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COMMISSION REPORT

Qualifying Capacity of Supply-Side Demand Response Working Group Final Report

Gavin Newsom, Governor

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Patty Monahan
Kourtney Vaccaro

Erik Lyon
Tom Flynn
Daniel Hills-Bunnell
Primary Authors

David Erne
Deputy Director
ENERGY ASSESSMENTS DIVISION

Aleecia Gutierrez
Director
ENERGY ASSESSMENTS DIVISION

Drew Bohan
Executive Director

ABSTRACT

This report provides the California Energy Commission's (CEC) final findings and recommendations from the CEC's working group on supply-side demand response to the California Public Utilities Commission (CPUC). The CPUC requested these findings and recommendations in Decision 21-06-029 and last year in Decision 22-06-050. In these decisions, the CPUC requested the CEC launch a stakeholder working group process and make recommendations to improve the method for determining the qualifying capacity of supply-side demand response, which are values based on what the resource can produce during periods of peak electricity demand. This is the final report published by the CEC to make recommendations on improving the method for determining the qualifying capacity of demand response.

Demand response provides California with benefits that include providing greater grid reliability and helping prevent rotating outages. Improving the counting conventions for the qualifying capacity of supply-side demand response can support a robust demand response market, allowing demand response to further support reliability in California.

Today's method for determining the capacity of a demand response resource, eligible to be counted toward meeting the CPUC's resource adequacy requirement, is the CPUC's load impact protocols. The load impact protocols rely heavily on measurements of the historical performance of demand response resources as a basis for forecasting anticipated performance. In this report, CEC staff recommends that the CPUC move away from the load impact protocol approach and adopt an incentive-based qualifying capacity approach.

Keywords: Supply-side demand response, resource adequacy, qualifying capacity, reliability

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EXECUTIVE SUMMARY

This report provides the California Energy Commission's (CEC) final findings and recommendations from the CEC's working group on supply-side demand response to the California Public Utilities Commission (CPUC), as requested by the CPUC in Decision 21-06-029 and most recently requested by the CPUC in Decision 22-06-050. In these decisions, the CPUC requested the CEC launch a stakeholder working group including demand response providers, utilities, industry associations, and others, and make recommendations to address capacity counting issues associated with supply-side demand response. This is the final CEC report, which makes recommendations on improving the method for determining the qualifying capacity of demand response.

Demand response provides customers with incentives to reduce or shift electricity use from peak demand periods. Demand response provides California with benefits that include providing greater reliability to the grid and helping prevent rotating outages. Improving the counting conventions for the qualifying capacity[1] of supply-side demand response, which are values based on what the resource can produce during periods of peak electricity demand, may help demand response better support reliability in California.

The current method for determining the capacity of demand response resources, eligible to be counted toward meeting the CPUC's resource adequacy requirement, is the CPUC's load impact protocols. The load impact protocols rely heavily on measurements of actual historical performance of demand response resources as a basis for forecasting anticipated performance.

In this final report, CEC staff makes its recommendations primarily based on consideration of the five stakeholder proposals produced in the working group and stakeholder comments on the proposals. The recommendations are guided by CEC staff's experience this year applying the status quo approach in support of CPUC staff's review and analysis of the filings submitted by demand response providers through the load impact protocols.

CEC staff recommends that the CPUC move away from the load impact protocol approach and adopt an incentive-based qualifying capacity approach. Staff also recommends a framework that closely resembles its own proposal submitted through the working group. Replacing the upfront forecasting approach with an incentive-based framework can prompt DR providers to commit to achievable capacity contributions and to meet those commitments while streamlining the process for both DR providers and agency staff. Staff included components of other proposals and incorporated stakeholder feedback into its final recommendations. The recommendations in this report describe the suggested features of the incentive-based approach.

1 The maximum capacity that an electricity resource may be eligible to provide to the California ISO to meet customer demand at all hours within a study period. The criteria and methodology for calculating the qualifying capacity of resources are established by the CPUC or other applicable local regulatory authority.

CHAPTER 1: Introduction

This report provides the California Energy Commission's (CEC) final findings and recommendations from the CEC's working group on supply-side demand response (DR) to the California Public Utilities Commission (CPUC), as requested by the CPUC in Decision (D.) 21-06-029 and most recently requested by the CPUC in D.22-06-050. These decisions requested that the CEC launch a stakeholder working group[2] process and make recommendations to address electricity capacity counting issues associated with supply-side demand response.

This report is the second in a series of reports published by the CEC to recommend methods for determining qualifying capacity (QC) of DR eligible to be counted toward meeting the CPUC's resource adequacy (RA) requirement. The first interim report was published in early 2022. This is the CEC's final report on the topic.

Existing Qualifying Capacity Method for Demand Response

To determine the capacity of each resource eligible to be counted toward the CPUC's RA requirement, the CPUC develops QC values based on the load impacts of a resource during peak electricity demand periods (typically between 4 and 9 p.m. on the year's hottest days). The CPUC-adopted QC counting conventions vary by resource type. For DR, the QC values are set based on historical performance using load impact protocols (LIPs).

Currently, the process to determine the QC of a DR resource portfolio requires following the CPUC's LIPs. The LIPs rely heavily on measurements of historical performance of DR resources as a basis for forecasting anticipated future performance. For background, the status quo LIPs are summarized below.

The LIPs were adopted by the CPUC in D.08-04-050 in 2008. These protocols established guidelines for measuring historical performance of DR resources, forecasting anticipated performance under varying conditions, and reporting the results. However, they did not specify how load impacts should be applied for RA.

DR providers calculate resource capacity based on the expected load reduction capabilities of DR resources under typical expected peak grid needs. In essence, the LIPs generate a model to estimate the load reduction of a DR resource under varying conditions. This model might account for ambient temperature, day of the week, hour of the day, and month of the year,

2 CEC staff formed a stakeholder working group for this purpose in Summer 2021. Participation was open to all interested stakeholders. Stakeholder organizations represented include Sunrun, California ISO, Enel X North America, Recurve, Olivine, OhmConnect, CPUC Energy Division, CPUC Public Advocates Office, Hy Power Salton Sea, SCD Energy Solutions, Grounded Analytics, Southern California Edison, Pacific Gas and Electric, Barkovich & Yap, Inc. for the California Large Energy Consumers Association (CLECA), California Efficiency + Demand Management Council (CEDMC), CPower, SDG&E, Middle River Power, Leap, CalCCA, Powerflex, NRG Curtailment Solutions, Jay Luboff Consulting, Demand Side Analytics, Opinion Dynamics, California Energy Storage Alliance, Verdant Associates, Enchanted Rock, ecobee, and EnergyHub.

depending on the nature of the resources. To generate a QC value, this model is applied to a set of conditions expected to reflect the peak grid need. These planning assumptions include the median peak temperature expected for each month on a weekday over the hours with the highest net demand. DR resources made of aggregations of small customers, such as residential "smart thermostat" programs, may be modeled as a demand reduction per customer, and the total capacity value is adjusted by the expected future participation.

Finally, the capacity value adopted as the QC for a given resource is provided by CPUC Energy Division staff. CPUC staff reviews LIP reports with estimated capacity values and makes a "reasonableness determination" for each resource. For capacity values found unreasonable, CPUC staff may change assumptions regarding the expected load impacts or participation based on professional judgment. The resulting value is adopted as the QC and represents the maximum capacity a DR resource can provide in an RA capacity contract.

2022 LIP Process

In 2022, CEC staff and CPUC Energy Division staff collaborated on the LIP reviews for the first time. Together, staff from the two agencies reviewed and analyzed the LIP submissions of third-party DR providers and developed consensus determinations. CEC staff did not review investor-owned utility LIP filings. This provided CEC staff with an opportunity to acquire first-hand knowledge of LIP filings, the LIP process, and the role of Energy Division staff in the LIP process. Through this experience CEC staff gained an appreciation for the extensive undertaking that the preparation of LIP reports by DR providers represents and the workload of Energy Division staff in reviewing those reports and developing QC determinations.

CEC Interim Report

On June 25, 2021, the CPUC issued Decision 21-06-029, which asked the CEC to launch a stakeholder working group process and make "recommendations for a comprehensive and consistent [measurement and verification] strategy, including a new capacity counting method for [DR] addressing *ex post* and *ex ante* load impacts for implementation as early as practicable. (35)"[3] The CPUC specifically requested the CEC "make actionable recommendations" on the following issues:

1. "Whether the [California ISO's] ELCC [effective load carrying capability] proposal is reasonable and appropriate to determine DR QC and/or what modifications, if any, should be considered;
2. Whether the LIP-informed ELCC proposal is reasonable and appropriate to determine DR QC and/or what modifications, if any, should be considered;
3. Whether other proposals that may be presented in the CEC's stakeholder process are reasonable and appropriate to determine DR QC;

3 *Ex ante* refers to values that are based on forecasts rather than actual results. *Ex post* refers to values that are based on actual results rather than forecasts.

4. Whether and to what extent alignment of DR M&V [measurement and verification[4]] methods in the operational space for California ISO market settlement purposes with methods to determine resource adequacy QC in the planning space should be achieved, and if so, how;
5. Whether, and if so what, enhancements to intra-cycle adjustments to DR QC during the RA compliance year, as adopted in D.20-06-031, are feasible and appropriate to account for variability in the DR resource in the month-ahead and operational space;
6. Whether implementation of any elements of DR QC methodology modifications that might be adopted by the Commission should be phased in over time;
7. Whether, and if so how, any changes to DR adders should be reflected in DR QC methodology." (35–36).

The CPUC requested that the CEC submit its recommendations for implementation in the 2023 RA compliance year,[5] no later than March 18, 2022.

In response to the request in Decision 21-06-029, the CEC launched a stakeholder working group process in July 2021. By October 2021, it was clear that there was insufficient time to develop a permanent QC methodology for the 2023 RA compliance year. The stakeholders believed that the working group should await the outcome of the CPUC reform track process in its RA proceeding before making its recommendations. As a result, the CEC submitted its report to the CPUC on February 18, 2022.

The interim report recommended several proposed approaches on an interim basis for 2023: the LIP-informed ELCC for IOU resources, the incentive-based approach for third-party Demand Response Providers (DRPs), the LOLP-weighted LIPs as a back-up option for IOUs and third-party DRPs, and the status quo LIP methodology. The CEC interim report recommended the CPUC request California ISO grant a resource adequacy availability incentive mechanism (RAAIM)[6] exemption for DR resources that choose to use LIP-informed ELCC and the CPUC direct IOUs to move DR portfolios onto California ISO supply plans. Lastly, the CEC interim report recommended the CPUC extend the working group process beyond February 2022 to develop long-term recommendations beginning with the 2024 RA compliance year.

The three approaches proposed in the interim report are summarized below. The status quo LIP method was summarized earlier in this chapter.

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4 *Measurement and verification (M&V)* for demand response means the determination of the demand reduction quantities.

5 The Resource Adequacy (RA) program was developed in response to the 2001 California energy crisis. The program ensures that CPUC jurisdictional load-serving entities have sufficient capacity to meet their peak load with a 15 percent reserve margin. The RA program began implementation in 2006 and is intended to provide the energy market with adequate forward capacity to meet peak demand and integrate renewables. Each October, the RA program requires load-serving entities to make compliance showings for the coming year.

6 The RA Availability Incentive Mechanism (RAAIM) is a mechanism for California ISO to assess nonavailability charges and provides availability incentive payments to RA resources based on whether the performance of these resources falls below or above defined performance thresholds.

LIP-Informed ELCC Proposal

Pacific Gas & Electric (PG&E) and Southern California Edison (SCE) proposed using the LIP analysis to inform the QC of the effective load carrying capability (ELCC) methodology, referred to as *LIP-informed ELCC.* The method proposed to apply the same logic and principles as bid-informed ELCC but would use LIP profiles as the input for the ELCC model. The proposal assumed that CPUC staff would calculate the ELCC values.

CEC staff recommended that for the 2023 RA compliance year, the proposal should be adopted on an interim basis for investor-owned utility resources. Because of time constraints, CEC staff noted it was unlikely CPUC staff could perform the modeling for third-party DRPs.

The California ISO, PG&E, and SCE supported the proposal as an interim approach for the 2023 RA compliance year. OhmConnect suggested that the method should be available to third-party DRPs, as well as IOUs. California Large Energy Consumers Association (CLECA) and SDG&E opposed the proposal.

Incentive-Based Proposal

The California Efficiency + Demand Management Council (CEDMC) proposed an incentive-based approach modeled in part by approaches used by the PJM Interconnection and the New York Independent System Operator. On a quarterly basis, DRPs would estimate the capability of their resources and claim a corresponding QC value using any proprietary analytical tool. DRPs would submit claimed QC values and supporting documentation to the CPUC for review, after which CPUC staff would determine the approved amount. Each DR provider would provide a $2,500/MW-year collateral payment to the CPUC Energy Division to be held in escrow based on the amount of NQC contracted. The performance of a resource would be evaluated against the provider's monthly supply plan to determine underperformance. A financial penalty structure would be based on PG&E's Capacity Bidding Program, where penalties are issued if providers deliver less than 75 percent of the contracted amount.

CEC staff recommended the proposal be adopted on an interim basis for third-party DRPs for the 2023 RA compliance year. Staff recommended a penalty structure based on PG&E's Capacity Bidding Program structure and the Demand Response Auction Mechanism penalty structure, where penalties would be triggered if a DR resource performs below 90 percent of contracted capacity.

OhmConnect, CESA, and a coalition of DR providers supported CEDMC's proposal as an interim solution. Several stakeholders opposed the proposal, including Cal Advocates, the California ISO, PG&E, and SCE.

LOLP-Weighted LIP Proposal

CLECA proposed to use relative loss of load probability (LOLP) as hourly weights to apply to the LIPs (rather than using a simple average), referred to as the *LOLP-weighted LIP proposal.*

CEC staff recommended that for the 2023 RA compliance year, the LOLP-weighted LIP proposal should be adopted as an interim back-up option for third-party DRPs and IOUs. Staff believed the proposal provided an incremental improvement to reflecting contribution to reliability relative to unweighted LIP results.

The California ISO, CESA, and a coalition of DR providers supported the LOLP-weighted LIP proposal as an interim solution for 2023. PG&E believed it was not robust enough for an interim solution but recommended that the working group develop the proposal as a potential long-term solution. SCE suggested that the proposal did not evaluate contribution to grid reliability in the context of other types of capacity on the grid, such as wind, solar, and storage, and did not consider the order through which DR resources are dispatched or the related interactive effects.

CPUC Decision 22-06-050

After considering the CEC recommendations in its interim report and taking comments from stakeholders, the CPUC issued Decision 22-06-050 in Rulemaking 21-10-002 on June 24, 2022.[7]

The CPUC observed that to implement new QC methods for DR resources for the 2023 RA compliance year, even on an interim basis, there would be significant timing and resource constraints for the proposed methods. The CPUC found insufficient record to adopt a DR QC counting proposal for the 2023 RA compliance year. Consequently, the CPUC determined that the status quo LIP method would remain in effect unless superseded by a future decision.

The CPUC agreed that the CEC working group should continue to develop long-term recommendations, consistent with the adopted reform track framework. The CPUC found that to adopt a new DR QC method for the 2024 RA compliance year, in advance of the load impact protocol process that begins in December, a working group recommendation would need to be submitted by August 2022. The CPUC found that given the short time remaining, it would be unlikely that the working group would have sufficient time to develop an implementable proposal for 2024 and more realistic to submit recommendations for the 2025 RA compliance year and beyond.

Thus, the CPUC requested that the CEC working group develop recommendations that consider the following issues for 2025 RA compliance year:

1. "Whether the proposals that are presented in the CEC's stakeholder process are reasonable and appropriate to determine the QC of DR resources;
2. Whether the DR QC methodology reflects the contributions of DR resources to reliability;
3. Whether the DR QC methodology is compatible with the new RA framework for the 2025 RA year and beyond;
4. Whether the DR QC methodology is transparent and how it could be implemented in a time-efficient manner;
5. Whether and to what extent alignment of DR M&V [measurement and verification] methods in the operational space for CAISO market settlement purposes with methods to determine DR QC in the planning space should be achieved, and if so, how;

7 See Section 3.4.1 (pages 27-41) of the decision for more detail. https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M488/K540/488540633.PDF.

6. Whether, and if so what, enhancements to intra-cycle adjustments to DR QC during the RA compliance year, as adopted in CPUC Decision 20-06-031,[8] are feasible and appropriate to account for variability in the DR resource in the month-ahead and operational space;
7. Whether, and if so how, any changes to DR adders should be reflected in DR QC methodology." (40-41).

The Commission requested that the CEC working group submit recommendations into Rulemaking 21-10-002 by February 1, 2023.

Development of a Long-Term Methodology

Prior to CPUC Decision 22-06-050, the CEC recommenced the working group on April 7, 2022. The working group began with the assumption that the status quo load impact protocol methodology would remain in effect unless superseded by a future CPUC decision and that the working group should focus on recommendations for the 2025 RA compliance year and beyond. Those assumptions were confirmed by CPUC Decision 22-06-050. The decision also confirmed that the working group should develop recommendations consistent with the slice-of-day framework adopted by the CPUC. This meant that the development of a long-term solution by the working group would need to be done in parallel with the development of the slice-of-day framework by the CPUC. The working group began its work on a durable solution following the decision. Since CPUC Decision 22-06-050 gave the working group a deadline of February 1, 2023, the working group developed a workplan and timeline that would achieve this goal. The working group also revisited the principles it had developed in 2021 and further refined them in preparation for using them to help evaluate proposals. The final set of nine principles were posted to docket 21-DR-01 on May 2, 2022.[9]

The working group also began the development of a range of proposals for QC of supply-side DR for the 2025 RA compliance year and beyond. Ultimately, five proposals were developed and submitted to the working group by participants. The CEC posted the five written proposals to Docket 21-DR-01 on September 28, 2022. Chapter 2 summarizes and compares the five proposals.

The CEC received written stakeholder comments during the week of October 17, 2022, and posted those to Docket 21-DR-01. Chapter 3 summarizes the stakeholder comments received. The CEC provides its recommendations in Chapter 4 based on its consideration of the five proposals, stakeholder written comments, and CEC staff's experience this year in supporting CPUC staff review and analysis of the 2022 LIP filings submitted by DR providers.

8 See page 45 of CPUC Decision 20-06-031 issued in CPUC Rulemaking 19-11-009 on June 30, 2020. https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M342/K083/342083913.PDF

9 California Energy Commission staff. 2022. *DR QC Counting Methodology Principles*. California Energy Commission, https://efiling.energy.ca.gov/GetDocument.aspx?tn=242909&DocumentContentId=76492

CHAPTER 2:
Proposals for Qualifying Capacity of Supply-Side Demand Response

Following the submittal of the interim report to the CPUC on February 18, 2022, the CEC moved the working group's focus away from an interim solution and on to the development of a long-term solution for RA compliance year 2025 and beyond. Five proposals were developed and sponsored by several stakeholder participants in the working group and final written descriptions of these were submitted to CEC in September 2022 and posted to Docket 21-DR-01.[10]

The chapter begins with a section summarizing each proposal in brief, followed by a section comparing the different proposals across four key attributes. For summaries of stakeholder positions on these proposals based on written comments solicited by CEC staff, see Chapter 3.

