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 3 WORKSHOP ISSUES

The California Independent System Operator Corporation ("ISO") respectfully submits comments on the proposals of the California Public Utilities Commission ("CPUC") Energy Division to modify the resource adequacy program, as presented and discussed at the workshop held on January 27, 2014.[1]

The purpose of the resource adequacy program is to ensure that capacity is available in the locations and during the time periods needed to serve load, meet appropriate reserve requirements, and support reliable operation of the ISO controlled grid. The CPUC's annual proceeding to review the resource adequacy program is important for maintaining an effective program and to consider refinements and enhancements that will better facilitate open and efficient competition, produce the optimal mix of existing resources sufficient to meet end-use demand at stable and reasonable prices, and reliably provide for the operating requirements of the ISO balancing authority area.

[1] The ISO submits these comments in accordance with the Phase 3 Scoping Memo and Ruling of Assigned Commissioner and Administrative Law Judge ("Scoping Memo") dated August 2, 2013, and the extension of time for filing comments discussed at the workshop and granted by the Administrative Law Judge on February 4, 2014,

In this proceeding, the Energy Division proposes to (i) change the methodology for calculating the qualifying capacity of wind and solar resources that may be counted toward meeting a load serving entity's local and system resource adequacy requirement, (ii) to adopt qualifying capacity and flexible capacity calculation methodologies for energy storage and supply-side demand response resources, and (iii) revise various provisions related to cost allocation mechanism ("CAM") resources and combined heat and power resources.

The ISO commends the Energy Division for the considerable effort it has undertaken in developing these three proposals. In particular, the evaluation of how to calculate the effective load carrying capacity of wind and solar resources using stochastic modeling is extremely technical and complex. The Energy Division proposals represent significant progress toward important changes to the effective load carrying capacity of wind and solar resources as well as greater inclusion in the resource adequacy program for energy storage resources and demand response.

The ISO believes, however, that further consideration of the proposals would be beneficial before they are finalized. The ISO's comments on the effective load carrying capacity proposal and the qualifying capacity and flexible capacity proposal for energy storage and demand-side response resources discuss several areas where clarification or additional information is needed and where improvements could be made to reach a more optimal methodology. The ISO encourages the Energy Division to continue developing the complex effective load carrying capacity methodology and extend consideration of these proposals to undertake this effort.

I. EFFECTIVE LOAD CARRYING CAPABILITY AND QUALIFYING CAPACITY CALCULATION METHODOLOGIES FOR WIND AND SOLAR RESOURCES

A. Energy Division Proposal

The Energy Division's proposal suggests methodologies for calculating the effective load carrying capability and the qualifying capacity of wind and solar resources. The proposal describes effective load carrying capability as --

> . . . a percentage that expresses how well a resource is able to meet reliability conditions and reduce expected reliability problems or outage events (considering availability and use limitations). It is calculated via probabilistic reliability modeling, and yields a single percentage value for a given facility or grouping of facilities. ELCC can be thought of as a derating factor that is applied to a facility's maximum output (Pmax) in order to determine its QC.

The proposed methodology for determining the effective load carrying capability of wind and solar resources is based on the following framework:

- ELCC will reflect the contribution of a resource type towards ensuring load is met;
- ELCC will be calculated for groups of similar facilities using probabilistic modeling;
- The contribution of an actual resource type toward ensuring load is met will be determined by comparing the tested resource to that of a "perfect generator" that is modeled assuming ideal operating characteristics (i.e. without transmission constraints, ramp times, use limitations, or outages);
- ELCC calculations consider all hours in the year;
- ELCC will be based on a monthly loss of load expectation metric; and
- ELCC for a given technology, category, region, and month will be a comparison of the amount of generation capacity in the category in the

region to the amount of "perfect generation" required to yield the same monthly loss of load expectation if the capacity were excluded from the model.[2]

B. ISO Recommendations

It is a high priority for the ISO that variable energy resources, demand response, and energy storage resources are able to provide, and be accurately counted for, generic and flexible resource adequacy capacity. The Energy Division proposal represents an important first step in developing the ELCC methodology for variable energy resources and the use of the ELCC and EFC for demand response and energy storage resources. While significant progress has been made in developing the stochastic model needed to conduct the ELCC study, there are still aspects of the proposal that the ISO believes are unclear or warrant additional vetting and consideration.

