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Comments of Nuvve Holding Corp on Electric School Bus Bi-directional Infrastructure Funding Conceptas

Additional submitted attachment is included below.

Comments of Nuvve Holding Corporation on the on the California Energy Commission (CEC) Electric School Bus Bi-directional Infrastructure Funding Concept Workshop

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Medium- and Heavy-Duty Zero-Emission Vehicles and Infrastructure

Nuvve is a San Diego-based company operating across the U.S. and internationally whose mission is to lower the cost of electric vehicle ("EV") ownership while supporting the integration of renewable energy sources, such as wind and solar. Nuvve's Grid Integrated Vehicle platform ("GIVe"), transforms EVs into grid assets when those vehicles are connected to a bidirectional charger while guaranteeing the expected level of charge at the time the owner or driver needs it for transportation.

The aggregation of thousands of parked EVs plugged into bidirectional chargers turns an EV fleet into a virtual power plant using Nuvve's GIVe platform. This allows Nuvve to provide EV drivers and fleet owners with additional value through earning revenue from participating in electricity markets with a power capacity and capability compared to traditional stationary storage systems. Using our proprietary vehicle-to-grid ("V2G") technology, Nuvve's GIVe platform produces real benefits to society by reducing the cost of electric infrastructure to support transportation electrification. In addition, V2G helps to reduce harmful emissions beyond those associated with switching from liquid fuels to electricity for transportation by supporting the integration of variable sources of generation including solar and wind. These benefits can be realized across all types of EVs including light-duty vehicles (both battery-only and plug-in hybrids) and medium- to heavy-duty vehicles, such as school buses and other short-haul fleets.

Nuvve is the only company, working collaboratively with San Diego Gas & Electric ("SDG&E"), to have successfully developed an electric school bus ("ESB") V2G pilot program in California. Eight 60 kW bidirectional chargers and eight V2G capable Lion Electric school buses were deployed at Cajon Valley Union School District. Using Nuvve's GIVe platform, these buses participated in 10 Emergency Load Reduction Program (ELRP) events from August 17th through September 9th through SDG&E. The buses will continue to respond to ELRP events as needed through the end of October.

Nuvve appreciates the opportunity to provide comments on the California Energy Commission ("CEC") Workshop on Electric School Bus Bi-directional Infrastructure Funding Concept hosted on September 13, 2022.

Program Funding

Nuvve supports the CEC staff's funding concept but encourages the CEC to consider increasing the funding level to accelerate investments in bi-directional charging. It is widely recognized that V2G technology can support many of the State's clean energy goals including increasing EV adoption and providing a vast new flexibility resource to enhance power grid resilience. Ideally, the funding could be distributed as ongoing rebates to school districts rather than a one-time grant funding opportunity ("GFO").

Ongoing funding to pay for bi-directional infrastructure will play a vital role in the commercialization of V2G technology in California. Today, bi-directional EV chargers and the associated infrastructure can be cost-prohibitive for a school district seeking to electrify thier bus fleet. As a result, virtually all the EV charging infrastructure being installed today is unidirectional (e.g., does not support V2G functions). The CEC funding concept will result in new projects that will contribute valuable insights and learnings necessary to scale bi-directional infrastructure deployments. Furthermore, more successful ESB and V2G projects will provide additional market confirmation of V2G's viability and thus encourage more school districts to adopt this technology.

Project Eligibility

Nuvve encourages the CEC to have limited eligibility criteria to allow as many school districts as possible to participate in the program. Our experience talking with numerous school districts across California finds that it is difficult to find a willing partner to both invest time and resources to procure specific V2G capable ESBs and install the compatible bi-directional charging infrastructure. In addition, the success of these projects requires a supportive and engaged utility partner committed to making the necessary utility-side make-ready investments and ensuring a seamless interconnection process. The fewer restrictions placed on eligible school districts will expand the pool of potential projects thus maximizing the likelihood of a successful program.

Geographic Eligibility

- **Limiting project eligibility to projects located in Tier 2 and Tier 3 High Fire Threat Districts will limit the pool of potential school districts that can participate in the program.** In addition, this restriction could inadvertently preclude participation by school districts outside these high fire threat districts that are located within distribution circuits that would see significant benefits from V2G. For example, a local V2G resource could potentially enhance the reliability of a distribution circuit or avoid costly upgrades in locations outside high fire threat districts.

Project Scale Eligibility

- **Nuvve recommends that the CEC not require a minimum number of ESBs for an eligible project.** Again, we believe that setting a minimum number of bi-directional ESB per project will limit the pool of projects. In our experience, school districts view the electrification of their bus fleets as taking place in phases. Many school districts choose to start by gaining experience with a small number of ESBs. The proposal to limit project eligibility by local education agencies ("LEA") that own and operate a minimum of 10 bi-directional-capable ESB would preclude LEAs that have decided to take an incremental approach to school bus electrification. We do recognize the goal of creating a sizable V2G grid resource for each funded project. Nuvve recommends that, if the CEC decides to establish a minimum requirement in terms of bi-directional ESB, that four would be reasonable. Assuming a 60-kW bi-directional charger, a project with four bi-directional ESB would have a power rating of 240 kW. This project scale would represent a sizable grid resource that could deliver significant local reliability benefits.

Grid Services Participation

- The CEC staff proposes that projects must, "Demonstrate the capability for participation in grid services in exchange for payment." **Nuvve recommends that the CEC require that funded projects actively participate in one of the available programs that provide compensation for V2G for a minimum of 3 years upon project completion.** The significant investment of public funds that the proposed CEC program will make in bi-directional infrastructure should be fully utilized contributing to supporting a more resilient and reliable grid that privides broad public benefits.

