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BEFORE THE PUBLIC UTILITIES COMMISSION OF THE

STATE OF CALIFORNIA

Order Instituting Rulemaking to Oversee the Resource Adequacy Program, Consider Program Refinements, and Establish Forward Resource Adequacy Procurement Obligations.	Rulemaking 19-11-009

SOUTHERN CALIFORNIA EDISON COMPANY (U 338-E) AND CALIFORNIA COMMUNITY CHOICE ASSOCIATION'S TRACK 3 PROPOSAL

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Pursuant to the *Assigned Commissioner's Scoping Memo and Ruling* issued on January 22, 2020 and the *Assigned Commissioner's Amended Track 3.A and 3.B Scoping Memo and Ruling* issued on July 7, 2020 ("Amended Scoping Memo"), Southern California Edison Company ("SCE") and California Community Choice Association ("CalCCA") (together, the "Joint Parties") respectfully submit their initial Track 3 proposal to the California Public Utilities Commission ("Commission") for Track 3.B.[1]

I.
INTRODUCTION

As indicated in the Amended Scoping Memo, the scope of Track 3.B of this resource adequacy ("RA") proceeding includes:

1. Examination of the broader RA capacity structure to address energy attributes and hourly capacity requirements, given the increasing penetration of use-limited resources, greater reliance on preferred resources, rolling off of a significant amount of long-term tolling contracts held by utilities, and material increases in energy and capacity prices experienced in California over the past years.

2. Other significant structural changes to the RA program identified during Track 1 or Track 2, including:

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[1] Pursuant to Rule 1.8(d) of the Commission's Rules of Practice and Procedure, CalCCA has authorized SCE to file this proposal on its behalf.

a. Incentives for load-serving entities that are deficient in year-ahead RA filings, as discussed in D.20-06-031.

b. Multi-year system and flexible RA requirements, as stated in D.20-06-002.

c. Refinements to the [Maximum Cumulative Capacity ("MCC")] buckets adopted in D.20-06-031.

3. Other time-sensitive issues identified by Energy Division or by parties.[2]

The Joint Parties appreciate the opportunity to reexamine the overall structure of the RA program and discuss necessary improvements to ensure the RA program is well positioned to meet reliability objectives as California continues its important mission to decarbonize the state. California has set ambitious clean energy and climate goals to reduce greenhouse gas ("GHG") emissions 40 percent below 1990 levels by 2030 and achieve 100 percent of electricity retail sales from zero-carbon resources and carbon neutrality by 2045.[3] As California's electric system transitions to powering 100 percent of retail sales with carbon-free electricity, the nature of the resources interconnected to the California Independent System Operator ("CAISO") grid will evolve. These changes bring different challenges as operating these resources is bound by different constraints than those in existence when the RA program began nearly 20 years ago. At that time, relatively few resources had physical constraints due to use limitations. This enabled a system in which RA could be constructed to meet the peak load and MCC constraints,[4] which ensured that primarily contractually obligated resources were available in the hours needed to serve load.

As California continues to progress in meeting its decarbonization goals, the existing RA framework is increasingly poorly suited to ensuring reliability for California's decarbonizing, high-renewables electric system. The peak-load focused construct was adequate for a system

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2 Amended Scoping Memo at 4-5.

3 *See* Senate Bill ("SB") 32 (2016); SB 100 (2018); Executive Order B-55-18.

4 The MCC buckets were constructed to ensure that load in all hours was met by restricting the amount of short duration contracts that were designed to serve super-peak and peak needs. Over-reliance on such resources would meet the peak load need but may not be available in later hours to serve the load at hours other than the peak load hour.

dominated by thermal, hydroelectric, and other conventional generation. Today, however, the limitations of resources are less often set by contractual obligations and more frequently by physical limitations and in some cases, regulatory limitations. For example, in Track 2 of this proceeding, a new cap was set on the amount of wind and solar resources that could be counted within MCC Category 4 (i.e., resources available 24 hours per day) in recognition that wind and solar facilities are generally not available to meet load in all 24 hours of the day.[5] The number of use-limited resources is increasing significantly as the grid continues its evolution in generation technology. Not only are wind and solar limited in production to hours in which ambient conditions allow for production, but other resources are also increasingly use-limited.

Battery storage technology deployment typically has a dispatch duration of four hours with one to two cycles per day. Moreover, natural gas-powered resources have had increasing use limitations placed upon them including noise restrictions prohibiting operation in some hours and criteria pollutant limitations that cap total production. These limitations have placed significant pressure on the current RA construct. The peak load-based RA construct fails to capture possible reliability issues arising outside of peak hours and struggles to reflect contributions of renewables, storage, and other resources providing off-peak energy, load shifting, and other reliability services. This evolution has created a pressing need for a review of the RA program structure to ensure that RA can continue to provide reliability as the nature and capability of generating resources changes to achieve California's policy goals.

In addition, the landscape of load-serving entities ("LSEs") and their procurement preferences are dramatically changing. At the outset of the RA program, there were a few LSEs with most load concentrated among the three large investor-owned utilities. When California's environmental policy goals were in their infancy, the technologies available in both type and quantity were limited. Each LSE met its environmental mandates in a very similar manner. This meant that the pressure on reliability from any LSE was proportionate to their load ratio

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[5] *See* D.20-06-031 at 53-58, Ordering Paragraph 19.

share. Today, the number of LSEs has increased dramatically and the expansion of clean energy and GHG reduction goals coupled with the reduced costs for renewable technologies has resulted in a rapid expansion of use-limited renewable technologies. It has also meant that LSEs are no longer meeting environmental mandates in the same manner. In fact, some entities have established their own goals to surpass California's mandates for clean energy.

These developments have been a positive outcome for the state's decarbonization and other environmental policy goals. However, the reliability structure of the RA program is under new stresses that are only increasing. Now is the appropriate time to implement a new RA design that will continue to ensure reliability as the resources used to serve load continue to change. The Joint Parties propose such a new RA construct in the comments below. In addition, the Joint Parties have attached to this proposal a presentation describing the RA construct.

II.
PROPOSED RA CONSTRUCT

With generation technology continuing to evolve, the RA construct must evolve along with it. This new model must recognize the constraints of resources and develop a fleet capable of meeting both the capacity and energy needs of the grid. The MCC buckets were not designed with the current fleet of resources in mind; they were developed for an electric system with non-use-limited resources only limited by contractual obligations. Contractual obligations are not likely to mirror the physical limitations of resources as the grid moves forward, and those physical limitations do not always follow the traditional load shape experienced on the grid.

Indeed, much has been discussed regarding the concept of a net peak load. Net peak load is the amount of peak load served after netting wind and solar output. While the current RA construct targets sufficiency to serve peak load, there is growing concern regarding the ability to serve net peak load, peak load after netting production from wind and solar resources. It is widely known that the net peak load occurs later in the day where gross load is not at its peak, but still relatively high and solar production has dropped significantly as the sun sets.

These conditions coupled with the use limitations of resources other than wind and solar make the MCC buckets significantly less effective than they once were, and a re-evaluation based upon a more accurate accounting of use limitations is warranted.

