

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA**

Order Instituting Rulemaking to Oversee the
Resource Adequacy Program, Consider
Program Reforms and Refinements, and
Establish Forward Resource Adequacy
Procurement Obligations.

Rulemaking 21-10-002
(Filed October 7, 2021)

**OPENING COMMENTS ON THE LOSS OF LOAD EXPECTATION STUDY, LOCAL
CAPACITY REQUIREMENT/FLEXIBLE CAPACITY REQUIREMENT SCHEDULE
AND LOCAL CAPACITY REQUIREMENT WORKING GROUP REPORT OF THE
CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION**

Roger E. Collanton
General Counsel
Anthony Ivancovich
Deputy General Counsel
Jordan Pinjuv
Senior Counsel
California Independent System
Operator Corporation
250 Outcropping Way
Folsom, CA 95630
Tel: 916-351-4429
Fax: 916-608-7222
Email: jpjuv@caiso.com

Dated: March 14, 2022

Table of Contents

I. Introduction..... 1

II. Discussion on the Energy Division Staff Study..... 2

III. Discussion on the Phase 2 Schedule for Local Capacity Requirement (LCR) and Flexible Capacity Requirement (FCR) Comments 10

IV. Discussion on the Local Capacity Requirement Working Group Report..... 11

A. Topic 1: Potential Modifications to the Current LCR Timeline or Processes to Allow More Meaningful Vetting of the LCR Study Results 11

B. Topic 2: Inclusion of Energy Storage Limits in the LCR Report and Its Implications on Future Resource Procurement..... 11

C. Topic 3: How Best to Harmonize the Commission’s and CAISO’s Local Resource Accounting Rule 12

V. Conclusion 12

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OPENING COMMENTS ON THE LOSS OF LOAD EXPECTATION STUDY, LOCAL CAPACITY REQUIREMENT/FLEXIBLE CAPACITY REQUIREMENT SCHEDULE AND LOCAL CAPACITY REQUIREMENT WORKING GROUP REPORT OF THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR CORPORATION

I. Introduction

The California Independent System Operator Corporation (CAISO) submits: (1) opening comments on the Energy Division Study for Proceeding R.21-10-002: Loss of Load Expectation and Effective Load Carrying Capability Study Results for 2024 (Energy Division Study), (2) comments on the flexible capacity requirement (FCR) schedule, and (3) opening comments on the Local Capacity Requirement Working Group Report (LCR Report). Items (1) and (2) are per the February 18, 2022 *Ruling on Loss of Load Expectation Study and Supply Side Demand Response Report, and Setting Comment Schedule* (LOLE and Comment Schedule Ruling) by Administrative Law Judge Chiv. Item (3) is per the March 4, 2022, *Ruling Seeking Comments on the Future of Resource Adequacy Working Group Report and the Local Capacity Requirement Working Group Report* (LCR Ruling) by Administrative Law Judge Chiv.

The Energy Division Study provides the assumptions and results of the Energy Division staff's 2024 Loss of Load Expectation (LOLE) and Effective Load Carrying Capability (ELCC) studies to assess the sufficiency of the current 15% planning reserve margin (PRM) used to set resource adequacy obligations. The Energy Division Study poses 11 questions for party comment. The CAISO appreciates the Energy Division Study and considers this a positive starting point for more dialog and additional vetting and analyses. The CAISO strongly supports the Commission's effort to determine the PRM and ELCC values based on a stochastic LOLE

study and provides responses to each question. Importantly, the Commission should not remove deliverability restrictions used to develop the net qualifying capacity values in the LOLE studies.

Also in the LOLE and Comment Schedule Ruling is a modified Phase 2 schedule for Local Capacity Requirement (LCR) and Flexible Capacity Requirement (FCR) comments and reports. As discussed below, the CAISO is unable to submit the final FCR report until mid-May.

Decision (D.) 20-06-031 identified California Community Choice Association (CalCCA) and Pacific Gas and Electric Company (PG&E) as the co-leads of a working group to evaluate three specific LCR topics and submit a working group report. The working group convened on February 2, 2022, the co-leads distributed a draft of the LCR Report to the service list on February 18, 2022, and the LCR Ruling included the final report. The CAISO provides opening comments on the final report and the three specific LCR topics.