- Significant effort has been made by the California Public Utilities Commission ("CPUC"), CEC, and stakeholders over the past several years to create compensation mechanisms for V2G. The ELRP program includes V2G resources as eligible to participate recognizing the important role that EVs can play to contribute to grid reliability.[1] The CEC recently extended the opportunity beyond the three investor-owned utilities ("IOUs") for demand-side resources including V2G to contribute to system reliability through the Demand Side Grid Support ("DSGS") program.[2] Beyond the ELRP and the DSGS programs, IOUs are creating additional opportunities for V2G compensation through dynamic rates. For example, the CPUC recently issued a proposed decision to approve Pacific Gas & Electric's ("PG&E's") day-ahead real-time pricing option including compensation for V2G exports.[3] A final decision is expected in early October. In sum, Nuvve strongly encourages the CEC to require that completed projects leverage the investments in bi-directional infrastructure made through the program by participating in one of the available opportunities for V2G compensation for a minimum of 3 years.

Equipment Eligibility

The program should rely on commercially available V2G equipment that meets the relevant certifications and aligns with existing California funding and compensation program requirements. Nuvve is supportive of most of the CEC staff's proposed charging equipment eligibility criteria. We are supportive of the following equipment eligibility criteria:

- Bi-directional DCFC using CCS-1 connector
- Internally networked (5-year networking agreement)
- Capable of bi-directional charging at a minimum of 60 kW
- Hardware ready for digital communication using ISO 15118-20
- Compliant with Open Charge Point Protocol 1.6 or later

[1] See California Public Utility Cmmission. Final Decision 21-12-015, Phase 2 Decision Directiong Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas & Electric Company to Take Actions to Prepare for Potential Extreme Weather in the Summer of 2022 and 2023 available at https://www.cpuc.ca.gov/news-and-updates/newsroom/summer-2021-reliability.

[2] See the California Energy Commission, Demand Side Grid Support program description available at https://www.energy.ca.gov/programs-and-topics/programs/demand-side-grid-support-program.

[3] See California Public Utility Commission, Proposed Decision, Decision Adopting Settlement on Export Compensation for Certain Pacific Gas and Electric Company Customers available at https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M496/K924/496924142.PDF.

Below, we provide comments on the three remaining proposed equipment eligibility criteria.

UL 1741 SB Certification

- **The CEC should adopt the inverter-related standards that are consistent with those that are required under CPUC's interconnection requirements known as Electric Rule 21.** Rule 21 is a tariff that describes the interconnection, operating and metering requirements for generation facilities to be connected to a utility's distribution system. The current standard for grid-interactive inverters operating in parallel with the grid in California is UL 1741 SA. It is necessary for Rule 21 interconnections of V2G DC systems outside of the ELRP and optional for ELRP participation. The CPUC provided an exception for UL 1741 SA for bi-directional EV chargers participating in the ELRP given a lack of bi-directional chargers that have received UL 1741 SA certification. It is premature at this point to use UL 1741 SB as an equipment eligibility criterion. As Southern California Edison noted in its presentation during CEC's May 17th V2G Inverter List Workshop, UL 1741 SB will not take full effect on April 1st, 2023.[4] Thus, it is unlikely that there will be bi-directional EVSE certified to UL 1741 SB at the time of the anticipated bi-directional infrastructure funding program launch in Q1 2023.

Responding to ELRP Events

- The CEC staff proposal includes a requirement that the charging equipment be capable of responding to ELRP events. **In line with our comment above regarding program eligibility and grid services, Nuvve recommends that the charging equipment demonstrate that it can discharge energy from an ESB to a building or the grid on a routine basis based on advance notifications.** A functional V2G system requires compatibility between the ESB and the bi-directional charger plus the ability to receive and respond to dispatch commands. Nuvve has worked closely with ESB original equipment manufacturers ("OEMs") to ensure that their vehicles are compatible with our bi-directional chargers. Nuvve's GIVe platform accepts utility dispatch commands for energy discharges from an EV while managing the battery's

[4] See California Energy Commission, Workshop on Vehicle-to-Gri Inverter List, Sothern California Edison V2G Interconnection Rules available at https://efiling.energy.ca.gov/GetDocument.aspx?tn=243085.

state of health and state of charge to meet anticipated driving needs. Some companies make claims about what their products are capable of doing, which may be unsubstantiated. Successful market development should be based on the ability to demonstrate that the technology can consistently perform as intended.

Renewable Energy and DERs

- **Nuvve recommends that the funding be focused solely on investment in bi-directional infrastructure for ESBs.** A project should be able to include solar or other distributed energy resources ("DER"), but the funding should be exclusively for the bi-directional infrastructure. This will maximize the number of bi-directional chargers that are supported through the program. Solar and other DERs are further along the commercialization path and thus do not require the level of funding necessary to advance bi-directional charging. Furthermore, there are other funding opportunities and programs available to support investments in solar and other DERs.

Applicant Eligibility

- **Nuvve supports the eligibility criteria for applicants as proposed by the CEC staff.**

Conclusions

Nuvve applauds the CEC for recognizing the key role that EVs connected to a bi-directional chargers can play in enhancing grid resilience and reliability. The proposed funding for bi-directional infrastructure for ESBs will help to spur the industry and provide further proof of concept accelerating commercialization of V2G technology. We appreciate the opportunity to provide comments on the proposed eligibility criteria and look forward to working with the CEC during the implementation phase.

/s/ Steve Letendre, PhD September 30, 2022

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