered by standard capacity product, to provide guidance to LRAs, LSEs, and supply resources regarding the products needed to address system and local capacity needs. These issues will be addressed in the second phase of this initiative.

Also related to FRAC MOO, the ISO identified a gap in the FRAC-MOO tariff as it pertains to MSS load-following LSEs and their flexible capacity obligation for variable energy resources not included on the portfolio of resources used to follow load. The ISO proposes to require a MSS load-following LSE that does not include variable energy resources in its portfolio to provide adequate flexible capacity to address the contributions these resources might have on the ISO flexible capacity need.

Finally, the ISO proposes new requirements for bid insertion, ancillary service participation, and RUC bidding from RA resources. The requirements tie into a use-limited definition being developed in the Commitment Cost Enhancements phase two initiative and specifically exempt certain resource-types that are no longer considered use-limited, but cannot automatically be accommodated under the full must-offer requirements without additional policy and review. The ISO will reexamine these resources and must-offer requirements in phase two of Reliability Services initiative to determine if full participation from all non-use-limited resources is feasible.

In **Part 2**, the ISO proposes a new incentive mechanism for RA capacity to participate in the ISO energy market. The current standard capacity product (SCP) incentive mechanism is not easily adaptable to flexible RA capacity or the increasing amount of non-traditional resource types on the grid. The current mechanism only uses forced outages to gauge whether a resource is available or not. Under the new flexible RA requirement, flexible RA resources must economically offer into the energy market. To capture this requirement the ISO proposes to move to a paradigm that assesses whether a resource offered in during its RA must-offer

obligation hours. The mechanism's design is built on two fundamental questions: (1) whether and how the resource was *supposed to bid* into the energy market, and (2) whether and how the resource *actually bid* into the energy market. The ISO believes this framework will be adaptable to future flexible RA requirements in addition to the interim ones approved by FERC in August 2014.

The current SCP mechanism also does not easily capture use-limited resources' availability because rather than putting in an outage a use-limited resource sometimes will not bid in a certain hour. The resource then is not available to the energy market, and this non-availability is not captured by the current mechanism. In the future, if a use-limited resource does not provide its capacity to the energy market by providing energy bids, the availability incentive mechanism will assess the resource as not available. This rule will be implemented with an opportunity cost methodology being developed in phase two of the Commitment Cost Enhancement initiative that will allow use-limited resources greater control over the start-up and run times using economic bidding.

The ISO proposes three main design features for the new available incentive mechanism. It will:

- Calculate availability based on the resource offers into the energy market,
- Assess this bid-based availability against a fixed allowed availability percentage threshold where resources that perform under the availability threshold will be charged a penalty, and resources that perform over the availability threshold will be paid, and
- Enhance the calculation of availability charges and incentive payments using a new availability incentive price of $3.79/kW-month, to more equitably reflect monthly resource availability across resources. This involves decreasing capacity exemptions from the availability mechanism and accounting for differences in the number of days the RA capacity was provided to the ISO.

The ISO will have a two month advisory period for the availability incentive mechanism that will begin with the implementation date. This will allow time for market participants and the ISO to make any final adjustments needed to accommodate the new mechanism.

In **Part 3**, the ISO addresses needed changes to the ISO's RA process and outage rules-substitution rules for forced outages and replacement rules for planned outages. The goal of the new policy is to (1) enhance reliability by aligning the ISO's need for high quality resources with market participants incentives to provide RA capacity, (2) simplify the current design to increase transparency and decrease transaction costs, and (3) build a platform to develop rules related to flexible RA resource's planned outages. The ISO proposes to implement new policies in a staged approach.

For implementation by the 2016 RA year, the ISO proposes to:

- Change the deadline for requesting day-ahead substitution to the ISO from 6:00 AM to 8:00 AM to allow additional time for participants to submit additional RA capacity in the instance of a forced outage.

- Allow real-time substitution for system resources and remove the rule requiring substitute resources to have a higher ramp rate than the original resource. This removes the incentive for load serving entities to hold back faster ramping resources to use if a forced outage of another resource occurs. Under the ISO's proposal, load serving entities are incented to always provide the highest quality resource on the initial RA plan.
- Develop criteria to relax the local "like for like" rules requiring substitution to occur at the same bus. This will allow additional resources that are electrically similar to provide resource adequacy capacity in real time.
- Implement substitution policy for flexible RA resources. The ISO will require substitution at the same flexible category or better must offer obligation and allow the scheduling coordinator full control over how many flexible RA MWs are substituted during an outage. There will be no check for substitution on whether the resource can meet the minimum flexible category over the entire month.
- Change the ISO's outage policy to remove the gap created in the OMS tariff revisions that exempted forced outages from seven to four days from the availability incentive mechanism.
- Allow the "release" of substitution capacity if an outage moves and the ISO therefore no longer requires the capacity.
- Expose resource adequacy capacity to the RAAIM mechanism if any non-exempt outage occurs, including planned outages that have not provided required replacement, under the availability incentive mechanism.

For implementation by the 2017 RA year the ISO proposes to:

- Change the monthly RA process timeline to separate the monthly RA showing process from the outage impact assessment.
- Move the responsibility for coordinating additional capacity during planned outages onto the supplier.
- Allow planned outage capacity to be "released" for the originally scheduled timeframe if an outage moves and the ISO therefore no longer requires the capacity in that timeframe.
- Use a consistent forecast and set of rules to assign replacement responsibility for all planned outages reported to the ISO.

3. Schedule

3.1. Stakeholder engagement

The ISO proposes the following schedule stakeholder engagement for phase one of this initiative.

Item	Date
Paper: Draft Final Proposal	January 22, 2015
Call: Draft Final Proposal meeting	January 29, 2015
Comments due: Draft Final Proposal comments due	February 12, 2015
Board of Governors Meeting	March 2015

3.2. Coordination with CPM replacement initiative

Stakeholders have asked the ISO to identify where the CPM replacement proposal overlaps with the Reliability Services initiative proposal and their relative timing to go to the ISO BOG and FERC. The ISO will take the CPM Replacement proposal to the ISO BOG in February 2015, prior to taking the Reliability Services proposal to the ISO BOG in March. This way any dependencies in Reliability Services initiative may still be changed if the BOG changes any aspects of the CPM Replacement proposal. The ISO has identified only one dependency of the Reliability Services proposal on the CPM Replacement initiative.

The proposed timeline for the 2017 RA year depends on whether the BOG approves the proposed Competitive Solicitation Process to replace the current backstop administrative rate. To accommodate the new backstop process, the ISO must accommodate extra time in the 2017 RA proposed timeline.

3.3. Schedule for FERC filing

The Reliability Services initiative and CPM Replacement will have separate FERC filings; however, the two filings will be sent to FERC together. This is because of the overlap between the two initiatives. The ISO is considering a two-staged FERC filing for the Replacement and Substitution proposal. As described in section 7, the RA process, replacement, and substitution proposal roadmap, due to contracting, and implementation requirements, the ISO proposes a staged approach to the proposed rule changes. While it therefore makes sense for all aspects of the proposal to go to the BOG at one time, the ISO is considering whether certain items should go through a separate tariff process at a later date and be included in a separate FERC filing.

PART I: MINIMUM ELIGIBILITY CRITERIA AND MUST-OFFER RULES

4. Evaluating default qualifying capacity provisions for system and local RA resources

4.1. Purpose

A resource must obtain a net qualifying capacity (NQC) value to qualify as a resource adequacy resource. The ISO determines the NQC based on a resource's deliverable capacity during peak periods using a resource's qualifying capacity value. Typically a local regulatory authority (LRA) establishes a methodology to determine the qualifying capacity value for resources procured by their jurisdictional LSEs. If so, the ISO will use this value in the NQC determination. However, sometimes either an LRA chooses not to develop qualifying capacity provisions or has not yet developed rules for a specific resource type. Section 40.8 of the ISO tariff explains how to determine a resource's qualifying capacity if "the CPUC or Local Regulatory Authority has not established and provided to the CAISO criteria to determine the types of resources that may be eligible to provide Qualifying Capacity and for calculating Qualifying Capacity for such eligible resource types."[2] In such a case, the ISO can apply default provisions and establish a qualifying capacity value to calculate an NQC for the resource.

As part of the current stakeholder initiative, the ISO proposes to establish default qualifying capacity provisions, including availability and eligibility criteria requirements, for two additional resource types: distributed generation facilities[3] and non-generator resources.[4] The ISO has also reviewed the existing default qualifying capacity criteria in section 40.8.1 of the tariff to ensure the existing default provisions are still adequate. Based on this review, the ISO believes that proxy demand resources default eligibility criteria should also be updated.

4.2. Issue statement

The ISO tariff provides default qualifying capacity provisions for thirteen resource classifications.[5] The ISO has also undertaken several initiatives to enable distributed generation facilities and energy storage resources to provide capacity to the ISO system. Specifically, the ISO has completed or is conducting the following stakeholder initiatives to enable these resources to provide capacity to the ISO system:

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[2] ISO tariff section 40.8

[3] A distributed generation facility is defined as a Generating Facility connected to the Distribution System of a Utility Distribution Company, irrespective of the size of the facility or the resource type.

[4] An non-generator resource is defined as a resource that operate as either Generation or Load and that can be dispatched to any operating level within their entire capacity range but are also constrained by a MWh limit to (1) generate Energy, (2) curtail the consumption of Energy in the case of demand response, or (3) consume Energy.

[5] A resource classification, in this context refers to the different resources identified in subsections 40.8.1 of the ISO tariff. The resource classifications currently covered under section 40.8.1 include nuclear and thermal, hydro, unit specific contracts, contracts with liquidated damages, wind and solar, geothermal, qualifying facilities, participating load, jointly owned facilities, facilities under construction, system resources and pseudo-ties, and proxy demand resources.

- Deliverability for distributed generation,
- Non-generator resources in ancillary services market,
- Flexible RA criteria and must-offer obligation (FRAC MOO), and
- Energy storage interconnection.

There are no default-qualifying capacity provisions in section 40.8.1 for either distributed generation facility or non-generator resources. The ISO will develop such default provisions in the current stakeholder initiative. While this initiative outlines the default qualifying capacity provisions for distributed generation facility and non-generator resources, these resources are still subject to a deliverability assessment to determine the NQC ultimately used to determine how the resource can be counted towards meeting RA requirements. These deliverability assessments are beyond the scope of this stakeholder initiative.

Finally, to the extent the ISO relies on default qualifying capacity provisions, it must ensure these provisions continue to provide reasonable criteria for establishing a qualifying capacity. This helps ensure that the resources given a qualifying capacity value under these provisions address resource adequacy needs. The ISO has reviewed all the existing default provisions to ensure that the criteria used for establishing a qualifying capacity value are adequate.

4.3. Establishing new default qualifying capacity provisions

The following section addresses the proposed default qualifying capacity provisions, availability, and eligibility criteria requirements for distributed generation facility and energy storage resources.

4.3.1. Distributed generation facility

As part of the deliverability for distributed generation stakeholder initiative, the ISO established the study methodology to determine that a distributed energy facility is deliverable. This methodology allows a resource to receive qualifying capacity and NQC values. The current stakeholder initiative will not revisit this process. Instead, it focuses on the availability and eligibility criteria requirements a distributed generation facility must meet and the method for determining the resource's default qualifying capacity.

The ISO must establish a methodology for determining the initial default qualifying capacity for distributed generation facilities. However, it is not feasible to identify a single methodology that applies to all technology types operating as distributed generation facilities. A distributed generation could be a solar, gas-fired resource, or storage resource. So the ISO proposes to apply the same availability and bidding criteria for a resource classification of distributed generation facilities as those applied to the same resource classification interconnected to the transmission system. A solar resource connected to the distribution system would have the same default availability and eligibility criteria as a solar resource connected to the transmission system. These current criteria are outlined in Appendix A.

Regardless of the technology type, the ISO must still have visibility of the resources. Therefore, as with all other resource types identified in Section 40.8, the ISO will require that a distributed generation facility must be a participating generator or a system resource. This requires the resource be at least 0.5 MW. However, individual distributed generation facilities smaller than 0.5 MW can be aggregated to meet the 0.5 MW minimum size requirement. All aggregated resources must be from the same resource type.

4.3.2. Non-generator resources

The ISO proposes to develop default qualify capacity and eligibility criteria for non-generator resources. First, as with the distributed generation facilities described above, non-generator resources must be a participating generator or a system resource. The ISO expects that non-generator resources can provide availability consistent with conventional thermal resource adequacy resources and therefore proposes no lowered minimum availability requirements such as a reduced number of hours or days the generation is available. Because the ISO can optimize a non-generator resource based on the resource's charge and discharge bids, that resource could be available to the ISO continually. Therefore a non-generator RA resource will be fully subject to RA must-offer obligation rather than have any specific default eligibility criteria.

The ISO must also determine the maximum value of the default qualifying capacity for non-generator resources. One of the unique attributes of energy storage resources is the ability to charge and discharge. This benefit is captured in the effective flexible capacity calculation, which determines the effective flexible capacity based on the entire charge and discharge range for non-regulation energy management resources. For peak requirements; however, the ISO proposes to limit the default qualifying capacity of an energy storage resource to only the resource's maximum instantaneous discharge capability. For example, a distributed energy storage resource that could discharge up to 5 MW could not have a default qualifying capacity value greater than 5 MW.

Because non-generator resources can perform and be available similar to conventional generation, ISO proposes to use the same default qualifying assessment period and assess the default qualifying capacity of all non-generator resources based on the output the resource can sustain over a four-hour period. The current flexible capacity counting rules recently approved by FERC[6] and the existing non-generator resource technical requirements for providing regulation provided in section 8.4.1.2 of the ISO tariff will not change.

The ISO is not proposing different treatment for REM and non-REM non-generator resources for default qualifying capacity provisions. In the revised straw proposal the ISO proposed default

[6] The qualifying capacity provisions are designed to assess the resource output during peak hours of the day. The Effective Flexible Capacity rules are designed to measure the resource's ability to change its output over a three hour time period. Non-generator resources may provide each of these capacity values very differently due to the charge and discharge capabilities of the resource. As such, a non-generator resource may be able to provide more Effective Flexible Capacity than qualifying capacity.

qualifying capacity rules for REM non-generator resources based on the resource's ability to provide 15 minutes of energy while non-REM non-generator resources would be measured over four hours, but modified this proposal in the second revised straw proposal. There are two reasons the ISO's made this modification. First, treating REM and non-REM resources differently (both from each other and other resources) would be discriminatory since all resource adequacy resources are measured based on their ability to provide energy during the four peak hours, not regulation. Second, this follows the CPUC's recently released qualifying capacity provisions, detailed in the final decision in the RA proceeding (D.14-06-050). The CPUC made no distinction between an REM and non-REM non-generator resource for RA purposes.

4.4. Modifying existing default qualifying capacity provisions for Proxy Demand Resources

In section 40.8.1.13, the ISO defines the default qualifying capacity provisions for proxy demand resource. For a proxy demand resource to receive a qualifying capacity under the ISO's default rules, it only needs to be available for four hours per month and 30 minutes per event. The ISO sees these requirements as inconsistent with the default provisions used for other resource classifications and are unlikely to ensure resource adequacy. Therefore, the ISO is proposing to replace the existing proxy demand response requirements with requirements that more closely align with the existing CPUC requirements. Specifically, the ISO proposes that the minimum availability requirements be:

- Able to be dispatched for at least 24 hours per month,
- Able to be dispatched for at least three consecutive days, and
- At least four hours per dispatch.

The ISO is not proposing to change the methodology used for determining the level at which the default qualifying capacity is set.

4.5. Default flexible qualifying capacity provisions for phase two consideration

This section describes future work on default flexible qualifying capacity that will be taken up in more detail in phase two of this initiative. The ISO expects that the issues outlined in this section will require significant time and data collection before the ISO can develop proposals to address them. As such, the ISO has identified these items for phase two completion and outlines a high level plan for addressing these issues. However, if these issues are to be resolved by the end of phase two, the study process and data collection must start during phase one of this stakeholder initiative.

4.5.1. Intertie resources

As noted throughout the FRAC MOO stakeholder initiative, the current definition of flexible capacity will simultaneously address load-following and longer ramps, as long as the resources

providing the flexible capacity are available for five-minute dispatch. In March 2014, when the FRAC-MOO revised draft final proposal was approved by the Board, the ISO committed to an additional review of how intertie resources could provide flexible capacity. On October 16, 2014, FERC agreed that the ISO should conduct additional review regarding how rules and requirements needed to allow 15 minute intertie resources to provide flexible capacity. FERC also instructed the ISO to "assess the feasibility of permitting static import resources to provide flexible resource adequacy capacity and to include this assessment in [an] informational report."[7]

In the FRAC-MOO stakeholder initiative, the ISO began their review of intertie resources and their ability to provide flexible capacity. Specifically, the review forecasted net load increases over 5, 15, 60, 90, and 180 minutes for the 2014 forecasted net-load.[8] The ISO has conducted a similar assessment using the 2015 forecasted net-load.

The ISO finds that 15-minute intertie resources could provide an extra source of flexible capacity to address longer duration flexibility needs. But it may not be enough to look at the upward changes in the forecasted net-load to see how much 15-minute dispatchable intertie capacity we can use to address flexibility needs with longer durations. This is because we must also ensure that load-following and short-duration ramping needs are also addressed. So the ISO is seeking stakeholder input on how the ISO might assess intertie resources for flexible capacity. In comments to the second revised straw proposal, Powerex provided comments regarding the difference between the frequency of the dispatch instruction (5 minute vs. 15) and the timing of the dispatch instruction (T minus 7.5 minutes vs. T minus 37.5 minutes). While the Powerex comments provided no specific proposal about how the ISO should consider dispatch timing in its comments, the ISO believes this matter warrants additional consideration. The ISO will include dispatch timing as part of the assessment of interties to be conducted in phase two of this initiative.

The ISO will conduct additional analysis determine the minimum five-minute dispatchable resources needed to meet the five-minute net load variations. This will be based on an analysis of the difference between fifteen-minute granularity of net load variations and five-minute granularity of net load variations. It will include an evaluation of: (1) continuous ramping needs, which will inform the CAISO of how long and at what rate the system must be able to maintain a continuous ramp to meet the maximum needs; (2) load following needs; (3) ramp rate needs, which compare the load following must the 15-minute and five-minute ramp rate needs; (4) minimum load burden, which is the amount of minimum load online for the ramping needs and the impact of dispatch frequency and timing.

[7] FERC Design on FRAC-MOO at paragraph 79.
[8] See Table 2 in the Flexible Resource Adequacy Criteria and Must-Offer Obligation revised Draft Final proposal. Available at http://www.caiso.com/Documents/RevisedDraftFinalProposal-FlexibleRACriteriaMustOfferObligation-Clean.pdf

4.5.2. Block dispatchable pumping load

In FRAC-MOO, the ISO recognized the benefits that flexible hydro resources can provide. The ISO also recognized the flexibility that non-generator resources' charging capabilities offer. But not every storage resource fits within the non-generator resource model. NGRs are treated as generators (with positive and negative output) and never as load. Their ability to continuously move between positive and negative output bolsters their treatment as a generator. Introducing the concept of transition times between positive and negative output weakens their treatment as a generator and makes them look like a combination of generator and load.

Pumped hydro pump storage is an example of a storage resource that does not fit into the ISO NGR model. The ISO's pumped hydro storage model treats the resource as two resources (load and generation). While this model works reasonably well to ensure the resource can charge for peak load, it is not clear that such a model is well suited for addressing the CAISO's need for five-minute dispatchability or transitioning from charge to discharge during peak net load ramping hours. Further, the CAISO's NGR model efficiently manages flexible capacity between the charge and discharge capabilities of a storage resource, with both states being dispatchable every five minutes. The NGR model, however, does not allow for a transition time. Currently, the resources with transition times would fall under the pumped hydro model, The pumped hydro model, unlike the NGR model, is not five-minute dispatchable for the pumping portion of the resource and lacks detail regarding the parameters for the load component of the resource (i.e. start-up time, ramp rates) that are present in the NGR mode.

The CAISO does not currently have a resource model that can manage an energy storage resource with a transition time like pumping load. The CAISO may need to design a new product that would likely pull various aspects from the existing models for NGR, pumped hydro, and multistage generation resources. This is a reliability question. The CAISO is in the best position to assess the reliability concerns that arise from energy storage resources that do not meet the requirements of the NGR model and develop a model for treatment as flexible capacity.

The CAISO's NGR tool is ideally designed to address flexible capacity from the storage portion of energy storage resources. The continuous transition between charge and discharge allows for a smooth transition of the energy storage resource during peak net load ramping hours (i.e., from the belly of the duck to the neck) and managing shorter duration flexibility needs. It is not clear that the same can be said for the ISO's pump hydro model. The reliability impact of a transition time for energy storage resources for flexible capacity, regardless of duration, is unclear.

4.5.3. Assessment of ISO's dependence on CPUC maximum cumulative capacity buckets

CPUC's maximum cumulative capacity buckets (MCC buckets) are an element of the existing RA market that has, to date, helped the ISO address system needs. For example, the MCC

buckets are one of the primary tools of the CPUC's RA program preventing an over-reliance on use-limited resources. The MCC buckets are shown in Figure 1.

Figure 1: CPUC Maximum Cumulative Capacity Buckets[9]

Category	Criteria
DR	Demand response resources available for greater than or equal to 24 hours per month
1*	These ULR hours for May through September are, respectively: 30, 40, 40, 60, and 40. Sometimes referred to as the "210 hours."
2	Greater than or equal to 160 hours per month
3	Greater than or equal to 384 hours per month
4	All hours (unrestricted)
*http://www.cpuc.ca.gov/word_pdf/REPORT/37456.pdf pgs. 24 - 25	

For the past several RA cycles, the CPUC has proposed eliminating the MCC buckets. Though the ISO supports a reevaluation of the MCC buckets, simply discontinuing their use without putting a new structure in place is not advisable. It could cause an over-reliance of use-limited resources for RA capacity. So the ISO suggests that a reassessment of the MCC buckets, along with existing availability hours covered by standard capacity product, can provide guidance to LRAs, LSEs, and supply resources about the products needed to address system and local capacity needs.[10]

The first step of this reassessment will be to collect information.[11] First, the ISO must determine if the existing MCC buckets will continue to effectively meet the ISO's reliability needs. If they will not, the ISO, LRAs, and other stakeholders must determine what new products are needed. For example, in the FRAC-MOO stakeholder initiative and the CPUC's RA proceeding, the ISO identified categories of flexible capacity based on operational needs. If the assessment of the MCC buckets demonstrates a need for additional capacity products, the availability incentive mechanism developed as part of this stakeholder initiative can be easily modified to account for different or more hours.

