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Geothermal Rising Comments on draft SB 100 Report

Additional submitted attachment is included below.

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www.geothermal.org
Tel: 651-808-4463

December 18, 2020

RE: Comments of Geothermal Rising on the Draft 2021 SB 100 Joint Agency Report

Thank you for the continued efforts on the SB 100 draft. We appreciate your presentation of the modeling work at the most recent workshop on December 4 to review the most current draft, and the continued commitment of the CEC, CPUC and CARB to California's development of 100% clean and renewable energy over the next 25 years.

Geothermal Rising (GR), formerly the Geothermal Resources Council (GRC), recognizes the importance of addressing climate change as a priority for the State of California, the nation and the world. We are a non-profit organization supporting communication of robust research, knowledge, and guidance in geothermal energy in the United States and around the globe. Founded in 1972, we are the largest direct-membership professional and trade association serving the geothermal industry, with over 1,300 members representing a broad and diverse demographic from across the geothermal community. Our members include developers, universities, national laboratories, government, and other non-governmental organizations.

GR has reviewed the current draft of the first quadrennial report of the CEC, CPUC and CARB to the Legislature on the implementation of SB 100, the 100 Percent Clean Energy Act of 2018. The Report does a reasonable job of assessing the barriers and opportunities to implementing the 100 percent clean electricity policies and of identifying a range of potential paths to accomplishing the important and challenging goal. We appreciate all the efforts undertaken in preparing this comprehensive assessment and its conclusion that a diverse energy supply is a key component of successful decarbonization of the electric grid as part of the transition to a clean energy economy that can be enjoyed by all Californians.

We are pleased that, while it was apparently not feasible to incorporate all the recommendations included in our September comments in response to SB 100 Draft Results Workshop, submitted under our former GRC name, the current draft report does acknowledge the increasing role that geothermal energy can play in meeting the ambitious goals. These comments will focus on several specific areas.

Diversity Benefits

We note that Figure 16 of the Draft report estimates that, due to substantial reliance on solar generation to provide most of the renewable energy in 2030, the three-hour ramp required as the sun sets is estimated to be approximately 25,000 MW. This is one place where the value of a firm, dispatchable resource like geothermal can be beneficial. Because it is able to operate consistently around the clock, geothermal can help reduce the magnitude of the challenging evening ramp. As a baseload resource, one MW of geothermal generation produces the same amount of energy (MWh per day) as three MW of solar generation. Thus, 2,000 MW of added geothermal capacity could potentially reduce that evening ramp by 6,000 of solar generation that it could replace. Modern geothermal plants, capable of operating 24/7, are also able to be dispatched in response to system needs.

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Growth Potential

Geothermal has been an early success in developing California's renewable resource leadership. As of 2019, geothermal energy produced 10,943 gigawatt-hours (GWh) of electricity in the state. Combined with another 700 GWh of imported geothermal power, geothermal energy produced 5.46 percent of California's in-state generation portfolio. There were a total of 43 operating geothermal power plants in California with an installed capacity of 2,730 megawatts. However, the development of new geothermal capacity has slowed as solar, wind and battery storage have experienced significant cost reductions. One result of the explosion in battery storage capacity for stationary and mobile utilization has been a significant increase in demand for lithium. In response, AB 1657 (Garcia, 2020) was enacted to convene a Blue Ribbon Commission to investigate the potential for lithium extraction in California, a process that is a natural partner for geothermal energy generation. GRC anticipates that this focus will drive technology development that will continue to bring down geothermal prices, while providing a substantial growth opportunity for the industry.

Cost Assumptions

The SB 100 assessment has utilized technological learning curves for future LCOE. Although solar and wind have had remarkable cost reductions over the last 10 years, there is no guarantee that their efficiencies will continue to increase rapidly or that balance of plant, labor and other costs will continue to decline. Although well drilling costs have come down in recent years, future geothermal power LCOE used in California do not reflect these changes in drilling costs nor do they distinguish the differences in the costs and performance of advanced geothermal power generation technologies. These advances are partly reflected in the 2020 Annual Technology Baseline (ATB) published by the National Renewable Energy Laboratory (NREL) and referenced in the Draft Report. The 2020 ATB establishes a lower price for geothermal energy going forward, likely in the range of $60/MWh. This is comparable to the cost of Generic Dispatchable and Generic Baseload generic studied in the 2045 Annual cost summary (Table 16 of Report), which results in a $2 billion annual savings over the "SB 100 Core" scenario. As more than a "generic" hypothetical resource, geothermal can be a specific actual resource, while also helping lower the cost of all those lithium-ion batteries.

Reliability Enhancement

As witnessed in the August rotating outages, we have already experienced some of the unintended consequences of over-reliance on intermittent solar and wind generation. Though it recognizes the importance of resource diversity, the SB 100 report has not adequately modeled grid reliability and lifecycle costs under stress conditions. Future modeling should evaluate a broad range of scenarios, including "high consequence" events and their foreseeable impacts, such as those resulting from climate change, heat waves, fires and falling trees in forests, as well as less predictable events, like explosions in natural gas pipelines, releases from gas storage fields, earthquakes, cyber-attacks on the grid, terrorist acts, electro-magnetic pulses from the sun, and volcanic eruptions that affect global weather, which have historically obscured the sun for months at a time. Multi-day or longer events need to be scrutinized to develop a more diverse and robust resource mix for the state and the western region.

Informing Decision-Making

California's planning and ratemaking has focused on minimizing near-term economic costs rather than minimizing longer-term economic costs and lifecycle environmental impacts. As currently applied by the CPUC, its "least-cost, best-fit metrics" do not adequately reflect grid reliability and Resource Adequacy

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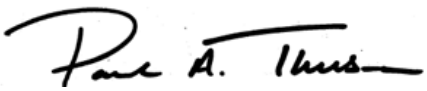
(RA) needs. As this August demonstrated, the current resource mix cannot satisfy California's future RA needs and will not avoid future higher costs accompanied by adverse environmental and societal impacts. However, fuel secure, carbon-free geothermal power can provide the resource diversity, grid reliability, and system resilience that other renewables, even with batteries, cannot.

Trends are portending a significant advance of the ability of geothermal energy to rise to the occasion. By incorporating carbon-free generic resources which are operationally consistent with geothermal, the SB 100 draft report identifies the benefits of this potential. Geothermal Rising supports this addition and encourages the Joint Agencies to include specific reference to the long-term potential of geothermal growth to serve California's environmental goals.

Thank you for your continued leadership on developing a clean energy economy and mitigation of climate change. We applaud you for your efforts on the latest SB 100 draft report and look forward to working with you through 2021 and beyond.

Sincerely,



Paul Thomsen
Geothermal Rising Policy Committee Chair
pthomsen@ormat.com

Will Pettitt
Geothermal Rising Executive Director
wpettitt@mygeoenergy.org