A redesign of the RA construct is needed to ensure the original intent of RA is upheld. RA targets should account for both the net peak load need and the energy need. Responding to this new reality, this proposal evolves the RA construct to incorporate energy and capacity explicitly. It moves beyond the need for inaccurate proxy constraints for intermittent renewables, demand response, and other resources that will increasingly dominate California's resource mix. Further, it will more properly align LSE incentives and compliance requirements towards procuring a resource mix which can meet their customers' reliability needs in all hours. RA should be capable of providing sufficient capacity in all hours to meet energy needs given a desired level of reliability to be achieved through the RA requirement.

The framework described does not address all issues that need to be addressed (see Section V). The Joint Parties recognize that implementing this new RA construct will require quantitative analysis to achieve the desired level of reliability as well as additional work on the implementation details of each element. The Joint Parties look forward to addressing these issues with Commission staff and stakeholders.

A. <u>Net Peak Load Need</u>

The peak load need has evolved and the need of the grid to meet the net peak load has become important from a reliability perspective. Accordingly, it is the appropriate time to measure net peak load need explicitly and establish reliability criteria to meet this objective. To accomplish this task, the load forecasting process will need to change. These changes are necessary because it will be the individual LSE hourly load forecasts that will become the focus of requirements, rather than the aggregation of those forecast values. In addition, while the individual load forecasts will serve as the basis for RA requirements, the sum of LSE energy needs will still need to equal the CAISO energy needs. At the same time, individual load forecasts and requirements for net peak load will result in a non-coincident peak net load. This non-coincidence will never be lower than the coincident net peak load and will likely be higher. The RA process will need to account for this over-estimation of net peak load to avoid over-procurement. The methodology will need to be driven by quantitative analysis that accounts for all sources of uncertainty (e.g., load variations, renewable resource output profiles, fossil resource limitations) in the RA program and evaluate those against the desired level of reliability to arrive at an implementable structure.

RA requirements should also reflect individual LSE contributions to reliability needs. LSEs are utilizing increasingly different portfolios of resources to serve their customer energy needs. These differences have been driven by different technologies with differing characteristics, and particularly different use limitations. Because of this, each LSE portfolio can have a significantly different impact on grid reliability. Therefore, the net load forecasting process would be applied to each LSE individually by creating an hourly load forecast by LSE for every hour of the compliance month.

This load would then be reduced by anticipated wind and solar generation within the LSE's portfolio. Such wind and solar generation profiles could be developed based upon the geographically specific profiles utilized in the Integrated Resource Planning ("IRP") proceeding, R.20-05-003. The profile, along with the contracted and planned wind and solar capacity that is fully deliverable,[6] would then produce an expected energy output from wind and solar resources. This hourly generation profile would be subtracted from the managed load forecast[7] of the LSE

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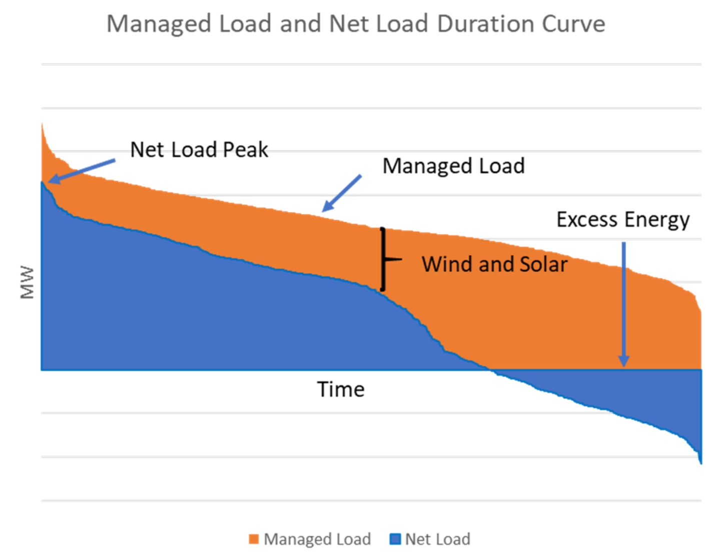
[6] The definition of "full deliverability" status should be re-examined under this proposal. Full Capacity Deliverability Status historically has been viewed as the conditions necessary to deliver output under peak load conditions. Under this proposal, both the ability to deliver under peak load needs and as energy in all other hours are equally important. Restricting the deliverability study to one set of conditions is unlikely to produce an outcome that is consistent with the reliability contribution of all resources to the grid. While this proposal uses the term "fully deliverable," the definition of this term will need to be evaluated to accurately reflect both peak load and energy needs.

[7] Managed load refers to the load on the grid after behind-the-meter resources are netted from gross load. Thus, the proposed methodology would establish the RA requirements after netting behind-the-meter generating actions and in-front-of-the meter wind and solar that is shown in the LSE's portfolio.

to create a net hourly load curve. Rank ordering this curve would produce the net peak load as the highest value observed. It would also indicate the overall amount and duration of energy needed above and beyond the renewable generation as well as the amount of energy available for storage charging. These values would then create the RA capacity need of the LSE that must be met by resources other than wind and solar resources as shown in Figure II-1 below.

Figure II-1

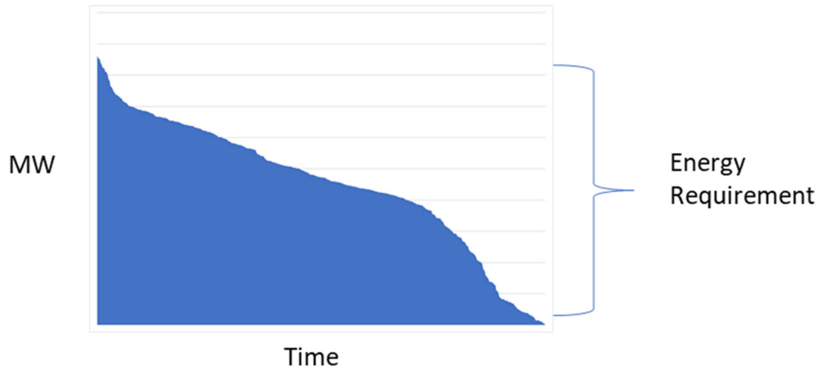


B. <u>Net Energy Need</u>

With the challenges facing the MCC buckets and the ability of wind and solar resources to meet energy needs when ambient conditions allow, the framework to provide assurance that the grid has sufficient ability to meet load needs in all hours would shift from the MCC bucket concept to an explicit measurement of energy need. The use of the net load duration curve from the peak net load need can be utilized. The net energy need of an LSE is represented by the area under the curve where the net load is a positive value. Based upon the area under this curve, the LSE will need to serve not only the net peak load but also the net load in all other hours. Because this load is already net of shown wind and solar generation (specifically, wind and solar that is fully deliverable and qualifies as an RA resource), the resources utilized to serve this load will need to come from resources other than wind and solar. The sum of the hourly loads will represent the amount of energy from the LSE's procured capacity that is necessary to meet the energy that cannot be supported by wind and solar as shown in Figure II-2 below. It is important to note that while this is an "energy" need, compliance will not require the procurement of "energy" but rather capacity with the capability to produce energy. This topic will be discussed in Section IV.