Proposal Summaries

This section introduces the five proposals submitted through the DR QC working group process from the CLECA, Demand Side Analytics (DSA), OhmConnect, CEDMC, and CEC staff.

CLECA Proposal

The CLECA proposes adapting the status quo LIP-based methodology to the slice-of-day framework. CLECA notes the LIPs "already produce hourly expected load reductions" that are averaged under the current process; under slice-of-day, they simply do not need to be averaged. CLECA's emphasis is more on the flexibility in *when* DR providers can provide capacity and requirements for counting capacity across hours than on the specific method used to calculate the values.

Specifically, CLECA observes that "under the 24-hourly proposal, the requirement that DR must be available from 4 to 9 p.m. may no longer be necessary. That change would allow an LSE to develop DR programs to meet its load requirement shape." However, the CLECA proposal does maintain other elements of the status quo RA requirements, including a minimum four-hour dispatch and minimum availability of 24 hours per month from May to September.

Under the slice-of-day framework, CLECA proposes to require DR providers to account for "any significant spillover impacts which increase [or decrease] load before or after the event." This element is included for consistency with storage under slice-of-day, which requires load-serving entities to "show the resources providing energy used for charging as part of their capacity requirements." CLECA notes the specific requirements may need to be revisited based on future reliability studies.

10 See California Energy Commission Docket Log 21-DR-01. https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=21-DR-01.

The CLECA proposal also includes guidance on a method to determine the monthly QC value for the California ISO need determination and on the "additional items" presented later in this report. The need determination method is being addressed in the reform track of CPUC Rulemaking 21-10-002 and out of scope for this report. The CLECA perspective on additional items is presented later in the "Reporting Requirements and Timeline

The five proposals submitted all recognize the requirement for developing hourly capacity values by month, though they differ by how directly and explicitly that process is described. Some proposals focused on new reporting requirements for the slice-of-day framework, while others focused on unnecessary reporting requirements under the status quo that can be eliminated and the extent to which this streamlining can allow for QC values to be finalized earlier.

The DSA proposal focused on the format of QC reporting for the slice-of-day framework. Specifically, DSA proposes a reporting format referred to as the *24-slice-of-day table* with months as columns and hours of the day as rows that is filled in with the capacity value for that hour of the "worst day" of that month. For weather-sensitive resources, DSA also proposes a time-temperature matrix that includes temperature, dispatch start time, and hours into event in addition to month and hour.

The incentive-based proposals from CEDMC and CEC staff both included requirements for reporting *ex ante* claimed capacity. For CEDMC, the claimed capacity values would be a single megawatt value for each hour of each month for which a DR provider is seeking RA capacity. The CEDMC proposal requires a single value because the methodology does not include weather normalization. In contrast, the CEC staff proposal also requires a "capability profile" that represents the minimum capacity the DR provider is willing to commit to over a range of temperatures. The monthly/hourly capacity values are determined by applying the planning temperature for each month and hour to the capability profile, resulting in a single value much like the CEDMC proposal. Both proposals are ultimately compatible with the slice-of-day table.

CEDMC and OhmConnect focused on eliminating excess *ex ante* reporting requirements. OhmConnect began with the list of protocols enumerated in the LIPs and removed or amended those found to be unnecessary. (See OhmConnect Proposal for details.) CEDMC took the opposite approach and proposed a new list of "supporting data," including:

a. Current and projected number of service accounts.
b. Customer class, size, and technology type, if applicable.
c. Projected aggregated load.
d. Projected percentage of load impact or reduction.
e. Nature of load being aggregated.
f. Dispatch method.
g. Historical performance data.

CEDMC and OhmConnect proposed reducing the timeline for finalizing QC values such that DR providers can contract with load-serving entities earlier in the year-ahead process. Under the

proposed timelines, final QC values would be available by June 1 and July 1, respectively, prior to the RA compliance year.

The CEDMC and DSA proposals also included *ex post* performance reporting requirements. For CEDMC, the main purpose of *ex post* reporting is to provide a measurement of delivered capacity for the CPUC to complete its assessment of performance relative to commitments and, if necessary, enforce penalties. In the CEC staff proposal, *ex post* capacity measurement is assumed to be completed by a state agency or the California ISO.

DSA proposes two novel measurements of *ex post* performance, the "bid alignment metric" and "performance alignment metric." The bid alignment metric "is a ratio between historic[al] bidding values and the capability forecasted by the historic[al] [*ex ante*] model." The performance alignment metric "is a ratio between the historic[al] performance … and the planning values developed from the historic[al] *ex ante* model for the same weather and dispatch conditions." According to DSA, these metrics "can let implementers, planners, and [the California ISO] know if there needs to be an adjustment to the planning model in the long term so that there is greater alignment between actual performance and the forecasted performance" or bids.

Role of State Agencies and California ISO

Under the current processes, CPUC Energy Division staff reviews LIP reports and makes a finding as to whether claimed QC values are reasonable. The three LIP-based proposals from OhmConnect, CLECA, and DSA would maintain this role. CEDMC proposes to preserve the prerogative of the CPUC to conduct the same level of detailed review, but because of the "penalty structure in place to provide after-the-fact rigor, … it will not be necessary that the Energy Division apply the same degree of up-front rigor it uses under the LIP process." The CEC proposal takes a similar approach and suggests specific criteria under which CPUC staff waives the prerogative and approve claimed QC values. These criteria include the following:

- "[*Ex post*] capacity value is at least 90 percent of the committed capacity."
- "Requested [*ex ante*] capacity is no more than 25 percent above the [*ex post*] delivered capacity in the previous year."

CEC staff states that together, these criteria "will reduce administrative burden on both DR providers and CPUC staff, while still retaining oversight abilities in cases where a DR provider underperformed in the previous year or a significant increase in QC is requested."

The DSA proposal also included a new *ex ante* role for a central agency. DSA suggests the CPUC, CEC, or California ISO produce a "reliability risk heatmap" ahead of the RA compliance year. The heatmap would guide development of DR resources by quantifying reliability risk (for example, loss of load probability or expected unserved energy) by month and hour of day over the RA compliance year. The heatmap would be provided roughly 18 months ahead of the RA compliance year.

CEDMC recommends "the Energy Division [to] assess the monthly Demonstrated Capacity reports of each [investor-owned utility] and DR provider." CEC staff does not specify which entity would implement the penalty structure.

Additional Items" section of this chapter.

For more information, see the CLECA proposal posted to CEC Docket 21-DR-01.[11]

DSA Proposal

DSA proposal is fundamentally an application of the LIPs to the new slice-of-day framework. The first element of the proposal states: "The [LIPs] should be retained but modified to address the 24-hour slice-of-day framework." Such modifications include updating planning temperatures to the "worst day" as defined in the RA program, allowing DR resources the flexibility to provide capacity value based on need (in contrast to the static availability assessment hours), and accounting for spillover in nonevent hours (including negative load impacts or takeback).

Much of the DSA proposal focuses on standardization of reporting requirements and outputs. For all resources, a *24-slice-of-day table* would show hourly load impacts for the worst day in each month. Each load impact estimate in the table would be the hourly capacity value eligible for RA in that hour and month. For weather-sensitive resources, DSA proposes production of a time-temperature matrix of load impacts as an upon-request output. The time-temperature matrix could also disaggregate load impacts by event start time or hours into event, if needed.

The proposal includes supplemental components apparently for informational purposes. DSA proposes that a central planning authority produce a "reliability risk heatmap" for each compliance year that will help DR providers align resources and programs with system need but does not directly affect either *ex ante* or *ex post* capacity valuation.

The proposal also includes two *ex post* performance metrics:

- The **bid alignment metric** measures the extent to which resources bid as expected based on the associated 24-slice-of-day table or time-temperature matrix or both.
- The **performance alignment metric** measures the extent to which resources perform as expected when dispatched.

Like the risk heatmap, these metrics do not appear to directly impact *ex ante* or *ex post* capacity valuation. DSA writes of both metrics: "we recognize that stakeholders may want additional discussion and the opportunity to test it in practice before it is adopted," suggesting it may be integrated into the QC methodology, but a description of how it would do so is not provided.

DSA also included suggestions for aligning evaluation of load impacts in the planning space with evaluation used for settlement. These elements of the proposal are included in the section "Alignment of Operational and Planning Spaces" of this report.

For more information, see the DSA proposal posted to CEC Docket 21-DR-01.[12]

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11 Nelson, Paul. 2022. *Proposal for Demand Response Resource Counting for Slice of Day*. CLECA, https://efiling.energy.ca.gov/GetDocument.aspx?tn=246242&DocumentContentId=80425

12 Demand Side Analytics Staff. 2022. *Demand Response Qualifying Capacity Working Group Proposal.* San Diego Gas & Electric, https://efiling.energy.ca.gov/GetDocument.aspx?tn=246240&DocumentContentId=80424

OhmConnect Proposal

OhmConnect proposes using the same underlying methods used in the current LIP-based status quo and focuses instead on removing or otherwise streamlining the LIP reporting requirements not directly applicable to QC. OhmConnect argues that current protocols regarding *ex ante* evaluation of a resource are both "burdensome and inefficient" for DR providers and CPUC Energy Division staff. OhmConnect notes that streamlining reporting requirements is "compatible with any number of approaches to modify the LIP outputs for the slice-of-day RA program" but "does not opine on any individual proposal here." While OhmConnect uses the status quo LIP-based methodology as a sensible default, it signals openness to alternative methodologies so long as the reporting requirements are simplified sufficiently "to *just* those that are necessary for the determination of RA QC."

Reporting changes proposed by OhmConnect include the following:

- **Streamline evaluation plan requirements:** OhmConnect proposes a standardized tabular or spreadsheet template that would reduce burden on DR providers and CPUC Energy Division staff (Protocol 1). To further reduce the reporting burden, OhmConnect proposes that only first-time DR providers or providers making "material changes" to their program or evaluation approach should be required to submit an evaluation plan to the CPUC Energy Division staff for approval (Protocol 1) or respond to questions/issues regarding the evaluation plan (Protocol 3).
- **Eliminate *ex post* and *ex ante* impact estimates not relevant to QC valuation:** OhmConnect proposes eliminating reporting requirements including average and total resource impact (Protocol 5), estimates for typical and average day events (within Protocol 8), change in monthly/annual energy use (Protocol 19), non-RA-relevant *ex ante* event estimates, such as the 1-in-10 peak (within Protocol 22), and capacity projections beyond the RA compliance year for which the DR provider is seeking QC.
- **Eliminate all non-event-based DR protocols:** The LIPs include a suite of protocols (Protocols 11 through 16) specific to load-modifying and other non-event-based DR that can be eliminated for supply-side DR.
- **Streamline evaluation report, especially public review:** OhmConnect proposes eliminating the "comparison to prior year's study in *ex ante*" because it introduces confusion (within Protocol 26). However, OhmConnect places greater emphasis on shortening the evaluation review process and eliminating the public review component that was designed for oversight of IOU DR programs (Protocol 27). According to OhmConnect, public review requires considerable time and effort, and redaction of proprietary data renders the value of public oversight "questionable." OhmConnect notes that full, unredacted evaluation reports can still be provided to the CPUC, CEC, California ISO, or the CPUC Public Advocate's Office, or a combination, as appropriate.

For the comprehensive list of proposed changes, see the OhmConnect proposal posted to CEC Docket 21-DR-01.[13] Between these changes, OhmConnect proposes the LIP timeline be

13 OhmConnect staff. 2022. *"Simplified LIPs" Proposal*. OhmConnect, https://efiling.energy.ca.gov/GetDocument.aspx?tn=246232&DocumentContentId=80415

shortened so DR providers can receive QC values for the following year by July 1, rather than mid-September.

CEDMC Proposal

CEDMC proposes an *ex post* incentive structure that levies a penalty on underperformance to ensure delivered capacity. This proposal is largely aimed at reducing the burden and risk for DR providers, who bear compliance costs of participation and uncertainty of awarded QC, and oversight for CPUC Energy Division staff, who is responsible for auditing submissions and approving final awarded QC.

Central to the CEDMC proposal is the penalty structure, which determines the financial incentives faced by DR providers. This penalty structure is adapted from PG&E's Capacity Bidding Program. When demonstrated capacity is 50 to 100 percent of committed capacity, the payment is adjusted to the demonstrated capacity but does not face an incremental penalty. Below 50 percent, the DR provider loses the entirety of its capacity payment *and* is penalized by the value of the committed capacity.

Along with shifting from an analytical forecasting or predictive approach (that is, a LIP-based approach) to an incentive-based one, the proposal includes several specific elements to further streamline the process for DR providers and CPUC Energy Division staff. To avoid complex analytics, *ex post* capacity "would be assessed based on a resource's performance during the best hour." In the absence of market dispatches, *ex post* capacity could be based on a test event or bids. Neither approach would apply weather normalization.

The penalty structure itself is selected to accommodate the streamlined *ex post* capacity valuation. According to CEDMC, "The 50 percent 'tolerance band' may appear substantial but … [w]ithout weather normalization, performance of a given weather-dependent DR resource would be lower under cooler conditions." For weather-sensitive resources, the simplified *ex post* valuation methodology is a rough measure of capacity that requires a high tolerance band to avoid improperly penalizing DR providers.

The incentive-based approach is intended to reduce the burden on CPUC Energy Division staff in addition to DR providers. The proposal specifies a minimum amount of data to document *ex ante* capacity values and retains CPUC Energy Division staff's role in assessing claimed QC values, but notes that "there would be a penalty structure to provide after-the-fact rigor, so it will not be necessary that the [CPUC] Energy Division [staff] apply the same degree of up-front rigor it uses under the LIP process." An incentive-based approach shifts the risk of incorrect or overinflated *ex ante* assessment from CPUC Energy Division staff to DR providers.

Based on the proposed methodology and process, CEDMC proposes shortening the timeline so that QC values are awarded by June 1 preceding the RA compliance year.

For more information, see the CEDMC proposal posted to CEC Docket 21-DR-01.[14]

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14 California Efficiency + Demand Management Council staff. 2022. *California Efficiency + Demand Management Council Incentive-Based Method DR Counting Proposal.* CEDMC, https://efiling.energy.ca.gov/GetDocument.aspx?tn=246235&DocumentContentId=80417

CEC Staff Proposal

CEC staff proposes an incentive-based approach to minimize shortfalls in delivered capacity from DR providers. To account for different weather-sensitive resources, DR providers define a temperature sensitivity profile for each resource in each hour of the day and month (or group of months). Critically, the DR provider must define a series of temperature change points for weather-sensitive resources capability profiles that will be used in *ex post* capacity calculation. The *ex ante* capacity value for each month is determined by the intersection of the capability profile with the planning temperature (the assumed temperature for the "worst day"), which can be audited by CPUC Energy Division staff. Energy Division staff may review requested QC if the DR provider has not met performance criteria or is projecting drastic resource growth and approve QC values.

After the period for which RA capacity was shown, *ex post* load impacts of events are calculated. Simple, non-weather-sensitive resources are directed to use the results from settlement in the California ISO market, when possible. For other resources, particularly those that are weather sensitive, an alternative baseline may be used if it can produce better results but cannot reasonably be implemented for settlement.

Load impacts are normalized to the amount bid to account for the reality that DR load impacts may be low for some events simply because the full resource was not called, not because of underperformance of the DR resource. These bid-normalized load impacts (BNLI) are calculated by the following formula:

$$\text{BNLI} = \text{Max}\left(Bid\left(\frac{\text{Min}(Delivered, Dispatch)}{Dispatch}\right), Delivered\right)$$

A simple linear regression determines the *ex post* demonstrated capabilities of the resource, analogous to the capability profile submitted in the *ex ante* phase. The regression applies the temperature change points previously submitted to measure the capacity value of the resource under hot or cold temperatures. The *ex post* demonstrated capacity is the intersection of the *ex post* capacity regression line with the same planning temperature used in the *ex ante* process. For resources without weather sensitivity, the *ex post* capacity value can be generated simply from average hourly bid-normalized load impacts.

CEC staff proposes a penalty mechanism as a function of the shortfall in demonstrated capacity relative to committed capacity (the portion of QC that was contracted for and included in an RA showing). The penalty is levied if a resource meets less than 94.5 percent of the committed capacity. Below this threshold, a resource is compensated for the delivered capacity minus the shortfall amount. CEC staff notes that load-serving entities and DR providers can develop contracts that compensate DR providers for exceeding capacity commitments, but these provisions are outside the scope of determining QC.

For more information, see the CEC staff proposal posted to CEC Docket 21-DR-01.[15]

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15 Lyon, Erik. 2022. *Hourly Regression Capacity Counting Methodology for Supply-Side Demand Response*. California Energy Commission, https://efiling.energy.ca.gov/GetDocument.aspx?tn=246244&DocumentContentId=80427

Proposal Comparisons

Table 1 below compares the five proposals with respect to how each address four key attributes: mitigating capacity overestimation risk, DR characteristics, reporting requirements and timeline, and role of state agencies and the California ISO.

Table 1: Comparison of Proposals

	Mitigating Capacity Overestimation Risk	DR Characteristics	Reporting Requirements and Timeline	State and ISO Role
CLECA	NC (*ex ante* analysis similar to status quo)	Account for spillover and takeback (pre-cooling, snapback)	Encourages flexibility outside the 4 to 9 p.m. window for when DRPs can supply capacity	NC
DSA		Account for spillover and takeback (pre-cooling, snapback)	*Ex ante*: Slice-of-day capacity table and time-temperature matrix for weather-sensitive resources. *Ex post*: Calculate Bid Alignment Metric and Performance Alignment Metric.	CEC, CPUC, or ISO produce reliability risk heatmap.
OhmConnect		NA	Eliminates many LIP reporting requirements QC finalized July 1	NC
CEDMC	Penalty Mechanism: Adapted from PG&E Capacity Bidding Program	Capacity based on maximum ("best") dispatch.	Claimed monthly/hourly capacity value along with specified supporting data QC finalized June 1	CPUC implements penalty
CEC	Penalty Mechanism: Capacity Shortfall Penalty	Calculate *ex ante* hourly capacity value with availability profile and monthly planning temperature	Claimed monthly/hourly capability profiles over varying temperature conditions.	CPUC expedites approval of QC for providers with proven track record. CPUC or ISO implements penalty.

