BEFORE THE
PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Oversee the Resource Adequacy Program, Consider Program Refinements, and Establish Annual Local Procurement Obligations.	)	Rulemaking 11-10-023

CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION
COMMENTS ON PHASE 1 WORKSHOP ISSUES

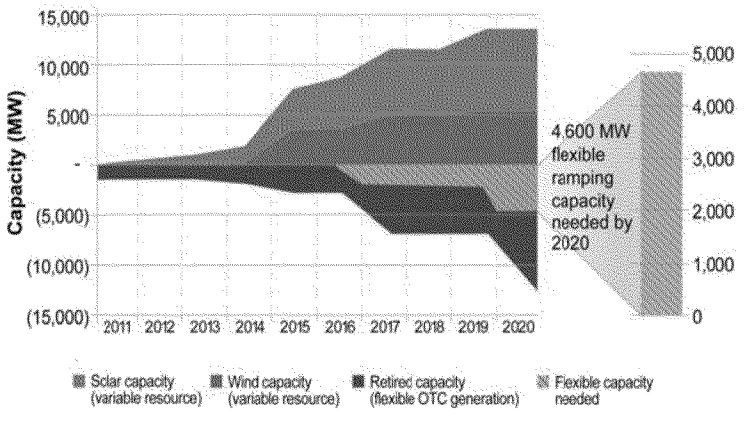
In accordance with the Phase 1 Scoping Memo and Ruling of Assigned Commissioner and Administrative Law Judge ("Scoping Memo") dated December 27, 2011, and the extension of time for filing comments discussed at the workshop and granted by the Administrative Law Judge on March 30, 2012, the California Independent System Operator Corporation ("ISO") respectfully submits to the California Public Utilities Commission ("CPUC") comments on the resource adequacy issues designated by the Scoping Memo to be addressed in Phase 1 of this proceeding and the proposals discussed at the workshops held on January 26 and 27, 2012 and March 30, 2012.

I. SUMMARY

The ISO commends the CPUC for its continuing review of the resource adequacy program and its willingness to approve enhancements when shown that they will improve the ability of the program to ensure that sufficient resources are available where and when needed. The ISO depends on the capacity of resource adequacy resources to be available in the locations and during the time periods it is needed to serve load, meet appropriate reserve requirements, and support reliable operation of

the ISO controlled grid. In order to maintain an effective resource adequacy program, it is important that the CPUC, ISO, and stakeholders consider proposals in this on-going series of resource adequacy proceedings that will enhance the RA program so that it better facilitates open and efficient competition, to produce the optimal mix of existing resources and new infrastructure investments sufficient to meet end-use demand at stable and reasonable prices and reliably provide for the operating requirements of the ISO balancing authority area.

In this proceeding, it is of paramount importance that the CPUC establish the framework for load serving entities to procure flexible capacity to meet ISO needs as grid conditions undergo unprecedented change. California's electric system is undergoing one of its most significant transformations ever, toward a cleaner, greener and more diverse energy supply portfolio. Policy makers have enacted some of the strictest and time-aggressive environmental regulations in the country. California is implementing a renewables portfolio standard, which requires that 33 percent of retail energy sales be met by eligible renewable energy by 2020, while simultaneously eliminating the use of once-through cooling technology at coastal power plants, causing the potential retirement of 12,079 megawatts of generation, or 21 percent of California's installed generation capacity, over the next eight years.[1]



[1] Installed net dependable capacity in the ISO balancing authority area in January 2012 was 58,458 MW.

The ISO anticipates that retirement of once-through cooled resources will create a flexible capacity gap of more than 3,500 megawatts needed to serve load in the ISO's balancing authority area as early as the end of 2017, and the ISO projects the need for flexible capacity gap to grow to 4,600 megawatts by 2020. The ISO's analyses identifying this capacity gap take into account new capacity additions, most of which will be variable energy resources. The 4,600 megawatts of identified need by 2020 also assumes that most of the conventional gas fleet not subject to the once-through-cooling retirements will remain available, including the 535 megawatt Sutter Energy resource. The ISO studies performed in 2010 did incorporate planned and approved fleet additions. However, the studies did not incorporate local resources that may be required to meet local capacity needs in light of the once-through-cooling retirements. Since then, the ISO has completed its local capacity studies, which do indicate that at least 3,331 MW of local capacity in Los Angeles, San Diego and Ventura will need to be repowered or added by 2020 to meet local reliability. The ISO is in the process of studying what residual flexible capacity will be needed assuming the local resources are indeed added and also provide operational flexibility. As a result of these local reliability concerns, the ISO has recommended that the Commission's 2012 LTPP procurement authority decision primarily focus on local capacity needs this year.[2]

Along with these additions and retirements, substantial amounts of renewable distributed generation resources are being developed as relatively small-scale and largely inflexible resources connected to utility distribution systems and located close to load. Distributed generation is a key component of California's strategy for increasing

[2] See CPUC R.10-05-006, ISO filed Testimony of Mark Rothleder, dated July 1, 2011.

the share of renewable resource electricity production in the state. The state has adopted a goal of 12,000 MW of distributed generation by 2020. Load-serving entities may want their distributed generation procurement to count toward resource adequacy requirements. Since a majority of the distributed resources built will be inflexible behind-the-meter photovoltaics, if counted as resource adequacy capacity, these resources will displace needed flexible resources under the CPUC's current resource adequacy program.

As the system operator for a majority of the state, the ISO is responsible for maintaining grid reliability and doing so in a cost-effective manner. This is increasingly difficult given the significant transformation that the electricity grid is undergoing. In order to fulfill this responsibility, the ISO's analysis shows that significant quantities of flexible capacity are needed in the resource fleet to respond to changing grid conditions.

