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STATE OF CALIFORNIA
CALIFORNIA ENERGY COMMISSION

In the Matter of: *Senate Bill 100 Joint Agency Report*	Docket No. 23-SB-100

CALIFORNIA COMMUNITY CHOICE ASSOCIATION'S COMMENTS ON THE FEBRUARY 16, 2024, SENATE BILL 100 INPUTS AND ASSUMPTIONS WORKSHOP

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California Community Choice Association[1] (CalCCA) submits these Comments on the California Energy Commission's (CEC's) October 31, 2023, Senate Bill (SB) 100 Inputs and Assumptions Workshop (Workshop).[2]

I. INTRODUCTION

CalCCA appreciates the opportunity to comment on the Workshop including the presentation of the inputs and assumptions to be used in modeling for the 2025 SB 100 Report.[3] Materials presented and discussion at the Workshop demonstrate the extensive collaboration and overall robust approach of the CEC, the California Public Utilities Commission (CPUC), and the

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1 California Community Choice Association represents the interests of 24 community choice electricity providers in California: Apple Valley Choice Energy, Ava Community Energy, Central Coast Community Energy, Clean Energy Alliance, Clean Power Alliance, CleanPowerSF, Desert Community Energy, Energy For Palmdale's Independent Choice, Lancaster Energy, Marin Clean Energy, Orange County Power Authority, Peninsula Clean Energy, Pico Rivera Innovative Municipal Energy, Pioneer Community Energy, Pomona Choice Energy, Rancho Mirage Energy Authority, Redwood Coast Energy Authority, San Diego Community Power, San Jacinto Power, San José Clean Energy, Santa Barbara Clean Energy, Silicon Valley Clean Energy, Sonoma Clean Power, and Valley Clean Energy.

2 CEC Docket No. 23-SB-100, *Notice of Senate Bill 100 Modeling Impacts and Assumptions Staff Workshop* (Feb. 2, 2024), located at https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=23-SB-100.

3 CEC Docket No. 23-SB-100, *Presentation for SB 100 Inputs and Assumptions Workshop* (Feb. 16, 2024), located at https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=23-SB-100 (Presentation).

California Air Resources Board (CARB) (the Joint Agencies) in setting the framework to determine the most cost-effective and reliable resource mix to comprehensively meet the SB 100 goals.

Community choice aggregators (CCAs) will play an important and unique role in the State's march towards 2045 and the SB 100 goals. CCAs collectively provide retail electric service to approximately 14 million users of electricity in the State – equivalent to 36 percent of load in the investor-owned utility (IOU) territories and about one-third of the state's population. CCAs are committed to climate action and advancing the robust mix of renewables and energy storage technologies that California needs to transition to a carbon-free electricity supply, as well as reliability and affordability. As of December 2023, CCAs have collectively signed 203 long-term power purchase agreements (PPAs) for a combined 13,977 megawatts (MW) of new-build clean energy resources including solar, wind, energy storage, geothermal, and demand response resources.[4]

California faces significant hurdles and trade-offs in shaping the resource mix to meet SB 100's clean energy goals, while ensuring reliability as well as cost-effectiveness and affordability. The inputs and assumptions for modeling for the SB 100 resource mix chosen by the Joint Agencies as presented at the Workshop represent constructive building blocks to ensure accuracy. While the inputs are critical, particularly difficult assumptions must also be incorporated, including the uncertainties of resource availability. For example, the nascent offshore wind industry in California has great potential for the CEC's projected 25 gigawatts (GW) of capacity by 2045, but several hurdles must first be overcome to achieve that target. In addition, the magnitude of distributed energy resources (DERs) as well as the impact of existing and future demand flexibility policies are uncertain, difficult to measure, but potentially

[4] *See* CalCCA website, https://cal-cca.org/cca-impact/.

impactful. Finally, factors influencing the future availability to California of out-of-state wind and other imports are widespread, including transmission constraints, regional coordination, and potential regulatory barriers. Given the uncertain availability of these and other resources and the many factors that must be resolved, alternative resources must be considered.