Finally, the Joint Parties acknowledge that the use of a load duration curve and the use of energy output from RA resources has the risk of a binding temporal constraint that is not accounted for in the mechanism. In other words, the use of a net load duration curve does not directly account for the specific hour in which the energy is needed while a Net Qualifying Energy ("NQE") structure likewise does not address specific hours. NQE is a new concept in this proposal that would utilize the capacity and operating hours of the resource to define the possible energy output from the resource to meet energy needs. This concept is further described in Section III. The Joint Parties recognize this limitation and recommend that this issue be examined in workshops to determine the probability that the existing fleet of resources and expected loads will produce such a result. If such a result is possible given the current fleet and expected loads, then the probability of it occurring should be evaluated along with the magnitude of the deficiency. Once these elements are known, any of several options for addressing this deficiency can be implemented within this proposal to resolve the reliability concern accurately. This issue is further addressed in Section V.D.

Figure II-2
Net Energy Need

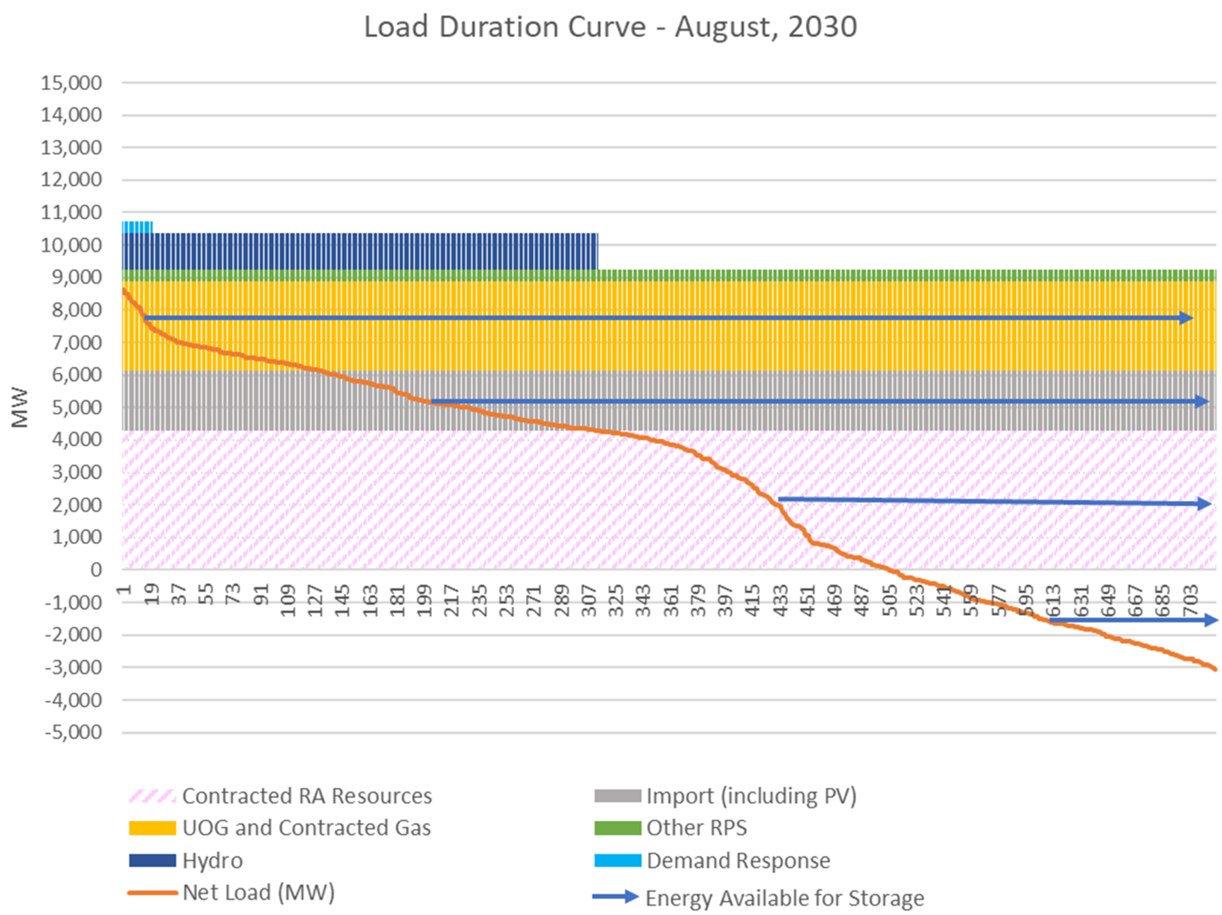


C. Energy Storage

Use of energy storage by an LSE to meet their net peak load needs will require verification that the LSE's portfolio has sufficient energy to meet both its load and storage charging needs. An LSE who plans to use energy storage resources to meet its net loads would need to show there is enough excess energy available from their RA capacity, after serving their instantaneous load, to charge the storage device including efficiency losses.

The excess energy available to charge an LSE's storage resources would come from one of two sources. Over-supply conditions in the LSE's portfolio would provide excess energy available and used for charging storage resources. That is, the amount of wind and solar in an LSE's portfolio produces a negative net load because the amount of wind and solar energy exceeds their load needs. A second source may come from energy output of resources that can produce in more hours or more energy at times than are needed to serve the LSE's load. The excess generation is shown in Figure II-3 below.

Figure II-3



III.
RESOURCE COUNTING

Consistent with the current RA framework, the capacity counting for resources will be an important measure. Similar to the current RA framework, this proposal would use the RA program to evaluate the resources necessary to reliably operate the grid assuming only the RA resources are made available to the CAISO. Critically, this means that the resources used to meet the RA obligation will need to be fully deliverable to ensure they are not likely to be congested off the system at a time of need and each resource will have a must-offer obligation to make the energy associated with the capacity available to the CAISO. In addition, minimum operation from resources will still need to be in place. The shortest duration currently allowed in the RA structure is a minimum of four hours per day, three consecutive days in a row. The Joint Parties understand this minimum was in part established to allow the CAISO reasonable assurance that the dispatch of such a resource would likely cover the peak load hour. Under a shift to net peak load, this concern remains; therefore, this proposal would not change the minimum hours of operation of a resource to qualify for RA.

Because this RA proposal contains a capacity and energy measurement, it will be necessary to define a new counting attribute associated with a monthly energy output of the resource. This concept is similar to the capacity counting mechanism, which utilizes Net Qualifying Capacity ("NQC") to measure the amount of capacity that can be relied upon to meet peak load needs. In this case, it is the amount of energy – the Net Qualifying Energy or NQE – necessary to meet the energy needs of the LSE for the month. The NQE would need to account for the amount of energy that could be expected from the resource given any use limitations for the month. For example, a hydro resource with a 100 MW capacity that could operate at that capacity for 300 hours for the month would have a 30,000 MWh NQE and a 100 MW NQC. The specifics of NQE development for each resource is a detail that will require working groups or workshops to determine the correct methodology and measurement for each resource for each month.

A. Wind and Solar Resources

As noted above, fully deliverable wind and solar resources would be netted from the managed load to formulate the net load curve for the LSE. In doing so, this method would form a refined effective load carrying capability ("ELCC") that accounts for the expected contribution to reliably serving load in each hour. Rather than evaluating ELCC as a generic derating of the capacity (i.e., NQC) of a wind or solar resource, this ELCC methodology would account for the expected contribution to capacity in each hour. In addition, this methodology would value the over-supply from such resources as they provide excess energy for energy storage to meet capacity and energy needs in other hours.

