BEFORE THE
PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Consider Annual Revisions to Local Procurement Obligations and Refinements to the Resource Adequacy Program	)))))	R.08-01-025

PHASE II COMMENTS OF THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION

Pursuant to the Administrative Law Judge's October 30, 2008 and January 27, 2009 rulings that established the procedural schedule for Phase II of the Resource Adequacy ("RA") proceeding, the California Independent System Operator Corporation ("CAISO") hereby submits the following comments on the Phase II issues. The CAISO appreciates the opportunity to address the issues set for consideration in the Phase II proceeding. Specifically, the CAISO provides below its proposals and comments on the following issues:

- the Standard Capacity Product ("SCP") proposal that the CAISO intends to file with the Federal Energy Regulatory Commission ("FERC") in April 2009;
- the Ancillary Services Must-Offer Obligation ("A/S MOO") proposal that the CAISO will file with FERC in conjunction with its SCP proposal;
- a revised counting rule for intermittent resources;
- the counting rule for Qualifying Facilities ("QFs");
- extension of the interim counting rule for new resources; and
- retention of the existing replacement requirement.

I. THE CAISO'S STANDARD RESOURCE ADEQUACY CAPACITY PRODUCT PROPOSAL

The RA program was implemented to ensure that adequate resources would be available to serve load, meet appropriate reserve requirements, and support reliable operation of the CAISO Controlled Grid. As the RA program has evolved, participants have identified a need to develop a standardized capacity product to facilitate the selling, buying and trading of capacity to meet RA requirements. A standardized capacity product with appropriate availability requirements and incentives for RA resources would also enhance the ability of the CAISO to ensure reliable grid operations. Stakeholders have affirmed to the CAISO that their ability to efficiently transact RA contracts is hindered by the current approach that requires negotiating agreements between parties without a standard product definition for trade. The need to address this matter was highlighted during the CAISO's Market Initiatives Roadmap process in 2008 where the SCP was ranked the highest priority out of a list of over 70 initiatives.

At the request of stakeholders, the CAISO initiated a stakeholder process in the summer of 2008 to design an SCP that would augment the RA program by establishing a standardized product to facilitate bilateral contracting for RA capacity and further enhance reliable CAISO grid operations. The stakeholder process has involved multiple workshops, conference calls and opportunities to comment on the development of the SCP. The stakeholder process will conclude at the end of February 2009. The draft final SCP proposal that has resulted from that process, as well as a February 6, 2008 White Paper discussing

some currently outstanding issues is attached to these comments in Attachment A. Following a stakeholder conference call on February 13, 2009, the CAISO staff will develop solutions for the outstanding issues and submit a final proposal to the CAISO Board of Governors for approval at the March 2009 Board meeting. If approved, the CAISO will thereafter submit a tariff filing to FERC to request approval of such SCP proposal.

Under the CAISO's SCP proposal, most of the existing RA process will not be changed. The SCP proposal can be summarized as follows, with additional details provided in Attachment A:

- Availability Standard. If a resource receives payments for providing RA capacity, there is an expectation that the full RA capacity of that resource will be available to the CAISO, unless the resource is on a forced equipment outage or derate that diminishes its ability to provide the full amount of its RA capacity. Under the SCP, hourly resource availability will be tracked on a monthly basis and compared against a monthly availability standard or target (12 unique monthly targets during the course of a compliance year) based on the historic performance of the RA resource fleet during the peak hours of the respective month over the previous three years.

- Availability Incentives. The SCP proposal will provide financial incentives for each resource to meet or exceed the target availability standard. On a monthly basis, the CAISO will assess charges to resources whose availability falls short of the target, and will provide credit payments to resources whose availability exceeds the target. Credit payments will be funded only through revenues available from the financial charges. This will ensure that the mechanism is revenue neutral on a monthly basis and does not depend on revenues from other sources.

- Unit Substitution. A resource owner will be able to substitute a non-RA resource for an RA resource on forced outage in order to avoid the outage being counted against the RA resource's availability. A pre-approval process will be required for local RA substitutions to ensure that the replacement capacity is comparable to the original RA capacity in an operational sense.

- Transition to SCP. The SCP has provisions for the grandfathering of existing RA contracts that were executed prior to January 1, 2009. Such grandfathered contracts would be exempt from the CAISO-enforced availability standards and incentives under the SCP. Upon the expiration of the primary term of such contracts, any grandfathering would cease.

- Deferment of SCP availability standards and incentives for certain RA resource types. The CAISO proposal would not initially apply the SCP availability provisions to intermittent renewable generation (wind and solar), Qualifying Facilities, and demand response resources. The CAISO intends to revisit the applicability of the SCP provisions to these resource types at a later date.

The CAISO believes that implementing an SCP will be a step forward in enhancing the benefits of and streamlining California's RA program, which is the Commission's goal in this proceeding.

II. PROPOSAL FOR AN ANCILLARY SERVICES MUST OFFER OBLIGATION

In its FERC tariff filing to implement the SCP proposal, the CAISO will also propose to further enhance the effectiveness of the RA program by adding an Ancillary Services Must Offer Obligation for RA capacity in the day-ahead Integrated Forward Market ("IFM") under the Market Redesign and Technology Upgrade ("MRTU"). For the reasons set forth below, the CAISO requests that the CPUC support adoption of the A/S MOO, as described herein.

Under the current MRTU Tariff, RA resources (except units on an outage, Load Following MSS Units, and certain Use Limited Resources) have an obligation to submit in the IFM either self-schedules or economic bids for all of their RA capacity. This obligation is referred to as the Resource Adequacy Must Offer Obligation ("RA MOO"). In the CAISO's SCP FERC filing, the CAISO will also propose to modify the RA offer obligation to require those RA resources

subject to the RA MOO to submit in the IFM both (a) Economic Energy Bids and/or Self-Schedules for all of their RA Capacity and (b) A/S bids and/or Self-Provided Ancillary Services for all of their A/S certified RA capacity. This will allow the IFM to co-optimize the use of RA capacity that is subject to the RA MOO to provide Energy, A/S or a combination of both, in accordance with the RA resource's physical capability (*i.e*., to the extent the RA resource is certified to provide A/S), and thereby to make most efficient use of the available RA capacity.

Additional features of the A/S MOO are as follows:

- If an RA resource subject to the RA MOO fails to submit A/S bids for RA capacity that is certified and physically capable of providing A/S, the CAISO will insert default A/S capacity bids at the price of $0 per MW-hour for each A/S for which the resource is certified. (This is analogous to the existing provision of the RA MOO under MRTU that authorizes the CAISO to insert Default Energy Bids for an RA resource that fails to submit energy bids or self-schedules for the full amount of its subject RA capacity.)

- The CAISO will honor RA capacity energy self-schedules unless it is unable to procure 100% of its A/S requirements in the IFM. In such cases, the CAISO would be able to curtail the energy self-schedule or portion thereof, with the exceptions as discussed below, to allow certified A/S capacity to be used for A/S.

- Hydro RA resources that offer economic bids for energy to the IFM should submit A/S bids, together with their energy bids, for all their certified A/S capacity commensurate with their economic bids for energy. Hydro RA resources submitting energy self-schedules will not be required to offer A/S in the IFM for their RA capacity that is self-scheduled to provide energy.

- Non-Dispatchable Use Limited RA Resources will be exempted from the IFM A/S MOO.

An important design feature of the MRTU markets is the co-optimization of the procurement of energy and A/S in both the IFM and, to the extent additional

Ancillary Services are needed, in the Real-Time Market. Co-optimization utilizes available resources in the most efficient manner to meet customer demand and system reliability needs. However, the benefits of co-optimization of A/S and energy will be severely undercut if the RA MOO under MRTU is not explicitly extended to cover A/S for which the RA capacity is certified.

Further, under MRTU, the CAISO is required to procure 100% of its forecasted Real-Time A/S requirements in the IFM. If the RA offer obligation is limited to Energy, the CAISO could find itself in a position where it has more energy bids than it needs but insufficient A/S supply being offered to meet the applicable Reliability Standards, even though there is more than enough RA capacity capable of providing those Ancillary Services. That could put the CAISO in the precarious position of being unable to meet its A/S requirements fully in the IFM, which could cause A/S prices to increase significantly and unnecessarily. Moreover, once the CAISO implements "scarcity pricing," which FERC has directed the CAISO to implement within a year after MRTU go-live, A/S withholding could trigger scarcity pricing events more often than would otherwise occur without an RA A/S offer obligation.[1]

An A/S MOO would not impose any additional burdens or costs on Load Serving Entities ("LSEs"). If an LSE is paying for the capacity of a resource under a bilateral RA contract or through a centralized capacity market, the AS MOO would enable the LSE to obtain all of the capacity services that the

[1] Scarcity Pricing is a mechanism that causes the market A/S prices to rise automatically, potentially beyond any applicable bid cap, when there is a shortage of A/S supply in the market. FERC directed the CAISO to file tariff language and to implement a reserve shortage Scarcity Pricing mechanism within 12 months after MRTU startup as part of its September 21 MRTU Order. *California Independent System Operator Corporation,* 116 FERC ¶ 61,274, Ordering Paragraph V (2006).

resource is capable of providing from the capacity that the LSE has purchased, not just energy, and would prevent the supplier of that capacity from meeting its RA offer obligation in such a manner as to create artificial scarcity of A/S supply. Through the IFM co-optimization process, the CAISO will determine how much it needs of energy or A/S from the procured RA capacity.

The CAISO emphasizes that its A/S MOO proposal *does not* impose any additional procurement obligation on LSEs, either in terms of an aggregate capacity requirement or the composition of their RA portfolio to include an explicit mix of A/S certified resources. Nor does the A/S MOO proposal extend the RA MOO to any RA resources that are not already subject to the RA MOO. Rather, the proposal is simply limited to ensuring that RA resources procured by LSEs for the purpose of complying with their Commission-established RA obligation that happen also to be certified to provide A/S also make their A/S capacity available to the CAISO.

Similarly, suppliers of RA capacity should be financially indifferent to complying with the A/S MOO. At the Commission's March 30, 2008 workshop in Rulemaking 08-01-025, the CAISO presented an analysis demonstrating that RA resources can use bidding strategies to reflect preferences between energy and A/S that result in revenue at least equivalent to, and potentially greater than, resources submitting only energy bids. A copy of the CAISO's analysis is attached hereto as Attachment B. As a result, an A/S MOO will not trigger additional supplier costs that must either be passed through to LSEs or absorbed as a loss by suppliers. Thus, an A/S offer obligation may be imposed on all

existing RA contracts that are subject to the current MRTU RA MOO without undermining the balance of benefits and burdens of the RA contracts.

The CAISO requests that the Commission support a requirement that resources offering RA capacity that can provide A/S make those products available to the CAISO in the MRTU Day-Ahead Market. This obligation would require RA capacity to submit A/S and energy bids for co-optimization into the CAISO's IFM. It is important to note that by imposing such obligation on suppliers of RA capacity, the CAISO is not in any way suggesting that there is any new or additional obligation of LSEs to procure A/S-capable capacity to meet their RA requirements. Nor is the CAISO advocating that the RA portfolio has to change in any way.

III. QUALIFYING CAPACITY OF INTERMITTENT RESOURCES

A. Policy Overview

The following parties have submitted proposals to the Commission regarding the appropriate methodology for measuring the Qualifying Capacity ("QC") of intermittent resources: Dynegy Morro Bay LLC, Dynegy Moss Landing, LLC, Dynegy Oakland LLC and Dynegy South Bay, LLC, jointly ("Dynegy"); Division of Ratepayer Advocates ("DRA"); Large-Scale Solar Association ("Solar Association"); Pacific Gas & Electric Company ("PG&E"); Energy Division Staff ("Staff"); California Wind Energy Association and American Wind Energy Association, jointly ("CalWEA"); and the CAISO, Southern California Edison Company ("SCE") and San Diego Gas & Electric Company ("SDG&E"), jointly.

The CAISO recognizes the importance of renewable resources, including wind and solar, in meeting the State's environmental policy goals. The CAISO understands and shares the urgency in implementing measures to reduce greenhouse gas emissions, including promoting the development of renewable resources. To that end, the CAISO has taken proactive steps to enhance its ability to integrate, *inter alia,* wind and solar resources in support of the State's goals. However, the challenge facing the Commission in this proceeding is a different one, *i.e.,* to determine how best to count intermittent resources given that the RA program is designed to (1) ensure that LSEs procure sufficient resources to meet monthly peak demand levels plus reserve margin, and (2) meet the CAISO's operational needs. Importantly, the purpose of the RA counting rules is not to serve as a vehicle for policy development. Intermittent resources have great value in displacing generators that emit greenhouse gas emissions and other pollutants. However, intermittent resources have significant limitations in their ability to meet peak demand. At this point in time, they generally can generate power only when the wind blows or the sun shines, Historical data demonstrates that those times do not necessarily correlate with peak demand for energy. The joint proposal for counting intermittent resources submitted by the CAISO, SCE and SDG&E (referred to hereinafter as the "Joint Proposal") only seeks to ensure that the rules for counting intermittent resources reflect their true ability to help meet peak demand. In evaluating the merits of the various intermittent resource counting proposals, the Commission

must keep in mind the fundamental goals of the RA program and approve the proposal that is most consistent with and best achieves those goals.

In D.04-01-050, the Commission described the fundamental concept of RA and the role of RA Requirements as follows:

> Resource procurement traditionally involves the Commission developing appropriate frameworks so that the entities it regulates will provide reliable service at least cost. This involves determining an appropriate demand forecast and then ensuring that the utility either controls, or can reasonably expect to acquire, the resources necessary to meet that demand, even under stressed conditions such as hot weather [footnote omitted] or unexpected plant outages. Resource Adequacy seeks to address these same issues. In developing our policies to guide resource procurement, the Commission is providing a framework to ensure resource adequacy by laying a foundation for the required infrastructure investment and assuring that capacity is available when and where it is needed.[2]

In Decision D.05-10.042, the Commission further elaborated on the fundamental tenets of the RA program. The Commission emphasized that it was seeking through the RA program "to ensure that the infrastructure required for reliability actually occurs."[3] . The Commission also stressed that it was seeking "to ensure that the generation capacity made possible through that investment is available to the grid at the times and at the locations it is needed" and that the "capacity must be sufficient for stressed conditions, *i.e.,* sufficient generation should be available under peak demand conditions even when there are unexpected outages."[4] Importantly, the Commission stated that its "policy that RAR should ensure that capacity is available when and where it is needed means that the

[2] D.04-01-050 at 10-11.
[3] D.04-01-042 at 7.
[4] *Id.* at 7-8.

RAR program design must be consistent with the CAISO's operational needs."[5] In that regard, the Commission stated that "it is pointless to design a regulatory system that encourages investment in order to create capacity unless that capacity is actually available to the grid operator to serve load where it exists."[6]. The Commission also recognized that the RA program should seek to provide reliability at least cost.[7]

To achieve these objectives, the Commission established an RA program whereby LSE forward capacity procurement obligations are based on meeting monthly peak loads, plus reserve margin. Decision D 05-10-042 at 43-51. The qualifying capacity ("QC") counting conventions determine the quantity of a resource's capacity that satisfies the forward commitment obligation. D04-10-035 at 21. As the Commission staff recognized in its 2007 Resource Adequacy ("RA") Report, the QC counting conventions are "intended to reflect the expected capacity value that will be available to the CAISO during periods of system peak demand."[8]

The CAISO submits that the Joint Proposal best promotes the aforementioned fundamental goals of the RA program and the purpose of the QC counting conventions. In contrast, those proposals that seek either to retain the existing counting convention for intermittent resources or otherwise ignore the

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[5] *Id.* at 10.

[6] Elsewhere in D.05-10-042 the Commission noted that "[a]s set forth throughout our decisions on Resource Adequacy, including this one, a key purpose of our RAR is to ensure that resources are made available to the CAISO when and where they are needed." D.05-10-042 at 15.

[7] *Id.* at 8.

[8] See Page 17, section 4.1 of the 2007 RA Report. The 2007 RA Report can be accessed through the following link: http://docs.cpuc.ca.gov/PUBLISHED/REPORT/81717.htm.

availability and dependability (or lack thereof) of these resources during peak load hours conflict with the RA program's foundational goals.

The Commission should not compromise the objectives of the RA program by ignoring that the primary fuel source for wind and solar resources is not only variable, it is significantly unpredictable as well. Simply put, absent storage capability, wind and solar resources cannot contribute to system peak unless the wind is blowing or the sun is shining. This variability requires that sufficient dispatchable capacity be available to compensate for the inevitable fluctuations in the output of intermittent resources. As a result, it is essential to accurately assess the expected output of intermittent resources during peak load conditions to ensure that adequate dispatchable resources are in fact available to provide service if intermittent resources are not producing.

Consistent with the principles enunciated in the Commission's prior RA orders and in the Staff's 2007 RA report, the CAISO believes that there are two essential principles that should guide the selection of the QC methodology for intermittent resources:

- The QCs determined for RA resources should provide the CAISO with a high level of assurance that the RA capacity is actually available to meet peak demand, which is consistent with the primary objective of the RA program. Thus, the methodology for assessing the QC of wind and solar resources should closely align with the expected generation of such resources to serve load during the appropriate peak periods.

- The QC methodology must be scalable to accommodate the expected increase in capacity from wind and solar resources in the years ahead as California seeks to meet its Renewable Portfolio Standard ("RPS"). In other words, the methodology must be capable of adjustment to account for the wide variation in output from these resources and must produce greater confidence in predicting actual production during peak hours (as the quantity of installed capacity from wind resources becomes a more significant proportion of California's overall generating capacity).

The existing methodology for counting intermittent resources does not satisfy these guidelines. In its 2007 RA Report, the Energy Division provided data demonstrating that the current methodology for determining wind resources' QC (using a three-year historical average of hourly production during Standard Offer ("SO1") peak hours overstates the available capacity of these resources during peak demand periods[9]. In particular, the RA Report recognized that wind production was negatively correlated with CAISO system load during summer months.[10] These findings are consistent with the CAISO's operational experience.[11] As California increasingly relies on wind and solar resources to

[9] *See* 2007 RA Report at 23-26.
[10] *Id.* at 23-24.
[11] *See 2008 Summer Loads and Resources Operations Preparedness Assessment* at 10-11 (April 28, 2008) ("2008 Summer Assessment"). The 2008 Summer Assessment is available at the following link: http://www.caiso.com/1fb7/1fb7855eed50.pdf. *See also,* CAISO Presentation re *Achieving California's 20% Renewable Operation Issues,* at 12,16 ("Renewables Integration Presentation") which is available at http://www.caiso.com/1c64/1c64e47b71020.pdf and the *Integration of Renewable Resources Report* (Nov. 2007) at 63-70 which is available at the following link: http://www.caiso.com/1ca5/1ca5a7a026270.pdf Attachment C shows that in most seasons wind generation tends to peak when total system load is low and is at its lowest production levels when system load is high.

meet RPS requirements and energy production needs, it becomes even more critical for purposes of maintaining reliability that the existing QC counting convention for intermittent resources be revised to more accurately reflect a dependable level of ***generation*** that will be available during the peak load hours because intermittent resources cannot be dispatched. The Joint Proposal responds to this need for closer alignment between the QC counting rules, the Commission's RA goals and operational realities.

B. The Joint Proposal

1. Proposed Methodology For Counting Wind And Solar Resources With Three or More Years Operating Data

Set forth below is the specific intermittent resource counting methodology reflected in the Joint Proposal, including the steps in the calculation and the data that must be obtained to implement the methodology.

Performing the analysis requires the following load and generation data:

1. The previous three years of wind generation energy production data (hourly integrated) for each wind resource for each of the six wind areas within California. [12] Each wind resource will be assigned to one of the six wind areas within California.[13]

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[12] The CAISO, SCE and SDG&E have proposed that the CPUC establish the following six wind areas within California for purposes of this proposal:

- San Gorgonio;
- Teha chapi;
- Altamont;
- Solano;
- Pacheco Pass; and
- San Diego.

[13] The wind areas may change over time to the extent wind resources are constructed in areas other than those previously defined.

2. For each wind area and for each wind resource within that wind area, the hourly integrated generation that corresponds to the five peak hours of each day of the month. A set of about 450 data points (5 peak hours * 30 days per month * 3 years of data) will be collected for each wind area and each wind resource within that wind area. The hours for each month shall be:

Jan–Mar, Nov and Dec	HE17-HE21 (4:00 p.m.-9:00 p.m.)
Apr–Oct	HE14-HE18 (1:00 p.m.-6:00 p.m.)

The Joint Proposal is based on establishing an appropriate level of confidence that intermittent RA resources will be generating at (or above) their RA capacity value during the peak demand period through the use of an exceedance methodology. The Joint Proposal also captures the diversity benefit of aggregating multiple intermittent resources in a wind resource area. The diversity benefit is a result of higher output from some wind resources offsetting lower output of other resources in the same wind area. As a result, the QC value for the wind area will generally equal or exceed the sum of the individual wind resource QCs at a given exceedance level. The initial proposal served on January 15, 2009 provided a means to allocate this diversity benefit across individual resources within a wind area. Following the initial filing, the CAISO, SCE and SDG&E worked with the California Energy Commission ("CEC") to refine the calculation procedure to fairly allocate diversity benefits. This procedure is as follows:

Using the data identified above, the following would be determined for each resource and the six wind areas within California:

1. Calculate the exceedance (70-80% as appropriate) QC for each resource in the wind area for each of the three years of the data period. These are referred to as the **initial QCs** for each resource; Save these values.

2. Calculate the exceedance QC for the entire wind area for each year of the data period; these are the **wind area QCs**.

3. Calculate the diversity factor for each wind area for each year of the data period. The diversity factor is the wind area QC divided by the sum of all initial QCs for that month; a value greater than 1 implies a positive diversity benefit. These are the **annual diversity factors** for each wind area. Save these values.

4. Calculate the percentage of nameplate by dividing wind area QC by total nameplate capacity for each year of the data period. These are the **annual wind area % nameplate ratings**. Save these values.

5. Calculate the future NQC for each resource by multiplying each year's **initial QC** (from Step #1) by that year's **annual diversity factor** (from Step #3); this is the **annual calculated QC** for each resource.

6. If there are less than three years of data, estimate the resource's NQC for the missing year(s) by multiplying the resource nameplate capacity by the **annual wind area % nameplate rating** (from Step #4); this is the **annual estimated NQC**.