CalCCA greatly appreciates the efforts of the Joint Agencies in balancing the trade-offs and creating the modeling framework presented by the CEC at the Workshop. To further refine the SB 100 modeling inputs and assumptions, CalCCA provides the following recommendations:

- Detailed transmission cost analysis should inform resource selection across all SB 100 modeling scenarios;
- All factors impacting reliability should be considered for each modeling scenario, including the compliance requirements for load-serving entities (LSEs) from the CPUC's Slice-of-Day (SOD) Resource Adequacy (RA) framework, as well as other considerations affecting reliability of resources;
- The assumed variable operating and maintenance (O&M) costs for hydrogen fuel cells should be reexamined and aligned with other lower cost estimates; and
- Long duration energy storage costs should be represented in the modeling using battery technologies with fundamentally different characteristics than lithium-ion batteries to ensure the cost implications of both are adequately represented.

II. DETAILED TRANSMISSION COST ANALYSIS MUST INFORM RESOURCE SELECTION IN ALL SB 100 MODELING SCENARIOS

As a starting point, transmission cost analysis should be endogenous to resource selection across all modeling scenarios being studied for the SB 100 Report.[5] Resource decisions will impact transmission investment needs, which can significantly impact cost-effectiveness and affordability. The modeling will include transmission candidate resource considerations across regions (but not intra-regional transmission). However, the CEC should clarify whether all

[5] Scenarios proposed to be considered include reference, base, minimum compliance, DER focus, resource diversification, geographic diversification, and combustion resource retirement. Presentation, Slide 11.

scenarios will incorporate transmission cost considerations or whether only the "Geographic Diversification" scenario described on Slide 11 will consider selection of resources taking into account transmission costs. Also unclear is if all scenarios will address situations such as the addition of 25 GW of offshore wind, which will significantly impact transmission costs within Pacific Gas and Electric Company's (PG&E's) region, but the "inter-regional" transmission cost analysis may not fully incorporate those likely significant costs. Another situation that may decrease transmission costs is additions of storage, DER, or demand flexibility in the model. The magnitude of these costs must be considered in resource selection across all scenarios.

In addition, transmission cost projections should be provided similar to the costs projected for resource candidates in Slides 26-28. Without these cost projections, stakeholders cannot provide comment on the cost inputs to the model. Finally, any identification of cost projections should also include the source of those projections.

III. ALL FACTORS IMPACTING RELIABILITY SHOULD BE CONSIDERED FOR EACH MODELING SCENARIO

The CEC's proposal to evaluate reliability in the context of each scenario will build confidence in the feasibility of reaching SB 100 goals while maintaining a reliable system. CEC Staff noted at the workshop that its reliability analysis will not consider compliance impacts associated with the CPUC's new SOD RA framework. However, as set forth below, CalCCA strongly recommends that the SOD RA considerations be included. In addition, absent from the discussion of the reliability assessment was any list of the factors that will be considered in the reliability assessment. CalCCA provides several factors below that should be included in any such assessment.

A. Compliance Requirements from the CPUC's Slice-of-Day Resource Adequacy Framework Should be Factored into the Reliability Analysis Along with Loss of Load Expectation

The CECs' supply model should factor in compliance implications from the CPUC's SOD RA framework[6] in addition to considering reliability through a loss of load expectation (LOLE) analysis. Slide 13 notes that the Stage 2 Capacity Expansion (PLEXOS) stochastic modeling will result in a LOLE analysis. However, nowhere in the modeling pathway is there consideration of how the proposed resource build will cost-effectively allow compliance by LSEs with the SOD requirements. Compliance requirements for LSEs ultimately impact affordability for customers, as RA costs constitute a significant procurement cost for LSEs that is passed through to customers. Therefore, any consideration of the future resource mix must not only consider overall reliability, but also how the mix enables regulatory compliance.