The ISO urges the Commission to adopt the ISO's proposal in this proceeding to create the framework for flexible capacity to be considered in the resource adequacy program. Specifically, the ISO requests that the Commission in this proceeding:

- Adopt the ISO's three flexible capacity categories, and how they are calculated,, as advisory targets for 2013;
- Find that either a companion track or new resource adequacy proceeding should be launched in Summer 2012 to directly address the nature and implementation of a flexible capacity requirement for resource adequacy compliance year 2014; and
- Require that load-serving entities show all resource adequacy resources procured at the 90% level for each of the twelve months of 2013.

The details of the ISO's proposal are discussed below separately for resource adequacy compliance year 2013 and resource adequacy compliance year 2014.

For resource adequacy compliance year 2013, in order to ensure the fleet maintains its flexibility during the unprecedented transition, the ISO proposes that the Commission adopt the ISO's three flexible capacity categories and how they are calculated in this phase of the resource adequacy proceeding. The ISO is confident that these three flexible capacity categories appropriately address the duration, megawatt quantity, and ramp speeds needed from resources to reliably operate the system in the future. As noted by several parties at the workshop, more discussion is required to translate these three flexible capacity categories into an explicit resource adequacy requirement and load-serving entity procurement terms. In response to the parties, the ISO is no longer requesting that the Commission impose a mandatory flexible capacity requirement for the 2013 compliance year. Instead, the ISO is asking the Commission to adopt the ISO's three flexible capacity categories as a framework for 2013, including the methodology for how the three flexible capacity categories are calculated. With this framework in place as advisory targets in 2013, the Commission, ISO and all other parties can study and further refine how to integrate a flexible capacity requirement into the resource adequacy program for 2014 compliance.

To address flexible capacity implementation concerns and gain additional understanding and data about how existing procurement practices would comply with a flexible capacity requirement under the framework, the ISO asks the Commission to include two important elements in the final decision in the current proceeding. First, the decision should find that either a companion track (which is the ISO's preferred solution)

or new resource adequacy proceeding should be launched in Summer 2012 to focus on the nature and implementation of a flexible capacity requirement for resource adequacy compliance year 2014. In particular, this proceeding should address how the flexible capacity requirements are calculated in a forward-looking analysis, and how the categories apply to specific resources and resource types. Moving these issues to a separate track or separate proceeding will allow the LTPP to focus on local capacity and not be distracted or delayed by consideration of flexible capacity. Second, the decision should require that load-serving entities show all resource adequacy resources procured at the 90% level for each of the twelve months of 2013 when they make their final 2013 year-ahead resource adequacy filings. With this information, the ISO can assess the resource adequacy fleet and its flexible capacity attributes for the entire year including shoulder periods.[3] Having a 12-month showing will inform the next proceeding on flexible capacity procurement requirements. As the analysis the ISO provided at the workshop demonstrated these shoulder periods are often when the ISO sees higher flexible capacity needs, and thus being able to use the annual showings to verify that sufficient flexible capacity will be available during these periods has become more important.

It is imperative that the Commission adopt the ISO proposed flexible capacity framework in order allow flexible capacity issues to be resolved in a timely manner while allowing the opportunity to develop and refine the implementation of a flexible capacity requirement. Delaying acceptance of the ISO proposed flexibility categories will only lead to rearguing the same issues in subsequent resources adequacy proceedings,

[3] It may be increasingly possible that generic RA requirements with baseload or variable resources will result in insufficient flexible capacity being available during shoulder months.

leading to less time and more urgency to address flexible capacity procurement requirements as increasing numbers of intermittent resources connect to the system, causing new reliability challenges. The ISO believe it is prudent to plan ahead for flexible capacity and avoid crisis-mode decision making that leaves little time for in-depth analysis and consideration of the issues.

For resource adequacy compliance year 2014, the ISO expects the Commission will establish mandatory flexible capacity requirements. Thus, the Commission's objective in the current phase of this resource adequacy proceeding should be to establish a clear path forward for determining a flexible capacity requirement in 2014. The flexible capacity requirement adopted by the Commission should provide the attributes that fulfill the operational needs expressed in ISO's flexible capacity framework. The ISO is open to discussing any proposals that satisfy the ISO's three flexible capacity needs and ensure load-serving entities and resource owners can agree to procurement terms that satisfy resource adequacy requirements, including flexible capacity.

In conjunction with implementing a CPUC flexible capacity requirement in 2014, the ISO will develop and seek approval from the Federal Energy Regulatory Commission ("FERC") for a flexible capacity backstop procurement mechanism based on the CPUC's flexible capacity framework. The ISO intends to implement this expanded backstop authority in conjunction with the CPUC's 2014 resource adequacy compliance year.

Finally, the ISO encourages the Commission in this and subsequent resource adequacy proceedings to advance a discussion about a multi-year resource adequacy

requirement and to consider refinements to resource adequacy procurement methods and mechanisms.

In addition to the subject of flexible capacity, these comments provide supplemental information and updates about the ISO's stakeholder initiative to address the allocation of resource adequacy deliverability for distributed generation.

II. FLEXIBLE CAPACITY PROCUREMENT

A. Flexible Capacity Procurement Is Needed To Maintain Grid Reliability In Response To The Significant Transformation Of The Electricity Grid

The need for traditional, flexible generation that can balance the swings in net load (i.e., load net of variable generation) is increasing while capacity and energy revenues for these units decrease and their costs increase.[4] The ISO is concerned that intermittent resource additions will quickly displace flexible capacity in meeting resource adequacy obligations, thereby leading to insufficient flexible operating capability being available to ensure future reliability.