NC = No change from status quo; NA = Not directly addressed

Source: CEC Staff Analysis of DR QC Proposals

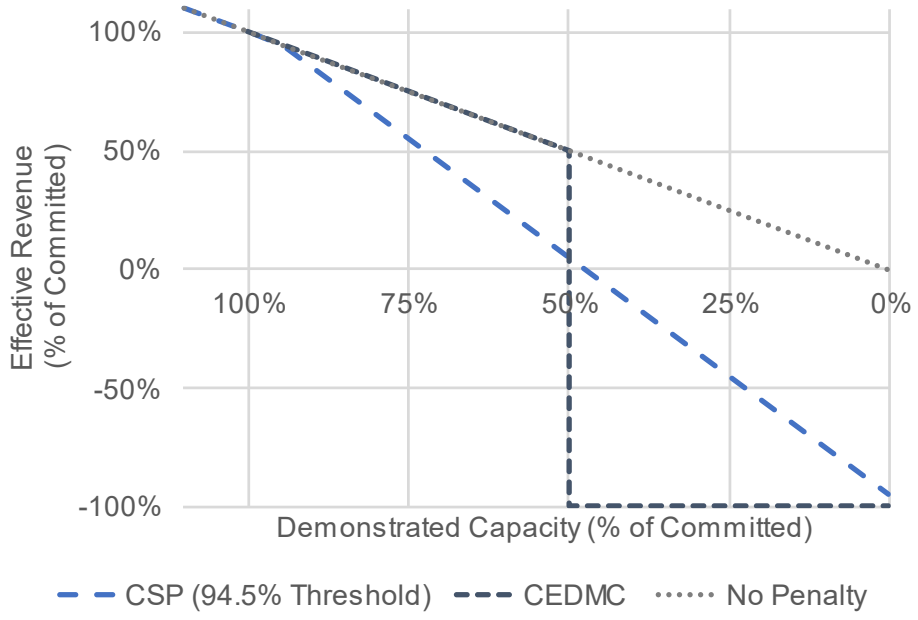
Mitigating Capacity Overestimation Risk

Fundamentally, the QC proposals fell into two categories based on the strategy for reducing the risk of overstating the *ex ante* capacity value of DR resources. The first category rests upon a detailed *ex ante* analytical method that seeks to forecast the capacity value of resources based on a mix of past performance and projected changes in the resource, such as enrollment and customer composition. This approach is consistent with the LIP-based current practice. The CLECA, DSA, and OhmConnect proposals fall into this category.

The second category of QC proposals relies on a penalty for underperformance relative to commitments to ensure DR providers face an incentive not to overestimate resource capacity values. The CEDMC and CEC staff proposals fall in this category. The CEDMC penalty structure is less severe at low to moderate levels of performance but becomes extremely severe after reaching a threshold underperformance level. The CEC "capacity shortfall penalty" structure, by contrast, increases slowly but steadily under increasing levels of underperformance.

Figure 1 illustrates the differences between the two proposed penalty structures. The graph shows the amount of capacity the DR provider would be compensated for based on varying levels of performance relative to its commitment. For reference, the reference case of no penalty (gray dots) represents a case wherein the DR provider is compensated for its demonstrated capacity, regardless of its committed capacity. As demonstrated capacity falls from 100 percent to 0 percent of committed capacity, the revenue falls proportionally.

Figure 1: Comparison of CEC Capacity Shortfall Penalty and CEDMC Penalty Adopted From the PG&E Capacity Bidding Program



Source: CEC staff analysis.

Both incentive structures recognize that the RA framework requires an *ex ante* commitment and reliability may be threatened if these commitments are not met, justifying additional penalties. These penalties are represented graphically by falling below the reference case. The

CEDMC proposal tracks the no-penalty case until the DR provider falls below half of committed capacity, at which point the DR provider loses the entire value of its contract *and* must pay the contract amount in penalties. In contrast, the CEC capacity shortfall penalty takes effect at higher levels of performance in small amounts and grows rapidly with underperformance. The DR provider loses its entire contract value just below half of its committed capacity and faces a net penalty beyond that point. The CEC capacity shortfall penalty is more severe for moderate underperformance, and the CEDMC capacity bidding program-based penalty is more severe for extreme underperformance.

CEDMC proposes its penalty be assessed "at the program level for each [investor-owned utility] and at the contract level for DR providers," as opposed to at the resource level. Similarly, CEC staff proposes allowing "capacity aggregation," or applying penalties to the aggregated portfolio of a DR provider rather than individual resources, to reduce underperformance risk.

Demand Response Characteristics

Stakeholders in the working group generally agreed that a robust QC methodology must account for the diverse characteristics of DR resources. These characteristics include use and availability limitations and weather sensitivity, among others.

The LIPs allow for normalizing DR load impacts for variable weather conditions, and capacity values are based on a 1-in-2 (median) forecast peak temperature. OhmConnect, CLECA, and DSA all carry forward the weather-normalization process from the LIPs while noting the planning temperatures will need to be updated to match the slice-of-day framework. OhmConnect proposes to "align required 'day type(s)' with the adopted [slice-of-day] program," and DSA proposes "aligning weather conditions with the worst day of the month as defined in [RA]." CLECA also references the worst day in its summary of SCE's 24-hourly slice proposal. Effectively, all three proposals adapt the status quo process to the new slice-of-day framework with varying levels of specificity.

CEC proposes a weather normalization process that is largely influenced by the LIPs but imposes consistency across resources. The CEC proposal comprises related but distinct processes for *ex ante* QC valuation and *ex post* capacity measurement. These processes are:

- ***Ex ante* capability profile and QC:** The capability profile shows the minimum load impacts a DR provider expects of a resource under varying temperature conditions, as described in Reporting Requirements and Timeline below. The profile includes regions where a resource can show responsiveness to temperature, such as an increase in capacity under hotter temperatures (smart thermostat programs, for example). The QC value is the intersection of the capability profile and the planning temperature. Like in the CEDMC proposal, the *ex ante* submission is primarily the responsibility of the DR provider.
- ***Ex post* performance regression:** The *ex post* performance regression measures actual bid-normalized load impacts as a function of temperature during a given compliance period. Weather sensitivity is measured only in the regions specified in the *ex ante* capability profile, making the *ex ante* profile and *ex post* regression directly

comparable. The *ex post* demonstrated capacity, like in the capability profile, is the intersection of the regression line and the planning temperature.

Relative to the other approaches to weather normalization, the CEDMC proposal is an outlier. Instead of applying weather normalization, CEDMC proposes, "Demonstrated Capacity would be assessed based on a resource's performance during the best hour." Applying the maximum load impact is an accommodation for the lack of explicit weather normalization. CEDMC explains, "[I]f Demonstrated Capacity from a market dispatch was instead based on average performance, then there might be a motivation not to dispatch a DR resource … if the first dispatch resulted in a [high value]."

DSA and CLECA both propose including positive and negative load impacts outside the dispatch window. These impacts are collectively referred to as "spillover effects" in both proposals and include both increases (for example, precooling and snapback) and decreases in load. CLECA writes, "The hourly values for the assumed DR call period, including any significant spillover impacts which increase load before or after the event, would be used in the resource stack." DSA similarly calls for updating the LIPs to include "spillover effects such as snapback, pre-cooling, or persistence of load reductions beyond the event window." CLECA notes this approach is consistent with the approach used for battery storage, whereby load-serving entities "would show the resources providing energy used for charging as part of their capacity requirements." CEC staff proposes including only negative load impacts (increases in load) within two hours of a dispatch and suggest including all positive load impacts in hourly capacity values.

Reporting Requirements and Timeline

The five proposals submitted all recognize the requirement for developing hourly capacity values by month, though they differ by how directly and explicitly that process is described. Some proposals focused on new reporting requirements for the slice-of-day framework, while others focused on unnecessary reporting requirements under the status quo that can be eliminated and the extent to which this streamlining can allow for QC values to be finalized earlier.

The DSA proposal focused on the format of QC reporting for the slice-of-day framework. Specifically, DSA proposes a reporting format referred to as the *24-slice-of-day table* with months as columns and hours of the day as rows that is filled in with the capacity value for that hour of the "worst day" of that month. For weather-sensitive resources, DSA also proposes a time-temperature matrix that includes temperature, dispatch start time, and hours into event in addition to month and hour.

The incentive-based proposals from CEDMC and CEC staff both included requirements for reporting *ex ante* claimed capacity. For CEDMC, the claimed capacity values would be a single megawatt value for each hour of each month for which a DR provider is seeking RA capacity. The CEDMC proposal requires a single value because the methodology does not include weather normalization. In contrast, the CEC staff proposal also requires a "capability profile" that represents the minimum capacity the DR provider is willing to commit to over a range of temperatures. The monthly/hourly capacity values are determined by applying the planning

temperature for each month and hour to the capability profile, resulting in a single value much like the CEDMC proposal. Both proposals are ultimately compatible with the slice-of-day table.

CEDMC and OhmConnect focused on eliminating excess *ex ante* reporting requirements. OhmConnect began with the list of protocols enumerated in the LIPs and removed or amended those found to be unnecessary. (See OhmConnect Proposal for details.) CEDMC took the opposite approach and proposed a new list of "supporting data," including:

h. Current and projected number of service accounts.
i. Customer class, size, and technology type, if applicable.
j. Projected aggregated load.
k. Projected percentage of load impact or reduction.
l. Nature of load being aggregated.
m. Dispatch method.
n. Historical performance data.

CEDMC and OhmConnect proposed reducing the timeline for finalizing QC values such that DR providers can contract with load-serving entities earlier in the year-ahead process. Under the proposed timelines, final QC values would be available by June 1 and July 1, respectively, prior to the RA compliance year.

The CEDMC and DSA proposals also included *ex post* performance reporting requirements. For CEDMC, the main purpose of *ex post* reporting is to provide a measurement of delivered capacity for the CPUC to complete its assessment of performance relative to commitments and, if necessary, enforce penalties. In the CEC staff proposal, *ex post* capacity measurement is assumed to be completed by a state agency or the California ISO.

DSA proposes two novel measurements of *ex post* performance, the "bid alignment metric" and "performance alignment metric." The bid alignment metric "is a ratio between historic[al] bidding values and the capability forecasted by the historic[al] [*ex ante*] model." The performance alignment metric "is a ratio between the historic[al] performance … and the planning values developed from the historic[al] *ex ante* model for the same weather and dispatch conditions." According to DSA, these metrics "can let implementers, planners, and [the California ISO] know if there needs to be an adjustment to the planning model in the long term so that there is greater alignment between actual performance and the forecasted performance" or bids.

Role of State Agencies and California ISO

Under the current processes, CPUC Energy Division staff reviews LIP reports and makes a finding as to whether claimed QC values are reasonable. The three LIP-based proposals from OhmConnect, CLECA, and DSA would maintain this role. CEDMC proposes to preserve the prerogative of the CPUC to conduct the same level of detailed review, but because of the "penalty structure in place to provide after-the-fact rigor, … it will not be necessary that the Energy Division apply the same degree of up-front rigor it uses under the LIP process." The CEC proposal takes a similar approach and suggests specific criteria under which CPUC staff waives the prerogative and approve claimed QC values. These criteria include the following:

- "[*Ex post*] capacity value is at least 90 percent of the committed capacity."
- "Requested [*ex ante*] capacity is no more than 25 percent above the [*ex post*] delivered capacity in the previous year."

CEC staff states that together, these criteria "will reduce administrative burden on both DR providers and CPUC staff, while still retaining oversight abilities in cases where a DR provider underperformed in the previous year or a significant increase in QC is requested."

The DSA proposal also included a new *ex ante* role for a central agency. DSA suggests the CPUC, CEC, or California ISO produce a "reliability risk heatmap" ahead of the RA compliance year. The heatmap would guide development of DR resources by quantifying reliability risk (for example, loss of load probability or expected unserved energy) by month and hour of day over the RA compliance year. The heatmap would be provided roughly 18 months ahead of the RA compliance year.

CEDMC recommends "the Energy Division [to] assess the monthly Demonstrated Capacity reports of each [investor-owned utility] and DR provider." CEC staff does not specify which entity would implement the penalty structure.

Additional Items

CPUC Decisions 21-06-029 and 22-06-050 asked that the CEC working group address several additional items related to supply-side DR: operational and planning space alignment, intracycle updates, and DR adders. The extent to which each of the five proposals address these items is discussed below.

Alignment of Operational and Planning Spaces

Three of the five proposals directly addressed alignment between measurement of DR events for energy market settlement and *ex ante* and *ex post* capacity valuation. These proposals included guidelines for how and when measurement baselines can and cannot differ between settlement and *ex post* analysis. Summaries of the three alignment proposals follow.

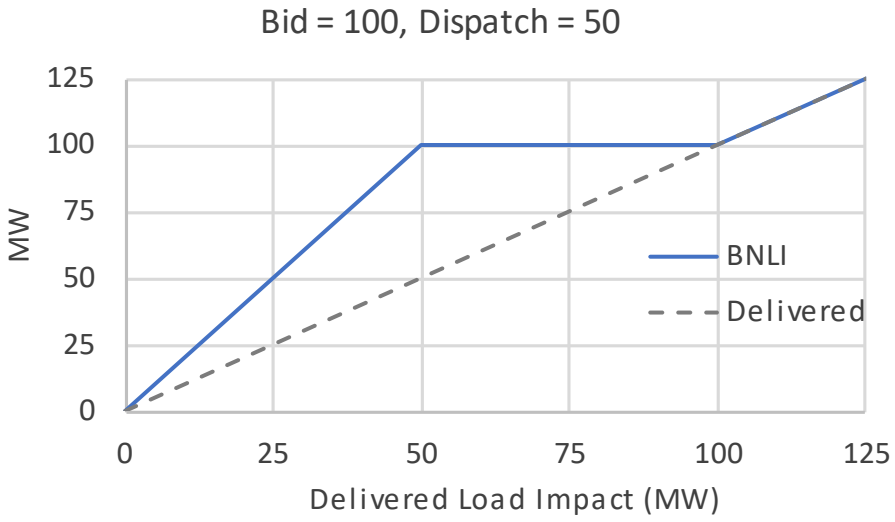
- **CEDMC** proposes that the DR provider must use the same baseline for energy settlement as the baseline used to measure demonstrated capacity.
- **DSA** proposes that the California ISO allow alternative baselines used in capacity evaluation to be allowed for settlement if they are (1) included in an evaluation plan, (2) able to be produced within the settlement period, and (3) accompanied by any code used to produce the results.
- **CEC staff** proposes using the same baseline for California ISO settlement as for capacity counting where possible but grants an exception for cases where an alternative baseline is superior but unable to be implemented within the settlement period.

CEC staff also proposed an adjustment to measured load impacts to account for the amount made available to the market through bids called *bid-normalized load impact*. This adjustment is an attempt to align planning and operations in cases where the capability of DR resources is greater than the delivered load impact simply because the resource received a partial dispatch.

Under a full dispatch, the bid-normalized load impact is equal to the delivered load impacts. Under a partial dispatch, the bid amount is adjusted by the ratio of delivered load impacts to

the bid amount. The only time bid-normalized load impact can exceed the bid is when load impacts exceed the bid, regardless of the dispatch amount. Figure 2 illustrates how bid-normalized load impact would be calculated over various levels of performance under a partial dispatch of 50 MW relative to a total bid of 100 MW.

Figure 2: Graphical Illustration of Bid-Normalized Load Impact (BNLI)



Source: CEC staff analysis.

Under the CEC staff proposal, bid-normalized load impacts would be used in *ex post* regressions to calculate delivered capacity, rather than unadjusted load impacts. Bid-normalized load impacts can exceed the bid only when load impacts do. This affordance serves to balance out instances of underperformance (because DR is a resource with inherent randomness) and allow DR providers to demonstrate *overperformance* that can be used to justify larger future QC values, enabling DR growth.

Intracycle Updates

Stakeholders were asked to respond to the need for intracycle updates to DR QC values in written comments prior to the final proposals. SCE was the only stakeholder to respond, stating: "Like other third-party [DR] providers, SCE currently conducts [biannual] checks of any updates to supply-side DR QC, based on changes in enrollments for the current RA compliance year. This process should be made available for the IOU to update its supply-side DR QC values."[16]

In addition, the CEDMC proposal explicitly addressed intracycle updates. CEDMC proposes allowing DR providers to "seek QC values for up to three years in advance … to allow … [multiyear] RA contracts." That is, the "cycle" could be extended to three years, and intracycle updates could occur annually. CEDMC also proposes the timeline for such intracycle updates

16 Southern California Edison. August 11, 2022. *Intra-Cycle Updates — Southern California Edison Response*, https://efiling.energy.ca.gov/GetDocument.aspx?tn=244562&DocumentContentId=78647.

overlap with new or updated QC requests "such that the Energy Division would perform one round of assessments rather than two."

Demand Response Adders

Stakeholders also separately submitted comments on the appropriateness of two categories of adders: the planning reserve margin (PRM) adders and the transmission and distribution loss factor adders. The first category, which collectively comprise the PRM adder, sum to the 15 percent historical planning reserve margin. The PRM adder includes 6 percent for operating reserves and ancillary services that has since been eliminated by CPUC Decision 21-06-029 for RA compliance year 2022, with the remainder (9 percent) split between load forecast error and forced outage rate. In the same decision, the CPUC found the load forecast error adder inappropriate to credit to DR resources but maintained the 9 percent remainder of the PRM because there was no appropriate method to distribute the remainder between load forecast error and forced outage rate. In D.21-06-029, the CPUC agreed with the Energy Division's rationale that the component associated with load forecast error should be removed. However, the CPUC stated it is unclear how the 9 percent should be divided and so opted to retain the full 9 percent portion of the PRM adder. In this same decision, the CPUC asked the CEC-led working group to provide recommendations on the PRM adder.

The second category of adders relates to reductions in losses in the transmission and distribution system attributable to a decrease in demand on the grid rather than an increase in generation. The distribution loss factor (DLF) adder is added directly to QC values, whereas the transmission loss factor (TLF) adder is grossed up and included as a credit to the California ISO. In Decision 21-06-029, the CPUC opted to retain the transmission and distribution adders but agreed with Energy Division that the CEC working group process should consider whether it is appropriate to retain the transmission adder beyond 2022.

Working group stakeholders provided input on the adders through a survey. Positions on the adders were not requested in QC proposals (though some authors included them). Results from the survey are included under the heading "DR Adders" below.

CHAPTER 3:
Stakeholder Positions

Once the five written proposals were posted to Docket 21-DR-01 on September 28, 2022, the CEC requested stakeholders submit their written comments on each of the proposals. The CEC received written stakeholder comments during the week of October 17 and posted those to Docket 21-DR-01. This chapter summarizes the positions of stakeholders on each proposal based on the written comments submitted. This summary has been organized into the following key attributes: mitigating capacity overestimation risk, characteristics of DR, reporting requirements and timeline, and role of state agencies (and the ISO). The summary also examines the additional issues including alignment of operational and planning spaces, intracycle updates, and DR adders. CEC staff findings are presented in a discussion following a summary of stakeholder comments and positions on each attribute.

Mitigating Capacity Overestimation Risk

Stakeholder support for analytical *ex ante* forecasting and incentive-based approaches is largely split between third-party and investor-owned utility DR providers. Third-party representatives tended to back incentive-based approaches that reduce the difficulty, uncertainty, and cost of compliance, whereas representatives of investor-owned utilities and their customers supported analytic approaches that more closely resemble the status quo. PG&E, SCE, SDG&E, and CLECA all support the CLECA and DSA proposals, at least in general. All these stakeholders but SCE support streamlining the LIPs per OhmConnect's proposal, though there is some disagreement on how to do so. In contrast, Leap, CEDMC, and CESA support a mix of elements from the CEDMC and CEC incentive-based proposals. The California ISO "has longstanding concerns"[17] with the LIPs but also expresses some caution about an incentive-based approach.