[9] *2014 Filing Guide for System, Local and Flexible Resource Adequacy (RA) Compliance Filings,* Available at http://www.cpuc.ca.gov/NR/rdonlyres/0C2512A4-AE6C-4BB7-BC0D-75D2F40741BA/0/Final2014RAGuide.docx

[10] The ISO is not proposing to establish procurement requirements as part of this assessment, but will continue to work with LRAs to ensure the procurement matches ISO needs identified through this assessment.

[11] The ISO is still in the processes of determining the best method for collecting this data as well as the appropriate parties to request that data from.

Further, as part of this effort, the ISO proposes to collect data on *subset of hours* contracts, in which an internal resource may be under contract to provide RA capacity to the ISO only for certain hours of the day, perhaps for a subset of the typical 24-hour must-offer requirement. Currently a subset of hours rule is only in place for imported RA capacity. However, a full assessment of generic RA needs, by hour, was not conducted. The ISO proposes to collect subset of hours contract information, which will help the ISO determine how these contracts align with the ISO's needs.

4.6. MSS Load Following Flexible Capacity Requirements

In the FRAC MOO stakeholder initiative the ISO proposed the MSS load-following LSEs should not be required to provide the ISO with monthly or annual flexible capacity showings. This proposal was based on the presumption that the MSS load-following LSEs had to manage all of their own variability, including the variability of wind and solar resources on their MSS resource portfolio.

An MSS load following LSE must balance its load with resources from its identified portfolio of resources. If this portfolio includes variable energy resources, then any increase or decrease from these resources must be balanced by another resource from the portfolio. However, nothing in the ISO tariff requires an MSS load-following LSE to include all of its contracted wind and solar resources in its portfolio of resources. If an MSS load-following LSE does not include these resources in its designated portfolio, then the LSE would not be required to move another resource to balance the portfolio. This creates the potential for an MSS load-following LSE to lean on other LSEs to provide flexible capacity needed to address the variability of these resources. The ISO believes it is important to ensure MSS load-following LSE fully cover their allocable share of flexible capacity.

In the FRAC MOO initiative, the ISO established a methodology for allocating an LRA's contribution to the ISO's flexible capacity need. With a minor modification, the ISO proposes to utilize this methodology for variable energy resources contracted with MSS load following LSEs. Specifically, the proposed FRAC MOO allocation methodology to an LRA was done as follows:

Contribution = Δ Load – Δ Wind Output – Δ Solar PV – Δ Solar Thermal[12]

Because MSS load following resources must follow their load already, the Δ Load component of this formula is not needed for calculating its contribution to flexible capacity needs. Further, any changes in output from variable energy resources on the MSS resource portfolio must also be compensated for through other resources. ISO will remove these factors from the MSS load following LSE's contribution to the flexible need. Therefore, an MSS load following LSE's contribution to the maximum three hour net load ramp would be calculated as:

MSS Contribution = – Δ Wind Output* – Δ Solar PV* – Δ Solar Thermal*

Where:

[12] The ISO's FRAC-MOO Revised Draft Final Proposal, at p. 20.

1) Δ Wind Output* – LRA's average percent contribution to changes in wind output *from wind resources not included in the MSS load following LSE's resource portfolio* during the five greatest forecasted 3-hour net load changes x ISO total change in wind output during the largest 3-hour net load change
2) Δ Solar PV* – LRA's average percent contribution to changes in solar PV output *from Solar PV resources not included in the MSS load following LSE's resource portfolio* during the five greatest forecasted 3-hour net load changes x total change in solar PV output during the largest 3-hour net load change
3) Δ Solar Thermal* – LRA's average percent contribution to changes in solar thermal output *from solar thermal resources not included in the MSS load following LSE's resource portfolio* during the five greatest forecasted 3-hour net load changes x total change in solar thermal output during the largest 3-hour net load change

While the ISO will calculate an MSS load-following LSE's contribution to the three hour net load ramp using only the resources not on the resource portfolio, the MSS load following LSE must submit to the ISO, as part of the annual flexible capacity needs assessment, a list of all wind and solar resource under contract to the LSE. The MSS load-following LSE can, as part of this data submission, designate resources that will be on it MSS resource portfolio. The ISO as part of the FRAC-MOO FERC filing stated that it will not rerun the annual flexible capacity needs assessment after May 1 each year. However, an MSS load following LSE's resource portfolio is not due to the ISO until October 31. It is possible that wind and solar resources designated as being part of the MSS resource portfolio during the study may not be on the final resource portfolio for a given RA month. The ISO cannot rerun the flexible capacity needs assessment at the time to determine the impact this deviation might have on the need for flexible capacity. Therefore, the ISO proposes that MSS load-following LSE provide an additional MW of flexible capacity for each MW of capacity from variable energy resources that was supposed to be on an MSS resource portfolio but was not. Based on comments provided by Six Cities, the ISO considered reducing this replacement to less than a one-for-one requirement. However, specific resources contribute differently towards the ISO's three hour net load ramp, even resources of a similar technology type. Therefore, using an average contribution or index may not accurately reflect the resource's impact on the three hour net load ramp. Because the ISO cannot rerun the flexible capacity needs assessment, this requirement is the only way the ISO can ensure that the deviation from the original study assumptions do not impact the adequacy of flexible capacity on the system. It would not be possible to determine if a resource contributed more flexible capacity need then the average.

Finally, the FRAC-MOO tariff filing contemplated there would be overlap between flexible capacity resources and resources used to cover contingency reserves. As such, the ISO included in the flexible capacity requirement an additional 3.5 percent expected peak load to address this overlap. As per the recently ISO's approved FRAC-MOO tariff this component of the flexible capacity need will be allocated using peak-load ratio share. It is appropriate to include this component for MSS load-following LSEs as well. However, if 3.5 percent expected peak load is greater than an MSS load following LSEs contribution to the three hour net load ramp, then it would more than compensate for the potential overlap. Therefore, the ISO

proposes to include in an MSS load following LSE the lesser of 3.5 percent expected peak load or the LSE's contribution to the three hour net load ramp. This provision ensures that the MSS load following LSE is covering any potential overlap between flexible capacity resources and resources used to provide contingency reserves without having the 3.5 percent expected peak load drive the flexible capacity requirement. If MSS load following LSE's contribution to the three hour net load ramp is less than the LSE's contribution to the 3.5 percent of expected peak load then the ISO will not reallocate the remainder of the 3.5 percent expected peak load to other LRAs or consider it while assessing the need for backstop procurement.

Therefore, an MSS load following LSE's total flexible capacity contribution, excluding any potential allocation of an adjustment factor, will be determined as

Flexible capacity contribution = – Δ Wind Output* – Δ Solar PV* – Δ Solar Thermal* + Minimum [contribution to 3.5% Expected Peak Load, (– Δ Wind Output* – Δ Solar PV* – Δ Solar Thermal*)]

The ISO specifically exempts MSS load-following LSEs monthly and annual flexible capacity RA plan requirements. These plans are covered under section 40.10.5 for non-MSS load following LSE. Once an MSS load following LSE's contribution to the flexible capacity need for resources outside of the MSS load following portfolio has been determined, it would be required to provide monthly and annual flexible capacity RA plans to show the flexible capacity it is committing to satisfy that requirement as determined herein, consistent with the provisions 40.10.5 of the ISO tariff.

5. ISO Review of Must-offer Obligations

5.1. Purpose

The ISO has reviewed the must-offer obligations for each of the resource classifications identified in the tariff to determine if the must-offer obligations for all resource types are fully identified. As part of this review, the ISO has determined that the must-offer obligations for distributed generation facilities, non-generator resources, and proxy demand resources require additional clarification.

5.2. Issues brief

While the must-offer obligation for most resource types appears appropriate the ISO notes that must-offer obligations for distributed generation facilities and non-generator resources is not well defined. The ISO considered an additional must-offer obligation for Proxy Demand Resources. However, after review, the ISO finds such a modification is not required because the proposed availability incentive mechanism should provide adequate incentive for proxy demand resources to be available to the ISO in a manner comparable to other use-limited resources.

5.3. Distributed Generation Facilities

In section 4.3, the ISO proposes that the default qualifying capacity provisions for distributed generation facilities should mirror the default provisions for similar resource classifications connected to the transmission system. The ISO proposes that the must-offer obligation of distributed generation facilities should mirror resources connected to the transmission system. If a distributed generation facility applies for and is approved for use-limited status, then that resource would be subject to the must-offer obligations of a use-limited resource.

5.4. Non-Generator Resources

The ISO proposes not to include a minimum number of hours when non-generator resources must be available. However, the ISO must establish the must-offer obligation for non-generator resources. The basis for a must-offer obligation starts with a determination of whether the resource is use-limited or not. Two stakeholders have provided significant feedback on this matter. PG&E favors defining non-generator resources as use-limited, while CESA prefers a default of non-use-limited.

The ISO defines a use-limited resource as:

> A resource that, due to design considerations, environmental restrictions on operations, cyclical requirements, such as the need to recharge or refill, or other non-economic reasons, is unable to operate continuously. This definition is not limited to Resource Adequacy Resources. A Use-Limited Resource that is a Resource Adequacy Resource must also meet the definition of a Resource Adequacy Resource.[13]

In Commitment Cost enhancement Phase 2, the ISO is adding additional clarity to this use-limited resource definition. Specifically, the ISO has proposed to enhance this definition to:

> Capacity with operational limitations or restrictions established by statue, regulation, ordinance, or court order that cannot be optimized by the appropriate ISO commitment process without allowance for opportunity costs. [14]

Any changes to the treatment of use-limited resources rely on this new proposed definition.

The ISO can send dispatch instructions for a non-generator resource to charge or discharge based on ISO system needs. Because the ISO markets optimize the charge and discharge

[13] FERC approved the ISO revised definition for use-limited resources on December 30, 2014 in the ISO's commitment cost enhancements filing (ER15-15).

[14] See the Commitment Cost Enhancements Phase 2 revised straw proposal at p. 8. More information is available on the commitment cost enhancements webpage. http://www.caiso.com/informed/Pages/StakeholderProcesses/CommitmentCostEnhancementsPhase2.aspx

states of the resource based on market conditions, there is not a "cyclical requirement" that limits the resource either. All charging and discharging needs are optimized through the ISO market. A non-generator resource that is fully discharged (charged) and unable to provide upward (downward) regulation because of ISO dispatch instructions does not differ from a conventional resource that cannot provide downward regulation because the ISO has dispatched the resource to Pmin. In short, the resource is available to the ISO but has hit an operational constraint. Further, there does not appear to be inherent operational or environmental limits to justify the ISO classifying a non-generator resource as a use-limited resource by definition. Therefore, the ISO proposes that a non-generator resource be classified as non-use-limited, unless it applies for use-limited resource status demonstrating the resource's limitations meet the ISO's definition of use-limited resources. If the limitations meet the ISO's definition, then the ISO would approve the resource as use-limited.[15]

Typically, a non-use-limited resource would be subject to bid insertion provisions if the resource submitted no bid. In the second revised straw proposal, the ISO proposed to use a NGR's default energy bid for bid insertion. However, after further review, the ISO determined that the default energy bid, regardless of how it was established, is not appropriate for NGRs. At this time, the ISO proposes to exempt NGR resources from bid insertion provisions.[16] There is current no way to determine the best way to determine a rule for determining bid insertion rules for NGR resources. Further, there is still a significant need to understand the bidding and operational challenges associated with NGR resources. Therefore, the ISO will continue to monitor NGR bidding performance and the need to develop bid insertion rules.

5.5. Proxy Demand Resources

There are no tariff provisions exempting PDR from the standard RA requirements for Residual Unit Commitment (RUC) participation. Therefore, any PDR RA resource that bids into the day-ahead market must also provide that capacity in the RUC process. The ISO proposes to loosen this requirement as a first step to fully integrate PDR resources into the RUC.

At a high level, the purpose of RUC is to ensure there is sufficient capacity online to meet the CAISO Forecast of CAISO Demand (CFCD), unlike the day-ahead market that clears only to bid-in demand. This process is vital to ensure the reliability of the grid. The RUC process works by first taking all day-ahead schedules and comparing it to the CFCD. If additional capacity is still needed, RUC will then take all remaining RA capacity from resources committed in the day-ahead. This is because RA capacity is "free" to the RUC process. If this still is not sufficient to meet the CFCD, then RUC will begin committing additional resources and taking non-RA energy that has a bid into RUC based on cost minimization strategy to meet the CFCD. The

[15] See the ISO Second Revised Straw Proposal in the Commitment Cost Enhancement, Phase 2 for additional detail regarding the treatment of non-generator resources and use-limited status.

[16] This does not apply to storage resources such as participating load or pumped storage (and are already deemed use-limited).

consequence is that in some circumstances RUC will send binding commitments to long-start resources that cannot be started up by the real-time market.

RA proxy demand resources that do not have a minimum load cost or start-up cost will look "free" to the RUC process. This is because all RA capacity is inserted into RUC at $0. If a PRD needs to notify its customers more than 5 hours in advance, it cannot be "started up" in real-time and is the equivalent of a long-start thermal resource. If a long-start PDR receives a RUC award, then it will receive a binding RUC dispatch instruction. This will use up proxy demand resource's starts quickly within a month due to frequent, subsequent binding RUC commitments. In real-time the resource is unlikely to be the economic choice once energy bids are considered and therefore if a long-start PDR resource participated in RUC, RUC would deplete the resource's limited dispatches sub-optimally.

Short- and medium- start PDRs do not have this same issue. These resources can notify customers in the real-time and therefore will not receive a binding RUC commitment. Instead, any RUC schedule for these resources will be advisory. An advisory dispatch is for informational purposes only and therefore will not sub-optimally use up PDR starts. Therefore the ISO proposes to maintain the status quo for these resources and maintain the requirement to participate in RUC.

5.6. Changes to existing must-offer rules to accommodate updated use-limited definition

The Commitment Costs Enhancements phase 2 initiative is redefining the definition of use-limited resources.[17] The ISO proposes new policy rules for RA resources to account for the use-limited definition. These rules will not change the underlying current policy, but simply accommodate a new use-limited definition. Certain RA rules depend on the use-limited definition:

- Residual unit commitment (RUC) participation (tariff section 40.6.4.3.2) mandates that the ISO will not insert a $0 RUC bid or require participation by hydro, pumping load, and non-dispatchable, use-limited resources
- Energy and ancillary service bid insertion rules (tariff section 40.6.8) mandate that the ISO will not insert any bid into the energy or ancillary service market for an RA resource that is use-limited.

The ISO proposes to revise these definitions to maintain exemptions for resources previously exempt under the previous use-limited definition, but will no longer be exempt after implementation of the new policy. The ISO may revisit whether these exemptions are appropriate in phase II of the RSI; however, at this time the ISO cannot easily accommodate

[17] More information is available on the commitment cost enhancements webpage. http://www.caiso.com/informed/Pages/StakeholderProcesses/CommitmentCostEnhancementsPhase2.aspx

new rules for the many various resource types subject to generating bid and RUC rules without these changes.

For example, solar and wind resources are unlikely to be use-limited resources under the new definition. Therefore under the current generated bid and RUC rules the ISO must generate a bid price based on cost assumptions for solar and wind resources. The ISO has no cost-based price for these resources. While it may be appropriate for this to be developed, at this time the ISO proposes to maintain the status quo RA policy.

Therefore, besides use-limited resources and the NGR exemptions, the ISO proposes to exempt regulatory must-take, and variable energy resources from generated bid rules. And in addition to hydro, pumping load, and non-dispatchable, use-limited resources, the ISO proposes to also exempt QFs and regulatory must-take resources from RUC insertion. If these RA resources choose to participate in RUC, they still must participate and be paid consistent with other RA resources.

PART 2: AVAILABILITY INCENTIVE MECHANISM

6. Resource availability incentive mechanism

6.1. Purpose

Because reliability and market economics are inexorably linked, a reliable grid will have the right incentives in place to ensure the market has access to the right resources at the right time, in the right location. RA capacity has a must-offer obligation in the ISO energy markets, which is essential to maintain grid reliability. The ISO provides incentives beyond energy market revenues for RA capacity to participate in the energy market and meet a resource-specific must-offer obligation. This is done through an availability incentive mechanism that pays capacity for availability and charges capacity for non-availability. The availability incentive mechanism increases reliability through rewarding high performing resources and penalizing low performing resources, reducing potential gaming, and increasing the standardization of RA contracts.

6.2. Issues brief

Although the current SCP availability mechanism is functioning for some resources, about half of the RA capacity in the ISO market is not subject to the mechanism or is unequally subject to the mechanism. The ISO discussed this in detail in the ISO working group presentation on April 23, 2014.[18] The ISO cannot fully capture use-limited resource availability with the current mechanism, and does not consider flexible RA at any level. In August 2014, FERC approved a flexible RA requirement, compliance categories, and associated must-offers for the 2015 RA compliance year. The initiative process will address development of a flexible RA availability mechanism and price and review the incentive mechanism. The current availability price for RA resources is the CPM price, which expires February 16, 2016.

To integrate the flexible capacity requirement, the ISO proposes a new availability incentive mechanism that will address the following issues[19]:

- The significant number and capacity of RA resources not subject to the current availability incentive mechanism due to exemptions in the tariff (40.9.2),
- The significant number and capacity of RA resources that are use-limited and therefore not fully subject to the current forced outage method of calculating availability due to less

[18] Working group presentation beginning on slide 37: http://www.caiso.com/Documents/Presentation-ReliabilityServices-WorkingGroupApr23_2014.pdf
[19] For additional information on the issues please read the issue paper: http://www.caiso.com/Documents/IssuePaper-ReliabilityServices.pdf and working group presentation beginning on slide 37: http://www.caiso.com/Documents/Presentation-ReliabilityServices-WorkingGroupApr23_2014.pdf

restrictive outage requirements and exemption from the bid insertion rules that apply exclusively to use-limited resources,

- Enhancement of the availability incentive mechanism to cover flexible RA resources (also covering the associated, varying must-offer requirement obligations by flexible capacity category and capturing the economic bidding requirement), and
- A price for the charge and payment to replace the CPM Procurement Mechanism price that expires on February 16th, 2016.

6.3. Current SCP availability incentive mechanism

The ISO's current SCP incentive mechanism tracks the availability of RA capacity during five consecutive hours of each non-weekend, non-federal holiday day. The availability during these hours is translated into a resource-specific monthly availability percentage. Availability is defined as capacity not on forced outage or affected by an ambient derate. Detailed rules describe how outages and derates count toward determining a resource's compliance in tariff section 40.

Resource availability during the five peak hours is compared against the historical availability average during that month for the past three years. A resource with an availability percentage over 2.5% above the average is eligible for an availability incentive payment, while a resource with availability less than 2.5% below the average is subject to a non-availability charge. The availability price is the current CPM price of $70.88 per kW-year ($5.91/kW-month), which expires February 16, 2016.

More information on the current availability standard can be found in tariff section 40.9. Historical percentages and an assessment of the current availability standard can also be found in the ISO's April 23rd working group presentation.[20]

6.4. Summary of proposed design

The ISO proposes to use a portion of the current SCP incentive mechanism design in creating a new availability incentive mechanism. Resources will be paid or charged based on their availability relative to an ISO-determined, acceptable reliability range. Availability will be assessed monthly. The new availability incentive mechanism will assess availability based on whether a resource is bid into the ISO energy markets consistent with their RA must-offer obligation during assessment hours.[21]

The ISO proposes to assess flexible and generic RA capacity under a single availability assessment and not to double count any capacity if it is shown as both generic and flexible RA capacity. Any hours or capacity covered within the flexible or generic must-offer obligations will go into the resource's single availability assessment. When flexible must-offer requirements

[20] ibid
[21] System and local resources may self-schedule, whereas flexible RA resources and Proxy Demand Resources must economically bid into the energy market.

overlap with generic must-offer requirements, the ISO will hold the capacity to the higher flexible obligation. The ISO will only count a MW once in the assessment. There will only be one availability price for RA capacity, with the exception that any RA capacity that is also CPM capacity will have a different price for the CPM RA MWs. The CPM capacity price is discussed further in section 6.8.

The ISO will calculate a monthly MW availability incentive range specific for the resource, based on the standard availability incentive percentage range. Any capacity that falls below the standard availability incentive percentage range will be charged the incentive price. The incentive mechanism will be self-funding so available capacity above the standard percentage range will be paid using the pool of money from the unavailable capacity. As a result, payments per MW of availability can be higher or lower than the unavailability charge and will depend entirely on the amount of unavailable capacity. When no capacity meets the criteria for an availability payment, the funds will roll over into the following month's payment pool. Any excess funds in the pool at the end of the year will be allocated to load. Because of the roll over account, all settlement statements will be final at the T+55 statement.

Additionally, the new availability incentive mechanism will not count capacity on planned outage as available. Instead the mechanism will pull any capacity on a planned outage completely out of the assessment calculation.

In summary, the ISO proposes three fundamental features to include in the availability incentive mechanism.

- First, the availability assessment will determine a resource's availability based on whether the capacity is bid into the ISO market. The bid must be consistent with the RA capacity type's must-offer requirement. For example, flexible RA capacity must be economically bid into the ISO's energy markets. Using such an availability assessment rather than an outage-based assessment will account for the flexible RA obligation that requires an economic offer into the energy market. It will also better calculate availability for use-limited resources.
- Second, the ISO will assess a resource's availability against a fixed percentage rather than a moving average. Initially the ISO had no data on the average availability of the fleet and did not want to devise a range that might unduly penalize resources. Now data is available for the ISO to assess how a pre-determined fixed availability band could allow availability incentive payments to reflect market conditions without unduly penalizing resources.
- Finally, the ISO will calculate availability charges and payments using a single price and assessment methodology for all non-CPM RA capacity. This recognizes that the ISO needs a range of resources and capabilities to bid into the ISO energy markets in order to reliably operate the grid and that a resource's availability should reflect the resource's overall contribution to grid reliability.

The ISO will have a two month advisory period for the availability incentive mechanism that will begin with the implementation date. This will allow time for market participants and the ISO to make any final adjustments needed to accommodate the new mechanism.

6.5. Bid-based availability assessment methodology

The availability assessment is how the ISO determines whether a resource is providing itself to the ISO per the tariff's must-offer rules. The ISO will calculate a resource's availability by comparing the MWs the ISO expected to be available to the MWs economically bid or self-scheduled into the ISO market. The ISO will translate this into a resource specific availability percentage and compare it to the standard availability range. Any MW amount that falls outside this range will be subject to an incentive payment or charge. If a resource's availability is less than the standard range, then the ISO will charge the resource. If the availability is greater than the standard range, then the ISO will pay the resource. Therefore the availability assessment methodology is central to the availability incentive mechanism.

