Comments of the Vehicle-Grid Integration Council
on the EPA Clean School Bus Program

To: US Environmental Protection Agency, Region 9: Air and Radiation Division

From: Vehicle-Grid Integration Council,
with support from the following organizations:

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Subject: Clean School Bus Program

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VGIC VEHICLE GRID INTEGRATION COUNCIL

Vehicle-Grid Integration:
Unlocking EVs as a Strategic Grid Resource

Vehicle-grid integration represents a unique opportunity to establish and advance US leadership at the intersection of a decarbonized transportation and electric sector by ensuring the value from flexible electric vehicle charging – and discharging – is recognized and compensated.

The Clean School Bus Program will directly support deployment of electric school buses which, if enabled, will have untapped potential as crucial, flexible resources to support the evolving electricity grid. Managed charging and vehicle-to-grid technology provides opportunities for customers to capture additional benefits, from reduced charging costs and integration with on-site generation and storage, to backup power and payment for exports. By unlocking these key benefits, the Clean School Bus Program can have a much larger impact in accelerating the widespread adoption of electric school buses.

Vehicle Grid Integration Council (VGIC) is a 501(c)(6) nonprofit trade association focused on accelerating the role of smart EV charging and discharging through policy development, education, outreach, and research. VGIC supports the transition to a decarbonized transportation and electric sector by ensuring the value from EV deployments and flexible EV charging and discharging is recognized and compensated in support of achieving a more reliable, affordable, and efficient electric grid. Scaling VGI will help accomplish the following public policy goals:

- **Benefit fleet owners** by reducing the cost of ownership.
- **Decarbonize the transportation sector** by accelerating EV adoption.
- **Support decarbonization of the power sector** by providing essential grid services as renewable energy and distributed energy resource penetration increases.
- **Increase affordability** by reducing electricity bills for all customers.
- **Improve grid resiliency** and security during extreme weather events.
- **Foster economic activity** through innovation, competition, and market transformation.

With federal support and thoughtful Clean School Bus Program design, we believe this vision could become a reality and that school districts and other entities across the United States can take part in the acceleration of both transportation electrification and grid decarbonization. **Our vision for VGI encompasses the following key elements:**

- **Ensure mobility needs are satisfied.** School bus fleets will be able to participate in a wide variety of VGI services, nationwide, without compromising their mobility function.
- **Managed charging will provide benefits to school bus fleets**: School bus fleets in every state will be given the choice to align charging with the times of day when electricity prices are low, reducing operating costs by as much as 50% compared to unmanaged charging. Lowering the total cost of ownership will help to accelerate overall electric school bus adoption.
- **EVs provide emissions-free emergency power during blackouts**: During extreme weather blackouts or other power outages, electric school buses can utilize two-way charging and discharging capabilities to send energy to a building or microgrid, serving as a generator and providing safe backup power.

- **Charging infrastructure dollars go further**: Smarter management of EV charging will help manage the cost of deploying EV charging infrastructure, which encourages wider access to EV charging with equal or lower overall cost burden.
- **Electric school buses provide necessary services to the grid and get paid for it**: V1G (unidirectional charging) and vehicle-to-grid ("V2G" – bidirectional charging) will enable electric school buses to both receive and feed power back to the grid, supporting advanced grid services such as frequency control, demand response, peak shaving, and more. For customers and end-users such as school districts and their fleet managers, V1G and V2G services (load management, demand charge management, and participation in distribution utility demand response programs) also provide significant benefits in the form of operational savings. Providing these services can unlock new revenue streams for electric school buses, lowering the total cost of ownership.

VGI is a unique opportunity for the EPA to establish and advance US leadership in affordable, decarbonized, reliable, and resilient transportation and electricity. We are grateful to the US Environmental Protection Agency for this comment opportunity. The VGIC would be happy to further discuss any part of these comments in a follow-up meeting.