II. Discussion on the Energy Division Staff Study

The CAISO appreciates the Energy Division Study. It is a positive starting point for more dialog and additional vetting and analyses. The CAISO strongly supports the Commission's effort to determine the PRM and ELCC values based on a stochastic LOLE study. Stochastic analyses are better suited to evaluate highly variable conditions such as severe weather impacts on electricity demand driven by climate change. An LOLE analysis performed to meet the industry-standard 0.1 target can uncover reliability needs across all 8,760 hours of each study year and set meaningful PRM values. A combined stochastic LOLE analysis is robust because it tests a portfolio's ability to maintain reliability across a variety of conditions.

As noted in the Energy Division Study, the current 15% PRM is based on a 2004 LOLE study and is 6% lower than the 2024 draft results. As discussed below, the Commission should adopt a single annual static PRM value based on an unforced capacity (UCAP) construct that includes both forced outages and ambient derates for thermal resources. The Commission should use an ELCC analysis to determine qualifying capacity values for short-duration storage, hybrid resources, and demand response but not for pumped storage. The Commission should conduct the LOLE and ELCC analyses simultaneously to ensure consistency in assumptions, methodology, and versioning. Energy Division staff should conduct the study annually for informational purposes but, for contracting stability, the Commission may want to adopt two-year interval for updating the PRM and ELCC values. The Commission should work with the California Energy Commission to develop stochastic demand forecast sets that consider greater

climate change impacts and low hydro resource availability. Both the stochastic LOLE and ELCC studies are compatible with party proposals under the Reform Track of the current resource adequacy proceeding. Lastly, the Commission should not remove deliverability restrictions used to develop the net qualifying capacity values in the LOLE studies. The Energy Division Study’s proposal to remove deliverability requirements fundamentally misunderstands how the CAISO assesses deliverability.

The CAISO provides response to the 11 questions posed in the Energy Division Study.

Question 1: Which portfolio scenario (Base, A, B, C or D) best represents the likely portfolio in 2024? Which set of technology ELCC values should be assumed in selecting the short term average ELCC values?

In the resource adequacy proceeding, the Commission should conduct reliability analyses using a portfolio that reflects (or is very close to) the actual resource adequacy showings for the analyses to be meaningful. Including optimal portfolio additions based on modeling results, such as in the Base Scenario, may be more appropriate for planning studies like the integrated resource plan. Therefore, in the options provided in the Energy Division Study, Scenarios C and D are the closest proxies.

Question 2: What, if any changes should be made to the assumptions used to perform the LOLE study?

The CAISO recommends the following changes to the assumptions and methodology used to perform both the LOLE and ELCC studies.

- As discussed in response to Question 4, the PRM value should not include planned outages.
- As discussed in response to Question 7, it was not discussed why the initial average ELCC value of a specific resource technology is the average of its first-in and last-in marginal ELCC values with the modified “Delta Method.” It is also unclear what impact the “modified version of the ‘Delta Method’... to allocate ELCC to the different resource technologies within the portfolio”¹ has on the resultant ELCC values. The Commission should make available the documents

¹ Energy Division Study, p. 11.

and backup worksheets or a comparison of the ELCC values comparing the Delta Method and the modified Delta Method.

- As discussed in response to Question 8, the Commission should include short-duration storage and hybrid resources and demand response, but remove pumped storage resources from the ELCC valuation.
- As discussed in response to Question 9, the LOLE analysis should be conducted across a year, not monthly, and thus there should be a single PRM value that should be static across the year.
- As discussed in response to Question 11, the Commission should use the California Energy Commission's Integrated Energy Policy Report (IEPR) load forecast rather than scaling the monthly load forecast in SERVIM.

Question 3: Is a LOLE study appropriate to calculate RA obligations for: 1.) a peak RA capacity framework, 2.) a slice of day reliability construct?