1. Greater Transparency Needed

Along with the present proposal, the Energy Division has released Probabilistic Reliability Modeling Inputs and Assumptions and hosted two workshops in which the ELCC methodology has been discussed. The ISO commends Energy Division's efforts to provide transparency to date. However, the development of an ELCC framework is an extremely complex and detailed process. The ISO is concerned that several aspects of the proposed model, modeling assumptions and input data have still not been adequately explained or detailed in the proposal or at the workshops. Additional transparency and vetting of the proposed ELCC methodology is needed. For instance,

---

[2] Effective Load Carrying Capacity and Qualifying Capacity Calculation Methodology for Wind and Solar Resources, R.11-10-023 (January 16, 2014), pp. 7-8.

the only data that is publically available for review is the proposed load data. The actual proposed ELCC methodology has not yet been documented or examples of results provided. That information will be essential for the ISO to provide support or suggest refinements to the proposed methodology.

The ISO's 2014 Flexible Capacity Requirements Assessment shows that CPUC jurisdictional load serving entities will have approximately 18,000 MW of installed wind and solar capacity by the end of 2017.[3] Given the size of the expected wind and solar fleet, the ELCC methodology could have significant implications on procurement, system reliability, and renewable integration goals. It is prudent that the CPUC take adequate time to ensure that both the methodology and the inputs are well vetted so that these implications are better understood.

For instance, the CPUC has a transparent process to develop and vet stochastic modeling assumptions and methods in its long-term procurement plan ("LTPP") proceeding. Over the course of the LTPP proceeding, the ISO has provided reports and preliminary results of stochastic models. In the ISO's view, the assumptions and stochastic modeling required for calculating wind and solar resources' ELCC should be similarly transparent and vetted with participants, like is done in the LTPP. The ISO would be more comfortable and more decisive about the ELCC calculator if the CPUC followed a similar vetting process and revealed to parties significantly more detail about the calculator's assumptions and the underlying model.

2. Clarify Treatment of Transmission Constraints

The ISO requests that the Energy Division provide more information about its

[3] ISO Flexible Resource Adequacy Criteria and Must-Offer Obligation, Draft Final Proposal (February 7, 2014), p. 16.

proposed treatment of transmission and transmission constraints. In several places in the proposal, Energy Division suggests that transmission will be accounted for in the model. For example, the proposal states "the transmission constraints are modeled by placing the perfect generator in its own modeling region, and by setting this region to have no load and full deliverability." However, it appears that the proposed model does not account for power flow but instead places hard constraints on flows from one region to another. This modeling constraint could miss important counter-flow and loop flows that impact the ELCC calculation and outcome. Additionally, the effect of removing a resource from a region could be very impactful if that resource is providing reactive power that aides in moving power through the region and mitigates transmission congestion. However, if the ISO understands the proposal correctly, such benefits and impacts are unlikely to be realized using the proposed methodology. The treatment of transmission in the methodology must be further clarified for the ISO to develop an informed opinion on the validity and usefulness of the calculator.

3. Reassess "Highest Of" ELCC Values

The ISO recommends that the Energy Division reassess the concept of testing an ELCC calculation against the "perfect generator"" during all hours as well as during the Availability Assessment Hours, and applying the higher ELCC that results. The process of determining the ELCC should be based on resource adequacy and ensuring reliability. Running two calculations, as contemplated in the proposal and selecting the higher ELCC, provides neither. The CPUC, in selecting an ELCC methodology should simply consider which of the proposed approaches best satisfies the purpose and spirit of its resource adequacy program. The results of the study should continue to adhere

to these core reliability and resource sufficiency objectives, rather than merely producing the highest possible accounting.

