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**CaIETC and Co-Signatories' Comments on Draft AB2127 Report's
VGI and ISO 15118 Sections**

Additional submitted attachment is included below.



February 26, 2021

California Energy Commission
Dockets Office MS-4
Re: Docket No. 19-AB 2127
1516 Ninth Street
Sacramento, California 95814-5512

Submitted to on-line portal: <https://efiling.energy.ca.gov/Ecomment/Ecomment.aspx?docketnumber=19-AB-2127>

Re: Comments on the ISO 15118 and Plug and Charge sections of the CEC AB 2127 Draft Report

The California Electric Transportation Coalition (CalETC) and the broad coalition of co-signatories below appreciate the opportunity to provide feedback on the International Organization for Standardization (ISO) 15118 and Plug and Charge sections of the draft AB 2127 report. We greatly appreciate the time and effort it took to write this report, the supporting workshops, and the thoughtfulness of the presentations.

Lower cost charging solutions and increased flexibility are essential to growing the market for battery and plug-in hybrid electric vehicles (EVs) and meeting the state's EV and charging infrastructure goals, particularly as the state invests in communities where charging infrastructure is unavailable or very limited, including disadvantaged communities, low-income communities, rural communities, and multi-unit dwellings or homes with only street-side parking. We recommend policy makers pursue charging and vehicle-grid-integration (VGI) solutions that lower costs, and structure incentive programs, like CALeVIP, to promote accessible and affordable electricity fuel for all Californians. We do not agree with or support the draft AB 2127 report's sections on ISO 15118 and Plug and Charge or believe the report correctly assesses or addresses the situation with charging payment and VGI. We believe there are many competing goals for charging payment and VGI as shown by recent rulemakings by the California Air Resources Board (CARB) and California Public Utilities Commission (CPUC). ISO 15118 and Plug and Charge are certainly viable standards that provide user benefits and can continue to compete in the marketplace, however, the CEC should first complete an interagency process to update the California VGI roadmap for light-, medium-, and heavy-duty EVs with a detailed analysis before making any recommendations in the draft AB 2127 report on complex topics such as VGI, charging payment, and ISO 15118. Below we provide details on how we reach these conclusions and recommend a technology-neutral approach in alignment with SB 676 (2019), SB 454 (2013), and distributed energy resource (DER) services currently used for smart thermostats and smart inverters.

It is premature to adopt ISO 15118 and Plug and Charge as a singular standard because there are serious concerns around upfront and on-going cost, cybersecurity, inconsistency with other agency actions, and an inability to meet many of the VGI principles described in this letter.

ISO 15118 is not fully developed and Plug and Charge is a separate add-on service. The draft AB 2127 report does not go into depth on the different levels and capabilities of the ISO 15118 standard or

provide information regarding planned upgrades. Also, the draft report does not explain that Plug and Charge is not ISO 15118 but rather an add-on service that is not fully developed. There are outstanding issues associated with its public key infrastructure¹ and certification authority² requiring a complex system of hardware, software, and business solutions that may ultimately include bilateral agreements between individual parties. These complex outstanding business requirements cannot be solved through a technology requirement.

ISO 15118 standard and AC charging. Demand response programs with network charging exist today for level 2 charging using the J1772 connector and pulse width modulated (PWM) signals, but they cannot provide detailed information from the EV such as state-of-charge, battery health, etc. While EVs today are not smart charging with this more sophisticated information via the level 2 or level 1 AC charging station, it is possible to do this today via the EV with telematics³ and in the future with ISO 15118 from the AC level 2 charging station when the next version of ISO 15118 (15118-20) is adopted (likely Fall 2021 at the earliest). However, it is premature for the draft report to recommend adopting ISO 15118 now because the details of the next version of ISO 15118 are not widely available, including whether it will be backward compatible with ISO 15118-2, so it is hard to analyze its functionality.