This RA model would continue to require that grid reliability is accounted for assuming that only the RA fleet of resources are available for operating the CAISO grid. This will mean that the wind and solar resources utilized in the new load netting methodology will need to be fully deliverable and will have a must-offer obligation. These requirements do not differ from the current RA construct where wind and solar interconnect as fully deliverable[8] and the resource must bid or self-schedule the CAISO renewable energy forecast amount.

This methodology will better reflect the value of renewable resources in meeting grid reliability needs because it accounts for their hourly contributions. LSEs can identify the need for energy and energy storage resources and the flexibility to move energy from one period to another to meet reliability and energy needs. Moreover, it will obviate the need for a single ELCC value as used today in which an environment of decreasing ELCC values may discourage development of resources that otherwise could benefit reliability.

B. Other Resources

Other resources would continue to utilize the current RA structure, including developing an NQC value and being subject to a must-offer obligation at the CAISO to make their energy available to the market from the capacity procured. NQC values already exist for all other resources and that methodology would continue under this construct. As noted above, this construct would require the development of a new measure of energy contribution to the grid from the RA resource. The specific details of this accounting would be developed in further working groups. This methodology would replace the MCC buckets to provide for the amount of energy that could be produced by the portfolio of resources within the LSE's RA showing.

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[8] The Joint Parties acknowledge that the CAISO has updated the interconnection process for wind and solar and hybrid and co-located (i.e., wind or solar combined with energy storage) resources. This proposal would need to be coordinated with the CAISO's rules to ensure that the output from the resource can be used to meet reliability needs including the storage of energy for use at another time.

For CAISO-interconnected resources, this value would be based upon the physical characteristics of the resources accounting for any use limitations. For import RA, the contractual obligation would define the amount of NQE that the resource could meet as imports are still largely governed by contractual obligations. For example, a 100 MW super-peak import (four hours per day for all days of the month) would have an NQE of 12,000 MWh (30 days * 4 hours * 100 MW assuming 30 days in the month).

C. Energy Storage

Discussion has occurred regarding the need for long duration storage assets. The ability to store over-supply in a storage device may necessitate large inverter capability while the output may be of a lower capacity value and over a longer time. In this sense, the Joint Parties' proposed RA framework has the potential to be superior to the current RA framework because LSEs can decide whether long or short duration storage assets are needed to satisfy their RA obligations as the temporal issues discussed in Section V.D. are further developed and procure the most cost-effective fleet to meet their needs. Thus, while the minimum four-hour duration will need to be maintained for reliability, this RA structure will enable suppliers and LSEs to procure a variety of storage devices that are most capable of meeting their capacity and energy needs.

IV. COMPLIANCE

Compliance with this RA structure consists of understanding the components that meet the multi-prong test and understanding the method to evaluate the compliance of an LSE's showing.

A. Compliance Instruments

Because the compliance mechanism would become a three-prong test (capacity, energy, and storage), the compliance instruments become capacity (NQC) and energy (NQE). The Joint Parties reiterate that while there is now a measure of energy need, the compliance instrument does not need to be the procurement of energy specifically. Rather, the NQC and NQE are counting mechanisms that are combined with a must-offer obligation so that if necessary, for grid reliability, the energy associated with NQC and NQE will be made available to the grid. The value of energy storage will also be denominated NQC and NQE. Therefore, the change in structure is limited to considering only one additional element.

B. Compliance Evaluation

At a high-level, the following is a method to evaluate compliance with the three-prong test as well as a simplified compliance example.

Step-by-Step Compliance Process

1. Develop NQC for all RA resources in a process similar to today.

2. Develop NQE for all resources. Detailed methodologies to determine the NQE for various types of use-limited resources will need to be developed during implementation workshops.

3. Develop a load curve utilizing California Energy Commission ("CEC") load forecast data on an LSE basis. The details of load forecast methodologies will be developed in consultation with the CEC, including methods for LSE data on load modifiers and local load shapes.

4. Develop expected renewable energy from wind and solar using LSE's portfolio of resources and an energy profile for those resources from the IRP to account for expected energy from wind and solar resources.

5. Net the load curve with the wind and solar output.

6. Rank order the net load from highest to lowest to create a net load duration curve.

7. Establish the peak net load need as the highest hour net load.

8. Establish the energy need (NQE requirement) as the sum of the positive hourly loads for all hours. This represents the area under the net-load duration curve.

9. Commission provides notice to LSEs of their individual allocations of Cost Allocation Mechanism and Central Procurement Entity procurement with sufficient advance notice to enable effective procurement by those LSEs. The allocations count toward the LSE's NQC and NQE compliance requirements.

10. LSE shows resource portfolio to meet RA need, including dischargeable storage, dispatchable renewables, and thermal resources under RA contracts.

11. Portfolio is assessed to see if there is sufficient capacity to meet the net peak load of the LSE.

12. Portfolio is assessed to see if there is sufficient energy available from the resources (including storage resources but net of energy required to charge storage) to meet the net load needs of the LSE during the hours of positive net load.

13. If there is storage in the LSE portfolio, the energy need above is assessed to determine if there is excess energy necessary to fully charge the storage to deliver the necessary capacity.

The tables below demonstrate the step-by-step compliance process with an example. For simplicity, Table IV-1 through Table IV-5 below are examples consisting of only a single 24-hour period rather than an entire month (e.g., the total of 720 hours assuming 30 days in the month where 720 hours equals 30 days * 24 hours/day) as the RA program would ultimately need to consider.

Table IV-1- Creating the Net Load Curve (Steps 3 – 5)

Hour	Installed Capacity		RPS Profile		Expected Energy		Managed	Net
Ending	Solar	Wind	Solar	Wind	Solar	Wind	Load	Load
1	2,175	770	0%	95%	-	731	1,686	956
2	2,175	770	0%	63%	-	482	1,662	1,180
3	2,175	770	0%	63%	-	483	1,546	1,063
4	2,175	770	0%	55%	-	421	1,473	1,053
5	2,175	770	0%	41%	-	318	1,495	1,177
6	2,175	770	0%	36%	-	280	1,580	1,300
7	2,175	770	21%	16%	467	125	1,571	979
8	2,175	770	57%	28%	1,248	217	1,496	31
9	2,175	770	77%	2%	1,665	15	1,454	(227)
10	2,175	770	86%	2%	1,875	15	1,458	(431)
11	2,175	770	90%	2%	1,966	15	1,440	(540)
12	2,175	770	92%	2%	1,997	16	1,480	(534)
13	2,175	770	89%	2%	1,926	18	1,617	(328)
14	2,175	770	82%	2%	1,791	18	1,757	(52)
15	2,175	770	82%	8%	1,776	62	1,880	42
16	2,175	770	73%	31%	1,593	236	2,045	216
17	2,175	770	60%	26%	1,299	200	2,049	549
18	2,175	770	26%	47%	562	363	2,170	1,245
19	2,175	770	1%	58%	30	449	2,263	1,784
20	2,175	770	0%	60%	-	463	2,224	1,761
21	2,175	770	0%	73%	-	564	2,263	1,698
22	2,175	770	0%	70%	-	542	2,202	1,660
23	2,175	770	0%	68%	-	523	2,034	1,512
24	2,175	770	0%	74%	-	566	1,639	1,073

