COMMENTS OF THE CALIFORNIA COMMUNITY CHOICE ASSOCIATION TO THE CALIFORNIA ENERGY COMMISSION ON THE NOVEMBER 1 JOINT AGENCY WORKSHOP ON PLANNING FOR SB 100 ANALYSIS OF NON-ENERGY BENEFITS, SOCIAL COSTS & RELIABILITY
November 1, 2021

Docket Number 19-SB-100
SB 100 Joint Agency Report: Charting A Path To A 100% Clean Energy Future

I. INTRODUCTION AND SUMMARY OF RECOMMENDATIONS

California Community Choice Association (CalCCA)[1] appreciates the opportunity to participate in the Senate Bill (SB) 100 Docket, 19-SB-100. These comments address the "SB 100 Modeling" presentation made by the California Energy Commission (Commission) staff at the *November 1 Joint Agency Workshop on Planning for SB 100 Analysis of Non-energy Benefits, Social Costs & Reliability* (November 1 Joint Agency SB 100 Workshop). Specifically, CalCCA's comments address questions 4 and 5, posed in the Workshop:

4. *What recent and ongoing modeling work should we be referencing and engaging with?* and

5. *How can we best foster engagement on the modeling and build trust.*[2]

II. COMMENTS

Question 4: "*What recent and ongoing modeling work should we be referencing and engaging with?*"

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[1] California Community Choice Association represents the interests of 23 community choice electricity providers in California: Apple Valley Choice Energy, Baldwin Park Resident Owned Utility District, Central Coast Community Energy, Clean Energy Alliance, Clean Power Alliance, CleanPowerSF, Desert Community Energy, East Bay Community Energy, Lancaster Choice Energy, Marin Clean Energy, 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] November 1 Joint Agency SB 100 Workshop at 67. Available at https://efiling.energy.ca.gov/GetDocument.aspx?tn=240187&DocumentContentId=73645

The Commission should explicitly include climate change impacts on electric grid operations in its PLEXOS modeling. As the CAISO notes in its Final Root Cause Analysis (RCA), the electric grid is already being strained by extreme heat events. Indeed, the RCA explicitly found that "the climate change-induced extreme heat wave across the western United States resulted in demand for electricity exceeding existing electricity resource adequacy (RA) and planning targets."[3] The magnitude of these climate change effects is likely to change substantially over time, depending on the trajectory of global temperature over the next few decades. It is crucially important to capture this dynamic in modeling an electric system over a long time horizon (such as SB 100's horizon, which extends out to 2045).

Below is a list of specific climate change-related factors that the Commission should consider in its modeling, along with a table showing existing modeling work that the Commission can use to quantify climate change's effects.

1) *The effects of changing rainfall patterns on in-state hydro and imports from the Pacific Northwest.* Over time, changing weather patterns due to climate change are likely to affect the availability of in-state hydroelectric generation, and hydro imports from the Pacific Northwest.

2) *The effects of extreme heat on power plant operation*. As temperature rises, the capacity of thermal power plants drops.[4] Capturing this relationship is crucial for accurate modeling of the power system and will become more so over time as climate change causes more extreme weather. The CAISO's RCA flags this issue, stating that "Under very high temperatures, ambient derates are not uncommon for the natural gas fleet, and high temperatures reduce the efficiency of these resources."[5]

3) *Changing wind and solar generation.* Climate change will cause changes in the production of the solar and wind fleet, as rising temperatures and drought affect cloud cover, wind speed and rainfall.

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3 *Final Root Cause Analysis: Mid-August 2020 Extreme Heat Wave* at 1 (Final Root Cause Analysis). Available at http://www.caiso.com/Documents/Final-Root-Cause-Analysis-Mid-August-2020-Extreme-Heat-Wave.pdf

4 This phenomenon is called a "thermal derate" or "ambient derate."

5 Final Root Cause Analysis at 58.

4) *Load forecasting.* Higher heat and extreme temperatures will affect both the overall level of load, as well as the peak load.

Below is a table showing possible modeling data sources related to the items listed above. The Commission should consider these data sources in forming its climate change modeling approach. CalCCA looks forward to engaging with Commission staff on the analysis of the data.