Opponents of incentive-based approaches note they put significant responsibility on DR providers to estimate the capacity of their resources, which is an untested break from the approach taken historically. SDG&E summarizes this concern: "Outside of penalties, there is no mechanism to ensure the capability profiles submitted by DR providers are realistic. It is premature to move toward penalties."[18]

In contrast, CESA and Leap suggest that replacing extensive forecasting analysis with back-end rigor and penalties is consistent with proven methods in other ISO markets like the New

17 California ISO staff. 2022. CAISO Comments on DR Working Group Proposals, page 2. https://efiling.energy.ca.gov/GetDocument.aspx?tn=246608&DocumentContentId=80867.

18 San Diego Gas & Electric staff. 2022. *Comments on Demand Response Qualifying Capacity Proposals Submitted to the Working Group,* page 9. https://efiling.energy.ca.gov/GetDocument.aspx?tn=246630&DocumentContentId=80926.

York ISO, PJM,[19] and ISO New England. CESA summarizes the idea behind the incentive-based approach, writing "the penalties … faced by DRPs will incentivize rational creation of proposed QC values."[20]

The DR providers that support the CEDMC proposal also found the proposed penalty structure to provide a sufficient incentive to support reliability. OhmConnect writes, "The penalty structure should be sufficiently punitive to encourage reliability, while not so severe as to exceed the value of the contract for modest under-delivery"[21] and ultimately support the penalty structure proposed by CEDMC.

However, other stakeholders found the CEDMC penalty structure to be insufficient to support reliability. SCE suggests that "full compensation for 50% performance seems too lenient, thus rendering the penalty structure largely ineffective for promoting accountability and grid reliability" and that this mechanism could simultaneously act as a barrier for "any DR provider who cannot provide up to 50% of its awarded QC."[22]The California ISO asserts "penalties under the CEDMC proposal are simply inadequate incentives for [DR providers] to perform to their QC values in real-time"[23]. Similarly, PG&E states "the proposed penalty structure is too lenient for underperformance."[24] While the CEDMC penalty was modeled on that of the PG&E capacity bidding program, PG&E notes the distinction between applying the penalty to a single program and DR resources across the board: "the [capacity bidding program] is not exempt from the LIP process in determining the QC. PG&E's proposed [capacity bidding program] penalty structure has no direct bearing on the program's QC value."[25]

At low levels of performance, however, some stakeholders found the CEDMC penalty mechanism too severe. Leap, while generally supportive of the CEDMC proposal, suggests a modification: "Instead of…dropping to a full penalty for performance below 50 [percent], the penalty should continue to scale linearly."[26] SCE argues that for new DR providers, the penalty "could act as a market-entry barrier by creating disincentives for new third-party DR providers,

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19 PJM is a regional transmission organization that coordinates the movement of wholesale electricity through all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and the District of Columbia.

20 CESA. 2022. *CESA's Comments on SSDR QC Working Group Proposals*, page 3, https://efiling.energy.ca.gov/GetDocument.aspx?tn=246614&DocumentContentId=80871.

21 OhmConnect staff. 2022. *Informal Comments of OhmConnect on Demand Response ("DR") Qualifying Capacity ("QC") Proposed Methodology, Intra-Cycle QC Updates, and Adders*, page 2, https://efiling.energy.ca.gov/GetDocument.aspx?tn=246629&DocumentContentId=80925.

22 Southern California Edison staff. 2022. *SCE Comments on CEC Working Group Proposals for DR QC Counting*, page 7, https://efiling.energy.ca.gov/GetDocument.aspx?tn=246619&DocumentContentId=80876

23 California ISO. *CAISO Comments on DR Working Group Proposals*, page 6-7

24 Pacific Gas and Electric staff. 2022. *PG&E Comments on the final Supply Side Demand Response QC Proposals*, page 2, https://efiling.energy.ca.gov/GetDocument.aspx?tn=246609&DocumentContentId=80869.

25 PG&E. *PG&E Comments on the final Supply Side Demand Response QC Proposals*, page 2

26 Leap staff. 2022. *LEAPFROG POWER, INC COMMENTS ON THE DEMAND RESPONSE QUALIFYING CAPACITY COUNTING PROPOSALS*. Leapfrog Power, Inc., page 6-7, https://efiling.energy.ca.gov/GetDocument.aspx?tn=246610&DocumentContentId=80868.

who could take quite some time to demonstrate their Claimed QC and perform up to their Awarded QC."

The California ISO signals openness to the CEC's more stringent capacity shortfall penalty, writing "the Energy Commission staff's proposed penalty proposal may be more effective to incentivize reasonable capacity valuation up front." DR providers, in contrast, tended to feel it is too severe. OhmConnect described the capacity shortfall penalty as "severely punitive,"[27] and CEDMC writes that 94.5 percent "is far too soon for a penalty to take effect because there will always be a certain degree of variability to DR performance."[28] Even CESA, which states the organization is "open to a more stringent penalty mechanism"[29] references examples that are less stringent than the proposed capacity shortfall penalty. Leap appears to believe either of the proposed penalties "would act as a sufficient deterrent to poor performance,"[30] but supports the modified CEDMC penalty described above, the most lenient of any proposal.

Mitigating Risk Discussion

Third-party DR providers have made it clear throughout the working group process that the analytical LIP-based approach is difficult, opaque, and unpredictable. CEC staff finds these concerns valid and views the current approach as untenable and unable to support a robust and sustainable market for DR in California. Furthermore, CEC observes that the working group was formed in response to the shortcomings of the status quo; the initial CPUC decision forming the working group requested CEC "to develop recommendations for a comprehensive and consistent [measurement and verification] strategy, including a new capacity counting methodology for DR addressing *ex post* and *ex ante* load impacts."[31] Other approaches and frameworks may be appropriate for valuing capacity contributions of DR. In the view of CEC staff, incentive-based approaches were the only alternatives to adaptations to the LIP-based status quo put forth in the working group process that sufficiently address these shortcomings.

Based on experience supporting CPUC Energy Division staff review third-party LIP filings and assigning QC values, CEC staff has also observed that the current process makes Energy Division staff accountable for correctly assessing DR capacity, rather than the DR providers themselves. CEC staff believes that DR providers, rather than state agency staff, should be accountable for correctly forecasting the capacity values of their own resources. Accordingly, CEC staff finds an incentive-based approach is more appropriate for ensuring credible and attainable QC values for DR resources.

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27 OhmConnect. *Informal Comments of OhmConnect on Demand Response ("DR") Qualifying Capacity ("QC") Proposed Methodology, Intra-Cycle QC Updates, and Adders,* page 4

28 CEDMC. *California Efficiency + Demand Management Council Comments on Supply Side Demand Response Working Group Phase 2 Proposals*, page 6-7

29 CESA. *CESA's Comments on SSDR QC Working Group Proposals*, page 3

30 Leap. *LEAPFROG POWER, INC COMMENTS ON THE DEMAND RESPONSE QUALIFYING CAPACITY COUNTING PROPOSALS*, page 9

31 CPUC. 2021. Decision 21-06-029. *DECISION ADOPTING LOCAL CAPACITY OBLIGATIONS FOR 2022-2024, FLEXIBLE CAPACITY OBLIGATIONS FOR 2022, AND REFINEMENTS TO THE RESOURCE ADEQUACY PROGRAM*. https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M389/K603/389603561.PDF.

Staff notes that the idea for a performance-based penalty for DR as an alternative to the existing Resource Adequacy Availability Incentive Mechanism did not originate with CEC staff but has been recommended independently by CPUC Energy Division staff and California ISO Department of Market Monitoring staff. Department of Market Monitoring staff summarizes the reasoning:

> *A performance-based penalty or incentive mechanism could be particularly relevant for [DR] resources because of the difficulty of determining in advance whether…a new [DR] resource — or an existing provider that is selling additional new capacity — is capable of delivering load curtailment in critical hours equal to the quantity of [RA] capacity that the resource has been paid to provide.*[32]

In other words, DR capacity valuation faces an asymmetric information problem; the entity with the best knowledge of the resource capability also has an incentive to overstate that value. CPUC Energy Division staff made a similar recommendation in their DR proposals submitted under Rulemaking 19-11-009: "[The California ISO] is encouraged to explore an alternate mechanism [to RAAIM] to hold DR bidders accountable for the DR resource market bids accurately reflecting the capacity available under the applicable operating conditions associated with the specific day and hour."[33]

The main distinction between the prior penalty recommendations and CEC staff's proposal is that the proposal explicitly links the penalty mechanism to QC (or contracted and committed fraction thereof). While CPUC and California ISO staff did not explicitly recommend an incentive-based approach for *determining* QC, CEC staff finds careful definition of *ex ante* QC and *ex post* capacity measurement to be prerequisite to enforcing any performance mechanism.

CEC staff suggests that the CPUC should implement the incentive mechanism rather than the California ISO to keep *ex ante* QC determination and *ex post* capacity measurement and verification under a single central entity. As proposed, the penalty requires visibility into the contract price of DR capacity to implement. This format is appropriate for resources for which CPUC has visibility into contract prices, such as the DR Auction Mechanism. Equivalently, the penalty can be recast in terms of the amount of contracted capacity for which a DR provider is compensated in cases where the CPUC does not have and cannot gain visibility into contract prices.

As a less desirable alternative, CPUC may set a fixed penalty price per MW of capacity based on available RA contract cost data to be applied to all DR resources. However, CEC staff observes that implementing a penalty in this way would be equivalent to reducing the penalty for resources with capacity prices higher than the penalty price and increasing the penalty for lower capacity prices. This unintended effect may lead to DR contract price increases and

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32 California ISO. 2022. *Demand Response Issues and Performance*. http://www.caiso.com/Documents/ReportonDemandResponseIssuesandPerformance-Feb252021.pdf#search=demand%20response%20report.

33 California Public Utilities Energy Division. 2021. *Energy Division Demand Response Proposals for Proceeding R.19-11-009,* https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M378/K737/378737761.PDF.

overinflation of capacity values. While a fixed penalty price would simplify implementation and may deserve consideration, additional study is required to understand its potential consequences more fully.

Opponents of incentive-based approaches argue that that there would be no mechanism to ensure *ex ante* estimates are reasonable and that a penalty-based method is untested. However, the CEC DR QC working group was initiated in large part because of historical evidence showing that DR has not met expectations; the status quo process itself does not deliver satisfactory results. CEC staff believes an incentive mechanism is a *more* effective approach to "ensure the capability profiles submitted by DR providers are realistic,"[34] as SDG&E put it.

CEC staff also recognizes it is true that an incentive-based approach is untested in California. However, CEC staff agrees with CEDMC that an incentive-based approach is "generally consistent with that used by the PJM, ISO-New England, and New York [ISO] capacity markets in which each DR provider provides its proposed QC values."[35] Furthermore, if novel proposals are dismissed simply because they have yet to be tested, the available options are limited to those that closely resemble the current LIP process, as other proposals do.

Between the two incentive-based proposals, CEC staff finds the CEC proposed penalty structure to be more appropriate and reasonable. The CEDMC penalty, in contrast, appears insufficient to incentivize performance enough to support reliability. DR providers and their representatives strongly preferred the less stringent CEDMC penalty mechanism. The lenience of the CEDMC penalty is justified by the variability in weather and variability inherent to DR. CEDMC writes of the CEC staff penalty that "94.5 [percent] of the committed QC value…is far too soon for a penalty to take effect" because it "would very likely result in penalties for all DR providers."[36] While true, the objective of a penalty is to incentivize the desired performance, not to minimize the extent to which it is imposed on DR providers. Instead of weakening the penalty mechanism, CEC suggests more precisely accounting for differences in capabilities under varying temperature conditions to avoid penalizing DR providers for natural variability in weather (as described in Characteristics of DR below).

The primary purpose of the incentive mechanism is to ensure DR performance under critical conditions. Meeting just over half of commitments is poor performance and should be subject to a penalty beyond simply prorating the capacity payment to the delivered amount. From the perspective of policy makers, any underperformance relative to a capacity value is a failure to meet commitments to support reliability. The intent of the penalty mechanism is not to penalize DR providers, but to encourage them through incentives to forecast their capabilities accurately and deliver on their commitments.

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34 SDG&E. *Comments on Demand Response Qualifying Capacity Proposals Submitted to the Working Group*, page 9

35 CEDMC. *California Efficiency + Demand Management Council Comments on Supply Side Demand Response Working Group Phase 2 Proposals*, page 2

36 CEDMC. *California Efficiency + Demand Management Council Comments on Supply Side Demand Response Working Group Phase 2 Proposals*, page 7

CEC staff also agrees with stakeholders that it is important to avoid the edge effect observed by Leap: "While performance of 49 [percent] and 9 [percent] are both poor, a penalty structure should be more severe for worse performance."[37] However, Leap suggests making the CEDMC penalty structure *less* stringent to reduce this effect by scaling the penalty linearly below 50 percent, rather than dropping precipitously. Instead, CEC staff finds it reasonable for the penalty to take effect at lower levels of underperformance and linearly scale such that the penalty is more severe for worse performance — precisely as the capacity shortfall mechanism proposed by CEC staff does — to eliminate edge effects and retain a robust incentive.

Relatedly, SCE similarly suggested "step-wise or incremental incentives that would incentivize DR providers to maximize the performance of their resources or portfolio."[38] Such increments appear to represent a middle ground between the linearly increasing capacity shortfall penalty and the threshold-based CEDMC penalty. However, no evidence is presented that such a structure would produce the incentives to maximize performance any better than the capacity shortfall penalty as proposed.

SDG&E argued it is "premature to assign the same penalty structure for residential and non-residential customers."[39] It is not clear to CEC staff whether SDG&E is arguing it is permanently or only temporarily inappropriate to apply the same penalty structure to both customer classes. However, CEC staff views DR capacity as a product that should be as standardized as possible, despite the diversity in underlying resources, and a single penalty structure should apply to all supply-side DR resources to create a level playing field.

However, CEC staff realizes it is important to build understanding and confidence in the approach and leave room to make modifications as necessary. DR providers can construct the *ex post* regressions with the bid, dispatch, and load impact data already available to them to begin understanding the implications of this methodology on their resources. Based on the outcomes of *ex post* analysis of prior years, DR providers can understand the likely impacts of the new methodology and process on their resources.

CEC staff initially proposed applying the penalty to all underperformance under 100 percent but added the 94.5 percent threshold both in response to stakeholder feedback and for consistency with RAAIM. SCE and CLECA noted in their comments on adders that the forced outage adder is similarly intended to create equity between DR and other resources by setting comparable standards for availability. (See DR Adder Discussion below.) Accordingly, CEC staff conducted additional analysis to understand whether one approach is preferable to the other or whether applying both approaches is appropriate (see Appendix B for detailed analysis). CEC staff concluded that replacing the 94.5 percent threshold with a 5.8 percent adder applied to effective capacity is the superior approach.

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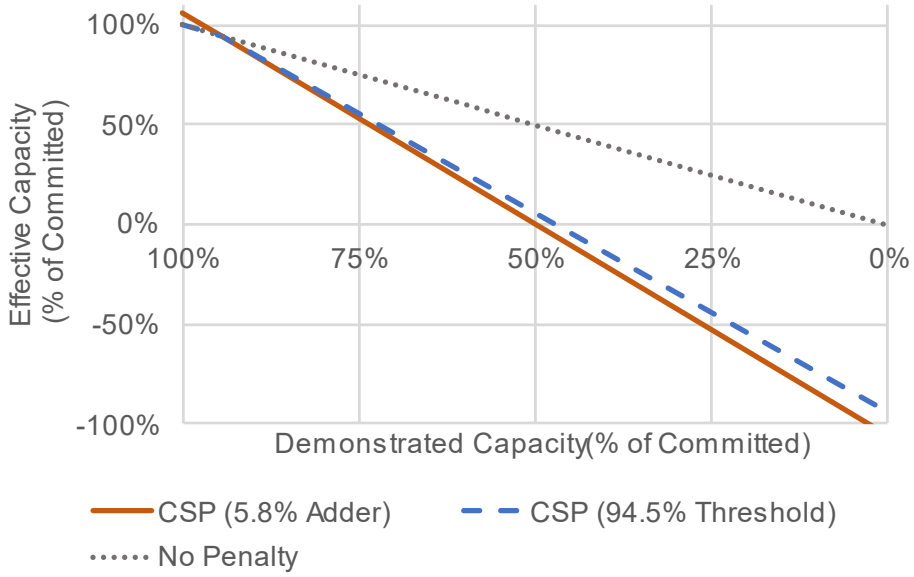
37 Leap. *LEAPFROG POWER, INC COMMENTS ON THE DEMAND RESPONSE QUALIFYING CAPACITY COUNTING PROPOSALS*, page 7

38 SCE, *SCE Comments on CEC Working Group Proposals for DR QC Counting*, page 13

39 SDG&E. *Comments on Demand Response Qualifying Capacity Proposals Submitted to the Working Group*, page 6

Figure 3 compares the capacity shortfall with the threshold as originally proposed by CEC staff and the updated version with a 5.8 percent forced outage adder proposed here. The updated capacity shortfall penalty results in a steeper line that exceeds 100 percent of demonstrated capacity.

Figure 3: Capacity Shortfall Penalty (CSP) With 94.5 Percent Application Threshold (Original Proposal) and 5.8 Percent Forced Outage Adder (Updated Proposal)



Source: CEC staff analysis.

Overall, CEC staff finds that the CSP with a 5.8 percent forced outage adder — rather than an application threshold as described in the CEC staff proposal — elegantly addresses multiple issues. First and most important, it preserves the incentive for DRPs to commit the expected capacity of their resources and no more. In contrast, the application threshold introduces an unintended incentive to overcommit. Second, the forced outage adder allows DRPs to earn the full expected capacity of their resources, so long as they can forecast the capacity value with reasonable certainty. In the absence of the adder, DRPs need perfect accuracy to be compensated for the full expected capacity of their resource.

Moreover, the forced outage adder derived from the RAAIM cutoff provides a defensible answer to the question of what value to apply. An adder of 5.8 percent is consistent with the application threshold proposed by CEC staff and less than 9 percent, the collective sum of the forced outage and forecast error adders. Finally, the adder can be embedded in the calculation of effective capacity as shown in this analysis, avoiding the need for any grossing up of QC values as credits to the California ISO.

CEC staff finds its proposal of applying the capacity shortfall penalty to the aggregation of all resources of a given DR provider and capacity product (that is, for system capacity and for local capacity in each local area) to be reasonable. For providers with multiple contracts for a given capacity product, DR resource commitments and shortfalls can be aggregated and attributed on a pro rata basis across contracts. However, the proposal can easily be applied to

more granular geographic units if desired, such as to investor-owned utility service area, load aggregation point (LAP), or sub-LAP. A tradeoff exists between the need for geographic specificity in the locational marginal pricing system of the California ISO and the benefits of aggregating many, small resources, which diminishes under increasing geographic granularity. At this point, CEC staff declines to recommend more granular geographic application of the penalty, but recognizes this issue may need to be addressed by the CPUC and California ISO.

Characteristics of DR

Overall, working group members agreed on the need for variable DR capacity profiles to meet the needs of the slice-of-day framework. CLECA explains, "Both [CLECA and DSA] proposals can develop hourly shapes for DR programs, which is necessary for RA Reform."[40] The California ISO notes that even under the LIPs, which is not its preferred approach, "using hourly LIP profiles as the basis for [DR] QC values is preferable to static QC values because the former capture resource variability across the day."[41] All proposals submitted through the working group process allowed for such variability.