Ideally, availability should be measured using the relevant must-offer requirement, MW amount shown on a resource's monthly supply plan, and the quantity economically bid or self-scheduled into the market for hours the capacity is listed as a RA capacity. If, because of the must-offer requirement, the RA capacity must be bid into the ISO market for certain hours, the resource's availability should be based on whether they made available their full RA value during those specific hours. This redefines the concept of availability. Where before availability meant '*not on forced outage',* availability is redefined to mean 'offering into the ISO market during the resource's must-offer requirement hours'.

The ISO finds two significant benefits from moving toward a bid-based, rather than outage-based, assessment. First, a bid-based availability metric will allow use-limited resources to be treated more like non-use-limited resources under the availability metric. Use-limited resources have the must-offer requirement to bid when available. However, availability is difficult to measure for use-limited resources using outage data because use-limited resources only have the requirement to bid according to their use-plan. This does not require bidding in every hour and so it is difficult for the ISO to track legitimate non-bidding and what is inappropriate non-bidding. A bid-based metric will allow the ISO to calculate availability for these resources using the same process as non-use-limited resources, promoting more consistent treatment among resources.

Second, a bid-based methodology will allow the ISO to evaluate flexible resource availability. The flexible must-offer requirement mandates that scheduling coordinators bid in flexible RA capacity using an economic bid rather than a self-schedule. The current outage availability metric cannot monitor whether resources have an economic- or self-schedule. Therefore if the ISO does not move to a bidding metric of some type, the ISO cannot verify that flexible resources are in fact providing flexibility to the energy markets.

The following sub-sections describe the proposed bid-based assessment methodology.

Generic resource adequacy capacity

Generic RA capacity in this section refers to capacity shown as either system or local capacity in the ISO's monthly showing requirement. At this time the ISO does not propose to differentiate between local and system capacity in the availability assessment. This section describes how a bid-based availability assessment would apply to generic capacity that does not overlap[22] with flexible capacity.

Must-offer requirements

The ISO has specific must-offer requirements for each hour a resource's capacity is shown as generic RA capacity. For most generic capacity the must-offer requirement is to bid or self-schedule capacity into the ISO market all hours of the day.

Specifically, tariff section 40.6.1 requires suppliers to make available to the day-ahead market all operationally available RA capacity. Scheduling coordinators must submit economic bids or self-schedules for all RA capacity and qualified ancillary services. Resources must also participate in RUC by submitting any additional capacity not procured in the day-ahead market. Tariff section 40.6.2 outlines additional resource bidding requirements.

RA resources that fulfill their must-offer requirement in *either* the day-ahead or real-time market will only be assessed under the availability incentive mechanism rules in that market.

Proposed availability assessment hours options

The ISO proposes a two-phase path forward for establishing assessment hours for generic RA capacity. Currently defined must-offer requirements are not in place to clearly delineate assessment hours for generic RA resource availability. The ISO is aware that certain resources are not available or under contract 24 hours each day and it would be a significant change to hold all generic resources accountable to a 24-hour bidding availability check.

The ISO therefore proposes in phase one of this initiative to maintain the five-hour methodology used in the current SCP assessment hours. In phase two of this initiative the ISO can evaluate the benefits assessing resources every hour they are contracted as RA capacity.

In either phase, in some hours, the generic RA assessment hours will overlap with the flexible assessment hours. This is addressed in section 6.6.

Proposed availability assessment methodology

For generic RA capacity that does not overlap with flexible capacity, the ISO proposes to assess availability hourly, based on bids into the day-ahead and real-time market. In both markets,

[22] "Overlap" refers to the event where a single MW is both counted as flexible and generic resource adequacy capacity.

scheduling coordinators must provide the ISO with hourly bids or self-schedules subject to requirements in tariff section 40.6.2.

The ISO will use the availability assessment in a resource's average monthly availability calculation. The monthly evaluation will use the minimum of the day-ahead and real-time market availability assessment (evaluated each day) in the monthly availability assessment percentage calculation. This would mean that, in any individual hour or day, a resource could be above or below the standard percentage without incurring a charge or payment. Only if the monthly MW-weighted average percentage fell above or below the standard percentage would a charge or payment be incurred.

The monthly assessment methodology is illustrated in a separate spreadsheet, *Incentive Calculation Model*.

6.6. Flexible resource adequacy capacity

Flexible RA capacity refers to capacity shown as flexible capacity in the ISO's monthly showing requirement. Currently, as proposed in the Flexible RA Criteria and Must-Offer Obligation (FRAC MOO), there are three flexible categories. Resources under any category are considered flexible resource adequacy capacity. This section describes how a bid-based availability metric would apply to flexible RA capacity in the associated categories. This methodology also applies to flexible capacity that overlaps with generic capacity.

Must-offer requirements

For flexible RA resources, the FRAC MOO stakeholder initiative specified that flexible RA must-offer requirements would mirror the generic must-offer requirements with three exceptions:

- Resources would not have the option to self-schedule any portion of the resource shown as flexible RA capacity into the energy market,
- Resources must offer their full operationally available flexible RA capacity into both the day-ahead and real-time market, and
- Resources only must offer into the ISO market during periods specified by their relevant flexible category.

In the FRAC MOO stakeholder initiative, the ISO determined that flexible RA capacity could fall into three categories with varying eligibility criteria and must-offer requirements. The categories of must-offer requirements are:

- Category one (base flexibility) capacity must offer into the energy market daily from 5:00 a.m. to 10:00 p.m. each day,
- Category two (peak flexibility) capacity must bid into the energy market daily for a pre-determined 5-hour window, and
- Category three (super-peak flexibility) capacity must bid into the energy market on all non-holiday weekdays during a pre-determined five-hour window.

The ISO proposes that each resource only has a single flexible must-offer obligation for the availability assessment. A resource may be shown in multiple categories, but the availability assessment on all the resource's RA capacity will be equal to the highest quality category shown. This policy reduces implementation complexity and recognizes that flexible categories were created to allow different resources to participate as flexible requirements, not to reduce the obligation of resources fully capable of meeting the higher must-offer obligation.

For showing purposes a resource may be shown in multiple categories. If an LSE has 100 MW available in category two left before hitting the maximum and only 50 MW left in category three, but has a 150 MW resource it wants to show as RA. Then 100 MW may be shown in category two, and the remaining 50 MWs may be shown in category three. This will allow LSEs to use the peak and super peak flexible categories. However, for availability assessment purposes, the resource will have all 150 MWs in category two.

This simplification is made so the ISO can assess the resource's availability. Assume that resource X has an EFC of 100MWs and was assessed in two categories- one and two – each for 50 MW, so the resource is showing a total of 100 MW. Let's assume in hour 15 on day 1 the resource was supposed to offer in 100 MW, but only offers in 50 MW and nothing else for the rest of the day. The ISO would have to assess how this 50 MW counted toward the requirement. Was it 100% of the category two requirement which is out of 5 hours, so 20% available in category two, plus 0% available in category one (0/17) or are they ~6% compliant for category one, which is out of 17 hours and 0% for category two (0/5). Whichever way the calculation is done, it would lead the ISO needing to track not just the MW quantity, but the MW range of flexible category. That is, resource X is flexible category two from 0 to 50 MW and category one from 50.1 MW to 100 MW. Alternatively, the ISO could pro-rate the MWs so each MW has a fraction counted toward the different category requirements by relative weights. This however has the effect of reducing transparency because getting an assessment MW value becomes a long equation. This gets increasingly complicated when factoring in substitution for forced outages and prorating of MWs if a resource has varying RA capacity over a month. The assessment calculation becomes so complicated it would be hard to validate or maintain a transparency.

Ultimately, the ISO proposes that the additional complication needed is not worth any additional benefit at this time. If an LSE wants a resource to be shown in category one and category two, it can show the resource entirely under category two and bid to the higher category requirement when able. If there is a time when the categories are closer to reaching their maximums, the ISO would consider enhancing the RAAIM to allow assessment in multiple categories, but at this time the maximum capacity allowed in category two and three are not causing a need for a resource to be shown in multiple categories for operational reasons.

Proposed availability assessment hours

Flexible capacity will be assessed during the hours determined by the resource's flexible category. RA resources that fulfill their must-offer requirement in *either* the day-ahead or real-

time market will only have hours assessed under the availability incentive mechanism rules in that market.

Proposed availability assessment methodology

The flexible assessment methodology will be the same as the methodology for generic capacity. The ISO will use the availability assessment in a resource's minimum daily availability calculation in both the day-ahead and real-time markets to determine the resource's monthly availability average. If the availability was the same in the day-ahead and real-time, the ISO will use the real-time availability, even if the real-time and day-ahead capacity obligation is different.

A monthly availability allows a resource to be above or below the standard percentage without incurring a charge or payment. Only if the resource's monthly MW-weighted average percentage fell above or below the standard percentage would it incur a charge or payment.

The specific assessment of the flexible requirement involves more variables than for generic capacity. For generic capacity the ISO must only look at whether a resource has a total offer into the ISO market for at least the shown RA capacity. For flexible capacity, however, the ISO must check if capacity has been economically bid into the ISO market. In some cases, this is not as simple as checking that a resource's economic bid into the ISO energy markets is at least the shown flexible RA capacity because Pmin capacity may or may not count as flexible RA, as discussed below.

In the ISO's FRAC MOO initiative, a resource's maximum amount of flexible RA was defined as a resource's effective flexible capacity (EFC). For most resources, the EFC is calculated using either of the following formulas, depending on the resource's start-up time. (In the formulas below, *SUT* means longest (cold) start-up time in minutes. *RRavg* means the average MW/min ramp rate between Pmin and NQC.)

- If start-up time greater than 90 minutes: EFC = minimum of (NQC-Pmin) or (180 min * RRavg)

- If start-up time is less than or equal to 90 minutes: EFC = minimum of (NQC) or (Pmin + (180 min – SUT) * RRavg)

When a resource's start-up time is greater than 90 minutes, a resource's availability is assessed entirely between Pmin and NQC. The ISO will therefore check whether the scheduling coordinator has economically bid in the resource up to the amount shown as flexible RA capacity.

When a resource's start-up time is less than 90 minutes, the assessment is more complicated because the resource's Pmin capacity will count toward the EFC. Recall that the flexible must-offer rule is that flexible capacity must be economically bid into the market. The energy market does not allow scheduling coordinators to explicitly bid in Pmin capacity and resources' capacity is made available to the market by the submission of energy bids. Energy market bids are *incremental* to Pmin capacity.

This means that a resource's economic bid may not reflect its full EFC value if the EFC includes Pmin capacity. Therefore, in some cases in order to evaluate whether a resource has met its bidding obligation, the ISO must account for the resource's Pmin capacity that counts toward their EFC.

The ISO proposes that for resources with a start-up time of less than 90 minutes, as long as a scheduling coordinator does not self-schedule their Pmin capacity or any portion of their energy schedule, the Pmin capacity will count toward a resource's flexible must-offer requirement. The ISO must impose this requirement because if any portion of a resources schedule above Pmin is self-scheduled, the ISO must also treat the Pmin capacity as a self-schedule and will not freely optimize the capacity in the market.

Practically, the ISO may not be able to freely dispatch Pmin capacity even without a self-schedule due to minimum run-time constraints; however, this was not addressed in the initial development of the EFC and will not be addressed in phase 1 of this initiative.

Overlapping flexible and system RA capacity

The relationship between generic and flexible RA is intricate due to the different must-offer requirements and counting conventions for each capacity type. This relationship is important to understand when determining how the availability incentive mechanism should evaluate a MW if it is counted toward both the flexible and generic RA requirement. The RA requirement comes with different obligations for flexible and generic capacity. In order to calculate whether a MW has met its obligations and is therefore considered available, clear criteria in the circumstance of overlapping obligations are needed.

A flexible and generic MW within a single resource can have overlapping obligations if two conditions are met. First, the obligation on the capacity must overlap in time. That is, the capacity must have both a flexible and system must-offer requirement in an individual hour. This is an *overlapping hour*.

Second, the obligation must overlap in capacity. That is, a single MW within a resource must count as both flexible and generic capacity. This feature, a single MW within a resource only sometimes counting toward a RA requirement, is unique to flexibility. For example, a local resource has every MW up to NQC count as local capacity. There is no equivalent for flexibility. A resource may have a portion of their capacity that is flexible, a portion that is only generic, and a portion that is both generic and flexible. This is because under the ISO's counting rules flexibility is a capability of a resource's capacity, not an inherent attribute of a resource. When a single MW is counted as both generic and flexible capacity, this is *overlapping capacity*.

Therefore, if both the overlapping hour and overlapping capacity conditions are met, the ISO must determine how to measure a single MW's availability.[23] The ISO proposes to assess

[23] When there is no overlap, the ISO will assess the MW under the applicable flexible or generic must-offer rules depending on how the MW was shown in the month-ahead resource adequacy process.

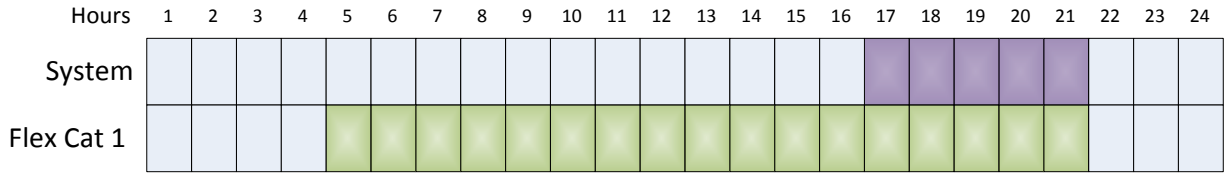
availability all within a single assessment and price. The overlapping concepts and assessment proposal are discussed in the following subsections.

Overlapping hours

In order for a flexible and generic MW to overlap in the availability assessment, the first condition that must be met is that the capacity must-offer hours overlap. The generic and flexible must-offer hours may or may not overlap depending on the seasonal determination of availability hours for generic capacity and annual determination of category-specific must-offer hours for flexible capacity. Currently the system and flexible must-offer hour determinations are not done concurrently and within the same study processes. However, in the future the ISO will seek to align the timing of these assessments in order to simplify implementation and compliance.

Figure 2 illustrates a simple example of system and flexible must-offer requirements overlapping. Because the system must-offer hours are seasonal, these hours are simply illustrative. In this example a single resource, Resource A, has capacity shown to meet both system and flexible RA requirements. At least a portion of the resource's capacity is shown as system capacity. Therefore the system capacity has an assessment period of five hours on non-holiday weekdays. Some of the resource's capacity is also shown as flexible capacity in the base flexibility category and so it has an assessment period of seventeen hours, seven days a week. Figure 2 illustrates that on non-holiday weekdays the resource has overlapping must-offer requirement during hours seventeen through 21.

Figure 2: Theoretical generic and flexible category 1 availability assessment hours



Overlapping capacity

The second condition for a flexible and generic MW to overlap in the availability assessment is that a MW within the resource must be counted as both a flexible and generic MW. The ISO allows a single MW to count toward an LSEs showing as only flexible RA, only generic RA, or as both flexible and generic RA. This is a function of the effective flexible capacity (EFC) methodology and unbundling of flexible and system capacity in the ISO's RA showing.

Figure 3 illustrates a simple example of overlapping capacity. The resource has a minimum load equal to zero and has a NQC and EFC both equal to 100 MW. In this example, the resource is

shown for flexible and system resource adequacy for 100 MW each and therefore the capacity completely overlaps.

Figure 3: Overlapping capacity example one

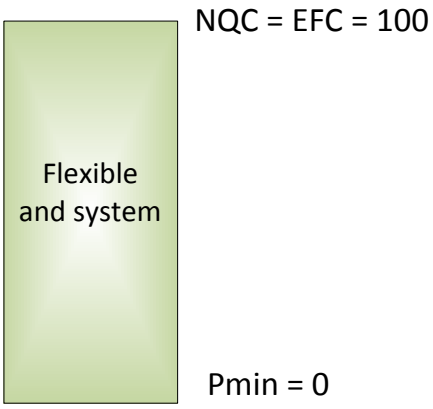
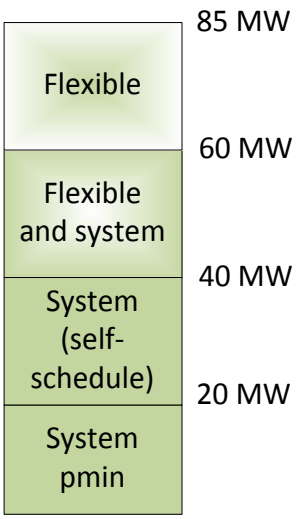


Figure 4 illustrates a slightly more complicated example of overlapping capacity. The resource has a minimum load equal to 20 MW and because the start-up time is greater than 90 minutes, none of the Pmin capacity counts as flexible RA capacity. Therefore the NQC is equal to 85 MW, but the EFC is equal to 65 MW. The resource is shown for 60 MW of system RA capacity and 45 MW of flexible RA capacity. In this example the resource self-schedules a portion of its capacity, which means the resource must economically bid in the remainder of its capacity to meet the flexible obligation. The amount of overlapped capacity is therefore 20 MW.

Figure 4: Overlapping capacity example two



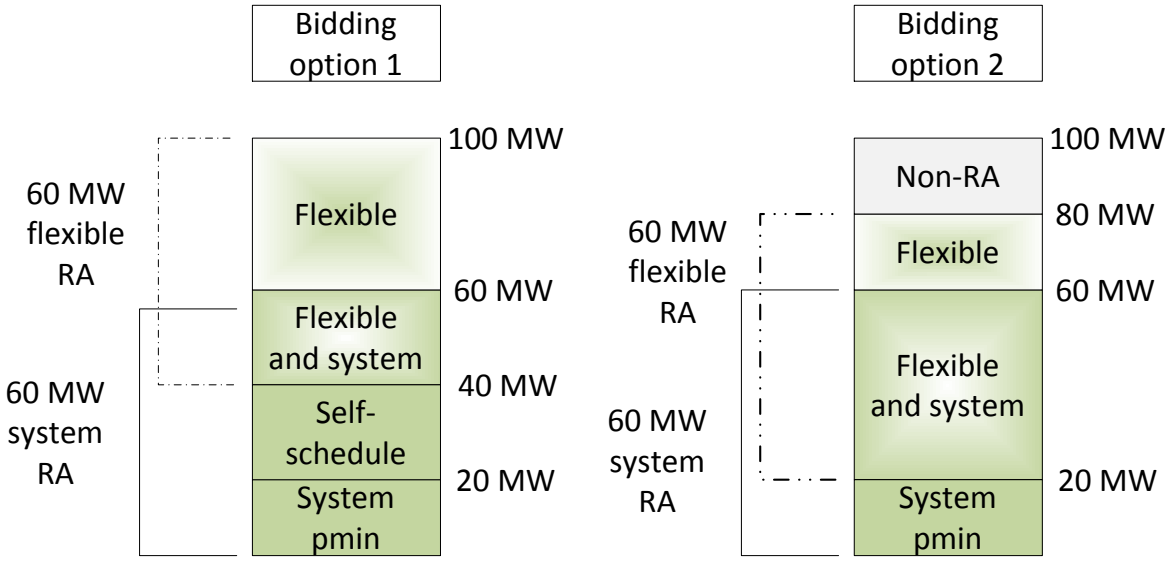
To complicate matters further, based on how the resource is bid into the energy market, the overlapping flexible and system portions can increase or decrease. Figure 5 illustrates how a single resource can be bid into the energy market in different ways to meet their system and

flexible capacity requirement. Based on how the resource is bid in, the resource may have different overlapping capacity amounts.

The resource has the following characteristics:

- An NQC equal to 100 MW, but due to the start-up time being greater than 90 minutes cannot count any of its 20 MW Pmin as flexible capacity,
- An EFC of 80 MW, and
- 60 MW of flexible capacity and 60 MW of system capacity shown on the monthly RA plan.

Figure 5: Varying overlapping capacity example



In bidding option one the resource has self-schedule for 20 MW. The total amount self-scheduled into the market is therefore 40 MW. The resource then economically bids in their remaining capacity to meet their 60 MW flexible requirement. The minimum overlapping portion therefore is 20 MW. This is because once the resource has bids made up of self-schedules and economic bids of at least 60 MW, the resource has met their system requirement. The resource still though must have another 40 MW of economic bids to meet their flexible requirement.

In bidding option two, the resource does not self-schedule any capacity. The Pmin does not count toward the flexible requirement so the overlapping capacity is 40 MW. This example demonstrates that it is impossible for the ISO to determine the overlapping flexible and generic MWs of a resource prior to the resource bidding into the energy market and that it can vary even in the circumstance a resource meets their must-offer requirements.

Overlapping assessment

When a resource has capacity shown as both flexible and generic resource adequacy capacity, the ISO must determine how to assess its availability. If the total generic plus flexible resource adequacy capacity is greater than the maximum of the EFC and NQC, then a portion of the resource's capacity must simultaneously satisfy both the flexible and generic resource adequacy requirement. When this occurs the ISO must decide how to assess availability given that flexible and generic resource adequacy capacity has different must-offer obligations that obligate the resource to fulfill different bidding criteria in different hours.

In general there are two possible methods of assessment for overlapping capacity. First, the ISO could determine availability separately for flexible and generic capacity. The ISO could assess the flexible availability of a resource and then completely separately assess the generic availability of a resource. These assessments could be combined under one price or evaluated completely separately using two prices. The primary detriment to doing this is that for the majority of capacity that is shown as flexible, the flexible capacity will entirely or almost entirely overlap with system capacity. This would cause a scenario where a single MW could be both paid and penalized under the availability metric if a resource self-scheduled in any overlapping capacity. The double assessment also could lead to a double penalty during forced outages.

Alternatively, the ISO could have a single assessment and hold the capacity to the highest must-offer obligation. This would only assess each MW one time and would not lead to double counting. These assessments could be combined under one price or evaluated completely separately using two prices as well.

In the interest of (1) not introducing further complexity into an already complex system, (2) limiting the potential for double penalties, and (3) maintaining incentives for flexible RA to provide economic bids, the ISO proposes not to move toward a double-counting assessment method. Instead, the ISO proposes to have a single assessment and price for availability based on a MWs highest obligation. Therefore, if an overlap occurs, the ISO would not give credit to a scheduling coordinator for self-scheduling a MW. This proposal also reflects the fact that the ISO created the flexible requirement in part due to difficulties with over-generation caused by self-scheduling during periods of high renewable output. Appendix B further describes why the ISO does not propose to move toward an availability incentive metric that evaluates flexible and system capacity separately.

