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Comments to the California Energy Commission
Response to Request for Information
Clean Energy Resources for Reliability
Docket #21-ESR-01

November 30, 2022

As the CEC contemplates how to effectively invest in clean energy resources in order to enhance grid reliability pursuant to SB 846 and AB 205, we respectfully submit comments in response to the following request for information: *"Please provide any specific program or recommendation on the design and implementation of the DEBA program."*

1) The DEBA program should prioritize funding of clean energy resilience in frontline communities that suffer the most from air pollution and power outages; the CEC should consult related recommendations submitted to the CPUC regarding the Microgrid Incentive Program by the Microgrid Equity Coalition (MEC). The MEC was formed in 2020 to advocate for funding to accelerate clean energy-based energy resilience for frontline communities. MEC members include the California Alliance for Community Energy, California Environmental Justice Alliance, Grid Alternatives, Microgrid Resources Coalition, Reclaim our Power: Utility Justice Campaign, Sierra Club, The Climate Center, and Vote Solar.

Over the past two years, the MEC has filed multiple comments with the CPUC regarding the CPUC Microgrid Incentive Program that are applicable to the new DEBA program. For example, the following recommendations were contained in the MEC August 5, 2022 filing with the CPUC:

- Grants need to be provided to disadvantaged vulnerable communities at the beginning of the process to enable communities to submit applications.
- Project scoring needs to ensure that projects from communities with limited financial resources are not disadvantaged.
- The Commission must proceed forward without delay, so that frontline communities in most need of clean energy-based energy resilience can get these projects on the ground.

These recommendations are equally applicable to the proposed new DEBA program. Additional detailed program recommendations are available in prior MEC filings to the CPUC from January 28, 2022 and January 14, 2022 as well as in the MEC Microgrid Incentive Program Workshop summary document from October 20, 2021.

We particularly recommend the MEC summary principles document, "Proposed Grant Program Criteria and Process: Energy Resilience and Microgrid Development in Disadvantaged and Vulnerable Communities" dated March 10, 2022, which provides a summary of the MEC's suggestions for grant program criteria and processes.

2) The DEBA program should prioritize utilization of DEBA funds to harness California's largest clean untapped DER asset: electric vehicles. California already has over a million EVs. If California puts 8 million EVs on the road by 2030 (as expected based on current market trends), the total aggregate power capacity (assuming instantaneous power export capacity of 10kW per passenger vehicle) would be approximately 80 GW. Assuming 10% of that could be reliably available for export or V2B islanding during evening peak periods, 8 GW of dispatchable energy could potentially serve as a flexible grid asset. A newly published MIT study explains how this can work. To quickly deploy this capacity, California should:

- **Mandate that state-funded ZEV and electric vehicle supply equipment (EVSE) purchases and customer incentive programs include bidirectional features**, so they can serve a dual purpose as grid reliability assets. This mandate would ensure that taxpayer funds produce the greatest public value per dollar.

- **Mandate that by a date certain, all ZEVs sold in California have bidirectional capability**, building upon the Governor's Executive Order N-79-20, calling for all passenger vehicle sales in California to be ZEV by 2035 and medium- and heavy-duty vehicles in the State be zero-emission by 2045. Currently, only about 4% of EV's on the road in California are bidirectional per CEC data. The recently passed Inflation Reduction Act (IRA) offers new federal incentives for EVs, which will further increase the rapid deployment of EVs, making it all the more urgent that these vehicles be bidirectional.

- **Utilize DEBA funds to accelerate utilization of existing EVs as VPPs.** This effort could include incentivizing EV and EVSE manufacturers to develop hardware and software platforms for adding bidirectionality to existing EVs and aggregating EV storage capacity as virtual power plants. For example, Teslas are currently the most popular EV in California and yet they are not currently bidirectional. With the correct market incentives, the 3 GW capacity of California's existing Tesla fleet could become a grid asset capable of supplying energy during shortfalls such as what occurred on September 6th of this year.

