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Form Energy, Inc Comments on Senate Bill 100 Kickoff Workshop

Additional submitted attachment is included below.



September 8, 2023

California Energy Commission
Docket Unit, MS-4
Docket No. 23-SB-100
715 P Street
Sacramento, CA 95814

Subject: Form Energy, Inc. Comments on Senate Bill 100 Kickoff Workshop

Form Energy, Inc. (“Form Energy”) appreciates the opportunity to comment on the California Energy Commission’s (CEC) August 22, 2023 Senate Bill 100 (SB 100) Kickoff Workshop and California’s planning efforts to achieve its clean energy and climate change goals. We encourage the SB 100 process to fully evaluate and plan for deployment of firm, zero-carbon resources, including emerging technologies and multi-day storage, in order to enable a truly clean, affordable, and reliable electricity grid. In addition, we urge that the upcoming SB 100 process include development and evaluation of scenarios that fully displace the need for fossil fuels and achieve 0 MMTCO₂ emissions in the 2035–2045 time frame, in line with national and state climate goals, while maintaining grid reliability across increasingly frequent multi-day and extreme weather events and maximizing benefits across an array of other metrics, including criteria air emissions, impacts on disadvantaged communities, land use, and other priorities.

About Form Energy

Form Energy, Inc. (“Form Energy”) is a U.S. energy storage technology and manufacturing company that is developing a rechargeable, iron-air battery capable of continuously discharging electricity for 100 hours at a system cost less than 1/10th the cost of lithium-ion battery technology. Form’s multi-day battery will enable a clean electric grid that is reliable and cost-effective year-round, even in the face of multi-day weather events. With over 500 employees, Form Energy has offices in the San Francisco Bay Area; Somerville, MA; and the Greater Pittsburgh area; and has recently broken ground on a first commercial battery manufacturing facility in Weirton, WV.

Scenarios Should Strive to Achieve Zero Emissions (0 MMT) While Accounting for Reliability

Current energy and climate planning in California relies heavily on existing natural gas power plants for maintaining reliability indefinitely into the future. This is especially the case during prolonged heat or other weather events that strain the grid and reach beyond the capabilities of solar power and short-duration batteries. This approach leads to high emissions and continued dependence on fossil

fuels, even under SB 100 requirements, as illustrated in the 2021 Joint Agency SB 100 Report and the recent 2022 Climate Change Scoping Plan, where energy-related greenhouse gas emissions in the electricity sector actually increase compared to business as usual until about 2035 and are *higher than in all other sectors combined* in 2044, before carbon capture is assumed to be widely applied to existing gas plants in 2045.

Of course, these results are simply the outcome of assumptions input into the State's energy and climate modeling efforts. We find it confusing, however, that those assumptions assume rapid and deep decarbonization of the industrial sector, building sector, transportation sector, and every other energy-using sector - aside from electricity. In the upcoming SB 100 analysis, we hope the joint agencies will fully evaluate scenarios that would put the electricity sector on a similar trajectory as the state has plotted for other sectors and in alignment with state and federal goals for decarbonizing our grid and economy. As detailed in our recent letter to CARB,¹ such scenarios would achieve 20-30 MMTCO₂/year from the electricity sector in 2030 and 0 MMTCO₂/year in the 2035-2045 timeframe. (For reference, the Core scenario in the 2021 SB 100 Report maintained emissions of about 24 MMTCO₂/year in the electricity sector through 2045 and presumably beyond.)

Planning for firm, zero-carbon resources, including emerging long-duration and multi-day storage technologies, will be key to achieving the State's clean energy goals and avoiding the ongoing need to rely on legacy, polluting power plants. To achieve the true vision of SB 100, it is crucial to conduct a comprehensive evaluation of the role that firm zero-carbon resources can play in replacing fossil fuels and achieving 0 MMT emissions.

Scenarios in the 2021 SB 100 report that deployed these resources in limited quantities demonstrated lower costs, emissions, and land use impacts compared to the Core and other scenarios. Several other studies have validated these results, including a study led by EDF, which found that California can achieve a 100% carbon-free grid by 2045 while keeping customer costs similar to levels today with the deployment of firm energy technologies,² and a study by Energy Innovation, which found that we can achieve a zero-carbon electrical grid, nationwide, by 2035, without increasing customer costs.³ Further exploration of these resources through the SB 100 analysis - and we hope, a thorough and timely evaluation pursuant to the requirements of SB 423 - will likely reveal additional benefits across this wide array of metrics, and help reveal a path to a truly clean, reliable, and more affordable electricity grid.