7. For each resource, average the **annual calculated QCs** and **annual estimated QCs** (if any) together. This average is the **final QC** for each resource that would be used for the following year's RA requirements.

8. QC values are calculated by the CEC and published on the CAISO website.

As a general matter, the Wind Area QC will be greater than the sum of the wind resource QCs within that wind area due to the diversification benefit described in section III.C. The positive delta will be added to each wind resource's Initial QC on a *pro rata* basis. An example of this allocation is provided below:

- For a given exceedance factor, Wind Area A (containing three wind resources) has a Wind Area QC of 75 MW. Each wind resource (at the same exceedance factor) has Initial QCs as follows:

  Wind Resource 1: 30 MW Initial QC

  Wind Resource 2: 20 MW Initial QC

  Wind Resource 3: 10 MW Initial QC

- The positive delta of 15 MW (Wind Area QC minus sum of Wind Resource Initial QCs) is allocated in proportion to each wind resource's Initial QC; 7.5 MW or 50% of the positive delta is added to Wind Resource 1's Initial QC, 5 MW or 33% is added to Wind Resource 2's Initial QC and 2.5 MW or 17% is added to Wind Resource 3's Initial QC.

- The final QC for each wind resource is as follows:

  Wind Resource 1: 37.5 MW final QC

  Wind Resource 2: 25 MW final QC

  Wind Resource 3: 12.5 MW final QC

2. Proposed Revisions To The Methodologies for Counting Wind and Solar Resources with Less than Three Years of Operating Data

a. Wind Resources

The rules for counting wind resources with less than three years of operating history were established under Decision D. 07-06-029, June 21, 2007. These rules provide as follows:

For new units: The average wind production factor of all units within the Transmission Access Charge ("TAC") area where the unit is located will be used. For example, for a new unit, if the average wind unit production as a percent of Net Dependable Capacity ("NDC") in the TAC area during June of year 1 was 23%, year 2 was 22%, and year 3 was 24%, the new unit's QC for June would be 23% of its NDC: (23 + 22 + 24) / 3 = 23%.

For units with some operating experience, but less than 2 years of data: The average wind production factor of all units within the TAC area where the unit is located will be used in place of the missing data in the 3 year formula. For example, if the average wind unit production in the TAC area as a percent of NDC

during June of year 1 was 23%, year 2 was 22%, and year 3 was 24%, and the new unit production for June was 21% of NDC for year 3, the unit's QC for June would be 22% of its NDC: (23 + 22 + 21) / 3 = 22%.

For units with at least 2 years of operating experience, but less than 3 years of data: The unit's actual operating experience will be used. In some months, the QC value will be based on 2 years of data rather than 3 years of data (as established in the counting convention).

The CAISO, SCE and SDG&E have proposed that the current RA provisions for wind units with less than three years of operating data (copied below in section C.1.a.), be changed as follows:

- Use a wind production factor calculated on a wind area basis as described in this proposal, instead of using the wind production factor of all wind units within the TAC area; and
- Determine the production factor using the exceedance approach described above for resources with three years of operating data, instead of using the average wind production factor of all units within the area where the unit is located.

Specifically, for new wind resources without three years of operating data, the QC value would be determined using "proxy" data derived on a wind area basis for the years for which actual operating data is not available. Thus, until

the particular resource has three years of historic production data, the amount of capacity that a new wind resource can be counted for RA purposes would be determined by using the Wind Area QC (the calculation of which is described above in the proposal for how to treat resources with three years of operating data) of the particular wind area in which the resource is located to "fill in" the missing years of data.

The "missing data" for a particular year for a new resource would be derived as follows. Note that a Wind Area QC value will be determined each year by the CEC and CPUC. The nameplate MW of a new resource that does not have three years of operating data would be multiplied by the following factor:

$$\text{Factor} = \frac{\text{Wind Area QC in MW}}{\text{Sum of Nameplate MW of All Wind Resources in Wind Area}}$$

Example:
Nameplate MW of all RA resources in Wind Area A = 1000 MW
CEC calculated Wind Area QC MW value = 100 MW
Factor = 100 MW/1000 MW = 10.0%
QC value for this year for a 150 MW new resource is 150 MW x 0.100 = 15 MW

b. Solar Resources

The CAISO, SCE and SDG&E have proposed that the exceedance methodology described above for use with wind resources also apply to solar resources with less than three years of operating data. However, the CAISO notes that there are two significantly different categories of technology in the solar resources. First, "photovoltaic" technologies typically receive the solar radiation and directly convert this to electricity. This approach is highly responsive to sunlight and therefore can have rapid and significant fluctuations

with broken cloud cover. Second, the thermal solar technologies receive solar radiation to heat an intermediate substance before producing electricity through a thermal conversion such as a steam turbine connected to an electric generator. This technology is able to maintain more stable electric output and is less susceptible to cloud cover changes. Thus, the CAISO supports dividing solar resources into two categories -- "thermal solar" and "photovoltaic" -- because they are sufficiently different technologies.

The CAISO has not recommended using the wind area for determining the proxy value to use in the years where there is no actual data, but instead recommend that the proxy be calculated using an exceedance methodology focused on the production of all solar units within each technology category within the TAC area where the solar unit is located. The CAISO proposes that this approach be used as the starting point for a methodology that would be in effect starting in 2010. However, the CAISO recognizes that as more solar resources come on line over the next few years the methodology may need to be revisited. The TAC area is a sufficiently vast geographic area that it will capture a reasonable amount of solar resources to serve as "proxy" resources for the QC determination. At this time, given the limited number of solar resources that have come on line, there is no option comparable to a "wind area" in which like solar resources can be grouped.

C. Basis For The Joint Proposal

1. The Appropriate Hours To Be Used For Counting Purposes

The Joint Proposal focuses on establishing an appropriate level of confidence that intermittent RA resources will be generating at (or above) their RA capacity value during the peak demand period. To achieve this level of confidence, the Joint Proposal uses a probability-based approach, referred to as an exceedance method, to calculate the QC value and thus set a level of confidence that the expected output will be achieved. The proposed methodology takes the historical output for each intermittent resource during a specified group of five hours within each day during that month. The specified group of five load hours is established based on historical load data to ensure that the peak load hour always falls within a five-hour range appropriate for the particular month during which the QC is being calculated. The specified hours correspond to the times when the CAISO has historically experienced the system coincident peak demand during each of the months. Consistent with the current counting methodology, the Joint Proposal uses a three-year average of data to create each resource's monthly QC value. Compared to the current counting rule, this approach will more accurately reflect the production of intermittent resources throughout the year during the different peak load periods each month.

In its January 15, 2008 Proposal, CalWEA noted its objection to the CAISO's use of the 30 peak hours during the month as a parameter in its

exceedance methodology proposed in Phase 1. CalWEA Proposal at 10. That parameter has been modified in the Joint Proposal. In that regard, the Joint Proposal uses the five peak hours of every day of the month. In other words, the Joint Proposal looks at five-times the number of hours that the CAISO's Phase 1 proposal considered. Accordingly, it provides a significantly greater sample -- both in terms of the number of hours and the number of days considered -- for purposes of evaluating the performance of wind resources.

The CAISO notes that the 2007 RA Report indicated that the current NQC counting rules use only SO1 peak hours, effectively ignoring the performance of wind resources on weekends and NERC holidays. Energy Division Staff stated that there was no reason to expect different behavior of the wind itself on different days. 2007 RA Report at 27. The Joint Proposal addresses this issue by assessing wind production during every day of the month.

2. Use Of An Exceedance Methodology Is Appropriate Given The Extreme Variation In Wind Production

Two fundamental approaches for determining the QC of wind and solar resources were discussed during Phase 1 of this proceeding: (1) a strict averaging methodology; or (2) an exceedance factor methodology. An averaging methodology takes the average of historical wind production during a given set of hours (*e.g.*, peak load hours). An exceedance approach uses historical production over a given number of hours (*e.g.*, peak load hours) to determine the minimum amount of capacity a unit generated during those hours (*e.g.*, a 30 MW nameplate generator produced at least 4 MW for 80% of the peak load hours).

The CAISO believes that the use of a strict averaging methodology (*e.g.*, determining QC based on the average output of resources during select hours over a three-year time period) -- even if it uses only peak generation output -- fails to adequately capture the extremely large variances (both positive and negative) between the average historical output and actual output on any given day during peak periods when capacity is most needed to serve load and support reliable grid operations.[14] That extreme variability can have a significant adverse impact on system operations and reliability, particularly during peak load periods.[15] In that regard, the high variability of generation output from wind resources can produce average values that are considerably higher than actual production.[16]

In contrast, the exceedance factor approach explicitly accounts for such variances, thereby resulting in a QC that is more closely correlated to the

[14] *See, e.g.*, 2007 RA Report, at 20 (Figure 3), comparing actual output to the QC of wind resources under the current averaging methodology. As the RA Report observes, "it is evident that daily production deviates broadly, in both directions, from the established QC." *Id.* at 20. *See also,* RA Report at 21-23 for further discussion regarding the variability of wind production. Similarly, in the 2008 Summer Assessment, the CAISO noted that "wind energy production is extremely variable, and in California, it often produces its highest energy output when the demand for power is at a low point. During some period of the year, wind generation is hard to forecast because it does not follow a predictable day-to-day production patter, 2008 Summer Assessment at 10-11. Likewise, the CAISO's *Integration of Renewable Resources Report* recognizes that "w]ind generation output varies significantly during the course of any given day, and there is no predictable day-to-day generation pattern." *Integration of Renewable Resources Report* at 57. The report shows an example of the significant variation in hourly wind generation from 2006. *Integration of renewable Resources Report* at 64. *See also, Renewable Integration Presentation at 17* for an example of the volatility of wind production compared to average production.

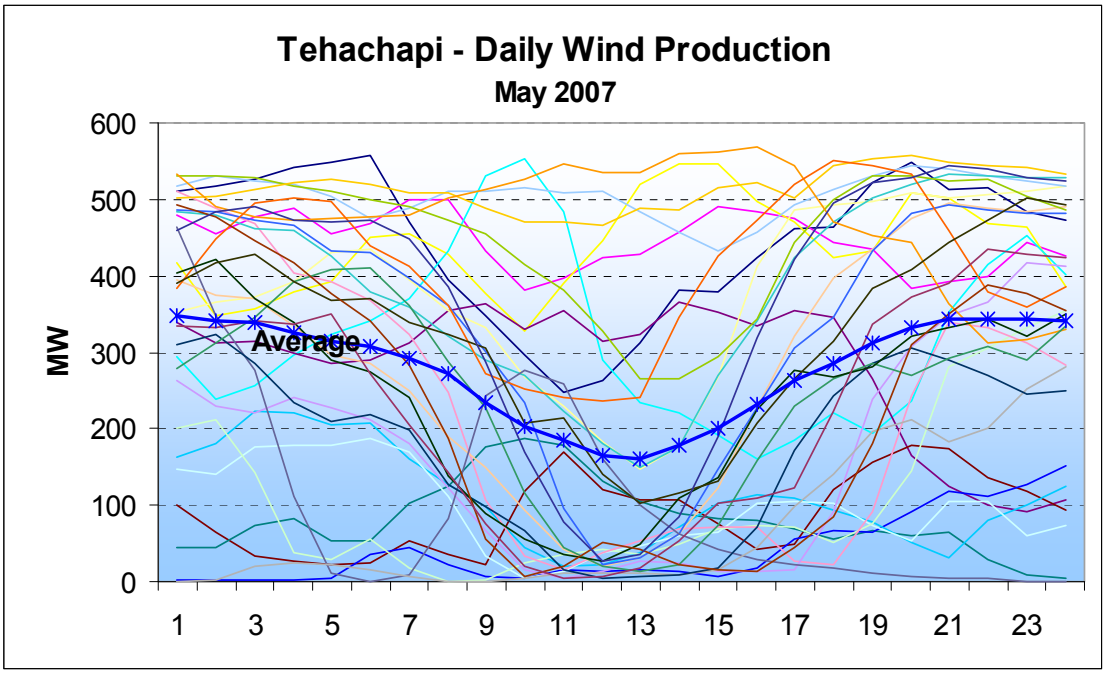
[15] *See Integration of renewable Resources Report* at 57-87 for a discussion of the operational issues that the CAISO faces in integrating renewable resources, including issues resulting from the variability in wind production.

[16] For example: wind resources in the San Gorgonio region reflected outputs over a three-year period from 2005 to 2007of 4.9%, 2.4% and 40.4% of nameplate capacity, respectively. The three-year average would result in a QC value of 15.9%. Use of this average number as the QC number would result in an over forecast of the actual output by more than 300% for two of three years (15.9% compared to the actual output of 4.9% and 2.4%).

expected output of intermittent resources during peak periods. Indeed, the exceedance factor approach increases the likelihood that the actual output of intermittent resources during peak hours will meet their QC consistent with the adopted exceedance level (*e.g.*, 80% of the time). Although solar resources may not experience the same magnitude of variances as wind, the use of an exceedance factor approach is equally applicable to solar resources for purposes of determining a QC value for solar resources.

For these reasons, the CAISO recommends that an exceedance methodology be implemented to determine the QC for wind and solar resources. The selection of the exceedance level must be consistent with the RA program's goal of ensuring that resources will be available when needed during peak demand. Accordingly, the Joint Proposal recommends an 80% exceedance factor as an ultimate goal. This is generally the same level used for hydroelectric power generation resources, whose QC counting rule equates to the expectation that the resource will meet its RA capacity for the given month in four out of five years. For the intermittent resources that are the subject of the Joint Proposal, the 80% exceedance factor equates to the expectation that the given resource will meet or exceed its RA capacity in four out of the five peak load hours. Given the historic importance of hydro resources to meeting reliability standards, and anticipating that intermittent resources will displace conventional resources in the delivery of energy, there is no reason why intermittent reasons should be treated in a dissimilar manner.

Although the Joint Proposal supports an ultimate exceedance value of 80%, the CAISO recognizes that the Commission may desire to adopt a phase-in approach to reach this exceedance level. As such, the CAISO suggests increasing the exceedance factor over time to facilitate the transition from the current QC values for wind and solar generation as wind and solar resources become a larger portion of the RA resource fleet. The CAISO believes that the initial exceedance level should be set at 70%. Adopting an initial exceedance level lower than 70% is contradictory to the RA program's goals and ignores the inherent variability of intermittent resource output. Simply put, given the extreme daily variability observed from wind resources, it is critical to reliable system operations that there be a high probability that the intermittent resource will be able to produce when the system is under peak stress conditions. An example of this daily volatility is set forth in the following graph.



Although the 70% exceedance level has some degree of arbitrariness, going below that level explicitly accepts that the likelihood the capacity will not appear will be nearly as great as the likelihood the capacity will appear. From a systems reliability perspective, this level of risk is untenable. [17] A 70% exceedance level also recognizes that some transition to an 80% exceedance might be appropriate.[18] However, the CAISO submits that, in order to support reliable grid operations, the 80% exceedance value should be in effect by the time that wind and solar resources reach twice their current level of approximately 3,000 MW.

The CAISO further recommends that the exceedance value be established ahead of the actual year that the MW threshold is reached (based on the forecast date that such amount of resources are expected to come online) so that there is no wait for the actual MW to materialize and a year lag in catching up to that level of MW exposure. The Commission must bear in mind that under the current RA counting rules for wind and solar resources -- with only about 3,000 MW of these resources currently online -- the risk exposure of being wrong on the counting methodology is only in the magnitude of several hundred MW (about the size of one generating plant). However, with approximately 7,000 MW of wind and solar resources expected to be online in the near future -- *more*

[17] The *Integration of Renewable Resources Report* (pages 57-88) shows the numerous operational challenges that the CAISO will face as the result of increasing the fleet of renewable resources. Not having counting rules that reflect the dependable level of generation that can reasonably be expected to be available will only magnify exacerbate those challenges.

[18] In the CAISO's opinion, an exceedance level as low as 50% is not sufficient to support the goals of the RA program or the CAISO's system reliability needs. A 50% exceedance factor is like "flipping a coin." Clearly, a higher standard is required for purposes of maintaining reliability, especially given the significant variation in production from wind resources that occur on a daily basis.

than double the current level -- the risk exposure grows significantly, and could result shortfalls equivalent to several generating plants if the counting methodology continues to be inaccurate. Thus, it is imperative for the Commission to implement more accurate counting rules for intermittent resources.

For the reasons discussed above, the CAISO submits that ultimate use of an 80% exceedance level is fair and reasonable and will promote reliability. Use of any lower exceedance level will simply increase the likelihood that intermittent resources counted for RA purposes will not be available during peak load periods a large percentage of the time. The CAISO notes that Dynegy has proposed a 96% exceedance factor. The Energy Division staff has presented an exceedance methodology using, 70%, 80% and 90% exceedance values. The CAISO submits that an 80% exceedance level is both fair and reasonable under these circumstances.

3. Use Of The Diversification Benefit Included In The Joint Proposal Is Appropriate

For wind areas that contain multiple wind resources with separate CAISO resource IDs, the Joint Proposal proposes that a diversification benefit be applied to each wind resource's QC. The diversification benefit is a result of multiple wind resources offsetting the generation variability of a single resource so that the QC value for the wind area is likely to equal or exceed the sum of individual wind resource QCs at a given exceedance level. Capturing this benefit is reasonable because the CAISO will receive energy from all wind resources within

a wind area simultaneously without constraints. However, due to constraints across various congestion paths with the CAISO Balancing Authority Area, the CAISO does not recommend extending diversification benefits across multiple wind areas.[19] Section III.B. above illustrates the calculation and application of the diversification benefit.

In its January 15, 2008 Proposal, CalWEA noted an objection to the CAISO's exceedance methodology in Phase 1 which was based solely on the performance of individual units because such an approach fails to reflect the geographic diversity of wind resources and the aggregate output of intermittent generators. CalWEA Proposal . at 10. As discussed above, the Joint Proposal has addressed this issue by including a diversity feature. Specifically, the Joint Proposal provides a diversification benefit by permitting the aggregation of all intermittent resources a wind resource area. As a result the QC value for the wind area will equal or exceed the sum of the individual wind resource QCs at a given exceedance level.

The CAISO recognizes that CalWEA would like to go a step further and aggregate the production of all wind resources in all wind areas.[20] However, the CAISO does not recommend an approach that extends diversification benefits across all of the wind areas because there are constraints across various congestion paths within the CAISO Controlled Grid. The underlying objective of Resource Adequacy is to ensure that sufficient resources are available when and

[19] The proposed wind areas are described in section III.B..

[20] Also, the proposal submitted by the Energy Division Staff would calculate an exceedance level of production for each class of intermittent resources based on all of the resources of the class as a group.

where needed to reliably operate the transmission system and serve load. To realize this fundamental goal, the resources relied upon must be “deliverable” to load during peak Demand conditions. Because wind resources from all wind regions may not be fully deliverable to load at their aggregated levels, it is inappropriate to aggregate all wind resources from all wind regions for purposes of counting wind resource QCs.

Thus, the Joint Proposal incorporates modifications from the CAISO’s Phase 1 proposal which address -- and accommodate to the extent feasible -- the diversification issues raised by CalWEA and the Energy Division Staff, while ensuring that only capacity levels that are truly deliverable will be counted. Limiting the diversification benefit to individual wind resource areas meets this goal and will ensure that reliability needs are not jeopardized because the counting rules count capacity that not deliverable during peak periods and, hence, cannot be used to meet customer demand. Under these circumstances, the Joint Proposal constitutes a reasonable “middle ground.” The Commission should not adopt any diversity benefit methodology that aggregates resources beyond a TAC Area level.

D. Compared To The Other Proposals That Have Been Submitted, The Joint Proposal Best Supports The Commission’s RA Goals

The CAISO believes that the Joint Proposal is the most appropriate methodology to count intermittent resources because it is aligned with the Commission’s RA goals and the CAISO’s reliability needs. The Joint Proposal provides a high degree of confidence that intermittent RA resources can be relied

upon during peak load hours and minimizes the likelihood that the CAISO will have to make "duplicative" payments for backstop capacity to compensate for the unavailability of intermittent RA capacity. Equally important, the Joint Proposal incorporates some modifications to the CAISO's Phase I proposal that address concerns raised by CalWEA and Energy Division Staff. In summary, the CAISO submits that the Joint Proposal fairly and more reasonably values the capacity of intermittent resources than the other proposals that have been submitted in Phase 2. Below, the CAISO submits its comments on the intermittent resource counting proposals submitted by other parties.

1. CalWEA's Proposal

In its proposal circulated to the parties on January 15, 2009, CalWEA suggests that the purpose of the RA program is to "provide reliable service at least cost." CalWEA Proposal at 2. CalWEA also states that the focus of the program is enhancing system reliability not "the narrower goal of serving demand during the monthly system peak hour."[21] *Id.* CalWEA argues that providing capacity during the system peak hour is one aspect of reliability but does not fully measure a resource's contribution to reliability because there is a significant risk of failing to meet load in many hours not just the peak hour.[22] *Id.* Accordingly,

[21] In response to CalWEA, the CAISO notes that the Joint Proposal does not simply address "the narrower goal of serving demand during the monthly system peak hour." The Joint Proposal looks at performance during the five hours on and around peak for every day of the month Thus, the Joint Proposal essentially measures contributions to reliability for 150 hours a month. These are the hours when demand on the system usually is greatest and the CAISO needs resources to be available to meet load and maintain reliable grid operations. In any event, the Joint Proposal measures reliability in more hours than just the peak hour each month.

[22] An RA program based on monthly system peaks should, by definition, ensure that reliability needs are satisfied in hours other than the peak. However, an RA program that counts resources based on their performance during non-peak hours creates the very real risk that there will be insufficient resources available to serve load during peak hours. This is the result that the Joint Proposal seeks to avoid. On the other hand, any counting proposal that fails to emphasize

CalWEA supports retention of the existing counting methodology for intermittent resources. *Id.* at 1.

As discussed herein, the existing counting methodology significantly overstates the availability of wind resources during peak load periods. As such, it does not support the Commission's reliability goals or meet the CAISO's reliability needs. Further, because the existing methodology over-counts wind, when peak load conditions occur and RA wind resources are not available, the CAISO will be forced to go out and procure backstop capacity. That will increase costs to ratepayers, thereby subverting the Commission's goal of ensuring Resource Adequacy at least cost.

It appears that CalWEA is seeking to re-define the fundamental goal of the RA program so that wind can be counted when it is available in non-peak hours. However, as discussed above, that is not the purpose of the RA program, nor should it be. Rather, the Commission has sought to ensure that generation capacity "is available to the grid at the times and at the locations it is needed" and that this "sufficient generation should be available under peak demand conditions even when there are expected outages." [23] D.04-01-042 at 7-8.