If generic and flexible capacity overlap, the ISO will hold the resource accountable to the full flexible must-offer obligation and not credit the resource for any self-schedules in this overlapped capacity. The ISO proposes that the total resource adequacy capacity of a resource is the maximum of the flexible and generic resource adequacy showings.

The ISO will use the following formula to calculate hourly availability. The formula can be used if a resource has overlapping RA commitments or flexible RA or generic RA. It determines the hourly MW availability value that will be used in the availability incentive assessment (section 6.9).

Hourly MW availability value:

1) { Min(economic bid + eligible Pmin, flexible RA showing) + Min {*Max generic incentive*, Max(0, *Total bid* – flexible RA showing) } / *Total RA requirement*, where:
    a. *Total bid* = self-schedule + economic bid + Pmin
    b. *Total RA requirement* = Max (committed flexible RA, committed generic RA)
    c. *Max generic incentive* = Max (0, committed generic RA – committed flexible RA)
    d. Economic bid is the market bid set, i.e. the clean bid set with outages
    e. Eligible Pmin is the Pmin eligible to count toward the flexible requirement.

Committed RA is the amount of RA committed to the ISO by either being shown on a monthly RA plan or being designated to account for forced and/or planned outages minus any exempt outage capacity. Non-exempt outage capacity is still considered committed RA until substitute or replacement capacity is provided.

Using this formula in an example, suppose a resource has an NQC = EFC = 100 MW and a system requirement of 100 MW and a flexible requirement of 70 MW. The resource has a self-schedule of 90 MW and an economic bid of 10 MW. The resource has a Pmin = 0 MW. The ISO will do the following calculation:

- Economic bid = 10 MW
- Eligible Pmin = 0 MW
- Flexible RA showing = 70 MW
- Max generic incentive = Max (0, 100 MW – 70 MW) = 30 MW
- Total bid = 90 MW + 10 MW + 0 MW = 100 MW
- Total RA requirement = Maximum (flexible requirement, generic requirement) = 100 MW

In this hour, therefore, the resource's total availability is:

Min (10 MW, 70 MW) + Min(30 MW, (Max(0, 30 MW)) / 100 MW, which equals

10 MW + 30 MW / 100 MW, which equals: 40 MW / 100 MW or 40%.

Availability in an overlapping hour will therefore be calculated as whether the resource met the relevant must-offer requirements for the overlapping and non-overlapping capacity amount during the resource's must-offer hours. The total availability percentage will be capped at 100% available.

In the circumstance where a resource provides flexible and generic RA capacity in a month, but does not provide both for the full month, the ISO will prorate the average MW value by the

number of days RA was provided against the total number of days that could have been provided, weighted by the difference in average daily flexible RA and generic RA committed.

6.7. Availability incentive standard percentage

The ISO proposes to create an availability incentive standard percentage band to assess individual resource availability against. In order to limit small amount of money exchanges between resources, the ISO proposes a 4% band around a target availability percentage. The ISO calculates the monthly availability incentive standard, using the historical forced outage rates of RA resources over the range of assessment hours for each month over the prior three years. The ISO proposes to continue the current mechanism construct of comparing resources to a percentage with a bandwidth. However, the ISO proposes to change how the availability incentive standard percentage is calculated.

The monthly RA construct implies that resource availability in non-peak months is equally important to reliability as resource availability in peak months. The system requirement in non-peak months is already less than peak months so the ISO need not reflect this in availability standard. The ISO proposes to move from an availability incentive standard percentage based on an expected forced outage rate included in the 115% planning reserve margin and the historical outage average for the previous four years. This proposal is based on the following considerations:

The availability incentive mechanism is a self-funding mechanism. Therefore, while each MW below the standard band is charged the availability incentive price, each MW above the standard band is only paid from the total charges on a per MW basis. Using historic availability has removed the possibility of any payments to generators that perform above the band in three of the months. (See *Figure 6*, Jan, Feb, and Dec.) The ISO has still charged resources in these months and instead has allocated these payments to load. A fixed standard percentage will allow well-performing resources to receive payments in months of average high availability.

Fixing the percentage will allow the payments made to resources to clearly reflect current market conditions. In months with an average high availability, less capacity will be charged and therefore resources will receive less of an incentive payment to perform. In months with low availability, more capacity will be charged and higher performing resources will be paid a higher amount per MW to perform. Therefore although the unavailability charge per MW is always the same, the availability payment per MW will directly reflect monthly market conditions. The payment will be capped at three times the availability incentive mechanism price.

Fixing the availability standard percentage will allow the mechanism always to charge resources if they are not meeting the minimum amount relied on by the ISO to operate the grid. Therefore it will additionally motivate resources to perform when they are most needed, by paying resources that meet the requirements for availability payments more when average availability is lowest. This creates the correct incentives to perform and over-perform during the periods when the ISO will need availability the most.

Figure 6: Average historical availability incentive standard percentage bounds compared to proposed bounds

	Current band (average)			Proposed band	
	Lower bound	*Upper bound*		*Lower bound*	*Upper bound*
Jan	95.1%	100.0%		94.5%	98.5%
Feb	95.1%	100.0%		94.5%	98.5%
Mar	93.9%	98.9%		94.5%	98.5%
Apr	93.1%	98.1%		94.5%	98.5%
May	92.3%	97.3%		94.5%	98.5%
Jun	94.1%	99.1%		94.5%	98.5%
Jul	93.8%	98.8%		94.5%	98.5%
Aug	93.3%	98.3%		94.5%	98.5%
Sep	93.3%	98.3%		94.5%	98.5%
Oct	94.2%	99.2%		94.5%	98.5%
Nov	93.8%	98.8%		94.5%	98.5%
Dec	95.2%	100.0%		94.5%	98.5%

The ISO proposes to put a 2% upper and lower bound on 96.5%. Resources within this band will neither be charged nor paid an availability incentive payment. This number is supported by the average historical availability for the prior 4 years, which on average for all years and months, shows 96.4% availability from applicable resources. (See *Figure 7.)* The Resource Adequacy requirement for load serving entities is adjusted each month based on 115% of the monthly load forecast, therefore, the percentage availability should remain constant each month as any adjust to needs is already done so in the RA requirement.

Figure 7: Average historical availability incentive standard percentage bounds by year

Trade Month	Availability Standard Percentage				Average
	2014	*2013*	*2012*	*2011*	
Jan	97.7%	97.5%	97.2%	98.0%	**97.6%**
Feb	97.0%	97.7%	97.8%	98.0%	**97.6%**
Mar	96.8%	97.0%	95.7%	96.0%	**96.4%**
Apr	96.2%	95.8%	95.4%	95.0%	**95.6%**
May	95.3%	94.9%	94.0%	95.0%	**94.8%**
Jun	96.3%	96.3%	96.6%	97.0%	**96.6%**
Jul	96.9%	96.6%	96.0%	96.0%	**96.3%**
Aug	95.1%	95.3%	96.8%	96.0%	**95.8%**
Sep	95.9%	95.5%	95.8%	96.0%	**95.8%**
Oct	95.3%	96.3%	97.2%	98.0%	**96.7%**
Nov	95.9%	96.1%	97.1%	96.0%	**96.3%**
Dec	97.4%	97.8%	97.7%	98.0%	**97.7%**
Average	**96.3%**	**96.4%**	**96.4%**	**96.6%**	**96.4%**

The reason the ISO proposes to continue using the band and not a single target is to prevent large amounts of payment shifting for relative small differences in availability. The width of the band must balance needless payment shifting for small availability differences and under- or over- subjecting resources to the mechanism. The ISO proposes to review these percentages periodically over time and if under the new availability metric the annual average availability standard percentage departs from the 96.5% proposal by more than a percentage point, will report findings to stakeholders along with an explanation of why or why not the availability target should be adjusted.

6.8. Availability incentive price

The ISO proposes to use only a single availability incentive price and not have separate prices for local, system, or flexible availability. This proposal is based on the premise that all RA capacity is needed to run the grid, and a particular type should not be more or less encouraged to participate in the energy markets to maintain their resources to prevent forced outages. The ISO acknowledges that certain resources may receive higher per MW RA compensation based on their location or resource capabilities. Theoretically, perhaps these resources should be subject to a higher availability price. However, the ISO does not have sufficient, easily accessible information -- essentially specific bilateral contract information for each resource --to calculate these values. This information would be necessary to decide which resources it would make sense to hold to a relatively higher or lower availability price.

Previously the ISO thought there would be a premium on flexible resource adequacy capacity. While this may be the case, it has not been demonstrated. Also, certain market participants

have pointed out that, in the future, flexible resources are expected to receive additional revenue in the energy and ancillary service markets. Under these circumstances, flexible resources may not require a premium when compared to system or local resources. It may be that certain flexible resources require a contracting premium, while other flexible resources do not. Also, at this point in time, the CAISO has no evidence to indicate that flexible resources are receiving a systematic and transparent premium. Given this uncertainty, the ISO proposes to maintain the current structure of a single availability price for all RA types.[24] A single price has the additional benefit of simplifying availability incentive mechanism overall.

The availability incentive charge and payment should ideally have the following attributes:

- Incent resources to perform routine maintenance to prevent unexpected outages
- Be a low enough not to be overly punitive to resources,
- Reflective of the approximate value of replacement capacity, and
- Reflective of market conditions, as possible.

The ISO proposes to use $3.79/kW-month as the availability incentive mechanism price. This is 60% of the proposed CPM offer cap price.[25] This price reflects current RA bilateral market contract prices as illustrated in the CPUC 2012 RA Report.[26] Given the diverse set of resources under RA contract there is no single price that will accurately reflect the contract price for all resources subject to the availability incentive mechanism. Furthermore, it has been noted on multiple occasions that bilateral RA contracts have different resource obligations and therefore there is no true average price that reflects a standard contractual agreement. Given the information provided to the ISO by the CPUC and market participants the ISO believes the current price of $5.90/ kW- month ($70.88 / kW-year) is significantly higher than the value needed to incent resource performance.

The ISO therefore proposes a $3.79 / kW-month ($45.48 / kW-year) price to reduce the risk of overly punitive charges being imposed on resource adequacy suppliers, but still incent required maintenance or resource substitution in the event of long, unexpected forced outages. An above average incentive price strikes an appropriate balance.

Because the RAAIM price is tied to the CPM offer cap, the ISO will reevaluate the RAAIM price during the offer cap review that will happen no less than every four years. The ISO will benchmark the RAAIM price to available data on bilateral market transactions. If there is a

[24] Currently the ISO has a single price for both local and system availability, despite an established capacity price premium for certain local areas.

[25] http://www.caiso.com/informed/Pages/StakeholderProcesses/CapacityProcurementMechanismReplacement.aspx

[26] http://www.cpuc.ca.gov/NR/rdonlyres/94E0D083-C122-4C43-A2D2-B122D7D48DDD/0/2012RAReportFinal.pdf

significant shift in RA market prices, the ISO will include changing the RAAIM price in a stakeholder initiative.

Capacity under a CPM designation will have a different RAAIM price than non-CPM committed RA capacity. The CPM capacity RAAIM price will be the CPM price. The resource will have a single availability percentage. If a resource has both CPM capacity and non-CPM RA capacity, any availability penalties will be pro-rated based on the relative CPM MW value and non-CPM RA MW value.

The ISO proposes to cap the availability incentive mechanism payment for all RA capacity, including CPM RA capacity, at three times the availability incentive mechanism price. This follows the current tariff. The ISO believes this will be high enough to incent generator performance without the potential of a single generator receiving windfall of profits because of a monthly irregularity.

6.9. Availability incentive assessment

The ISO will assess availability each month only during availability incentive hours. If the resource is on an outage and has provided substitute or replacement capacity, the obligation on the resource on outage will transfer to the substitute or replacement capacity resource up to the MW amount provided. For non-exempt capacity, the ISO will compare all applicable bids during availability assessment hours against the expected RA incentive capacity value. This value will be based on a resource-specific capacity eligibility calculation that takes in account shown RA quantities, resource-specific rules, and exempt outages. The ISO will sum all hourly RA obligation hours across the month and divide this by the total number of assessment hours in the month. The total number of assessment hours is determined by generic and flexible RA committed during the month. In the circumstance where a resource provides flexible and generic RA capacity in a month, but does not provide both for the full month, the ISO will prorate the average monthly MW value by the number of days RA was provided against the total number of days that could have been provided, weighted by the difference in average daily flexible RA and generic RA committed. This allows a resource to provide a single day of flexible RA capacity without it affecting the average monthly MW value used in the availability incentive assessment as if flexible RA was provided equally to generic RA.

The average monthly expected capacity MWs will be multiplied by 94.5% and 98.5% in order to get the resource specific availability incentive threshold amounts.

- If the average monthly availability MW is less than the threshold value, the ISO will subtract the average monthly available MW from the threshold value and charge the scheduling coordinator for the resource the difference multiplied by $3.79/kW*1,000.
- If the average monthly availability MW is greater than the threshold value, the ISO will take the minimum of the difference between total possible average availability and the threshold, and the actual average availability in the threshold. This MW amount will be eligible to receive a pro-rata share of any penalties assessed in the month.

The ISO demonstrates how the hourly availability assessment will work in a separate spreadsheet, *Incentive Calculation Model*[27]. This model was updated on December 12, 2014.

The ISO will provide market participants with enough resource specific data to validate all availability charges and payments.

6.10. Exempt capacity due to outages and derates

When RA capacity is unavailable due to certain types of outages, the period of the outage will be removed from the assessment calculation. The capacity is not counted as available or unavailable. Instead it is simply not part of the availability assessment. The recently completed outage management system (OMS) stakeholder initiative has proposed revised tariff language changing the definition of forced and planned outages, creating newly defined types of outages, clarifying the rules under which RA resources request outages, and creating new *nature of work* categories for outages. More information can be found in the draft tariff for the OMS stakeholder initiative. Planned outages come in four categories. When the category requires replacement, the availability incentive will apply to the replacement resource. If the nature of work category requires replacement and no replacement is provided, the ISO will penalize the resource under the availability incentive mechanism. When the planned outage does not require replacement, no obligation will transfer and the capacity on outage will not be considered in the availability assessment. The four planned outage categories are:

- Maintenance outage with replacement,
- Maintenance outage without replacement,
- Off-peak opportunity outage without replacement, and
- Short notice opportunity outage without replacement.

The new OMS system also contains a nature of work description to describe other outages. The nature of work codes indicate why the resource is on outage. The basic policy is that resource outages will be excluded from the availability incentive process if an outage is beyond the resource's control. The ISO proposes to exclude the following nature of work codes from the availability incentives:

- Unit testing,
- Unit cycling,
- Unit supporting startup,
- Transitional limitation,
- Ambient not due to temperature,
- RTU/RIG,

[27] The model can be found here: http://www.caiso.com/Documents/RAAIMIncentiveCalculationModel.xls

- ICCP,
- AVR/Exciter
- Transmission induced outage, and
- Use-limit reached.

The ISO proposes to include an additional category that would also be exempt:

- Short-term use-limit reached.

The short-term use-limit reached category would capture short term use-limitations that cannot be accounted for in the market optimization or opportunity cost methodology. For example, Proxy Demand Response resources' use-limitations are not for the remainder of the month, but allowed for under the must-offer rules. Proxy Demand Response is further discussed in Section 6.12. Additionally, the ISO expects that resources that qualify as super-peak flexible RA resources may use the short-term use-limit reached outage consistent with their use plans.

When RA capacity has provided substitute capacity to the ISO, the ISO will transfer the must-offer obligation and assessment to the substitute capacity and not assess the original resource's capacity under the availability incentive mechanism. Capacity on an outage is not eligible as substitute (or replacement) capacity.

RA capacity on outage due to lack of fuel is not except from the availability incentive mechanism and should note the reason for being out on a forced outage is due to fuel unavailability.

6.11. Use-limited resources and the availability incentive mechanism

Use-limited resources can have daily, monthly, or annual limitations.[28] Daily limitations (*e.g.* minimum run times, output levels, etc.) that can be accounted for in the optimization should not necessitate special treatment under the availability incentive mechanism. On the other hand, the ISO's market optimization cannot account for certain other limitations that are constrained over a longer than 24 hour time period. These limitations often create a situation where a scheduling coordinator must take action counter to the must-offer obligation in order to ensure an optimal dispatch. For example, a resource with a limited number of monthly starts may not offer into the energy market to preserve the start capability for a forecasted higher priced interval. Under the availability incentive mechanism, this resource would be penalized for this behavior despite the behavior leading to a more efficient market outcome. To address this deficiency, the ISO proposes to enhance the energy market optimization and rules where possible and exempt the use-limited capacity from the availability incentive mechanism where energy market changes are not sufficient.

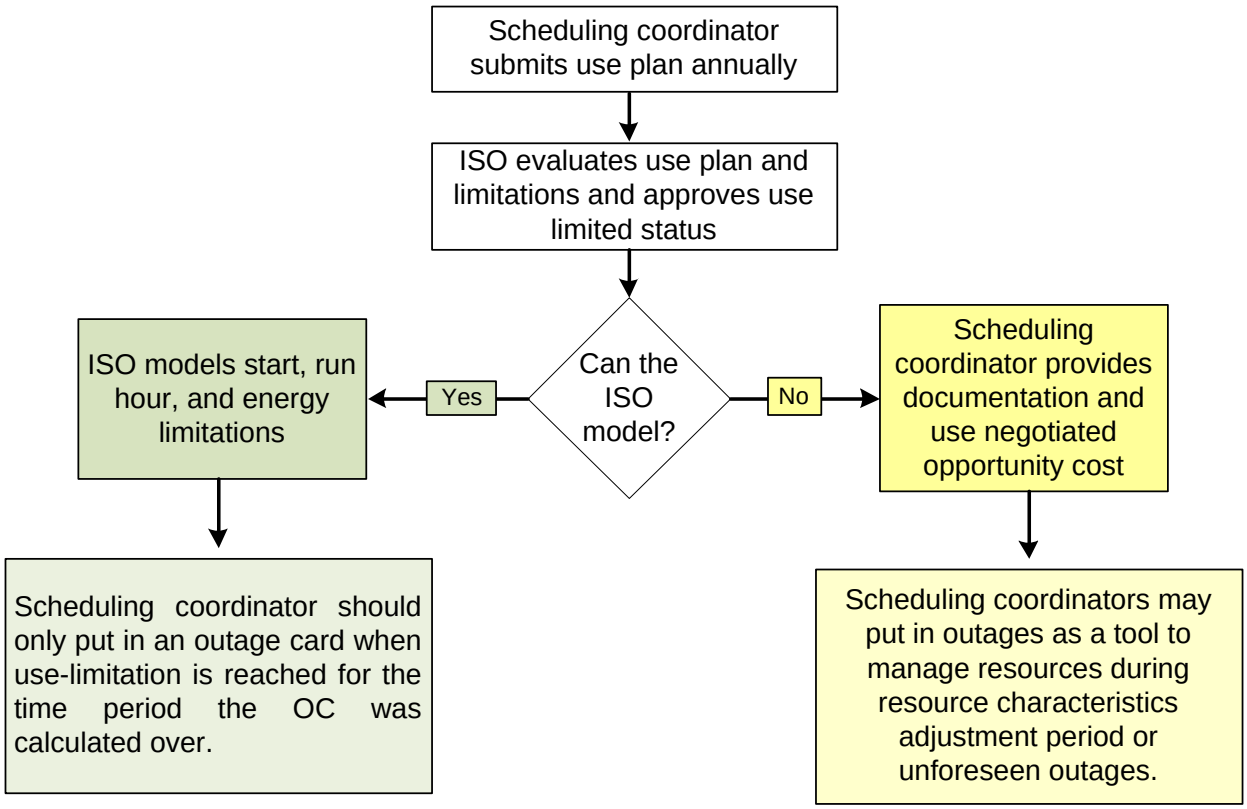
[28] The use-limited definition is being revised in the upcoming phase two of the Commitment Cost Enhancement initiative.

The ISO will allow resources to include opportunity cost in their minimum load and start-up costs. (Resources can already include opportunity costs in default energy bids.) This functionality was initially included in the commitment cost enhancements initiative and will be completed in a separate initiative.[29] The opportunity cost functionality will be implemented prior to or at the same time the availability incentive mechanism becomes effective.

RA resources that have monthly use-limitations will have the following exemptions:

- If the resource has an ISO calculable opportunity cost in their minimum load, start-up, or default energy bid costs, the ISO will allow the resource to be exempted from the availability incentive mechanism once its use-limitation is reached in that month and the resource has put in the appropriate outage card. The ISO will not allow resources with a calculable opportunity cost to submit outages to manage their resource limitations.
- If the ISO determines the resource has non-calculable "negotiated" opportunity cost, then a resource will be allowed to manage its use-limitation with outage cards and be exempted for the availability incentive mechanism during these outage periods.

Figure 8: Use-limited resources outage management tools and exemptions from availability incentive mechanism



[29] http://www.caiso.com/informed/Pages/StakeholderProcesses/CommitmentCostEnhancements.aspx

6.12. Proxy Demand Response (PDR)

Like traditional resources, PDR that is also an RA resource must offer into the energy market during relevant must-offer hours for the associated RA type (generic or flexible). However, PDR resources have the following additional rules.

- Must be available for at least three consecutive days, and
- Must be able to be dispatched for at least 24 hours a month.

Therefore, in order for PDR to be treated equally under the availability incentive mechanism, the ISO must manage the periods in which PDR is evaluated in accordance with these rules. The ISO will allow a PDR resource to manage its use-limitations through a new outage nature of work category, "Short-term use-limit reached." This category will exempt PDR resources from the availability incentive mechanism for 48 hours after being dispatched for three consecutive days. This category will exempt PDR resources from the availability incentive mechanism for the remainder of the month after the resource has been dispatched for 24 hours.

If a resource has been dispatched 24 hours, but can still operate at a portion of the original RA capacity, the resource may put in a partial derate, provided the baseline for that amount has been established in advance and the derate does not cause the resource to have a total MW value of less than 500 kW.

For flexible RA, PDR can qualify as a super-peak flexible resource. This requires that the resource be available to be dispatched at least 5 days in a month and offer into the energy market for 5 hours every non-holiday, weekday. The resource may submit a short-term use-limit reached outage after the resource was dispatched for 5 days in the month (if desired) and will be exempt from the availability incentive mechanism.

PDR that is also RA will be assessed under the flexible availability incentive mechanism for all applicable hours until the resource goes on exempt outage.

6.13. Flexible availability calculation for wind and solar resources

The ISO will not exempt wind and solar capacity that is shown as flexible RA from the flexible incentive mechanism assessment.