Table IV-2 - Evaluating the Peak Net Load and Net Energy Needs (Steps 6 – 8)

Net Load Duration	
1,784	Peak Net Load
1,761	
1,698	
1,660	
1,512	
1,300	
1,245	
1,180	
1,177	
1,073	
1,063	
1,053	
979	
956	
549	
216	
42	
31	
(52)	
(227)	
(328)	
(431)	
(534)	
(540)	
19,278	Positive Net Energy Need

Table IV-3 - Evaluating the NQC and NQE of the LSE Portfolio (Step 10)

Portfolio of Resources		
Technology	NQC	NQE
Thermal (no use limitations)	900	21,600
Hydro (limited to 8 hours run time)	300	2,400
Run of River Hydro	200	4,800
Geo Thermal	200	4,800
DR (4 hour availability)	100	400
Battery	100	-
Total	1,800	33,600

Table IV-4 - Evaluating the Sufficiency of the Portfolio to Meet NQC and NQE Needs (Steps 11 – 12)

Compliance Evaluation			
	Requirement	Portfolio	Pass/Fail
Net Peak Load	1,784	1,800	Pass
Net Energy	19,278	33,600	Pass

Table IV-5 - Evaluating the Excess Energy Necessary to Charge Storage Devices (Step 13)

RA Portfolio Available for Charging								
Load	Thermal	Hydro (Use limited)	Hydro (run of river)	Geo Thermal	DR	Sum	Available for Storage	Usable by Storage
1,784	900	300	200	200	100	1,700	-	-
1,761	900	300	200	200	100	1,700	-	-
1,698	900	300	200	200	100	1,700	2	2
1,660	900	300	200	200	100	1,700	40	40
1,512	900	300	200	200		1,600	88	88
1,300	900	300	200	200		1,600	300	100
1,245	900	300	200	200		1,600	355	100
1,180	900	300	200	200		1,600	420	100
1,177	900		200	200		1,300	123	100
1,073	900		200	200		1,300	227	100
1,063	900		200	200		1,300	237	100
1,053	900		200	200		1,300	247	100
979	900		200	200		1,300	321	100
956	900		200	200		1,300	344	100
549	900		200	200		1,300	751	100
216	900		200	200		1,300	1,084	100
42	900		200	200		1,300	1,258	100
31	900		200	200		1,300	1,269	100
(52)	900		200	200		1,300	1,352	100
(227)	900		200	200		1,300	1,527	100
(328)	900		200	200		1,300	1,628	100
(431)	900		200	200		1,300	1,731	100
(534)	900		200	200		1,300	1,834	100
(540)	900		200	200		1,300	1,840	100
							Total	2,030

Battery NQC	Efficiency	Energy Needed
100	85%	471

Requirement	Portfolio	Pass/Fail
471	2,030	Pass

V.

ELEMENTS REQUIRING FURTHER EXAMINATION

As stated above, this proposal is intended to be a framework. Many implementation details will need to be considered to develop an implementable RA framework, especially those requiring fact-based assessment of the empirical data or modeling to assess how the metric will function in practice. This section includes a brief description of the elements that will require further development. In some cases, quantitative analysis will be necessary to ensure that the appropriate level of reliability is attained.

A. Product Trading

As discussed in Section III, this proposal would define RA compliance in terms of capacity (NQC) and energy (NQE). The Joint Parties do not explicitly include within this proposal the ability to transact the NQC and NQE separately. However, if these products are not tradeable, LSEs may be forced to over-procure collectively, driving up customer costs. This proposal is structural; the implementation of separable and tradeable products should be discussed and evaluated within working groups or workshops. Historically, this discussion has focused on two fronts. First, the separation of the products must ensure that elements are not counted multiple times inappropriately (i.e., not allowed to be double counted). Second, the market must be able to transact without significant concern for the potential application of market power, either through limited supply or from withholding. If evaluating this proposal examines the ability to trade NQE and NQC separately, evaluation of these two elements will be necessary. That said, the Joint Parties see the potential value of such transactions to meet reliability while minimizing cost.

For example, one could imagine two LSEs where LSE1 has sufficient capacity (NQC) and excess energy (NQE) while LSE2 has energy storage but insufficient energy (NQE) to satisfy the energy storage needs. In this case, the combination of LSE1 and LSE2 may be sufficient for grid reliability needs for both capacity and energy and all of the resources shown by the LSEs have a must-offer obligation, meaning that the grid will operate reliably, yet the compliance showing would represent a deficiency in LSE2's portfolio. This issue could be resolved by allowing LSE1 to sell NQE to LSE2 to satisfy their energy needs while still satisfying its own energy needs.

B. <u>Diversity Benefits</u>

During the original development of the RA program, stakeholders heavily debated using a "top down" instead of a "bottom up" approach. The "bottom-up" approach utilized LSE-specific needs to develop RA requirements. The "top down" approach utilized the RA need at the CAISO level and allocated that need to LSEs on a load ratio share basis. The benefit of the "top down" approach was the simplification that the overall compliance need was only what was needed to meet total system reliability needs. The requirement was based upon the coincident peak need at the time of the CAISO need, rather than the non-coincident peak needs of LSEs individually. The current RA program is a "top down" approach and was possible given the similarity of loads and resources from all LSEs that made the allocation of RA on a load ratio share basis an approximation that was sufficiently accurate.

As discussed above, LSE portfolios are significantly diverging. This divergence makes the use of a "top down" approach difficult because allocation on a load ratio share basis is no longer sufficiently accurate to ensure reliability. This proposal is a "bottom up" approach. However, using a non-coincident peak need will tend to over-state the grid's total needs. The Joint Parties believe a method should be developed to ensure that the use of a "bottom-up" approach does not result in significant over-procurement when considering the diversity of loads on the grid. This issue should be part of a comprehensive discussion of planning reserve margin ("PRM") and methods for addressing uncertainties such as load forecast error and forced outage rates.

C. Uncertainty

The current RA program deals with a level of uncertainty. The 15 percent PRM attempts to account for known needs (i.e., ancillary services) and uncertain needs (i.e., generator forced outage rates and load forecast error). These issues are treated differently depending upon the process. For example, system RA utilizes a one-in-two load forecast with a PRM while local RA utilizes a one-in-ten load forecast and a variety of contingency events without a PRM. Each method accounts for uncertainty but does so in differing manners.

The Joint Parties recognize that utilizing a netting of wind and solar output will introduce a different element of uncertainty. Today, ELCC addresses the uncertainty of wind and solar output by derating the counting capability of the resource. For the new methodology in this proposal, the uncertainty of generating output from such resources will need to be addressed in a different manner. This could be done with a more conservative energy output profile (e.g., using a forecast output representative of a one-in-ten-year outcome) or by increasing the PRM to account for the variability in wind and solar output.