By 2020, the state's load serving entities will be required to have 33 percent of their energy provided by renewable resources. The ISO has been actively planning for the large-scale integration of renewable resources, as they increase each year leading up to 2020. In order to reach a 33% renewable portfolio standard, load serving entities are procuring large numbers of intermittent renewable resources that will inter-connect to California's electricity grid. Without timely modification to the Commission's resource adequacy program, inflexible and variable resources will displace resource adequacy capacity sourced from traditional flexible resources that have historically satisfied the

[4] See the ISO website for the following document http://www.caiso.com/Documents//Integration-RenewableResources-OperationalRequirementsandGenerationFleetCapabilityAt20PercRPS.pdf.

Commission's resource adequacy capacity requirements. Unlike most conventional resources, many renewable resources operate on intermittent or variable fuel supplies, such as sunshine and wind, and are incapable of responding to dispatch instructions. Instead, their generation is extremely variable and unpredictable, and not dispatchable by the ISO. This means the ISO must rely on other resources to provide the flexibility necessary to balance the electric grid.

In addition, flexible resources may retire prematurely due to revenue insufficiency unless enhancements are made to the resource adequacy program.[5] ISO studies show that intermittent resources increase supply variability and decrease supply predictability, which require greater availability of and response from flexible generation.[6] These studies also demonstrate that increases in the penetration of renewable resources will result in decreasing energy market revenues for traditional, flexible generation as more energy is provided by renewable generation.[7] Moreover, the traditional, flexible generation resources will be cycled more frequently, causing greater wear and tear and increasing operating costs.[8]

Further, the once-through-cooling policy will likely reduce the number of flexible resources. California's State Water Resources Control Board has promulgated a rule that eliminates most once-through-cooled resources by the end of 2020. As a result, 12,079 megawatts of flexible generation resources are impacted and could retire as

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[5] See ISO website for the following document http://www.caiso.com/Documents//Integration-RenewableResources-OperationalRequirementsandGenerationFleetCapabilityAt20PercRPS.pdf.

[6] See ISO website for the following document http://www.caiso.com/Documents/Summary_PreliminaryResults_33PercentRenewableIntegrationStudy_2010CPUCLongTermProcurementPlanDocketNo_R_10-05-006.pdf.

[7] See ISO website for the following document http://www.caiso.com/Documents//Integration-RenewableResources-OperationalRequirementsandGenerationFleetCapabilityAt20PercRPS.pdf.

[8] See ISO website for the following document http://www.caiso.com/Documents//Integration-RenewableResources-OperationalRequirementsandGenerationFleetCapabilityAt20PercRPS.pdf

early as the end of 2017.

As renewable capacity and energy output increase, revenue opportunities through the ISO market and resource adequacy contracts for the conventional generation fleet are likely to diminish absent significant changes to the regulatory/market structure. Substantial revenue reduction for flexible conventional resources increases the probability that some of these resources will retire. While there may be a decreasing need for the total energy output from conventional, flexible resources, there is still a very real operational need for the flexibility these resources provide, especially during critical ramping periods.

Thus, the resource adequacy program must ensure that these flexible resources remain viable and available to the ISO to maintain system reliability and to minimize the need for procurement through ISO backstop capacity procurement mechanisms.

B. The Flexible Capacity Categories Proposed By The ISO Are The Appropriate Operational Attributes To Be Considered In Determining Flexible Capacity Procurement

The flexibility of a resource is determined by its operational characteristics and ability to respond to ISO dispatch instructions or change its output to support the anticipated changes in demand. The degree of flexibility each resource has is determined by how fast it can ramp up or down, how long it can sustain an upward or downward ramp, how quickly it can change its ramp direction, how low it can reduce output and not encounter emission or other use limitations, how quickly it can start, and how frequently it can be cycled on and off. A resource's degree of flexibility at any particular time can vary depending on the status of that resource (e.g., on-line or off-line) or other operating parameters (e.g., current MW output or operating range).

Any parameters used to reasonably assess a resource's flexibility must support ISO operational needs, align with the market structure and resource adequacy construct, and be applied consistently across resources. In accordance with these objectives, the ISO proposes that the appropriate, durable parameters for assessing resource flexibility needed to maintain the reliability of the grid are these three operational attributes: maximum continuous ramping, load following, and regulation.

Maximum continuous ramping is the megawatt amount by which the net load (load minus wind and solar) is expected to change in either an upward or a downward direction continuously in a given month. The ISO determines the maximum continuous upward ramp using a moving five-minute window, based on the sum of the net load for each minute within a five-minute interval. As long as the sum of a subsequent five-minute interval is greater than the sum of the previous five-minute interval, the ramp is increasing. The maximum continuous ramping capacity requirement will ensure that there is sufficient ramping capacity to meet the ISO's largest continuous net load ramp for a particular month. Maximum continuous ramping capacity is expressed in megawatts. A resource's maximum continuous ramp capacity should be calculated as follows:

For resources that have a startup time ≥ longest ramp duration:

- min((NQC-Pmin),ramp duration*RRavg)

For resources that have a startup time < longest ramp duration:

- min(Pmin+(longest ramp duration--SUT)*RRavg, NQC)

Where:
SUT is the start-up time; and
RRavg is the weighted average ramp-rate. The weighted is based on the MW size of a resources ramp-rate segment.

For resources that can start in less time than the monthly continuous ramp

duration, the resource's Pmin can also count toward meeting the maximum continuous ramping requirement. While the ISO encourages all dispatchable capacity to bid into the ISO's real-time market, a portion of the maximum continuous ramp may be met by flexible resources that are ramping from one self-schedule to another.