The energy market optimization has functionality for VERs that allows these resources to bid up to a specified forecast and be dispatched downward. This allows VERs, primarily wind and solar resources, to be utilized by the ISO market optimization as flexible resources. For resources that have output dependent on a dynamic forecast, the ISO proposes to measure flexible RA availability using economic bids at ISO- or the scheduling coordinator- provided forecast to assess availability.

Under the condition that the resource is shown on the RA monthly supply plan up to the EFC for flexible RA the ISO will use economic bids up to the forecast to assess availability rather than the amount shown the supply plan.

- If the forecast is below the amount shown on the resource's monthly RA supply plan, the resource will be considered 100% available in the event the resource is bid in up to the forecast amount.
- In the event the forecast is above the amount shown for RA, the resource must bid in up to the forecast. If the resource bids or generates above the forecast, the ISO will limit availability calculated to the forecast amount, i.e. any amount provided over the forecast amount will be considered only 100% available. Bids will automatically be limited by the VERs forecast. If the resource generates above its forecast, the ISO will treat this as uninstructed imbalance energy and will assign the resource costs associated with maintaining reliability through resource deviations.[30] It would not make sense to both penalize and reward a resource for deviating above its forecast.

Under a different situation where a resource is shown on the RA monthly supply plan for an amount *less* than the EFC for flexible RA, so is a partial RA resource, the ISO will assess availability using the ratio of the amount shown on the supply plan to the relevant EFC. The ISO does not expect this to be a common occurrence, but the ISO must have rules in place in the event it occurs. For example, if the resource has a Pmax of 200 MW, an EFC of 100 MW, and is only shown for 25 MW on the flexible RA plan, the resource will not be held to the forecast, but rather 25% of the forecast amount. This is because the resource's forecast is based on the actual ability of the plant and not the amount shown on the RA plan. In this example if the forecast was 200 MW, then the resource's availability would be assessed against 50 MW rather than the full 200 MW. Likewise, if the forecast was for 20 MW, the resource's availability would be assessed against 5 MW, rather than the full 20 MW.

Incentive payments to a solar or wind resource will be based on the amount shown as flexible RA and not on the forecast. The forecast will only be used to determine the availability percentage. The quantity paid under the incentive mechanism will be the difference between the monthly threshold level and 100% of the flexible shown RA level.

VER resource adequacy resources that do not have an obligation to bid into the day-ahead will only have their real-time availability be assessed through the availability incentive mechanism.

6.14. Exempt resource capacity

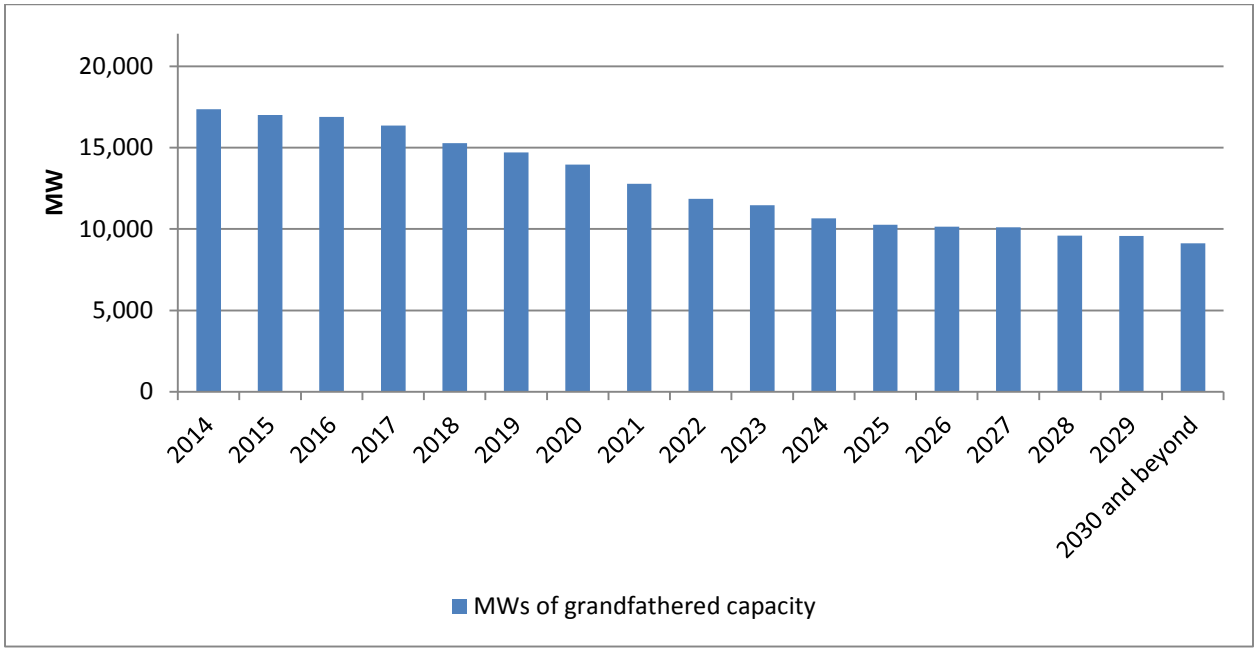
Currently, resources that fall under tariff section 40.9.2 are exempt from the SCP availability incentive mechanism. The new availability mechanism will likely need to include similar exemptions for certain resources.

[30] For example, 25% of the flexible ramping constraint is allocated to uninstructed imbalance energy.

Figure 9 shows the acquired contract capacity and contract year the RA capacity will expire. The ISO will not implement the new availability incentive mechanism until 2016. Additionally, many contracts will have to be renegotiated due to the new flexible RA requirement. Given these two points and the rapidly changing energy landscape, it is not in the best interest of reliability to expose only a portion of resources to new rules needed to reliably integrate renewable and preferred resources. The ISO will therefore seek to exempt only a select set of resources that are physically or uniquely unable to fully comply with their must-offer requirement as described below and have limited acquired resource provisions.

Figure 9: Acquired capacity exempt from current Standard Capacity Product availability mechanism by year

6.14.1.



The ISO proposes to specifically exempt the following resources from the availability incentive mechanism:

- Pmax < 1.0 MW as currently described in ISO tariff
- Contracts for Energy from non-specified resources as currently described in ISO tariff
- Load following MSS capacity for system, flexible, and local RA
- Most Qualified Facilities (QFs) as currently described in ISO tariff
- CHP resources for generic RA only
- Solar and wind resources for generic RA only
- Participating Load
- Acquired resources under specific conditions

6.14.2. Acquired resource rules

The ISO proposes to exempt acquired resources from the generic availability incentive mechanism under the following conditions:

- Capacity must be under a resource specific contract that existed prior to June 28th, 2009, [31] AND
- The scheduling coordinator for the capacity must specifically seek an exemption each year and demonstrate to the ISO that the resource's RA contract:
    - Includes penalties for nonperformance, or
    - Does not have a reopener clause due to ISO market design changes.

This demonstration must be done in advance of the annual RA showing deadline in accordance with the BPM and be recertified each year as accurate by the scheduling coordinator for the resource. While the scheduling coordinator must submit the affidavit, the affidavit may be from either the resource owner or the scheduling coordinator. After the initial affidavit is submitted, the scheduling coordinator will only have confirm each year that this affidavit is still valid and not resubmit a new affidavit. If any capacity on a resource is approved by the ISO as exempt under the acquired resource conditions, the full capacity on the resource shall be exempt from the availability incentive mechanism. These requirements will ensure both that resources are not double-penalized for non-performance and that all resources have an incentive to perform. Given the significant changes and reliability challenges that the grid will be facing, it is imperative that all resources have the proper incentives to perform to support reliable grid operations.

6.14.3. Wind and solar resources

If wind or solar resource is shown as system or local RA, the ISO proposes to exempt the resource from the availability incentive mechanism for two reasons. First, wind and solar resources' typically are procured under contracts that either provide payments for energy produced or have severe penalties for under-performance. In their September 5, 2014 comments LSA[32] stated, "…virtually all PPAs for wind/solar resources provide payments only for energy produced, i.e., there is no capacity payment and all PPA revenues are completely dependent on maximum equipment availability and production. Moreover, these PPA contain multipliers that provide for higher payments (and thus even greater availability/production incentives) during hours that are designed to be highly correlated with system needs."

Additionally, the ISO has reviewed the recent drafts of the Investor Owned Utilities' 2014 pro forma contracts for renewables awaiting approval by the CPUC. The ISO's understanding of at least some of these contracts is that they have provisions for non-performance. Given that these contracts are specific to wind and solar and are extremely standardized (unlike contracts for

[31] Specifically, the conditions to meet the current tariff section 40.9.2 subsection 2.
[32] http://www.caiso.com/Documents/LSAComments-ReliabilityServices-RevisedStrawProposal.pdf

other resource types) the ISO potentially would be double-penalizing renewables for non-performance without this exemption.

Second, and more importantly, the only way to assess wind and solar under the proposed methodology is to use the resource's forecast as a baseline for comparison. The ISO acknowledges the potential concern that in the event the resources perform up to a forecasted amount that is less than their RA amount; they would be taking away payments from resources that are in fact performing up to their RA amount. In other words, absent the exemption, these resources could be rewarded for performing less than other resources. Additionally wind and solar resources could provide their own forecast and always slightly under forecast their output in order to ensure full availability payments. The ISO's proposal strengthens the incentives for resources that are most likely to respond to ISO performance payments.

6.14.4. Combined Heat and Power

Somewhat similar to wind and solar resources, combined heat and power (CHP) resources will be exempt from the generic availability incentive mechanism. The amount a CHP resource can sell as RA from year to year is dependent on the output from the plant and CHP contracts typically have penalties for non-performance already in place. Therefore, these resources already have an incentive to perform and would be double penalized under the availability incentive mechanism. A penalty would first come in form of a penalty by the ISO, and then second by having a lowered amount of capacity available to sell in some cases or in other circumstances have contract penalties.

6.14.5. Participating Load that is also pumping load

Participating load that is also pumping load will be exempt from the availability incentive mechanism due to their unique must-offer requirement that requires real-time energy offers only if the resource receives a DA AS schedule. This cannot be accommodated in the availability incentive mechanism framework.

6.15. Availability incentive mechanism payments

The ISO will pay or penalize scheduling coordinators of RA capacity monthly. If the pool of penalties exceeds the total pool needed for payments up to three times availability incentive price (proposed at $3.79/kW-month), the ISO will create a roll-over account to be used in payments to high-performers for the following month. This roll-over account will continue until the end of the year, at which time any excess funds will be paid to load serving entities based on load ratio share.

PART 3: RA PROCESS, REPLACEMENT, AND SUBSTITUTION

7. RA process, replacement, and substitution proposal roadmap

Replacement and substitution are often discussed together as they are both related to the ISO potentially receiving resource adequacy (RA) capacity in the place of RA capacity on outage. Currently; however, these are two very different mechanisms. The replacement mechanism is meant to ensure that additional capacity is provided during planned outages, which are not accounted for in the planning reserve margin (PRM). The substitution mechanism is meant to ensure that additional capacity can be provided during forced outages, which are accounted for to a certain extent in the PRM. The ISO has therefore previously made a bright line distinction between these two mechanisms in order to differentiate between the ISO's presumed need for additional capacity. In reality; however, not all planned outages cause the ISO to need additional capacity and at a certain point, forced outages can no longer be accommodated within the PRM without affecting reliability. Therefore as the ISO is considering provisions to simplify and increase the transparency of replacement and substitution rules, the ISO will also clarify outages terms and reliability needs instead of relying on unnecessary compartmentalization of the replacement and substitution rules.

The ISO is aware that certain aspects of the replacement and substitution rules cause significant confusion and/or dissatisfaction among stakeholders. Some of these issues stem from when replacement or substitution is required, the distinction between whether the supplier or the LSE must provide the additional capacity, and which entity ultimately takes on the availability and procurement risk. Furthermore, the ISO expects that the integration of flexible RA into the replacement and substitution rules will increase this complexity, potentially to the point that the rules are unworkable from an internal processing standpoint.

If the ISO created new replacement and substitution rules to integrate the flexible RA requirements filed at FERC in August 2014, it would necessitate significant changes that would likely not be implemented until Fall 2016. Meanwhile, the ISO has committed to reevaluating the flexible RA requirements in order to propose an updated flexible RA requirement in Spring 2016. Therefore if the ISO proposed flexible replacement requirements within this initiative, the market design must likely change just after being implemented to account for flexible RA requirement market design changes.

The ISO proposes to delay until phase two of the RSI any market design proposal related to flexible RA planned outages and instead consider in phase one any changes to the replacement and substitution rules that would simplify the future integration of flexible RA planned outage rules. The ISO anticipates that there will need to be significant revisions to the current policy in order to implement the additional flexible RA component. These policy changes to the ISO's planned outage rules are proposed to have a sunrise date for the 2017 RA year in order to give market participants time to adjust to the changes to the ISO's current replacement and substitution rules.

A 2017 sunrise date has the additional benefit of supporting CPUC coordination. The ISO's proposed changes to the replacement rule may necessitate changing the ISO's monthly RA process. Proposing rules in phase one, but waiting to implement the rules until the 2017 RA

year will give the CPUC time to update the timing of any of their processes that are affected by the ISO's monthly RA process timeline change. The ISO will work with the CPUC in their RA proceeding to ensure timeline alignment.

Figure 10 summarizes the planned policy topics for phase one and phase two of the RSI, organized by target implementation timeframe. The ISO expects that all policy proposed in phase one will be implemented by the 2017 RA year. For policy proposed in phase two, given that any updates proposed to the flexible RA rules will also have to go through a CPUC proceeding, the ISO does not expect to implement any changes specifically related to these requirements until the 2018 RA year. If there are some small incremental changes that are entirely within the ISO processes and do not require CPUC coordination, it is possible the ISO will make these changes by the 2017 RA year, as indicated in the following table.

Figure 10: Expected implementation date of outage rules by RSI Phase

Expected implementation date		2016 RA year	2017 RA year	2018 RA year
Proposed in RSI Phase 1 (Q1 2015 BOG)	*Planned outages*	N/A	Redesign of replacement rule for system RA and monthly RA process	N/A
	Forced outages	Enhancements to current rules and new flexible RA forced outage rules	Any policy unable to be implemented by 2016	N/A
Proposed in RSI Phase 2 (Q1 2016 BOG)	*Planned outages*	N/A	Any additional changes in advance of implementing updated flexible RA requirements and associated outage rules, potentially intertie rules for outage replacement	Rules related to flexible RA planned outages
	Forced outages	N/A		Updated rules related to flexible RA forced outages, if necessary

The following sections describe the ISO's planned and forced outages market policy proposal. Section 8 describes flexible planned outages policies that will be discussed in phase two. Section 9 describes the ISO's proposal to address the reliability risk associated with forced outages of flexible RA as well as other enhancements to the substitution rule. This proposal is expected to be implemented by the 2016 RA year. Section 10 describes the ISO's simplified replacement requirement proposal that will sunrise in 2017. This proposal does not include rules for planned outages of flexible RA resources. It is intended as a platform for phase two of the RSI, which will develop updated flexible RA requirements and rules related to planned outages of flexible RA resources.

8. Planned outage proposal for implementation for 2016 RA year

8.1. Purpose and background

The ISO developed the replacement rule in recognition that while the ISO depends on the monthly RA showings to ensure reliability, there needs to be appropriate opportunities for RA resources to take maintenance outages. The rule mandates that capacity on a scheduled maintenance outage may need to be "replaced" with sufficient capacity in order to maintain grid reliability.

The current replacement rule for RA arises because of the monthly nature of the existing RA construct. Currently, RA requirements are determined monthly and vary according to the load requirements for each month. The planning reserve margin incorporated into each monthly requirement accounts for an anticipated amount of forced outages of RA capacity during the month, but is not designed to account for resources on planned outages for scheduled maintenance.

Therefore, when an LSE submits its monthly RA showing, the resources are expected to be available every day. The ISO has a process that requires LSE's or suppliers under certain circumstances to provide the ISO additional capacity in order for the resource's planned outage to be approved.[33] The replacement rule ensures that 115% of *system* capacity is available to the ISO every day of the RA month. Under the new proposed flexible RA rules the ISO will require that 100% of the flexible RA requirement is met in the monthly showing; however, there are no rules surrounding the replacement of flexible RA outages.

8.2. Issues brief

As described in section 7, the ISO intends to develop rules related to flexible RA planned outages in phase two of this initiative. There is therefore a gap between when the ISO needs flexible RA resources in order to ensure reliability and a rule to ensure adequate daily flexible capacity during planned outages of flexible RA resources.

The ISO has found that certain system planned outages are being replaced with capacity that had significantly different resource characteristics than the original resource shown on the monthly plan. While this inherently is not an issue, it potentially could increase the amount of RA use-limited resources beyond the allowable point under the CPUC MCC buckets and ISO reliability needs. This becomes a bigger issue once the ISO explicitly relies on flexible RA.

[33] If a resource on an LSE's monthly RA showing has an outage already scheduled when the submissions are due 45 days before the month, the LSE may be required to provide replacement resource adequacy capacity to make up for resource adequacy capacity on outage. For outages requested after the monthly LSE showings, the responsibility for replacing resource adequacy capacity switches to the scheduling coordinator for the resource.

8.3. Proposed rule changes

In the Revised Straw Proposal, the ISO proposed that in order to address the time gap between flexible RA requirements and the implementation of rules related to flexible RA planned outages, the ISO would impose minor limitations on system replacement for planned outages. These limitations would restrict the replacement by use-limitation and dispatchability. In response to this proposal, many stakeholders pointed out that this would cause the ISO to ask for more stringent requirements for system resources than originally asked for in the monthly showing. Therefore, the ISO proposes to delay all aspects related to flexible characteristics for planned outages until phase 2. The consequence of this is a slightly higher risk of the ISO needing to CPM a resource during the operating month in order to ensure the fleet can meet the real-time net load ramping needs. The ISO believes reliability can be maintained absent replacement rules for flexible characteristics in the next few years using already established tools such as outage cancellation and CPM designations. However, it will be imperative that once durable flexible rules are established that planned outages have rules ensuring the flexible attributes of the resource on outage are provided by the planned outage substitute resource. During this gap period the ISO will monitor flexible planned outages that are overlapping with system outages and monitor whether outages are being replaced with flexible resources, i.e. resources with an EFC and therefore would qualify as flexible RA.

9. Forced outage proposal for implementation for 2016 RA year

9.1. Purpose and background

RA resources are expected to be available during the entire month. The replacement rule provides opportunities for RA resources to take maintenance outages under specific conditions when there is advance notice of the outage. Resources also experience forced outages, when advance notice is not possible. The availability incentive mechanism is designed to provide resources with incentives to undertake actions to reduce the occurrences of forced outages in a month. In order to allow resources to manage their availability incentive risk, the ISO has developed substitution rules that allow capacity from resources to “substitute” for RA capacity which has experienced a forced outage.

A resource on a forced outage has the option to provide substitute RA capacity to mitigate any potential impact to the original RA resource’s availability incentive calculation. Requests for substitution must be a “like for like” resource, and must be made before the close of the IFM the day before the substitution takes effect. The ISO approves these substitution requests at its discretion if the resources are similar and in the determination of the ISO the substitution won’t impact reliability.

An additional accommodation is allowed in the case of local resources because of their unique situation. Local resources may pre-qualify a substitute resource on an annual basis, and a pre-qualified resource may be substituted in real-time. This accommodation is provided to local resources because local resources are often required to provide RA every month; they may not have the option of not providing RA for a month in order to perform maintenance or when they suspect that the resource may not be dependable. The option to pre-qualify a substitute

resource for a local RA resource and thus be able to substitute in real-time is restricted to a similar resource delivering power to the same bus. These requirements are important in allowing real-time substitution because the operators are assured that the substitution provides reliability to the grid and therefore should get substitution "credit" the availability incentive mechanism.

9.2. Issues and proposed rule changes

9.2.1. Deadline for providing day-ahead substitution

Some stakeholders have commented that the deadline for providing substitute capacity is unnecessarily early given the ISO's automated processes. The ISO proposes to establish an 8:00 AM deadline. This will provide additional time for suppliers to submit substitute capacity while still providing the ISO enough time to evaluate the capacity and providing the scheduling coordinator for the substitute resource enough time to prepare and submit required bids prior to the day-ahead market run.

9.2.2. Many-to-Many Substitution resources

The initial implementation of substitution rules by the ISO required that when a resource was being used as a substitute RA resource it could not be used as a substitute for another RA resource. This was true even if the initial substitution used only a small fraction of the non-RA NQC of the resource. This was an implementation aspect due to restrictions in the ISO's systems for accepting substitutions. Several stakeholders raised concerns over this limitation. Recently, the ISO has implemented a manual procedure which allows a resource to substitute for a second RA resource on outage, subject to certain restrictions.

The ISO is developing the capabilities required in its various systems to allow for automated many-to-many substitutions without the limits currently imposed with the manual procedure. The ISO proposes to extend the many-to-many substitution rules to flexible RA resources. Therefore any amount of capacity from a resource may be used to substitute for multiple other resources.

The ISO will also develop the functionality for a single resource to substitute for two separate resource outages, one that requires flexible capacity and one that requires generic capacity and vice versa.

9.2.3. Real-time substitution for system resources

Currently scheduling coordinators only have the ability to provide substitute capacity for system resources on forced outages day-ahead. This is because there is a rule that requires ISO grid operator action if the substitute resource has a lower ramp rate than the resource on forced outage. The ISO proposes to remove this rule and allow substitution of system resources regardless of their relative ramp rates. Therefore, because operator intervention is no longer needed, the ISO can fully automate the real-time system substitution process and allow real-time substitution for system resources on forced outage.

9.2.4. Changes to the local pre-qualification process for real-time substitution

In order to relax the requirement that substitute capacity for local RA in real-time must be located at the same bus, the ISO proposes to change the local pre-qualification process. The ISO will relax the same bus criteria, and in annual local pre-qualification process assess whether resources are at "compatible buses." The ISO will assess all resources during the pre-qualification process and scheduling coordinators or LSEs will not need to ask for specific resources to be assessed.

The ISO proposes to define compatible bus in more detail in the Reliability Requirements BPM process.

