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Calpine Corporation's Comments on the SB 100 Analytical Framework Workshop

Additional submitted attachment is included below.



CALPINE CORPORATION

14 November 2023

California Energy Commission
Energy Assessment Division
Docket Number 23-SB-100
715 P Street
Sacramento, CA 95814

Re: Calpine Corporation's Comments on the SB 100 Analytical Framework Workshop

Calpine Corporation (Calpine) appreciates the opportunity to comment on the October 31st SB 100 Analytical Framework Workshop. The workshop provided a helpful overview of the design for the 2025 SB 100 Report's modeling. In response to the questions posed to stakeholders, Calpine has the following comments on the Resource Diversification Scenario, which is intended to capture how increased deployment of emerging resources including hydrogen, carbon capture and sequestration (CCS), long duration energy storage, and offshore wind could impact achievement of SB 100 goals.

To best characterize the deployment of CCS in the Resource Diversification Scenario, CEC staff should draw on the Governor's 2022 Letter,¹ the 2022 Scoping Plan,² *An Action Plan for Carbon Capture and Storage in California* from the Energy Futures Initiative and Stanford University,³ AB 1279, SB 905, the EPA Class VI Well Tracker,⁴ and the Sacramento Municipal Utility District's (SMUD) *2030 Zero Carbon Plan: Progress Report*.⁵

To set a floor for the deployment of CCS, staff should draw on the Scoping Plan's 16.7 MMT 2045 target for CCS in the electricity sector (approximately 11.9 GW).⁶ This is in line with the Governor's call for 100 MMT of carbon dioxide capture and removal by 2045, recognizing that "there is no path to carbon neutrality without carbon capture and sequestration". This is also consistent with the intentions of AB 1279 and SB 905, both of which encourage further investigation into the benefits and potential of CCS.

¹ Newsom, G. (2022). *Governor's Letter to CARB*. <https://www.gov.ca.gov/wp-content/uploads/2022/07/07.22.2022-Governors-Letter-to-CARB.pdf>

² California Air Resources Board. (2022). *2022 Scoping Plan for Achieving Carbon Neutrality*. <https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf>

³ Energy Futures Initiative & Stanford University. (2020). *An Action Plan for Carbon Capture and Storage in California: Opportunities, Challenges, and Solutions*. https://sccs.stanford.edu/sites/g/files/sbiybj17761/files/media/file/EFI-Stanford-CA-CCS-FULL-rev2-12.11.20_0.pdf

⁴ Environmental Protection Agency. (2023). *Current Class VI Projects under Review at EPA*. <https://www.epa.gov/uic/current-class-vi-projects-under-review-epa>

⁵ Sacramento Municipal Utility District. (2023). *2030 Zero Carbon Plan: Progress Report*. https://www.smud.org/-/media/Documents/Corporate/Environmental-Leadership/ZeroCarbon/2030-ZCP-Progress-Report---April-2023_FINAL.ashx

⁶ For convenience, MMT of carbon capture have been converted to GW of electricity capacity. However, please note that conversions between GW and MMT are approximations based on findings in the Energy Futures Initiative and Stanford University Report: 1.4 million metric tons stored per gigawatt of capacity. Various individual, unit-specific variables, such as capacity factor, will impact the exact quantity of carbon captured and sequestered.

To take advantage of the networking potential for several capture sites to use shared pipeline and storage infrastructure, thus minimizing costs and impact on communities, staff should consider an earlier target of 6.5 MMT (approximately 4.6 GW) of CCS by 2035 to maintain the same deployment ramp as CCS in the cement sector, a strategy suggested within the Scoping Plan. This is feasible: SMUD has included the deployment of 1.5 MMT of CCS in their 2030 Plan, with an online date of 2027. That CCS PPA is backed by the Sutter Decarbonization Project, a 450 MW CCS retrofit project that is already well underway in the permitting and development process.⁷ Other power sector CCS projects have also begun the permitting process across the state, such as the CalCapture project in Kern County.⁸ Furthermore, the Energy Futures Initiative and Stanford University study highlights that there are 25 existing natural gas combined cycle units producing more than 20 MMT of carbon dioxide suitable for CCS retrofits. In their modeling, approximately 6 natural gas combined cycle power plants (approximately 4 GW) are retrofit by 2030, resulting in approximately 5.7 MMT of carbon dioxide captured annually by 2030.

Additionally, Calpine has broader concerns about the design of the Resource Diversification Scenario. It appears that the CEC plans to model diverse resources in combination. Some of these resources share similar attributes. For example, an existing natural gas combined cycle facility retrofit with CCS and an existing natural gas combined cycle facility retrofit to burn green hydrogen may be similar with respect to reliability, dispatchability, and emissions. In order to address this concern, Calpine encourages staff to model each diverse resource in isolation to better understand the costs and benefits of each (perhaps in addition to modeling them in combination). In addition, a qualitative analysis of diverse resources that considers the likelihood and feasibility of deployment (based on currently available technology, whether projects of a given technology are already operating, the permitting and development status of actual projects associated with the technologies, and how supply chain constraints impact deployment) may help illuminate realistic diverse resource scenarios and should be included in the final report.

Calpine looks forward to providing further input throughout the SB 100 Report process.



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⁷ Calpine Corporation. (2023). *Sutter FAQs*. https://calpineca.com/wp-content/uploads/2023/07/Sutter_Calpine_FAQs.pdf

⁸ California Resources Corporation. (2023). *CalCapture: A Carbon Terravault Project*. <https://www.crc.com/carbon-terravault/projects/calcapture/default.aspx>