One of the concerns expressed about the concept of maximum continuous ramp is that the maximum continuous ramp duration changes for the different months of the year and complicates accounting for how a resource ultimately contributes to the maximum continuous ramp. The ISO recognizes this and will work with stakeholders to address this issue as we develop the forward-looking requirements and obligations for the 2014 resource adequacy year. The ISO believes that the longest ramp duration of the year could be adopted as how much a resource can contribute.

Load following is the ramping capability of a resource to match the maximum megawatts by which the net load is expected to change in either an upward or a downward direction in a given hour for the relevant resource adequacy compliance month. The ISO is proposing a one-hour timeframe for this category to ensure that enough unloaded capacity with a defined ramping capability is available to be dispatched on a five-minute basis through the ISO real-time dispatch market application. A resource's load following capacity should be calculated as follows:

For resources with a start-up time ≥60 minutes:

- min((NQC-Pmin),60min*RRavg)

For resources with a start-up time < 60 minutes:

- min(Pmin+(60-SUT)*RRavg, NQC)

Where:
SUT is the start-up time; and
RRavg is the weighted average ramp-rate. The weighted is based on the MW size of a resources ramp-rate segment.

Regulation is the capability of a generating unit to automatically respond during the intra-dispatch interval to the ISO's four-second automatic generation control signal to adjust its output to maintain system frequency and tie line load with neighboring balancing area authorities. Only resources that are certified to provide regulation by the ISO would be eligible to satisfy the regulation flexible capacity requirement. The regulation capacity requirement of a resource will be determined based on the weighted average ramp rate of the resource over the range for which it can provide regulation. The regulation flexible capacity requirement is satisfied if the sum of the five-minute capacity with a defined ramp rate from all resource adequacy regulation resources exceeds the maximum five-minute change of the net load for each month. The regulation requirement is expressed as a megawatt per minute value.

The table below summarizes the characteristics of the three categories of flexible capacity.

Table 1: ISO Proposed Flexible Capacity Requirement Categories

Maximum Continuous Ramp	Load Following	Regulation
Maximum Capacity (MW): Maximum Continuous Upward Net Load Ramp for the Month or Year **Ramp Rate (MW/min):** Maximum Capacity/Ramp Duration	**Capacity (MW):** Maximum 1-hour upward Change in Net Load **Ramp Rate (MW/min):** Maximum Capacity Change in 1-hour/60	**Capacity (MW):** Maximum 5-minute Change in Net Load **Ramp Rate (MW/min):** Maximum 5-minute Change in Net Load/5
Requirement is determined by largest continuous ramping period in the relevant month.	Requirement is the 1-hour capacity need and the 60-minute ramping capability need in the relevant month.	Requirement is the need for 5-minute capacity expressed as a MW/min ramp rate in the relevant month.
Unit must respond to ISO dispatch instructions. Renewable generation and base load units are not eligible to provide this capacity.	Unit must respond to ISO dispatch instructions.	Units must be regulation certified.
Each resource's contribution is ramping capacity over the time period: · NQC – Pmin if the unit cannot start within the maximum continuous ramping period. · NQC if the unit starts and reaches NQC during the maximum continuous ramping period.	Each resource's contribution is the minimum of: · NQC - Pmin · Ramp Rate(/minute) * 60 minutes · Ramp Rate based on the MW weighted average ramp-rate of the resource for a resource with different ramp-rates for different operating ranges (i.e., use the megawatt size of the operating zone to weight the ramp rate for that zone).	Each resource's contribution is: · Ramp rate based on the MW weighted average ramp rate of the resource for the operating ranges where it can provide regulation. · No regulation requirement set for 2013.

The ISO requests that the Commission approve maximum continuous ramp, load following, and regulation as the appropriate parameters for a flexible capacity framework. These three categories represent the operational attributes needed by the ISO to reliably operate the grid and they can be applied consistently across the resource fleet to satisfy a flexible capacity requirement.

C. A Flexible Capacity Procurement Target Should Be Identified For 2013 Based On The Flexible Capacity Categories And Methodology Proposed By The ISO

In the ISO's Supplemental Information to Proposal submitted on March 2, 2012,

the ISO proposed that the Commission set a flexible capacity procurement requirement for each month of compliance year 2013 using historical data for 2011 that analyzed the changes in net load for durations relevant to the three categories of flexible capacity. Originally, the ISO had proposed to simply quantify the amount of flexible capacity available in the resource adequacy fleet in 2011/2012 and use the inventory as the basis for the flexible capacity requirements in 2013. However, based on feedback from stakeholders that any flexibility requirements need to be based on actual operational needs and experience, the ISO performed additional analysis to determine actual operational patterns of needed flexibility. The ISO originally proposed that the quantity of flexible capacity be determined based on operational experience and be set as a requirement for 2013.

As discussed at the workshop held on March 30, 2012, the ISO has reconsidered its proposal and is no longer suggesting that a flexible capacity procurement requirement be set for 2013. In response to questions and concerns raised by stakeholders and Energy Division staff, the ISO is now proposing that the flexible capacity procurement categories proposed by the ISO be adopted by the Commission, but that the specific procurement targets for the categories be adopted by the Commission as advisory for 2013.

For 2013, these flexible capacity procurement targets will serve as an informational measure, and facilitate the transition to a flexible capacity procurement obligation in 2014. The flexible capacity procurement targets for 2013 should be those proposed by the ISO. Adopting the categories and advisory target levels for 2013 will allow the ISO and market participants to gather data to inform the procurement process

for compliance year 2014 and begin the process in 2014 with a robust structure already in place.