- **Develop a new state program to incentivize installation of bidirectional charging equipment at existing public facilities that already have on-site solar PV capacity.** For example, roughly 2,800 schools already have solar PV installed on-site which could complement the rapid proliferation of electric school buses that can charge during midday and provide grid support during evening peak hours as grid reliability assets (see related case study in the Appendix).

- **Conduct a comprehensive assessment identifying likely charge/discharge scenarios that leverage vehicle-grid integration (VGI) benefits at both public and private locations utilizing California's rapidly expanding installed base of rooftop solar.** For example, using the school example described above, a pilot program could be developed in which teachers and other school personnel, who typically work the entire day at schools, are incentivized to purchase bidirectional EV and residential charging stations to load shift daytime workplace solar generation for at-home discharge to serve peak evening loads.

- **Partner with California's fleet operators to provide incentives for fleet electrification paired with bidirectional utilization.** A logical place to start would be with publicly owned vehicle fleets in California, which include hundreds of thousands of vehicles. During outage conditions, the combined capacity of these vehicles could keep critical public facilities operational.

- **Provide incentives for consumers to utilize privately-owned EVs as grid reliability assets.** EVs cannot be fully optimized for grid use and resiliency without market structures that compensate EV owners for the use of their batteries and EV charging systems. PG&E recently announced it will offer the nation's first export rate for commercial electric vehicles in California. This rate will likely support bidirectional school buses and other fleets of electric vehicles to participate in V2G backup power systems to support the grid during grid outages. Rates are also needed that offer fair compensation to individual bidirectional EV owners. Under the right market conditions, bidirectional EVs could deliver valuable grid services over a broad range of scales: individual homes, commercial/industrial buildings, or wholesale markets under FERC Order 2222, which allows DER assets to compete in wholesale markets on a more level playing field. This regulation, which is being designed and implemented for independent system operators such as CAISO, would allow mixed aggregations of DER assets, including bidirectional EVs, to provide grid services to wholesale transmission markets, setting the stage for bidirectional EVs to serve as a significant source of widely dispersed dispatchable energy. The enablement of such a massive energy reservoir could save consumers by avoiding the redundant development of additional stationary capacity needed to cover shortfalls during peak conditions. It is important to note that incentives for bidirectional EV's and bidirectional charging and V2G infrastructure not only benefit the owners of the assets, they also benefit all ratepayers. By leveling supply and demand of the grid through VGI, the peaks and valleys of the duck curve are also leveled, thereby lowering the cost of energy for everyone by reducing the need for fossil fuel peaker power plants.

Appendix: EV Resilience Case Studies

Oakland, California
The Oakland Public Library collaborated with Schneider Electric and Oakland transit to pilot a program that will use electric buses as a resilience asset in times of heat waves and blackouts. Owned and operated by AC Transit, the buses will store and discharge electricity to power filtered air conditioning and critical services at the West Oakland branch of the Oakland Public Library. Local residents will be able to use the library when it's hot or wildfires are making the outdoor air unhealthy to breathe. Because the V2B system operates as a microgrid, it will be able to isolate itself from the utility grid during a power outage and provide electricity to the building's critical loads. The microgrid is being designed to include about 300 kW of solar generation. The California Energy Commission was the main funder for the project.

Cajon Valley Union School District, Southern California
In August of 2022, the Cajon Valley Union School District piloted an arrangement to use its seven electric school buses funded by federal and state grant programs as a virtual power plant and discharge electricity back to the grid. The district's electric school buses deliver kids to school and home, and return from their routes with 70 percent of power remaining, leaving ample power to export back to the grid. The district partnered with Nuvve for the pilot and hopes to eventually convert its entire fleet of buses into bidirectional vehicles.