Nearly all stakeholders supported taking weather sensitivity into account when measuring capacity, which four of the five proposals included in some way. Stakeholders generally found the weather normalization in the LIP process acceptable and typically not the objectionable aspect of the program. For example, PG&E finds CLECA's LIP-based process for estimating hourly expected DR load reduction reasonable because it incorporates "DR performance history and weather conditions."[42]

Of the incentive-based approaches, stakeholders supported the weather normalization in the CEC proposal. OhmConnect stated that "[o]f the two proposals that combine up-front flexibility with back-end penalties, OhmConnect prefers CEC's proposal."[43] The California ISO notes the CEC proposal "expressly accounts for weather variability by treating both the *ex ante* stated capability and *ex post* performance as temperature-dependent."[44] In contrast, SDG&E notes "the [CEDMC] proposal does not address weather sensitivity of [DR] resources and is not well suited for them."

CEDMC acknowledges "weather-adjusting DR performance to account for the variable performance of weather-sensitive DR is beneficial to ensure that DR performance can be compared to a weather-normalized QC value on an apples-to-apples basis," and "sees [the CEC] approach as a reasonable alternative to its own Demonstrated Capacity proposal." However, it also argued that the CEC's "weather-adjustment element would eliminate any

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40 California Large Energy Consumers Association. 2022 *CLECA Comments on Supply Side Demand Response QC Methodologies*, https://efiling.energy.ca.gov/GetDocument.aspx?tn=246605&DocumentContentId=80862

41 California ISO. *CAISO Comments on DR Working Group Proposals*, page 7

42 PG&E. *PG&E Comments on the final Supply Side Demand Response QC Proposals*, page 2

43 OhmConnect. *Informal Comments of OhmConnect on Demand Response ("DR") Qualifying Capacity ("QC") Proposed Methodology, Intra-Cycle QC Updates, and Adders,* page 5

44 California ISO. *CAISO Comments on DR Working Group Proposals*, page 6

direct connection between DR performance in the [California ISO] market and committed QC value."[45]

Similarly, CESA, which represents battery providers, supports CEDMC's proposal because weather sensitivity is a "smaller factor" for storage-backed resources. However, CESA acknowledges other resources do display weather sensitivity and "supports CEC's proposed methodologies for [*ex ante*] and [*ex post*] analysis."[46]

Furthermore, stakeholders wanted the methodology to go beyond simply accounting for temperature. After noting the treatment of weather sensitivity in the CEC proposal, the California ISO continues: "However, the Energy Commission staff's proposal does not expressly account for use and availability limitations; it instead relies on a penalty mechanism to incentivize availability."[47] Similarly, SDG&E notes, "The [CEC] proposal addresses weather sensitivity and hour of day but does clearly address how other characteristics of DR are incorporated."[48]

DR Characteristics Discussion

Accounting for weather sensitivity and measuring resource capabilities under temperatures where reliability concerns are likely to arise is critical to valuing the contribution of DR to reliability. While not all DR resources display weather sensitivity, a viable DR QC method must have the *ability* to take weather sensitivity into account.

The CEDMC proposals attempts to avoid the weather normalization issue by taking the best performance by hour, which will likely occur under the hottest (or possibly coldest) conditions for weather-sensitive resources. CEC staff agrees with the assessment of PG&E that the approach is "highly upward biased and inconsistent with other QC methodologies."[49] Maximum performance is not the same as typical performance, even after adjusting for temperature. Accordingly, the CEC staff finds the CEDMC proposal of defining *ex post* hourly capacity by the best day or maximum performance unreasonable.

The weather normalization process implied in the LIPs is generally appropriate, but the application is opaque and difficult to reproduce, leaving policy makers largely reliant on the attestation of DR providers to certify QC values. In its proposal, CEC staff attempted to formalize and make explicit this process for weather normalization included in the LIPs. Stakeholders have observed that the proposal is consistent with the status quo. This similarity is a deliberate attempt to carry forward elements of the LIPs that are appropriate rather than fully reinvent the process.

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45 CEDMC. *California Efficiency + Demand Management Council Comments on Supply Side Demand Response Working Group Phase 2 Proposals*, page 6

46 CESA. *CESA's Comments on SSDR QC Working Group Proposals*,, page 5

47 California ISO. *CAISO Comments on DR Working Group Proposals*, page 6

48 SDG&E. *Comments on Demand Response Qualifying Capacity Proposals Submitted to the Working Group*, page 13

49 PG&E. *PG&E Comments on the final Supply Side Demand Response QC Proposals*, page 2

CEC staff attempted to include a significant amount of flexibility for resources that show weather sensitivity to higher temperatures, lower temperatures, both, or neither, with more complexity required to model resources with more weather sensitivity. However, some stakeholders such as PG&E believe the proposal is overly prescriptive. SDG&E similarly observed the proposal does not account for characteristics such as decay over the course of a dispatch. CEC staff is open to incorporating additional capability profile specifications to accommodate a greater diversity of DR resources. However, defining *in advance* how such specifications will be implemented and translated into hourly *ex post* capacity values consistent with the *ex ante* "worst day" is critical to the functioning of the CEC staff proposal.

Accordingly, CEC staff finds it reasonable to include a process to adopt new capability profile types for use in the RA program. New capability profiles should be incremental to those included in the CEC staff proposal and should be shown to account for resource characteristics not accounted for in the default set. Decay over multihour dispatches is a reasonable example to include, particularly for resources with large first-hour effects such as those backed by smart thermostats or other air-conditioning controls.

A note of caution on new capability profile specifications is warranted, however. More complex model specifications require more data simply to run, let alone to generate valid results. For a simple weather-dependent resource, Leap notes that if "in the month of January there were only 2 events, the *ex ante* projection for January would be based on little actual event data."[50] For specifications with additional variables, decisions must be made to handle instances when there are insufficient data to run the full model.

For example, CEC staff specified handling weather-sensitive resources with a single *ex post* data point by assigning that load impact value as the *ex post* capacity. Consider a model specification for weather-sensitive resources with first-hour effects (described above). If adopted, an additional decision must be made regarding whether to model load impacts as a function of temperature or dispatch hour when there is insufficient data to do both, and whether it is reasonable for the DR provider to choose. With additional variables, the number of such decisions grows. CEC staff sought to minimize such decisions in its proposal but recognizes it may be appropriate to include additional flexibility.

CEC staff also affirms stakeholders' recommendation to include negative load reductions such as precooling and snapback (collectively, "takeback"). SDG&E writes that "[p]recooling and [snapback] effects should be accounted for"[51] in the QC method and included in showings only if they occur within the "RA window" (that is, the availability assessment hours). The California ISO characterizes the DSA and CLECA proposals as "incremental enhancements to *status quo* LIPs by accounting for load pre-cooling and snapback effects."[52] The CEC staff proposal

50 Leap. *LEAPFROG POWER, INC COMMENTS ON THE DEMAND RESPONSE QUALIFYING CAPACITY COUNTING PROPOSALS*, page 4

51 SDG&E. *Comments on Demand Response Qualifying Capacity Proposals Submitted to the Working Group*, page 18

52 California ISO. *CAISO Comments on DR Working Group Proposals*, page 1

includes showing precooling and snapback effects two hours before and after the call period by default.

CLECA and SDG&E request including "call limitations" and "max event duration," respectively. CEC staff believes these concerns are addressed simply by showing a resource no longer than the associated maximum dispatch duration. For example, a resource with a 4-hour maximum dispatch within a 9-hour call window should only be shown for the four hours it is likeliest to be dispatched on the worst day (and include takeback effects before and after, where appropriate). Accordingly, CEC staff believes the CEC proposal accounts for these DR characteristics.

Reporting Requirements and Timeline

Nearly all stakeholders support simplification of the current LIP process to improve transparency and shorten the QC timeline. OhmConnect, having authored the proposal for streamlining the LIPs, "strongly opposes increasing the time, cost, and complexity of an already burdensome process."[53]

However, not all agreed on exactly how or to what extent to streamline the LIPs. SCE opposed OhmConnect's streamlined LIP proposal altogether, and SDG&E and PG&E opposed the elimination of protocols pertaining to *ex post* metrics for non-event-based DR. CLECA advocated more generally for a review from the Energy Division on which LIP elements are essential. SCE suggested that DR providers could request exemptions as opposed to eliminating protocols in the current LIPs.

CEDMC's proposal affords DR providers the most flexibility in reporting, which Leap suggests "would shorten the timeline from when DRPs submit estimates of Year Ahead QC …[and] allow DRPs to confidently, and accurately, contract with LSEs throughout the summer months when most bilateral contracts are signed."[54]

CEC staff's proposed hourly capability profile is more complex than the single hourly values proposed by others. PG&E found "that the methodology is overly prescriptive and generates a large amount of output not critical to the QC."[55] Stakeholders provided relatively little commentary on the reporting format required to implement the capability profile; CEC staff understands stakeholders may have been confused on the capability profile. SDG&E observed that "making the proposal more concise and clear would help make it more understandable."[56]

However, CEC staff attempted to address the increase in reporting requirements by allowing flexibility in how capacity is aggregated across resources and across the year into groups of months referred to as "seasons." Leap "agree[s] that aggregating by season is a good

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53 OhmConnect. *Informal Comments of OhmConnect on Demand Response ("DR") Qualifying Capacity ("QC") Proposed Methodology, Intra-Cycle QC Updates, and Adders,* page 4

54 Leap. *LEAPFROG POWER, INC COMMENTS ON THE DEMAND RESPONSE QUALIFYING CAPACITY COUNTING PROPOSALS*, page 6

55 PG&E. *PG&E Comments on the final Supply Side Demand Response QC Proposals*, page 3

56 SDG&E. *Comments on Demand Response Qualifying Capacity Proposals Submitted to the Working Group*, page 12

[workaround,] and we would recommend this approach be included under any proposal that requires fine toothed *ex ante* projections."[57]

Stakeholders expressed some interest in the bid and performance alignment metrics proposed by DSA, but nearly all were unclear on how these metrics would be incorporated into QC and RA processes. The California ISO wrote that "[a]lthough such metrics could indicate how availability and use-limitations impact the resource's availability, DSA does not propose that parties use these new metrics to inform QC values."[58] Similarly, Leap notes, "DSA's proposal would increase the complexity and cost of the analysis without speaking to the implementation of the new information."[59] CLECA is similarly "concerned about additional cost related to the performance metrics … since they are not necessary for QC determination."[60] CESA emphasizes: "[U]nless the … [metrics] will be used … in a formal venue …, CESA cautions against requiring excessive analysis that is not used for planning."[61] SCE explains the issue in additional detail:

> *Methodologies to quantify any difference between either the historical bids or recent* [*ex post*] *and historical* [*ex ante]* *used to inform RA planning do not align DR measurement and verification methods in the operational space for [California ISO] market settlements with methods of determining DR QC for RA planning purposes. The metrics simply demonstrate whether there has been alignment between either the historical bids or recent Ex Post and the historical Ex Ante (p. 6).*

The California ISO expressed interest in having the additional data outlined in DSA's proposal but found it "unclear how this additional data [would] be used to inform QC values"[62] regarding the time-temperature matrix. OhmConnect describes the time-temperature matrix (and the metrics described above) as "add[ing] too much complexity and cost to an already burdensome exercise."[63]

Many working group stakeholders expressed concern with the complex reporting requirements that effectively require outsourcing LIP analysis to external contractors. CEDMC expressed this concern for whichever methodology is ultimately selected: "[I]f consultants are required to implement the new methodology, then the DR providers … may be hesitant to incur the cost until observations can be made with regard to the [investor-owned utilities'] experiences with

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57 Leap. *LEAPFROG POWER, INC COMMENTS ON THE DEMAND RESPONSE QUALIFYING CAPACITY COUNTING PROPOSALS*, page 8

58 California ISO. *CAISO Comments on DR Working Group Proposals*, page 5

59 Leap. *LEAPFROG POWER, INC COMMENTS ON THE DEMAND RESPONSE QUALIFYING CAPACITY COUNTING PROPOSALS*, page 5

60 CLECA. *CLECA Comments on Supply Side Demand Response QC Methodologies*, page 6

61 CESA. *CESA's Comments on SSDR QC Working Group Proposals*,, page 6

62 California ISO. *CAISO Comments on DR Working Group Proposals*, page 7

63 OhmConnect. *Informal Comments of OhmConnect on Demand Response ("DR") Qualifying Capacity ("QC") Proposed Methodology, Intra-Cycle QC Updates, and Adders,* page 4

it."[64] CESA similarly notes that "[g]iven the amount of analysis and limited number of consultants that can conduct a LIP, the entire process for QC determination typically lasts over nine months and costs hundreds of thousands of dollars."[65]

Accordingly, stakeholders expressed the desire for a methodology requiring little or no external support from consultants. Stakeholders generally agreed that the CEDMC proposal would not require consultants and the three LIP-based proposals would. Stakeholders were less clear on whether they would be required under the CEC staff proposal. CEDMC argues that "all of the other proposals [not submitted by CEDMC] utilize a temperature-dependent adjustment to QC values which makes the *ex post* analysis process far more complicated and expensive due to the resulting need to retain consultants to perform the associated analysis."[66] CLECA writes the CEC staff proposal "would also require the use of consultants, which is a complaint of the third-party DR providers. It is also unclear if the cost to perform the regressions would be more or less expensive than the current LIP."[67] Leap, in contrast, found the CEC staff proposal "substantially simpler and more flexible than the LIPs, [but] it is unclear at this time if it is something that Leap can do internally, or if an external consultant will still need to be retained."[68]

Reporting Requirements Discussion

CEC staff recognizes that the reporting requirements of the LIPs have been a burden and a barrier, particularly to third-party DR providers who are not compensated for costs associated with the process and who tend to have more dynamic customer portfolios.

At the same time, the minimum possible reporting requirements will necessarily increase under the slice-of-day framework from single monthly values to up to 24 monthly values. The slice-of-day table proposed by DSA is an appropriate and reasonable format to convey these values. Moreover, CEC recognizes its proposal would require additional parameters that define the capability profile (specifically, any change points).

The CEC staff proposal addresses the increase in reporting requirements by allowing one capability profile to apply to multiple months as defined by a DR provider. CEC staff notes that CEDMC refers to this flexibility as "to-be-determined 'seasons' comprised of a handful of months,"[69] apparently implying these seasons will be prescriptively determined for all DR

64 CEDMC. *California Efficiency + Demand Management Council Comments on Supply Side Demand Response Working Group Phase 2 Proposals*, page 10

65 CESA. *CESA's Comments on SSDR QC Working Group Proposals*,, page 2

66 CEDMC. *California Efficiency + Demand Management Council Comments on Supply Side Demand Response Working Group Phase 2 Proposals*, page 9

67 CLECA. *CLECA Comments on Supply Side Demand Response QC Methodologies*, page 7

68 Leap. *LEAPFROG POWER, INC COMMENTS ON THE DEMAND RESPONSE QUALIFYING CAPACITY COUNTING PROPOSALS*, page 8

69 CEDMC. *California Efficiency + Demand Management Council Comments on Supply Side Demand Response Working Group Phase 2 Proposals*, page 7

providers. Instead, the intent of the CEC staff proposal is to allow DR providers to define any set of months as a "season."

Accordingly, CEC staff finds it reasonable to reduce supporting data reporting requirements. However, stakeholders have argued that some *ex ante* documentation should still be required, and no proposal eliminated such supporting information completely, especially during the transition to an incentive-based process. CEC staff finds the reporting requirements outlined by CEDMC and OhmConnect reasonable. However, given the proposed move away from the LIPs, the supporting information proposed by CEDMC is a more appropriate starting point. CEC staff does not propose eliminating the LIPs for purposes unrelated to QC of supply-side DR, such as for long-term IOU resource planning and for load-modifying DR.

CEDMC recommends requiring the following supporting information, all of which CEC staff finds reasonable to include:

- Current and projected number of service accounts.
- Customer class, size, and technology type, if applicable.
- Projected aggregated load.
- Projected percentage of load impact or reduction.
- Nature of load being aggregated.
- Dispatch method.
- Historical performance data.

CEC staff defers to CPUC on the refinement and definition of these requirements. In addition to the information listed above, CEC staff recommend also requiring a customer energy baseline measurement plan for DR providers that use a different baseline than for wholesale market settlement. Borrowing from the LIPs (Protocols 9–10), these DR providers should include error metrics for day matching, regression method, or other baseline method as appropriate from historical or non-event data (particularly for new resources) to support the use of the alternative baseline. The plan would be subject to approval by CPUC Energy Division staff and, upon approval, be considered binding for *ex post* measurement.

Other proposed reporting requirements are extraneous and should not be adopted. The time-temperature matrix proposed by DSA largely accomplishes the same objective as the capability profile proposed by CEC staff. However, CEC staff proposed the form of a continuous function rather than a stepwise table to avoid gamesmanship in how resources are shown to respond to temperatures. Furthermore, characteristics such as event decay can be incorporated into capability profiles (as proposed in DR Characteristics Discussion). A time-temperature matrix can easily be derived from a capability profile if a DR provider finds it helpful, but a capability profile cannot necessarily be derived from a time-temperature matrix.

Similarly, the bid alignment metric and performance alignment metric proposed by DSA are sensible and may be appropriate components of a viable alternative QC methodology. DSA recognizes that "stakeholders may want additional discussion and the opportunity to test [the metrics] in practice before [they are] adopted."[70] However, DSA did not specify what adoption

70 Demand Side Analytics. *Demand Response Qualifying Capacity Working Group Proposal.,* page 15

of these metrics would entail other than calculating them for reference. CEC staff does not oppose exploring inclusion of these metrics into a QC method, but as written they would not affect *ex ante* or *ex post* capacity counting in a meaningful way.

CEC staff believes the overall timeline can be shortened to meet the QC finalization milestones proposed by stakeholders. Earlier in the year is preferable to enable planning and contracting, so planning for June 1 is ideal, but July 1 is reasonable if the earlier date is not possible, especially in the first few years of implementation.

In the view of CEC staff, there are three main reasons consultants are required in the current process. Consultants possess technical expertise required to produce results, they have experience completing LIP reporting requirements, and they act at arm's length to DR providers to reduce the conflict of interest inherent in requesting QC values. CEC staff believes an incentive-based approach can reduce much of the reporting requirements and is a more resilient method of addressing conflict of interest, eliminating the latter two needs. However, it is not clear whether DR providers wish to eliminate the need for technical expertise. CEC staff views statistics, economics, and data science as fundamental to operating a robust DR market. Accordingly, DR providers should be expected to compensate individuals with that expertise, but CEC staff takes no position on whether that expertise should be held by in-house employees or contracted consultants.

Role of State Agencies and California ISO

Stakeholders that addressed the CEC staff proposal to adopt criteria for streamlined QC approval supported the change. SDG&E "also agree[s] with the recommendation for a streamlined approval for DR providers and resources that have a proven track record."[71] CESA similarly "agrees with the CEC that this streamlining will likely significantly reduce the administrative burden associated with reviewing any [*ex ante*] QC analysis."[72]

CESA also supported the DSA recommendation of "the release of risk allocation (*e.g.*, loss of load probability) for the state so that DRPs can be better informed as to where their resources may be most needed."[73]

Stakeholders expressed desire for more clarity on who will implement a proposed penalty if one is adopted. The California ISO writes that the CEDMC proposal "fails to specify who will be responsible for administering any penalties," and the CEC staff proposal "does not clearly define who will be responsible for administering the proposed penalty structure."[74] OhmConnect also urged the CEC to "recommend that any penalty structure be centrally administered,"[75] rather than be enforced by load-serving entities.