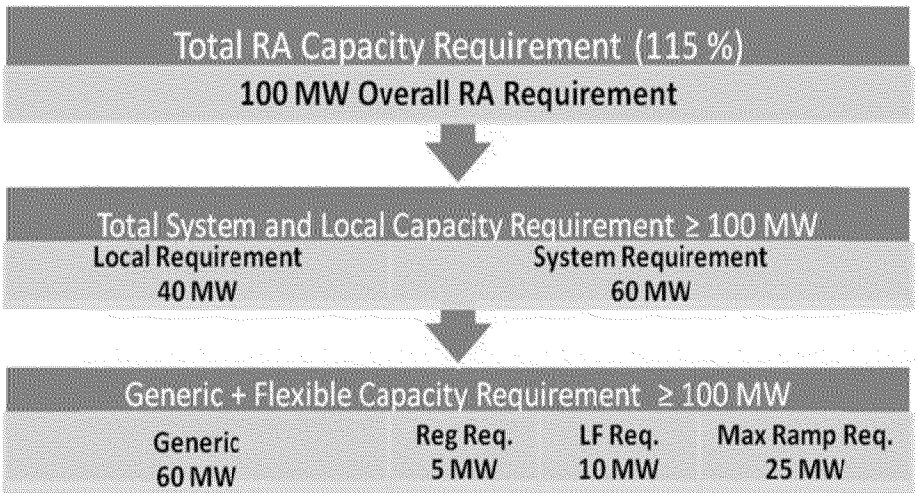
While the ISO is proposing that the historically-based targets for 2013 be purely advisory, the ISO would expect the 2014 targets be mandatory and based on a forward-looking needs assessment. This needs-based approach will provide the opportunity for market participants to plan and procure flexible capacity resources and gain experience that will help the process for future years. For 2013, the need for flexible capacity may not be overwhelming urgent, but the ISO believes that the situation is becoming more and more urgent and that, to ensure the reliability of California's electricity grid, prompt action is required. Waiting until the wildfire is racing toward your house before clearing the brush around it is not a prudent strategy. For 2013, the flexible capacity procurement target will not be subject to backstop procurement by the ISO if a load serving entity's monthly or annual resource adequacy plan shows a deficiency in meeting the target.

The ISO proposes that the total amount of flexible capacity needed for each of the proposed categories be established using an analytically determined, needs-based methodology. The total need will be identified for each month of the resource adequacy compliance year. Establishing the targets on a monthly basis will recognize that the amounts of flexible capacity needed differ month to month in a similar way the amount of planning reserve changes each month as the monthly peak load changes.

The ISO proposes that, similar to how local capacity counts as system capacity, the three flexible capacity categories contribute to the overall generic capacity requirement resulting in four capacity categories. The four capacity categories are:

generic capacity, maximum continuous ramping, load following, and regulation. Generic capacity is then further defined by its locational attribute: system or local capacity. Figure below illustrates how each capacity category must ultimately add up to the overall 115 to 117 percent resource adequacy capacity requirement.

Figure 1: Overall RA Capacity Requirement By Category



Many flexible resources will be able to provide capacity in three of the flexible capacity categories; however, certain other resources may only be able to provide generic resource adequacy capacity (i.e., they have no flexibility) or just one or two categories of flexible capacity. To allow for these varying levels of flexibility, the categories are not mutually exclusive by resource. A flexible resource located in a local capacity area may fulfill all capacity requirements depending on its operational capabilities– system, local, regulation, load following and maximum continuous ramping. A load serving entity with a resource adequacy requirement of 50 MW, might meet this with a 50 MW peaking plant. This plant might be able to provide 50 MW of

load following and 50 MW of maximum ramping resource adequacy capacity. The load serving entity would thus meet any requirements for generic, load following and maximum ramping resource adequacy capacity. If the peaking plant was also certified to provide regulation, the single 50 MW plant could meet all the requirements for the load serving entity.

Table 2 below lists the proposed 2013 resource adequacy procurement target for each of the three flexible capacity categories by month for the ISO balancing authority area as part of their advisory procurement goals. The maximum continuous ramping capacity is based on the duration of the continuous upward ramp for each month.[9] For the regulation requirement, although the table shows the approximate regulation requirement based on analysis of the net load one-minute change within any five-minute interval, the ISO recommends that a requirement not be identified for 2013, but be evaluated for implementation in 2014 and beyond based on additional information provided by the implementation of regulation pay-for-performance metrics.[10]

Several parties at the workshop expressed concern with the form of the maximum continuous ramping product in Table 2. Their concern was that because the maximum ramping period differs for each month, not only does the requirement for maximum continuous ramping change each month, but the amount of maximum continuous ramping that a specific resource can provide could also vary every month. There was concern this might make contracting and meeting the load serving entity's share of this requirement difficult. The ISO recognizes this concern and will work with

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[9] See the ISO's Proposal dated January 13, 2012 and Supplemental Information to Proposal dated March 2, 2012 for details about the methodology and calculation of the targets

[10] See the ISO's Proposal dated January 13, 2012 and Supplemental Information to Proposal dated March 2, 2012 for details about the methodology and calculation of the targets

stakeholders to address this issue as we develop the forward-looking requirements and obligations for the 2014 resource adequacy year.