Retrofitting existing EVs and EVSEs to be ISO 15118 compatible is unlikely. EVs today without fast charging are unlikely to have ISO 15118 for smart charging (V1G) and V2G because only a subset of the 15118-2 standard⁴ is typically implemented on DC fast charging with charging payment in mind. Existing EVs even with fast charging often only have this subset of ISO 15118 and do not have the software and certificates to perform the 2014 or upcoming 2021 version of ISO 15118 or a future Plug and Charge add-on.

Cybersecurity. ISO 15118 (with one end being the PEV and the other being the EVSE) is not an end-to-end solution and to reach the grid operator it must be decrypted, translated, and encrypted into another communication standard at the charging station. This presents yet-to-be-addressed issues

¹ Definition: Public key infrastructure (PKI) is a set of roles, policies, hardware, software, and procedures needed to create, manage, distribute, use, store and revoke digital certificates and manage public-key encryption. The purpose of a PKI is to facilitate the secure electronic transfer of information for a range of network activities such as e-commerce, internet banking and confidential email. It is required for activities where simple passwords are an inadequate authentication method. (See https://en.wikipedia.org/wiki/Public_key_infrastructure for more information).

² Definition: "In cryptography, a certificate authority or certification authority (CA) is an entity that issues digital certificates. A digital certificate certifies the ownership of a public key by the named subject of the certificate." (See https://en.wikipedia.org/wiki/Certificate_authority for more information).

³ Definition: Telematics in the VGI context is a communication medium, from the car or truck to a cloud server or aggregator that sends the signals to the grid. Typically, proprietary communication protocols are used from the EV to the cloud aggregator but open protocols such as IEEE 2030.5 or Open ADR 2.0 can also be sent. Telematics covers automation in automobiles including GPS navigation, integrated hands-free cell phones, insurance, wireless safety communications, and automatic driving assistance systems.

⁴ The subset is DIN SPEC 70121, which handles digital communication between a DC EV charging station and an electric vehicle for control of DC charging in the Combined Charging System. More information available at: <https://standards.globalspec.com/std/9889528/DIN%20SPEC%2070121>

with cybersecurity and man-in-the-middle attacks. The US Department of Energy, CPUC, and the utilities are making progress on this issue, but there are significant safety and reliability issues that will need to be addressed and several solutions demonstrated before ISO 15118 can be considered a secure end-to-end solution. ISO 15118 needs to be thoroughly vetted for cybersecurity assurance on par with other protocols included in the National Institute of Standards and Technology (NIST) specified “Catalog of Standards”⁵ deemed compatible with smart grid cybersecurity principles.

Cost concerns with network charging and ISO 15118. Today’s AC level 2 and level 1 charging stations do not have the computing power to encrypt and translate standards necessary to send signals to the grid. Adding ISO 15118 will increase capital costs for AC level 2 and level 1 charging because they will need to add the computing power to encrypt and translate these signals. In general, network charging via the AC charging station comes with costly network and data contracts. The recent Rocky Mountain Institute (RMI) study found yearly combined costs for data and networking contracts for each EVSE are \$284 to \$490 per year. The RMI report continues:

“Even small incremental costs, like a \$20 per month networking fee for a nonresidential charger, can eliminate the cost advantage of owning an EV over a conventional petroleum-powered vehicle when those costs are passed along to drivers.”

“We strongly suspect that soft costs are a big part of the reasons why charger installation costs in the United States are three to five times the cost of charger itself, a much higher ratio than that seen in Europe (even after allowing for some charging hardware in Europe having higher costs).”⁶

Because of these costs, we have not supported networking mandates but rather a flexible, voluntary approach. Lower-cost charging solutions must be maintained to make electricity fuel accessible and affordable for all EV drivers, particularly for those in disadvantaged and low-income communities.