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71 SDG&E. *Comments on Demand Response Qualifying Capacity Proposals Submitted to the Working Group*, page 8

72 CESA. *CESA's Comments on SSDR QC Working Group Proposals*,, page 7

73 CESA. *CESA's Comments on SSDR QC Working Group Proposals*,, page 8

74 California ISO. *CAISO Comments on DR Working Group Proposals*, page. 6-7

75 OhmConnect. *Informal Comments of OhmConnect on Demand Response ("DR") Qualifying Capacity ("QC") Proposed Methodology, Intra-Cycle QC Updates, and Adders,* page 2

Role of State Agencies and ISO Discussion

CEC staff observes that while few stakeholders directly addressed the streamlined QC approval criteria in the CEC staff proposal, no stakeholders registered opposition or suggested alternate criteria. CESA observed that while the streamlining criteria reduce administrative burden, "underperforming DRPs and large changes to QCs can be appropriately assessed by Energy Division."[76] CEC staff agrees with this assessment and finds the streamlined QC approval reasonable.

CEC staff finds the publication of a risk allocation heatmap for the state to be a potentially useful exercise, but one that is not critical to developing QC values under the slice-of-day framework. Similar studies are completed in other planning and reliability exercises; these studies can guide DR resource design.

CEDMC specified in its proposal that "Energy Division would assess" demonstrated capacity and implies Energy Division would accordingly administer the penalty. CEC staff agrees with OhmConnect's observation that "[m]any [load-serving entities] are small and do not have the resources to administer a penalty structure. Placing such a burden on these entities will raise the cost of doing business with DR providers."[77] CEC staff agrees that central administration of the penalty mechanism is preferable and that the CPUC is the appropriate entity to approve QC values and administer the penalty.

Alignment of Operational and Planning Spaces

Stakeholders provided relatively little feedback on proposal elements intended to align DR counting in the planning and operational spaces, other than by stakeholders that reiterated positions in their proposals. CESA expresses support for "the use of the [California ISO] settlement methodology to evaluate QC performance given that it increases transparency, aligns market performance, and represents a methodology familiar to [DR providers]."[78]

SDG&E opposes the bid-normalized load impact adjustment proposed by CEC staff, asserting the "metric introduces an asymmetric, downward bias in assessing performance."[79] SCE opposes any use of bids for the opposite reason, arguing that "[a] bid is not necessarily reflective of the maximum capacity of a weather-sensitive resource during the first hour of an event; nor do bids account for the actual decline of load impacts delivered over subsequent hours of an event."[80]

Operational and Planning Alignment Discussion

The CEC staff proposal for alignment is intended to be a reasonable middle ground between the proposals to use California ISO settlement baselines in *ex post* analysis (CEDMC) and vice

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76 CESA. *CESA's Comments on SSDR QC Working Group Proposals*,, page 5

77 OhmConnect. *Informal Comments of OhmConnect on Demand Response ("DR") Qualifying Capacity ("QC") Proposed Methodology, Intra-Cycle QC Updates, and Adders,* page 2

78 CESA. *CESA's Comments on SSDR QC Working Group Proposals*,, page 4

79 SDG&E. *Comments on Demand Response Qualifying Capacity Proposals Submitted to the Working Group*, page 12

80 SCE, *SCE Comments on CEC Working Group Proposals for DR QC Counting*, page 11

versa (DSA). CEC staff recognizes that while consistency between settlement and capacity valuation is desirable, California ISO baselines in regular use are "heuristics" that are "not well suited" for weather-sensitive resources, as described by SDG&E. On the other hand, any baselines used for California ISO settlement must be shown to be tariff-compliant, so simply submitting methods documentation and code ahead of time is insufficient to allow the baseline to be used in settlement. CEC staff observes that if a desired baseline method is submitted to the California ISO and approved as tariff compliant, using that baseline for settlement and *ex post* evaluation would be consistent with all three alignment proposals.

More important, the DSA proposal adds an element of inequity between third-party and utility DR providers. SCE comments highlight this potential inequity when rightly observing that comparison groups are often preferable to other common baselines:

> *For [investor-owned utilities], which can identify non-participants, the option of establishing a [comparison] group baseline to assess performance of its DR program should still be present, especially if it can produce more robust results of performance for weather-sensitive residential DR programs (p. 9).*[81]

The utilities themselves have access to nonparticipant data; third-party DR providers do not. CEC staff hopes to make comparison group baselines available to third-party DR providers eventually but is unlikely to be able to do so within the settlement period, at least within the next few years.

The CEC proposal attempts to clarify the existing logic for when different baselines may be used for settlement and *ex post* evaluation, rather than inventing a new process. Under CEC staff's proposal, a third-party DR provider would be able to use a day-matching or weather-matching baseline for settlement and *ex post* evaluation. They would *also* be able to use a comparison group or similar method for *ex post* evaluation, even if it requires waiting longer than the settlement period for the CEC or other entity to generate the baselines. If the utilities can apply comparison group baselines for both settlement and *ex post* evaluation, they should do so for consistency in measurement.

CEC staff disagrees with the assertion by SDG&E that the bid-normalized load impact metric produces a "downward bias" on load impacts. SDG&E explains its position with an example: "If a DR resource is called for 60 MW, but delivers 80 MW, the overperformance is ignored."[82] However, SDG&E does not specify the amount bid. Consider the bid-normalized load impacts of SDG&E's example under two bid amounts:

- 70 MW bid: The maximum function takes the 80 MW delivered, resulting in 80 MW of bid-normalized load impacts.

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81 SCE refers to nonparticipant group baselines as "control groups." CEC staff refers to these groups as "comparison groups" to distinguish them from control groups, which consist of enrolled participants who are withheld from participation for the purposes of developing a baseline.

82 SDG&E. *Comments on Demand Response Qualifying Capacity Proposals Submitted to the Working Group*, page 9

- 90 MW bid: The function recognizes that while the resource was only called for 60 MW, it exceeded its obligations, resulting in bid-normalized load impacts of 90 MW, its full bid amount.

In both cases, bid-normalized load impacts are greater than or equal to the actual load impacts. Indeed, CEC staff is more sensitive to SCE's argument that the bid-normalized load impact metric produces an *upward* bias on load impacts, particularly for partial dispatches. This concern appears to stem from a current issue for DR that DR resources have a must-offer obligation to bid the entire QC. To avoid dispatch of the full must-offer obligation, DR providers bid most of this capacity at or near the bid cap under conditions when that capacity is unlikely to be available (for example, on temperate days). While the proposal may *allow* DR providers to continue this practice, it will not *require* them to do so to avoid financial penalties.

A second reason to include bid normalization is equity between economic proxy demand response (PDR) and emergency reliability demand response resources (RDRR). High-bidding PDR functions like RDRR in that it is dispatched when there is an insufficiency or near insufficiency of bids in the market to serve load. While RDRR may bid economically in the market, it is not required to do so. Failing to account for the PDR capacity made available to the market through bids would improperly penalize PDR relative to RDRR, particularly for resources that bid across a range of prices, for being more regularly available to the market.

However, CEC recognizes that, as proposed, the bid-normalized load impact metric is generous in its evaluation of DR load impacts, particularly for underperformance in partial dispatches. Accordingly, CEC recommends an additional prerequisite for calculating bid-normalized load impacts: bid-normalized load impacts will be calculated and included in the *ex post* regression only if the dispatch amount is 20 percent or more of the bid amount.

This cutoff will require DR providers dispatch a significant portion of resource capability into the market to develop data points for the *ex post* regression. It also caps the ratio of actual load impacts to bid-normalized load impacts to one to five, preventing extremely high bid-normalized load impacts from being generated by extremely small dispatches. This feature provides some protection against overinflation of *ex post* capacity values from both bidding gamesmanship and fundamental statistical properties of small populations of dispatched customers.

CEC staff further clarifies that only customers in dispatched resources would be counted toward bid-normalized load impacts. That is, customers that are not dispatched by the California ISO, such as those in other sub-LAPs, but deliver load impacts cannot compensate for underperformance by customers in dispatched resources.

Intracycle Updates

In general, stakeholders found a single midyear intracycle update to be sufficient. For example, SDG&E writes, "[T]he proposed QC methodology should be able to produce a mid-year QC updated value."[83] CESA expressed support for the timeline proposed by CEDMC that

83 SDG&E. *Comments on Demand Response Qualifying Capacity Proposals Submitted to the Working Group*, page 15

would allow for midyear updates: "The Council proposes that claimed QC or [intrayear] updates be submitted to the CPUC by April 1 of each year and that Energy Division would provide a final QC value by June 1 of each year."[84] PG&E similarly recommended, "[T]he load impact filing in April 2023 should be used to inform the QC updates in the 2023 RA compliance year."[85]

The investor-owned utilities requested the update process be available to them, not just third-party DR providers. For example, SCE commented the intracycle update "process should also be made available for the IOU[s],"[86] consistent with the intracycle update proposal submitted by the utility.

Stakeholders also recommended revisiting the criteria for updating QC values (greater of 10 MW or 20 percent) during the RA compliance year. CEDMC expressed "strong concerns about the … unreasonably high threshold to trigger an update."[87] SCE notes these criteria apply to the "program level rather than portfolio level," so "[d]epending on the capacity (MW) provided by the supply-side DR resource, the net change due to enrollment at the portfolio level may not meet or exceed the [threshold]."[88] CEDMC recommended lowering the thresholds to the greater of 10 percent or 5 MW.

OhmConnect recommends deferring this issue to the RA proceeding. It notes that the topic of intracycle updates "was discussed only very briefly" and that appropriate recommendations for intracycle updates "depend heavily on the type of QC methodology that is ultimately adopted."[89]

Intracycle Updates Discussion

CEC staff agrees with the near-consensus that one midyear update is sufficient. If a new QC methodology and process shorten reporting QC finalization timelines as proposed by OhmConnect and CEDMC, updated QC values should be available to include in RA showings for July or August at the latest, consistent with the timing of California's critical peak needs. Midyear updates should be accessible to IOUs and third parties to provide equity between providers.

CEC staff believes it is reasonable to relax the threshold required to complete a midyear update. Presumably, applying the *maximum* of capacity or percentage was intended to reduce the number of midyear updates that CPUC Energy Division staff was required to review because the process was difficult and time-consuming. Ideally, under a faster, more streamlined approach, such limitations will not be necessary. The threshold can be decreased

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84 CESA. *CESA's Comments on SSDR QC Working Group Proposals*,, page 5

85 PG&E. *PG&E Comments on the final Supply Side Demand Response QC Proposals*, page 5

86 SCE, *SCE Comments on CEC Working Group Proposals for DR QC Counting*, page 12

87 CEDMC. *California Efficiency + Demand Management Council Comments on Supply Side Demand Response Working Group Phase 2 Proposals*, page 10

88 SCE, *SCE Comments on CEC Working Group Proposals for DR QC Counting*, page 12

89 OhmConnect. *Informal Comments of OhmConnect on Demand Response ("DR") Qualifying Capacity ("QC") Proposed Methodology, Intra-Cycle QC Updates, and Adders,* page 5

by changing the maximum of the two criteria to the minimum. For example, a 10 MW resource would be eligible for an updated value with a change of 2 MW, and a 100 MW resource would be for a change of 10 MW. CPUC may also consider decreasing one or both criteria as suggested by CEDMC.

CEC staff recognizes OhmConnect's concerns and suggests the preceding changes as sensible defaults. They may be reexamined and updated within the RA proceeding of the CPUC. However, no stakeholders expressed strong desire or need for intracycle updates beyond the single midyear update.

DR Adders

Working group members provided feedback on the adders included in QC values or as an additional credit to the California ISO by survey. Not all stakeholders responded to the survey, and not all those that did provided a position on every question.

Table 2 summarizes stakeholder positions on the PRM adders. A slim majority of respondents supported eliminating the adder for operating reserves and ancillary services, consistent with CPUC Decision 21-06-029. Respondents appeared most ambivalent on the load forecast error adder, with respondents split and nearly half declining to comment. Responses to the forced outage rate were similar, with one more respondent in favor of maintaining the adder than eliminating it.

Table 2: Stakeholder Positions on PRM Adders

Organization	PRM Operating Reserve/Ancillary Service Adder	PRM Load Forecast Error Adder	PRM Forced Outage Adder
CAISO	Eliminate	Eliminate	Eliminate
DSA	Eliminate	Maintain (>0%)	Maintain (>0%)
OhmConnect	—	—	—
CLECA	6%	Maintain (>0%)	Maintain (>0%)
Leap	6%	—	—
SDG&E	Eliminate	Eliminate	Eliminate
SCE	Eliminate	—	Maintain (>0%)

Source: Survey of DR QC working group participants

CLECA offered the only arguments in support of retaining the PRM adder in its entirety "on the grounds that capacity requirements are determined as peak load plus the PRM." In its view, supply-side and load-modifying DR should be treated the same as they both "effectively create an additional capacity margin by reducing load." In support of including the forced outage component, CLECA writes, "DR's QC is based upon historical performance, which include non-performance."[90]

The California ISO argues that it is inappropriate to include any component of the PRM adder because "[t]he presence of supply side [DR] does *not* reduce the [California ISO's] reserve requirements day to day." Rather, "the PRM adder inappropriately assumes [DR] would reduce procurement for load forecast error," and "there is no evidence…demonstrating that…[DR] reduces generator forced outages, or the amount of capacity [load-serving entities] must procure to account for those outages."[91]

Stakeholders more nearly reached consensus on the transmission and distribution loss factor adders, as summarized in Table 3. All stakeholders found the DLF reasonable and appropriate to include directly in QC values.

90 CLECA. *CLECA Comments on Supply Side Demand Response QC Methodologies*, page 9

91 California ISO. *CAISO Comments on DR Working Group Proposals*, page 3

Table 3: Stakeholder Positions on Transmission and Distribution Loss Factor Adders

Organization	Distribution Loss Factor	Transmission Loss Factor
CAISO	Maintain in QC	Eliminate
DSA	Maintain in QC	Maintain, include in QC
OhmConnect	Maintain in QC	Maintain as credit
CLECA	Maintain in QC	Maintain as credit
Leap	Maintain in QC	Maintain as credit
SDG&E	Maintain in QC	Maintain as credit
SCE	Maintain in QC	Maintain as credit

Source: Survey of DR QC working group participants

All but the California ISO found the TLF reasonable and appropriate to include as a gross-up credit to the California ISO. CLECA argued that TLF adder should be retained because "[t]he load forecast is at the transmission level, so the load impact at the meter should be grossed up for distribution losses to calculate [QC] losses."[92] The California ISO, the only stakeholder in favor of eliminating the TLF adder, suggests "other distribution-side resources do not receive a transmission adder … [and] [t]he loss factor adder for [DR] is unduly preferential." The California ISO argues that "a single, static avoided transmission loss factor does not accurately represent node-specific and dynamic congestion benefits across the year." Perhaps even more important, the record establishing the TLF adder values is insufficient; according to the California ISO, "[The attachment] to the Ruling [establishing the TLFs] lists avoided transmission and distribution loss factors 'supplied by the CEC,' but there is neither reference to the specific [CEC] study nor explanation how these factors were calculated."[93]

DR Adder Discussion

CPUC has previously found in Decision 21-06-029 that the components of the PRM adder associated with operating reserves and load forecast error are inappropriate to include for DR QC values. CEC staff finds the arguments for removing these adders reiterated by stakeholders, including the California ISO, persuasive.

CEC staff also finds it reasonable to include the PRM adder component associated with forced outages. SCE provides an argument similar to CLECA's for maintaining the forced outage component:

> *The LIP process accounts for forced outages (or non-performance) by looking at actual historical performance ([ex post]). If the historical performance was impacted by an outage (or non-performance) affecting the ability to curtail load, then the LIP will forecast a lower response rate. In other words, the LIP methodology already includes and de-rates DR for forced outages. To not apply*

92 CLECA. *CLECA Comments on Supply Side Demand Response QC Methodologies*, page 8

93 California ISO. *CAISO Comments on DR Working Group Proposals*, page 4-5

the forced outage adder of PRM, when LIP is used to estimate DR QC, would be de-rating the DR capacity twice and valuing it unfairly. (p. 15)

CEC staff's experience reviewing QC requests and LIP filings is inconsistent with the view of SCE and CLECA that nonperformance is included in QC values. For example, at least one LIP filing reviewed by the CEC team dropped events from its *ex ante* analysis where technical or communication errors prevented end-use customers from responding to dispatches from the ISO. It may have been appropriate to drop such points for *ex ante* valuation for the following year if the technical issue had been resolved, but the *ex ante* analysis did *not* reflect those outages.

CEC staff finds it reasonable to maintain the forced outage rate adder because under the framework recommended in this report, SCE's statement *would* be correct. The CEC staff proposal includes an explicit comparison of actual (*ex post*) performance with *ex ante* commitments that would incorporate the kinds of outages described above. Furthermore, based on this observation, CEC staff finds the adder a *more* appropriate adjustment to the capacity shortfall penalty than the 94.5 percent threshold as originally proposed by CEC staff, but it is inappropriate to include both. (See Appendix B.)

If the forced outage rate adder is found appropriate, the issue remains of how much of that amount to attribute to the forced outage rate. The forced outage rate and forecast error components collectively comprise the remaining 9 percent of the PRM adder. CPUC previously declined to apportion the adder between the two components and instead maintained the entire 9 percent. CEC staff finds it reasonable to apply a 5.8 percent adder for forced outages (implemented as a multiplier of 1.058). This value is derived from the reciprocal of 94.5 percent (105.8 percent), implying an adder of 5.8 percent. (See Appendix B.)

CEC staff finds the transmission and distribution loss factor adders reasonable to maintain, as supported by nearly all stakeholders. While the California ISO cautions against including the TLF because it results in inequitable treatment between DR and other distributed resources, CEC staff suggests that it may be appropriate to include a TLF adder to other distributed resources rather than remove it from DR. However, CEC staff is sensitive to the concern that the record on the TLF values themselves is insufficient. A new study of avoided transmission losses from DR — and perhaps other distributed resources such as solar or storage or both — is warranted. Until such a study has been completed, CEC staff does not opine on whether to maintain the TLF, or at what value, in the interim.

CHAPTER 4:
CEC Recommendations

The CEC's final findings and recommendations provided here consider the proposals received (Chapter 2) and stakeholder comments on the proposals (Chapter 3). These recommendations are informed by staff's experience reviewing and analyzing the 2022 LIP filings, which were submitted by DR providers.

CEC staff has served in a collaborative, advisory role with CPUC staff in all RA proceedings as designated by CPUC decisions. CEC recommends the continuation of its role to support the implementation of these recommendations.

