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November 30, 2022

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

Re: RFI Clean Energy Resources for Reliability

Veloce Energy and Siemens (the "Joint Technology Providers", or "Providers") file these comments on the "Request for Information Clean Energy Resources for Reliability" ("RFI") that the California Energy Commission ("Commission") issued on November 7, 2022.

Veloce Energy (Veloce) is a California-based provider of EV charging infrastructure solutions, committed to accelerating the electrification of transportation through technology and business model innovation. Veloce's solution supports modular and flexible charging infrastructure, with the intent to accelerate deployment, drive cost efficiencies, and provide resiliency.

Siemens has deployed charging stations across every state in the U.S. Siemens has made investments of more than $250 million in the U.S. EV market in the past 6 months, including expansion of our Pomona, California (IBEW Local 1710) manufacturing site, which helps provide the electrical infrastructure technologies that support EV charging systems and other critical electrical infrastructure. Siemens also has a new manufacturing facility coming online later this year and is introducing a new Buy American-compliant AC charger next year. These actions will help Siemens meet its commitment to build 1 million EV chargers for the U.S. over the next four years.

The Providers' comments apply to both CERIP requirements and the DEBA program design, and while we have elected to respond to select questions in the RFI, we reserve the right to comment on other questions posed by the Commission through the remainder of the stakeholder feedback process.

List of Resource types and Evaluation Attributes

Q 1 & 2: We commend the Commission for the categorization of resources based on the criteria of their grid-support capabilities and agree with the overall structure. However, we recommend that an additional resource be added to Table 1 and Table 3: **Energy Storage (shorter duration, 4 hours or less**).

Battery energy storage systems (BESS) of this duration are critical in in the deployment of charging infrastructure to offset peak pricing periods of 4-5 hours, especially for fleet charging which is bound by duty-cycles. In addition, BESS provides resiliency and reliability to ensure charging accessibility 24/7 and achieving 97% uptime.

This additional category would enable additional customers with smaller BESS to participate in delivering energy from batteries into the grid, because a BESS supporting a four-hour event could be half as large as a BESS required to deliver power for eight hours. This shorter period would also make it far easier for EVs to participate as a storage supply resource for the same reason. Also, having a four-hour performance period provides EVs flexibility given the inherent need to be available for transportation.

Q 3: We recommend that the attributes be both **qualitative and quantitative** in assessing the resources.

The Providers emphasize the need to add an attribute called **Deployment Flexibility** that would measure the potential positive impact to ratepayers if a specific distributed resource is capable of being deployed **both FTM and BTM**. For example, distributed resources co-sited with charging infrastructure (whether they be microgrids, BESS, or on-site solar/wind along with BESS), drive cost efficiencies and faster time to deploy **by reducing or eliminating unnecessary utility distribution system upgrades and service interconnection inefficiencies.** Take a NEVI approved site along an AFC: if a charging site needs 600kW of capacity to support the total connected load, and the service connection to that site can support only 300kW of load, the remaining 300kW can be provided through BESS.

Therefore, an additional attribute should be added to Table 4: **Deployment Flexibility.**

Q 4: Weighting should be assigned to the attributes listed in Table 4 based on the following recommended criteria (in descending order of importance):

1. <u>Sustainability and policy alignment</u>, including Policy Alignment, Cleanliness, and Equity
2. <u>Innovation and cost efficiencies</u>, including Customer Acceptance, Dispatchability, and **Deployment Flexibility**
3. <u>Market readiness</u>, including Readiness, Permitting, Interconnection, and Supply Chain

Emphasis should be on how innovation and sustainability ideas are driving cost efficiencies in both capital expenditures and operating costs of the project. In addition, these investments are in long-lasting infrastructure, so short-term deployment issues should be given lower priority than ensuring the infrastructure is built for purpose and done so cost-efficiently. Therefore, the listed attributes should be grouped under the above-suggested **three categories with weightage of 40, 40, and 20 points respectively.**

Resource Characterization

Q 1: General overview of the resource/s:

Resource type: Battery energy storage system (BESS)
Resource category: Supply and Demand Resource
Scale: Utility scale and distributed

Resource type: Electric vehicles connected to bi-directional chargers and capable of both receiving from and delivering energy to the grid (V2G)
Resource category: Supply and Demand Resource
Scale: Distributed

Resource type: Microgrid (MG)
Resource category: Supply and Demand Resource
Scale: Distributed

Q 2:

BESS, V2G, and MG reduce GHG and priority pollutants by enabling greater capture of electricity produced from renewable resources and, thus, reducing the amount of electricity that need to be generated from fossil-fueled plants. Specifically, power that is curtailed today can be captured in BESS within and outside of MGs, and in EV batteries, then either utilized locally (including within EVs) or returned to the grid at times of higher demand.