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the performance of resources during peak periods creates the risk the RA program will fail to meet its objective. CalWEA does not clarify how the peak load objective can be met if a resource is unable to produce power during peak load conditions.

[23] CalWEA states that in D04-10-35 the Commission clarified that the intent of the RA obligation is not limited to serving the peak hour, but rather the set of hours whose demands are within 10% of the monthly peak. CalWEA Proposal at 2. The Joint Proposal is consistent with that proposal because it looks at more hours than just the peak hour. As indicated above, the Joint Proposal looks at production during hours 1:00 p.m to 6:00 p.m. during the months April-October and hours 4:00 p.m. to 9:00 p.m. during the months November through March. Indeed, the Joint Proposal is much more favorable to wind resources in this respect than the existing counting methodology that looks at hours 12:00 p.m. to 6:00 p.m. during the summer months. The existing methodology is more likely to count wind resource production during hours when such production is at or near its lowest level (noon to 1:00 p.m.). *See* RA Report at 23; *Renewables Integration Presentation* at 14. Likewise, using the hours 4:00-9:00 p.m. during the

Compared to the existing counting methodology for wind resources, the Joint Proposal does a better job of assessing, with increased confidence, whether such resources are available when and where needed and, in particular, available to serve load during peak conditions.

As discussed above, wind resources generally are more available to serve load during non-peak hours. However, these are typically times when supply exceeds demand. The RA program goal appropriately recognizes that the problem is during peak load conditions when demand is high and there is less likelihood of surplus available capacity. It is during these peak periods that RA capacity is most needed to meet high demand and maintain reliability. If wind resources are allowed to count for RA even though they are less available during peak periods than assumed, there is an increased risk that there could be a deficiency in available capacity. Stated differently, if the counting rules overestimate the expected output of wind resources during peak load conditions, there is a risk that LSE procurement of RA capacity may not be sufficient to meet peak load. The CAISO acknowledges that there are QC methodologies that can recognize the contribution of all resources (not just intermittent resources) to reliability during non-peak conditions. However, the RA program is designed around meeting peak load conditions and, thus, a methodology that accounts for

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non-summer months should capture more wind production than using the hours of 12:00-6:00 p.m. as is currently done.

contributions during non-peal load conditions is fundamentally inconsistent with the RA Program.[24]

The CAISO is extremely concerned that the current NQC counting rules overstate the availability of wind resources. Indeed, the 2007 RA Report and the CAISO's operational experience shows that wind resource production during peak periods is significantly below NQC, and wind production is negatively correlated with CAISO system load (and prices) during the summer months. Because the current intermittent QC counting convention fails to accurately reflect the fact that wind resources generally are not available during times of high demand and low reserve margins, it fails to satisfy the "reliability" prong of CalWEA's own "reliability at least cost" principle. The Commission, the CAISO, and Load Serving Entities need to be confident that intermittent resources will be available during peak demand conditions to reliably serve customer needs. The existing intermittent resource counting methodology does not support achievement of this objective.

Further, contrary to CalWEA's claims, retention of the current counting rules does not support the "least cost" prong of CalWEA's stated "reliability at least cost" goal.

CalWEA argues that if the CPUC changes the counting rules and reduces the NQC of intermittent resources, 2,000-2,500 MW of new generation resources will need to be built to offset the reduced capacity of wind resources that count for RA purposes, and that will increase costs to ratepayers in a magnitude of

[24] For example, the following elements of the RA program are tied to peak load conditions: Local RA studies, deliverability, QC for thermal resources, import capacity, load forecasts, Path 26 counting rule, and transmission system availability.

$2.0 to $3.75 billion. CalWEA's basic argument is not sustainable, and it is based on faulty factual assumptions that inappropriately inflate the projected cost impacts of changing the wind counting convention.

CalWEA's argument that the mere adoption of a counting convention that reduces the QC of wind resources will require the construction of new thermal generation is a red-herring. There already exists a surplus of capacity that is not RA. In that regard, the CAISO's 2008 Summer Assessment showed a 23.9% planning reserve margin (the RA program provides for a 15% reserve margin) based on a 1-in-2 demand.[25] Thus, to the extent wind resources will count less than they do today as the result of adoption of a new, more realistic counting convention, any current and very near-term future difference can more than be made up simply by procuring existing resources and through Demand Response. There would not be any need to build the significant amounts of new thermal generation as CalWEA contends. CalWEA also ignores the fact that new or repowered thermal resources will likely need to be built anyway due to once-through-cooling mandates and to ensure the effective integration of the significant quantity of renewable resources that are expected to be connected to the grid in order to meet RPS goals in excess of 20%. As the CAISO concludes in the *Renewables Integration Report* (page 61), as a result of the expected increase in wind resources on the CAISO Controlled Grid, there will need to be changes in the RA program to (1) require more generation with faster and more durable ramping capabilities that will be required to meet future ramp requirements, and (2) require additional quick start units that will be required to

[25] *2008 Summer Assessment* at 3.

accommodate Hour-Ahead forecast errors and intra-hour wind variations. The need for these additional generation resources with fast start and fast ramping capability arise from the variability associated with more wind resources interconnecting to the grid in the future, not from changes in intermittent resource counting conventions, as CalWEA contends. Thus, at least a significant portion of the need for additional resources will arise regardless of the adoption of any refinement in the RA counting rules, but instead from the use of other conventional resources in the delivery of energy to serve demand.

Moreover, any counting rule that results in an "over-counting" of intermittent resources and does not accurately reflect their relative unavailability during peak load periods will likely result in increased costs to ratepayers (which would offset any purported increase in RA capacity costs). In that regard, under MRTU, when intermittent RA resources are not available (or expected to be available) to serve load, the CAISO will need to procure additional capacity either through the Residual Unit Commitment Mechanism ("RUC"), the Interim Capacity Procurement Mechanism ("ICPM") or through Exceptional Dispatch. The CAISO runs RUC to ensure that sufficient capacity is committed, on-line and available for dispatch in Real-Time to meet the CAISO's forecast for each trading hour of the operating day. Under the RUC mechanism, if scheduled deliveries of intermittent resources differ from the CAISO forecasted deliveries from such resources, the CAISO can adjust the forecasted Demand either up or down. *See* MRTU Tariff Section 31.5.3.4, As a result, if expected deliveries from intermittent resources are less than what is scheduled, the CAISO will procure additional

capacity through RUC. In other words, if the CAISO's objective third-party forecast indicates that scheduled wind resources will not be available to meet next-day load conditions, the CAISO will have to procure additional capacity via RUC. Capacity that the CAISO obtains through RUC must be paid a daily capacity payment.

Similarly, if capacity from scheduled wind resources is not sufficient or available in real-time to serve load, the CAISO could be forced to manually commit or dispatch non-RA (or partial-RA) units via the Exceptional Dispatch mechanism in order to meet these loads or otherwise maintain grid reliability. . *See* MRTU Tariff Section 34.9.1. FERC has preliminarily concluded that if the CAISO Exceptionally Dispatches a non-RA unit (or a partial RA unit) a single time, the CAISO should be required to provide a monthly capacity payment for the non-RA capacity of the unit.[26] Under MRTU, the CAISO also has the ability to procure backstop capacity pursuant to the ICPM. In particular, the CAISO can procure ICPM capacity to respond to a Significant Event which is an event that either results in a material difference from what was assumed in the RA program for purposes of determining RA capacity requirements and which produces a material change in system operations or causes or threatens to cause a failure to meet Applicable Reliability Criteria absent the use of non-RA resources. Thus, if wind resources are not available during peak load periods at levels assumed under the RA program and the CAISO needs to rely on non-RA units to serve load, the CAISO may have to procure backstop capacity pursuant to the ICPM.

[26] *California Independent System Operator Corporation,* 125 FERC ¶ 61,055 at P 107 (2008). A final FERC decision on the pricing of Exceptional Dispatches has not been issued yet.

This would result in a minimum one-month designation of non-RA capacity and a minimum one-month capacity payment.

Thus, if RA wind capacity is not available to meet peak loads and the CAISO is forced to commit non-RA resources, not only will ratepayers have to bear the costs of the monthly capacity payments to the unavailable wind resources, they will also have to bear the capacity payments made to non-RA units that the CAISO had to commit in order to serve load or otherwise maintain grid reliability. This will essentially result in "duplicative" capacity having to be procured and "duplicative" capacity payments being paid because the capacity of wind resources was "over-counted," and such capacity was not available when and where needed. These potential cost impacts on ratepayers can be mitigated only by more accurately counting the capacity of intermittent resources tying their QCs more closely to expected peak period performance. In any event, this demonstrates that a methodology that does not accurately count the value of wind resources during peak load conditions does not satisfy the second prong of the "reliability at least cost" principle." In summary, the proposal to retain the existing counting convention for intermittent resources does not support reliability and will not be least cost.

Even assuming arguendo that CalWEA's basic premise is correct -- which it is not for the reasons discussed above -- CalWEA makes several faulty factual assumptions which have the effect of inappropriately inflating the projected cost impacts of changing the wind counting convention.

First, CalWEA assumes that the installed wind capacity today on the CAISO grid is "about 2,000 MW." That number is significantly understated. The CAISO's 2008 Summer Assessment (April 28, 2008 shows 2,751 MW of installed wind capacity located within the CAISO Controlled Grid.

Second, CalWEA assumes that "installed wind capacity in California may grow to perhaps 10,000 MW in the next five years." CalWEA Comments at 13. CalWEA did not offer a basis for its conclusion. This likely reflects an overly optimistic estimate that lacks reasonable foundation. The CEC estimated that California would require an installed capacity of wind resources totaling 7,741 MW to achieve the State's 20% RPS mandate and 12,667 MW to achieve a future 33% RPS mandate.[27] The CEC further assumed only 1,411 MW of concentrated solar for the 20% RPS scenario and 3,115 MW for the 33% scenario. In reality, or, at least based on the outcome of the Commission-approved IOU RPS contracts, the relative percentage of concentrated solar will be much greater and the percentage of installed in-state wind capacity will be lower for the 20% RPS scenario.[28] There is no reasonable basis to conclude – as CalWEA does -- that the CEC's estimate of wind resource capacity assumed for the 20% RPS level will be built in the near term and, in contrast, it is quite likely that the CEC's estimate will prove too high.

Third, CalWEA appears to assume that any alternative counting methodology will count wind resources as having zero capacity value for RA purposes, and that all RA wind capacity will need to be replaced by other new

[27] CEC Intermittency Analysis Report.

[28] If out-of-state wind resources are able to be coupled with shaping services, the RA resource will be counted as any other import, not as an intermittent resource.

resources. These are patently erroneous assumptions. As discussed above, there is no basis , for CalWEA's claim that changes to the existing counting methodology will require that new resources be built. Further, as reflected in the *Supplemental Information To Joint Proposal* submitted by the CAISO, SCE and SDG&E on January 15, 2009 ("Supplemental Filing"), under the Joint Proposal, wind resources will have a positive annual capacity value; that annual capacity value will not be zero. CalWEA also appears to erroneously state that wind resources currently count for approximately 20-25% of nameplate annually. That is incorrect. Under the current counting rule, wind resources have counted within this percentage of name plate for approximately one quarter of the year.

Fourth, CalWEA assumes that replacement capacity will cost between $1,000 and $1,500 per KW. CalWEA's estimate overstates the expected cost of replacement capacity. The CEC Study (p. 41) shows that the cost of a new simple cycle units is $1,000 per KW, and the cost of other dispatchable resources that are likely to be constructed, such as new conventional combined cycle units, is only $844/KW. Also, CalWEA's reliance on the cost of SCE peakers is inapt. These peakers were constructed under exigent and expedited circumstances, and that resulted in higher costs than reflected in the CEC study. The CAISO submits that the comprehensive CEC study -- which evaluated the costs of a large number of new units -- provides a more reasonable gauge regarding the price of new capacity than the single example of the SCE peakers.

Thus, CalWEA's use of an existing installed wind capacity quantity that is too low, a future wind capacity quantity that is unreasonably high, and

counting rule assumptions that are incorrect means that CalWEA's projected need for new generation resources and the expected costs to be incurred are significantly and unjustifiably overstated. In any event, the mere modification of the existing counting rules for intermittent resources will not require new thermal generation to be built.

2. DRA's Proposal

DRA proposes an Effective Load Carrying Capability ("ELCC") method for determination of the net qualifying capacity ("NQC") of intermittent resources. The CAISO believes this method is not sufficiently developed and does not contain the appropriate assumptions to be applied for purposes of counting intermittent resources at this time. Specifically:

(1) ELCC measures capacity contribution across all hours of the year and thus considers, to some extent, generation during off-peak hours. This feature is at odds with the intent of the RA program;

(2) ELCC is a complex methodology that relies on numerous subjective assumptions and modeling decisions; and

(3) Because of this complexity and subjectivity, many aspects of the ELCC model will likely be contentious and continually vetted by stakeholders, resulting in a highly burdensome administrative process.

The CAISO discusses each of these points in greater detail below.

a. ELCC is more appropriately used as a measure of capacity value than as a measure of intermittent resource reliability during peak hours.

While the ELCC method may be a useful as a method for valuing capacity generically , it is not inherently appropriate for measuring the value of intermittent resources for RA purposes. The ELCC method measures the effective load carrying capability of a resource for all hours of the year. By definition, this method attributes capacity value to a resource regardless of the specific hours it is needed. While appropriately valuing an intermittent resource (*i.e*., wind) during off-peak periods when it contributes the most, the ELCC method potentially could overstate the reliability value of an intermittent resource during peak periods. As indicated above, such a result is inconsistent with the goals of the RA program.

DRA's proposal erroneously assumes that ELCC is an accepted method for the valuation of reliability when, in fact, it is not clear what the relationship of the resulting ELCC value is to reliability during peak periods. As described in DRA's proposal, the ELCC of an intermittent resource is the capacity value that an equivalent "perfect" resource would provide to the system on a year round hourly basis. It is not clear that the ELCC directly translates this into the capacity that the Commission, LSEs and the CAISO can depend upon during peak hours when the system is most vulnerable to service interruptions.

DRA's proposal is vague in its description of reliability and misses the focus of this RA proceeding. In their workshop handout, DRA states that the

"NQC goal is finding the contribution to system reliability…" DRA's definition avoids expressing reliability in terms of a resource's contribution to serving peak loads, be available "when and where needed" and meeting the CAISO's operational needs during stressed conditions. The issue of intermittent resource counting is being addressed in this proceeding, in part, because the 2007 RA Report exposed the fact that intermittent resources are not contributing the amount of capacity during system peak that is implied by their current NQC values. DRA does not address whether an intermittent resource's contribution to reliability occurs during on-peak hours when the system is most vulnerable or during off-peak hours when there is typically excess capacity to meet load.

b. ELCC is a complex methodology prone to subjectivity in input assumptions and results.

The measurement of ELCC typically requires sophisticated modeling to produce a credible result. This entails accurate modeling of all generation resources in the subject service area, including associated forced and scheduled outage rates and accurate generation profiles for all resources. In Attachment "A", the DRA correctly points out that "This [ELCC] is already computed in power production models, such as the GE Mars program being used in the Planning Reserve Margin proceeding (R.08-04-012)". However, DRA fails to mention that the Planning Reserve Margin proceeding has already taken a year thus far, and the input assumptions and results are still being disputed by multiple parties.

In anticipation of this argument, DRA offers an abbreviated approach, the Garver approximation. While this approach appears to reduce the level of

complexity, it is vague and underdeveloped. The proposal requires a “leap of faith” to accept the derivation of the Garver constant, its input assumptions, and other associated variables in the formula. The use of a Garver approximation seems like a “black box” approach that does not instill confidence in the result. The brevity of DRA’s proposal -- in the face of the fact that an ELCC is an extremely complex undertaking -- raises concern and begs for further development before it can be considered. The Commission should not be “rolling the dice” when reliability matters are at stake, especially as the quantity of intermittent resources on the system will be significantly increasing.

The Joint Proposal offers a simple, understandable, objective approach that can be implemented immediately. It supports reliability and will not impose unnecessary increased costs on ratepayers. DRA’s brief, vague and complex proposal would need to be fully vetted through the workshop (or similar) process before commencing any time consuming study.

c. DRA’s proposal is administratively burdensome.

DRA has not undertaken an ELCC study and has not specified in their proposal who would conduct such a study if their method were adopted. The ELCC method requires a level of modeling expertise that is not readily available. The development of input assumptions -- and obtaining the acceptance of these assumptions (which is a controversial issue) -- alone would be time-consuming.

Although the DRA has proposed an abbreviated version of the ELCC approach, a high level of rigor is still required to achieve acceptable results. For example, the derivation of one variable in the Garver Approximation formula, the

constant “m”, is explained by the DRA in Appendix 3: “This constant can be found by inspection of figures 2.1 through 2.7 in the California Renewable Portfolio Standard Renewable Energy Integration Cost Analysis.” It is not clear whether the DRA method requires an update to this Cost Analysis in order to produce an applicable “m” constant for RA counting purposes.

Given the reliability concerns and the potential adverse cost impacts associated with continued use of the existing counting rule, the CAISO submits that the most prudent course at this time is to approve the Joint Proposal. To the extent the Commission desires to consider evaluating the merits of an ELCC approach, it should be done in a future RA proceeding with proper and full vetting.

3. PG&E’s Proposal

PG&E has submitted a proposal, but that proposal has not been fully fleshed out. It essentially adopts a mean averaging approach, which is inappropriate for the reasons discussed in Section III.C.2.. Any averaging approach for wind resources will overstate actual output approximately 50% of the time or, significantly worse, if the median value is less than the mean value. That is inappropriate from a reliability perspective.

The PG&E proposal is also based on insufficient data. For each resource, PG&E’s proposal averages output during the top 10 hours of each month over a three year period, resulting in a data set of only about 30 values. This data deficiency results in potentially erratic and misleading capacity values that can readily be observed if plotted. Not only can the results run counter to real,

observed generation patterns (for example, seasonality effects), they can change significantly and unpredictably each year if the incoming data set from the most recent year differs substantially from the data set being replace for a given month.

On the other hand, the Joint Proposal assesses wind production across five hours for every day of the month, resulting in a data set of approximately 450 values for each month for each resource over a three year period.

4. Energy Division Staff Proposal

With respect to the proposal submitted by the Energy Division Staff, the CAISO notes that the Joint Proposal incorporates a diversity feature which is one of the elements that Staff has sought to include. As discussed above, the CAISO does not believe that applying the diversity benefit at a state-wide level is appropriate. The Joint Proposal also address the issue raised in the 2007 RA Report regarding the appropriate days to be considered in assessing intermittent resource production.

IV. QUALIFYING CAPACITY COUNTING RULE FOR QUALIFYING FACITLIES

A. Backgrou nd

During Phase 1 of the RA proceeding, the CAISO and PG&E agreed there was a possibility that scheduled outages could be "double" counted if a QF resource reported a scheduled outage to the CAISO that exceeded the time threshold[29] in the RA program rules. In the Phase 1 final decision (D.08-06-031),

[29] As taken from the 2009 RA Guide, page 11, the rule for RA resources with Schedule Outages is:

the CPUC recognized the validity of the concern, but also wanted a more thorough analysis performed so that it could better understand the scope of the problem. In addition, the Phase 1 decision adopted a cut-out for calculating QC values for dispatchable QF resources. As discussed in greater detail below, the CAISO, PG&E, SCE and SDG&E have developed a proposal to address this issue in connection with non-dispatchable QFs (referred to hereinafter as "Joint QF Counting Proposal").

B. Issue

The concern with the counting rules for QF resources is that there is a possibility that a QF resource could have it's QC reduced for scheduled outages even though the Load Serving Entity ("LSE") had procured replacement capacity consistent with the Commissions' scheduled outage rules. The current CPUC QF counting rule takes an average output of these resources during the past three-years and generates a monthly average output. Because this data is based on historical output, the counting rule inherently takes into account scheduled outages (and forced outages) when calculating that average number. The current rules do not make any adjustment to historical values when the LSE has procured replacement capacity.

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1) May through September – Scheduled outage exceeding 25% of days in the month the resource does not count for RA, for scheduled outages equal to or less than 25% there is no adjustment.
2) October through April – Scheduled outages less than 1 week, no adjustment is made to NQC, for scheduled outages 1-2 weeks the NQC is adjusted by the following formula
[1 – (days of scheduled outage/days in month) – 0.25] * NQC
For scheduled outages over 2 weeks the resource does not count towards RAR.

C. Anal ysis Performed

For purposes of assessing the scope of the problem, the CAISO Outage Coordination group pulled outage data from 2007 and 2008 (2008 included all months except December since the data was pulled in early December). The CAISO also received a list of the resources that use the historic three-year average method to calculate the QC value from the CPUC. The list of QF resources consisted of 262 resources with a total 2009 NQC of 5194 MW. No distinction was made and no analysis was done on whether the QFs were providing system RA or local RA capacity.

Next, the 2007 and 2008 outage data was filtered to include only scheduled outages on the 262 QF resources that met the scheduled outage counting criteria that would have resulted in a reduced RA availability amount. Forced outages were excluded because there is no RA adjustment needed for these outages. The table below reflects the outage MW impact for 2007 and 2008 by month for those QFs that may have had an RA replacement obligation under the CPUC's current rules. Any resource with an outage less than the RA criteria is not included in the table. If an outage extended across two or more months, and it met the minimum criteria for an RA adjustment, then the outage MWs were shown for each month. If a resource had a partial de-rate, the value reflected in the table below is just the curtailed MW, as long as it did not exceed the QC value.

	2007 Outage MW	2008 Outage MW
January 390.7		311.1
February 344.0		98.8
March 368.6		203.9
April 403.4		125.7
May 274.0		113.6
June 0		0
July 0		0
August 0		0
September 0		0
October 415.5		235.0
November 424.1		317.4
December 232.0		51.0

D. Joint Proposal for QF Counting Rule

To address the counting issue described above, the CAISO, PGE, SCE and SDG&E have submitted the Joint QF Counting Proposal to modify the current CPUC QC counting rule for QF resources.