When producing these scenarios, we also encourage evaluation of reliability not just during peak summer demand days, but also over the course of multi-day and widespread weather events, similar

1

https://ww2.arb.ca.gov/system/files/webform/public_comments/5256/SB%20350_C%26T%20comments_Form.pdf

2

<https://www.edf.org/sites/default/files/documents/SB100%20clean%20firm%20power%20report%20plus%20SI.pdf>

3

<https://energyinnovation.org/wp-content/uploads/2020/09/Pathways-to-100-Zero-Carbon-Power-by-2035-Without-Increasing-Customer-Costs.pdf>

to those that have strained our grid in recent years. These evaluations should extend beyond summer months to encompass long, cold, and dreary weeks in winter, which several energy models have identified as a key reliability constraint in our clean energy future, and account for the role that long duration and multi-day storage can play in powering through these events with surplus renewables stored from other periods of the year.

Additional Recommendations for the 2025 SB 100 Report

We appreciate the thorough set of presentations and scoping issues offered related to developing the 2025 SB 100 report. In addition to the main points raised above, and in response to the slides presented at the workshop, we offer the additional recommendations, which we encourage CEC and the joint agencies to consider:

- 2025 Report Vision presentation
 - Slide 3: Minimizing cumulative greenhouse gas and criteria pollutant emissions should be a primary goal of the report and analysis.
 - Slide 6: The SB 100 Pathway definition should include reliability: *A distinct set of assumptions that create a possible future scenario for a reliable and clean electric grid, including a developed resource portfolio.*
 - Slide 7: Pathway analysis should include the evaluation of non-energy benefits, including impacts on greenhouse gas emissions, criteria pollutants, impact to low-income and disadvantaged communities, land use, and other factors.
 - Slide 9: Emerging zero-carbon resources, particularly long-duration and multi-day storage technologies, should be included and specifically assessed as part of the SB 100 scenarios, due to the technology's unique ability to deliver reliability, emissions, and cost benefits and that can serve to phase out fossil fuel power plants.
 - Slides 13 & 15: Pathways for resource diversification and combustion retirement should include multi-day storage with long-duration storage. All pathway concepts should also consider various emissions outcomes, including accelerated reductions.
 - Slides 16 & 21: Greenhouse gasses (GHGs) should be a key factor in the evaluation criteria, along with impacts to low income and disadvantaged communities, so that the SB 100 goals are achieved in the most environmentally friendly way while prioritizing communities that have historically been the most impacted by environmental burdens. The evaluation of GHGs should not be reduced to the economic analysis of non-energy benefits/impacts and social cost. SB 100 was passed to address climate change, and that should serve as a primary metric for measuring success across various scenario options. To the extent the social cost of carbon is used, it should reflect the most recent EPA numbers from their November 2022 proposed methane rule.⁴
- Demand Forecast and Long-Term Scenarios presentation

⁴ https://www.epa.gov/system/files/documents/2022-11/epa_scghg_report_draft_0.pdf

- As we transition to a 100 percent clean energy grid, it is paramount that demand forecasts reflect the latest understanding of grid conditions and the factors that affect grid operations, including extreme weather. We strongly agree with the sentiment that historical weather data is no longer sufficient for predicting future grid conditions, and further suggest that this emphasizes the need for climate scenarios to account for multi-day weather events. A 1-in-40 year forecast should be developed, as well as a 1-in-20 year forecast, that looks at both the impacts to demand as well as generation. These forecasts should be based on the same weather assumptions used to develop hourly demand forecasts to ensure generation assumptions of solar and wind energy are accounted for.

Conclusion

We appreciate the CEC's efforts to advance California's clean energy and climate change goals. We also commend the work done by organizations like EDF in highlighting the role of clean firm resources in achieving state objectives. Our comments are aimed at strengthening SB 100 outcomes, emphasizing the importance of firm zero-carbon resources, and ensuring that California's energy transition aligns with its environmental and reliability goals.

Thank you for the opportunity to comment on these proceedings and for your work to deliberately and effectively advance California's climate change goals and replicable climate change solutions. Please do not hesitate to reach out with any questions or follow up items.

Respectfully,

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