Additionally, the output of variable energy resources can change dramatically at any time. As such, it is important to examine the availability of these resources during all hours. The ISO supports using all hours in the calculation. Given the variability of wind and solar resources, the ISO believes that the all-hours approach will produce a more representative ELCC value than focusing on only the Availability Assessment Hours.

4. Evaluate Implications of Grouping Technologies

The ISO believes Energy Division's proposal to group each technology in a region into a single ELCC category needs further assessment. The Energy Division proposal outlines some of the theoretical and practical benefits of grouping resources in a region for ELCC determination purposes. While the ISO conceptually understands the benefits of grouping all resources of a technology type into a single category, the proposal offers little discussion about what trade-offs there are in using this assumption. For example, the first resource of technology type T in a region may have an ELCC of 0.5. As resources are added over time, the ELCC of this resource may decrease. However, the reality may be that new resources actually add less and less incremental reliability benefit to the region. The potential reduction of a resource's ELCC under this approach could create uncertainty and increase the risk or cost of new resource financing. Alternatively, as a new resource is proposed, it is not clear that this methodology would allow for an accurate, long-term assessment of the value/benefit of the resource.

In short, the proposal needs to provide additional details regarding the treatment of "vintage" resources and the incremental benefit of subsequent resources, and how the ELCC of vintage resources may be impacted. The ISO believes the ELCC of resources should be based on the incremental value of the resource across the life of the resource, and the ELCC of vintage resources should not artificially inflate the ELCC of newer resources or, conversely, have their own ELCC artificially deflated.

The ISO also notes that the current NQC calculation methodology uses actual historical output values to determine the NQC of each resource. The ELCC methodology, however, would rely on the Pmax value of the resource. The ISO is concerned that the proposed ELCC calculation is inconsistent with the determination of NQC and would remove the link between the actual resource performance and its NQC value. The ISO recommends that the Energy Division take additional time to discuss the implications of this transition.

5. Explain Rationale For Modeling Added Capacity

The ISO seeks further explanation of the reasons for adding capacity to the model when the actual capacity of a technology in a region is too small to change the probability of load shedding. The ISO understands that there are instance when small resources will have very small impacts on the probability of load shedding. However, there are also instances where the marginal benefit of additional capacity in a region is zero. The proposed modeling does not distinguish between these two possibilities. Without understanding the rationale for added capacity, the ISO is concerned that this aspect of the proposal could lead to unreliable results.

6. Explore Consequences of Profiling Approach

The ISO encourages the Energy Division to engage in additional discussion in order to further evaluate the benefits and detriments of using the proposed 18 regions in developing wind and solar profiles versus using the competitive renewable energy zones. The benefit of the existing competitive renewable zones is that they cover 30 areas and would account for greater regional diversity in terms of wind and solar production profiles. In addition, the existing zones are already established on an operational and policy basis. Using fewer regions may simplify the modeling, but it may also lose geographic diversity and create misalignment with the existing competitive renewable zones. This aspect of the proposal warrants further exploration.

7. Address Inconsistency In Treatment of Co-Located Storage

The treatment of co-located storage in the ELCC proposal seems to conflict with the Energy Division proposal on Qualifying Capacity and Effective Flexible Capacity Calculation Methodologies for Energy Storage and Supply-Side Demand Response Resources. The ELCC proposal states that co-located storage "will be modeled as part of the WECC system in the reliability calculations, but will not be considered to be operating in conjunction with the co-located wind or solar facility at this time."[4] However, the other proposal states that "[e]nergy storage that is co-located and operated in conjunction with an RA eligible conventional facility or variable energy resources … should not receive a separate QC or EFC and should instead modify the QC and EFC of the facility."[5] If the two resources (i.e. the generator and the storage

[4] Effective Load Carrying Capacity and Qualifying Capacity Calculation Methodology for Wind and Solar Resources, R.11-10-023 (January 16, 2014), p. 7.