After reviewing the data and discussing various options, the CAISO, PG&E, SCE and SDG&E concluded that a Historical Output Correction approach provides the best solution to resolving the issue of the "double" counting of scheduled outages for QFs whose QC is calculated based on three years of historical output. The CAISO recommended this general approach during Phase 1 of the RA proceeding. Under this approach, the historic output values for all of the QFs would be adjusted to remove scheduled outages that met the CPUC criteria, as described in footnote no. 22 above, prior to calculating the QC. This approach maintains the requirement that LSEs would have to "make up" in their RA showings any QF- scheduled outages that reduced or eliminated any QC if such QC reductions caused the applicable LSE to be

deficient in meeting its RA obligation. After further review of this proposal, the CAISO, PG&E, SCE and SDG&E concluded that this approach constitutes a valid way to remove the double counting of scheduled outages. The remaining administrative concern to be worked out with the CEC is the process by which the CEC will obtain the outage data necessary to implement this new counting rule. The CAISO does not believe that any additional administrative burdens this process might create would outweigh the benefits of a more accurate counting rule.

Specifically, under the Joint QF Counting Proposal, a process would be developed to allow the CAISO to provide the CEC with data for the outages that exceed the CPUC threshold, as described in the RA Guide and footnote no. 22 above. This data would include, among other things, the resource ID and start and end dates of the scheduled/planned outage. The CAISO and the other proponents of this proposal envision that this data would come from the CAISO's SLIC outage system. The CAISO and CEC would need to ensure that the necessary process is in place to provide this data to the CEC. From this data, the CEC would be able to identify the hourly output data that needs to be adjusted. Under the Joint QF Counting Proposal, the hourly output data would be replaced with a "proxy QF output" based on the output values for the same dates from the previous two years. The "proxy QF output" would be calculated by averaging the output values in the previous two years. This "proxy QF output" value would then be used as the historical value for the subsequent three-year average calculations. Once all values have been retrieved, the CEC would

perform the same QC calculation process as is done under the current process. The following example illustrates this proposal: Assume there is a QF that had a scheduled outage for the period March 7, 2008 through March 23, 2008. This outage limited the resource's output during the scheduled outage. For the purpose of this example, the table below reflects the output data for one day of the outage, but assumes that there is similar data for each day of the scheduled outage. In Table 1 below, the second to last column shows the 2009 NQC that would be calculated under the current rule, using the reduced output during the scheduled outage period. The current rules do not make any adjustment for the output during the prior year scheduled outage, so the reduced output is included in the average calculation. That initial 2009 NQC value is then subject to a further reduction during the 2009 operating year if the QF resource had a scheduled outage in 2009 identical to its outage in 2008. The last column of the table reflects the 2009 NQC that would be calculated under the proposed rule change. The output recorded during the 2008 scheduled outage period would be removed and replaced with a value derived by taking the hourly output from the previous two years and averaging these two values to come up with a replacement output for the hours of the scheduled outage. This replacement value would then be used in the three-year average calculation, with the new 2009 NQC subject to a reduction in the applicable LSE's RA compliance filing for any scheduled outages in the operating year that meet the CPUC's threshold.

Table 1

QF Counting Rule Example under Current CPUC and New Proposed Rule

Day	HE	2006 Historical Output	2007 Historical Output	2008 Historical Output	Revised 2008 Historical Output	2009 NQC Under Current CPUC Rule	2009 NQC Under Proposed Rule Change
7-Mar	1	50.0	53.0	16.0	51.5	39.7	51.5
7-Mar	2	51.0	54.0	15.0	52.5	40.0	52.5
7-Mar	3	50.0	52.0	17.0	51.0	39.7	51.0
7-Mar	4	52.0	50.0	16.0	51.0	39.3	51.0
7-Mar	5	55.0	53.0	17.0	54.0	41.7	54.0
7-Mar	6	60.0	63.0	18.0	61.5	47.0	61.5
7-Mar	7	70.0	65.0	16.0	67.5	50.3	67.5
7-Mar	8	71.0	70.0	17.0	70.5	52.7	70.5
7-Mar	9	72.0	75.0	18.0	73.5	55.0	73.5
7-Mar	10	72.0	74.0	17.0	73.0	54.3	73.0
7-Mar	11	74.0	72.0	16.0	73.0	54.0	73.0
7-Mar	12	74.0	73.0	20.0	73.5	55.7	73.5
7-Mar	13	75.0	77.0	19.0	76.0	57.0	76.0
7-Mar	14	74.0	76.0	18.0	75.0	56.0	75.0
7-Mar	15	76.0	72.0	19.0	74.0	55.7	74.0
7-Mar	16	75.0	73.0	19.0	74.0	55.7	74.0
7-Mar	17	75.0	78.0	18.0	76.5	57.0	76.5
7-Mar	18	74.0	75.0	20.0	74.5	56.3	74.5
7-Mar	19	70.0	73.0	19.0	71.5	54.0	71.5
7-Mar	20	68.0	69.0	18.0	68.5	51.7	68.5
7-Mar	21	65.0	67.0	19.0	66.0	50.3	66.0
7-Mar	22	63.0	65.0	18.0	64.0	48.7	64.0
7-Mar	23	60.0	62.0	18.0	61.0	46.7	61.0
7-Mar	24	58.0	59.0	18.0	58.5	45.0	58.5

As the example illustrates, the proposed change to the QF counting rules would allow a QF resource to have its QC value adjusted to a value that more closely resembles the capacity provided, but would still retain the requirement that LSEs procure the necessary replacement RA capacity should the resource be unavailable and the reduced QC cause the LSE to be deficient in its RA obligation.

In summary, the CAISO submits that the Joint QF Counting Proposal is a reasonable and effective approach to addressing the QF counting issue because it an eliminates the counting concern without jeopardizing reliability by retaining the obligation for LSEs to replace capacity under the current CPUC RA program rules. This will ensure that the necessary amount of RA capacity is maintained in order to ensure reliable grid operations. The CAISO stresses that its support for the Joint QF Counting Proposal is conditioned on the CPUC retaining the requirement that the Commission retain the existing LSE replacement rule. This rule ensures that any capacity that is not expected to be available and which would cause the LSE to fall below its RA obligation, will need to be replaced with available capacity by the LSE. Because there was “real” capacity made available to the CAISO by the replacement resource, it makes sense to insert a proxy capacity value when the original QF resource is not available. Absent this feature, capacity might be counted for RA purposes but will not actually be available when it is needed to meet reliability needs. In the event the Commission accepts the Energy Division Staff proposal and eliminates the

replacement requirement, the CAISO no longer would support the adoption of the Joint QF Counting Proposal because it would unjustifiably reduce the quantity of available RA capacity and, hence, reliability.

V. PROPOSAL TO EXTEND INTERIM COUNTING RULE FOR NEW RESOURCES

In the latter stages of Phase 1, PG&E proposed that new resources should be counted toward local RA obligations in the year-ahead demonstration if the LSE demonstrates local procurement sufficient to cover the obligation in the months preceding the expected commercial operational date ("COD") of the new resource. For example, a LSE could count a new resource with a March COD in its year-ahead demonstration, as long as it could show a short-term contract with an existing unit for the bridge months from January to March. The PG&E approach allows the LSE to substitute a new resource and avoid a long-term contract with an existing unit when the new resource's COD falls after the October 31st RA filing deadline. Several parties, including SDG&E, WPTF and the CAISO, supported the PG&E approach.

In its Phase 1 Decision (D.08-06-031), the Commission adopted the PG&E approach for counting new resources, with two limitations. First, the Commission required that an LSE who relies on a new resource that is not commercially operational prior to its final annual local RA compliance showing must, in its showing, (a) claim the entire new resource, and (b) specify a single local unit that it will show on every monthly filing to make up the capacity until the new unit has reached commercial operational status. The second limitation the

Commission adopted was temporal: the revised methodology for counting new resources only applied to the 2009 reporting year.

The CAISO, PG&E and SDG&E have jointly proposed that the Commission adopt the PG&E approach until such time as a better approach is identified and adopted. Although it is not a perfect fix, the PG&E approach protects ratepayers by avoiding the costly over procurement that invariably occurs when a new resource achieves COD after the annual RA demonstration. Furthermore, because the LSE must acquire sufficient local capacity to meet its local capacity requirement, and maintain that capacity until the new resource comes on line, there is no risk to system reliability or need for the CAISO to engage in backstop procurement.

Because this interim revision saves ratepayers money without having any adverse effects on reliability, the CAISO requests that the Commission accept the amended rule for counting new resources adopted in D.08-06-031 as a permanent amendment to the CPUC's RA counting rules.

VI. THE EXISTING REPLACEMENT RULE SHOULD BE RETAINED

Energy Division Staff proposes that if the Standard Capacity Product ("SCP") is adopted for the 2010 RA compliance year, then the scheduled outage replacement requirement contained in Section 3.1 of 6.06-07-031 should be eliminated.

The CAISO submits that adoption of the SCP will not eliminate the need for the replacement rule. Accordingly, the replacement requirement should be retained. In that regard, SCP will only impose charges on RA resources that are

unavailable as the result of forced outages. SCP does not impose charges on RA resources that are unavailable as the result of a scheduled outage. Thus, one of the bases for staff's recommendation, *i.e.,* that by approving a scheduled outage for an RA unit the CAISO is implicitly agreeing to operate the grid without the unit during the outage, is not applicable.

In any event, the mere existence of SCP and its availability provisions do not -- and cannot -- ensure that a sufficient number of RA resources will be available. Staff's proposal could result in units that are being counted for RA purposes not being available to the CAISO as the result of a scheduled outage. This could force the CAISO to rely on the RUC and Exceptional Dispatch mechanisms under MRTU to access non-RA units in order to maintain reliability and compensate for the unavailability of RA capacity that was on an outage and was not replaced. That will only increase expenses for ratepayers because the CAISO will have to make daily or monthly capacity payments to such units. That will result in capacity payments being made for redundant capacity.

Also, if the replacement rule is eliminated, the CAISO will have less flexibility to approve scheduled outages. In the past year, the CAISO has already faced some situations where it has had to cancel outages due to reliability concerns. This unfortunately leads to the canceling of much needed clearances for maintenance and overhauls of generating resources that routinely occur during off-peak months. Elimination of the replacement rule will only exacerbate the situation.

VII. CONCLUSION

For the foregoing reasons, the CAISO respectfully requests that the Presiding Administrative Law Judge prepare a proposed decision for Commission consideration that incorporates the proposals articulated herein.

Respectfully submitted,

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Date: February 17, 2009

Attachments

CERTIFICATE OF SERVICE

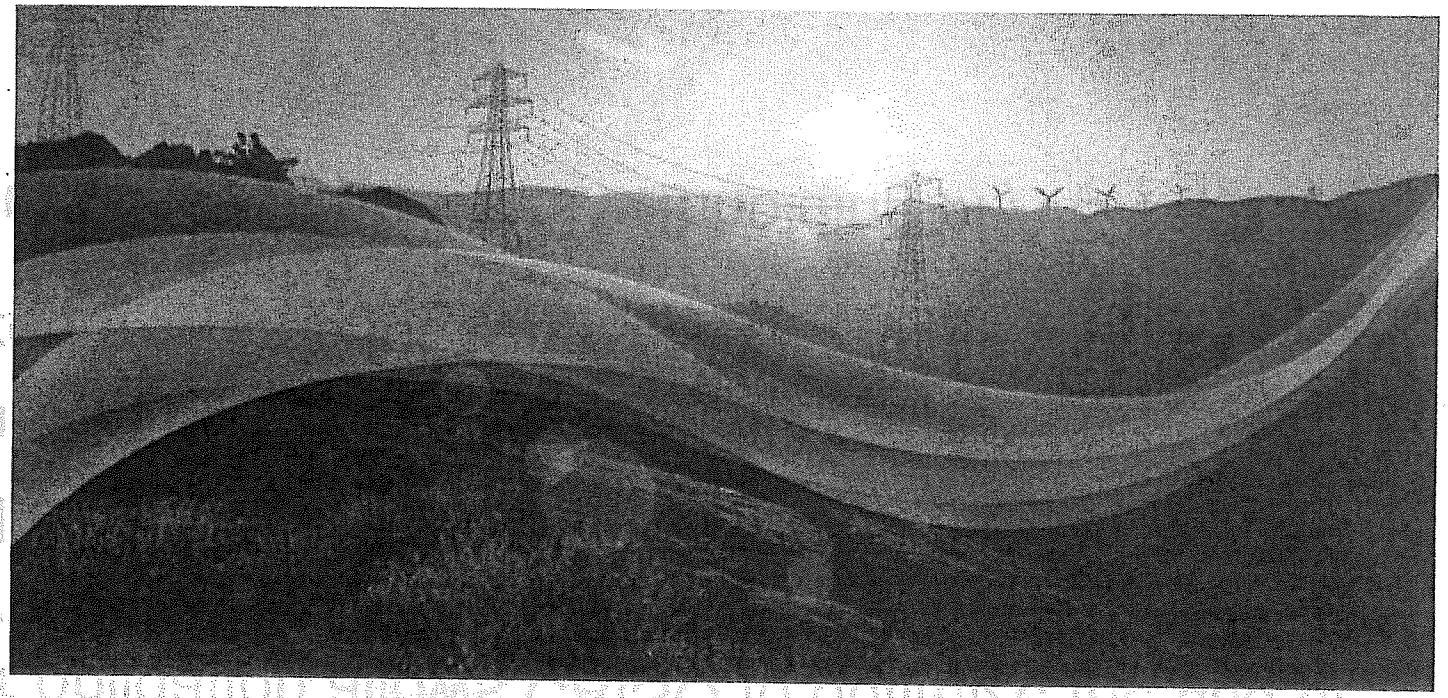
I hereby certify that on February 17, 2009, I served, by electronic and United States mail, a copy of the foregoing Phase II Comments of the California Independent System Operator Corporation to each party in Docket No. R.08-01-025.

Executed on February 17, 2009
at Folsom, California

/s/ Susan L. Montana //

Susan L. Montana,
An Employee of the California
Independent System Operator

RA Resource Day-Ahead A/S Must-Offer Obligation



Shucheng Liu, Ph.D.
Principal Market Developer

California ISO
Your Link to Power

CPUC RA Workshop
March 25, 2008

RA A/S Offer Obligation Helps Achieve Optimal Utilization of Resources

- RA A/S offer obligation allows CAISO to optimize the use of RA capacity along with other bid-in resources to achieve
  - balanced energy and A/S markets from co-optimization;
  - minimum-cost supply for demand; and
  - "maximized" rewards for supply.
- RA A/S offer obligation prevents withholding of A/S capacity.

RA A/S Offer Obligation Is Already Part of Existing RA Product

- CPUC has determined that RA resources must be available to the CAISO markets.
  - "RA Capacity Products must meet the unit commitment and dispatch requirements as determined by the CAISO"
  - "the CAISO shall have the right to commit any type of Units on a Day-Ahead basis."

—CPUC Decision 06-07-031 July 20, 2006

RA A/S Offer Obligation Does Not Require Any Change to Existing RA Product

- RA A/S offer obligation does not require RA resources to be A/S certified.
  - CAISO would only utilize A/S capacity to extent RA resources have A/S certified capacity.
  - LSEs can continue to determine whether to self-provide A/S based on their own portfolio optimization.
  - CPUC can consider whether to impose an A/S procurement obligation on LSEs as part of RA program.

A/S Offer Obligation Compensates RA Resources

- Resource owners can reflect their preferences through submitting supply bids for energy and A/S.

- MRTU co-optimization will
  - determine the optimal utilization of resources based on the supply bids; and
  - sufficiently compensate resources when they are used for A/S instead of energy.

Example without Scarcity – Resource Is Compensated for Providing Energy and A/S

Case 6: Opportunity Cost in A/S Prices

$$\min(300 \cdot E_1 + 360 \cdot E_2 + 250 \cdot Spn + 80 \cdot NSpn)$$

s.t.

$$Spn \geq 1000$$
$$Spn + NSpn \geq 1950$$
$$E_1 + E_2 = 40000$$
$$Spn \leq 1020$$
$$NSpn \leq 1000$$
$$E_1 + Spn + NSpn \leq 41000$$
$$E_2 \leq 2000$$
$$E_1, E_2, Spn, NSpn \geq 0$$

Energy and A/S compete for Supplier 1's capacity. A/S prices reflect the opportunity cost from the energy offer prices (Non-Spinning $140 = $80 + $360 - $300, Spinning $310 = $250 + $360 - $300). Supplier 1 is indifferent in providing energy or A/S.

Variables Optimal Value (MW)					
E_1	E_2	Spn	$NSpn$		
39050	950	1000	950		
Shadow Prices of Constraints ($/MWh)					
Spinning γ	Non-Spin η	Energy κ	Spin Capacity φ	Non-Spin Capacity λ	Total Capacity μ
170	140	360	0	0	-60
Market Clearing Prices ($/MWh)					
Energy (κ)	Spinning ($\gamma+\eta$)	Non-Spin (η)			
360	310	140			

Example with Scarcity – Resource Is Compensated for Providing Energy and A/S

Case 6B: Opportunity Cost in A/S Prices, Scarcity in Non-Spinning

$$\min(300 \cdot E_1 + 360 \cdot E_2 + 250 \cdot Spn + 80 \cdot NSpn + 1000 \cdot Spn_S + 600 \cdot NSpn_S)$$

s.t.

$$Spn + Spn_S \geq 1000$$

$$Spn + NSpn + Spn_S + NSpn_S \geq 1950$$

$$E_1 + E_2 = 40000$$

$$Spn \leq 1020$$

$$NSpn \leq 920$$

$$E_1 + Spn + NSpn \leq 41000$$

$$E_2 \leq 2000$$

$$E_1, E_2, Spn, NSpn, Spn, Spn_S, NSpn_S \geq 0$$

Due to scarcity in Non-Spinning, A/S prices are set by the scarcity price of Non-Spinning at $600/MWh, while energy price is still $360/MWh set by Supplier 2. Supplier 1 is compensated for providing A/S.

Variables Optimal Value (MW)					
E_1	E_2	Spn	$NSpn$	Spn_S	$NSpn_S$
39060	940	1020	920	0	(10)
Shadow Prices of Constraints ($/MWh)					
Spinning γ	Non-Spin η	Energy κ	Spin Capacity φ	Non-Spin Capacity λ	Total Capacity μ
0	600	360	-290	-460	-60
Market Clearing Prices ($/MWh)					
Energy (κ)	Spinning ($\gamma+\eta$)	Non-Spin (η)			
(360)	(600)	(600)			

Comments Are Welcome

- Please send your comments to

SPComments@caiso.com

California ISO
Your Link to Power

Draft Final Proposal

Standard Resource Adequacy Capacity Product

ISO Draft Final Proposal
January 8, 2008

California ISO
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Draft Final Proposal

Standard Resource Adequacy Capacity Product

ISO Draft Final Proposal
January 8, 2008

1 EXECUTIVE SUMMARY

The purpose of this document is to present the ISO's draft final design proposal for a Standard Resource Adequacy Capacity Product (SCP). This draft final proposal represents the culmination of a stakeholder process on SCP that was started in Summer 2008, and is the proposal which the ISO expects at this time to present to its Board of Governors for approval at the February 2009 Board meeting and, if approved, to file at FERC shortly thereafter. The term "draft final" means that the ISO will still consider possible modifications to this proposal based on submitted stakeholder comments received no later than January 14, 2009, but fully expects that any such modifications would not affect the fundamental structure of the proposed SCP design. The final ISO proposal on SCP will be published in conjunction with the documentation prepared for the February Board meeting.

In initiating the SCP effort the ISO did not have to start from scratch to create the SCP. Currently (and in MRTU) there is a process defined for the RA program which has been functioning since 2006. The ISO intends to maintain that same process when SCP is implemented and is only recommending a few key enhancements at this time. Also, a broad coalition of stakeholders had already spent a lot of time preparing elements of a standard capacity product prior to the ISO stakeholder process, which has been valuable in enabling the SCP effort to arrive at this draft final proposal in just a few months.

The key enhancements to the existing RA program that would result from the SCP proposal are:

- Implementation of an availability standard in the ISO tariff. If a resource receives payments for providing RA capacity, there is an expectation that the full RA capacity of that resource will be available to the ISO, i.e., the resource is not on a forced equipment outage or derate that diminishes its ability to provide the full amount of its RA capacity. Under the SCP, resource availability will be measured on a monthly basis and compared against a single availability standard or target based on the historic performance of the RA resource fleet during the peak hours of each month of the previous year.
- Implementation of availability incentives. The SCP proposal will provide incentives for each resource to meet or exceed the target availability standard. On a monthly basis the ISO will assess financial penalties to resources whose availability falls short of the target, and will provide bonus payments to resources whose availability exceeds the target. Bonus payments will be funded through the financial penalty revenues so that this mechanism is financially neutral on a monthly basis.

Other important elements of the ISO's SCP proposal include:

- Unit Substitution. A resource owner will be able to substitute a non-RA resource for an RA resource on forced outage in order to avoid the outage being counted against the RA resource's availability. A pre-approval process will be required to ensure that the replacement capacity is comparable to the original RA capacity in an operational sense.

- Transition to SCP. There are provisions for transitional grandfathering of existing RA contracts that have availability standards and incentives comparable to those specified in the SCP tariff language. Such grandfathered contracts would be exempt from the ISO-enforced availability standards and incentives under the SCP. These transitional provisions would expire with the expiration of such contracts.
- Deferment of SCP availability standards and incentives for certain RA resource types. The ISO proposal would not initially apply the SCP availability provisions to intermittent renewable generation (wind and solar), Qualifying Facilities (QFs), and demand response resources. The ISO intends to revisit the applicability of the SCP provisions to these resource types at a later date.

Finally, in conjunction with the SCP effort the ISO and stakeholders have discussed an enhancement to the existing Resource Adequacy Must Offer Obligation (RA MOO) that would enable the ISO markets to utilize both the energy supply and ancillary services capabilities of RA capacity in an optimal manner. Accordingly this draft final proposal also includes provisions for an Ancillary Services Must Offer Obligation (AS MOO), which the ISO intends to include in bringing its SCP proposal to the Board and filing at FERC. The AS MOO as described in this proposal would not alter the applicability of RA MOO as defined today, nor would it be dependent on whether or not the RA capacity is subject to the SCP availability provisions. Rather, the AS MOO would simply allow the ISO to utilize the certified AS capability of RA capacity that is already subject to RA MOO or that has offered to supply energy in the ISO markets.

The ISO is requesting that stakeholders submit their comments on this draft final proposal to SCPM@caiso.com by January 14, 2009.