Some parties have expressed concern about load forecast error and generator outages that are in excess of the current PRM. There should be a comprehensive examination of the PRM and all factors that address uncertainty to enable the RA program to achieve the needed level of reliability. This should include currently open items such as the CAISO's RA Enhancements stakeholder process which, in part, is examining the use of an unforced capacity mechanism to account directly for forced outages of resources, the appropriate level of load forecast certainty for both system and local purposes, as well as the study processes utilized to set RA needs such as the Local Capacity Requirement studies. The Joint Parties anticipate that this process can develop explicit rationale behind the use of various processes and the level of the PRM such that any future changes to these mechanisms can be informed by their original design, intent, and established levels.

D. Temporal Aspects of Load and Generation

As discussed in Section II B, there is a possibility that in creating a net load duration curve, the relationship of energy and the time period in which it can be generated and the load and the time period in which it will be consumed can create a deficiency that the three compliance mechanisms proposed cannot detect. The probability of this occurrence depends highly on the shape of the net load and the capability of the fleet of resources. For example, where the monthly peak net load is sustained for a high number of hours and a significant amount of resources are limited to very short duration output, it is possible that the portfolio shown will pass the net peak load test and show enough energy in total to meet the NQE needs, but the energy will be in excess in some periods and not be available in others where the net peak load remains high.

This concern is best addressed by first quantitatively examining the elements that would lead to such an outcome. These elements are the nature of the load, renewable, and non-

renewable profiles. While the outcome summarized in the preceding paragraph is possible, the solution to this issue is best addressed by knowing the probability of such an outcome and the potential magnitude of the outcome. Once this information is known, a targeted approach can address this concern if the empirical data shows it is necessary. This issue should be part of the workshops/working groups to develop the details necessary to implement this proposal.
In addition, future capability of the portfolio of resources to meet all needs including temporal aspects of loads and resources should be evaluated in the IRP proceeding to ensure that the build out of new resources meets all grid needs. Those workshops/working groups should include the CAISO, the Commission, and stakeholders, to first evaluate the data for existing resources and loads to ascertain the probability and the magnitude so that the workshop/working group can determine if a new mechanism is necessary to address the issue and if so, what it should.

VI.
OTHER RA ELEMENTS

The Joint Parties' proposed RA framework will work for both system and local RA needs. While system RA is the current process that will benefit the most from this structure, local RA will ultimately benefit from this structure because in order for California to meet its environmental policy objectives, reliance upon natural gas-powered energy in the local areas will need to decrease. This will lead to the same resource constraints (i.e., use limitations) in the local areas that are becoming prevalent for system RA. Because it will take some time to evaluate and develop this proposal into an implementable solution, and with the continuing desire to decarbonize the electricity sector in California, developing this proposal to meet both system and local RA needs is appropriate.

Flexible RA will continue to be relevant in the immediate term. This will necessitate the continuation of the flexible RA program, which can still be denominated in capacity and evaluated as it is today. Thus, like today's program, LSEs must show a quantity of resources capable of meeting ramping needs. These resources will also satisfy the LSEs' system needs and, depending upon location, their local needs.

As the current fleet of slow ramping dispatchable resources retire and IRP develops resources necessary to meet policy objectives, ramping needs should be considered and incorporated in the IRP's requirements. If done correctly, this may ultimately obviate the need for a flexible RA program as the fleet of resources necessary to meet the capacity and energy needs will already have the ramping attributes necessary.

VII.
COORDINATION WITH IRP

In the long-term, the RA and IRP processes should be coordinated to ensure that resource portfolios meet all RA, grid, and GHG emissions reduction needs. This would include capacity, energy, and ramping capability. The IRP process is currently grappling with the fact that the system RA construct does not guarantee that the overall system will have an acceptable loss of load expectation in all hours. Since the proposed net load duration curve-based construct explicitly accounts for available energy in all hours, it may prove useful as a diagnostic tool for the IRP process.

VII.
INTEGRATION WITH IRP

IRP is the mechanism to evaluate future grid needs and develop resources necessary to meet those needs, considering both reliability needs and other considerations such as policy goals. The RA program is primarily designed to ensure that existing resources are accounted for in meeting operating grid needs, are under contract to ensure their viability, and have a must-offer obligation to the CAISO to utilize their capacity to meet reliability needs. It is therefore critical that the planning processes including IRP and elements of the Transmission Planning Process and the Local Capacity Requirement study process are utilized to plan for a grid capable of meeting future needs.

Under this proposal, it will be important for the IRP process to ensure new and existing resources can meet both the net peak load and net energy needs of the grid. In addition, IRP should be evaluating the ability of resources to provide other necessary services to the grid such as ramping and ancillary services. As the grid evolves, the RA program should remain indifferent to which resources provide energy and which provide ancillary services. Today, the must-offer obligation is to make the resource available to the CAISO through either of these elements necessary to maintain grid reliability. But as California progresses in its goals to reduce GHG emissions, it will be necessary to develop the ability of renewable resources to provide ancillary services. As such, the IRP should assess the need for renewable resources, not only from an energy output standpoint, but also from an ancillary services standpoint. Additionally, as LSEs file their IRPs, it is critical that there are clear and actionable filing requirements in place that require LSEs to demonstrate that their individual portfolios are reliable by meeting the same net peak capacity and net energy criteria that is used in the RA proceeding. Incorporating a consistent set of reliability criteria forms a critical bridge between the RA and IRP programs. Once those resources are planned for and procured, the resources will then be capable of providing the necessary elements for a reliable grid operation as the RA program will continue to require a must-offer obligation that can be met by the provision of energy or ancillary services.

Finally, the IRP process should evaluate both available capacity and the likely production output from the available resources to ensure that the RA program is not solely dependent on resources that are unlikely to run due to their economics. While such a mechanism may indeed produce a reliable outcome, the purpose of the planning process is not simply to produce a reliable outcome, but also to produce that outcome while considering other factors such as policy goals and costs.

VIII.
CONCLUSION

The Joint Parties appreciate the opportunity to submit their initial Track 3 proposal for Track 3.B and assist in the further development of the Commission's RA program. For the reasons expressed in this proposal, the Joint Parties encourage the Commission to establish the necessary workshops or working groups to evaluate and develop the necessary elements to create an implementable solution using the RA framework described in this proposal.

Respectfully submitted on behalf of SCE and CalCCA,

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August 7, 2020

Attachment A
Resource Adequacy ("RA") Track 3 Proposal
July 2, 2020

Resource Adequacy (“RA”) Track 3 Proposal

July 2, 2020

Agenda

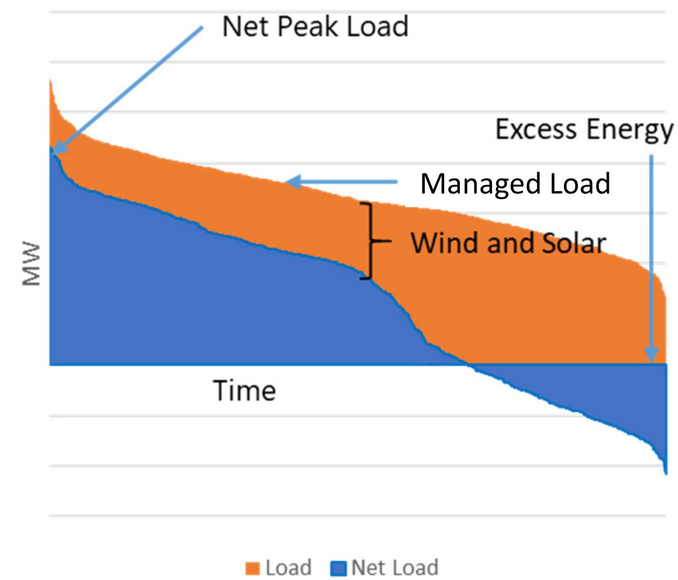
- Overview of SCE RA Track 3 Proposal by Section
  - Questions and answers provided during each section
- Identification of potential joint filing