[5] Qualifying Capacity and Effective Flexible Capacity Calculation Methodologies for Energy

resource) are running in coordination with one another, then they should be treated as a single resource for purposes of the ELCC as well. It is unclear whether the two staff proposals are comparable or not.

8. Determine Comparability of Intermittent Resource Profiles in Other States

The ISO observes that the results of the California-based ELCC studies discussed in the Energy Division proposal vary widely from study to study. This further demonstrates the need for a thorough vetting of the inputs and proposed ELCC methodology. The ISO would also suggest that caution be exercised in relying on the non-California based ELCC studies mentioned in the proposal. These studies may provide an interesting data point, but the wind, solar, and load profiles in those regions are likely different than in California. Before using non-California based ELCC study results to test the robustness and accuracy of the proposed methodology, the CPUC should first determine if the regional study bears sufficient similarity to California to warrant the comparison.

II. QUALIFYING CAPACITY AND EFFECTIVE FLEXIBLE CAPACITY CALCULATION METHODOLOGIES FOR ENERGY STORAGE AND SUPPLY-SIDE DEMAND RESPONSE RESOURCES

A. Energy Division Proposal

The Energy Division proposal suggests counting provisions for the flexible capacity for demand response, and for the qualifying capacity and flexible capacity for energy storage resources and aggregated demand response and energy storage resources. The Energy Division proposal recommends developing the qualifying capacity for energy storage resources based on what the resources can produce for

---

Storage and Supply-Side Demand Response Resources, R.11-10-023 (January 16, 2014), p. 7.

over four hours. The flexible capacity for demand response resources would be based on the difference between a resource's net qualifying capacity and its PMin. The PMin for these resources, as proposed by Energy Division, could be negative.[6]

The objective of this aspect of the proposal is to account for the capability of energy storage resources to charge and the potential for demand response resources to increase load during low price periods. The PMin would be measured by performance over 1.5 hours in charge mode for energy storage resources or increasing usage for demand response resources. Under these calculations, the flexible capacity for these resources could be greater than the net qualifying capacity for demand response and storage resources.

B. ISO Recommendation

1. Adopt Proposed Flexible Capacity Methodology for Decremental Demand Response

The ISO supports the Energy Division's proposed flexible capacity calculation for decremental demand response. The staff proposal is reasonable and aligns well with the ISO's proposal in the draft final proposal issued on February 7, 2014 in the stakeholder initiative on the flexible resource adequacy criteria and must-offer obligation. The Energy Division proposal, in combination with the ISO's flexible resource adequacy criteria and upcoming development of a standard flexible capacity product and standard capacity product for demand response, is intended to provide

---

[6] While the Energy Division proposal refers to effective flexible capacity, the ISO's comments distinguish between flexible capacity (FC) and effective flexible capacity (EFC). The distinction is, analogous to how the CPUC or other local regulatory authority sets the qualifying capacity (QC) and the ISO sets the net qualifying capacity (NQC). The Flexible Capacity developed by the CPUC could be adjusted by the ISO as an effective flexible capacity value based on, for example, testing of a resource's ramping capability to meet the ISO's minimum effective flexible capacity criteria. The ISO will discuss this issue further in its comments to the *Staff Proposal on the Implementation of the Flexible Capacity Procurement Framework*.

appropriate incentives for demand response resources to test their qualifying capacity and flexible capacity in a manner that accurately measures the resource's capabilities.