2 INTRODUCTION

This paper addresses two enhancements to the RA program – the Standard Capacity Product and the addition of an Ancillary Services Must Offer Obligation (AS MOO) to enhance effectiveness of the Resource Adequacy Must Offer Obligation (RA MOO)

The implementation of a Standard Capacity Product (SCP) is a step forward in streamlining California's Resource Adequacy (RA) program. The RA program was implemented to ensure that adequate resources would be available to serve load. As the RA program evolved over the years, participants identified a need to develop a standardized capacity product to facilitate the selling, buying and trading of capacity to meet RA requirements. Stakeholders have affirmed to the ISO that their ability to efficiently transact RA contracts is hindered by the current method of negotiating agreements between parties without a standard product definition for trade. The need for resolution was highlighted during the ISO's Market Initiatives Roadmap process where the Standard RA Capacity Product was ranked highest priority out of a list of over 70 initiatives.[1] Stakeholders have expressed their desire to have this product implemented in the ISO Tariff as soon as possible so that it may be used as the basis for capacity contracting during 2009 for the 2010 delivery year. As a result, in 2008, the ISO began the stakeholder process for designing the SCP.

[1] *Market Initiatives Roadmap Process, Final Report on Ranking of High Priority Market Initiatives 7/7/2008* http://caiso.com/1ff9/1ff9aee434530.pdf

In parallel, the California Public Utilities Commission (CPUC) is also conducting proceedings to further the development of California's Resource Adequacy Program. Currently the CPUC is engaged in Phase 2 of R.08-01-025[2], the "Order Instituting Rulemaking to Consider Annual Revisions to Local Procurement Obligations and Refinements to the Resource Adequacy Program." In its Scoping Memo, the CPUC references SCP as a topic for parties' consideration and requests that:

> In conjunction with the CAISO Stakeholder processes, [parties] review the Calpine Proposal and any other proposals for a standardized resource adequacy contract and associated resource obligations.

The Scoping Memo also includes Ancillary Services Must Offer Obligation (AS MOO) as a topic for discussion and the ISO proposal also incorporates this concept.

Clearly, the ISO, the CPUC and market participants are all seeking to accomplish the same goal – enhance the current RA program for the State of California. This proposal is intended to bring us closer to that objective.

3 IMPLEMENTING RESOURCE ADEQUACY WITH SCP AND AS MOO

3.1 IMPLEMENTING THE STANDARD CAPACITY PRODUCT

In the course of the ISO's stakeholder process on the SCP, it became clear that two elements were key to the SCP design:

- Specification of availability standards for RA capacity and associated incentives for suppliers of such capacity to comply with those standards, both of which would be incorporated into the ISO tariff; and
- Clear specification of the applicability of the SCP standards and incentives, including potential exemption or transitional "grandfathering" of certain types of RA capacity.

As a result the ISO proposal in this document focuses on these key elements.

In addition, in stakeholders' submitted comments there was broad (but not total) consensus on some issues regarding the changes to the RA framework under SCP:

- The current RA process should be changed as little as possible.
- The LSEs responsibility should end with the submission of their RA plans.

This section of the paper outlines the proposed changes to the current RA program that would result from adoption of the proposed SCP. It provides a summary of the updated resource adequacy framework. It is based on the Business Practice Manual (BPM) for Reliability Requirements and Tariff Section 40 regarding Resource Adequacy. Figure 1 displays the process flow.

Each year the ISO's RA process begins with the publication of the Local Capacity Study and the Deliverability Study. The purpose of the Local Capacity Study is 'to determine

[2] *Order Instituting Rulemaking to Consider Annual Revisions to Local Procurement Obligations and Refinements to the Resource Adequacy Program*, Assigned Commissioner's Ruling and Scoping Memo, 9/15/2008 http://docs.cpuc.ca.gov/efile/RULC/90797.pdf

the minimum capacity needed in each identified transmission constrained "load pocket" or Local Capacity Area to ensure reliable grid operations'.[3] The Deliverability study establishes the deliverability of generation in the ISO in the balancing area. It also establishes the total import capability for each import path allocated to each LSE. The information contained in these reports along with generator data is used to compile the annual Net Qualifying Capacity (NQC)Report which is a listing of the NQC of "all Participating Generators and other Generating Units that request inclusion"[4] for the next compliance year.

LSEs utilize the NQC report to identify resources which are available to contract to provide capacity to satisfy their RA requirement. Currently, there are no standard provisions dealing with availability requirements and incentives for RA capacity, and consequently contracting parties must agree on such provisions themselves and the terms and conditions can vary among the contracts. The SCP will provide availability standards and incentives located in the ISO tariff, which contracting parties will be able to incorporate by reference into their bilateral RA contracts.

In the year ahead and month ahead timeframes, LSEs and Resources that supply RA capacity are required to provide information to the ISO demonstrating that the Resource Adequacy Requirements will be met for that period. LSEs submit Resource Adequacy Plans which identify specific resources that the LSE is relying on to satisfy its forecasted peak demand and reserve margin for the reporting period. SCs for the Resources are responsible for Supply Plans which are a verification and confirmation of the information contained in the LSEs Resource Adequacy Plan. Thus the Supply Plan "establishes a formal business commitment between the CAISO and Resource Adequacy Resources by confirming the status of the resource as [a] Resource Adequacy Resource." [5]

The Resource Adequacy Plans and Supply Plans are cross-validated by the ISO. For CPUC jurisdictional entities, the CPUC ensures that LSEs are in compliance with their RA requirements through their RA Plans, while the ISO provides feedback on the physical generating units and system resources listed in their RA Plans to see if the SCs of those resources submitted a Supply Plan confirming that the RA capacity was sold in accordance. For Non-CPUC jurisdictional entities, the ISO reviews the RA Plans and Supply Plans in the same manner as for the CPUC jurisdictional entities and sends any discrepancies to the Local Regulatory Authority (LRA).

With the initial implementation of SCP, LSEs and suppliers of RA capacity who wish to be exempt from the ISO tariff-based availability standards and incentives in accordance with the grandfathering criteria outlined in Section 9 of this document will be required to submit a signed affidavit certifying that their contracts meet those criteria. Assuming the SCP proposal is approved by FERC some time in spring 2009, this certification document will be required prior to the 2010 annual showing for RA.

All RA capacity that is confirmed through the RA Plans and the Supply Plans and that is not exempt from the SCP provisions in accordance with the criteria outlined in Section 9 will then be subject to the ISO-tariff-based SCP availability standards and incentives.

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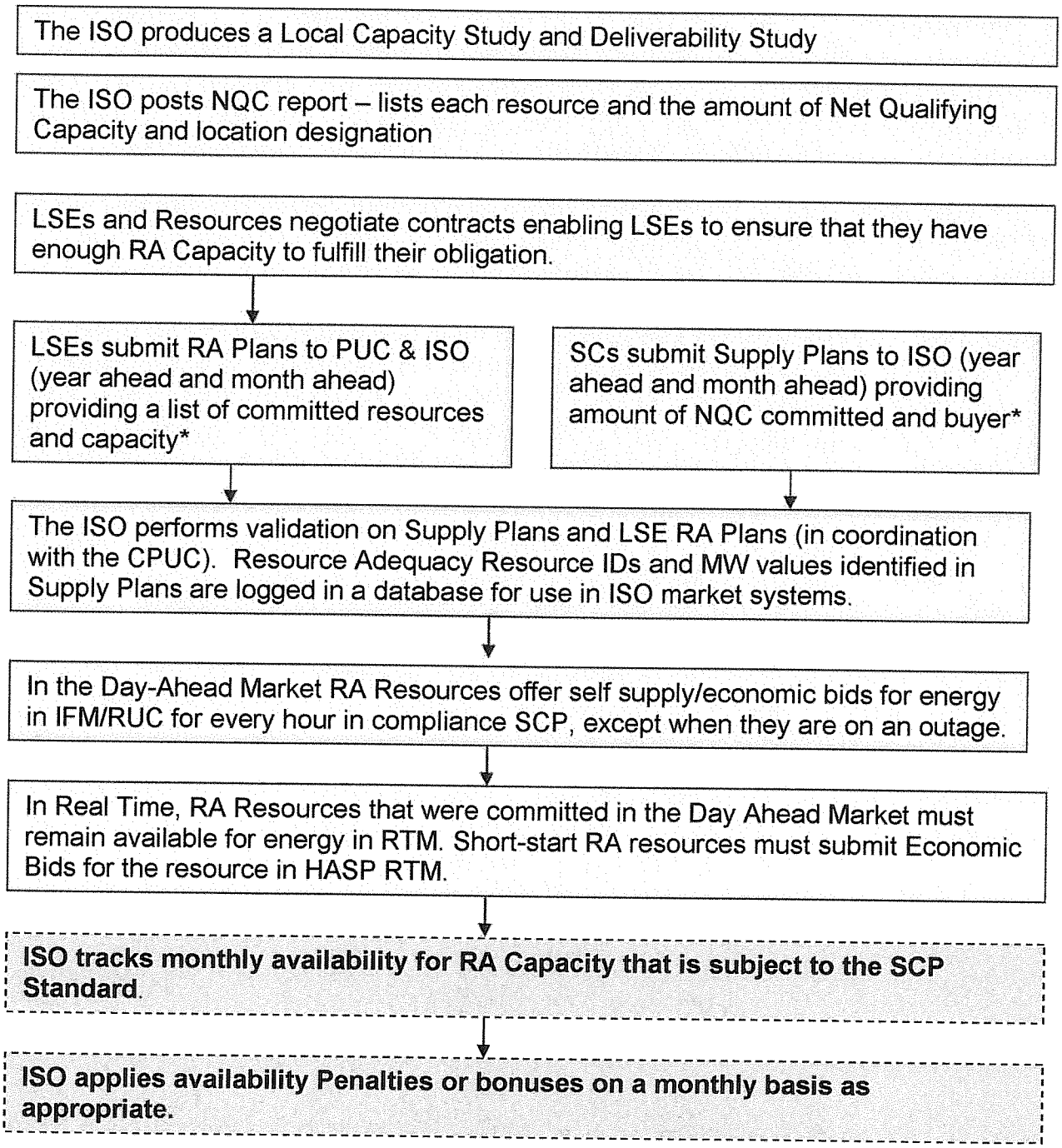
[3] 2010 Local Capacity Area Technical Study Manual pg 3
[4] BPM for Reliability Requirements pg 34
[5] Id. At 22

This means that such capacity will be tracked by the ISO for availability in the targeted compliance hours of each month (i.e., whether the full amount of RA capacity is available and not on a forced equipment outage or derate), and will be subject to a financial penalty or bonus payment depending on the extent to which its availability deviates from the SCP availability standard.

1. Figure1 –ISO RA Process under MRTU



* For the initial implementation of SCP, Contract holders who wish to grandfather their contracts will be required to submit certifying documentation. See Section 9 for additional information.

3.2 THE ANCILLARY SERVICES MUST OFFER OBLIGATION

SCs for RA resources are required to make their RA capacity available to the ISO in accordance with the RA-MOO provisions of Section 40 of the ISO tariff. In the Day-Ahead Market an RA resource that is subject to RA-MOO must submit economic bids or self schedules for their RA capacity in the IFM and RUC. Economic bids can be offers to supply energy or ancillary services or both. There are certain exceptions to this rule including Extremely Long Start Resources and Use Limited Resources.

RA resources that were committed in the IFM or RUC must remain available through Real-Time. Short Start Units and Dynamic System Resources that supply RA capacity subject to the RA-MOO and are not scheduled in either the IFM or RUC are still subject to the RA-MOO in the next day's Real Time Market and must submit Economic Bids or Self-Schedules into that market.

Extremely Long Start Resources

Extremely Long Start (ELS) Resources are those resources that are flagged in the master file and have a start-up time that is greater than 18 hours. Such resources must be given start-up instructions prior to the publication of Day Ahead Market results in order to be available as needed during the next operating day. ELS resources can also be system resources that have contractual limitations that require the energy to be committed prior to the publishing of the Day-Ahead Market results. For these units a special Extremely Long Start Commitment process is used. This process is described in Section 6.8 of the BPM for Market Operations.

RA MOO for Energy and Ancillary Services

As noted above, the current RA MOO tariff language allows suppliers of RA capacity to meet their RA MOO by offering offer energy or ancillary services or a combination of both, but does not specifically require the supplier to offer both energy and ancillary services if the capacity is certified to provide ancillary services. This limits the ISO's ability to co-optimize the use of all the capabilities of RA capacity, and may thus increase the cost of scheduling energy and procuring ancillary services in the IFM. Under the proposed AS MOO a supplier of RA capacity that is already subject to the other RA MOO provisions would have to be available for the ISO to optimally utilize that capacity for either energy or AS, to the extent the capacity is certified to provide AS.

In implementing the AS MOO the ISO would still allow RA capacity to self-schedule energy in the IFM, and the market optimization would try to procure all required AS from resources that offer AS through their economic bids or AS self-provision. If the RA capacity offers economic bids for energy, however, the AS MOO would require that resource to offer economic bids for AS for the same capacity to the extent it is certified to provide AS, so that the market can schedule that capacity for energy or AS or a combination of both in the most optimal manner. In addition, in the event that the market cannot procure all required AS from economic AS bids and AS self-provision, the AS-MOO would allow the ISO to reduce the energy self-schedule of subject RA capacity to provide AS. In such instances the compensation for providing AS would be based on the Ancillary Services Marginal Prices as specified in the MRTU tariff. .

There are two key reasons why the AS-MOO is being proposed. First, upon MRTU start up the FERC MOO will no longer apply and the pool of resources that must offer into the

market will be limited to RA resources. Second, in the IFM the ISO optimizes energy and ancillary services to meet 100 percent of its forecast AS requirements and there will need to be enough AS supply in the market to perform this optimization. This enhancement helps ensure supply sufficiency and market liquidity.

There has been considerable discussion regarding the AS MOO in the ISO's reserve scarcity pricing stakeholder process. In the final proposal for the reserve scarcity pricing design posted on ISO website on July 15, 2008, the following revisions were proposed:

1) All RA resources must submit AS bids for 100% of their AS certified RA capacity into the DAM, even if the RA capacity has been self-scheduled for energy. Otherwise, a zero ($0/MW) bid will be inserted;
2) All RA resources with AS certified capacity, with the exceptions as discussed below, will always be considered for energy and AS in the DAM IFM energy and AS co-optimization.
3) The ISO will honor RA capacity energy self-schedules unless it is unable to procure 100% of its AS requirements in the DAM. In such case, the ISO would curtail the energy self-schedule, or portion thereof, to allow certified AS capacity to be used for AS.
4) Due to various restrictions of operating conditions, hydro RA resources that offer energy bids should submit AS bids, together with their energy bids, in the day-ahead market for all their available AS capacity based on the expected available energy.[6] Hydro RA units submitting energy self-schedules will not be required to offer AS in the DAM for the RA capacity corresponding to their energy self-schedules.
5) Non-Dispatchable Use Limited RA Resources will be exempted from the DAM AS must-offer requirement.

4 MARKET DESIGN PRINCIPLES

The SCP was created based on the following market design principles:

1. The purpose of the SCP is to meet the RA Requirement. The SCP is being developed to streamline and improve the current RA process for market participants and the ISO. The SCP enhances the existing procedures by providing a device that facilitates capacity trading and establishes performance rules in the tariff.

2. The SCP is fungible and can be easily traded. By its very definition a standard capacity product should have an enduring nature and represent a set of similar attributes. The SCP utilizes the Net Qualifying Capacity (NQC) that has been set forth in Section 40.4.1 of the tariff and the imports that are reported by LSEs and the SC representing resources to determine the amount of SCP MWs that a resource will provide.

3. SCP MWs are bound by the availability standards and incentives in the tariff. Sections 6 of this proposal describe this process.

[6] It is consistent with the MRTU Tariff Section 40.6.4.3.2.

5 PRODUCT DEFINITION

The SCP is a set of attributes defined in the ISO MRTU tariff which specify the availability standards and incentives for RA capacity. There will be one availability standard that will be applicable to all RA resources each month during the upcoming compliance year, which will be based on the historic availability of the RA resource fleet during a pre-defined set of peak hours during a previous three-year period. Financial penalties will be applied on a monthly basis to RA resources that fail to achieve the target availability value during that month. RA resources that exceed the target availability value during the month may receive a bonus payment to the extent such funds are available from the collection of financial penalties for that month.

6 AVAILABILITY STANDARD AND INCENTIVES

The current RA programs of the CPUC and LRAs do not differentiate among RA capacity in terms of the forced outage rate of the procured RA resources. Parties procure RA capacity under bilateral arrangements and a price is paid for the capacity. The bilateral arrangements may have availability requirements and incentives to encourage performance. Stakeholders have asked the ISO, as part of the SCP, to incorporate resource availability standards and incentives into the ISO Tariff to facilitate contracting. Stakeholders envision that, with resource availability standards and incentives in the ISO Tariff, parties can refer in their contracts to the ISO Tariff provisions thereby simplifying and improving contracting.

Stakeholders have suggested that there be a standard that considers the forced outage rates of RA resources, rewards RA resources that have low forced outage rates by providing additional compensation and penalizes RA resources that have high forced outage rates by applying a financial penalty. A system such as this during the compliance year would recognize and differentiate among RA resources that experience low forced outages compared to RA resources with high forced outages.

To address this aspect of the SCP, the ISO has developed an "availability" standard and incentives. There will be one availability standard, an "annual target availability" value, based on the historic availability of the RA resource fleet during a pre-defined set of peak hours during a previous three-year period. This standard will be applicable to all RA resources each month during the upcoming compliance year. "Availability" will be defined as not being on a Forced Outage, as currently defined in the ISO Tariff, to an extent that would prevent the RA resource from offering to the ISO markets and providing the full MW value of the RA capacity that the resource has sold to an entity for RA purposes and provided to the ISO in an RA showing. Financial penalties will be applied to RA resources that fail to achieve the annual target availability value, and RA resources that have exceeded the annual target availability value may receive a bonus payment to the extent such funds are available from the collection of financial penalties in that month. The tariff provisions described below are intended to provide incentives for each resource that has sold RA capacity to be available to provide that capacity to the ISO.

The availability standard and incentives will be subject to review and potential modification in subsequent years, and any multi-year RA contracts signed after these initial SCP provisions have been approved by FERC will continue to be subject to any changes made in the SCP and RA obligations incorporated in the ISO Tariff.

Outages under the ISO Tariff

The ISO Tariff defines several types of outages. To provide context for the discussion in this paper, relevant definitions from Appendix A of the current ISO Tariff are provided below.

> *Outage: Disconnection, separation or reduction in capacity, planned or forced, of one or more elements of an electric system.*
>
> *Forced Outage: An Outage for which sufficient notice cannot be given to allow the Outage to be factored into the Day-Ahead Market or Hour-Ahead Market scheduling processes.*

When the ISO implemented its current outage reporting penalties in 2007 the ISO interpreted variations of output of wind generators and Qualifying Facilities (QF) not to be reductions in capacity but reductions in output. The following guidance was provided to market participants:

> *Question/Comment 5:*
> *"As available" Qualifying Facilities, which supply energy with a profile that resembles a wind Generating Unit should not have to report availability as the output of these Generating Units is constantly changing, making the availability report of little value.*
>
> *Answer 5:*
> *The CAISO does not consider normal variations in the output of Qualifying Facilities for which the output depends on a process separate from the production of electricity to represent changes in the unit's maximum output capability. As such, these normal variations are not required to be reported. Aside from these normal variations in output, participants are required to report reductions in the maximum output capability of a Qualifying Facility if a Participating Generation Agreement (PGA) for the unit has been entered into with the CAISO (or if the unit is a Resource Adequacy Resource) and the reduction meets the reporting threshold.*

The threshold for reporting outages that is specified in the ISO Tariff section 9.3.10.3.1 is as follows: "*Report a Generating Unit's Availability after it is reduced (from the value registered in SLIC) by at least 10 MW or 5 percent of the Generating Unit's PMax, whichever is greater, for an outage that lasts 15 minutes or longer.*"

Penalties specified in the ISO Tariff for not reporting forced outages range up to $5,000 per unreported or late reported outage, depending on the number of violations. Penalties in the ISO Tariff for reporting false information range up to $10,000, depending on the number of violations. In addition, egregious violations will be referred to FERC, which has a number of sanctions available to it, including $1 million per day penalty authority.

Any gaming consisting of reporting inaccurate availability data will be referred to FERC which has $1 million per day penalty authority.

Peak Hours Availability Assessment

The availability standard and incentives are focused on the actual MW of capacity that has been sold and provided to the ISO. During the course of this stakeholder process the ISO considered whether the availability standard should be established by assessing Forced Outages during all hours of the month versus assessing Forced Outages during the peak-hours of the month. The ISO proposes that the assessment will look at performance during a pre-defined set of peak hours in the month. The ISO proposes to define the RA peak hours based on the operating periods when high demand conditions are likely to occur and therefore resource performance is most critical to maintaining system reliability. The proposed peak-hours are shown in the table below. The five hours of each day have been chosen because, based on actual data, the ISO has found that the peak load hour always falls within that five-hour range. These hours are when the ISO has typically experienced the coincident peak demand during each of the months. By assessing performance during the hours when the system is most likely to be capacity-constrained, this approach provides appropriate incentives for resources to take actions to improve peak-period availability.

Month	Hour-Ending	Exclusions
Apr - Oct	14:00 - 18:00	Saturday, Sunday and federal holiday
Jan - Mar, Nov & Dec	17:00 - 21:00	

The ISO will monitor the results of using only a peak hour assessment. If refinement is needed of the defined peak hours, or some alternative form of metric such as an all-hours metric is needed, the ISO will consider that as a future enhancement.

Source of Outage Data

The ISO considered using either data from its scheduling and outage logging system ("SLIC") or data reported to NERC using the Generator Availability Data System ("GADS") protocol. The ISO proposes to use data from its SLIC system for outage data. Using SLIC data will allow for implementation of SCP for compliance year 2010. It is not feasible to implement a NERC GADS approach for compliance year 2010. Although the ISO proposes to use SLIC data; it is willing to consider moving to NERC GADS data in the future if warranted.

To determine the availability of RA resources greater than 10 MW the ISO will use data from the ISO SLIC system to assess the availability of RA resources.

Because the requirement in the ISO Tariff is for all resources to only report de-rates that exceed the greater of 10 MW or 5% of the resource's capacity, resources that are less than 10 MW in size are not required to submit outage data to the SLIC system. However, a new requirement will be established under the SCP where resources that are less than 10 MW will be required each month to submit outage data separate from SLIC that is equivalent to outage data submitted by resources greater than 10 MW.

