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Form Energy Comments on Draft SB 846 Report

Additional submitted attachment is included below.



October 9, 2023

California Energy Commission
Docket No. 21-ESR-01
715 P Street
Sacramento, California 95814

RE: Form’s Comments on Draft Senate Bill 846 Diablo Canyon Power Plant Extension Cost Comparison, Comparison to Alternative Portfolio of Resources Consistent with Greenhouse Gas Reduction Goals Report

Form Energy, Inc. (Form Energy) appreciates the opportunity to provide feedback to the California Energy Commission (CEC) regarding the *Draft Senate Bill 846 Diablo Canyon Power Plant Extension Cost Comparison* (Draft Report) prepared by CEC staff. Senate Bill (SB) 846 directs a new retirement date of December 31, 2030 for both units of Diablo Canyon Nuclear Power Plant (DCPP). In conjunction with this authorization, SB 846 calls for the the CEC to “present a cost comparison of extended operations at the Diablo Canyon powerplant compared to a portfolio of other feasible resources available for calendar years 2024 to 2035.”¹

In line with statutory requirements, the CEC has compiled an analysis of the feasibility of replacing DCPP with zero-carbon resources that are incremental to procurement directed by the California Public Utilities Commission (CPUC). This analysis focuses on the ability of these resources to replace DCPP energy in a “like-for-like” annual energy profile of 18,000 GWh and DCPP capacity of 2.2 GW during California's evening net peak. Overall, the CEC concludes that there is no feasible way to replace DCPP by 2025 but that DCPP can be replaced with incremental long-duration energy storage (LDES) and demand-side resources by or before 2030.²

The Draft Report draws the conclusion that DCPP can be replaced by or before 2030 because it determines that the net peak analysis shows that the main constraint on replacing DCPP is its contributions to the net peak.³ In other words, considering a full annual replacement of DCPP’s total energy profile is likely not needed. Form agrees that this is an important finding with regard to the options available for DCPP replacement. However, only looking at single day and annual scenarios overlooks the

¹ PRC § 25233.2(a).

² Draft Report at 2.

³ Draft Report at 19.

need for flexible resources that can respond to longer-term California grid conditions and provide multi-day reliability services.

While Form Energy agrees with CEC Staff's underlying conclusion that DCPD can be replaced by or before 2030, we provide the following comments and recommendations for the Final Report:

- LDES and multi-day storage (MDS) technologies are ready and able to begin meeting the state's energy and capacity needs today.
- The Final Report should include an assessment of multi-day reliability events and MDS technologies that can last through these events.
- California should focus on developing flexible resources that meet evolving grid needs and provide reliability during multi-day weather events.

About Form Energy

Form Energy is a U.S. electrochemical solutions company that is developing and manufacturing energy storage technology, and in particular 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.

LDES and MDS technologies are ready and able to begin meeting the state's energy and capacity needs today.

In the Draft Report, the CEC includes LDES as a resource to replace DCPD capacity. Staff states that LDES technologies, "vary in terms of commercial maturity and availability but are largely still nascent in the market for durations long enough to satisfy net peak periods readily and reliably, above eight hours within the time period before 2025."⁴ Form seeks to clarify that LDES technologies are, in fact, readily and reliably able to discharge above eight hours.

While technologies do vary in their maturity and market readiness, there are LDES and MDS technologies today that are readily available to be installed and can reliably discharge for over eight hours. Load-serving entities (LSEs) and utilities, both within and outside of California, have also already signed contracts with LDES projects to provide power. California LSEs and POU's alone have contracted over 430 MW of non-lithium LDES.⁵ Form Energy has already contracted for and announced projects with Xcel

⁴ Draft Report at 27.

⁵ *226MWh of vanadium flow batteries on the way for California community energy group CCCE*. Available at: <https://www.energy-storage.news/226mwh-of-vanadium-flow-batteries-on-the-way-for-california-communit>

Energy,⁶ Southern Company,⁷ Great River Energy,⁸ New York State Energy Research and Development Authority (NYSERDA),⁹ and Dominion Energy¹⁰ to provide over 50 MW and 5,000 MWh of capacity in the coming years, using technologies that deliver energy over multiple days. In addition, the CEC has awarded a grant to Form Energy to conduct a use case analysis and site evaluation with Pacific Gas and Electric (PG&E), an intermediate step towards deployment of a 5MW / 500 MWh project in California.

For projects that have not already contracted with LSEs, meeting pre-2025 commercial operation date (COD) timelines is challenging not because technologies lack commercialization but rather due to overall project development timelines and bottlenecks that are not unique to LDES, such as interconnection and permitting. As highlighted by the Draft Report, interconnection and permitting have delayed projects of all technology types.¹¹ With respect to the third bottleneck identified in the Draft Report, supply chain constraints, LDES and MDS technologies can actually mitigate against these risks by relying on alternative raw materials that are more common or not subject to the same supply chain risks. For example, Form's iron-air battery relies on iron, which is much cheaper to procure and globally abundant, unlike lithium, nickel, and cobalt which are used in lithium-ion batteries.

Therefore, the Draft Report should clarify that LDES and MDS technologies are ready and able to deploy on California's electrical grid and provide critical reliability services. More specifically, the CEC should make clear in the Final Report that 2025 deadline challenges are due to larger barriers impacting all supply-side energy projects, rather than due to lack of availability of LDES and MDS technologies.