Table 2: ISO Proposed 2013 Flexible Capacity Target

2011							
Monthly System Requirements	Maximum Continuous Ramp			60-Minute Load Following Requirement		Regulation Requirement	
	Capacity (MW)	Ramp Rate (MW/min.)	Duration (Hr.)	60-min Capacity (MW)	Ramp Rate (MW/min.)	5-minute Capacity (MW)	Ramp Rate (MW/min.)
January	8,133	32.7	4.2	3,935	66	664	132.8
February	6,982	32.8	3.6	3,630	60	656	131.3
March	5,453	26	3.4	3,271	55	1,020	204.0
April	8,859	20	7.4	2,897	48	544	108.7
May	8,000	22	6.0	2,951	49	678	135.7
June	11,382	32	5.9	2,637	44	637	127.5
July	13,544	23	9.8	3,137	52	840	167.9
August	18,181	27	11.1	2,933	49	686	137.1
September	17,824	34	8.7	3,004	50	634	126.8
October	9,510	20	7.8	3,514	59	635	126.9
November	7,855	22	5.9	3,746	62	1,351	270.2
December	7,577	29	4.3	4,506	75	668	133.7

The ISO proposes that, beginning in 2013, each load-serving entity be required to show procurement of 90 percent of its flexible capacity requirement on the annual resource adequacy showing for all twelve months and 100 percent procurement of the requirement on the monthly resource adequacy showing. Thus, the ISO is proposing for 2013 that the annual showings be changed to require a showing for all twelve months, rather than just the five summer months. This change is necessary so that the ISO can assess the flexibility of the fleet for the entire resource adequacy compliance year. Fleet flexibility is important not just in the traditional peak summer months, but also in other months when fewer resources are committed and variability can actually be greater than in the summer.

Based on the annual and monthly showings each load-serving entity submits beginning in 2014, the ISO will evaluate the quantity of flexible capacity provided in each of the three flexible capacity categories for the respective annual or monthly time period for the total system and by local-regulatory authority. If all load-serving entities in aggregate demonstrate sufficient system-level flexible capacity, then the ISO will not need to take any further action to cure an individual load serving entity's deficiency. However, if in aggregate, the system flexible capacity requirement has not been met, then the ISO will evaluate the showings by load-serving entities. The ISO will notify the deficient load serving entity's scheduling coordinator and the relevant local regulatory authority. The ISO proposes that the local regulatory authority coordinate with its load-serving entities to cure any deficiencies and provide a revised showing to the ISO. If the local regulatory authority's load-serving entities do not cure the deficiency, the ISO may exercise its backstop authority to cure the deficiency and satisfy the system-level flexible capacity requirement. The specific form of this backstop procurement and the allocation of the backstop procurement costs are being considered in the ISO's flexible capacity procurement stakeholder process.

As a general principle, the ISO proposes that all resource adequacy resources be eligible to provide flexible capacity, except those resources that are unable to respond to ISO dispatch instructions. Under this criterion, most renewable generation resources, which generate only when the sun is shining or the wind is blowing, base load generation, such as the nuclear units that do not respond to dispatch instructions unless there is a system emergency, and other physically or contractually limited resources should not count as flexible capacity if they cannot respond to ISO dispatch

signals. Eligibility rules are not fully developed and require additional time and input.

The implementation of flexible capacity procurement categories and an initial advisory target for compliance year 2013 requires CPUC action in this proceeding to modify the resource adequacy program. The CPUC's existing resource adequacy program imposes local and system resource adequacy procurement obligations on its jurisdictional load-serving entities for each month in the resource adequacy compliance year. To date, the Commission has not imposed an obligation on those load-serving entities to procure resources with specific operational characteristics. Load-serving entities are not required to demonstrate that they have procured capacity with specific operational characteristics in their year-ahead or month-ahead resource adequacy showings. Accordingly, the characteristics of the resource adequacy fleet available to reliably operate the grid during the compliance period may or may not meet the operational flexibility required by system conditions, especially in light of the grid transformation occurring over the next few years.

Approving the ISO's methodology for determining the three categories of flexible capacity and adopting initial, advisory monthly flexible capacity procurement targets for the 2013 resource adequacy program will be an important first step to ensure that the ISO has sufficient flexible capacity available. This will allow the ISO and stakeholders to start managing the flexible capacity in 2013 without binding requirements and will provide significant data and experience going forward to allow the ISO to manage operational and reliability needs as more intermittent resources come on-line. Beginning the transition in 2013 to a flexible capacity procurement requirement for 2014 will allow the ISO, CPUC, and market participants to gain experience and make

refinements to the requirements in subsequent years so that the program is robust and well established in the 2015-2017 timeframe when even higher penetrations of renewable resources and once-through-cooled generation retirements underway.

Going forward, the prudent course is for the ISO and CPUC to begin the challenging transition to the new supply paradigm, which means operating with a more variable and less predictable supply fleet. We must start this transition now by establishing and refining rules that will ensure reliability for the very near future. Any decision to avoid or delay a timely transition is untenable and only shortens the limited time we have to "get it right." In the end, the risks of doing nothing versus doing something are significant and asymmetric. Securing too little flexible capacity may not be correctable until several years in the future given the time to re-commercialize retired resources or build new ones. Because the need for flexible capacity will continue to grow over the next few years with the addition of new renewable resources and, as existing once-through-cooled plants retire, the situation will worsen before it will improve. It is critical that the Commission in this proceeding take the necessary first step in the transition toward adoption of a flexible capacity procurement requirement that will ensure the resource adequacy fleet is sufficient to continue to meet the reliability and operational needs of the system for 2013 and beyond.