The CAISO strongly supports using a stochastic LOLE study to calculate resource obligations in the current single peak capacity framework. Stochastic analyses are better suited to evaluate highly variable conditions such as severe weather impacts on electricity demand driven by climate change. An LOLE analysis performed to the industry-standard 0.1 LOLE target can uncover reliability needs across all 8,760 hours of each study year and set meaningful PRM values. A combined stochastic LOLE analysis is robust because it tests a portfolio's ability to maintain reliability across a variety of conditions, rather than a static snapshot or across a narrow subset of hours. As the Energy Division Study notes, an LOLE analysis was last conducted in 2004 to inform the current 15 percent PRM.² Energy Division staff's draft study results show a 21% PRM is necessary to maintain a 0.1 LOLE for 2024. This reflects increased reliability needs as the generation fleet becomes more variable and use- and energy-limited.³ The CAISO strongly supports refreshing the current PRM using an updated stochastic LOLE analysis. The Energy Division Study provides a methodology for conducting the stochastic LOLE analysis without forced outages, which is compatible with today's framework. The Commission should also consider including forced outages as discussed in response to Question

² Energy Division Study, p. 5.

³ Energy Division Study, p. 20. 21% PRM for September under the current NQC, with new portfolio ELCC.

4 below. The Commission should also refresh the ELCC values for wind and solar, which were last updated in 2019,⁴ and apply ELCC values to short-duration storage and demand response.

In the resource adequacy proceeding Reform Track, parties have proposed two alternative constructs for establishing resource adequacy procurement obligations: (1) a peak and net peak capacity framework, and (2) a slice of day reliability construct. Stochastic, reliability-based LOLE modeling is appropriate, necessary, and compatible with both options. Other methodologies, such as a stack analysis, are not sufficiently robust to capture the interactive effects of a high penetration of variable, use- and energy-limited resources across all 8,760 hours of the study year.

For the proposed peak and net peak capacity framework, a stochastic LOLE analysis should set the single annual static PRM and simultaneously set the ELCC values. See also response to Question 6. Both the single annual static PRM and ELCC values can be used under the proposed slice of day construct. For example, the single annual static PRM can be allocated to each hour of the slice and ELCC values can better inform the Commission and load serving entities on the relative reliability value of use- and energy-limited resources interacting in the portfolio. For both constructs, the Commission should develop a process to ensure prospective modeling (*i.e.*, to establish the PRM and ELCC values) is consistent with shown resource adequacy capacity (*i.e.*, to validate whether load serving entities are collectively showing resources that generally comport with the studied portfolio).

Question 4: How should planned outages be treated in calculating an RA PRM using an LOLE study?

The Commission should include planned outages in the actual production cost modeling of the LOLE study but should not include the outages in the resultant PRM. This may lead to double counting because the PRM above 100% can account for planned outages.

Question 5: Would removing deliverability restrictions in the NQC calculation be an accurate translation of the way that resources provide reliability value to CAISO in most instances, outside of particularly constrained times? Would it be possible that certain resources would avoid making transmission upgrades because they have less

⁴ Energy Division Study, p. 5.

of an incentive? Do parties have any other arguments pro or con about deliverability restrictions in the QC calculation?

The Commission should not remove deliverability restrictions used to develop the net qualifying capacity values during the LOLE studies. The Energy Division Study erroneously assumes that “[s]ignificant MWs of NQC are restricted in RA compliance by limiting their NQC at deliverability, and staff believe it is likely more accurate to count this impaired generation towards RA obligations.”⁵

First, the argument fails to recognize that a resource can only qualify to provide resource adequacy if it is deliverable to the aggregate of load based on the transmission topology and the other flows on the transmission system during critical assessment periods. Therefore, deliverability is a requirement—not a restriction—and removing it renders the LOLE studies and their results unusable and incompatible with the resource adequacy program. In other words, the PRM required in the resource adequacy program should only account for deliverable resources with a must-offer-obligation in the CAISO markets.

Second, the argument also fundamentally misunderstands how deliverability is assessed and what it represents. The CAISO’s deliverability analysis assesses peak system conditions. If a resource is not deliverable during those conditions it is likely not deliverable during other hours with higher renewable output levels and lower load.

