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First Student Inc Response Letter Regarding Flexible Demand and Load Shifting RFI

Additional submitted attachment is included below.

December 16, 2024

California Energy Commission
Docket Unit
Re: Docket 24-FDAS-04
715 P Street
Sacramento, CA 95814

Headquartered in Cincinnati, Ohio, First Student (FS) is the leading school transportation solutions supplier in North America.

With more than a century of experience in providing safe and reliable transportation to students across the U.S. and Canada, FS understands the priorities of today's K-12 community and assists school districts build a transportation solution tailored to each community's needs. Since FS serves the most diverse communities in North America, it attracts, engages, and continually develops a workforce that reflects the students, communities, and customers it serves.

As the largest and most-chosen student transportation provider, FS provides a proven solution. FS has more experience with all sizes of school districts than any other provider. Its history, experience, and dedicated service showcases its commitment to student safety, parent trust, and school district partnerships across North America. It is the only school transportation company recognized as a leader in safety by the prestigious Campbell Institute and to have been awarded the National Safety Council (NSC) Green Cross for Safety medal.

FS works with school districts to achieve their missions by providing the best start and finish to every school day with unmatched care and the safest ride experience. With more than 500 locations across North America, FS operates more than 46,000 vehicles, serves 1,300 customers representing more than 21,000 schools, and safely completes 5 million passenger trips to and from school every day.

First Student is proud to lead the charge in school bus electrification, setting new standards for sustainability and innovation across the industry. With 408 electric buses currently operational, we have driven over 4.5 million electric miles, serving 22 school districts across nine states and provinces in North America. We have been awarded more than $500 million in grant funding, securing a total of 1,690 electric buses to date. These achievements have earned us prestigious industry accolades, including the EV Private Fleet of the Year award at the 2024 ACT Expo, the Green Bus Fleet Award from STN in 2023, and the Go Yellow, Go Green Award from NSTA in 2023. As we continue to expand our footprint in clean transportation, we are committed to delivering innovative, cost-effective solutions that support school districts' sustainability goals while ensuring the safest ride for students.

Below are our general responses and the feedback we feel most qualified to provide in relation to RFI's questions and our experience:

1. **Operational Considerations**

a. Q3.c., Q12. ESB operators have been the vanguards of the MHDEV industry due to our predictable routes and schedules. These benefits have simplified adoption and allowed existing EV and EVSE technology to serve almost all ESB use-cases over the last few years. ESBs typically have a bus-to-plug ratio of 1:1 with EVSE power levels ranging from 19.2 kW AC to 60kW DC per plug. Charging is managed through software to ensure on-time departures for morning home-to-school and afternoon school-home. Charging windows are generally 9am-2pm and 5pm-6am. Because chargers are typically installed according to a lowest cost strategy, meaning that the chargers are sized for worst-case (early school release), charging sites typically see a site-wide load factor close to one (1) after morning student drop-off and in the evening after peak pricing.

b. Q3.d. Fleets who own and/or control their fueling operations naturally have a steep learning curve to get to optimized charging for new deployments. Moving from traditional fueling to electric introduces new and disparate factors that are not readily controllable at the start of operation due to the complexity that is introduced. Many light-duty, last mile applications often benefit from simple time of use controls, while medium and heavy duty (MHDEV), using high power DC, often have many more factors to consider for energy and asset management. The easiest way to control and optimize a new site or charging network is to network it with a highly capable software solution, though the prior knowledge needed to select for a solution is often a pitfall of new adopters. The difficult economics of MHDEV adoption, from initial capital outlay to the operational expenses, will continue to drive businesses towards more sophisticated charging strategies, and they will undoubtedly find mutual benefits with utilities through grid integration.

c. Q2. Vehicle-level scheduling to ensure on-time departure is the basis for optimizations. By enabling an intelligent software solution to have access to the data and controls needed to perform optimizations for reliability and energy management, the EVs can better be utilized as a distributed energy resources and revenue generators for business. Most EVCI installations are isolated from grid-relevant data at the meter. Further development of high impact use cases for vehicle-grid integration (VGI) will require continued standards development and adoption to enable communication-based controls with utilities.

d. Q3.a. On-time departure according to vehicle-level scheduling takes precedence over all other factors for the EV school bus use case. Once that is set and routing changes are considered, a charging strategy of optimal state-of-charge and slowest, lowest cost charging is used for uni-directional use cases. When V2X use cases are considered, battery life and warranty, time of use arbitrage for net metering, and the V2G-related tariffs can be added to the model.