Q 3: Resource vs Reliability

BESS: Supply, load reduction, net peak reduction, emergency asset
V2G: Supply, load reduction, net peak reduction, emergency asset
MG: Supply, load reduction, net peak reduction, emergency asset

a) BESS, V2G, and MG can be relied upon to provide backup power during emergencies. Since the amount of backup power depends on the battery state of charge in all three cases – though typically MG also has on-site generation as well – clear expectations must be developed through monitoring of real-world operating experience as well as modeling when backup power is likely to be needed. For building backup, the end user would be responsible for planning when to charge the batteries and assess the likelihood of the need for power backup. For grid backup, those expectations must be developed in the context of the regulations and programs that would apply to using the resources as grid backup power (e.g., advance notice requirements).

Q 4:

BESS and MG: Bloomberg New Energy Finance (BNEF) projects the U.S. will have 100 GW of stationary energy storage by 2030, a doubling from 2025.[1] Should the trend continue from 2030 to 2035, that implies the U.S. would have 200 GW of BESS by 2035. Given California's size (12% of U.S. population) and leadership, a quarter of that amount is likely to be in California, or 50 GW. BNEF estimates a quarter of the stationary storage will be BTM.[2]

V2G: BNEF estimates EVs will have 17 times the battery capacity of stationary storage systems by 2030, totaling 18.7 TWh globally.[3] If this ratio holds in California, the state will have 850 GW of battery storage available in EVs by 2035. Of this total amount, only a portion of EV drivers will participate in V2G programs. Based on experience with demand response programs – and the fact that both the vehicles and EV chargers need to be bidirectional[4] – 10 to 20 percent of EV drivers are likely to participate, and only a portion of the EV capacity would be practically available – we estimate 50 percent. Accordingly, we estimate 5 to 10 percent of total EV battery capacity will be available for V2G, or 42 to 85 GW in 2035.

a) For BESS, MG, and V2G, the available capacity differs based on the type of event (duration) and amount of advance notice. The shorter the notice time, the less capacity would be available. For day-ahead notice, close to 100 percent of enrolled capacity should be available for a four-hour event. For five-minute notice emergency events, the availability for BESS and MG is likely to be in the range of 50 percent, while V2G would be in the range of 25 percent. These are very preliminary estimates that need to be validated through actual program experience. Importantly, the vast majority of emergency events are associated with extreme weather and can be forecasted many hours in advance.

Q 5: Lazard's levelized costs of storage capacity and energy for 2021 are shown below:[5] Bloomberg estimates battery "prices in 2030 will be close to half of what they are today."[6]

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[1] https://about.bnef.com/blog/global-energy-storage-market-to-grow-15-fold-by-2030/#:~:text=New%20York%2C%20October%2012%2C%202022,research%20company%20BloombergNEF%20(BNEF).

[2] *Ibid.*

[3] https://assets.bbhub.io/professional/sites/24/BloombergNEF-ZEV-Dashboard-Sep-2022.pdf

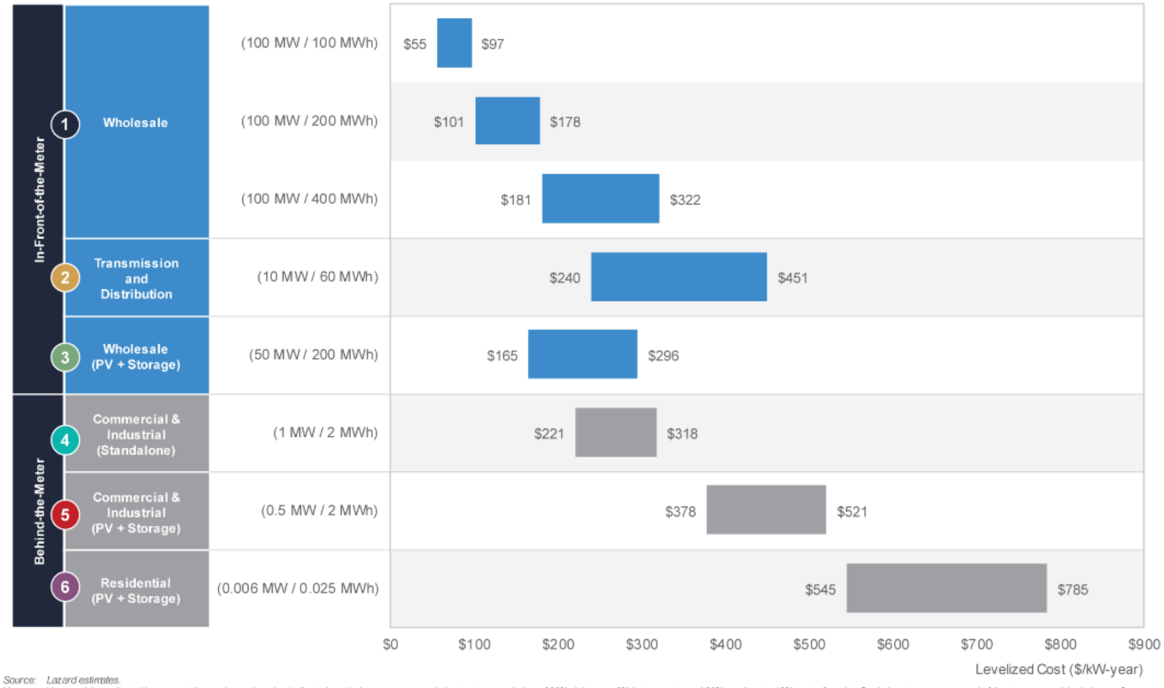
[4] Note that we expect a very high percentage of both EVs and EV chargers to be bidirectional by 2035, because there is very strong interest among EV buyers and owners to use their vehicles as backup power during outages.