Reviewing deliverability from within a simple radial generation area provides an illustrative example. Consider a radially connected generation pocket with approximately 100 MW of transmission capability, 200 MW of peak load, and 500 MW of solar and wind generation. Regardless of the quantity of generation connected in this area, only 300 MW of output is “deliverable” at the peak load—*i.e.*, the sum of 100 MW exported to load outside the area and 200 MW consumed by local load. Under light load conditions with demand at 50% of peak within the generation pocket, only 200 MW of the internal resource output would be “deliverable”—*i.e.*, 100 MW export to load outside the area and 100 MW consumed by local load. As a result approximately 300 MW of renewable generation output would need to be curtailed. Therefore, actual “deliverability” to the aggregate of load decreases with lower load levels and higher renewable generation output and there is no “extra deliverability” available at less than peak periods. To simplify the computations for the resource adequacy program, the

⁵ Energy Division Study, p. 22.

CAISO’s analysis assumes that resources deliverable at peak can count with their full output in other non-peak hours because the system needs less resources to serve load and managing actual grid congestion is available assuming all resource adequacy resources have a 24 hour, 7 day-a-week must-offer-obligation. However, this simplification does not result in “additional deliverability” at any other hour outside of the peak hour.

The Commission may not and should not “remove deliverability restrictions”, for reasons explained above, in any resource adequacy studies and requirements, including the LOLE studies and the resource adequacy planning reserve margin.

Question 6: How often should staff perform LOLE studies for RA obligations and ELCC values? Are there problems with performing RA studies and ELCC studies together simultaneously as is done in this proposal?

The CAISO supports an annual, simultaneous refresh of the LOLE and ELCC studies, at minimum, for informational purposes. The annual frequency provides transparency regarding the collective impact of the changing resource adequacy fleet and how well it is maintaining reliability. As noted in response to Question 3, there is a six percent increase in the PRM requirement between the LOLE analysis conducted in 2004 and the draft results of the Energy Division Study for a 2024 portfolio. Conducting the analyses simultaneously allows for consistent use of assumptions and methodologies and clearer versioning. The Commission should also consider how to leverage this work between the resource adequacy and integrated resource planning (IRP) proceedings.

Although the LOLE and ELCC studies are calculated annually, the Commission may wish to lag changes in the PRM and ELCC values by up to two years, consistent with the binding (*i.e.*, 100%) local capacity forward procurement. This allows for predictability and stability for contracting purposes. However, the Commission could require changes if the study results show significant changes negatively impacting reliability.

Question 7: Do parties have comments on the revised ELCC methodology which assign diversity benefits via a series of marginal ELCC studies at different portfolio penetration points? Or do parties prefer the older method of calculating a capacity weighted average method of assigning diversity benefit?

The Energy Division Study developed a “modified version of the ‘Delta Method’... to allocate ELCC to the different resource technologies within the portfolio. The modified Delta Method includes a proportional adjustment for diversity among resource technologies and ensures the sum of resource technology-specific effective capacity equals the portfolio effective capacity.”⁶ It is unclear what impact the modifications and other portfolios adjustments have on the resultant ELCC values. Also, the revised Delta Method “calculated an initial average technology ELCC as the average of the First-In ELCC value and the Last-In ELCC Value.”⁷ This calculation assumption was not discussed and proved. The Commission should direct Energy Division staff to make available the documents about the revised Delta Method and backup worksheets, or a comparison of the ELCC values between the Delta Method and the modified Delta Method. The Commission should also host additional workshops with comment opportunities to discuss the current and additional analyses.

Question 8: Should storage and hybrid resources be valued using an ELCC methodology?

The CAISO agrees that storage and hybrid resources should be valued using an ELCC methodology for capacity purposes. Currently, the minimum four-hour duration requirement to qualify for resource adequacy capacity has effectively served as a maximum duration for the vast majority of battery storage resources. This increases the penetration of the same energy-limited, short-duration storage resource, and an ELCC methodology appropriately captures the reliability capacity contribution of these resources and their interactive effects with the rest of the portfolio. Similarly, the Commission should also evaluate demand response capacity counting on an ELCC methodology.