9.2.5. Flexible forced outage substitution proposal

The ISO proposes to create rules to address forced outages of flexible RA. Flexible RA is proposed in this initiative to be covered under the ISO's RA availability incentive mechanism, and therefore, the ISO will also propose rules to mitigate this risk by allowing flexible capacity substitution. In the event of an outage causing flexible RA capacity to be subject to the availability incentive mechanism, the ISO will allow the scheduling coordinator for the capacity to provide forced outage substitute capacity. This capacity must comply with the flexible RA category must-offer requirements of the resource on outage. The exception to this is if the resource that has capacity substituted had capacity shown at a higher quality than the original capacity on outage, the substitute capacity must comply with the higher quality category must-offer requirements for the entire resource's committed RA capacity. That is, a flexible RA resource cannot take on multiple categories must-offer requirements for different portions of its resource. While a category 1 resource may substitute for a category 2 resource, if the category 1 resource had any capacity shown on an RA plan on that day as category 1, it must take on the higher must-offer obligations for all RA on the resource.

The ISO will allow a scheduling coordinator to provide flexible substitute capacity beyond the amount on outage and will not limit the amount provided to an assumed needed quantity. This is because ultimately it is up to the scheduling coordinator how it will run the resource and the ISO will make no presumptions as to how much substitute capacity a scheduling coordinator must provide to the ISO to meet its flexible RA obligations. If an outage occurs, it is up to the scheduling coordinator to tell the ISO how much RA capacity it wants assigned to the substitute resource. The ISO will hold the substitute resource accountable up to the provided substitute capacity value and hold the initial resource on outage accountable up to the remainder between the quantity shown on the resource's supply plan as RA capacity and the quantity told to the ISO that the substitute resource will provide.

For example, assume resource A was shown for 100 MW of flexible RA and has an EFC of 150 MW and goes on outage for 50 MW. Although it may seem like the resource can still meet its flexible RA requirement, there may be other constraints on the resource that the ISO is not aware of and cannot account for in the tracking process. Therefore, the ISO will allow the scheduling coordinator to indicate a substitute value. For example, resource A can indicate

resource B has a substitute capacity quantity of 20 MW. The ISO would then assess resource A under the flexible availability incentive mechanism for 80 MW (100 MW – 20 MW) and the assess resource B under the flexible availability incentive mechanism for 20 MW.

9.2.6. Changes to forced outage days policy

Proposed tariff language to implement the new OMS system[34] in the fall of 2014 clarifies the rules under which RA resources may request outages without the outage impacting affecting the resource's availability incentive calculation. During this initiative the ISO exempted forced outage capacity that was reported to the ISO between seven and four days from the availability incentive mechanism. The OMS system tariff changes were not intended to address changes to the SCP incentive mechanism. This initiative addresses both outage and the availability incentive mechanism policy and, thus, it is appropriate in this initiative to remove the tariff exemption for forced outages reported from seven to four days.

9.2.7. Release of forced outage substitute capacity as RA capacity if an outage moves

The ISO proposes that forced outage substitute capacity can be released from RA capacity obligations if an outage moves. Scheduling coordinators can move up to quantity of the original substitution MW. This will allow suppliers to reduce their availability incentive mechanism risk when their capacity is no longer needed as planned outage substitute capacity on a day.

10. RA process and outage rules proposal for implementation for 2017 RA year

10.1. Purpose and background

The ISO developed the replacement and substitution rules in recognition there needs to be both (1) appropriate opportunities for RA resources to take maintenance outages and (2) limits on the amount of forced outages that can occur without resource substitution. Both should ensure sufficient capacity is available in order to maintain grid reliability.

The current outage rules for RA resources arise because of the monthly nature of the existing RA construct. RA requirements are determined monthly and vary according to the load requirements for each month. The planning reserve margin incorporated into each monthly requirement accounts for an anticipated amount of forced outages of RA capacity during the month, but is not designed to account for resources on planned outages for scheduled maintenance. Thus, the ISO created replacement and substitution mechanisms to ensure grid reliability.

Numerous issues have been identified with the current replacement and substitution rules. Figure 16 in Appendix C illustrates the ISO's current monthly RA process. There are two

[34] http://www.caiso.com/informed/Pages/StakeholderProcesses/OutageManagementSystemProject.aspx

different processes in place today for providing replacement capacity for a planned outage. This is illustrated by the two horizontal lines in Figure 16 showing different process paths for LSEs and suppliers. These paths map out the different rules that relate to LSEs and suppliers' obligations under the replacement rule. The reason for the two separate paths is the approval procedure, obligation, requirement, and penalties related to providing additional RA capacity during a planned outage changes based on whether the outage capacity was reported before or after T-45.

For planned outages reported to the ISO prior to T-45:

- **Outages will be approved, denied, or pending by T-45.** The ISO's outage management office will consider all outage requests prior to the ISO running the outage impact assessment.
- **The obligation to replace is on the LSE**. Outages are stacked in last in, first out order and on any day that the system is short and an LSE that showed the capacity on their RA plan is also short compared to their LSE system requirement, the LSE then must replace the planned outage capacity.
- **Replacement is required up to the monthly RA system requirement.** The ISO requires replacement of outages until the system is back at the CEC 1 in 10 forecast plus 15%.
- **Non-replaced outages may trigger a monthly CPM event.** If an LSE does not provide replacement, the ISO may designate capacity under the monthly CPM event and allocate the costs to deficient LSEs.

For planned outages initially reported to the ISO, increased in severity, or increased in length after T-45:

- **Outages will be approved, denied, or pending tentatively by T-11**. The ISO's outage management office will look at outages on a case-by-case basis and may wait until T-11 or later to make a final decision on planned outage.
- **The obligation to replace is on the supplier**. As additional outage capacity is made known to the ISO, the supplier may have to replace some or all of the planned outage capacity.
- **Replacement is required at the ISOs discretion.** The ISO may require replacement based on updated system conditions at the ISO's discretion.
- **Non-replaced outages may be cancelled.** If a supplier does not provide replacement, the ISO may cancel an outage. If the planned outage turns into a forced outage, the supplier would face SCP incentive mechanism penalties.

10.2. Issues brief

Figure 17 in Appendix C shows the same monthly process, but highlights where stakeholders, both internal to the ISO and external market participants, have indicated there are issues with the current process. The numbers within Figure 17's issue boxes correspond to the numbered issues below.

10.2.1. Process complexity

The current monthly RA evaluation process is complex from the perspectives of both the ISO and market participants. This complexity leads to data transparency issues, additional administrative and coordination costs for the market, customer frustration, and overall customer dissatisfaction.

Overlapping cure periods for traditional LSE RA requirements and LSE replacement requirements

One reason that the process is complex is that the cure period for traditional RA requirements overlaps the cure period for the replacement requirement. The LSE must meet two types of requirements: (1) the traditional RA requirements (peak demand & local) and (2) replacement requirements. The ISO evaluates the traditional RA requirements concurrently with the replacement requirements and where the ISO finds an LSE deficient for either requirement, the cure period overlaps all the way until the concurrent due date of 11 days prior to the operating month (T-11).

Any traditional RA deficiencies directly influence the outage impact assessment performed by the ISO to determine which LSEs must replace outages. When one LSE is short of its traditional monthly RA requirement, it causes system shortages potentially driving the ISO to assign another LSE a replacement requirement if it finds an outage that overlaps those system short days. Also, when one LSE is short of its traditional RA requirement, the ISO sees the LSE as net short all month and will assign replacement requirements to the LSE on any day where one of the resources on its RA Plan is on an outage. Once assigned, the LSE must provide the replacement capacity required and the capacity to cure the traditional RA deficiency on each day of the month.

Overlapping cure periods for LSE requirements and supplier replacement requirements

Another reason that the process is complex is that the cure period for all of the LSE requirements (both traditional monthly RA requirements and replacement requirements) overlaps the cure period for the supplier replacement requirement. As discussed above, between T-45 and T-11 the LSEs are given the opportunity to cure their deficiencies. During this time ISO cannot assume that the LSEs will meet their requirements when evaluating new outage requests; the ISO must compare the new outage requests to the known operationally available RA level on each day of the requested outage at the time that it evaluates the request. LSEs will provide additional capacity on any day between T-45 and T-11, necessitating a different analysis of new outages each day up to T-11. The LSE deficiencies skew the

determination of whether a supplier must replace an outage on a given day, and the extent of this skew is different depending on the day the evaluation occurs.

In addition to the issues involved in evaluating new outages submitted by suppliers during the overlapping LSE cure period, there is the issue of not having the final picture of the committed RA fleet for the operating month until T-11. All capacity associated with the LSE (traditional monthly or replacement) is not due to the ISO until T-11; however, in the T-45 to T-11 timeframe, the ISO can only require replacement capacity on committed RA resources that are requesting outages. The fact that the LSE cure period overlaps the supplier replacement evaluation period to such a large extent allows a scenario where the supplier for resources that were not included in an initial submittal of a supply plan, but are being used by the LSE to cure a monthly deficiency, to submit outages to the ISO in the T-45 to T-11 timeframe and potentially take those outages without supplying replacement capacity.

The ISO, for its part, verifies the operational availability of replacement capacity upon submittal of the replacement capacity, but the scenario is complicated because multiple contacts within the same supplier entity must coordinate to ensure that this scenario does not occur; and when it does, they must re-coordinate to figure out the appropriate way to provide replacement capacity to the ISO. As for the cures related to traditional monthly RA capacity, the ISO cannot deny the resubmittal of the RA plan or supply plan that adds additional capacity to cure the LSE traditional RA requirements and instead must engage in a manual process to make sure all parties agree on the capacity quantity provided to the ISO for each day of the RA month and which entity has the replacement responsibility.

Tracking of outage replacement responsibility across multiple functional entities

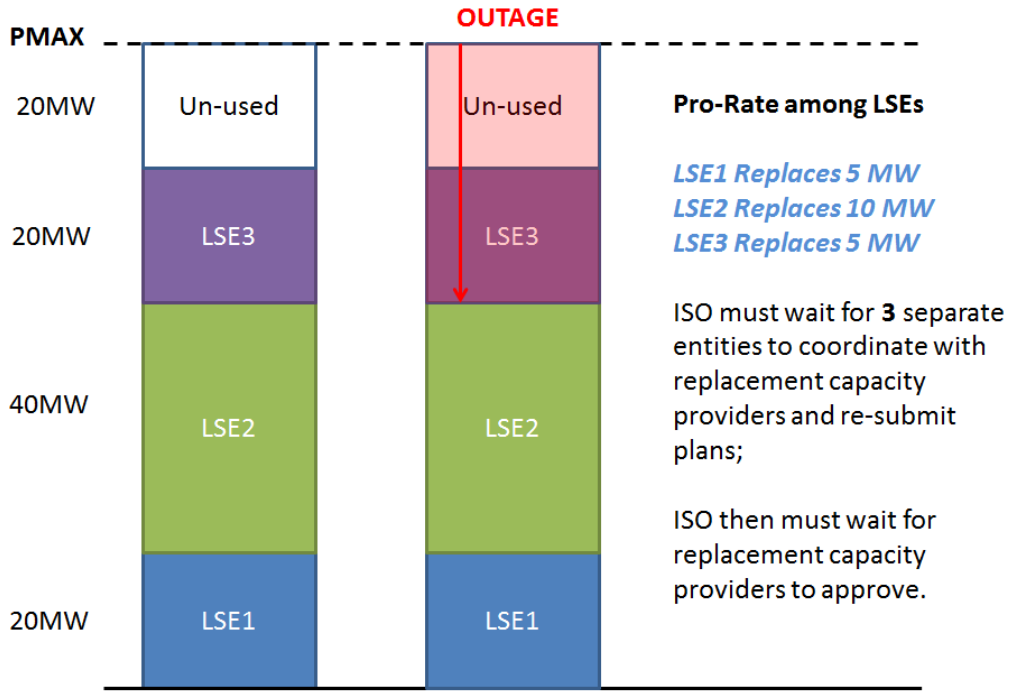
Another reason that the process is complex is that the outage replacement responsibility is split between the LSEs and the suppliers requiring the tracking of outage replacement responsibility across these two different functional entities. The ISO analyzes a snapshot of outages taken 45 days prior to the operating month when assigning replacement requirements to LSEs. Suppliers cancel or move outages frequently between the planning horizon and operating horizon. If a supplier moves or cancels an outage at any point in time after the snapshot is taken, the ISO must implement and track a complex process. The ISO must manage which entities are responsible for replacement, crediting LSEs on days where the outage either increased availability or move away from the original outage period. And the ISO must require suppliers to provide capacity where the outage decreased availability or moved to days where the original outage was not planned. This is a constant iterative process that must be tracked by both the ISO and market participants.

Multiple LSE replacement responsibility for a single outage

Adding to the complexity, the LSE outage replacement responsibility is split between multiple LSEs that share a single outage on a single resource increasing the number of dependencies and contact transactions that must occur before the ISO can receive final approved RA replacement capacity.

The capacity on a single RA resource is often shared by multiple LSEs. When the resource has scheduled a planned outage prior to T-45, all LSEs may share in the replacement responsibility in the ratio of their RA Plan capacity compared to each other and compared to the outage curtailment MW. Consider the example below in Figure 11 of an RA resource shared by three LSEs with a single outage.

Figure 11: Outage on a single resource shared by multiple LSEs



In this example, the ISO stresses the complexity from a process standpoint: any process that requires inputs from several parties is prone to instabilities. In this example, there is one outage on a single RA resource, yet the ISO must assign replacement responsibility to three other parties. Each of those three other parties must coordinate replacement capacity purchases, submit them back to the ISO, and wait for the suppliers providing the replacement capacity to approve. This example requires at least a four party coordination (ISO, LSE1, LSE2, and LSE3) and up to any number of party coordination depending on how many suppliers an LSE will rely on to replace its portion of the unavailable capacity. The larger the number of coordinating parties, the longer it takes to secure the capacity and the higher the likelihood of mistakes.

There are other complexities that arise related to proper treatment of replacement assignment that reduces transparency to market participants. First, in the example above, the ISO will often find that perhaps one of those LSEs is not short of operationally available capacity and therefore does not have to replace its pro-rated portion of the outage. In these scenarios, the ISO seeks out only the pro-rated capacity from those LSEs that are short.

Second, further related to complexities resulting in reduced transparency, this scenario is often extended even further. RA resources have multiple overlapping outages and each outage is

considered for LSE assignment of replacement requirement in last-in, first-out order. In these cases, the ISO pro-rates both outages among the LSEs at an outage level, but only seeks the replacement capacity related to each if it reaches that point in the outage priority queue before fulfilling the total system RA requirement. Due to confidentiality issues, it is impossible for the ISO to share all of this information with every market participant to allow independent verification of the replacement decisions.

10.2.2. ISO dual processes and associated incentives

The ISO manages dual processes that depend on when outages are received. In one process, it manages and assesses outages that increase in severity or duration and newly requested outages to determine the supplier replacement responsibility. In another process, it manages and assesses outages that decrease in severity or duration and outages requested prior to T-45 to determine the LSE replacement responsibility. In both of these processes, the goal is to determine which organizations are responsible for providing replacement capacity.

As noted above the ISO has separate processes for evaluating the replacement requirement before and after T – 45. This is indicated by the two separate lines in Figure 17 in Appendix C. Outages that are received by the ISO prior to T – 45 follow the blue line in the LSE replacement process, whereas outages received after T – 45 follow the orange line and supplier replacement process. Outages that follow the LSE replacement process are always asked to be replaced up to the CEC 1 in 10 forecast amount. Outages that come in after T – 45 may or may not be asked to have additional capacity provided at the ISO's discretion. Potentially, the ISO could be giving incentives for suppliers to delay reporting planned outages until after T – 45 to receive more favorable treatment under ISO rules. There are no rules that force a supplier to inform the ISO of a planned outage during a specific timeframe and the ISO does see the majority of outages (approximately 3 out of 4 or 4 out of 5 depending on the month) each month come in after T-45.

The ISO is concerned about getting such a significant number of planned outages reported after T – 45. The later outages come in, the less time the ISO has to evaluate how outages impact the ISO system and the more the ISO will move around outages to try and accommodate necessary work. Additionally, in a capacity scarce environment last minute planned outages make the outage coordination task for the ISO as well as market participants even more difficult.

10.2.3. Contract complexity

The timing of outage submission drives the obligation of replacement and potential penalties associated with failing to replace. If an outage is reported prior to T-45 it will go through the LSE replacement process and if replacement is required, but not provided, the LSE may incur CPM costs. If an outage is reported after T-45 it will go through the supplier replacement process and if replacement is required, but not provided the supplier may have the outage cancelled, moved, or else will risk availability incentive mechanism penalties in the event the planned outage is restated as a forced outage.

When suppliers and LSEs contract for RA neither party will be fully sure if planned outages will be reported before or after T-45 and therefore are unaware of the potential risks related to ISO policies. This increases contract complexity and, presumably, costs for market participants.

10.2.4. Inefficient RA commitment and over-procurement

The ISO requires RA capacity where and when needed in the planning horizon in order to reliably operate the system in the operating horizon. It endeavors to achieve this goal by creating policies that allow for the efficient and proper procurement of capacity understanding that this will lead to fewer costs to the market. The ISO is aware that the current RA rules might not be as efficient as possible.

Use of load forecasts in both planning and operating horizons

As described in section 10.2.1 the ISO assesses monthly RA shortages both before and after the outage impact assessment is complete. This process can potentially lead to over-procurement if an LSE does not fully comply with its monthly RA obligation until after the replacement requirement has been assigned.

Additionally, it is possible that energy grid conditions will significantly change after the CEC 1 in 10 forecast was developed. Under the current rules for outages reported prior to T-45, even if the ISO noted radically different weather conditions than expected, the ISO still requires LSEs to provide replacement capacity up to the CEC forecast. Likewise, under the current rules for outages reported after T-45, the ISO may require suppliers to replace the outage capacity that causes the ISO system to drop below its CEC forecast. The use of the CEC 1 in 10 forecast in both the planning and operating horizons potentially forces more procurement than is needed for reliability on individual days. This has been addressed to some extent in the OMS tariff changes, which created rules to allow very short planned outages during low load periods.

Overlapping cure periods

One reason that inefficient RA commitment and over-procurement occurs is that the cure period for traditional RA requirements overlaps the cure period for the replacement requirement. The LSE must meet two types of requirements: (1) the traditional monthly RA requirements (peak demand & local) and (2) replacement requirements. The ISO evaluates the traditional RA requirements concurrently with the replacement requirements and where the ISO finds an LSE deficient for either requirement, the cure period overlaps all the way up until the concurrent due date of 11 days prior to the operating month (T-11).

One LSE's traditional RA capacity deficiencies could make the difference between the overall system shortage or excess on certain days. If any other LSE is deficient and the system is short, then outages are assigned for replacement under the replacement rule. Because other LSEs may be short or long, there is no guarantee that the one LSE which intends to provide additional capacity during the formal cure period will not cause a different LSE entirely to have to provide unneeded replacement capacity during these days. Because the ISO stacks outages in last in, first out order, oftentimes different LSEs must fill the shortage with replacement capacity even though the first LSE intends to fill the shortage for all days during the formal cure period. The

LSE is likely to provide this capacity rather than risk a penalty as they have no insight that the shortage will be cured by the LSE that was deficient of its traditional RA capacity requirements prior to the month. The traditional monthly RA deficiency cures often times would have reduced the overall replacement requirement placed on other LSEs.

Similarly, the short LSE could potentially then have to replace on days when there is a system deficiency. It is entirely possible that the LSE will be responsible for providing replacement capacity in addition to providing capacity to fulfill their monthly requirement. RA capacity used for replacement does not count toward the LSE's traditional RA requirement because replacement capacity that is not provided for every day of the compliance month cannot count toward the monthly requirement, so the LSE may end up having to provide twice the actually required RA. The LSE first provides additional RA on certain days to comply with the replacement rule, and second provides even more RA capacity for all days of the month on the RA plan to comply with the traditional RA requirements.

Timing of outage assessment

The timing of the ISO outage assessment contributes to inefficient RA commitment and potentially over-procurement. The ISO analyzes a snapshot of outages taken 45 days prior to the operating month when assigning replacement requirements to LSEs. As discussed above, suppliers cancel or move outages frequently between the planning horizon and operating horizon. If outages are moved or cancelled at any point in time after replacement capacity has been committed, the ISO may have more RA capacity on the original dates of the outage.

10.2.5. Risks related to canceling or moving planned outages

One concern from several suppliers is that the ISO will ask or tell a resource to move their planned outage relatively close to the RA month causing additional cost to the resource if they had already lined up maintenance or replacement capacity.

ISO asks suppliers to move planned outages after T-45

To meet its reliability objectives, the ISO reviews many different aspects of outages. One aspect related to the issue at hand is its comparison of the outage curtailment MW to the operationally available RA capacity on the days of the outage. If the total system operationally available RA capacity falls shorts of reliability needs on days where the scheduling coordinator requests an outage, the ISO works with the scheduling coordinator to find an appropriate time to take the outage or receive replacement capacity. Both of these options place additional burden on suppliers.

Suppliers cancel or move planned outages

Suppliers cancel or move outages frequently between the planning horizon and operating horizon. In order to secure certain outage dates, a supplier may have provided the ISO replacement capacity. This replacement capacity, once approved, is committed to the ISO as RA capacity and cannot be moved. Even if the outage is subsequently cancelled or moved, the

supplier has already procured the capacity and committed it to the ISO placing an additional burden on suppliers.

10.3. Unnecessary standard capacity product incentive mechanism risk

The ISO endeavors to promote the efficient and proper procurement of resources needed to reliably operate the system. Certain issues expose suppliers to unnecessary standard capacity product incentive mechanism risk, thereby complicating supplier risk assessment and increasing associated costs to the market.

Local area capacity commitment

In the monthly showing process LSEs provide their RA plans without distinguishing between system and local capacity. The ISO automatically counts all local resources on an LSE's RA plan as being shown to meet local requirements. This can result in LSEs "leaning" on other LSEs showings because the ISO will only determine there is a local shortage if the entire system is short on local, not just an individual LSE. Therefore, in real-time if a local resource goes out on forced outage, the ISO requires local capacity to be replaced with other local capacity even if the LSE can fully meet its local requirement without this capacity. If there is no local capacity available, the ISO will penalize the resource out on forced outage under the SCP incentive mechanism. This was listed as a top 5 issue in the ISO's Stakeholder Initiative Catalog.[35]

Suppliers cancel or move planned outages

Suppliers cancel or move outages frequently between the planning horizon and operating horizon. In order to secure certain outage dates, a supplier may have provided the ISO replacement capacity. This replacement capacity, once approved, is committed to the ISO as RA capacity and cannot be released or moved. If the outage is subsequently cancelled or moved, the supplier retains the standard capacity product risk associated with the replacement capacity. In other words, even though the outage creating the need for the RA has moved, the ISO still relies on the replacement as RA capacity and the capacity is subject to standard capacity product incentive mechanism risk.