Thus, for RA Resources less than 10 MW in size, the ISO will use the outage data provided by the resource to determine the availability of those RA resources.

The ISO will develop a template that such resources will use each month to submit their outage data to the ISO. The data that will be submitted will identify all Outages that have occurred over the previous calendar month, including Maintenance Outages, Scheduled Maintenance and Forced Outages. The data will include start and end times, MW availability and cause of Outage. The template would be submitted shortly after the end of each month, accompanied by a sworn affidavit by one of the executives of the company (similar as to what is done for the submission of Congestion Revenue Rights eligibility data).

There will be a minimum size threshold of 1.00 MW for this requirement, i.e., resources less than 1.00 MW do not have to submit outage data each month and will not be subject to the availability standard and incentives.

SLIC data will be used for the initial implementation of the SCP; however, it is recognized that the ISO Tariff does not require that resources report every MW of Outages and it may be desirably to develop more detailed reporting requirements at a later date, perhaps including a more detailed monthly submission from all RA resources.

Annual Target Availability Value

There will be one availability standard, an annual target availability value, that will be applicable to all RA resources each month during the upcoming compliance year based on the historic availability of the RA resource fleet during a pre-defined set of peak hours during a previous three-year period of compliance years[7]. A single value will be established before the start of the upcoming compliance year that will be applicable to RA resources each month during the upcoming compliance year. This concept is supported by a majority of the stakeholders.

The target availability value will be established well before the applicable compliance year and will be updated each year. The value will be posted by the ISO by June 1 of each year to be factored into procurement for the subsequent compliance year. The timeline for development of the target availability value is shown below (using the 2015 compliance year as an example).

- Data from January through December for 2011, 2012 and 2013 will be used for determining the value that would be in effect for compliance year 2015.
- The ISO will assess the 2011-2013 data in early 2014.
- The ISO will publish a single value in June 2014.
- The ISO will assess the actual availability of RA resources each month during 2015.

The formula for the annual target availability value will use three years of data. However, in the first year of SCP (compliance year 2010) it will be necessary to use two years of historical data in the formula because that is all of the full-year data that is available as the RA program did not start until June 2006 – we only have 2007 and 2008

[7] The compliance year for RA is currently established as a calendar year.

as full years of data). Starting with compliance year 2011 and beyond, three years of historical data will be used.

The ISO will use only data from its SLIC system to calculate the annual target availability value in the first year of the SCP. In subsequent years (when data from resources less than 10 MW is available) the ISO will use both data from its SLIC system and the outage data that is submitted by resources that are less than 10 MW in size to calculate the annual target availability.

Only resources that have been provided as RA resources, have an ISO Resource ID, submit outage data, and have the availability standard and incentives applicable to them will be used to calculate the annual target availability value. Resources that are not subject to the availability standard and incentives because applicability has been deferred, or resources that have been exempted from the provisions will not be included in the calculation.[8]

Since each month can have a unique set of RA resources, and each RA resource may offer different amounts of RA capacity, the annual target availability value will be calculated by summing the total **available** RA capacity MW across all compliance hours of the year and all RA resources subject to the SCP, then divided by the total **sold** RA capacity MW for the same set of hours and resources. The criteria for Forced Outages to be included in the calculation are described in the next section (Monthly Assessment of Actual Availability).

An example of how the annual target availability value will be calculated is provided below. The example uses a simplified model where:

- There are only two RA resources in the RA fleet;
- The "month" consists of only six hours;
- The "year" consists of only three months (January through March); and
- The calculation is made using just one year of data (note that the methodology proposed by the ISO uses three years of historical data for the annual target availability value).

Example of Calculation of Annual Target Availability Value

Assumes for simplicity just one year of data, two RA resources, a six-compliance-hour month and a three-month year.

	Jan	Feb	Mar	Reference Period Totals	
Unit A					
MW Sold as RA	100	90	100		
				MW Available	MW Sold
Actual MW Available: Hour 1	100	90	100	290	290
Hour 2	90	90	100	290	290

[8] Resources less than 10 MW in size will not be included in the calculation for determining the annual target availability value until the ISO has received one full year of outage data from these resources.

Hour 3	90	90	0	180	290
Hour 4	70	70	0	140	290
Hour 5	80	80	100	260	290
Hour 6	100	90	100	290	290
	530	510	400	1440	1740
Unit B					
MW Sold as RA	50	60	50		
Actual MW				150	160
Available: Hour 1	50	50	50		
Hour 2	30	0	50	80	160
Hour 3	30	0	50	80	160
Hour 4	40	50	50	140	160
Hour 5	50	50	50	150	160
Hour 6	50	50	50	150	160
	250	200	300	750	960
All RA Resources				**2190**	**2700**

The calculation demonstrated above allows us to determine the annual target availability value in a manner that weights the availability of each resource by the amount of RA capacity MW sold by that resource. The formula that reflects the RA MW of each resource is shown below:

X = total of all RA capacity MW **available** over all compliance hours of the reference period and all resources subject to the SCP

Y = total of all RA capacity MW **sold** over all compliance hours of the reference period and all resources subject to the SCP.

Then the annual target availability rate is X/Y (or 100 * X/Y as a percent).

Based on the example above:

X = 530 + 510 + 400 + 250 + 200 + 300 = 2190
Y = 600 + 540 + 600 + 300 + 360 + 300 = 2700

Then X/Y = 2190 / 2700 = 0.8111 or 81.1%.]

Thus, the annual target availability value in this example is 81.1%.

Monthly Assessment of Actual Availability

An assessment of each resource's availability during the applicable peak hour period against the annual target availability standard will be done each month. The assessment will look at each RA resource's availability during the RA peak hours in the month using either

- SLIC data (for resources 10 MW or greater), or
- Data submitted by the resource (for resources less than 10 MW)

"Available" will be defined as not being on a Forced Outage during the applicable peak hour period to an extent that would prevent the resource from providing its full RA capacity value if called upon by the ISO. The formula for determining "availability" will use the MW value for each RA resource of the RA capacity that has been sold. The formula does not use the nameplate capacity, Pmax capacity, Qualifying Capacity, or Net Qualifying Capacity value.

Availability for each RA resource for each month will be determined by calculating: (a) the total RA capacity MW available over all compliance hours of the month, divided by (b) the total RA capacity MW designated in the RA plan for the same hours. Thus a resource is considered 100% available if it has no Forced Outages during the defined peak hours in a month. Any Forced Outages during peak hours during a month will decrease the resource's availability from 100% available. Maintenance Outages and Scheduled Maintenance taken in a month will not decrease the resource's availability from 100% available.

Stakeholders have asked the ISO to provide additional detail regarding how Outages are treated in SLIC, and, in particular, how Forced Outages are determined versus "non-Forced Outages" for purposes of the SCP availability standard. For example, stakeholders are concerned with whether Outages submitted in SLIC for ambient de-rates or to inform the ISO of "forbidden ranges" after startup of MRTU will be treated as Forced Outages under the SCP availability standard. Stakeholders also have asked if the ISO believes that SLIC needs to be modified to implement the availability standards. To address these topics, the ISO provides the information below.

First, the ISO does not think that SLIC needs to be modified to implement the availability standard. The current SLIC functionality is sufficiently robust to handle the proposed SCP availability standard methodology.

Second, currently, Outages submitted using "Normal Cards" and "Ambient Cards" when submitted in SLIC are not classified as Forced Outages. This functionality will not change under MRTU. Outages submitted in SLIC using the Normal Card (for example, to inform the ISO of "forbidden ranges" under MRTU) will not be classified in SLIC as Forced Outages, nor will those Outages be counted against the hourly availability of the resource under the SCP availability standard (see the discussion below). Normal Cards are used to document holding points when a resource cannot be dispatched due to engineered holding points. Normal Cards are each good for only a four-hour period. Normal cards are used to work around the limitation of the ISO system that cannot recognize things such as forbidden ranges and ramping constraints. The Net Dependable Capacity as defined by NERC is still available to the ISO.

However, although Outages submitted using Ambient Cards will not be classified in SLIC as Forced Outages, these Outages will be counted against the hourly availability of the resource under the SCP availability standard (see the discussion below). In contrast to the submission of Normal Cards where the Net Dependable Capacity is still available to the ISO, in the case of ambient de-rates the capacity is not fully available to the ISO. The NERC definition of Net Dependable Capacity specifically includes the ambient limitations. NERC Definitions (from Generating Unit Statistical Brochure dated October 2008):

Net Maximum Capacity - NMC
Capacity a unit can sustain over a specified period when not restricted by ambient conditions or equipment deratings, minus the losses associated with station service or auxiliary loads.

Net Dependable Capacity - NDC
NMC modified for ambient limitations.

There are two ways that an Outage can be classified as a Forced Outage.

- If the Outage is not submitted 72 hours or more in advance of an Outage that Outage is considered to be a Forced Outage. In other words, there is a timeline basis to determining whether an Outage is a Forced Outage or not a Forced Outage.[9]
- A resource might request an Outage 72 hours or more in advance of a requested Outage, but, if the ISO does not approve the Outage (this could occur if system conditions will not allow the ISO to reliably operate the system if the Outage were to be taken) than, if the resource goes out on an Outage less than 72 hours in advance of the Outage, that Outage is classified as a Forced Outage.

As discussed above, the key determinant of whether an Outage is a Forced Outage is timing (the 72 hours threshold). The ISO protocol for Outages, including the timeline, is described in Procedure T-113[10] If an Outage occurs and the resource operator is not able to provide the 72-hour notice to the ISO, and a resource operator is entering the Outage in SLIC, the SLIC application will display a popup message that notified the resource operator that the Outage will be considered to be a Forced Outage and will ask if the resource operator wants to continue with the data entry (i.e., there is no ambiguity about whether any Outage submitted is a Forced Outage, or is not a Forced Outage – the resource operator knows as the data is being submitted how the Outage will be classified).

The ISO has designed SLIC to include functionality that will not classify certain types of Outages as Forced Outages, regardless of the time when the Outage is submitted, provided that the resource operator codes the data correctly when it is entered.[11] This functionality has been in place for a number of years. This functionality is described below.

- Normal Cards: "Normal Cards" are provided to recognize engineered limits on resources. The Normal Card was designed and has been in place for years to allow "hold points" for designed engineered limitations in a resource. Therefore, if a resource operator submits a Normal Card the Outage is not classified as a Forced Outage. The Outage will look like a Forced Outage at first when the data is being submitted to SLIC due to the timeline, but by using the proper code on the drop down list of the Normal Card, the Outage will not be recorded in SLIC as a Forced Outage. Instead, the Outage will be shown as a Normal Card, and

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[9] The specific language regarding timing from section 3.4 of Procedure T-113 is as follows: "submit the request for CAISO approval no later than 1130 hours at least three (3) working days prior to the starting date of the Outage."

[10] Procedure T-113 can be found at the following link: http://www.caiso.com/docs/2002/01/29/2002012913333822467.pdf

[11] The ISO for years has offered and conducted extensive training to plant operators on how to use SLIC and submit Outages, including the types of coding described in this proposal.

Outages associated with a Normal Card will not count against a resource's availability relative to the availability standard. Normal Cards can be used by resources such as combined cycle resources that want to enter data into SLIC relative to forbidden ranges after startup of MRTU.[12]

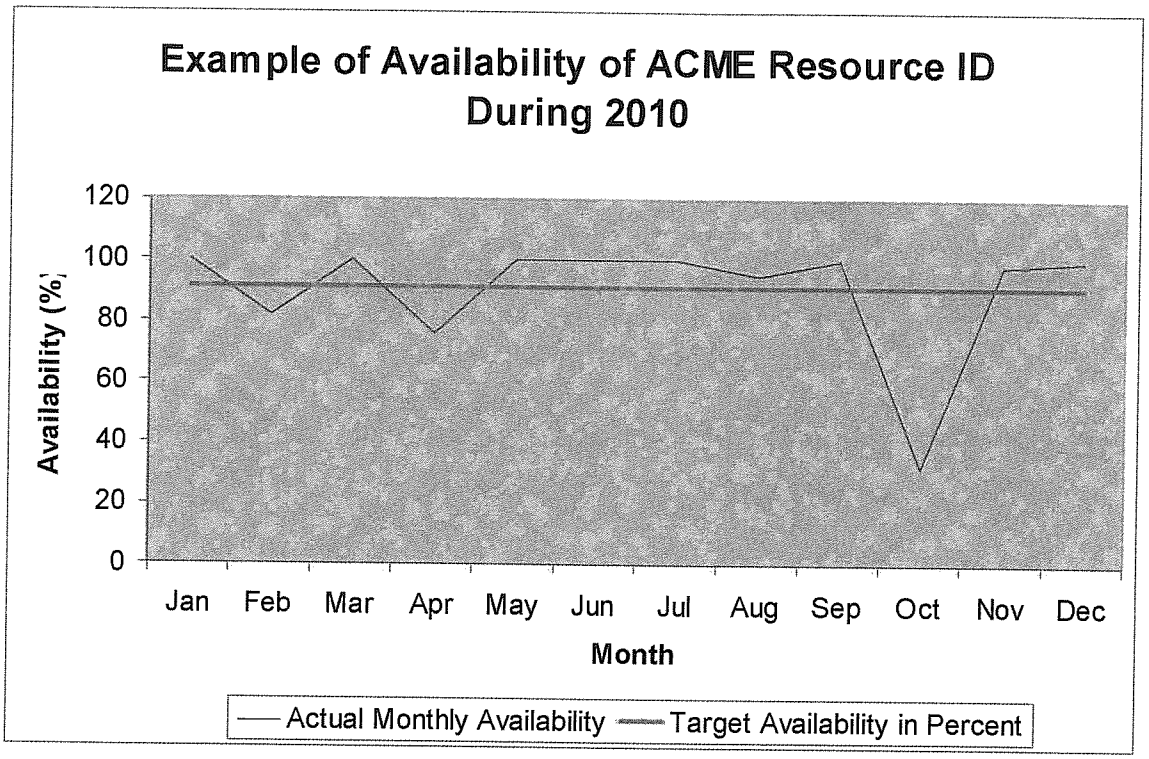
- Ambient Card: Ambient Cards are used for situations where the Outage is outside of the control of the resource operator. The Ambient Card is intended for limitations on the resource, such as those caused by temperature, weather and lack of fuel. If the Ambient Card is submitted with the proper codes, even if not 72-hour notice has been provided to the ISO, that Outage will not be recorded in SLIC as a Forced Outage. The Outage will be recorded as an Ambient Card. As was discussed further above, Outages associated with an Ambient Card will count against a resource's availability relative to the SCP availability standard.

The actual availability of each RA resource each month will be calculated as described below.

- The ISO will assess each resource's operational status during the applicable peak hour period for each month using the Outage data provided by the resource's Scheduling Coordinator to the ISO through the SLIC system. Each hour during the applicable peak hour period that the resource has no Forced Outages that impair its contracted RA value will be counted as the resource having a 100% availability for that hour.
- For each hour during the applicable peak hour period that the resource is partially or fully curtailed a pro-rated percentage will be calculated. For example, a 100 MW resource that is available for 50 MW for the hour during an applicable peak hour period will be counted as 50% available, or the same resource curtailed to 0 MW for 30 minutes will also be counted as 50% available.
- The ISO will calculate a monthly average availability for each resource during the applicable peak hour period. The calculation will be based on the actual hours that the resource was available during the applicable peak hour period compared to the target available hours during the applicable peak hour period for that month.

The actual availability of each resource each month during the applicable peak hour period will be calculated and compared to the target availability. In months where there are no Forced Outages, the actual availability of the resource would be above the target availability. In months where a Forced Outage occurs during the applicable peak hour period, the actual availability would be less than 100%. The graph below shows this relationship (shown in percentage terms to easily convey the concept - actual operational status during the applicable peak hour period would be based on hours in the applicable month, not percentage).

[12] Normal Cards are described in the ISO SLIC Web Client document posted on the ISO web site at the following link: http://www.caiso.com/docs/2004/01/28/2004012807111918934.pdf



The formula for determining the availability of a resource during the applicable peak hour period in any given month will be as follows:

$$A_{jn} = \frac{\sum \text{Hourly RA MW Available from Resource j in month n}}{\text{(RA MW Capacity of Resource j) x (Total Compliance Hours of Month)}}$$

Where A_{jn} = Availability Percentage of Resource j in Month n during the applicable peak hour period.

As only peak hours will be used in the assessment, the Hourly RA MW Available from Resource and Total Compliance Hours of Month will only include peak hours. In essence, the ISO will sum the MW that were available in the month for only the defined peak hours.

An example of the monthly assessment is provided below.

Example of Monthly Assessment of Actual Availability

Assumes a six-hour month.
Assumes Unit A sold 100 MW as RA.

Unit A

Hour 1	100	
Hour 2	90	90MW for full hour
Hour 3	100	
Hour 4	70	▶ 100MW for 42min / 0 MW for 18min = 70MW
Hour 5	80	▶ 100MW for 35min / 50MW for 14min /0 MW for 11min = 80MW
Hour 6	100	

530/600
88.3% Monthly Availability

Performance Incentives

During the course of this stakeholder process the ISO considered both financial and physical penalties. The two approaches are summarized below.

Penalty	Description
Financial Penalty	Charge assessed during compliance period or just after its conclusion for not meeting the standard within the compliance period
Physical Penalty	Adjustment to Net Qualifying Capacity for subsequent compliance period for not meeting the standard within the current compliance period

The ISO proposes to add a financial penalty to the ISO Tariff as a performance incentive. A financial penalty is supported by a majority of stakeholders, who believe it provides the correct incentive to be available. There is very little support among stakeholders for a physical penalty. Failure to achieve the target availability value in any month during the compliance year will result in a financial penalty from the ISO to the Scheduling Coordinator. Each RA resource will have an incentive to ensure that it performs to limit its exposure to the financial penalty

The proposals for a financial penalty that were provided by stakeholders in previous rounds of stakeholder comments on the SCP included the following elements:

- Each resource's availability should be compared to actual fleet availability;
- Resources with lower-than-standard availability during peak load periods should receive penalty charges, while resources with higher-than-standard availability should receive credits; and
- Resources with availability of less than50% should have a penalty applied to entire RA capacity; those with availability of greater than 50% but less than the target should have a penalty applied to a portion of their RA capacity.

The ISO has used many of these principles in developing its proposed availability standard and performance incentives.

A financial penalty, or potentially a bonus payment, will be applied to Scheduling Coordinators of RA resources. A financial penalty will be applied each month to the SCs of resources that do not meet the target availability, as part of the first feasible settlement statement after the conclusion of the applicable month. A potential bonus payment will be made each month (to the extent that penalty funds are available) to resources that exceed the target availability. The payment will be made as part of the first feasible settlement statement after the ISO has received payment on the assessed penalties. Because the bonus payment program is to be self-financing, the ISO will wait until it has received the penalty funds before paying out those funds to eligible resources (to the extent such funds are available).

The intent for the financial penalty charge funds and potential bonus payments is that each month would be treated separately from other months, with its own "account" of financial penalty funds collected and potential bonus payments going out (to the extent such funds are available) to the RA resources that exceed the target availability. The "account" for each month would either be paid out to RA resources that have exceeded the target availability or put it into the RT neutrality and paid back to measured demand, i.e., any excess not paid out to resources that exceed the target availability will be paid out to measured demand.

A dead band of 5% will be used around the target availability (2.5% on either side of the target availability value) to limit the amount of penalty and bonus payment assessments. The dead band provides for penalties and bonus payments to only be assessed when resources perform significantly better or worse compared to the established availability standard.

The "price" value in the financial penalty formula will be the replacement cost (or ISO "backstop" cost) of capacity that is established in the ISO Tariff. That value is currently $41/kW-year, as established in the Interim Capacity Procurement Mechanism ("ICPM") provisions.[13] The ISO intends that the price value of the successor to the ICPM would be used in the SCP financial penalty formula.

The penalty formula will work as shown below. It will be a monthly charge (and will recognize the dead band).

Actual Availability	Formula[1]
For resources with availability of 50% and up to the target availability percent, recognizing the dead band	(Target Availability- Dead Band - A_{jn}-) x (RA capacity in kW) x (ISO backstop replacement cost of capacity)
For resources with availability less than 50%	(RA capacity in kW) x (ISO backstop replacement cost of capacity)

Where A_{jn} = Availability of Resource j in Month n

The funds collected from the application of penalty charges will be allocated to RA resources that exceed the dead band for target availability. The funds will be distributed by calculating a monthly bonus rate and applying it to the amount of capacity that exceeded dead band above the target availability standard (i.e., a 90% target and with 5% dead band will provide a potential bonus to those RA resources that exceeded a 92.5% availability rate). The monthly bonus rate will be determined by dividing the total monthly penalty dollars by the sum of MW of all resources that exceeded the target plus dead band. Resource bonus payments will equal the monthly bonus rate times the MW availability above the target plus dead band level and calculated as shown below.

A monthly bonus rate will be determined by dividing total monthly penalty dollars by the sum of all MW exceeding target plus dead band of all RA resources.

- Rate = Total Revenue $ / $\sum_j$ [((Target + Dead Band) - A_{jn}) x RA MW_j]
- $Payment_j$ = Rate x ((A_{jn} – (Target + Dead Band)) x RA MW_j)

  Where A_{jn} = Availability of Resource j in Month n

[13] The ICPM tariff, including the pricing provisions, sunset on December 31, 2010.

Example

- A 90% target with a 5% dead band will provide a potential bonus payment to RA resources that exceed a 92.5% availability rate (90% plus 2.5% means resources that achieve greater than 92.5% are eligible to receive a bonus payment)
- 500 MW resource available 100% of time during a month would receive a bonus payment = Monthly Bonus Rate *(100%-92.5%)*500

The ISO desires to provide an incentive to RA resources to strive to achieve an availability level greater than the target availability, and hence be eligible to receive potential bonus payments. The ISO also recognizes that there could be instances where in a particular month many RA resources have been assessed a financial penalty and there are just a few RA resources that have exceeded the target availability. This situation could lead to a potential windfall to these few RA resources. Therefore, the ISO proposes to "cap" the potential bonus payment each month so there is not a windfall to just a few entities that are above the target availability value and return any excess financial penalty funds by putting those funds into RT neutrality and paying the funds back to measured demand. The ISO also recognizes that it should be careful not to establish incentives for LSEs to procure poor quality resources for RA purposes that may trigger very large financial penalty charge proceeds, a portion of which may flow back to the LSE under the "cap" approach described above. To provide a strong incentive to RA resources to strive to exceed the target availability, while at the same time balancing the amount that might be returned to measured demand, the ISO proposes to use three times the penalty rate that is charged to RA resources that fail to meet the target availability as the maximum rate to pay the RA resources that exceed the target availability. Thus RA resources that exceed the target availability never get paid more per MW than three times the penalty rate, but may get less if not enough financial penalty charge funds are collected. If there is any remaining surplus, then that surplus would be put it into the RT neutrality and paid back to measured demand. The use of three times the penalty rate as a cap should provide a strong incentive for RA resources to shoot for, and should, in most cases, mitigate any large windfall amount that might accrue and be paid back to LSEs.