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⁶ Form Energy Partners with Xcel Energy on Two Multi-day Energy Storage Projects. Available at: <https://formenergy.com/form-energy-partners-with-xcel-energy-on-two-multi-day-energy-storage-projects/>

⁷ Form Energy, Georgia Power Continue Forward With 15 Megawatt Iron-Air Battery System Agreement. Available at: <https://formenergy.com/form-energy-georgia-power-continue-forward-with-15-megawatt-iron-air-battery-system-agreement/>

⁸ Form Energy Announces Pilot with Great River Energy to Enable the Utility's Transition to an Affordable, Reliable and Renewable Electricity Grid. Available at: https://formenergy.com/wp-content/uploads/2020/05/Form-Energy_-GREPilotPress-Release.pdf

⁹ 10 MW/1000 MWh <https://formenergy.com/form-energy-awarded-grant-to-deploy-first-multi-day-battery-system-in-new-york/>

¹⁰ Form Energy, Dominion Energy Explores Pioneering Battery Storage Technologies in Virginia, Available at: <https://formenergy.com/dominion-energy-explores-pioneering-battery-storage-technologies-in-virginia/>

¹¹ Draft Report at 20.

The Final Report should include an assessment of multi-day reliability events and MDS technologies that can last through these events.

Form strongly agrees that a mix of LDES, MDS, and demand-side resources can replace DCPD capacity during net-peak by 2030, or even earlier. At the same time, Form believes that the CEC should analyze replacement opportunities that consider more than just a full like-for-like 18,000 GWh annual energy profile and a single-day net peak capacity need. We recommend including analysis around multi-day reliability events and resource types that can help mitigate energy and capacity shortfalls during such events. These analyses should consider opportunities associated with stand-alone LDES and MDS technologies, as well as opportunities associated with pairing these technologies with renewables.

In planning venues across California, including at the CEC and CPUC, there has been a growing recognition that, as the penetration of intermittent renewables increases, the focus of resource planning should be on managing events where variability in intermittent resources or external environmental factors leads to extended curtailment or shortfalls in capacity. California increasingly faces excesses of renewable energy, primarily from solar, that floods daytime energy markets, especially during springtime. In the second quarter of 2022, CAISO saw negative prices in 8 percent of intervals for the real-time 15-minute and 5-minute markets.¹² On the other hand, California faces supply shortfalls due to increasingly hot weather and risks to energy imports due to wildfire-related transmission contingencies. Multi-day extreme weather events, like the 10-day heat wave from August 31 through September 9, 2022, are becoming more common.¹³ Inflexible baseload resources, like DCPD, are ill-equipped to respond to these fluctuating grid needs, and thus a planning focus should appropriately be targeted to managing multi-day shortfalls that are caused by these variables.

The 10-day extended heat wave in 2022 showed the importance of considering extended, multi-day reliability events. California has been starting to explore these events of sustained increased demand, but there is also evidence that the state will face extended periods of low renewable energy supply as well. Form has conducted analysis that shows that California experiences 100-hour renewable energy shortfall events approximately once every ten years and 50-hour events more than once every two years.¹⁴ During these events, renewable energy output is more than 25% below the 35-year average. These multi-day reliability events do not reflect a baseload 24/7 annual need, as they are still limited in nature, but they do pose a unique challenge compared to single-day needs.

¹² CAISO, *Q2 2022 Report on Market Issues and Performance* at 22. Available at: <https://www.aiso.com/Documents/2022-Second-Quarter-Report-on-Market-Issues-and-Performance-2022-10-14.pdf>

¹³ See CAISO, *Summer Market Performance Report*. Available at: <http://www.aiso.com/Documents/california-iso-posts-analysis-of-september-heat-wave.pdf>

¹⁴ Form Energy, *Opening Comments of Form Energy, Inc. on Administrative Law Judge's Ruling Seeking Feedback on Mid-Term Reliability Analysis and Proposed Procurement Requirements* submitted to CPUC Rulemaking 20-05-003 at 3-7. Available at: <https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M376/K501/376501686.PDF>

In particular, multi-day reliability events have strong implications for the types of resources that can be used to replace DCPD and serve general California reliability needs. In the Draft Report, CEC Staff shared how DCPD can be replaced by 2030 with LDES and demand-side resources.¹⁵ However, as acknowledged in the Draft Report, demand-side resources do not perform well during extended multi-day periods of demand response (DR) dispatch due to customer fatigue and attrition.¹⁶ Therefore, additional supply-side resources will be needed.

Specifically, MDS will be needed for these reliability events. While the CEC categorizes LDES as storage technologies that can discharge for more than eight hours, some, such as Form's 100-hour battery, can last through the longest expected multi-day reliability events.¹⁷ Hence, they have significant ability to meet these crucial multi-day grid needs.

California should focus on developing flexible resources that meet evolving grid needs and provide reliability during multi-day weather events.

In addition to further analysis, suggested above, Form generally supports policies that will encourage development of MDS projects in the state. Such resources will assist in the ability of the state's achievement of its energy policies, and will be key to realizing the opportunity identified in the Draft Report to retire DCPD before 2030.

Conclusion

Form Energy appreciates the opportunity to provide public comment and looks forward to continuing to engage with the CEC on these important issues.

Respectfully,

/s/ Mark Thompson

Mark Thompson
Sr. Director, State Affairs
Form Energy, Inc.

¹⁵ Draft Report at 23 and 27.

¹⁶ Draft Report at 22.

¹⁷ Form Energy, *Opening Comments of Form Energy, Inc. on Administrative Law Judge's Ruling Seeking Feedback on Mid-Term Reliability Analysis and Proposed Procurement Requirements* submitted to CPUC Rulemaking 20-05-003 at 7. Available at: <https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M376/K501/376501686.PDF>