[5] https://www.lazard.com/perspective/levelized-cost-of-energy-levelized-cost-of-storage-and-levelized-cost-of-hydrogen/

[6] https://www.bloomberg.com/news/articles/2021-11-30/battery-price-declines-slow-down-in-latest-pricing-survey

Unsubsidized Levelized Cost of Storage Comparison—Capacity ($/kW-year)

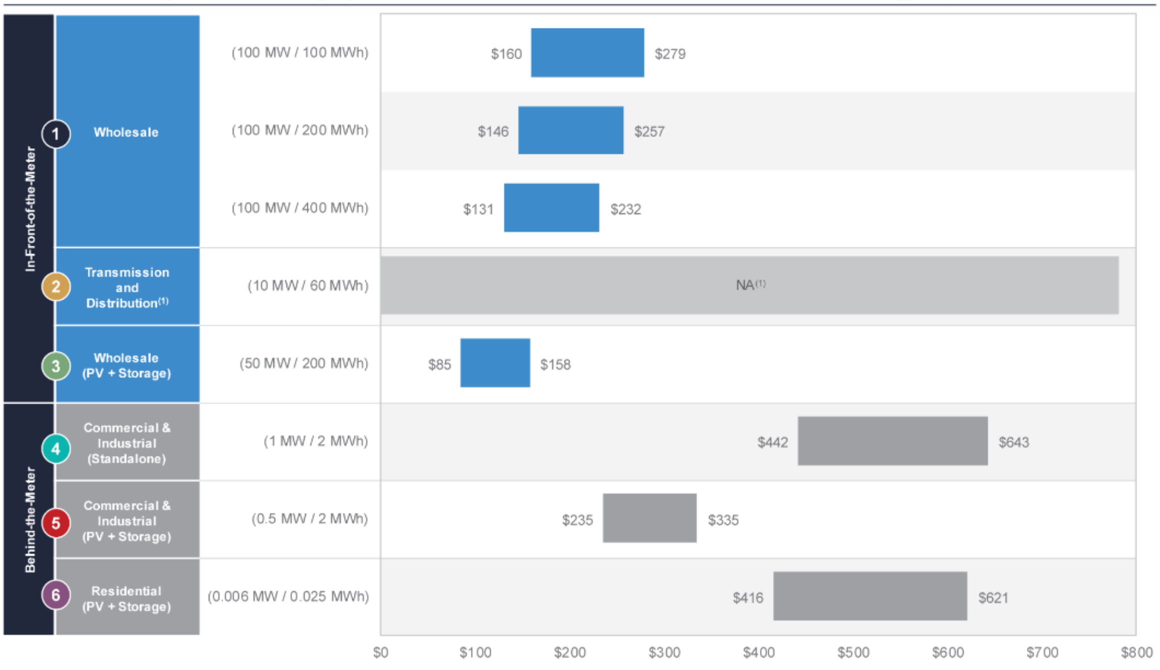
Lazard's LCOS analysis evaluates storage systems on a levelized basis to derive cost metrics based on nameplate capacity



Source: *Lazard estimates.*
Note: Here and throughout this presentation, unless otherwise indicated, analysis assumes a capital structure consisting of 20% debt at an 8% interest rate and 80% equity at a 12% cost of equity. Capital costs are composed of the storage module, balance-of-system and power conversion equipment, collectively referred to as the Energy Storage System ("ESS"), solar equipment (where applicable) and EPC. Augmentation costs are included as part of O&M expenses in this analysis and vary across use cases due to usage profiles and lifespans.