Introduction

- Key elements causing need for change in the RA program
  - Use limitations of resources different than contractual limitations under the Maximum Cumulative Capacity (MCC) construct
  - Increased deployment of solar resources has resulted in a net peak load service concern during and immediately after sunset while gross load is still relatively high
  - Increasing number of LSEs and portfolio options has led to differing impacts on reliability from each LSE
- These changes have resulted in stresses on elements of the RA program that were designed under different circumstances:
  - MCC buckets addressed the need to meet load in all hours but was dependent on resources that were largely available in any hour and only bound by contractual obligations
  - Better depiction of the net peak load and energy need is necessary to ensure reliability
  - Evaluation of reliability need across LSEs is not necessarily proportionate to load ratio share

Structural Proposal

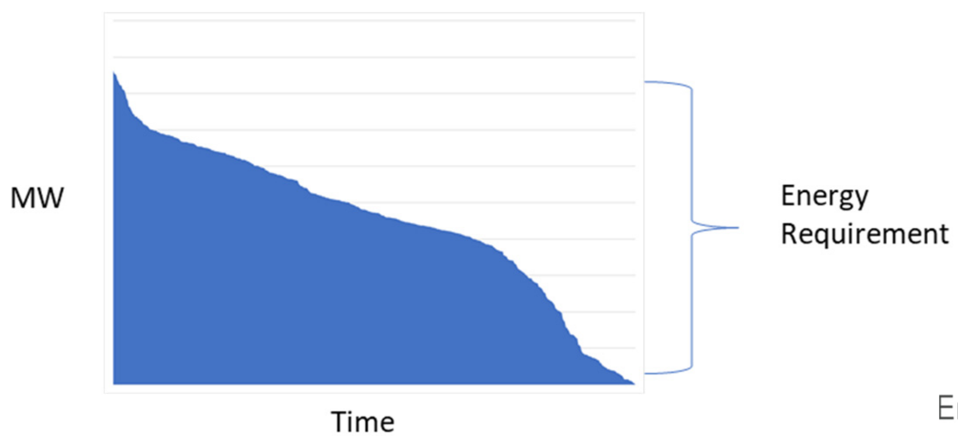
- Net Peak Load
  - The current ELCC construct evaluates wind and solar in its ability to meet peak load needs. This construct does not appropriately account for the contribution toward meeting needs in the hours in which ambient conditions allow for production and the ability to utilize generation in excess of need for energy storage to be utilized at a time of need.
  - Creating a mechanism in which the impact of wind and solar is accounted for in the forecast enables more accurate accounting of the contribution of such resources
    - Forecasting of wind and solar output can utilize existing IRP energy profiles*



* More discussion on Slides 8-9, 12-13

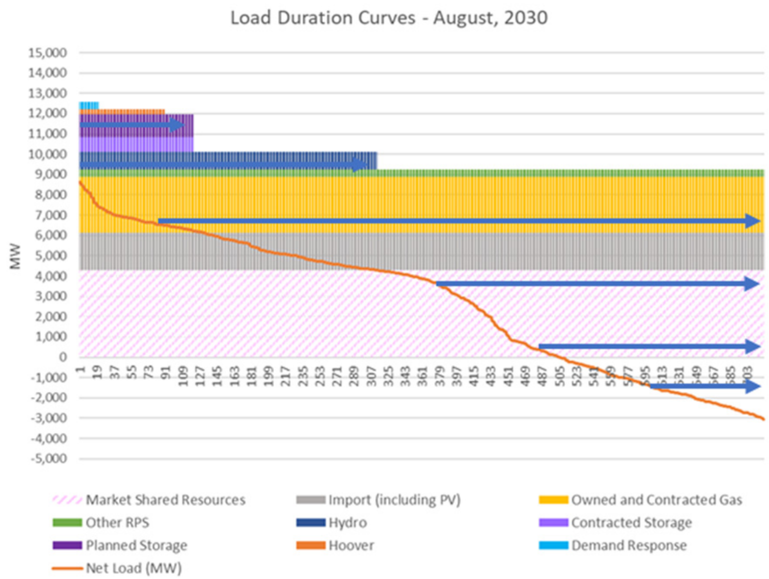
Structural Proposal (continued)

- Net Energy Need
  - MCC addressed the need to meet load in all hours but today faces difficulty addressing use limitations that occur due to physical and regulatory restrictions rather than contractual restrictions
  - Meeting load needs in all hours continues to be important and is met in part by wind and solar and in part with other resources
    - Netting the load needs from expected wind and solar output will depict the energy need that must be met from non-wind and solar resources by procuring capacity with a must-offer obligation that enables the CAISO to access the energy



Structural Proposal (continued)

- Energy Storage
  - Energy Storage will become an increasingly important grid element
  - In using energy storage to satisfy net peak load, the energy need (NQE) will increase by the losses associated with storage round-trip efficiency
    - For example, an LSE using a 25 MW storage device with 4-hour duration and an 85% efficiency rate will need 117.6 MWhs of energy ([4 * 25]/0.85 = 117.6)
  - The energy available for storage can come from supply from any RA resource (including the netting of wind and solar) that is in excess of the load needs of the LSE



Structural Proposal (continued)

- Energy Storage (continued)
  - Capacity value of the storage device will be determined by the energy available to store in the device
  - If the LSE does not have sufficient energy to fully charge the storage device, the capacity of the device would be de-rated
    - Using the prior example, suppose an LSE had only 75 MWhs of excess energy, the capacity would be de-rated to 15.9 MWs ([75 * 0.85]/4 = 15.9)
  - Because this proposal evaluates both peak net load and energy needs, the incentives for storage could be to build high capacity short duration devices or low capacity long-duration devices depending on the needs of the purchasing LSE

Resource Counting for NQE

- Wind and Solar
  - Expected energy output by hour netted from hourly load
- Non-use limited
  - NQC * 24 * Days
- Use limited
  - Accounting for energy from use limited resources will require discussion
  - Where the limitations are easily expressed as run hours per month, the solution is simple (e.g. NQC * Run Hours * Days)
  - Where limitations are not easily expressed as run hours, further examination will be required

Compliance

Step-by-Step Compliance Process

- Develop load curve utilizing CEC load forecast data on LSE basis
- Develop expected renewable energy from wind and solar using LSE portfolio of resources and an energy profile for those resources from the IRP to account for expected energy from RPS
- Net the load curve with the wind and solar output

