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Form Energy Comments on the October 28 Workshop on Clean Energy Alternatives for Reliability

Additional submitted attachment is included below.

November 10, 2022

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

Subject: Form Energy, Inc. Comments on the October 28 Workshop on Clean Energy Alternatives for Reliability, Docket #21-ESR-01

Form Energy, Inc. ("Form Energy") appreciates the opportunity to comment on the California Energy Commission's (CEC) Lead Commissioner Workshop on Clean Energy Alternatives for Reliability, held on October 28, 2022. In these comments, we focus on the development of the Clean Energy Reliability Investment Plan (CERIP), weighing in on the preliminary list of resource options and proposed resource attributes, and on the eligibility criteria for the Distributed Electricity Backup Assets Program (DEBA Program). We will provide additional input and information in response to the November 3, 2022 Request for Information on Clean Energy Resources for Reliability (Clean Energy Resource RFI).

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 300 employees, Form Energy has offices in the San Francisco Bay Area; Somerville, MA; and the Greater Pittsburgh area.

Recommendation: Multi-day Energy Storage should be included as a supply category

The preliminary list of resource options splits storage into three categories: Pumped Hydro, Energy Storage (Short-Duration; <8 hr.), and Energy Storage (Long-Duration; ≥8 hr.). Form Energy strongly recommends that a Multi-day Energy Storage (MDS) category be introduced: Energy Storage (Multi-day; ≥24 hr.). This would result in four energy storage categories:

- Pumped Hydro,
- Energy Storage (Short-Duration; <8 hr.),

- Energy Storage (Long-Duration; 8-24 hr.), and
- Energy Storage (Multi-day; ≥24 hr.).

The Long Duration Energy Storage (LDES) class merits division into two categories because of both its technological diversity and its ability to meet a variety of grid needs. LDES (8-24 hr.) is most appropriate to provide intra- and some interday cycling, which is necessary for grid reliability even in moderate renewable energy penetration grids, especially in solar-heavy portfolios. MDS (≥24 hr.), while able to provide intra- and interday cycling, can also serve as dispatchable capacity during multi-day reliability events such as periodic extreme weather events and renewable energy generation lulls. These services become increasingly important as renewable energy penetration increases and baseload capacity retires. In this way, MDS is more appropriately treated as firm zero-carbon capacity than as analogous to 8-hour storage, a distinction that is lost when MDS is combined with LDES (8-24 hr.).

The Long Duration Energy Storage Council's (LDES Council) effort to benchmark the cost and performance of LDES technologies, conducted in collaboration with McKinsey & Company and published in November of 2021 as a public report (LDES Council Report)[1], reflects the need for the distinction between LDES and MDS, establishing 8-24 hour and 24+ hour technology archetypes.

Recommendation: In assessing the quantitative and qualitative attributes of both LDES and MDS, the CEC should rely on the LDES Council Report

Form Energy believes that the LDES Council Report is well-suited to serve as a source for LDES and MDS data. The LDES Council collected more than 10,000 cost and performance data points from across the industry in order to inform their 8-24 hour and 24+ hour technology archetypes and have indicated their intention to update their report annually to reflect advancements in the space. Form Energy participated in this study and believes the data published in the LDES Council Report provides one of the most accurate representations of the LDES technology landscape available.

Recommendation: Qualitative Attributes

- *Readiness:* Readiness should be assessed on a forward-looking basis. For example, the CERIP will consider investments in resources to be deployed not only next year but also in the 2026-2028 timeframe. If a technology is on track to be fully commercially available by 2026, it should be treated as fully "ready" for the purposes of those forward-looking investment decisions.
- *Interconnection*: The intention of this attribute is somewhat unclear, as the ease of interconnection is typically project and site dependent rather than technology specific. If the intention of this attribute is to reflect the increased interconnection costs associated

[1] "Net Zero Power: Long duration energy storage for a renewable grid": https://www.mckinsey.com/~/media/mckinsey/business%20functions/sustainability/our%20insights/net%20zero%20power%20long%20duration%20energy%20storage%20for%20a%20renewable%20grid/net-zero-power-long-duration-energy-storage-for-a-renewable-grid.pdf

with technologies that require specific siting, we recommend that this category be replaced by a "modularity and siting flexibility" attribute. If the intention of this attribute is to reflect the increased interconnection costs associated with synchronous generation, as opposed to inverter-based generation, we recommend that this distinction be included as a quantitative attribute.