In the case of a month where there are financial penalty funds, but no RA resource has exceeded the target availability, then those funds will be placed into RT neutrality and paid back to measured demand.

Reporting

The ISO proposes to include the following information in an annual report that will be posted by June 1 of each year:

- Annual target availability value; and
- Information on the average availability of the RA fleet, total financial penalties assessed; and total bonus payments paid out.

Deferral for Wind, Solar, QF and Demand Response Resources

There are several types of RA resources whose QC value is calculated each year based on historical actual hourly output data, which, by its nature, may include some outage hours that occur during the period during which actual output is measured in determining

the QC. These RA resources include wind, solar and Qualifying Facility resources. Therefore, if the availability standard discussed herein were to be applied to these types of resources, then those resources may be put in a position where outages may be double-counted. The ISO supports a uniform standard that will apply to all RA resources, but recognizes that some changes may need to be made to the CPUC and LRA counting procedures to reflect that the QC of these types of resources is already de-rated to reflect actual output and may include some level of outages. Therefore, the ISO proposes that the availability standard and incentives initially will not apply to RA resources whose QC value is calculated each year based on historical actual hourly output data that may include some outage hours that occur during the period during which actual output is measured. This means that wind, solar and Qualifying Facility RA resources initially will not be subject to these the availability standard and incentives of the SCP. The deferral of these provisions to these types of RA resources is temporary, and in the future the ISO will revisit the applicability of these provisions to wind, solar and Qualifying Facility RA resources. The ISO will coordinate with the CPUC and LRAs on changes that may be made in the future to prevent double-counting of outages.

Several types of DR resources currently count for RA. Some of the RA DR resources have an ISO Resource ID, but most of the RA DR resources do not have an ISO Resource ID nor do they report outage data to the ISO. Rather than have some portion of RA DR resources be subject to the availability standard and incentives at implementation of the SCP and have other DR resources that are not subject to these provisions because of factors such as some DR resources do not have a Resource ID and some do not report outage data, the ISO proposes to defer applicability of these provisions to RA DR resources until the time when dispatchable DR functionality has been implemented under MAP after MRTU startup. The ISO will revisit applicability of these provisions to RA DR resources in the context of, or in parallel with the DR proceeding, as well as the timing of implementation of dispatchable DR functionality.

Exemption for Liquidated Damages Energy Contracts

Liquidated damages energy ("LD") contracts are financial contracts and are not physical contracts tied to a specific resource. Energy from LD contracts is delivered internal to the ISO and the ISO does not know where the LD contract was sourced from. Furthermore, this type of RA capacity is not subject to outage reporting requirements and does not have associated outage data upon which to measure availability and apply the financial incentives. The ISO supports a uniform standard that will apply to all RA resources, but recognizes that since these type of RA resources are not represented by a physical resource, it is not possible to apply the availability standard and incentives to LD contracts. The ISO notes that the quantity of such RA capacity has decreased each year over the last three years and the use of LD contracts for RA purposes has been phased out by the CPUC as of 2008, i.e., 2008 was the last year that these types of resources were allowed to count for RA by the CPUC (there is one exception, for CDWR contracts). The ISO strongly encourages LSEs to not procure these contracts for RA purposes.

Different Approach for Non-Resource-Specific Imports

Non-resource-specific imports that are not tied to a specific resource pose a dilemma for the ISO[14]. The root of the dilemma is that such RA capacity is not subject to outage reporting requirements and does not have associated outage data upon which to measure availability and apply the financial incentives. At the same time, the quantity of this type of RA capacity is significant enough that the ISO is reluctant to simply waive the availability standard and financial incentives for this capacity. The ISO would therefore like to determine a way to measure availability for this type of import capacity in a manner that is meaningful and reasonable given the absence of an associated physical supply resource, and that will provide appropriate financial incentives to maximize availability.

The ISO proposes to measure availability for non-resource-specific RA resources based on the offer of the capacity into the ISO markets. Under MRTU, RA imports must offer into the Day-Ahead market the full amount of their RA capacity and will have to establish a Resource ID to be able to conduct these transactions. Since imports have to schedule with a Resource ID under MRTU, the ISO could track the extent to which each RA import resource offers into the Day-Ahead market the full amount of its RA capacity. Thus non-resource-specific RA imports could be held to an annual target availability value and the ISO could apply penalties and allow these resources to be eligible for potential bonus payments. The ISO proposes using an annual target availability value of 100% of RA hours for this type of RA resource. If there is a path or branch group de-rate during a month, it will not be counted against the non-resource-specific RA import resource's availability in that month.

7 UNIT SUBSTITUTION

The ISO proposes to adopt a provision to allow a supplier of RA capacity that is tied to a specific generating resource the ability to substitute an alternative resource in the event the RA resource is on an outage, and by means of such substitution to avoid counting the outage of the RA resource toward the monthly availability assessment. This provision will offer reliability benefits by encouraging the availability of otherwise non-RA capacity when RA resource outages occur, provided the substitute is comparable to the original RA resource. Comparability will be determined based on a pre-approval process by the ISO for potential replacement units.. This will be done so that the ISO would not need to assess the acceptability of the substitute in real time. In addition, the ISO will allow such substitution only in the day-ahead time frame. As such the supplier would need to submit a request for substitution before the close of the IFM. The ISO would have the discretion of approving this request.

8 CREDIT REQUIREMENTS

Most stakeholders who commented did not see the need for credit requirements. A few agreed that credit requirements would be necessary if financial penalties were assessed and suggested they be netted with the SCs entire portfolio.

[14] Note that resource-specific RA imports will be treated like other RA resources (such as thermal resources) and will be subject to the availability standard and incentives. Path or branch group de-rates in a month will not affect the availability calculation for resource-specific RA imports during that month.

In the updated straw proposal the ISO suggested that since the penalties due to unavailability would not be used to fund the procurement of a backstop, no specific credit requirement should be necessary for Scheduling Coordinators (SCs). At the MSC/Stakeholder meeting the SCP team updated its proposal, indicating that SCs for capacity resources should be responsible for creditworthiness due to the obligation to pay the bonus incentive to SCs of resources to exceed the target availability metric.

Based on stakeholder comments and additional internal discussions, the ISO believes that there is no need for a "special" credit policy for SCP. The general credit policy, as described in Section 12 of the ISO tariff, should provide sufficient credit coverage. This is based on the following considerations:

- SCP performance penalty will appear as a new charge type on the monthly invoice, similar to the penalty for un-instruction generation deviation, and is part of the liability of each SCs portfolio.
- Most RA providers are creditors of the ISO. The penalty may be netted out with the provider's credit on the same invoice on the same invoice.

Additional details about the general credit policy are provided in the Business Practice Manual for Credit Management.

9 TRANSITION ISSUES

LSEs sign bilateral contracts with resources to meet their RA obligations. While most stakeholders support the concept of SCP (which standardizes availability standards in the ISO tariff rather than requiring unique language in each RA contract), some parties are concerned that upon SCP implementation they will be exposed to conflicting or duplicate availability standards and incentives due to the provisions in their existing contracts. It is our understanding that some current contracts contain availability standards that may expose contracting parties to double penalties. In other contracts, SCs or LSEs may not be able to pass penalty assessments on to resource owners.

In our recent stakeholder forums, a number of stakeholders have expressed a desire to allow existing contracts a transition period before moving to SCP. To this end the ISO requested that stakeholders offer proposals describing more precisely how appropriate transitional arrangements might be structured to address these concerns, and in response received only one specific proposal (a set of joint comments by NRG Energy, Reliant and SDG&E in the last round of comments). On December 12th the ISO sent out a market notice with a questionnaire to gather information related to existing resource adequacy contracts that stakeholders felt would need grandfathering. The ISO received a total of 20 responses, 12 submitted by RA Resources and 9 from LSEs with RA contracts (one entity filled out both types of questionnaire).

Based on the data received the ISO has developed a proposed solution to the transition issue that enables parties to grandfather their contracts while still providing additional certainty that RA capacity will be available to the ISO. These are the elements of the ISO's proposal:

Contracts signed:	Grandfathering Status
Before January 1, 2009	Exemptions will be provided to RA contracts for which the

	contracting parties certify that the availability standards and incentives in their contracts are at least equal to the requirements set forth in the SCP tariff language. This exemption lasts for the life of the contract. The RA capacity in these contracts will not be tradable.
Between January 1, 2009 and FERC approval of SCP	Exemptions will be provided to RA contracts for which the contracting parties certify that the availability standards and incentives in their contracts are at least equal to the requirements set forth in the SCP tariff language. This exemption lasts for 5 years, until the 2014 annual RA showing. After that point the RA capacity from these contracts will be required to comply with the SCP tariff language. Until this time, the RA capacity in these contracts will not be tradable.
After FERC approval of SCP	No grandfathering will be available for these contracts.

Stakeholders who require a "transition period" from their existing RA contracts to the SCP will be able to exempt their contracts based on the timeframes and limitations provided in the table. The ISO will require a signed affidavit by an executive from each party to a contract certifying that the availability standards and incentives are at least as robust as those in the tariff provisions for SCP. These documents will be due to the ISO prior to the annual showing 2010, at which time the ISO will establish an expiration date for each contract. A market notice will provide the details of this schedule. This certification provides the ISO with assurance that a certain level of reliability will be maintained.

Contracts that were signed before January 1, 2009 and did not have an opportunity to consider the upcoming SCP availability standards when their contracts were signed, will be able to maintain their exemptions for the life of the contract. Once the contract expires, or parties decide to end their exemption, the RA capacity associated with that contract will be subject to the SCP tariff provisions.

Contracts that were signed prior to FERC approval of the SCP tariff provisions, but after January 1, 2009 will also have the benefit of grandfathering, although these contract holders will be limited to a 5 year exemption. Thus if such a contract is submitted in fulfillment of RA requirements for the 2014 delivery year, it will be subject to the SCP provisions.

10 OTHER ISSUES

Metered Subsystems (MSS)

The SCP availability standard and incentives cover Metered Subsystems the same as any other type of LSE. With regard to Load Following MSS the current BPM Section 6.3 and Tariff Section 40.2.4 explain that Load Following MSS must provide an annual RA Plan but no monthly submissions are required. Section 40.3 subjects Load Following MSS to Local Capacity Area RA requirements, whereas Section 40.6 of the tariff exempts Load Following MSS from the RA must offer requirement. The ISO expects therefore that the SCP availability standard and incentives would apply only to the Local Capacity Area RA capacity submitted by a Load Following MSS.

RA less than Pmin
Section 40.4.3 of the MRTU tariff describes the general qualifications for supplying NQC. One situation that had not been contemplated when writing this section was when a resource is contracted for an RA amount that is less than the Pmin of the committed unit. In an upcoming MRTU 205 filing with FERC, the ISO remedies this omission by adding language that "For a resource with contractual Resource Adequacy capacity less than Pmin be available to the ISO for commitment or dispatch at Pmin subject to tariff provisions for Bid Cost Recovery so that the resource's Resource Adequacy capacity can be utilized as required by this CAISO Tariff."

RA Registry – This is an implementation feature that may be deferred for a future release.

Bulletin Board Feature – This is an implementation feature that may be deferred for a future release.

11 NEXT STEPS

Currently the market design process is on track to file the Standard Capacity Product tariff changes with FERC in February 2009. While some stakeholders, including AReM feel that this schedule is critical to meet in order to enable parties to use the product for the 2010 Annual RA showing, many others (including Dynegy, Calpine, Southern California Edison, Mirant, CFCMA) have expressed concern that the ISO should ensure that the product is thoroughly developed before filing it at FERC. Their sentiment is that they would rather get the filing done right the first time, rather than get it done quickly only to revisit and correct the product later. The ISO agrees with this sentiment and will assess the level of stakeholder support of the final proposal after the January 15th conference call to determine whether to continue under the current schedule or to extend the stakeholder process to further develop the SCP proposal.

This is the current schedule:

January 8 – Publish Final Draft Proposal
January 14 – Written comments due to SCPM@caiso.com
January 15 – Conference Call
February 10, 11 – Board of Governors Decision
February – File Tariff language.

California ISO
Your Link to Power

White Paper

Standard Resource Adequacy Capacity Product

White Paper
February 6, 2008

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1 INTRODUCTION

This purpose of this white paper is to clarify and update specific topics related to the Standard Capacity Product (SCP) in preparation for the Final Draft Final Proposal which is scheduled for posting on February 27, 2009. That document will reflect the complete Standard Capacity Product proposal which will be used to prepare for the ISO Board of Governors meeting scheduled for March 26, 27, 2009.

The SCP topics discussed in this paper are:

- Clarification to the Target Availability Value calculation;
- Additional information regarding the Availability Standard and Incentives;
- Updated discussion regarding the availability target for the Non-Resource Specific Imports;
- Clarifications regarding Ambient Outages relative to the determination of a resource's actual availability.
- Additional details about the Unit Substitution Process;
- Updated Grandfathering proposal to facilitate the transition to SCP.

The ISO is requesting that stakeholders submit their comments on this proposal to SCPM@caiso.com by February 20, 2009.

2 AVAILABILITY STANDARD, CHARGES AND CREDITS

Target Availability Value

There will be a unique target availability value established for each month of the compliance year (12 values for each year), calculated using the actual RA fleet availability for the RA resources (excluding Use Limited Resources and non-resource specific imported RA) during each respective month over each of the past three years. In its previous proposal, the ISO proposed a single annual target value. The ISO now proposes a unique value for each month of the year as this will provide a more equitable target for resources to be measured against as different months of the year have different outage profiles. This change should mitigate stakeholder concerns that a single annual target value is unfair and may not be nearly revenue neutral to a resource that actually achieves an actual annual availability that is equal to the target annual availability.

The target availability value will be calculated using an RA fleet that includes RA resources that have been grandfathered so that there are ample RA resources in the calculation (if we exclude grandfathered RA resources, then the RA fleet may be only a few hundred RA resources and not comparable to the 600-resource RA fleet that is currently supplying RA capacity).

Two types of resources will be excluded from this calculation, Use Limited Resources (ULR) and non-resource specific imported RA. The reason for excluding ULRs from the availability target calculation hinges on the fact that the historical outage data for these types of resources does not differentiate between forced outages and outages due to energy limits. At the point when ULR outage data provides this type of distinction, it will be included in the target calculation. The non-resource-specific RA import resources will

not be included in the calculation of the target availability value (these types of resources have their own unique metric).

Availability Standard and Incentives
The financial penalties and bonus payments will be settled all within the same settlement month. After consulting internally with its Finance department, the ISO has concluded that there is no need to wait until the penalty funds are received to later pay out the bonus payments.

The ISO clarifies the following regarding the payment of incentives: The ISO expects the amount of any excess funds in a month beyond what is paid out as bonus payments to be very small, if any, as the cap is three times the financial penalty rate; the ISO believes it is efficient to establish a simple mechanism to pay out this small amount of funds each month if there are any funds to pay out as excess; and the ISO has chosen to pay the funds to load because load is the entity that is paying for RA capacity (both RA procurement and backstop procurement).

The ISO will change the nomenclature in the SCP from "financial penalties" and "bonus payments" to "non-availability charges" and "availability credits."

Non-Resource-Specific RA Imports
The ISO clarifies that non-resource-specific RA imports are to be separated into a distinct SCP category. This category will have its own self-funded account where monies that come in from non-availability charges assessed to non-resource-specific RA imports will be used to fund availability credits to non-resource-specific RA imports. Separate accounting is necessary as the metric for non-resource-specific RA imports is different than the metric for other types of SCP RA resources and needs to be treated separate from the other SCP capacity.

The target availability for non-resource-specific RA imports will be set at 100% with no dead band.

The incentive mechanism for this category will use the same $/MW/hour penalty rate as for internal generators (i.e., the mechanism that will apply generally to SCP capacity for which non-availability charges and availability credits are applicable).

The money collected from non-availability charges assessed to non-RA imports will be used to provide availability credits to non-resource-specific RA import resources that achieve 100% for the period, with a ceiling rate comparable to the rate for internal generators. If there are excess funds, then the same approach will be used as for internal generators.

The non-resource-specific RA import resources will not be included in the calculation of the target availability value for other RA capacity as these resources have their own unique metric.

It is assumed that any resource-specific imported RA capacity will be treated like internal generators for purposes of SCP - they would use SLIC to report Outages, and the ISO would insert default bids for them if these resources fail to offer their RA capacity and are not on an Outage.

Ambient Outages

An *Ambient* Outage is a type of Outage where the cause is due to ambient conditions outside of the resource operator's control. Its purpose is to classify an Outage in such a way that it does not require a submittal of a 48-hour Forced Outage report per the ISO tariff and is not publicly posted as a *Forced* Outage if it would be considered *Forced* according to the request timeline for submitting Outages.

In order for an Outage to be classified as an *Ambient* Outage, it must fall in the Forced Outage timeframe *and* it must use predefined cause codes that describe ambient conditions.

The ISO proposes that Ambient Outages, with the exception of those caused by Uncontrollable Forces (as defined in Appendix A to the Tariff) will count against the availability of all SCP resources. Uncontrollable Forces are defined as "Any act of God, labor disturbance, act of the public enemy, war, insurrection, riot, fire, storm, flood, earthquake, explosion, any curtailment, order, regulation or restriction imposed by governmental, military or lawfully established civilian authorities or any other cause beyond the reasonable control of the CAISO or Market Participant which could not be avoided through the exercise of Good Utility Practice."

Consideration will be made in assessing the actual availability of SCP resources that qualify as use-limited resource under the ISO Tariff. The ISO proposes that ambient outages for use limited resources (ULR) will be counted against their availability as they would for any other SCP resource, but only up to a point. Once a use limited resource encounters an energy limit constraint, ambient outages would no longer count against the SCP availability determination for the relevant month. The rationale for this exemption is as follows. Use limited resources provide monthly advisory use plans to the ISO that indicate their energy limitations. The ISO uses this information to determine how to best utilize the resources to meet system needs. These resources are expected to provide the full amount of RA capacity that they are contracted to supply within the energy limit constraints of the resource. Therefore, until an energy limit constraint is encountered, the resource is expected to provide the full amount of RA capacity that it has sold.

To ensure that ULRs provide reasonably accurate use plans to the ISO, the ISO will assess the accuracy of resource use plans compared to actual operation of the resource. The chronic submittal of inaccurate use plans will be brought to the attention of the resource and any relevant LRAs.

The following is a summary of the SCP Application of Ambient Outages:

- Ambient Outages caused by Uncontrollable Forces will not be counted against availability
- Ambient Outages that are due to the fact that the ISO has requested a resource to run up to the total of their operational environmental limit will not be counted against availability
- Calculation of the amount of ambient derate that will be applied toward a non-availability charge (penalty)
    - During the month, the number of MWs of ambient derates will be totaled for each resource.

- Ambient de-rates due to Uncontrollable Forces will subtracted from the total
- Ambient de-rates due to exceeding use-limited limits will be subtracted from the total
- The remaining amount will be applied toward the non-availability charge

For each resource each month:
Ambient Outages counted against availability = Total Ambient Outages – Uncontrollable Forces – exceeding set limits

The ISO will review the current ambient outage SLIC codes and will modify them as necessary for implementation of the SCP policy described above.

3 UNIT SUBSTITUTION

The ISO's Draft Final Proposal included a provision to allow a supplier of RA capacity that is tied to a specific generating resource the ability to substitute an alternative resource in the event the RA resource is on an outage, and by means of such substitution to avoid counting the outage of the RA resource toward the monthly availability assessment. This provision will offer reliability benefits by encouraging the availability of otherwise non-RA capacity when RA resource outages occur, provided the substitute is comparable to the original RA resource. Comparability will be determined based on a pre-approval process by the ISO for potential replacement units. This will be done so that the ISO would not need to assess the acceptability of the substitute in real time. In addition, the ISO will allow such substitution only in the day-ahead time frame. As such the supplier would need to submit a request for substitution before the close of the IFM. The ISO would have the discretion of approving this request.

Clarifications to the Draft Final Proposal

- Resources designated to meet local RA needs will need to pre-qualify the units that could be substitutable in the event of a forced outage. A template will be developed for submitting these requests to the ISO. It is contemplated that they will be required with the annual showing and will be approved prior to the beginning of the year.
- For local substitutions, an ISO evaluation will be done to ensure that the substitute resource is electrically equivalent (connected at the same bus or otherwise suitable).
- Resources designated for system RA needs will not be required to pre-qualify alternate units for substitution. When a system RA unit has an outage that may count against its availability, the supplier, prior to the close of the IFM, may request the use of a non-RA unit to be used in the place of the original unit. The ISO will make every effort to accommodate these requests to the extent that they provide the same level of reliability as the originally designated resource. For example if a supplier requests a substitute unit that would still cause the ISO need to procure backstop capacity, that unit substitution request would be denied.
- SCs for resources could request unit substitution in the event of a forced outage to avoid non-availability charges. Also, the ISO, at its discretion, could contact the SC of a resource and request a substitution in order to avoid backstop procurement.

4 TRANSITION ISSUES

This section begins with a summary of the grandfathering proposal that was presented in the January 7 Draft Final Proposal followed by most recent revisions to that proposal.

January 7 Draft Final Proposal.

Contracts signed:	Grandfathering Status
Before January 1, 2009	Exemptions will be provided to RA contracts for which the contracting parties certify that the availability standards and incentives in their contracts are at least equal to the requirements set forth in the SCP tariff language. This exemption lasts for the life of the contract. The RA capacity in these contracts will not be tradable.
Between January 1, 2009 and FERC approval of SCP	Exemptions will be provided to RA contracts for which the contracting parties certify that the availability standards and incentives in their contracts are at least equal to the requirements set forth in the SCP tariff language. This exemption lasts for 5 years, until the 2014 annual RA showing. After that point the RA capacity from these contracts will be required to comply with the SCP tariff language. Until this time, the RA capacity in these contracts will not be tradable.
After FERC approval of SCP	No grandfathering will be available for these contracts.