10.3.1. Outage information sharing

Market participants are concerned that the ISO practice of sharing certain outage information to aid in the replacement requirement process amounts to sharing confidential information with competing entities in circumstances where the LSE is not also the supplier.

35 http://www.caiso.com/informed/Pages/StakeholderProcesses/StakeholderInitiativesCatalogProcess.aspx

ISO shares information to aid in cure process

ISO shares supplier outage information (Curtailment MW, dates, and Outage IDs) with LSEs that rely on the resources to meet their RA obligations to allow LSEs to verify the ISO's proper assignment of replacement requirements as well as to aid in the LSE's coordination with their supplier to cure the deficiencies.

10.4. Proposed rule changes

The ISO intends to address these issues by redesigning the current replacement and substitution rules. The ISO proposes a process where the terms "replacement" and "substitution" are no longer used. Instead there would be outages with nature of work categories and depending on the outage the ISO will require or allow: forced outage substitute capacity, planned outage substitute capacity, or no substitute capacity. Ideally, all outage substitute capacity will run through the same processing system. The following subsections describe the ISO's proposed policy related to planned outage substitute capacity. This proposal is intended as a base to eventually accommodate flexible RA outages in RSI phase two's market design to be implemented in the 2018 RA year.

As noted in the previous sections, there are two main goals of the ISO's monthly planning process, (1) to ensure that there is adequate monthly RA capacity in monthly RA plans, and (2) to ensure that there is adequate daily RA capacity given that certain resources on the monthly plan may have scheduled outage maintenance during the RA month. Sections 10.1 and 10.2 describe the ISO's current procedure for ensuring monthly and daily reliability and the associated issues with the current design. The ISO proposes to revise the current monthly planning process in order to address the identified problems described in the issues brief and create a simplified platform for the incorporation of flexible RA planned outages to be developed in RSI phase two.

Figure 18 in Appendix D outlines the ISO's proposed new RA process and rules to achieve reliability going into the RA month. The green bars and flags describe the process for LSEs and the ISO. The light purple bars comment on additional rules related to the associated process.

Beginning at the green flag at T- 45, the ISO will validate LSE and supply RA plans for discrepancies (differences between LSE and supply plan) and for shortages (difference between LSE's monthly requirement and amount on RA plan). The ISO will ask for specific local, system, and flexible showings. These results will be given to the LRA, LSE, and supplier. The ISO will then allow a cure period for LSEs to cure any shortages until T-25. At this point, according to tariff section 43, the ISO has authority to backstop for deficiencies using the CPM, the ISO may do so. The only change from today is the addition of the ISO asking for LSEs to specifically indicate the RA type (flexible, system, local) and the timeline the RA process occurs.

The ISO proposes no other changes to the traditional monthly RA process.[36] Currently this process begins at T-45 and is finalized at T-7. The ISO proposes that the monthly RA process now run from T-45 to T-25. The new timeline is described fully in Appendix D.

The revised monthly RA timeline allows the ISO to fully separate the monthly RA process from the planned outage analysis process. Therefore, the second purpose of the ISO's monthly planning process- to ensure planned outages do not affect real-time reliability- will be conducted entirely after the monthly RA plan process is completed at T-25. The ISO will then run the outage impact assessment and allocate any responsibility to provide planned outage substitute capacity on the supplier in last in, first out ("LIFO") order. Suppliers will then provide additional capacity or risk having their planned outage cancelled or denied, and risk availability incentive mechanism penalties if the outage is denied and the resource still goes on outage. If the ISO required additional capacity for the planned outage and the supplier did not provide the additional capacity, the outage capacity will be subject to the availability incentive mechanism. The availability incentive mechanism penalty is proposed to initially be $3.79/kW-month.

If after the supplier provides planned outage substitute capacity, the planned outage moves for any reason, the ISO will allow the supplier to release any provided RA capacity up to the substitute capacity amount.

Figure 12 below summarizes the ISO's proposed changes and their associated benefits. The proposal is further described in detail in sections 10.4.1 through 10.4.7.

[36] The impact on the CPUC RA program is that the ISO's timeline for being able to provide supplier data and LSE shortages has moved 15 days earlier than the current timeline and the amount of time between notifying the CPUC of a shortage and doing the CPM assessment has decreased from 14 to 10 days.

Figure 12: Summary of ISO proposed changes and benefits of the proposed changes

ISO proposed changes	Proposal benefits and issues addressed
Change in timeline to separate monthly RA process from planned outage assessment and replacement process	Eliminates overlapping cure periods for LSE monthly RA requirements and planned outage responsibility. This reduces over-procurement and simplifies the process.
	Allows the ISO to do an outage impact assessment closer to the RA month which should decrease the number of outages moving around after approval and therefore reduce over procurement and availability incentive mechanism risk.
Separation of LSE and supplier responsibility where LSEs are responsible for the monthly RA plan and suppliers are responsible for planned outage RA coordination with the ISO	Eliminates the dual replacement processes. This provides incentives for suppliers to report planned outages to the ISO as soon as possible.
	Eliminates the issue with multiple LSEs having replacement responsibility for a single outage and therefore simplifies the process.
	Eliminates the stakeholder concerns regarding confidentiality of the supplier having to notify the LSE when the resource is taking a planned outage.
Penalties for planned and forced outages aligned at $3.79/kW-month	Reduces risks related to outages moving around and reduces contract complexity as all outages that needed to have substitute capacity provided and didn't, whether forced or planned, will be treated the same.
Cap the local RA requirement at the system requirement	This will ensure that LSEs do not need to show more than their system requirement and therefore suppliers will not have to replace any capacity on forced outage above the system requirement.
Remove replacement requirement in the event the ISO tells a supplier move a previously approved outage	Reduces financial risks due to ISO planning and moving outage after the fact.
Release RA capacity associated with an outage if the planned outage moves	Reduces additional RA capacity during periods when the ISO no longer needs the capacity for reliability, which reduces the suppliers' availability incentive mechanism risk.
Develop rules for the separation of system and local showing in order to allow system resources to provide forced outage substitute capacity for local resources not specifically shown as local **in phase II** of this initiative	Reduces the potential that a local resource not needed to fulfill local requirement is penalized under the availability incentive mechanism due to inability for supplier to find a local substitute.

The ISO proposes a new timeline and rules for the planned outage replacement. The ISO believes that these rule changes as a package will enable the ISO and market participants to simplify and enhance the planning process without risking grid reliability.

10.4.1. Monthly RA timeline changes

The ISO proposes to change the ISO's monthly RA process timeline. Figure 18 in Appendix C illustrates the ISO's proposed new monthly RA process and associated rule changes. This proposal attempts to streamline the monthly process by removing any complexity that was unnecessary to maintain the safety and reliability of the grid in real-time.

The proposed monthly RA process would begin at T-45, which is the same as the current deadline. However, because the ISO is proposing to separate the daily outage assessment from the monthly RA validation and CPM process, the ISO proposes to decrease the time between when monthly LSE plans and supply plans are due, and the cure period and the CPM process. The ISO will provide an informational outage snapshot at T-42 to the relevant scheduling coordinators. As shown in Figure 18 this process will now entirely take place between T-45 and T-25. Because most of the ISO's monthly processes are automated and market participants will not long have to address outages during this time period, the ISO believes the somewhat reduced cure and CPM period are feasible. The timeline reflects a balance between giving market participants enough time during the monthly cure period and not extending the process so long in time it reduces the time allowed to cure daily replacement deficiencies during the outage assessment process.

10.4.2. Local requirement capped at the system requirement

The ISO proposes a minor adjustment to the local resource adequacy requirement. This change is to accommodate planned outage rules. In the monthly resource adequacy process, the ISO proposes to cap a load serving entity's local capacity requirement at that load serving entity's system requirement. In the event that an LSE has requirements in multiple TAC areas, the ISO will cap each local requirement at the LSE's system requirement for that TAC area (i.e. based on load in each TAC area relative to their total load). This will not impact the current local capacity technical study methodology used to determine the load serving entity local capacity requirements each year.

Currently, during some months of the year, a load serving entity may be required to demonstrate local capacity in excess of its monthly peak demand and reserve margin. This occurs because the local requirement is determined for August and applied to all months in order to assure local reliability. Since the inception of the local capacity technical study, peak load requirements have become increasingly different from month to month. The impact of this is that there is a potential for the monthly local requirement to be greater than the monthly system requirement. This will have a negative consequence in the future if a load serving entity commits more local capacity to the ISO than system requirement. Under the ISO replacement rule if a local resource goes on a planned outage that resource is also automatically considered a system resource and therefore has a replacement requirement associated with it. In the event planned outages bring the ISO system to an amount less than the system requirement and the

ISO requests additional capacity for capacity on outage in last in, first out order. If a load serving entity commits more than its system requirement two things may occur. First, other load serving entities may take outages and lean on the over-committed capacity. Second, the load serving entity may be required to replace an outage that would require the load serving entity's total capacity in aggregate to be beyond the load serving entity's peak demand and reserve margin requirement.

The ISO believes that it is reasonable to only require total commitment of resource adequacy capacity up to a load serving entity's peak demand and reserve margin requirements. In months where the peak demand and reserve margin requirement is less than the local requirement, the ISO would still receive local resource adequacy commitment up to the updated forecasted peak demand and reserve margin for that month. Therefore all committed capacity would be local capacity for these load serving entities. There is no reliability reason why the ISO should require additional local capacity beyond the peak demand and reserve margin requirements.

10.4.3. Separation of LSE and supplier responsibility for outage coordination

The ISO proposes that from T-45 to T-25 the ISO solely conducts the monthly RA and supply plan validation and CPM process. LSEs will be fully responsible for their monthly RA plan, and suppliers will be responsible for all necessary outage coordination. LSEs monthly local requirement will be capped at the monthly system requirement. Therefore LSEs only need to show the monthly system requirement on their showing. Then, in last in, first out "LIFO" order suppliers will be required to replace outages. If all LSEs exactly show their system requirement, all outages will be required to be replaced. This should reduce the general complexity both the ISO and market participants face each month, reduce contract complexity, and reduce the potential for over-procurement.

Complexity will be reduced for the ISO and market participants because this will allow the ISO to have one streamlined process for monthly RA and outage replacement. Figure 18 in Appendix C illustrates this new process where the obligation for replacement coordination is solely on the supplier. This change allows the ISO to first to work with LSEs on monthly RA plans and complete this process before working with suppliers. The ISO is then completely done with the LSE by T – 25 and only has to work with the supplier on any RA outage coordination, rather than having to coordinate with both LSEs and suppliers throughout the month on outages.

Contract complexity is also reduced by separating the LSE and suppliers roles. The ISO will now have the same penalties, provisions, and obligations no matter when the planned outage is reported. If the ISO asks for planned outage substitute capacity, it will always coordinate with the supplier on outage and the penalty will always be either cancelling the planned outage or the availability incentive mechanism penalty.

Finally, over-procurement is reduced in this rule because the ISO will no longer have the potential to ask for replacement capacity on a single day and then ask for more capacity in the

monthly timeframe. Recall this was a result of the replacement requirement being assigned prior to the monthly RA process being completed. Separating the roles allows the monthly RA process to be fully completed prior to the outage impact assessment and assignment of planned substitute (replacement) capacity.

Figure 13 and Figure 14 illustrate the number of "touch points" the ISO expects to occur during outage coordination under current rules and after the proposed separate outage coordination rules are implemented.

Figure 13 first describes the process for suppliers and LSEs to provide the ISO with replacement capacity if the ISO was notified of the outage prior to T-45. If the supplier and LSE have a non-firm contract, this is illustrated by the graphic on the left. When the resource goes out on replacement, then the LSE may be contractually obligated to provide the ISO replacement capacity.[37] Often a single supplier will contract with multiple LSEs. In the event the supplier goes on outage, the supplier must notify the LSEs and ISO (indicated by the black arrow). The ISO then assigns the LSEs a replacement obligation amount (indicated by the blue arrow). The LSEs then will contract with suppliers (or the supplier side of their house) and provide this capacity to the ISO as replacement capacity (indicated by the orange arrow). The supplier providing the replacement will then validate that they agreed to provide RA capacity (indicated by the dashed orange line). A very typical scenario is that multiple LSEs will provide multiple resource replacements for a single outage. Each arrow that touches the ISO is a "touch point" and increases the complexity and reduces transparency for all parties involved.

The graphic on the right shows the same scenario, except for in this scenario the LSE and supplier have decided that the supplier will bear the replacement risk. This complicates things further because although the LSE is the entity coordinating the replacement with the ISO, the ISO must also verify with the suppliers all information.

Below the previously described graphics are depictions of the coordination that occurs today after T-45, when outage coordination falls on the supplier. Note the number of touch points between the ISO and outside entities is significantly reduced. Figure 14 shows these same graphics as this is consistent with the ISO proposal for all time periods. The ISO only coordinates outages with suppliers; however, this does not in any way prohibit contractual obligations from being fulfilled. Just as today, parties may enter into a firm, non-firm, or other more complicated capacity contract. The ISO only proposes to change the coordination responsibility to make all outage coordination the same it is today after T-45 and does not intend to prevent or incent any changes to contract replacement obligations.

[37] The ISO is aware that contracts are more complicated than just "firm" and "non-firm" and is just using this classification for illustrative purposes.

Figure 13: Illustration of outage coordination communication under current rules

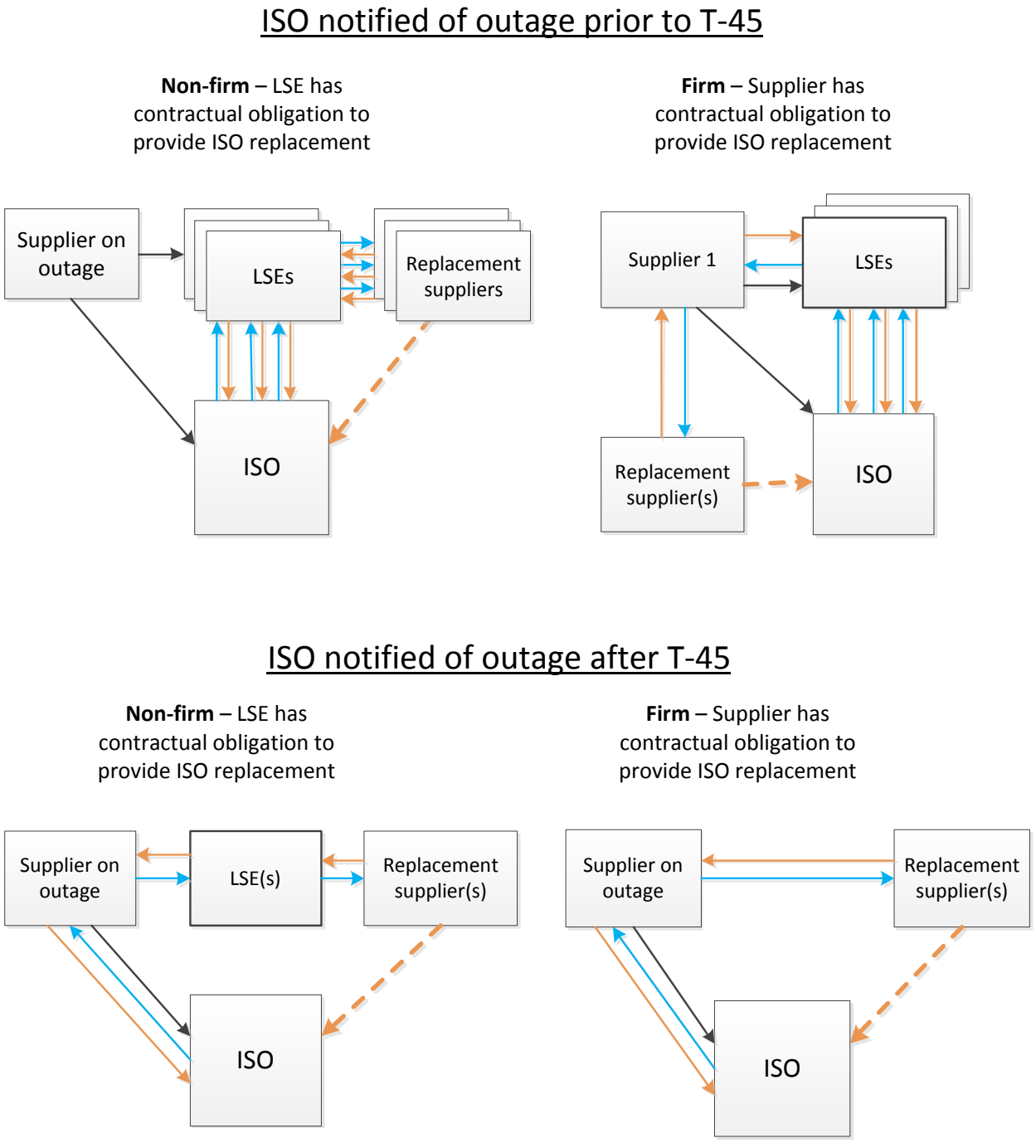
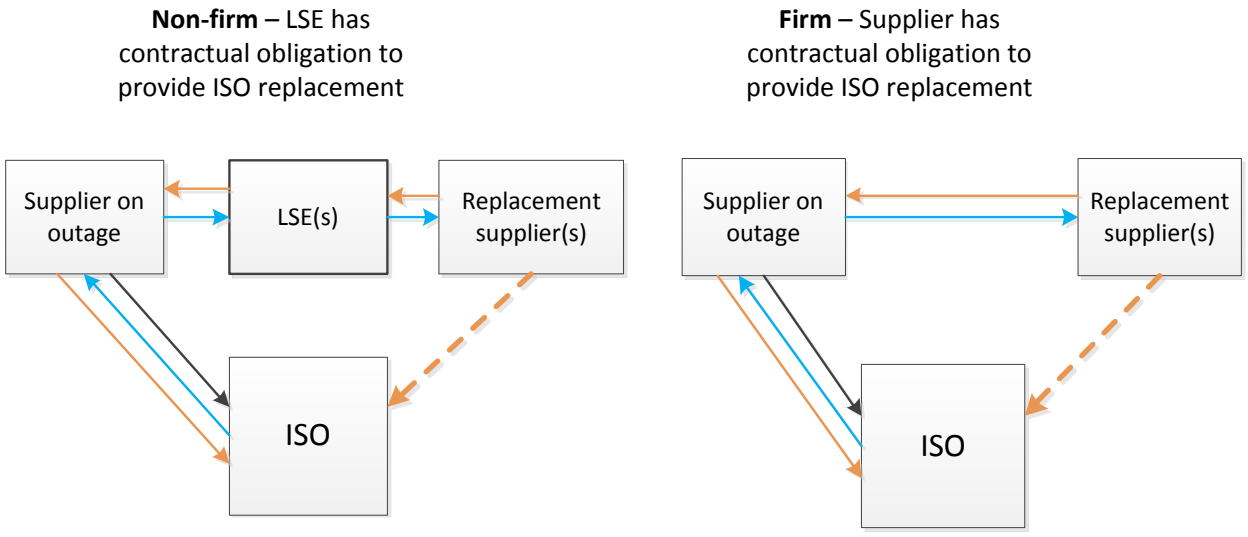


Figure 14: Illustration of outage coordination communication under proposed rules



In order to implement separation of LSE and supplier responsibility the ISO proposes the following:

- Change the monthly RA process timeline where the formal cure period and CPM event procedure is moved up to occur prior to T-25.
- Change the responsibility for outages prior to T-45. Previously LSEs were responsible for these outages, but now the ISO proposes to make the supplier responsible for all RA outage coordination, even ones reported prior to T-45.
- Exempt previously approved outages that are moved by the ISO from the replacement requirement.
- Change outage report and assignment process. The ISO proposes to run the outage impact report and assign planned substitute capacity to suppliers without taking LSEs into account. Outages will be stacked last in, first out ("LIFO") and be required to replace until the system is no longer short. There will be no consideration for whether the LSE that contracted or owns the resource is individually short or long. This is because all LSE RA plans will be finalized prior to the outage impact report.

10.4.4. Consistent forecast used to assign any needed planned outage substitute capacity

The ISO proposes to move the outage impact assessment up to T-25 and determine at that point which planned outages can only move forward if the ISO receives planned substitute capacity. Because the ISO has moved this timeline and assessment from T-45 to T-25, the ISO will continue to rely on the CEC 1 in 10 forecast. Any outage reported after T-25 would be moved to the top of the stack and asked for replacement if any was needed. This approach removes the incentive for resources to wait until the last minute to report their planned outages

as all outages would be assessed against a consistent system condition outlook. All planned outages that come into the ISO will be assessed using this forecast and therefore be consistently asked to provide planned outage substitute capacity regardless of the reporting time.

10.4.5. Penalties for planned and forced outages aligned

Currently planned outages may or may not risk triggering a CPM event depending whether they were reported to the ISO before or after T-45. The ISO proposes to remove the language allowing the monthly CPM to be used in the event the ISO requires additional capacity for a planned outage.[38] Instead the ISO will rely on the ability to cancel or deny planned outages and subject planned outages that were supposed to provide planned substitute capacity, but did not, to the availability incentive mechanism. The ISO specifically proposes:

- To remove the tariff language allowing the ISO to use the monthly CPM for planned outage deficiencies.
- To add to the availability incentive mechanism that any capacity on planned outage that that did not have the required planned outage substitute capacity will be fully subject to the availability incentive mechanism.[39]

The ISO already has the ability to cancel or deny planned outages for reliability reasons and so the ISO does not propose any additional rules at this time.

10.4.6. Release of planned outage substitute capacity as RA capacity in the event an outage moves

The ISO proposes that planned outage substitute capacity can be released from RA capacity obligations in the event an outage moves. Scheduling coordinators can move up to quantity of outage that moved. This will allow suppliers to reduce their availability incentive mechanism risk when their capacity is no longer needed as planned outage substitute capacity on a day.

The ISO proposes in phase II of this initiative to explore the possibility of LSEs to specifically indicate on their month-ahead showing whether a resource is being shown to satisfy a local or system requirement. This would be a resource (rather than capacity MW) designation and even if only a single MW was shown as local capacity, the entire resource would then be categorized as local for CPM and outage purposes. The ISO would then track the status of resource through the month and in the event it goes on outage, the ISO would allow the capacity to be substituted under the rules governing the shown resource type, and not the actual resource type. This would allow suppliers to substitute local capacity with system capacity if the capacity was not shown as local under the monthly RA plan. This also reduces leaning between LSEs in the initial monthly RA process. The ISO would also do all local CPM determination assessments

[38] The ISO will still be able to use the significant event and exceptional dispatch CPM as needed.
[39] The ISO proposes to implement this piece concurrently with the availability incentive mechanism, expected to be implemented in Fall 2016.

using only the resources shown specifically as local RA. There are significant implementation and policy details to figure out concerning the unbundling of local and system capacity and the ISO proposes to begin a more robust policy discussion on this in phase II of this initiative.