Theoretically, both SOD RA considerations and the SB 100 study should be looking to achieve a loss of load probability consistent with a 1 in 10 expectation. However, the factors considered in the two frameworks (SOD RA and SB 100) may vary. For example, the CPUC SOD RA mechanism uses a profile of expected energy output for renewable resources based on an exceedance methodology. If that profile is different than that used in the SB 100 study, the two studies could produce varying results. Given that SOD RA is in its beginning stages, now is the time for the CEC and the CPUC to begin working together to ensure that all modeling produces results that meet both energy and capacity compliance needs. Since the SB 100 modeling already has 8760 hours per year of load forecasting capability and the CPUC method for profiling renewable resources is public, the analysis of SOD RA compliance in the context of

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[6] *See* CPUC D.22-06-050, *Decision Adopting Local Capacity Obligations for 2023-2025, Flexible Capacity Obligations for 2023, and Reform Track Framework,* R.21-10-002 (June 23, 2022); *see also* D.23-04-010, *Decision on Phase 2 of the Resource Adequacy Reform Track,* R.21-10-002 (Apr. 6, 2023) (Slice of Day Decisions).

the SB 100 study should not be very difficult but is an important consideration for the SB 100 resource mix.

B. Additional Considerations Impacting Reliability Should Be Included in the Reliability Assessment

CalCCA appreciates the CEC's incorporation of a reliability analysis in the SB 100 modeling. However, the Presentation did not provide any details on the elements that will be considered. In addition to the SOD RA compliance considerations discussed above, CalCCA recommends the reliability studies consider:

- Multiple years of wind, solar, hydro, and load profiles to account for weather variation;
- Forced and planned outages of generators;
- Variation in supply and demand across all hours of the year, not just the current critical summer months;
- Retention of generation resources sufficient to meet ancillary service requirements beyond the hourly load; and
- Deviations of load from the forecast for reasons other than weather variation, as described further below.

Inclusion of these and other factors determined by the CEC will ensure a comprehensive analysis of factors impacting reliability.

One consideration listed above – deviations of load from the forecast for reasons other than weather variation – requires further explanation. In Comments in this Docket on the October 31, 2023, SB 100 Analytical Workshop, CalCCA encouraged consideration of macro-economic load forecast errors in its reliability assessment.[7] As new resources can take multiple years to build, these long-term forecast errors can impact reliability. Any determination of a

[7] CEC Docket 23-SB-100, *California Community Choice Association's Comments on the October 31, 2023, Senate Bill 100 Analytical Framework Workshop* (Nov. 14, 2023), at 2-3, located at https://efiling.energy.ca.gov/Lists.DocketLog.aspx?docketnumber=23-SB-100.

portfolio's loss of load expectation, including the SB 100 modeling analysis, should therefore account for these long-term load forecast errors. In fact, the CPUC includes load forecast errors in its reliability assessments.[8]

CalCCA recommends that the values of load forecast errors and their respective probabilities should be based on California's experience with load forecasting. To quantify this experience, CalCCA compared the Commission's Integrated Energy Policy Report (IEPR) 1-in-2 peak demand forecasts between future years and the current 2023 IEPR year to estimate load forecast errors unrelated to weather (*i.e.,* all peak loads are based on the 1-in-2 weather conditions resulting in forecast errors from macroeconomic or other structural factors).[9] CalCCA's comparison, updated to include the most recent 2023 IEPR load forecast, found that the standard deviation of the California load forecast error over the past nine years is approximately three percent of peak demand, with forecast errors resulting from the demand update in the 2022 IEPR exceeding seven percent, as shown in Figure 1, below. CalCCA recommends that this quantification be incorporated into the SB 100 modeling through its reliability assessment.