University of California - San Diego

The University of California-San Diego has a microgrid that incorporates 30 MW of natural gas turbines operating as a combined heat and power (CHP) resource, 2.3 MW of solar PV and a 2.8 MW fuel cell that runs on methane fuel. The university recently added an EV fleet of seven cars, five of which are currently in operation, to its Triton Rides program, which provides free nighttime shuttle service to all UC San Diego students, staff and faculty. The new EVs, provided by Nuvve, will take advantage of the company's V2G bidirectional charging stations around UC San Diego's campus and will provide grid services, helping to inform the project's use case of campus fleet vehicles to optimize unused and renewable energy. The project commenced in October 2017 with support of a $4 million grant from the CEC. Its long-term goal is to add over 50 EVs to California's grid over three years to demonstrate the real-world benefits of VGI and V2G—that EV owners can share batteries when parked and sufficiently charged.

Green Omni Terminal Demonstration (Port of Los Angeles)
A microgrid at the Port of Los Angeles is expected to serve as a model for 26 other marine terminals at the port. The first phase of the $27 million microgrid project incorporated 1 MW of solar PV and an on-shore 2.6 MWh battery storage system along with heavy-duty electric drayage trucks, yard tractors and high-power EV chargers. The microgrid will be able to island during a grid outage. The EV chargers will convert DC power produced by microgrid assets to the AC power needed to power electrical equipment drives and motors, as well as the EVs themselves. Along with automated demand response, this microgrid/VPP can tap the diverse pool of assets (in two different locations) both in the microgrid and the offsite EV charging stations to provide regulation services.

Montgomery County, Maryland

The Brookville Smart Energy Bus Depot project, which began operating in October 2022, illustrates how microgrids financed under an energy-as-a-service business model can help local governments work toward state goals on clean energy and clean transportation. In Maryland, state policy seeks to electrify half of its bus fleet by 2030 to meet aggressive emission reduction targets; Montgomery County's [microgrid] will help with this goal. The 5.6 MW microgrid integrates onsite solar PV, batteries, and fuel flexible generators capable of supporting 2 MW of EV charging—enough to charge up 45 all-electric buses. The microgrid ensures uninterrupted bus services during emergencies, even in the event of a multi-day utility grid outage.

Camp Carson, Colorado

The U.S. Department of Defense (DOD) has been a pioneer in developing microgrids. One of its most comprehensive programs is known as Smart Power Infrastructure Demonstration for Energy Reliability and Security (SPIDERS). Under this program, the DOD scaled up three different stationary base microgrid installations over time, with each subsequent microgrid installation validating increasing sophistication. In terms of reliability and security, SPIDERS is developing a design template for the ability of military bases to provide secure power for at least 72 hours after a loss of standard utility power. This 2 MW project Camp Carson microgrid was Phase 2 of this three-phased SPIDERS project. It pushes the envelope with the integration of large-scale renewables with large-scale energy storage. The most noteworthy aspect of the demonstration is the integration of large-scale PEV charging systems into the microgrid network. The project integrated 5 bi-directional V2G systems into the microgrid to provide voltage support from EV charging stations into the microgrid. Additional V2G use cases explored were demand response, peak shaving and additional ancillary services to the wholesale market.

Jeju Island (South Korea)

One of the largest smart grid demonstrations with EVs in the world is at Jeju Island in South Korea. With a goal of reaching 100 percent carbon free energy by 2030, the island is a microgrid/VPP hybrid with an interconnection to the mainland, and it has tested out 150 smart grid technologies involving 168 different vendors since commencing in 2009. The deployment and optimization of EVs is one critical aspect of research exploring the nexus between smart transportation, smart electricity services and smart grid. PEV charging and discharging strategies of EV fleet aggregators were integrated into an optimal power flow model, allowing for integration with local renewable resources. The EVs, and their ability to provide grid support, are being managed by recognizing the state-of-charge of the mobile batteries as well as the market responsive behavior of the EV aggregators. The EV population is forecasted to reach 371,000 by 2030, supported by over 75,000 charging stations. These fleets of EVs are a crucial and integral part of the project's strategy to address the variability of wind and solar energy as all fossil fuels will be phased out. It will likely remain the largest V2G project in the world, exhibiting use cases for both microgrids and VPPs.