2. Grid Integration Considerations

a. Q5. Grid integration control strategy discussion begins during the interconnection process. This is the best opportunity for grid operators to engage businesses on the benefits of incorporating autonomous or communication-based controls. Flexible connection programs have shifted traditional distribution planning calculations to allow for projects to both be oversubscribed on connected load and to take advantage of site demand scheduling above the most restrictive limits of the year. These initiatives are accelerating deployments of previously load-constrained projects and finding acceptable compromises while feeder or substation upgrades are planned.

e. Q13. There are two types of control methods available to charging station operators for the flexible connection programs. The simplest, and easiest to adopt, is autonomous site control. This requires the operator to validate that site load limits can be set and followed according to a schedule. The utility communicates these schedules, typically through email, as needed according to predicted demand on the distribution grid. Communication-based controls are the second method, and they require an integration of the charging station through the utility’s choice of communication standard, to their Distributed Energy Resource Management System

(DERMS). This controls methodology allows the demand to be controlled under a certain set of rules that both the utility and the customer determine fit their business needs. Flexible demand control integrations open the door for more advanced VGI like demand response (DR) for load curtailment to ensure peak load balancing and long-term load profile flattening strategies. Frequency and voltage stabilization are also targeted benefits for some grid operators.

b. Q13. A significant challenge to wider adoption of this "first-touch" integration is that many utilities do not have a DERMS in place and they are not seeing immediate need to dedicate resources to use one. Because of this, we are seeing a variety of load limit communication methodologies that make it difficult to scale VGI nationally. These methods have ranged from IEEE 2030.5 and Open Automated Demand Response (ADR) to emailed Excel files schedules.

c. Q20. To support equity and wider, more rapid adoption, the fleet charging station operators' benefits for participation in VGI must be supported by upfront subsidy, favorable tariffs, and aligned energy markets that offset the additional hardware and operational expenses associated with these capabilities. The near-term benefits (2-3 yrs) of VGI should be predictable and transparent for fleet operators to increase confidence for decision makers. Ideally, the decision to install these capabilities on a charger deployment should also be informed by long-term, predictable benefits that businesses can budget for. The nature of this industry, in its current state, makes it very difficult to do cost-benefit analysis for fueling infrastructure strategies at scale due to multiple unknowns and complexities. The simplification of incentivization strategies will likely make the largest impact for equitable adoption. Access to VGI benefits often has its gate kept by expensive consultants who are necessary to flatten the learning curve, but they come at a high cost.

f. Q7., Q13. The standardization of communications protocols among utilities would aid state-wide and national fleets to adopt grid integration benefits more easily. Across North America, we are seeing simple, autonomous, site-controlled load management settings being communicated by utilities through spreadsheets, emails, and phone calls. We understand the associated time and hurdles for an electric utility to adopt a Distributed Energy Resource Management System (DERMS) in order to move to communication-based controls. For those that have a DERMS in place, the primary integration protocols in use have been IEEE 2030.5 (Smart Energy Profile 2.0) or the Open Charge Alliance's Open ADR. Of all these methods, we would encourage nationwide adoption of IEEE's for its current scale in use of the Internet of Things (IoT) devices and robust backing by industry.

g. Q19. Due to the potential severity of cybersecurity threats to the grid, we must also stress the importance of utilities and grid-integrated customers meeting certain minimum standards to participate in IoT controls systems. Communicating signals from the grid or third-party systems to supply energy for electric vehicles (EVs) presents cybersecurity challenges due to the complexity of interactions among systems and stakeholders. Ensuring data integrity and authenticity is crucial, as tampered signals could lead to energy mismanagement. End-to-end encryption, digital signatures, and the SAE 15118-20 Plug and Charge standard, which enhances authentication through Public Key Infrastructure (PKI), are vital solutions.
Unauthorized access to EV chargers or connected systems poses risks like service disruptions and data breaches. Mitigation measures include mutual TLS, multi-factor authentication (MFA), strong key management, and Zero Trust Architecture (ZTA) principles such as least privilege

access and micro-segmentation. Man-in-the-middle (MITM) attacks highlight the need for secure communication protocols like TLS 1.3 with certificate pinning and certificate management, including standards such as IEEE 2030.5 and IEC 61850 to ensure secure and interoperable interactions.

Denial of Service (DoS) and Distributed Denial of Service (DDoS) attacks threaten system availability and grid stability. Mitigation strategies include rate limiting, anomaly detection, traffic filtering, and real-time monitoring to identify disruptions promptly. Endpoint and device security are equally critical, requiring regular firmware updates, hardening, and anomaly detection to prevent exploitation.

Interoperability risks from diverse systems and protocols can be reduced with standardized frameworks like IEEE 2030.5. Data privacy can be protected through compliance with regulations such as CCPA and using anonymization techniques. Addressing supply chain vulnerabilities is essential, involving rigorous audits, Software Bill of Materials (SBOM) tracking, and adherence to proposed commerce Department of Commerce rules such as BIS-2024-0005, to secure connected vehicles from foreign adversaries. Real-time monitoring and AI-driven threat detection enhance proactive risk management, while aligning with standards like NIST SP 800-53, NIST IR 8743, IEC 62351, and ISO/IEC 27001 ensures comprehensive protection. By addressing these challenges with targeted standards, the CEC can further secure and strengthen EV energy networks.

To maintain and grow the trust our customers put in us to provide safe and healthy transportation for our children, FS has committed to fully electrify our fleet by 2035. We are heavily invested in the future of Electric School Buses (ESBs) and in developing mutually beneficial energy strategies between us and North America's grid operators and power producers. In California, FS expects to have ~100MW of flexible charging load active by 2030.

We always appreciate opportunities to collaborate with the CEC and we hope our comments here can provide useful direction. We are encouraged by the CEC's interest and focus on this subject because of its high importance to our electrification goals. We are interested in continuing this discussion or answering additional questions pertaining to this and fleet electrification more generally. Please reach out any time.

With kind regards,

Kevin L. Matthews

Kevin L. Matthews

Head of Electrification, First Student, Inc.

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