Item	Possible Sources	Description	Example Use Case
Effects of changing rainfall on hydro generation	▪ EIA historical hydroelectric generation data[6] ▪ Historic and projected drought data[7] ▪ PRISM historical rainfall & climate data[8] ▪ County-level climate forecasts[9]	Time series data on hydro generation, drought, and rainfall.	Accounting for changes in hydroelectric generation in short and long term with drought and climate/rainfall forecasts
Effects of extreme heat on power plant operation	▪ CAISO outage/derate data[10] ▪ PRISM historical temperature data[11] ▪ County-level climate forecasts[12]	Thermal derate data for gas-fired power plants, and corresponding temperature that caused the derate.	Accounting for reduced gas capacity in higher-temperature climate scenarios.
Changing wind and solar generation	▪ Rasmussen, Holloway, and Nemet (2011) [13] ▪ Wang, Ullrich, and Millstein (2020)[14]	Modeling work suggesting that future wind patterns may be significantly different from historic.	Adjust siting to account for anticipated wind patterns. Adjust long-term wind generation forecasts to account for climate uncertainty.

6 Available at https://www.eia.gov/electricity/data/eia923/

7 Available at https://droughtmonitor.unl.edu/ConditionsOutlooks/Outlooks.aspx

8 Available at https://prism.oregonstate.edu/historical/

9 Available at https://rucore.libraries.rutgers.edu/rutgers-lib/49865

10 Available at http://www.caiso.com/market/Pages/OutageManagement/CurtailedandNonOperationalGenerators.aspx

11 Available at https://prism.oregonstate.edu/historical/

12 Available at https://rucore.libraries.rutgers.edu/rutgers-lib/49865

13 Rasmussen, D. J., Holloway, T., & Nemet, G. F. (2011). Opportunities and challenges in assessing climate change impacts on wind energy—a critical comparison of wind speed projections in California. *Environmental Research Letters*, *6*(2), 024008. Available at https://iopscience.iop.org/article/10.1088/1748-9326/6/2/024008

14 Wang, Meina, Paul Ullrich, and Dev Millstein. "Future projections of wind patterns in California with the variable-resolution CESM: a clustering analysis approach." *Climate Dynamics* 54.3 (2020): 2511-2531. Available at https://link.springer.com/article/10.1007/s00382-020-05125-5

Item	Possible Sources	Description	Example Use Case
Load forecasting	▪ Academic articles on climate change impacts to demand[15] ▪ CAISO historic load data[16] ▪ PRISM historical climate data[17] ▪ County-level climate forecasts[18]	Historic relationship between demand and temperature suggesting strong, non-linear relationship. Climate forecasts suggesting different temperature ranges than historical.	Adjust 1-in-X demand scenarios to account for increased incidence of extreme heat days.

Question 5: "*How can we best foster engagement on the modeling and build trust?"*

CalCCA appreciates the monumental task facing the Commission in modeling an SB 100 electric system, and offers the following suggestions to allow for stakeholder collaboration in the modeling:

- Publish results timely and allow sufficient time for stakeholder review and comment before decisions are made.
- Post public PLEXOS and other SB 100 datasets on the Commission website, and allow stakeholders to review them. For example, the Commission could create a webpage like the California Public Utilities Commission's webpage *Unified RA and IRP Modeling Datasets 2019*, and post relevant materials there.[19]

[15] Auffhammer, Maximilian, Patrick Baylis, and Catherine H. Hausman. "Climate change is projected to have severe impacts on the frequency and intensity of peak electricity demand across the United States." *Proceedings of the National Academy of Sciences* 114.8 (2017): 1886-1891. Available at https://www.researchgate.net/publication/313410662_Climate_change_is_projected_to_have_severe_impacts_on_the_frequency_and_intensity_of_peak_electricity_demand_across_the_United_States

[16] Available at http://oasis.caiso.com

[17] Available at https://prism.oregonstate.edu/historical/

[18] Available at https://rucore.libraries.rutgers.edu/rutgers-lib/49865

[19] Available at https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-power-procurement/long-term-procurement-planning/2019-20-irp-events-and-materials/unified-ra-and-irp-modeling-datasets-2019

III. CONCLUSION

CalCCA appreciates Commission staff's efforts in Docket Number 19-SB-100 and looks forward to further collaboration on this topic.

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