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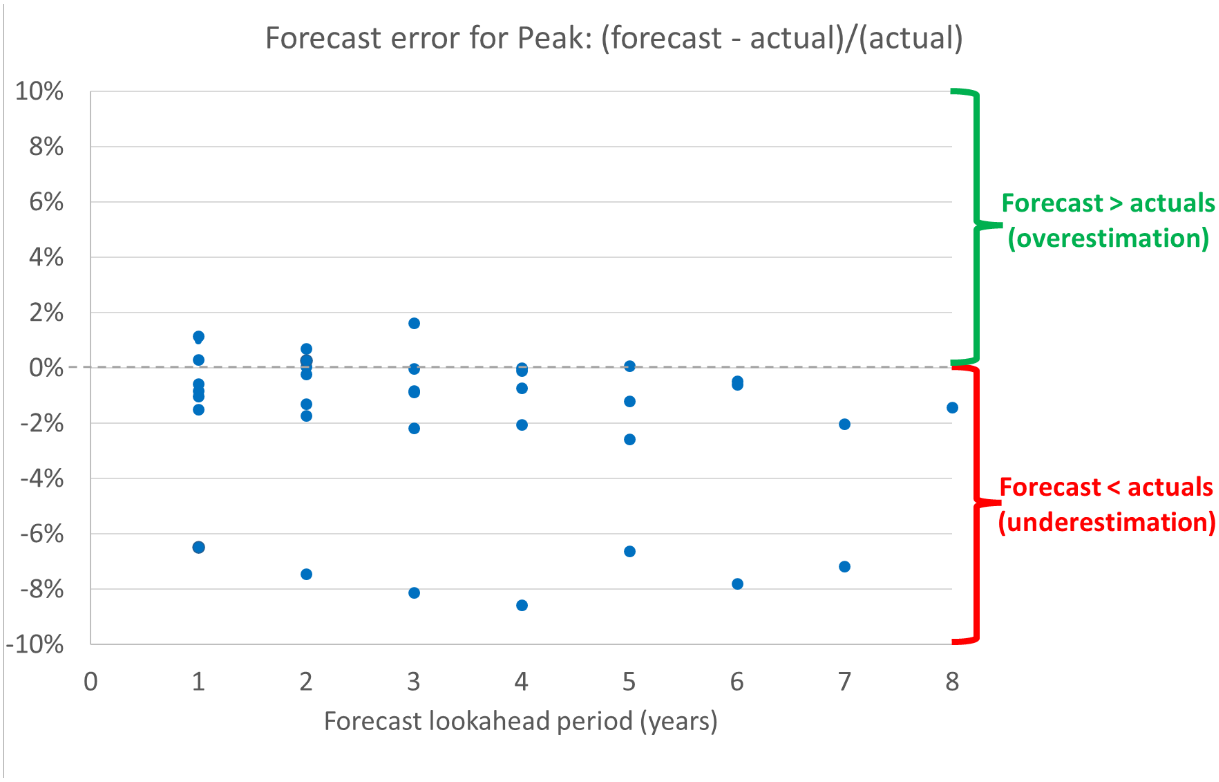
8 *See California Public Utilities Commission Inputs & Assumptions, 2022-2023 Integrated Resource Planning* (Oct., 2023), at 130: https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/integrated-resource-plan-and-long-term-procurement-plan-irp-ltpp/2023-irp-cycle-events-and-materials/inputs-assumptions-2022-2023_final_document_10052023.pdf.

9 CEC IEPR Forecast Data, 2015-2023.

Figure 1: CalCCA Analysis of CEC IEPR Load Forecast Errors for California Peak 1-in-2 Demand



IV. THE ASSUMED VARIABLE OPERATING AND MAINTENANCE COSTS FOR FUEL CELLS SHOULD BE REEXAMINED

The CEC's technology cost assumptions as provided at the Workshop appear reasonable, except for the variable O&M costs for a hydrogen fuel cell on Slide 28. The Joint Agencies' variable O&M cost assumption is \$37/MWh. In contrast, National Renewable Energy Laboratory (NREL) recently estimated the variable O&M costs for a hydrogen fuel cell as \$1.3/MWh,[10] an order of magnitude smaller than the CEC's estimate. CalCCA recommends reexamining this cost assumption and revising to align with other estimates.