1. **Apply a consistent QC framework and methodology across DR resources.** Create consistency among investor-owned utility programs, third-party DR contracts, and DR Auction Mechanism resources by applying these recommendations broadly to DR resources.
2. **Adopt an incentive-based approach.** CEC staff recommends moving away from the analytical forecast approach represented by the LIP process and finds the status quo approach unsustainable. Fundamental to the LIP format, QC results are variable in interpretation, time consuming, and difficult for both DR providers to produce and CPUC staff to review. The lengthy timeline of the LIP process makes securing contracts and making QC improvements difficult for DR providers. Since producing LIP filings will likely remain an expensive undertaking, many DR providers have no guarantee of recouping that cost. Under the status quo approach, CPUC Energy Division staff — rather than DR providers— is accountable for the DR provider results with no recourse when DR resources underperform. CEC staff believes that an incentive-based approach is the only viable alternative that addresses issues with the status quo LIP-based approach. A performance-based incentive mechanism for DR has been recommended by CPUC Energy Division staff and the California ISO Department of Market Monitoring.
3. **Adopt the capacity shortfall penalty incentive mechanism with forced outage adder.** Of the two incentive-based proposals considered by the working group — the CEDMC proposal and the CEC staff proposal — CEC staff recommends the capacity shortfall mechanism proposed by CEC staff as the most viable and capable of delivering high performance to support reliability. The proposed penalty increases steadily with underperformance, avoiding the edge effect present in the CEDMC proposal.
   The capacity shortfall penalty was developed under a theoretical framework to encourage DR providers with incentives to accurately forecast the actual expected capacity of their resources. The penalty design accounts for the fundamental variability of DR and provides the same affordances for forced outages and other forms of underperformance granted to all resources under the RAAIM while preserving the incentive for DR providers to accurately value and reliably operate their resources.

   The capacity shortfall penalty can be implemented in terms of cost ($) where contract prices are known, such as for the DR Auction Mechanism, or in terms of capacity (MW)

where they are not. As a less desirable but simpler alternative, a single reference shortfall penalty price applied across all DR resources may be considered.

4. **Adopt the *ex ante* capability profile and *ex post* regression approach proposed by CEC staff.** The temperature-dependent regression approach accounts for temperature variability during the compliance year and allows more accurate adjustment for weather-sensitive resources. The CEC recommends the adoption of the temperature-dependent regression-based approach, which represents weather-sensitive resources and provides an incentive for consistent performance better than simpler proposals such as the "best hour" approach recommended by CEDMC. The CEC approach also allows DR providers to use simpler methods when modeling weather sensitivity is unnecessary.

   CEC staff recognizes the diversity of DR resources and considerations specific to different DR providers and recommends adopting the profile types proposed by CEC staff and continuing a stakeholder process to adopt additional parameters as needed.
5. **Require resources to show takeback.** Showing takeback affords DR similar treatment to other resource types such as battery storage. A requirement to show negative impacts outside a dispatch window should also be incorporated as outlined by CLECA and DSA.

   CEC staff does not believe additional changes are required to distinguish between dispatches and spillover of load reduction as proposed by CLECA and DSA. Rather, these load reductions can be shown as part of the hourly capacity values of the resource, rendering the distinction unnecessary.
6. **Require DR providers to submit capability profiles and "slice-of-day" table to summarize QC values.** DR providers submit a capability profile that applies to every combination of month and hour for which they are seeking a QC value. Capabilities may include sensitivity to hot temperatures, cold temperatures, both, or neither, as well as a first-hour effect.
   The slice-of-day table proposed by DSA conveniently summarizes *ex ante* QC values by hour and month. These QC values, plus takeback in surrounding hours, should be directly derived from *ex ante* capability profiles.
7. **Reduce reporting requirements for QC determination.** Require submission of information needed to determine QC values, including the DR resource IDs submitted for QC approval, specifications for how they will be aggregated, capability profiles for each aggregation including seasons, change points, and first-hour effects.
   CEC staff recognizes that some documentation of ex ante forecasts and assumptions is reasonable to require, particularly during the transition to an incentive-based framework. Also require the supporting information outlined by CEDMC, as well as a customer energy baseline measurement plan for DR resources that do not use the same baseline for California ISO market settlement and *ex post* measurement.
8. **Plan to produce final QC numbers by June 1 preceding the RA compliance year.** CEC staff appreciates the need for a shorter timeline for DR providers to receive final QC valuation to facilitate year-ahead planning and contracting. Based on the recommended reporting and process changes, target completion of the QC valuation process by June 1. However, allow flexibility if needed to produce values by July 1, particularly during the first few years of transition.

9. **Adopt streamlined QC approval criteria.** Approve QC values for all months and hours that the DR provider has demonstrated at least 90 percent of its committed capacity and is requesting no more than a 25 percent increase from its demonstrated capacity for that hour and month in the previous year. CEC staff recognizes that CPUC Energy Division staff always retain the prerogative to conduct detailed analysis of submissions, but these are reasonable thresholds to waive that prerogative for DR providers that have a consistent performance record and reasonable growth values.
10. **The CPUC should implement the proposed penalty mechanism and the California ISO should exempt DR from the RAAIM.** The CPUC should administer the capacity shortfall penalty for DR. The CPUC can implement the methodology for the DR Auction Mechanism resources and utility DR programs.

    With the capacity shortfall penalty in place, the CEC recommends the California ISO exempt supply-side DR from the RAAIM. RAAIM exemption is consistent with treatment of other variable resources such as wind and solar but was not feasible in the absence of an appropriate incentive mechanism.
11. **Phase in the incentive-based approach over time.** CEC staff finds it reasonable to reduce or waive the penalty in the first year of implementation (RA compliance year 2025) to allow DR providers to gain experience with the new framework. CPUC Energy Division staff should ensure all aspects of the proposal are implemented in the first year, including calculating *ex post* capacity and determining prospective penalties. During the phase-in period, CPUC may require elements of the LIPs, such as those enumerated in OhmConnect's proposal. CEC staff recommends the CPUC maintain the discretion to extend the phase-in period based on the success and acceptance of the new approach.

    CEC staff also recommends that CPUC Energy Division staff continue to collaborate with CEC and California ISO staff on implementation details and to host one or more workshops to discuss the proposed approach in more detail so DR providers can prepare for and transition into the new process.
12. **Require DR providers to use the same baseline for settlement and *ex post* evaluation unless an alternative is more accurate but unable to be used for settlement.** Measurement consistency between settlement and *ex post* evaluation should be preferred by default. However, CEC staff realizes that feasible ISO-approved baselines are often insufficient, particularly for weather-sensitive resources. More accurate methods may require longer to implement, especially when additional data is required.
    This recommendation is framed as a qualitative guideline rather than a prescriptive standard because proving whether these criteria are met is difficult. However, CEC staff believes it is important for policy makers to articulate implementation preferences.
13. **Adopt bid normalization for load impacts in *ex post* capacity valuation.** For calculating delivered capacity, apply the bid-normalized load impact metric proposed by CEC staff to avoid penalizing DR providers for partial dispatches, to preserve equity between economic and reliability DR, and to reduce opportunities for gamesmanship. Apply bid normalization to dispatches of 20 percent or more of the amount bid and discard dispatches of less than 20 percent from the *ex post* capacity valuation process.

14. **Reduce the threshold required for midyear QC update.** Rather than require a change of the greater of 10 MW or 20 percent, allow midyear QC updates for DR resources or portfolios with changes of *either* 10 MW or 20 percent. The current threshold is a barrier to updates for large and small resources alike. Additional intracycle updates appear unnecessary but can be explored in the RA proceeding, if desired.
15. **Eliminate the components of the PRM adder associated with operating reserves and load forecast error.** CEC staff generally agrees with the conclusion in D.21-06-029 that these components are inappropriate to include.
16. **Convert the forced outage adder to a multiplier applied in the capacity shortfall penalty.** CEC staff recommends the equivalent of a 5.8 percent adder for forced outages consistent with other RA resources. However, the forced outage adder can be converted to a multiplier of 1.058 included in the effective capacity formula of the capacity shortfall penalty rather than as a credit sent to the California ISO.
17. **Maintain the distribution loss factor adder in QC values.** CEC staff supports the unanimous view of working group stakeholders that distribution loss factors are appropriate to include in DR QC values.
18. **Update transmission loss factors and include the adder as a credit.** CEC staff supports the near-unanimous view that transmission loss factors are appropriate to gross up as a credit to the California ISO. DR is typically deployed when grid usage and attendant transmission losses are high, and this characteristic should be valued.

    Conduct a follow-up transmission loss factor study including factors for other distributed energy resources such as battery storage to allow equity between distributed resources. CEC staff declines to take a position on whether the current values should be maintained or eliminated until a study is completed.

APPENDIX A: Principles

Introduction

As an additional means of evaluating proposals, the working group developed a set of principles that a qualifying capacity method should meet. A final set of nine principles developed by the working group were posted to Docket 21-DR-01 on May 2, 2022.[94]

The principles are listed in the next section. A subsequent section presents the results of a principles survey provided to working group participants.

Principles

The following nine principles represent the final set adopted by the CEC's demand response qualifying capacity working group. These principles are intended to provide an additional means of evaluating QC methodology proposals. Each principle should be considered independently of all others when applied to a given QC methodology proposal. A proposal may score highly by some principles and poorly by others, which helps make tradeoffs between the various options visible.

1. The QC methodology should be transparent and understandable.
2. The QC methodology should use best available information regarding resource capabilities, including recent historical performance and participant enrollment and composition projections.
3. The QC methodology should allow DR providers to quickly determine or update QC values.
4. The QC methodology should be consistent and compatible with the resource adequacy program.[95]
5. The QC methodology should account for any use limitations, availability limitations, and variability in output of DR resources.
6. The QC methodology should translate a DR resource's load reduction capabilities into its reliability value.
7. The QC methodology should include methods to determine delivered capacity (*ex post*) that are compatible with the determination of qualifying capacity (*ex ante*).
8. The QC methodology should not present a substantial barrier to participation in the RA program.
9. The QC methodology should account for a resource's capacity when reliability needs are highest.

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94 California Energy Commission staff. 2022, *DR QC Counting Methodology Principles*, https://efiling.energy.ca.gov/GetDocument.aspx?tn=242909&DocumentContentId=76492

95 CEC planned to accommodate multiple possible slice-of-day proposals. By the time the working group completed this exercise, however, the 24 slice-of-day framework had been selected by the CPUC and working group members rated proposals relative only to this framework.

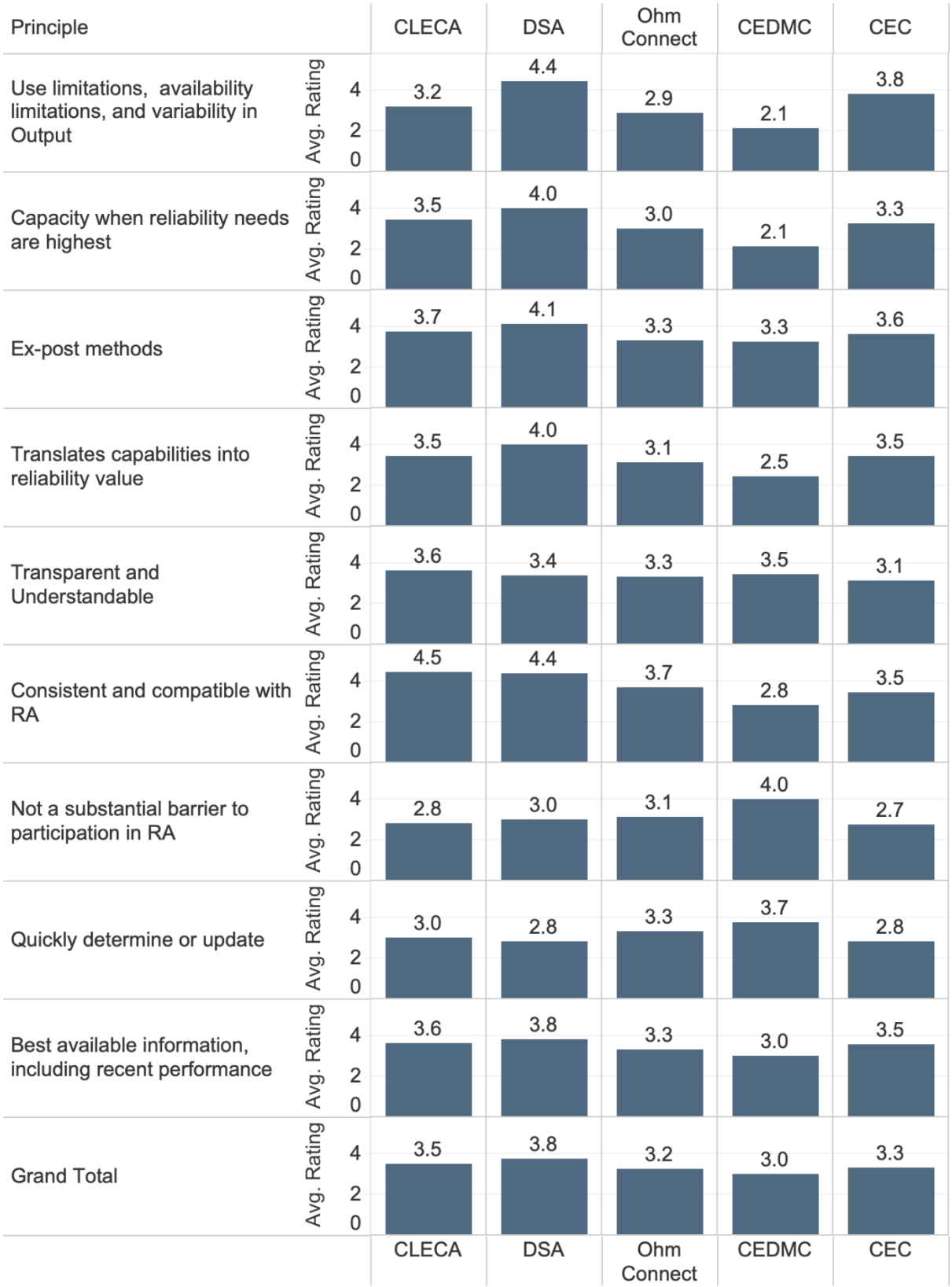
Survey Results

Once the five proposals were submitted by stakeholders and posted to Docket 21-DR-01, CEC staff provided a survey to working group participants on September 28, 2022. CEC staff requested that respondents rate how much they agree (or disagree) that each proposal meets or aligns with each of the nine principles on a five-point scale. The survey closed October 4, 2022, and the results were discussed during a meeting of the working group October 6, 2022. The results were aggregated so that no respondent is identified.

The results are only intended to be a guide for stakeholder discussion and should not be considered conclusive for several reasons. First, only a subset of working group participants responded to the survey, and the respondents were not necessarily representative of the working group. Respondents included Sunrun, SCE, CEC staff, SDG&E, California ISO, Leap, DSA, PG&E, CEDMC, Olivine, and CLECA. Of these 11, 5 were directly or indirectly involved with at least one of the two LIP-based proposals that scored highest overall (DSA and CLECA). Second, some respondents did not rate all five proposals.

Additionally, some respondents may have misinterpreted some of the principles. OhmConnect observes that "the final set of principles appears to be interpreted differently by different entities." CEDMC similarly concluded "that stakeholders applied far different interpretations to most of the principles." CLECA also "noted that parties had different interpretations on what a principle meant and how it should be applied to a proposal." With these caveats in mind, the results are provided in Figure 1 on the following page.

Figure 1: Aggregated Survey Results



Source: Principles survey of working group participants

APPENDIX B: Capacity Shortfall Penalty

An incentive mechanism known as the Capacity Shortfall Penalty (CSP) is put forth as an alternative to the current incentive mechanism in the California ISO markets, the Resource Adequacy Availability Incentive Mechanism (RAAIM). The RAAIM is assessed based on bids under must-offer obligation (MOO) hours, currently the availability assessment hours (AAH). However, the RAAIM requires resources to bid their shown QC in each AAH. This incentive mechanism generally appears sufficient for traditional dispatchable generation resources that can produce a constant output over many hours; if a natural gas power plant bids 100 MW for five consecutive hours, it is highly likely to deliver that power if called upon to do so.

DR resources are fundamentally different and only some types of DR can deliver sustained constant load impacts over many consecutive hours. Even so, variable DR resources can provide significant capacity contributions. The incentive mechanism differs from the RAAIM by applying to the *ex post* measured capacity relative to the shown or otherwise committed capacity, which is in turn limited by the *ex ante* qualifying capacity. In doing so, it accounts for actual performance where applicable. This feature is critical to ensure DR providers cannot avoid penalties under a RAAIM-style system by bidding the contracted capacity value and purchasing the difference in the spot market.

Theoretical Framework

The CSP is defined as the product of any shortfall in demonstrated capacity relative to the contracted capacity, the market price for capacity, and a penalty parameter. The shortfall *S* is defined as:

$$S = \max\left(Cap_{Com} - Cap_{Dem}, 0\right)$$

Where Cap_{Com} is the committed capacity (typically, the shown capacity), and Cap_{Dem} is demonstrated capacity. Note the maximum function ensures DR providers face a penalty for delivering below the capacity award, but do not receive a bonus for surpassing it. The overall CSP is defined as the product of the shortfall (*S*), the price of capacity (*P*), and a multiplier (λ) that adjusts the relative intensity of the penalty:

$$\begin{aligned} CSP &= \lambda\, P\, \mathrm{S} \\ &= \lambda\, P \max\left(Cap_{Com} - Cap_{Dem}, 0\right) \end{aligned}$$

Under this proposal, the capacity revenue for a DRP is given as the demonstrated capacity less the CSP:

$$\begin{aligned} Revenue &= P\, Cap_{Dem} - \ CSP \\ &= P\, Cap_{Dem} - \lambda P \max(Cap_{Com} - Cap_{Dem}, 0) \end{aligned}$$

Demonstrated capacity can be rewritten as the committed capacity minus the shortfall, which simplifies as follows:

$$Revenue = P\, (Cap_{Com} - \max(Cap_{Com} - Cap_{Dem}, 0)) - \ \lambda P \max(Cap_{Com} - Cap_{Dem}, 0)$$

$$= P\ (Cap_{Com} - \max(Cap_{Com} - Cap_{Dem}, 0) - \lambda \max(Cap_{Com} - Cap_{Dem}, 0))$$

$$= P\ (Cap_{Com} - (1 + \lambda) \max(Cap_{Com} - Cap_{Dem}, 0))$$

That is, revenue is the price of the committed capacity times a large factor that represents committed capacity less the shortfall once for adjusting for demonstrated capacity (the 1 component of 1+ λ) and an *incremental* penalty for the shortfall (λ).