On the other hand, the Commission can remove pumped storage resources from the storage ELCC calculation. At this point, there is limited penetration of pumped storage resources and pumped storage’s longer duration does not present the same portfolio impacts as variable and energy-limited resources

⁶ Energy Division Study, p. 11.

⁷ Energy Division Study, p. 13.

Question 9: Should the PRM be static across the year or vary monthly (or seasonally)? How should PRM and ELCC values be allocated across months? Via month specific studies or via some allocation method?

As discussed above, the CAISO supports a single static PRM value across the year as this adheres to the annual duration of industry-standard LOLE analyses with a 0.1 LOLE target. The Energy Division conducted its study on a monthly basis in an effort to align with the Commission’s resource adequacy program, but it arbitrarily assigns LOLE to each month. Although the Energy Division Study “assumes that achieving 0.13 LOLE for the peak months is sufficiently close to achieving a 0.1 LOLE reliability level annually” this has not been proven.⁸ The Commission should revert back to the annual industry standard, which would produce annual PRM values and eliminate the need to force or artificially “surface” LOLE in the off-peak months.⁹

The Commission should direct Energy Division staff to conduct a stochastic analysis to achieve an annual 0.1 LOLE target. The Commission should host additional workshops with comment opportunities to discuss any additional analyses and whether monthly analyses are needed to develop monthly ELCC values.

Question 10: Should forced outage rates on thermal resources be included in setting their QC value? In other words, should the PRM be set using a UCAP or ICap framework? If an UCAP framework is used should the forced outage rates also include ambient derates?

The CAISO supports including forced outage rates on thermal resources in setting their QC values. This should include ambient derates. Consequently, the PRM should be set using a UCAP framework. A UCAP methodology will assess capacity needs and resource contributions taking into account resource availability and deliverability. Furthermore, using unit-specific forced outage rates will better reflect this information in procurement. The Commission should also include forced outage rates in QC values for non-thermal resources not using an ELCC methodology, to the extent available.

⁸ Energy Division Study, p. 14.

⁹ Energy Division Study, p. 15.

Question 11: Should the load forecast used to set RA requirements be based on the monthly load forecast produced by SERVIM or the IEPR (as done today)? Should the PRM calculation (presented in Table 10) be based on the IEPR forecast as opposed to the SERVIM monthly load forecast? Why or why not?

The CAISO supports using the California Energy Commission's (CEC's) IEPR managed load forecast to maintain process alignment. The same forecast set is used in the resource adequacy and IRP proceedings and numerous CAISO processes such as the local and flexible capacity studies. The Energy Division Study's scaling of SERVIM monthly load forecasts to the IEPR forecasts disconnects the IEPR forecasts from the underlying demand drivers and modifiers.

Furthermore, if stochastic demand forecast sets are needed to conduct LOLE and ELCC studies, the CEC is the lead agency to develop such data, which should in turn be coordinated with the IEPR single managed forecast set. The Commission should host additional workshops with comment opportunities to discuss this issue.

III. Discussion on the Phase 2 Schedule for Local Capacity Requirement (LCR) and Flexible Capacity Requirement (FCR) Comments

The LOLE and Comment Schedule Ruling also modifies the Phase 2 schedule for comments on the draft local capacity requirement (LCR) report. The CAISO supports the corrected comment due date for the LCR report. Regarding the flexible capacity requirement (FCR) final report, the LOLE and Comment Schedule Ruling does not change the April 29, 2022 final report filing date. However, the CAISO is unable to submit the final FCR report until mid-May, given the late adoption date of the CEC's Integrated Energy Policy Report (IEPR) demand forecast, on which the FCR analysis depends. A late January adoption by the CEC may not allow sufficient time for the CAISO to conduct its stakeholder process and produce final results by the end of April, especially when the CAISO or stakeholders identify additional analyses. The CAISO noted this specific impact in its FCR stakeholder presentation and discussed it at the stakeholder meeting on February 2, 2022.¹⁰ The CAISO will endeavor to file final results with the Commission earlier than mid-May if possible.