The ISO will set minimum criteria for determining EFC capacity. To address the CPUC's process concerns, the ISO could clarify that local regulatory authorities can set FC values and then the ISO will validate those values against the minimum criteria established by the ISO. If the values meet or exceed the minimum criteria, then the local regulatory authority's FC becomes the EFC, If the values do not meet the ISO's minimum criteria as established through the FRAC-MOO proposal, then the ISO will reduce the FC to meet the minimum criteria and that will become the EFC used in the ISO's determination whether backstop is needed.

The ISO, at this time, cannot yet support the Energy Division proposal for incremental demand response without further vetting. While the ISO believes incremental demand response has the potential to provide additional flexibility, additional discussion is needed to explore the utility and applicability of the load impact protocols to measure incremental demand response. Further evaluation is required before the ISO could support, and make a decision to include, incremental demand response as flexible capacity.

2. Provide Information About Composite QC and EFC

The ISO requests additional information about establishing a composite qualifying capacity and flexible capacity for aggregated energy storage and demand response resources, which may not be well suited to be assessed strictly as a demand response or storage resource. Figure 1 of the Energy Division proposal shows

examples of combined demand response and energy storage resources.[7] However, the proposal lacks details as to how this composite calculation would be made. The ISO requests that the Energy Division provide examples of the calculation for review by the parties.

3. Provide Information About Adjusting QC and EFC Test Results

The ISO requests additional explanation about how the Energy Division might modify test results for qualifying capacity and flexible capacity. The proposal states that "[i]n determining the resource's QC and EFC, test results may be adjusted by the CPUC to reflect anticipated changes in weather, enrollment, or program design."[8] From the discussion in the proposal, it is unclear to the ISO what criteria the Energy Division would use to determine when an adjustment should be made and how that adjustment would be calculated. The ISO requests further clarification and discussion on these points.

4. Reconsider the EFC Calculation Methodology

The ISO urges the Energy Division to reconsider its proposed methodology for calculating the flexible capacity and adopt instead the ISO's approach in the draft final proposal issued on February 7, 2014 in the stakeholder initiative on the flexible resource adequacy criteria and must-offer obligation.

The ISO's proposed methodology will provide benefits beyond those offered by the Energy Division proposal. First, the ISO proposal treats the output of energy storage resources more consistently with conventional resources by allowing for a ramp rate rather than assuming a constant output across all hours. Second, it provides a

---

7 *Id.* at 3.

8 *Id.* at 4.

clear first step for accounting for the flexible capacity benefits of energy storage resources. The ISO does not believe that the Energy Division proposal will accurately account for the flexible capacity benefits that some storage resources may be able to provide during charging cycles or fully considers the operational differences that exist between energy storage technologies. The charging cycle of storage may be able to provide flexibility, but the concept needs additional analysis. Further evaluation should be made of the timing of the peak and the trough of the net load, how they relate to the three-hour net load ramp, the characteristics of storage devices, and how they will be used be the ISO market optimization to reduce the net load ramp. For example, because of operational attributes, a resource might have to stop charging completely for some period of time before switching from charging to discharging. In this instance, it is not clear what flexibility benefits the energy storage resource has provided.

The ISO believes that this scenario, along with other potential operational issues as to whether different storage technologies are better suited to produce energy products or regulation services, can be resolved and provide an opportunity for many resources to provide flexible capacity benefits during the charging portion of the resource. However, it does point to the need to spend additional time addressing these matters. The ISO's proposed methodology would provide a clear starting point for measuring the flexible capacity of energy storage.

The ISO remains concerned about certain other aspects of the Energy Division proposal with respect to the counting of flexible capacity for storage resources. The proposal suggests that the EFC could be greater than the NQC for a resource.[9] It is not clear to ISO whether the proposed methodology would accurately measure the flexible

[9] *Id*. at 5-6.

capacity of the resource or be consistent with the Energy Division proposal on flexible capacity issued on February 10, 2014.