D. The ISO's Flexible Capacity Proposal Is the Best Approach For Obtaining The Quality And Quantity of Flexible Capacity Needed

The existing resource adequacy program includes four resource categories, referred to as the maximum cumulative capacity buckets, which define the amount of resource adequacy capacity each load serving entity may procure under limited availability contracts. The buckets were created to restrict the dependence of load

serving entities on resources that are either contractually or operationally limited, which could have an adverse impact on the reliability of grid operations by the ISO. Bucket 1 covers resources available up to 87 hours each month during the five summer months and limits the maximum cumulative percentage of those resources to 13.6 percent. Bucket 2 includes resources available up to 171 hours each month and limits the maximum cumulative percentage of those resources to 18.6 percent. Bucket 3 includes resources available up to 415 hours each month and limits the maximum cumulative percentage of those resources to 30.1 percent. Bucket 4 resources are available at all hours of the month and can represent up to 100 percent of the resource adequacy a load serving entity procures. The Energy Division routinely checks the monthly resource adequacy showings to validate whether the load serving entities have secured contracts that conform to the prescribed buckets. However, the CPUC and other parties expressed at the workshop that the existing MCC buckets have had limited utility guiding actual capacity procurement. Thus, the ISO commends the Energy Division for reconsidering the nature and purpose of the buckets in its workshop report and taking this opportunity to propose a major restructuring to the MCC bucket construct to address future procurement needs, including flexible capacity.

The Energy Division proposes to redefine resource categories into maximum capacity buckets, eliminating the "cumulative" link between the buckets, reflecting a changing resource mix, and introducing operational dispatchability as a component of the bucket structure, recognizing the importance of resource flexibility for maintaining grid reliability. In the Energy Division's proposal, resource dispatchability is determined by three criteria:

- A maximum ramp rate of 4 MW/min from the ISO master file;
- A contractual obligation to be available to the ISO for dispatch; and
- A registered startup time of 10 hours or less or a minimum down time not to exceed 24 hours.

The structure of the new maximum capacity buckets proposed by the Energy Division is described in the following excerpt from the workshop report:

1. *Bucket 1* would consist of resources that are non-dispatchable and limited in hours of consistent operation. They are able to operate and generate energy, but sometimes these resources become a problem for CAISO to manage. This would be the most restricted bucket and include resources such as non-dispatchable hydro, wind, and non-dispatchable Combined Heat and Power.

2. *Bucket 2* would consist of resources that are dispatchable but limited in hours of consistent operation. This bucket would include resources like peaker plants, dispatchable Demand Response, and energy storage used as a stand-alone.

3. *Bucket 3* would consist of resources that are non-dispatchable but are able to produce energy over longer period of hours. This would include resources like solar facilities, nuclear plants, and nondispatchable geothermal facilities. Most of these resources produce consistent energy predictably, for example solar during the day or base load nuclear facilities during all hours. Solar resources are included in Bucket 3 because load shapes suggest that these resources can operate during continuous peak hours on a typical summer day.

4. *Bucket 4* would consist of resources that are dispatchable and are able to produce energy over long continuous hours. The type of resources that would fall in this bucket would typically be combined cycle gas turbine or pumped storage facilities. LSEs would be allowed to procure up to 100% of their resources from this bucket, as these resources are the most reliable options in the resource mix.

Although the Energy Division's redefined bucket structure differs significantly from the ISO's proposed flexible capacity procurement, the approaches do share an important principle – both recognize the importance of and need for flexible capacity to

maintain grid reliability as new intermittent resources come on-line to meet the 33 percent renewables portfolio standard and as once-through-cooled resources retire.

The ISO's and Energy Division's proposals both seek a common goal-- to retain sufficient flexible capacity in the resource fleet; however, both proposals address the problem differently. The primary distinction between the two is that Energy Division's proposal seeks to limit inflexible resources whereas the ISO's proposal seeks to directly ensure sufficient flexible resources. For instance, Energy Division's maximum capacity proposal relies primarily on restricting the amount of capacity that non-dispatchable, inflexible resources count towards resource adequacy capacity requirements. Conversely, the ISO's flexible capacity framework relies on the explicit procurement of capacity attributes the ISO requires to maintain grid reliability. Requiring the procurement of the type of capacity needed is a superior procurement strategy compared to limiting the procurement of capacity that does not fulfill the flexibility needs while hoping the remaining procurement provides the correct type of capacity.

The Energy Division's approach of limiting the amount of non-flexible resources does not ensure provision of sufficient flexible resources. This is particularly evident in shoulder months. For instance, in the shoulder months, inflexible resources and partially flexible resources could satisfy the minimum resource adequacy requirements without any flexible resources provided in the flexible capacity bucket 4.

The Energy Division's proposal may also lead to a portfolio of resource adequacy resources that is not as durable as the fleet becomes more variable. Without explicit flexibility requirements, the ISO is concerned that as load levels change by month, the fleet will also change. Because the flexibility needed to reliably operate the system will

differ by month, it may be possible to satisfy the Energy Division's bucket criteria using buckets 1- 3 and providing no resource procurement from the dispatchable non-use limited bucket 4.

A significant deficiency in the Energy Division's proposal is that it does not adequately address intra-hour variability. Conversely, the ISO's flexible capacity proposal captures intra-hour variability through the load following flexible capacity category, which is a critical operational attribute for mitigating intermittent resource excursions within the hour.

Another shortcoming in the Energy Division's proposal is that it is based on conclusions drawn from hourly averaged net load data, which cannot capture the very short term changes in wind and solar generation that can occur. There are dramatic ramps both up and down from wind generation intra-hour. For instance, on October 5, 2011, the ISO experienced a 781 MW increase in wind generation over 31 minutes while the load only increased 58 MW. The magnitude of these excursions will only grow as the number of intermittent resources grow.

In addition, the Energy Division's most stringent analysis used the 90th percentile of hourly load based on the typical day. Analyzing the "typical day" versus an atypical, high load day and then applying the 90^{th} percentile to actual hourly load data produces requirements that 10% of the time the system would be resource inadequate. Ten percent translates into 876 hours per year or 36 days per year. The ISO finds this aspect of Energy Division's proposal flawed and not appropriate for setting resources adequacy requirements, which are meant to ensure sufficient resources are available under reasonable, yet stressed system conditions.