[10] *See* Supplementary Information Table S25: Operation-and-maintenance costs in Hunter, C.A., *et al.* "Techno-economic analysis of long-duration energy storage and flexible power generation technologies to support high-variable renewable energy grids." *Joule* 5, no. 8 (2021): 2077-2101. https://doi.org/10.1016/j.joule.2021.06.018.

V. LONG DURATION ENERGY STORAGE COSTS SHOULD BE ADEQUATELY REPRESENTED USING BATTERY TECHNOLOGIES WITH FUNDAMENTALLY DIFFERENT CHARACTERISTICS THAN LITHIUM-ION BATTERIES

The Joint Agencies should consider alternative technologies to represent long-duration energy storage costs. As currently presented on Slide 29, variations in costs with duration of the long-duration energy storage candidate are similar to the lithium-ion candidate. Ideally, a long-duration energy storage technology will have a fundamentally different cost structure from lithium-ion batteries, such that costs do not increase as fast with increasing duration.

Figure 2 below compares the total capital cost of the lithium-ion battery to the long-duration energy storage candidate.[11] The cost of both technologies is low for durations of four hours or shorter but increase rapidly with increasing duration. In contrast, costs of compressed air energy storage (CAES), estimated by the Pacific Northwest National Laboratory[12] (PNNL) and shown in Figure 2, are relatively flat with increasing duration. As duration increases beyond four hours to 10 or 24 hours, however, the low costs of the CAES technology are increasingly distinct and more attractive than the rapidly rising costs of the options presented in the CEC presentation. Storage technologies in which costs are relatively invariant with duration, such as CAES, are more representative of the advantage of long-duration energy storage technologies than the CEC's current choice of technology.

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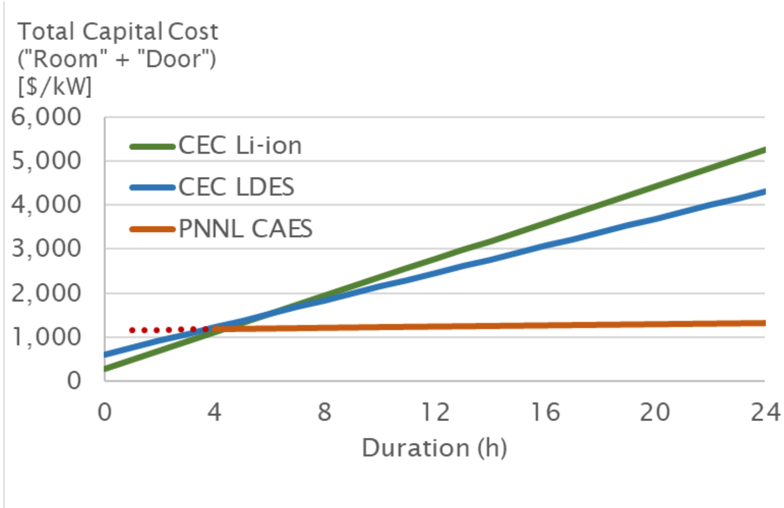
[11] Total capital cost of the Joint Agencies' storage candidates is based on the power capacity ("door") and energy capacity ("room") costs for 2035, as presented in Slide 29.

[12] Viswanathan, V. et al. (2022) 2022 Grid Energy Storage Technology Cost and Performance Assessment. Publication No. PNNL-33283. Technical Report. Pacific Northwest National Laboratory. https://www.pnnl.gov/sites/default/files/media/file/ESGC%20Cost%20Performance%20Report%202022%20PNNL-33283.pdf. See Figure 4.14, p. 64. Compressed air energy storage costs are for 2030 assuming a 100 MW plant. CalCCA extrapolated PNNL's costs to estimate costs for durations shorter than four hours.

Figure 2: Variation in Total Capital Costs of Storage Technologies with Duration



VI. CONCLUSION

CalCCA looks forward to continuing its participation in the SB 100 proceeding and further collaboration on modeling to ensure the resource mix chosen for the 2025 SB 100 Report incorporate all considerations regarding clean energy, reliability, cost-effectiveness, and affordability.

Respectfully submitted,

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March 1, 2024