The objective of the DRP is to maximize revenue. Note that because the capacity price P_{Cap} is constant, the DRP will maximize revenue if it maximizes the large term, deemed "effective capacity," which is defined as the contracted capacity less the product of λ and the amount by which, if any, the DRP fails to meet the capacity award:

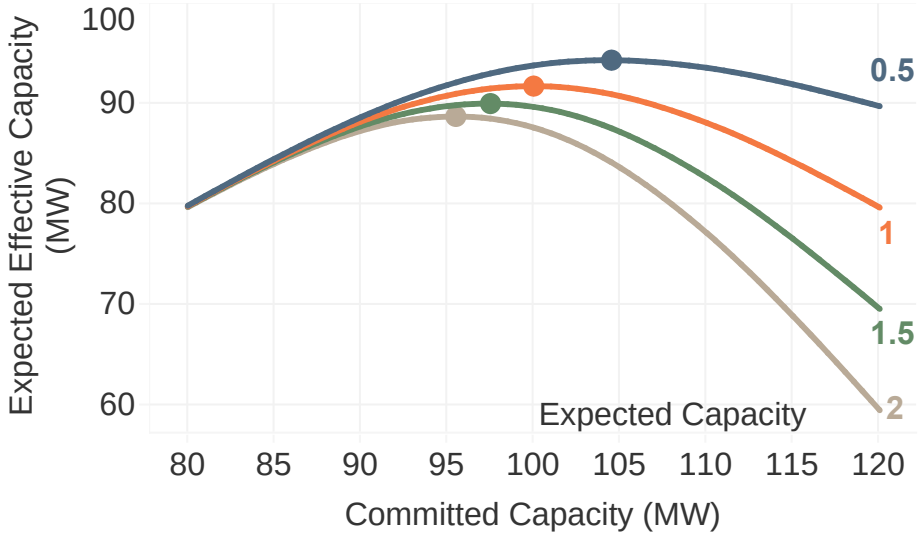
$$Cap_{Eff} = Cap_{Com} - (1 + \lambda)\ \max(Cap_{Com} - Cap_{Dem}, 0)$$

In other words, effective capacity is the equivalent amount of capacity for which the resource is compensated after applying the penalty. When λ = 0, the effective capacity is equal to demonstrated capacity for resources that underperform relative to their contracts, so only values of λ > 0 are considered to truly be considered a penalty.

A critical challenge of DR resources is that the demonstrated capacity is subject to future uncertainty and cannot be known precisely ahead of time. To account for this uncertainty, demonstrated capacity can be represented by random values from a normal distribution with known mean and standard deviation. CEC staff modeled a DR resource with mean 100 MW and standard deviation 10 MW to find the DR provider's optimal commitment for the resource under varying penalty parameter values to understand its impact.

Figure B- shows the expected effective capacity as a function of awarded capacity for each value of λ, with the mean value (vertical line) shown for reference. Expected capacity tends to increase with awarded capacity at low levels when there is little risk of not meeting the obligation. Expected capacity begins to decrease as the penalty begins to outweigh the increased award.

Figure B-1: Optimal Capacity Commitment by Penalty Parameter



Source: CEC staff analysis.

When λ < 1, the optimal capacity award exceeds the expected value of the, as the top line (blue) does for λ = 0.5. When λ = 1 (orange), the optimal award amount is equal to the median and expected value. When λ > 1 (green and gray), the optimal award amount is less than the median and expected value. A penalty parameter of 1 is therefore recommended because it provides the incentive to contract as much as but no more than a resource is expected to provide.

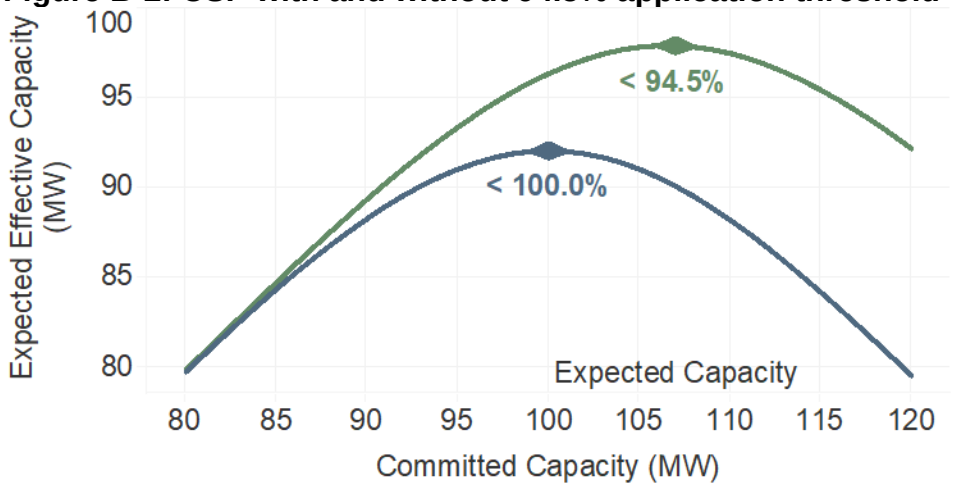
Forced Outages and Consistency with RAAIM

Unlike the penalty mechanism demonstrated above, the RAAIM applies only below 94.5 percent of shown capacity. This feature acknowledges the impossibility of perfect availability and sets a target for reasonable availability that penalizes or rewards resources for being less or more available. Accordingly, CEC staff included the 94.5 percent cutoff for consistency in the final CSP proposal (no cutoff was included in the draft proposal). However, stakeholders that advocated for including a forced outage adder remarked that the forced outage adder largely fulfills the same role of accounting for a reasonable rate of forced outages. This is particularly important when forced outages (or parallel forms of underperformance) are embedded in the QC methodology.

This section explores the impacts of adopting a penalty application threshold and/or a forced outage adder within the CSP construct.

Figure B-2 shows the optimal capacity commitment behavior with and without the application threshold of 94.5% of committed capacity under the penalty parameter of λ = 1. Including the application threshold has the effect of increasing the optimal committed capacity for DRPs to claim, similar to decreasing the penalty parameter. However, it also increases the effective revenue to closer to the expected capacity of the resource.

Figure B-2: CSP with and without 94.5% application threshold

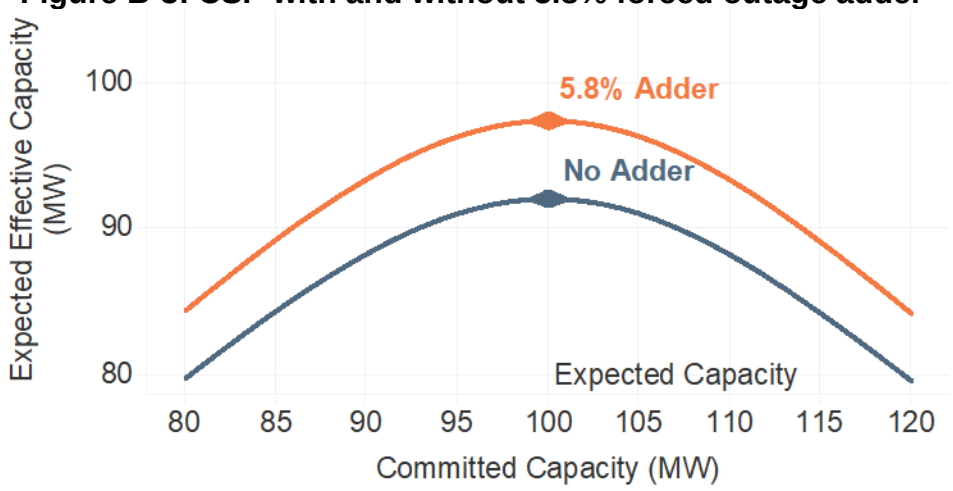


Source: CEC staff analysis

A forced outage error is modeled as a multiplier to the effective capacity based on the draft CSP (with no application threshold). Figure B-3 shows optimal capacity commitment behavior with and without a forced outage. For consistency with RAAIM, the forced outage adder is set

to 5.8%, the reciprocal of the 94.5% cutoff (minus one).[96] Under an adder, the optimal committed capacity remains at the expected capacity and the expected effective capacity (the amount the DRP will be compensated for) increases closer to the expected capacity.

Figure B-3: CSP with and without 5.8% forced outage adder



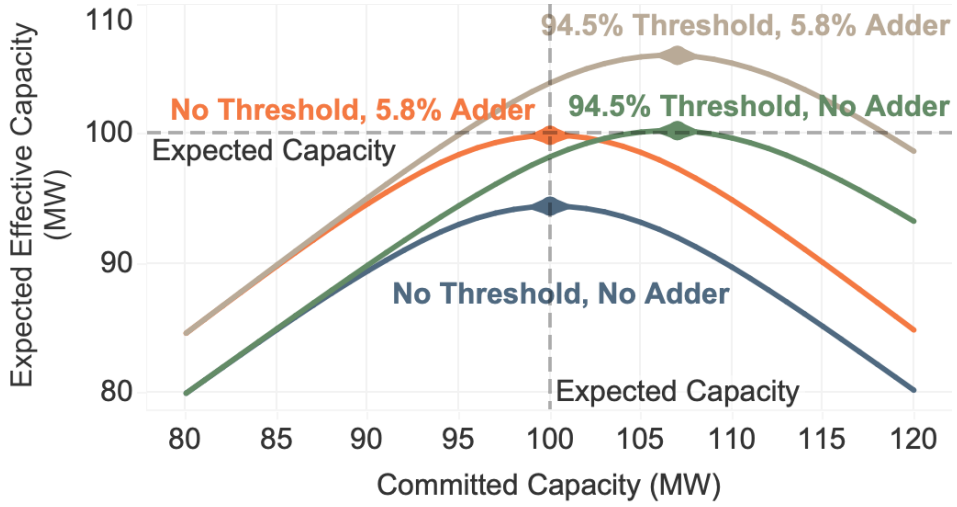
Source: CEC staff analysis

The amount by which the expected *effective* capacity (that is, the capacity value after taking the penalty into account) differs from the expected capacity of the resource depends on the amount of variability in the resource. In this analysis, the variability is modeled as the standard deviation of the distribution of possible capacity outcomes. The expected effective capacity of the resource modeled up until this point (standard deviation of 10 MW) does not quite reach its expected capacity (100 MW).

DR resources with less variability will have higher effective capacity under the CSP. The case of a 100 MW DR resource with standard deviation of 7 MW is instructive. Figure B-4 shows the optimal capacity commitment of this resource under the CSP with no adjustments, with the 94.5% threshold (as proposed), with a 5.8% forced outage rate adder applied, and with both. In all cases, the penalty parameter $\lambda = 1$.

96 (1/0.945)–1 = 0.058 = 5.8%

Figure B-4: CSP variations with DR resource of standard deviation 7 MW



Source: CEC staff analysis

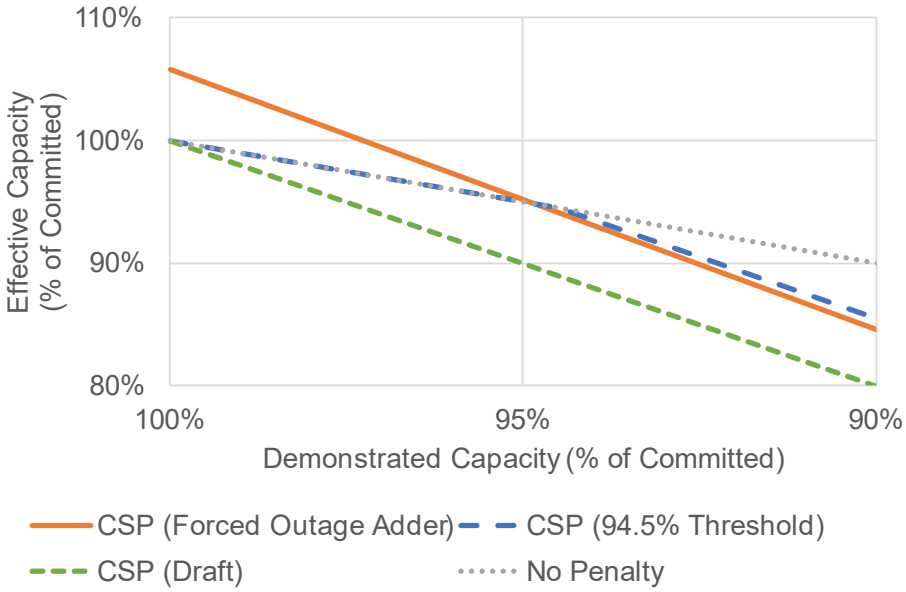
At this reduced level of variability, the DR resource will have an expected effective capacity of almost exactly 100 MW under either penalty design. However, the optimal capacity commitment under the threshold increases to 107 MW, compared to 100 MW under the adder — precisely the expected capacity of the resource. While the expected *effective* capacity changes with resource uncertainty, the optimal capacity commitment is always 100 MW, avoiding the distortionary effect caused by the threshold and incentivizing DRPs to commit no more than their expected capacity. Under both the threshold and the adder, the DRP both incentivized to overcommit and financially overcompensated for doing so. Accordingly, including both accommodations for forced outages is inappropriate and can be ruled out.

Note the expected effective capacity of the resource without adder or threshold is 94.5 MW, the amount initially targeted by the threshold (94.5% of 100 MW). That is, the DR resource will be compensated for 100% of its committed capacity so long as it meets 94.5% of its commitment, the desired outcome.

Another small difference from the threshold approach is that under the adder, a resource with even less uncertainty relative to its expected capacity will be earn an expected effective capacity *greater* than its expected capacity (over 100 MW in this example). This feature is consistent in motivation with RAAIM, which allows RA providers to be rewarded for overperformance relative to a standard.

The adder approach is more generous in response to minor underperformance than either the draft CSP or the proposed CSP with threshold. Figure B-5 shows the three variations of the CSP — with a forced outage adder, an application threshold, and neither (the draft version) — from 90–100% of committed capacity. The draft CSP, which does not take forced outages into consideration at all, is the most stringent of the three in this range. From 94.5–100%, the adder approach is the most generous, but below 94.5% becomes slightly more stringent than the CSP with penalty. Only under severe underperformance (<50% of committed) does the CSP with adder become the more stringent of the three.

Figure B-5: Comparison of CSP variations at low levels of underperformance



Source: CEC staff analysis

Overall, CEC staff find that the CSP with a 5.8% forced outage adder — rather than an application threshold as described in the CEC staff proposal — elegantly solves multiple issues. First and most importantly, it preserves the incentive for DRPs to commit the expected capacity of their resources and no more. In contrast, the application threshold introduces an unintended incentive to overcommit. Second, the forced outage adder allows DRPs to earn the full expected capacity of their resources, so long as they can forecast the capacity value with reasonable certainty. In the absence of the adder, DRPs need perfect accuracy to be compensated for the full expected capacity of their resource.

Additionally, the forced outage adder derived from the RAAIM cutoff provides a defensible answer to the question of what value to use. An adder of 5.8% is consistent with the application threshold proposed by CEC Staff and less than 9%, the collective sum of the forced outage and forecast error adders. Finally, the adder can be embedded in the calculation of effective capacity as shown in this analysis, avoiding the need for any grossing up of QC values as credits to the California ISO.

APPENDIX C: Acronyms and Abbreviations

Acronym	Term
CBP	Capacity Bidding Program
CEDMC	California Energy + Demand Management Council
CLECA	California Large Energy Consumers Association
DR	Demand Response
DRAM	Demand Response Auction Mechanism
ELCC	Effective Load Carrying Capability
EUE	Expected Unserved Energy
IEPR	Integrated Energy Policy Report
IOU	Investor-Owned Utility
ISO	Independent System Operator
LIP(s)	Load Impact Protocols
LOLE	Loss of Load Expectation
LOLP	Loss of Load Probability
LRA	Local Regulatory Authority
LSE	Load-Serving Entity
PDR	Proxy Demand Resource
QC	Qualifying Capacity
RA	Resource Adequacy
RAAIM	Resource Adequacy Availability Incentive Mechanism
RDRR	Reliability Demand Response Resource

APPENDIX D: Glossary

CAPACITY BIDDING PROGRAM – An investor-owned utility DR program that is managed by third-party aggregators responsible for designing their own DR program as well as customer acquisition, marketing sales, retention, support, and event notification tactics.

CALIFORNIA ENERGY + DEMAND MANAGEMENT COUNCIL – A statewide trade association of non-utility companies that provide energy efficiency, DR and data analytics products and services in California.

CALIFORNIA LARGE ENERGY CONSUMERS ASSOCIATION – An organization of large electricity customers located in California who all participate in the Base Interruptible Program.

DEMAND RESPONSE – Providing wholesale and retail electricity customers with the ability to choose to respond to time-based prices and other incentives by reducing or shifting electricity use, particularly during peak demand periods, so that changes in customer demand become a viable option for addressing pricing, system operations and reliability, infrastructure planning, operation and deferral, and other issues.

DEMAND RESPONSE AUCTION MECHANISM – Aggregated DR solicited by investor-owned utilities from third-party aggregators and bid directly into the California ISO market by third-party aggregators, typically as Proxy Demand Resources.

EFFECTIVE LOAD CARRYING CAPABILITY – A metric used to assess the capacity value or reliability contribution of electricity resources.

EXPECTED UNSERVED ENERGY – A measure of the amount of customer demand that cannot be supplied due to a shortage of electricity generation.

INDEPENDENT SYSTEM OPERATOR – An entity regulated by the Federal Energy Regulatory Authority that operates transmission facilities and dispatches electricity resources, but has no financial interest in these facilities or resources.

INTEGRATED ENERGY POLICY REPORT – A California Energy Commission report that contains an integrated assessment of major energy trends and issues facing California's electricity, natural gas, and transportation fuel sectors. The report provides policy recommendations to conserve resources, protect the environment, ensure reliable, secure, and diverse energy supplies, enhance the state's economy, and protect public health and safety.

INVESTOR-OWNED UTILITY – A private company that provides a utility, such as water, natural gas, or electricity, to a specific service area. The investor-owned utility is regulated by the California Public Utilities Commission (CPUC).

LOAD IMPACT PROTOCOLS – A set of guidelines comprised of 27 protocols that are used to estimate the aggregate load drop impacts of DR programs. The Load Impact Protocols provide guidance on how to measure the historical (*ex post*) performance of DR programs which informs the future (*ex ante*) performance of DR programs.

LOAD SERVING ENTITY – Any entity that has been granted authority or has an obligation pursuant to state or local law, regulation, or franchise to sell electric energy to end-use consumers of electric power.

LOCAL REGULATORY AUTHORITY – The state or local governmental authority, or the board of an electric cooperative, responsible for the regulation or oversight of a utility.

LOSS OF LOAD EXPECTATION – The expected number of hours per year that available generation capacity will be inadequate to supply customer demand.

LOSS OF LOAD PROBABILITY – The likelihood (probability) that system demand will exceed the generating capacity during a given period.

MEASUREMENT & VERIFICATION - Measurement and verification for DR means the determination of the demand reduction quantities.

PROXY DEMAND RESOURCE – Economic DR comprised of a load or aggregation of loads that bid into the California ISO market under normal operating conditions.

QUALIFYING CAPACITY – The maximum Resource Adequacy capacity that an electricity resource may be eligible to provide to the California ISO. The criteria and methodology for calculating the Qualifying Capacity of resources are established by the CPUC or other applicable Local Regulatory Authority.

RELIABILITY DEMAND RESPONSE RESOURCE – Emergency DR comprised of a load or aggregation of loads that bid into the California ISO market during supply-shortage conditions.

RESOURCE ADEQUACY – The ability of electricity resources (supply) to meet the customers' energy or system loads (demands) at all hours within a study period.

RESOURCE ADEQUACY AVAILABILITY INCENTIVE MECHANISM – A mechanism through which the California ISO assesses nonavailability charges and provides availability incentive payments to Resource Adequacy resources based on whether the performance of these resources falls below or above, respectively, defined performance thresholds.