By including use-limited resources in the same 4 buckets, it is very hard to tell from the Energy Division's proposal exactly how much actual generation the ISO can count on at any point in time. The current buckets limit the amount of capacity from resources with very limited times and the ISO is concerned that this limitation is not addressed in staff's proposal. That problem could be exacerbated as older once-through-cooling plants retire and are replaced by newer peaking plants with severely limited air permit run times.

More generally, it is unclear what resource types fit into which buckets. For instance, steam units are identified in bucket 3, but Energy Division has indicated that certain steam units may also be in bucket 4. Another example is that interties were identified in bucket 4. However, Energy Division indicated that the interties in bucket 4 were limited to dynamic scheduled intertie resources. As a point of contrast, in the ISO's proposed categories, the application is not based on a technology, but on a mathematical calculation using operating characteristics.

Another flaw in the Energy Division's proposal is that using a resource's maximum ramp rate likely over estimates the resource's typical ramping capability. This is inappropriate since resources do not always ramp at their maximum ramp rate and may not be able to sustain the maximum ramp rate over the full output of the resource. The ISO's proposed use of a resource's weighted average ramp rate is more appropriate value since it better reflects what would be expected from a mix of resources. Of similar concern, establishing a 4 MW/min ramp rate threshold as an indication of flexibility is arbitrary and does not necessarily reflect what is or is not a flexible resource.

The Energy Division proposal analyzed August wind production. August is not a month the ISO would expect operational challenges given load is generally high, a large percentage of the generation fleet is running, and wind production is generally low during peak conditions. It would be more appropriate to evaluate wind production and its variability in the months of March, April and October. This is when the load is low and wind generation is high and variable. Thus, Energy Division's conclusion that wind does not cause significant variability problems is likely related to analyzing the wrong data and the fact that wind production is still small relative to the load.

As a final matter, the Energy Division proposal assumed that demand response could count in the dispatchable, non-use limited bucket. While some demand response may be able to act as flexible resource, the ISO finds it operationally inappropriate to consider all demand response as a flexible, dispatchable non-use limited resource. At best, most demand response resources could be considered dispatchable use limited resources. For example, most of the investor owned utilities' demand response programs are subject to limits on the frequency with which the enrolled resources may be called.

For the foregoing reasons, the ISO submits that the Energy Division's proposal has serious drawbacks and that the ISO's proposal is a more reasonable and methodologically sound approach that should be adopted by the Commission.

III. RESOURCE ADEQUACY FOR DISTRIBUTED GENERATION

At the workshop in this proceeding, the Energy Division staff and workshop participants discussed the ISO's stakeholder initiative for allocating resource adequacy deliverability for distributed generation resources. These comments supplement and

update that discussion.

The purpose of the ISO initiative is to develop a process for providing resource adequacy deliverability status to distributed generation resources without any additional delivery network upgrades. The development of substantial amounts of distributed generation resources – relatively small-scale resources connected to utility distribution systems and located close to load – is a key element of California's strategy for increasing the share of renewable resource production in the state's annual consumption of electricity. Because load-serving entities in the coming years will be procuring significant amounts of their energy needs from distributed generation resources, they will likely want to count the capacity of these resources towards their annual resource adequacy requirements. The ability of a specific resource to count toward resource adequacy requirements depends on, among other things, a demonstration that the energy from the resource is "deliverable" to load within the ISO area. Deliverability means that the energy from the resource can be dispatched, simultaneously with all other deliverable capacity within an electrically-connected study area of the ISO network, to meet peak load conditions without overloading any transmission facilities or causing other reliability problems.

On March 29, 2012, the ISO posted its draft final proposal in the stakeholder initiative. The draft final proposal presents a streamlined approach for providing resource adequacy deliverability status to distributed generation resources, subject to the capability of the ISO grid to support such deliverability without additional delivery network upgrades.

The ISO proposes to conduct an annual process consisting of two parts to provide resource adequacy deliverability status to these resources. In the first part of the process, the ISO will determine MW amounts of deliverability available for distributed generation resources at specific network nodes on the ISO grid without requiring additional network upgrades. In the second part of the process, the ISO will allocate the use of such deliverability to the CPUC and other local regulatory authorities that oversee procurement by their regulated load serving entities. The intent of this streamlined process is to enable load serving entities to procure deliverable distributed generation resources up to these MW amounts without requiring further assessment to establish deliverability in the interconnection processes (DG resources are still required to apply to and complete the appropriate Rule 21 or WDAT interconnection process, however). The timeline for this annual process would run from the fourth quarter of one year to mid-summer of the following year.

The ISO intends to conduct the first study in fall 2012 and post the results in February 2013. These results could then be used by the local regulatory authorities to obtain resource adequacy capacity from distributed generation resources in the 2014 compliance year.

Contrary to the concern expressed by Vote Solar at the workshop, the ISO's proposal will not trigger transmission-level delivery network upgrades. The process is designed to identify nodal quantities of deliverability for distributed generation that do not require upgrades on the transmission grid. Vote Solar also seemed to suggest that the deliverability of existing grid-connected resources should be reduced in the deliverability study to accommodate more distributed generation resources. This

suggestion is not viable. Not only would removing deliverability from existing deliverable generators and allocating it to new projects be inconsistent with the interconnection procedures in the ISO tariff, it would degrade the effectiveness of the resource adequacy program by reducing the eligibility of flexible resources to provide resource adequacy capacity and substituting more inflexible resources.

IV. CONCLUSION

For the foregoing reasons, the ISO respectfully requests that the CPUC issue an order consistent with the ISO's proposal.

Respectfully submitted,

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