- *Customer Acceptance:* It is unclear how this attribute will be assessed and appears potentially duplicative of "readiness." Given this lack of clarity and our concern that this attribute will be challenging to assess empirically, we recommend, ideally, eliminating it entirely or, if it is retained, assigning it limited weight.
- *Safety:* We recommend including "safety" as a qualitative attribute and note that it could be an appropriate attribute to replace "customer acceptance."
- *Cleanliness*: We recommend reframing this attribute as "direct emissions" in order to make it clear what is being reflected. In addition, we note that the CERIP is explicitly focused on clean energy reliability investments. Given this focus and considering the aggressive decarbonization actions necessary to meet California's SB 100 goals, this attribute should be either taken as an eligibility criterion or weighted very heavily.
- *Dispatchability:*
    - This attribute is defined in the workshop slides as "Certainty and firmness of an option, including number of events, frequency of events, and event duration." Form Energy strongly supports the CEC's effort to reflect the need for investment in firm zero-carbon resources. In order to align this effort with other relevant legislative mandates, we recommend that firmness be defined in alignment with SB 423's definition of "firm zero-carbon resources": "...electrical resources that can individually, or in combination, deliver zero-carbon electricity with high availability for the expected duration of multiday extreme or atypical weather events, including periods of low renewable energy generation, and facilitate integration of eligible renewable energy resources into the electrical grid and the transition to a zero-carbon electrical grid."
    - To reflect this, we recommend that the attribute definition be updated to the following: "Certainty and firmness of an option, where firmness is assessed based on a resource's ability to, individually or in combination, deliver electricity with high availability for the expected duration of multi-day extreme or atypical weather events, including periods of low renewable energy generation, and facilitate integration of eligible renewable energy resources into the electrical grid."
    - Additionally, Form Energy believes there is an opportunity to assess "firmness" and "dispatchability" quantitatively, based on resources' expected availability during multi-day extreme or atypical weather events, and hopes the CEC will engage with stakeholders to define relevant metrics.
- *Stakeholder Engagement*: As the CEC continues to define resource attributes and technology categories, Form Energy requests that stakeholders be given additional opportunities to weigh in on the attributes assigned to specific technology categories.

Recommendation: Eligibility criteria for participation in the DEBA Program should be clarified and should not preclude broad participation

The CEC proposes to restrict eligibility for the DEBA Program to resources that participate as on-call emergency resources. Form Energy recommends that this requirement be clarified such that it does not preclude resources from day-to-day operations or market participation, assuming that such operations do not interfere with the ability of the resources to provide emergency services. Form Energy's 100-hour iron air battery could, for example, reserve a designated state of charge for emergencies, corresponding to a specified number of hours of duration, while still participating in energy markets and providing ancillary services.

Form Energy also recommends that the CEC avoid overly restricting the size of eligible projects. Project eligibility should be based on the demonstrated need rather than any arbitrary megawatt (MW) cap. The Viejas Tribe microgrid project, which the CEC recently awarded a $31 million grant, is an excellent example of a distributed electricity backup asset project that, while involving over 6 MW of energy storage capacity, is right-sized to meet the needs of the community.

Conclusion

Form Energy appreciates the opportunity to provide public comment. We will provide additional information in response to the Clean Energy Resource RFI and look forward to continuing to engage with the CEC on the development of the CERIP, the DEBA Program, and other clean energy-oriented reliability efforts.

Respectfully,

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