Hour	Installed Capacity		RPS Profile		Expected Energy		Managed	Net
Ending	Solar	Wind	Solar	Wind	Solar	Wind	Load	Load
1	2,175	770	0%	95%	-	731	1,686	956
2	2,175	770	0%	63%	-	482	1,662	1,180
3	2,175	770	0%	63%	-	483	1,546	1,063
4	2,175	770	0%	55%	-	421	1,473	1,053
5	2,175	770	0%	41%	-	318	1,495	1,177
6	2,175	770	0%	36%	-	280	1,580	1,300
7	2,175	770	21%	16%	467	125	1,571	979
8	2,175	770	57%	28%	1,248	217	1,496	31
9	2,175	770	77%	2%	1,665	15	1,454	(227)
10	2,175	770	86%	2%	1,875	15	1,458	(431)
11	2,175	770	90%	2%	1,966	15	1,440	(540)
12	2,175	770	92%	2%	1,997	16	1,480	(534)
13	2,175	770	89%	2%	1,926	18	1,617	(328)
14	2,175	770	82%	2%	1,791	18	1,757	(52)
15	2,175	770	82%	8%	1,776	62	1,880	42
16	2,175	770	73%	31%	1,593	236	2,045	216
17	2,175	770	60%	26%	1,299	200	2,049	549
18	2,175	770	26%	47%	562	363	2,170	1,245
19	2,175	770	1%	58%	30	449	2,263	1,784
20	2,175	770	0%	60%	-	463	2,224	1,761
21	2,175	770	0%	73%	-	564	2,263	1,698
22	2,175	770	0%	70%	-	542	2,202	1,660
23	2,175	770	0%	68%	-	523	2,034	1,512
24	2,175	770	0%	74%	-	566	1,639	1,073

Compliance (continued)

Step-by-Step Compliance Process

- Rank order the net load from highest to lowest to create a net load duration curve
- Establish the peak net load need as the highest hour net load
- Establish the energy need as the sum of the positive hourly loads for all hours. This represents the area under the net-load duration curve
- LSE shows resource portfolio to meet RA need (done as monthly assessments as the wind and solar profiles differ significantly throughout the year)

Net Load Duration	
1,784	Peak Net Load
1,761	
1,698	
1,660	
1,512	
1,300	
1,245	
1,180	
1,177	
1,073	
1,063	
1,053	
979	
956	
549	
216	
42	
31	
(52)	
(227)	
(328)	
(431)	
(534)	
(540)	
19,278	Positive Net Energy Need

Portfolio of Resources		
Technology	NQC	NQE
Thermal (no use limitations)	900	21,600
Hydro (limited to 8 hours run time)	300	2,400
Run of River Hydro	200	4,800
Geo Thermal	200	4,800
DR (4 hour availability)	100	400
Battery	100	-
Total	1,800	33,600

Compliance (continued)

Step-by-Step Compliance Process

- Portfolio is assessed to see if there is sufficient capacity to meet the net peak load of the LSE (PRM to be determined which will need to account for non-coincidence of peaks)
- Portfolio is assessed to see if there is sufficient energy available from the resources to meet the net load needs of the LSE
- If there is storage in the LSE portfolio, the energy need above is assessed to determine if there is excess energy necessary to fully charge the storage to deliver the necessary capacity

Compliance Evaluation			
	Requirement	Portfolio	Pass/Fail
Net Peak Load	1,784	1,800	Pass
Net Energy	19,278	33,600	Pass

RA Portfolio Available for Charging								
Load	Thermal	Hydro (Use limited)	Hydro (run of river)	Geo Thermal	DR	Sum	Available for Storage	Usable by Storage
1,784	900	300	200	200	100	1,700	-	-
1,761	900	300	200	200	100	1,700	-	-
1,698	900	300	200	200	100	1,700	2	2
1,660	900	300	200	200	100	1,700	40	40
1,512	900	300	200	200		1,600	88	88
1,300	900	300	200	200		1,600	300	100
1,245	900	300	200	200		1,600	355	100
1,180	900	300	200	200		1,600	420	100
1,177	900		200	200		1,300	123	100
1,073	900		200	200		1,300	227	100
1,063	900		200	200		1,300	237	100
1,053	900		200	200		1,300	247	100
979	900		200	200		1,300	321	100
956	900		200	200		1,300	344	100
549	900		200	200		1,300	751	100
216	900		200	200		1,300	1,084	100
42	900		200	200		1,300	1,258	100
31	900		200	200		1,300	1,269	100
(52)	900		200	200		1,300	1,352	100
(227)	900		200	200		1,300	1,527	100
(328)	900		200	200		1,300	1,628	100
(431)	900		200	200		1,300	1,731	100
(534)	900		200	200		1,300	1,834	100
(540)	900		200	200		1,300	1,840	100
							Total	2,030

Battery NQC	Efficiency	Energy Needed
100	85%	471

Requirement	Portfolio	Pass/Fail
471	2,030	Pass

Elements to be Further Considered

- Planning Reserve Margin
  - The PRM was established at 15% based upon the need for ancillary services, forced outage rate, and load forecast error
  - Assumptions on each of those elements and how much they contribute to the overall PRM are not defined as the 15% was largely a settlement within the original RA proceeding
  - PRM therefore covers certainty (ancillary services) and uncertainty (load forecast error and forced outage rates)
  - As this proceeding and this proposal move forward, the elements of certainty and uncertainty should be evaluated and a measure to address them devised:
    - Ancillary Services is a known and can be added to the PRM easily and effectively
    - Forecasting error (load and wind/solar output) could be included in a PRM or could use a more conservative forecasting approach (e.g. 1-in-5 rather than a 1-in-2)
    - Forced outage rates could be in the PRM or the CAISO UCAP could account for them at a resource level
      - In this proposal, forced outages would need to be accounted for in both NQC and NQE

Elements to be Further Considered (continued)

- Diversity
  - The bottom-up approach will account for a higher net load peak than is necessary to satisfy system needs
    - This would result in over-procurement unless addressed in the requirements or PRM to reflect this potential
  - Product trading may be necessary to address the circumstances in which an LSE that is long energy can trade that energy length to another LSE that is short
    - Since the must offer obligation is based upon the shown capacity, the system level benefit will be realized, and the accounting should therefore not produce an outcome that does not benefit the system
- Deliverability
  - The RA structure has historically ensured that if only the RA fleet were available, the grid needs could be served
  - This has required RA resources to be fully deliverable
  - Full deliverability has been a peak load measure
  - How is deliverability measured under the new NQE construct where energy will be needed in all hours and not jus the peak
- Other RA elements
  - This proposal should be pursued for local RA as well
    - This would require the integration of CPE procured resources that are now allocated to LSEs for capacity and energy for their system showing
  - The Flex RA program can continue to ensure that the CAISO has energy bids necessary to meet ramping needs

Summary

Benefits of the proposed framework

- Addresses the changing resource mix & penetration of renewable and use-limited resources
- Addresses capacity and energy needs that are required to ensure reliability and serving load
- Strikes the right balance between a peak-hour requirement and an 8760-hourly requirement
- Replaces MCC construct and addresses the shortcomings of ELCC as currently applied

List of potential items/next-level questions for workshop/working group

- NQE determination for use-limited resources
- Potential NQE trading mechanism
- PRM determination (including the use of 1-2 or 1-5 load forecasts)
- Load forecast process adjustment if necessary
- Application to local RA and consideration of flex RA
- Interaction with CPE process
- Application to hybrid/co-located resources
- Deliverability assessment