Unsubsidized Levelized Cost of Storage Comparison—Energy ($/MWh)

Lazard's LCOS analysis evaluates storage systems on a levelized basis to derive cost metrics based on annual energy output



Source: *Lazard estimates.*
(1) Given the operational parameters for the Transmission and Distribution use case (i.e., 25 cycles per year), certain levelized metrics are not comparable between this and other use cases presented in Lazard's Levelized Cost of Storage report. The corresponding levelized cost of storage for this case would be $1,613/MWh – $3,034/MWh.

Q 6:

BESS: Veloce Energy's modular BESS solution is typically available on a 16 weeks' time to operation from purchase.

V2G: the time between purchasing an EV and having it available for V2G operations is likely to be in the three-to-six-month range. The steps needed include installation of a bidirectional charger and enrollment in a V2G program. In the larger context, widespread V2G is probably five years away, because the standards for bidirectional charging must be finalized, EV designs have to be modified and equipped with bidirectional charging capability, EV chargers have to be made bidirectional, and the regulations and processes for implementing V2G programs – including regulatory approval of programs – have to be approved and put in place.

MG: MGs are more complex than simple BESS installations, requiring additional design, permitting, and construction. From time of contracting, the start of MG operations may be from 6 to 18 months, and longer should there be any utility side involvement required.

While interconnection and utility service upgrades (site specific) are needed for rapid deployment, distributed resources such as BESS and MG have additional use cases (FTM/BTM) that allow for reducing or eliminating unnecessary utility distribution system upgrades and service interconnection inefficiencies.

Q 8:

Target customer segments for BESS, V2G, and MG: Commercial, Industrial, Agricultural, and Residential. MGs are typically limited to Commercial and Industrial

Q 9: Key non-financial barriers to deployment:

BESS: While energy storage is encouraged as a resource in alignment with the state's High DER Future, existing regulations disincentivize customer deployment of BESS (BTM), while incentivizing traditional rate-based distribution system upgrades (FTM) versus using BESS as a non-wires alternative. Other barriers are a lack of tariffs to attract market participation, interconnection processes and time involved, as well as a lack of customer education on the myriad merits of BESS, especially from an OPEX perspective.

V2G: Widespread V2G is probably five years away, because the standards for bidirectional charging have to be finalized, EV designs have to be modified and equipped with bidirectional charging capability, EV chargers have to be made bidirectional, and the regulations and processes for implementing V2G programs – including regulatory approval of programs – have to be approved and put in place

MG: the biggest non-financial barrier to MG deployment is completing the development of the regulations and processes for deploying MGs and designing and implementing the programs that allow MG owners to monetize sending power back to the grid – including regulatory approval of those programs.

Q 10: Key financial barriers to deployment:

BESS: Siloed and/or lack of financial incentives for customers to deploy BESS (BTM). Incentives should be designed for co-location of BESS with other technologies such as fast charging infrastructure, as well as to enable charging of medium- and heavy-duty vehicles without adversely impacting the grid.

V2G: adding bidirectional capability to EVs and to EV chargers results in modest cost increases. While EV buyers place significant value on the ability of EVs to provide backup power during outages, it remains essential to provide further financial incentives for EV drivers to send power back to the grid. These incentives should include both availability payments and performance payments.

MG: as with BESS and V2G, enhanced reliability is a major driver of MG deployment. However, the cost-effectiveness of an MG is usually the deciding factor in a commercial (non-subsidized) deployment. MGs reduce demand charges and, for time-of-use tariffs, reduce energy costs through time-shifting of energy received from the grid. Beyond these benefits, it remains essential to provide further financial incentives for EV drivers to send power back to the grid. These incentives should include both availability payments and performance payments.

Q 11: Benefits for low income and disadvantaged communities, and tribes:

BESS, V2G and MG: the drivers for these technologies remain the same in low income and disadvantaged communities, and tribes, as in other applications: enhanced reliability and lower net costs (including financial incentives from providing grid support or sending energy back to the grid). While customers in these communities have less access to the upfront capital needed to deploy these technologies, the benefits can be even greater because the grid is often constrained in these areas. Provided that the benefits of utilities avoiding grid upgrades are shared with these customers, the overall net benefits can be significant.

Input on Distributed Electricity Backup Assets Program Design

Q 1:
DEBA should target commercial and industrial customer segments with mixed loads that can either reduce demand onsite and/or have the technical ability to "island" its load off the grid during constrained times. For this, the most suited resource would be battery energy storage, with site, load, and use case requirements dictating the size of the system that will have to be deployed.

Q 2:
Both utility and customer-side incentives should be structured to encourage the adoption of these technologies by providing the full value of the grid benefits created by the technologies. These incentives should include both availability payments and performance payments.

The Joint Technology Providers appreciate the opportunity to submit these comments.

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