ISO 15118 and add-on apps for payment and other features (e.g., Plug and Charge). Plug and Charge presents a sophisticated version of payment and financial settlement for VGI that is not fully developed. Plug and Charge requires a public key infrastructure (PKI) system with a Certificate Authority and unique identifying tokens on each EV. There are many challenges in how to implement Plug and Charge, including details on cybersecurity and complex negotiations between automakers, owners of the charging networks, owners of charging stations, and the certificate authority. SAE is currently working with OEMs and charging infrastructure providers to develop an industry-wide PKI platform that is protocol-independent and platform-agnostic. There are business model concerns for the automakers including addressing customer service issues if a driver’s token for their EV expires. In addition, due diligence is needed to avoid only one automotive-grade supplier for a chip (e.g., powerline carrier or HomePlug GreenPHY), obsolescence for older charging stations, or intellectual

⁵ Available at: <https://www.nist.gov/programs-projects/smart-grid-national-coordination/standards-information-resources-nist-and-sgip>.

⁶ See pages 8, 20, and 45. Available At: <https://rmi.org/insight/reducing-ev-charging-infrastructure-costs/>.

property protected software that requires licensing fees. Finally, Plug and Charge was not selected as a requirement in the CARB payment regulation.⁷ Even though Plug and Charge is not appropriate for adoption as part of a single standard, it remains a free market option for automakers to attract EV drivers that want a sophisticated solution for payment at public charging.

CalETC recommends removing the sections on ISO 15118 and Plug and Charge from the draft AB 2127 report and allow the interagency effort to update the VGI roadmap examine the issues around VGI and charging station payment for each charging market segment and make recommendations including ranking of competing principles and priorities.

CARB and the CPUC have done extensive, complex rulemakings on VGI and charging payment after lengthy public processes. We understand there are many competing priorities and trade-offs for the state on these topics, and that is why the rulemakings by CARB on charging station payment (per SB 454)⁸ and smart charging incentives,⁹ and rulemakings by the CPUC on VGI (per SB 350, SB 676, and AB 841)¹⁰ were so complex and lengthy. We recommend the CEC adopt a similar approach and before making recommendations on VGI and charging payment, conduct a deep dive and trade-off analysis in the upcoming VGI roadmap or show why they disagree with the other agencies on cost-effectiveness, cybersecurity, financial transactions, consumer acceptance, and related issues. Coordination between state agencies is critical as the CEC, CARB, and the CPUC are addressing complex issues with communication protocols, charging payment, and advancing VGI.

We believe low-cost charging and low-cost VGI are two of the highest priority goals. The CEC's draft report emphasizes the need for enhanced customer experience and bi-directional charging. We recommend that the CEC use the VGI roadmap process to analyze and rank all the relevant priorities including equity, technology neutrality, consistency among agencies for DER solutions, and avoiding obsolescence. VGI and charging payment options are complex topics that are evolving rapidly, and it is premature to adopt ISO 15118 and Plug and Charge as a singular standard.

A cost-benefit analysis of the various options for charging payment and VGI in each market segment is needed. Sensitive cost information could be provided by OEMs so long as it is protected by anonymizing data via NDAs with a consultant or non-profit. Each charging market is quite different and the low-cost solution to charging payment and VGI is also different. The CEC's VGI roadmap process could dovetail with the CPUC's recent SB 676 VGI decision that recognized this market

⁷ CARB selected options that work well for low- and moderate income EV drivers including payment cards (credit, debit and prepaid) and apps that use chip or tap as well as 1-800 numbers and OCPI. Available at <https://ww2.arb.ca.gov/our-work/programs/electric-vehicle-supply-equipment-evse-standards>

⁸ Ibid.

⁹ See Low Carbon Fuel Standard regulation sections 95483(c)(1)(B), 954861.1(c)(2), and 95491(d)(A-C) which provide monetizable smart charging credits that send greenhouse gas (GHG) reduction and price signals and provide financial value to all types of consumers without requiring a specific communication protocol or business model for VGI.