1. **A higher level of funding should be made available for V2G-capable school buses and chargers.** V2G stands to offer substantial public benefits as electric school bus deployment scales up. However, for these benefits to be fully realized, it is critical that VGI capabilities be considered and built into infrastructure investments as they are deployed, rather than after-the-fact. Bidirectional electric school buses and chargers can support grid reliability and community resiliency in the face of aging grid infrastructure and increasingly frequent extreme weather events. The incremental costs of deploying and enabling bidirectionality can thus create a significant public benefit that should be partially or fully offset under the Clean School Bus Program.

   It is also worth noting that incorporation of VGI technologies is not limited to physical infrastructure, but extends to communications and control architecture, as well. For example, stakeholders should consider the potential benefits of leveraging in-vehicle telematics to enable certain VGI use cases. VGIC believes both charging station and EV-based VGI solutions should be enabled through the new Clean School Bus Program. Together with the physical layer, the communication and control architecture needed to unlock VGI constitute the guardrails of VGI business models. VGIC recommends the Clean School Bus Program support VGI use cases while remaining open to supporting various EV aggregator business models, as it is too early – and not the federal government's role – to pick winners and losers in the VGI market. However, VGI-related activities should still be an eligible option for any projects supported by the Clean School Bus Program.

2. **Prepare for the coming wave of commercially-available VGI offerings by educating school districts, school bus fleet operators, as well as regulators and policy-makers.** The deployment of electrified transportation across the US represents a paradigm shift, and moving common thinking from "mpg" to "kWh" requires considerable outreach and education. For

many school bus fleets, converting to electrified school buses is a significant undertaking that lies outside of their existing expertise. Given the potential complexity of VGI, more policy support is needed to direct funding toward educating school bus fleets not only of the benefits of electrification in general, but the enhanced value proposition that VGI technologies can offer. These value propositions include new potential revenue streams from grid services, reduced charging infrastructure costs, reduced charging energy costs, new bill management options, and enhanced resilience of critical facilities. The Clean School Bus Program should guide applicants to partner with original equipment manufacturers ("OEMs") and EV service providers to ensure customer education expertise of these stakeholders are adequately leveraged.

VGIC also suggests the Clean School Bus Program educate local government and municipal applicants on the need to assess and enhance their purchasing practices to better facilitate electric school bus deployment. Specifically, municipal ledgers should account for savings and revenue, such as those generated from VGI, rather than focusing on capital expenses. This will help to level the playing field for electric buses that have a higher capital cost but lower total cost of ownership. This practice will also more accurately reflect the financial viability of VGI-enabled buses and chargers.

In addition to educating applicants and end-users, it will also be important to educate regulators and policy makers who may play a key role in overseeing the development of VGI programs and rules by local utilities or government agencies.

3. **Facilitate streamlined interconnection policies across the country to support advanced VGI opportunities.** In California, VGIC and other stakeholders have collaborated closely with utilities and their regulators to advance V2G functionality, including both V2G Direct Current ("V2G-DC") and V2G Alternating Current ("V2G-AC") configurations. This has ultimately led to the creation of a permanent V2G-DC interconnection pathway, and a temporary V2G-AC interconnection pathway. Despite this progress, it is not guaranteed that V2G systems can easily interconnect across the country since interconnection rules are governed individually at the state level and each utility typically has its own process. Meanwhile, OEMs must design products for a national marketplace and must contend with the possibility of a patchwork of interconnection rules and processes. VGIC strongly recommends the EPA facilitate efforts to streamline V2G interconnection pathways across the U.S., which may include clarifying how V2G systems can interconnect under existing interconnection rules. This could be done in partnership with the Department of Energy and Department of Transportation as these agencies implement the EV Charging Program.

   Additionally, there is a growing need to align utility distribution service connection and utility distributed energy resource ("DER") interconnection approaches, such that customers are subject to an easy and streamlined process. VGIC recommends that the EPA encourage electric utilities involved in Clean School Bus Program projects to align distribution service connection and DER interconnection approaches, such that customers are subject to a streamlined experience. For example, V2G interconnection approval (under current DER interconnection processes) has historically been a lengthy process relative to the time it takes to connect and begin operating EV chargers in load-only mode. Customers should not be prohibited from operating bidirectional chargers in load-only mode while they await approval to operate in bidirectional mode. Similarly, customers wishing to deploy co-located renewable generation

and/or stationary energy storage on-site with the EV charging infrastructure should experience a streamlined interconnection process.