The proposed methodology would count the discharging range of an energy storage resource at the NQC measured over four hours and the charging range measured over 1.5 hours. As noted above, the ISO believes the charging portions of energy storage resources can provide flexible capacity. However, the inconsistencies between the upward measurement and the downward measurement imply that additional work will be needed to more accurately address the discharging and charging flexibility of energy storage resources. While the ISO's proposed methodology does not account for the charging portion, it provides a starting point that easily facilitates improvement without starting over. It is likely that the flexible capacity counting provisions for storage would need a complete overhaul if the Energy Division proposal were adopted.

It is not clear to the ISO how such a resource would appear in a resource adequacy plan or a supply plan. The recently issued Energy Division proposal on flexible capacity[10] states that "[i]n order to avoid over procurement, an IOU must show flexible resources towards system targets and local RA targets when applicable." It is not clear how this statement aligns for resources were the FC is greater than the NQC. The ISO requests additional clarification on this point.

[10] Staff Proposal on the Implementation of the Flexible Capacity Procurement Framework, R.11-10-023 (February 10, 2014), p. 10.

III. RESOURCE ADEQUACY IMPLEMENTATION STAFF PROPOSALS -- CAM

A. Energy Division Proposal

At present, the CPUC allocates the capacity benefit of cost allocation mechanism ("CAM") resources to its jurisdictional load serving entities as a resource adequacy credit and reduces each load serving entity's resource adequacy requirement. The Energy Division proposal would change this process by limiting the resource adequacy capacity benefits of the cost allocation mechanism to resources that the load serving entity procures within its transmission access charge area.[11]

B. ISO Recommendation

With the implementation of the ISO's replacement requirement for scheduled generation outages, stakeholders recognized that the CAM program was not designed to enable allocation of the replacement capacity and associated costs. To resolve this issue, ISO and Energy Division staff worked together during 2013 to develop a methodology to both maintain the objectives of the CAM program and enable the ISO to implement the replacement requirement for the CAM resources. The ISO appreciates the Energy Division's collaboration on this matter and supports the overall CAM proposal. The proposal largely addresses the issues identified during discussions and will meet the ISO's objectives, with a few clarifications and modifications.

1. Modify Discussion of the Standard Capacity Product

The Energy Division's CAM proposal states that "[n]either the [standard capacity product] rule nor the scheduled outage replacement rule addresses how these mechanisms could apply to CAM and CHP resources."[12] The ISO notes that the

---

[11] RA Implementation Staff Proposals, R.11-10-023 (January 16, 2014).

[12] *Id.* at 5.

existing standard capacity product provisions in the ISO tariff section 40.9 do apply to CAM and CHP resources. Resources included on a monthly supply plan, including CAM and CHP resources, are currently subject to the standard capacity product non-availability charges and availability inventive payments for the amount of capacity included on the Supply Plan. The scheduling coordinators for those resources have the capability to manage their availability through the ISO's RAAM tool.

2. Clarify CAM Debit System and Entity Responsibility

The ISO seeks further explanation and clarification about the CAM debit system and discussion of which entity and entity-function will be responsible for certain actions. Specifically, the ISO requests that the Energy Division address these questions –

- Will the investor owned utility receive a CAM allocation equal to what they receive today minus the full CAM resource capacity because it will already receive credit for the CAM resource capacity as resource-specific designated capacity on its resource adequacy plan?
- In some scenarios, will the value be negative and act to raise the load serving entity's obligation?
- What will be the responsibilities related to CAM resources if the scheduling coordinator for the CAM resource is not the investor owned utility that originated the purchase?

IV. Conclusion

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

Respectfully submitted,

By*: /s/ Beth Ann Burns*
Roger E. Collanton
General Counsel
Anna A. McKenna
Assistant General Counsel
Beth Ann Burns
Senior Counsel
California Independent System
Operator Corporation
250 Outcropping Way
Folsom California 95630
Tel.: (916) 351-4400
Fax.: (916) 608-7222
bburns@caiso.com

Attorneys for the California Independent
System Operator Corporation

Date: February 18, 2014