Updated Proposal

Contracts signed:	Grandfathering Status
Before January 1, 2009	Exemptions will be provided for the term of the RA contracts. Renewals and evergreen type extensions will not extend the term of the grandfathering. Resources will be required to certify the start date of the contract, the expiration date and the amount of capacity that will be grandfathered.
After January 1, 2009	No grandfathering will be available for these contracts.

In addition to the revisions provided in the table above, the ISO has also considered the case of a resource that has RA capacity for grandfathered contracts along with RA capacity that is not grandfathered and is subject to availability standards, charges and credits of the Standard Capacity Product. The follow examples show how the availability will be impacted when a resource with this type of arrangement has an outage that counts against availability.

Sample Resource Data:

- Pmax = 600 MW
- Sold RA Capacity = 400 MW made up of:
  - Grandfathered RA Capacity (non-SCP MW) = 300 MW

- SCP MW = 100 MW

Calculation to determine the SCP MW subject to count against availability:

Max {0, (Total Outage MW – [Pmax – Total RA Sold])} * (SCP MW/Non-SCP MW)

Outage example 1 – 50 MW forced outage
In this example the capacity of the unit has been reduced from 600MW to 550 MW. The total RA Capacity that was sold (SCP MW and Non-SCP MW) is equal to on 400 MW of the unit. Because the total RA capacity that was sold is not affected by the outage, it would not count against the SCP availability standard.

Max {0, (50 MW – [600MW – 400 MW])} * 100MW/300MW
0 MW * 25% = 0 MW of SCP subject to count against availability

Outage example 2 – 400 MW forced outage.
In this scenario the capacity of the unit has been reduced from 600 MW to 200 MW. The total RA capacity that was sold will be affected by this outage by 200 MW. The first 200 MW of the outage were not sold as RA capacity, but the last 200 MW of the outage will be applied to the sold RA capacity pro-rata between the SCP and Non SCP MW.

Max {0,(400 MW – [600MW – 400 MW])} * 100MW/300MW
200 MW * 25% = 50 MW of SCP subject to count against availability

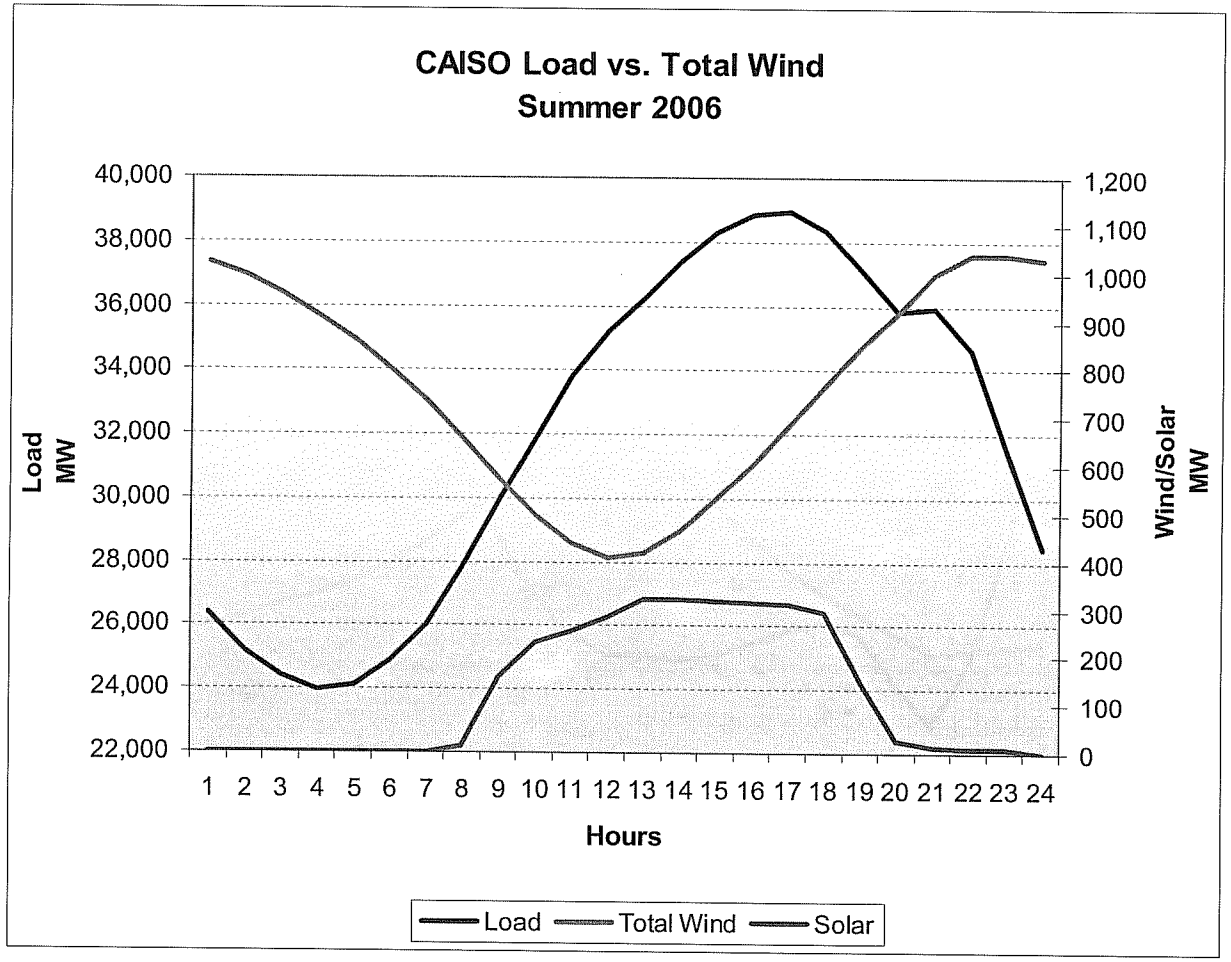
Outage example 3 – 600 MW forced outage
In this scenario the entire unit is forced out and all of the RA MW sold as SCP will be counted against availability.

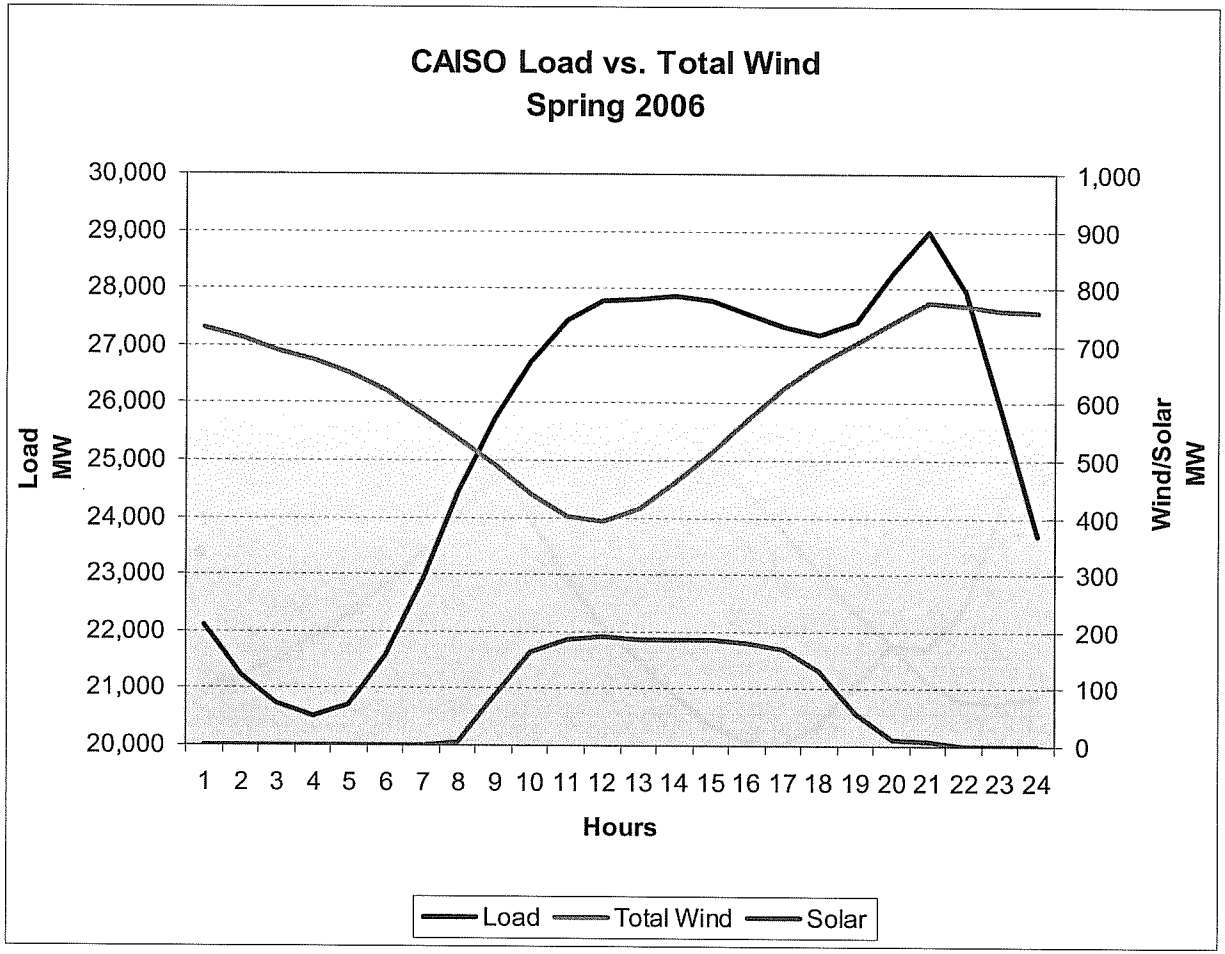
Max {0, (600 MW – [600MW – 400 MW])} * 100MW/300MW
600 MW * 25% = 100 MW of SCP subject to count against availability

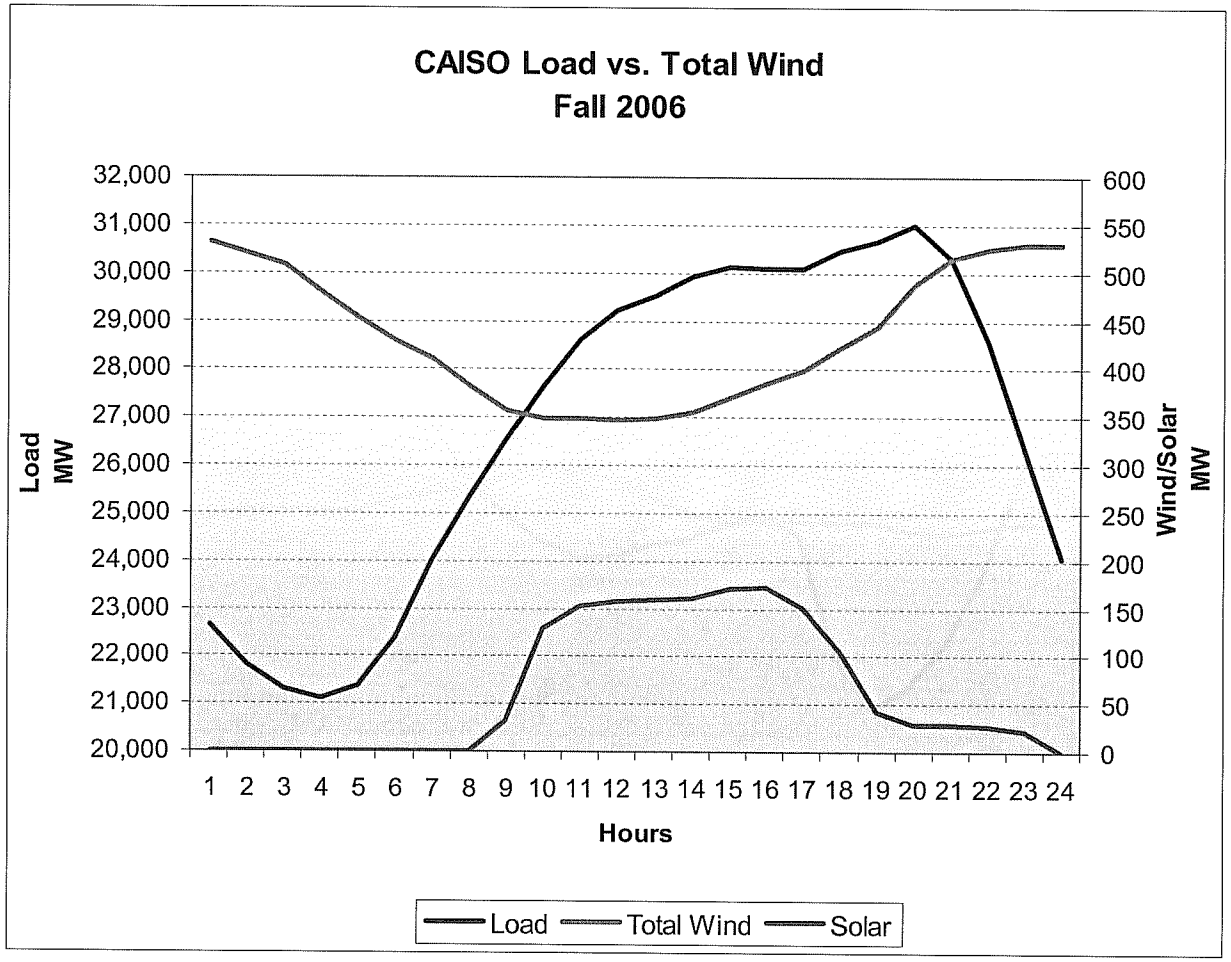
5 NEXT STEPS

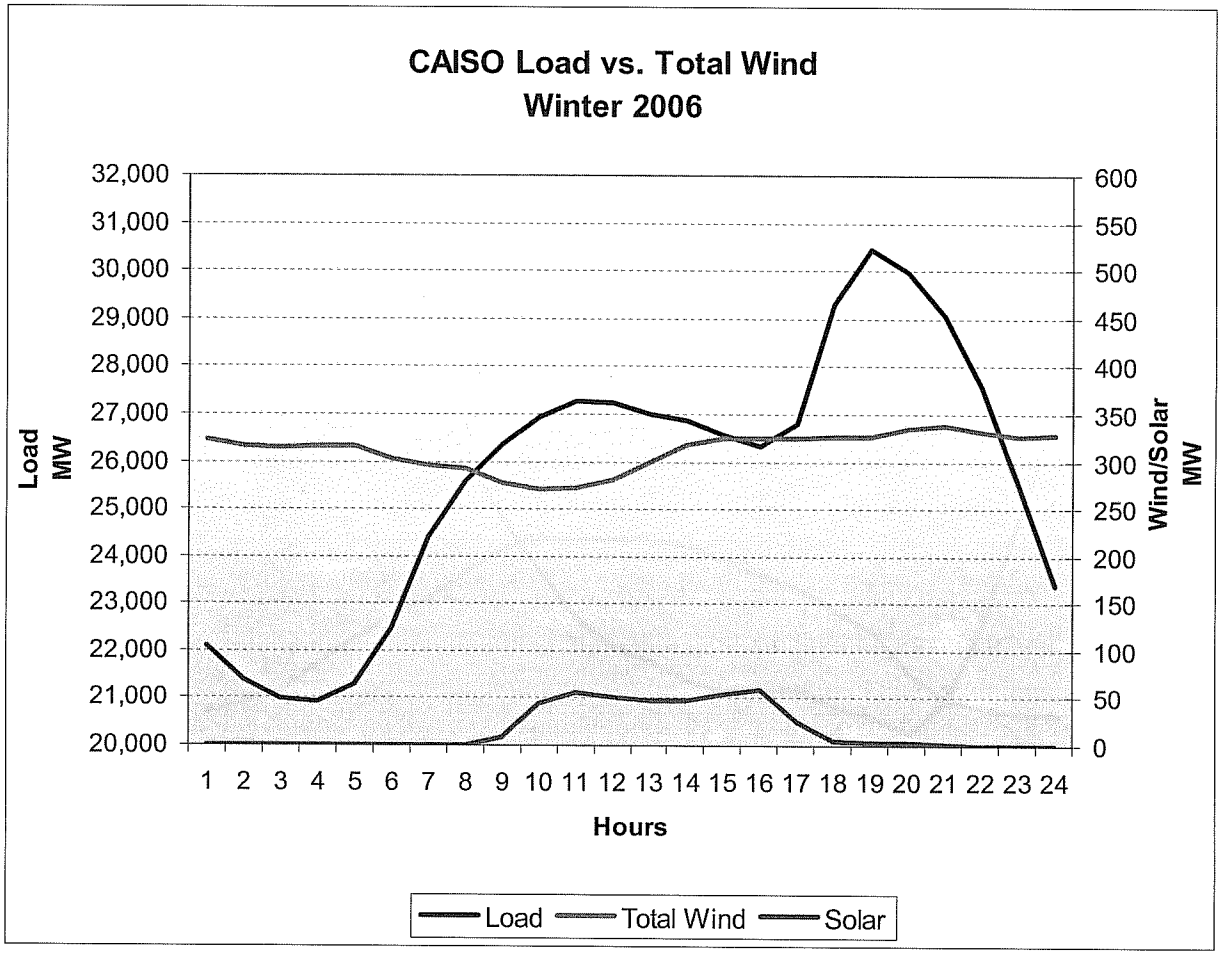
This is the current schedule:

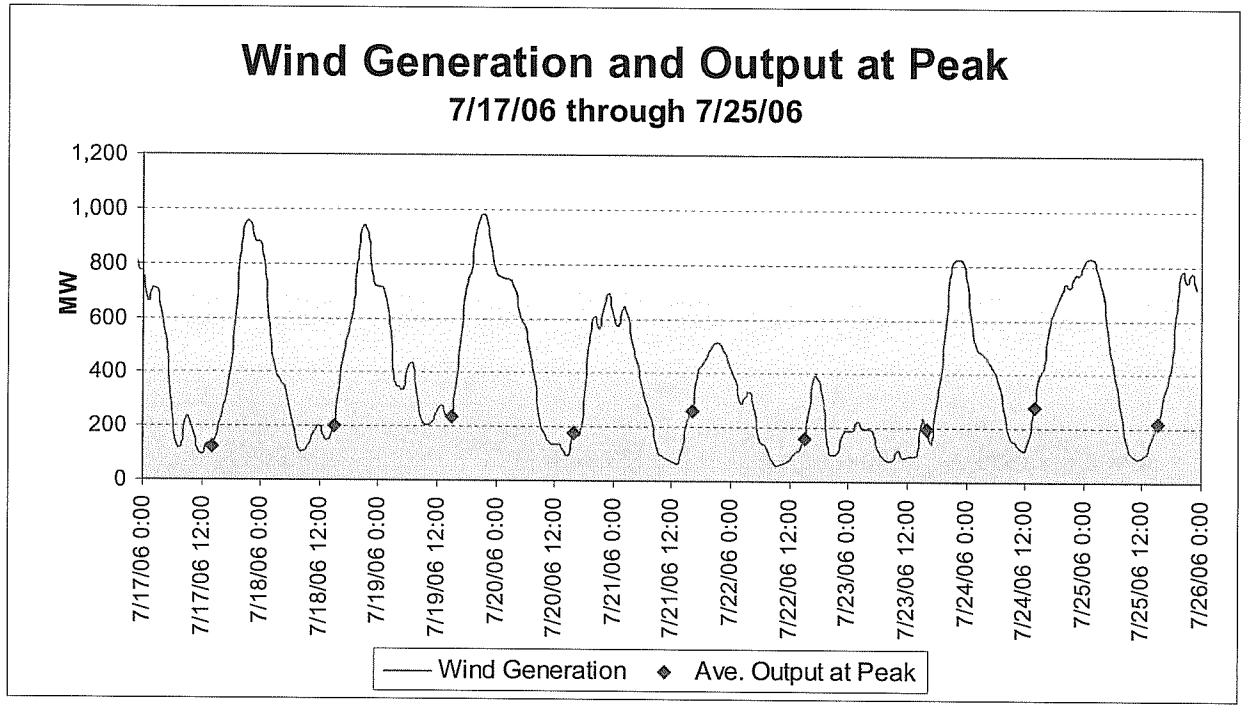
February 6 – Publish White Paper
February 13 – Conference Call
February 20 - Written comments due to SCPM@caiso.com
Week of February 23 – Publish Updated Draft Final Proposal
March 26, 27 - Board of Governors Decision
April – File Tariff language.


CAISO Load vs. Total Wind
Summer 2006
Load MW
Wind/Solar MW
40,000
38,000
36,000
34,000
32,000
30,000
28,000
26,000
24,000
22,000
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Hours
Load
Total Wind
Solar


CAISO Load vs. Total Wind
Spring 2006
Load MW
Wind/Solar MW
30,000
29,000
28,000
27,000
26,000
25,000
24,000
23,000
22,000
21,000
20,000
1,000
900
800
700
600
500
400
300
200
100
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Hours
Load
Total Wind
Solar


CAISO Load vs. Total Wind
Fall 2006
Load MW
Wind/Solar MW
32,000
31,000
30,000
29,000
28,000
27,000
26,000
25,000
24,000
23,000
22,000
21,000
20,000
600
550
500
450
400
350
300
250
200
150
100
50
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Hours
Load
Total Wind
Solar


CAISO Load vs. Total Wind
Winter 2006
Load MW
Wind/Solar MW
32,000
31,000
30,000
29,000
28,000
27,000
26,000
25,000
24,000
23,000
22,000
21,000
20,000
600
550
500
450
400
350
300
250
200
150
100
50
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Hours
Load
Total Wind
Solar


Wind Generation and Output at Peak
7/17/06 through 7/25/06
MW
1,200
1,000
800
600
400
200
0
7/17/06 0:00
7/17/06 12:00
7/18/06 0:00
7/18/06 12:00
7/19/06 0:00
7/19/06 12:00
7/20/06 0:00
7/20/06 12:00
7/21/06 0:00
7/21/06 12:00
7/22/06 0:00
7/22/06 12:00
7/23/06 0:00
7/23/06 12:00
7/24/06 0:00
7/24/06 12:00
7/25/06 0:00
7/25/06 12:00
7/26/06 0:00
Wind Generation
Ave. Output at Peak

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