¹⁰ CAISO, *Flexible Capacity Requirement Methodology for 2023 through 2025*, February 2, 2022, footnote on p. 31. Available at: [Presentation-2023FlexibleCapacityNeedsAssessment-Feb022022.pdf \(caiso.com\)](https://www.caiso.com/Documents/Presentation-2023FlexibleCapacityNeedsAssessment-Feb022022.pdf)

IV. Discussion on the Local Capacity Requirement Working Group Report

The CAISO reviewed the LCR Report and has no further edits to the written report. The CAISO provides comments on each of the LCR topics specified in D.20-06-031.

A. Topic 1: Potential Modifications to the Current LCR Timeline or Processes to Allow More Meaningful Vetting of the LCR Study Results

The CAISO has worked collaboratively with Commission Energy Division staff to ensure timely delivery of LCR study results. The CAISO relies on the CEC for the underlying demand forecast to develop the LCR needs. Despite occasional delays in receiving the demand forecast, the CAISO has been able to deliver the LCR results to the Commission with sufficient time to establish Commission-jurisdictional LCR needs. Moreover, the CAISO typically meets Commission-established deadlines for providing the final LCR study, despite undertaking additional analysis, such as developing engineering-managed results when local capacity requirements changed from a one- to three-year forward assessment and performing the storage charging assessment discussed below.

The CAISO has a robust and transparent multiple month-long stakeholder process (as described in the LCR Report in Section III.A.1) that allows for meaningful vetting, discussion, and analysis. Stakeholders should appropriately participate in the CAISO stakeholder process to raise any questions regarding the LCR study criteria, methodology, and results.

To improve coordination, the CAISO can work with Commission Energy Division staff to ensure the start of the CAISO's stakeholder process is also noticed via the Commission's service list. However, the CAISO cannot continue to compress its own stakeholder process timelines.

B. Topic 2: Inclusion of Energy Storage Limits in the LCR Report and Its Implications on Future Resource Procurement

As discussed in the LCR Report, the CAISO provided energy storage limit information to help the Commission, load serving entities, and the Central Procurement Entities form a better understanding of their collective procurement impacts in each local capacity area and sub-area vis-à-vis the existing and projected storage buildout.

C. Topic 3: How Best to Harmonize the Commission's and CAISO's Local Resource Accounting Rule

As the CAISO explained at the February 2nd workshop, existing CAISO and Commission rules require that a resource adequacy resource cannot receive, show, or otherwise sell a different net qualifying capacity (NQC) value towards meeting the local versus system requirement. In other words, a resource adequacy resource counts towards the local requirement because it is located in a given local area; however, the local counting value must be the same as that established by the Local Regulatory Agency (LRA) towards meeting the system-wide requirement. Therefore, in the CAISO systems all resources shown for local resource adequacy count both towards local resource adequacy and toward the system resource adequacy requirements based on their respective monthly NQC values as established by the LRA.

V. Conclusion

The CAISO appreciates the Energy Division Study and considers this a positive starting point for more dialog and additional vetting and analyses. The CAISO strongly supports the Commission's effort to determine the PRM and ELCC values based on a stochastic LOLE study with a 01. LOLE target. The Commission should adopt a single annual static PRM value based on an UCAP construct that includes both forced outages and ambient derates for thermal resources. Importantly, the Commission should not remove deliverability restrictions used to develop the net qualifying capacity values in the LOLE studies.

The CAISO will likely need until mid-May to complete and file its final FRC study with the Commission due to the end of January adoption date of the CEC's IEPR demand forecast. The CAISO will endeavor to file final results with the Commission earlier if possible.

To improve coordination, the CAISO can work with Commission Energy Division staff to ensure the start of the CAISO's local capacity study stakeholder process is also noticed via the Commission's service list.

Respectfully submitted

By: /s/ Jordan Pinjuv

Roger E. Collanton
General Counsel
Anthony Ivancovich
Deputy General Counsel

Jordan Pinjuv
Senior Counsel
California Independent System
Operator Corporation
250 Outcropping Way
Folsom, CA 95630
Tel: 916-351-4429
Fax: 916-608-7222
Email: jpjuv@caiso.com

Dated: March 14, 2022