In some states, existing interconnection pathways may already be sufficient and could serve as a blueprint for streamlined processes that could be developed in other states. VGIC believes the development of a national V2G interconnection blueprint to be a high-priority task that could be conducted in conjunction with the development of the Clean School Bus Program. VGIC envisions a future where EVs move across utility service territories – and even states – with the ability to seamlessly charge and discharge energy. This is only possible if states follow a common framework, which the EPA and other federal agencies could help establish through facilitating the development of a simplified customer experience for interconnection.

4. **VGIC supports stretching the Clean School Bus Program funds to electrify as many school buses as possible. One promising solution towards this goal may be to allow and incentivize optional Automated Load Management (ALM) to install charging infrastructure at a lower total cost.**

   Many low-income and disadvantaged communities are served by outdated utility infrastructure (substations, transformers) that may require significant and costly upgrades to be able to accommodate school bus charging load. The use of ALM can help mitigate these infrastructure upgrade costs by reducing the collective peak load at one site, therefore making charging infrastructure less costly. ALM is a VGI solution that is particularly well-suited for multi-charger sites such as school bus charging depots.

   More specifically, ALM is the use of behind-the-meter technologies that allow for strategic sharing of charging capacity across multiple charging ports at the same charging site to help safely connect multiple charging ports whose total nameplate load would otherwise exceed the rated capacity of the customer connection. This in turn can avoid or defer the need to upgrade certain distribution system infrastructure to accommodate the new EV charging load. For example, if a multi-charger site seeks to deploy a charging station with 5 ports, each with a 10-kW capacity, the distribution upgrades would normally be sized to accommodate 50 kW of incremental coincidental charging demand, equal to all 5 ports charging at full capacity. However, ALM can lower the coincident charging demand to 30 kW, or 6 kW per port on average, when all 5 ports are occupied, thus reducing distribution system upgrades to what is required for only 3 ports. In this scenario, when only 3 or fewer ports are occupied, the EVs can still charge at full speed. Having ALM available to customers as an option can lead to significant savings and ensure that investments in transportation electrification are used efficiently. Pacific Gas & Electric has worked with EV service providers to implement ALM solutions at 20 workplace and multi-unit dwelling host sites as of Q4 2020 and saved between $30,000 and $200,000 per project.[1] Southern California Edison also worked with EDF Renewables PowerFlex to implement ALM to deploy 168 charging stations at $3,000 per port, significantly less than comparable deployments at $10,000-$15,000 per port without ALM.[2]

[1] Pacific Gas & Electric. 2021. Presentation at CPUC ALM/EV EMS Workshop, Panel 2.
[2] EPIC Policy + Innovation Coordination Group. 2021. *Transportation Electrification Workstream Report*. https://epicpartnership.org/resources/Transportation_Electrification_Workstream_Report_Final.pdf

VGIC believes that ALM can stretch the Clean School Bus Program funds and ensure more chargers are installed in more places. We recommend the Clean School Bus Program promote the use of optional ALM to enable charger and electric school bus deployment at a site where doing so may otherwise be cost-prohibitive or space-prohibitive due to utility distribution system upgrades. Optional ALM solutions should be encouraged and incentivized when they are shown to be comparatively cost efficient versus traditional utility system upgrades. VGIC advises against mandating ALM requirements on charging infrastructure, as this may result in inequities by limiting charging capability for end-users. Instead, VGIC recommends ALM be allowed and incentivized (i.e. a "carrot" rather than "stick" approach) so that deploying ALM solutions becomes a viable option for those that wish to deploy. VGIC recommends that an optional, technology-neutral ALM incentive be included in the Clean School Bus Program.

Conclusion

VGIC appreciates the opportunity to submit this feedback on the Clean School Bus Program. We look forward to further collaboration with the US EPA and stakeholders on this important initiative.

Respectfully submitted,

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