10.4.7. Flexible CPM allocation methodology

If the ISO does not receive a flexible CPM allocation methodology that allocates 100% of the LRA's flexible RA requirement by the deadline published in the Reliability Requirements BPM, the ISO will use the ISOs flexible CPM default allocation. The ISO proposes this to address a gap in the current policy that could potentially lead to unallocated CPM capacity.

10.4.8. Plan resubmittal rules for 2017

The ISO would like to clarify submittal and resubmittal rules for RA plans so that going-forward in the revised process there is no confusion.

The ISO proposes an LSE can resubmit plans prior to T-30 under the following circumstances:

- If there is a valid discrepancy between the supply plan and RA plan;
- If there is a valid deficiency in the RA plan;
- Once RA capacity is validated then it cannot be removed from the RA plan.

The ISO proposes a supplier can resubmit plans prior to T-30 under the following circumstances:

- If there is a valid discrepancy between the supply plan and RA plan;
- Once RA capacity is validated then it cannot be removed from the supply plan.

11. Next Steps

The ISO will bring this policy to the March Board meeting.

12. Appendices

12.1. Appendix A

Figure 15: Summary of Bidding Requirements for Resources Providing RA Capacity[40]

Resource Type	Bidding Requirements			
	IFM	**RUC**	**RTM**	**ISO Inserts Required Bids**
Generating Units Including Pseudo Ties (other than Use-Limited Resources)	Economic Bids or Self-Schedules are to be submitted for all RA Capacity for all hours of the month the resource is physically available (ISO Tariff 40.6.1).	$0/MW RUC Availability Bids are to be submitted for all RA Capacity for all hours of the month the resource is physically available (ISO Tariff 40.6.1).	Economic Bids or Self-Schedules are to be submitted for any remaining RA Capacity from resources scheduled in IFM or RUC. Economic Bids or Self-Schedules are to be submitted for all RA Capacity from Short-Start Units not scheduled in IFM (ISO Tariff 40.6.2, 40.6.3).	Yes (1)
Dynamic, Resource-Specific System Resources (other than Use-Limited Resources)	Same bidding requirement as above (ISO Tariff 40.6.1).	Same bidding requirement as above (ISO Tariff 40.6.1).	Same bidding requirement as above (ISO Tariff 40.6.2, 40.6.3, 40.6.5.1).	Yes (1)
Dynamic, Non-Resource-Specific System	Same bidding requirement as above (ISO Tariff 40.6.1).	Same bidding requirement as above (ISO Tariff 40.6.1).	Same bidding requirement as above (ISO Tariff 40.6.2, 40.6.3, 40.6.5.1).	Yes (1)

[40] Available in the ISO's Reliability Requirements Business Practice Manuals at http://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Reliability%20Requirements.

Resource Type	Bidding Requirements			
	IFM	**RUC**	**RTM**	**ISO Inserts Required Bids**
Resources				
Non-Dynamic, Resource-Specific System Resources (i.e. unit-specific imports)	Same bidding requirement as above (ISO Tariff 40.6.1).	Same bidding requirement as above (ISO Tariff 40.6.1, 40.6.5).	Economic Bids or Self-Schedules are to be submitted for any remaining RA Capacity from resources scheduled in IFM or RUC. No RTM Bids or Self-Schedules are required for resources not scheduled in IFM or RUC (ISO Tariff 40.6.2, 40.6.3).	Yes (1)
Non-Dynamic , Non-Resource-Specific System Resources (i.e. non-unit-specific imports)	Economic Bids or Self-Schedules are to be submitted for all RA Capacity consistent with inter-temporal constraints such as multi-hour run blocks or contractual limitations (e.g. 6 X 16). (ISO Tariff 40.6.1, 40.6.8.1, 40.8.1.12.2). Economic Bids or Self-Schedules must be submitted under the Resource ID registered as an RA Resource on RA Supply Plan.	Same bidding requirement as above. (ISO Tariff 40.6.1, 40.6.5). RUC Availability Bids must be submitted under the Resource ID registered as an RA Resource on RA Supply Plan.	Economic Bids or Self-Schedules are to be submitted for any remaining RA Capacity from resources scheduled in IFM or RUC. No RTM Bids or Self-Schedules are required for resources not scheduled in IFM or RUC (ISO Tariff 40.6.2, 40.6.3).	Yes (1)
Non-Hydro and Dispatchable Use-Limited Resources	Economic Bids or Self-Schedules are to be submitted for all RA Capacity for all hours unit is capable of operating consistent	$0/MW RUC Availability Bids are to be submitted for all RA capacity for all hours unit is capable of operating consistent with the use-limitations	Economic Bids or Self-Schedules are to be submitted for any remaining RA Capacity from resources scheduled in IFM or	No (2)

Resource Type	Bidding Requirements			
	IFM	**RUC**	**RTM**	**ISO Inserts Required Bids**
	with the use-limitations described in unit's Use-Plan. RA Capacity from Eligible Intermittent Resources is not required to be offered into the DAM. (ISO Tariff 40.6.4.3.1, 40.6.4.3.4).	described in unit's Use-Plan. RA Capacity from Eligible Intermittent Resources is not required to be offered into the DAM. (ISO Tariff 40.6.4.3.1).	RUC, consistent with the use-limitations described in unit's Use-Plan. Energy Bids or Self-Schedules are to be submitted for all RA Capacity from Short-Start Units not scheduled in IFM, consistent with the use-limitations described in unit's Use-Plan (ISO Tariff 40.6.2, 40.6.3, 40.6.4.3.1).	
Hydro, Pumping Load, and Non-Dispatchable Use-Limited Resources	Economic Bids or Self-Schedules are to be submitted for RA Capacity that the market participant expects to be available Plan (ISO Tariff 40.6.4.3.2).	No RUC Availability Bids required (ISO Tariff 40.6.4.3.2).	Economic Bids or Self-Schedules are to be submitted for RA Capacity that the market participant expects to be available (ISO Tariff 40.6.4.3.2).	No (2)

Notes in table:

(1) ISO will insert economic bids and residual unit commitment (RUC) availability bids into DAM and RTM if required amounts of RA capacity are not offered into these markets.

(2) ISO will not insert bids for these resources when required amounts of RA capacity are not offered into the respective markets. An exception is that the ISO will insert economic bids into the IFM and/or RTM when there is a RUC availability bid or RUC schedule for a resource without a corresponding economic bid or self-schedule.

12.2. Appendix B

To provide a clear understanding of how the new must-offer obligations proposed shall be applied to each of these markets, the ISO provides the following summary.

Resource Type	Bidding Requirements			
	IFM	**RUC**	**RTM**	**ISO Inserts Required Bids**
Distributed Energy Resources (Single resource Type)	Economic Bids or Self-Schedules are to be submitted for all RA Capacity for all hours of the month the resource is physically available.	$0/MW RUC Availability Bids are to be submitted for all RA Capacity for all hours of the month the resource is physically available.	Economic Bids or Self-Schedules are to be submitted for any remaining RA Capacity from resources scheduled in IFM or RUC. Economic Bids or Self-Schedules are to be submitted for all RA Capacity from Short-Start Units not scheduled in IFM.	Yes [(1)]
Distributed Energy Resources	Same as resources type for grid connected resource	Same as resources type for grid connected resource	Same as resources type for grid connected resource	Same as resource type for grid connected resource
Non-generator resource (Non-REM)	Economic Bids or Self-Schedules are to be submitted for all RA Capacity for all hours of the month the resource is physically available.	$0/MW RUC Availability Bids are to be submitted for all RA Capacity for all hours of the month the resource is physically available.	Economic Bids or Self-Schedules are to be submitted for any remaining RA Capacity from resources scheduled in IFM or RUC. Economic Bids or Self-Schedules are to be submitted for all RA Capacity not scheduled in IFM.	Yes
Non-generator resource	Economic Bids or Self-Schedules are to be submitted for all RA	$0/MW RUC Availability Bids are to be submitted for all RA Capacity for	Economic Bids or Self-Schedules are to be submitted for any	Yes

Resource Type	Bidding Requirements			
	IFM	**RUC**	**RTM**	**ISO Inserts Required Bids**
(REM)	Capacity for regulation for all hours of the month the resource is physically available.	all hours of the month the resource is physically available.	remaining RA Capacity from resources scheduled in IFM or RUC. Economic Bids or Self-Schedules are to be submitted for all RA Capacity not scheduled in IFM.	
Proxy Demand Resource	Economic Bids or Self-Schedules are to be submitted for RA Capacity that the market participant expects to be available Plan.	$0/MW RUC Availability Bids are to be submitted for all short and medium start RA Capacity for all hours of the month the resource is physically available. No RUC Availability Bids required for long-start RA Capacity.	Economic Bids or Self-Schedules are to be submitted for any remaining RA Capacity from resources scheduled in IFM or RUC. Economic Bids or Self-Schedules are to be submitted for all RA Capacity from Short-Start Units not scheduled in IFM.	No (2)

(1) ISO will insert economic bids and residual unit commitment (RUC) availability bids into DAM and RTM if required amounts of RA capacity are not offered into these markets.

ISO will not insert bids for these resources when required amounts of RA capacity are not offered into the respective markets. An exception is that the ISO will insert economic bids into the IFM and/or RTM when there is a RUC availability bid or RUC schedule for a resource without a corresponding economic bid or self-schedule.

12.3. Appendix C

The ISO believes that assessing flexible RA and system RA availability separately would decrease the incentive for resources to provide economic bids for overlapping capacity. In order to not impose a double penalty on a resource for a single outage and still assess flexible and system RA separately, the ISO would have to have come up with prices that incent resources enough to comply with both requirements independently, yet do not double penalize capacity for a single outage. This is because the availability incentive mechanism applies to capacity that is solely system RA, solely flexible RA, or both flexible and system RA.

Under the construct where a MW can be shown as only flexible RA or only system RA, or as both system and flexible RA it may be infeasible to have separate prices for flexible RA and system RA without negative consequences. Under the two price system, either the ISO undervalues flexibility availability or double penalizes a resource that is shown as both flexible and system RA. This is because capacity must cover its underlying going forward fixed costs regardless of whether it is shown as flexible and system RA. Therefore, there is no adder price to system RA that would appropriately incent capacity shown as only flexible RA to be available.

A simple example illustrates this point: Assume a resource's NQC = EFC = 100 MW and it must recover $3.50/kW- month. It believes that providing flexible RA will have a $.5/kW-month adder. The resource then would sell its capacity for either $3.5/kW-month as system RA or $4.0/kW-month as flexible and system RA, or $4.0/kW-month as flexible only RA. There is no difference in cost to the resource to provide system and flexible RA or flexible only RA. The resource can be shown to the ISO in three ways. However, in all cases in order to incent the resource to be available, the ISO must have a price that is a significant enough proportion of the resources payments.

If the incentive prices were (as some participants have suggested) a system price and then "adder" flexible price, the incentive to be flexible would be small at best and non-existent at worst. For example, assume an availability price of $3.5/kW-month for system RA and $.5/kW-month for flexible RA. The following would then occur:

- If the resource was shown as flexible RA only, the ISO would only incent it by penalizing or paying it $.5/kW-month. This is only 1/4th of its capacity payment and far smaller than the resources RA payment of $4/kW-month, which undervalues flexible capacity.
- If the resource is shown as flexible and system RA and self-schedules for large portions of the month, the resource could end up being paid under the incentive mechanism for being fully compliant with the system obligation at up to $7/kW- month (twice the system price) and only end up being penalized $. 5/kW-month for sometimes not fulfilling the flexible obligation. This also undervalues the flexible RA portion of the resource and undermines the availability incentive mechanism for flexibility.

If the ISO therefore made both the flexible and system RA price equal at $3.5/kW-month, the ISO would end up over-penalizing resources on outage. For example, the following would occur:

- If the resource was shown as flexible and system RA and went on outage, the ISO would penalize the resource by charging it $7/kW-month. This is now overly punitive to the resource.

Therefore the ISO proposes to assess a single MW at a single price under a single availability metric as described in section 6.

Alternatively, the ISO could assess all overlapping capacity as flexible and all system and local non-overlapping capacity as generic- and have separate prices for flexible and generic capacity availability. It has been discussed that FRAC MOO was designed because of the potential for

flexible scarcity and so the RA price of flexible capacity should rise above the price for system capacity. Although this is potentially true, at this time the ISO does not have any insight into the premium of an average flexible RA contract compared to an average system RA contract. Furthermore, the ISO does have and has had data on the difference between local area RA contracts and observes that these differences are likely to be significantly and consistently more diverse than the differences in flexible and generic RA prices. The ISO; however, contends that because there is no capacity market, the differences from area to area and attribute to attribute are unlikely to be systematic and consistent enough to capture accurately and simply enough to be useful in the availability incentive mechanism.

12.4. Appendix D

Figure 16: Current Resource Adequacy monthly process

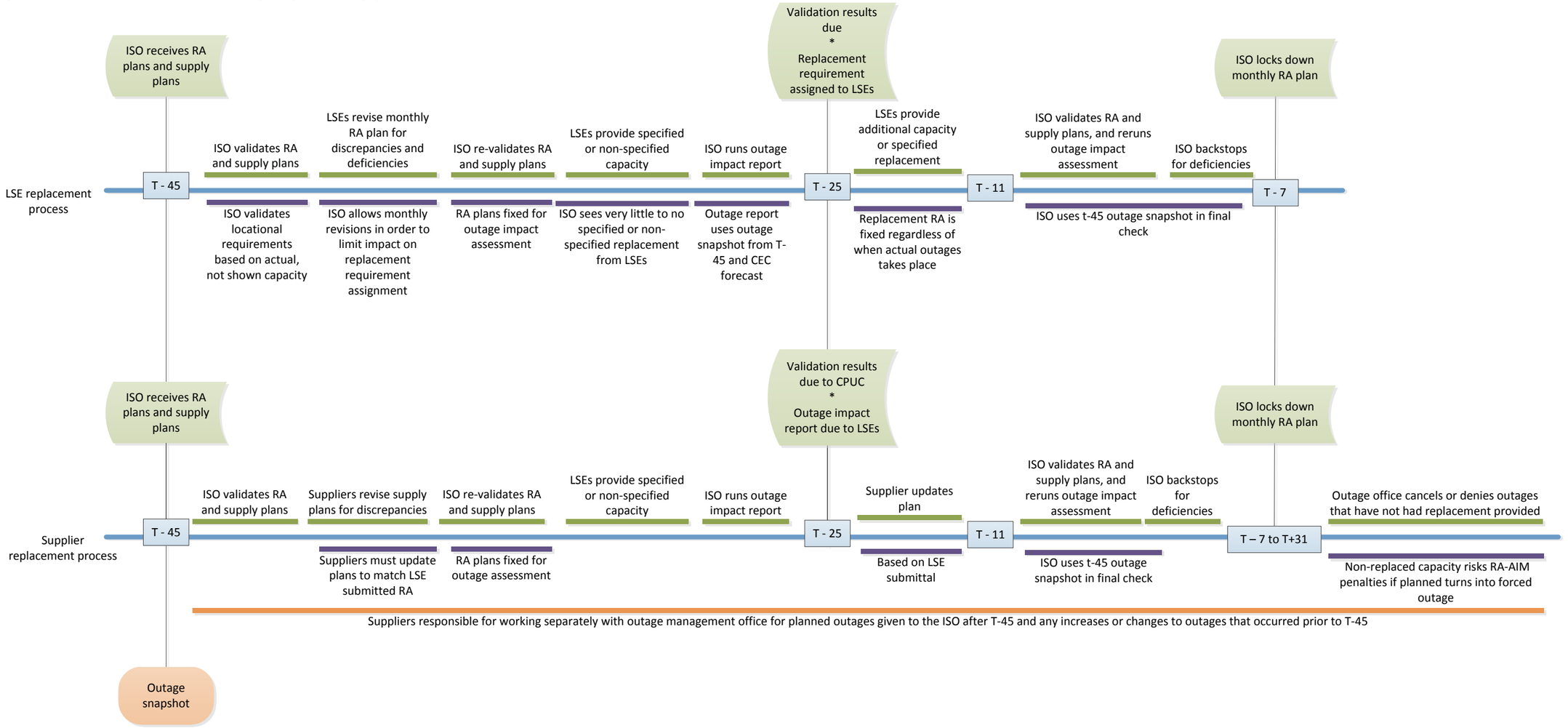


Figure 17: Current Resource Adequacy monthly process with issue boxes

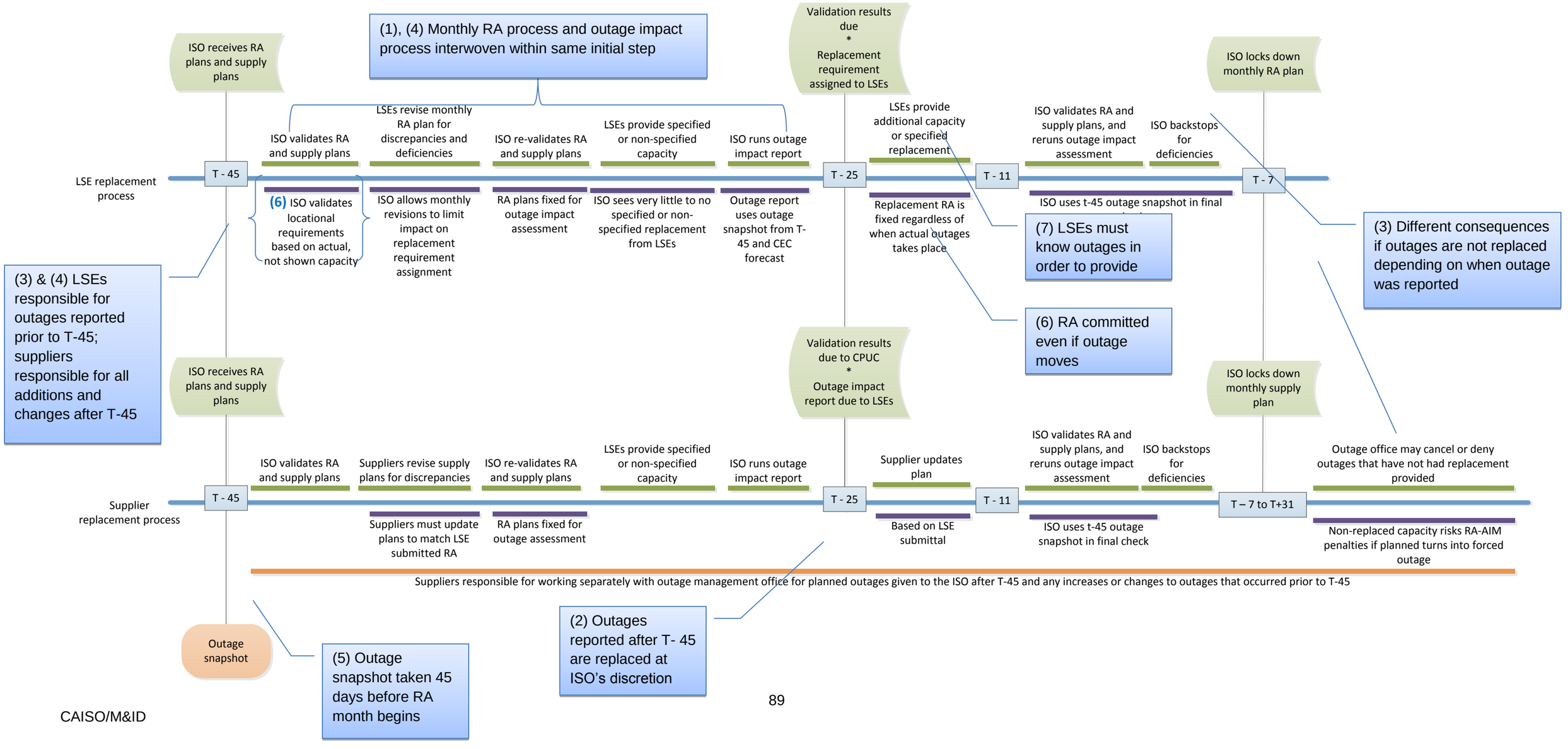


Figure 18: Proposed Resource Adequacy monthly process for 2017 RA year with current CPM process

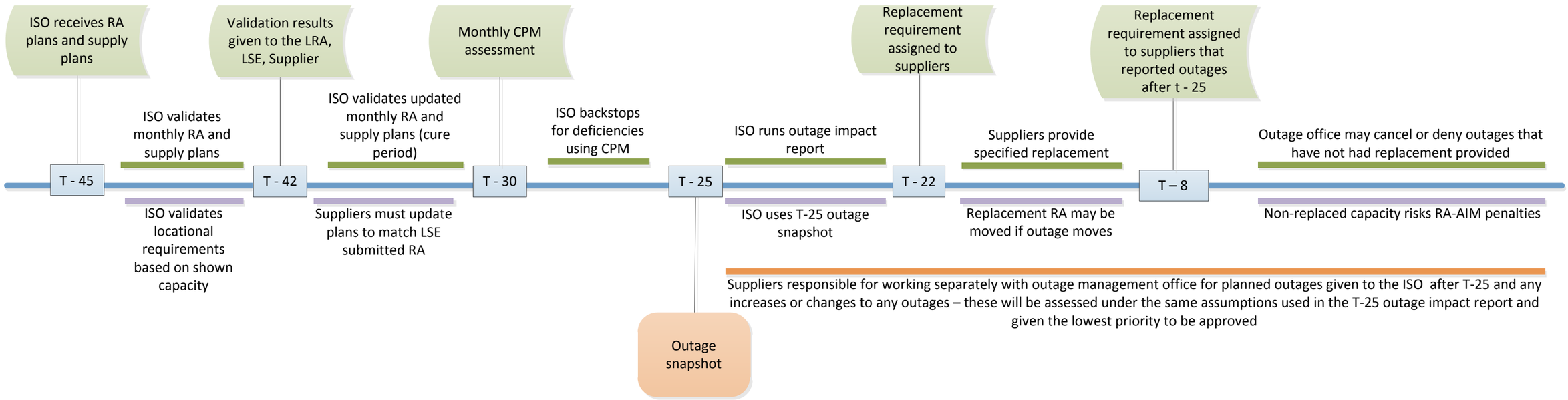


Figure 19: Proposed Resource Adequacy monthly process for 2017 RA year with proposed CPM process