¹⁰ See D-20-12-029, D-20-12-027, and D-20-09-035. Open rulemakings are considering VGI including R-20-05-12 (SGIP OIR) and R-18-12-006 (DRIVE OIR) which includes the results of and next steps from the Interagency VGI Working Group available at <https://gridworks.org/initiatives/vehicle-grid-integrationwg/>. Some provisions of SB 676 apply to the CEC.

diversity and the need for more information. CPUC Decision 20-12-029 allows the utilities to file applications for VGI pilots, emerging technology programs, and interim studies, including continuing the next steps recommended by the interagency VGIWG on cost vs benefits of VGI use cases, examining how to reduce the cost of VGI and charging in many market segments and funding policy recommendations such as policy 4.06 on funding an on-going VGI data experts' working group. High priority markets for VGI services are long-dwell locations such as homes, fleets, and workplaces. A high-level summary of the issues in each market segment is provided below:

- *Public DC fast charging* is subject to CARB's payment requirements. Regarding VGI, DC fast charging providers share the goal of seamless charging experiences for drivers, that may include automating charging, price signals, or load management with solar and stationary management. DC charging has long had the 2014 version of ISO 15118 and powerline carrier (PLC) chip, so providers could voluntarily offer more. Mandates are not needed as network providers will roll out the most up to date, advanced methodologies as commercial viability allows.
- *Fleets (using AC or DC charging including medium and heavy duty EVs)* are not regulated by CARB's payment regulation. Payment or VGI services including Plug and Charge and ISO 15118 are not needed at each networked charging station. To lower costs, fleets typically charge banks of charging stations all at once with communications from the microgrid or building energy management system and in the future directly from the EV using telematics. Fleets are a major opportunity to reduce grid impacts from charging, and many will opt for self-managed charging by responding to time-varying rates.
- *Home charging* is not regulated by CARB's payment regulation and self-managed charging can save hundreds of dollars per year. Automated networked charging for EVs is possible via the on-board telematics, a home energy management system or through the J-1772 connector to a wall box or cord set. Homes present a major opportunity to reduce the impact of charging to the grid and provide back-up power. Plug and Charge and ISO 15118 are not needed in this market segment.
- *Workplace AC level 2 charging* is sometimes regulated by CARB's payment regulation. Workplace AC charging is changing, with long range battery EVs dominating and emerging options (e.g., long-range plug-in hybrid EVs not needing workplace charging and power sharing charging stations that are non-networked). Innovative solutions can and should be explored to reduce cost and increase adoption, for example by focusing on employees who live in apartments and condos. Because of the complexity and changing nature of workplace charging, the best solution has not yet emerged, and a one-size-fits all mandate of ISO 15118 and Plug in Charge is not recommended.
- *AC level 2 charging at common areas of apartments and condos and long-dwell destination centers* is a situation similar to workplaces described above.
- *Short-dwell public charging (AC level 2)* is regulated by CARB's payment regulation. This market has much in common with DC fast charging where EV driver needs are a high priority, and the short sessions leave little time for most VGI services. As described below there are many interim and long-term VGI and payment solutions that do not involve ISO 15118 or Plug and Charge.

CalETC has long recommended the use of cloud aggregators because they can and do handle many different proprietary and open standards for VGI and other electricity end uses. This technology neutral approach is consistent with SB 676 directives, does not require any one standard, puts downward pressure on network costs for EV drivers, is done today for other DERs, is scalable, and should be allowed to continue as a long-term solution.

In several letters to the CEC in 2020 and 2021, CalETC emphasized that a technology- and business-model-neutral approach is working today for smart thermostats and smart inverters. This approach has been demonstrated to work for smart charging¹¹ and is consistent with SB 676. This SB 676 approach to smart network charging allows customers and charging providers the choice to select self-managed charging¹² or some type of automated charging using communication networks from automakers, charging providers, microgrids, or building energy management systems. The diversity of solutions encourages competition, putting downward pressure on prices, and encouraging innovation by using cloud aggregators that can use many types of open and proprietary communication standards. For example, utilities would receive communication signals from the aggregator via either IEEE 2030.5 (Rule 21 compliant)¹³ or Open ADR 2.0b.¹⁴ Importantly, ISO 15118 and Plug and Charge can be implemented with this technology-neutral, free-market approach.

The current competitive market works and allows for best fit options to serve the widely varying needs of today's market, including short- and long-dwell charging locations, low- and high-kW charging, AC and DC charging, free and paid charging, and automated network and non-networked charging (e.g., with solar and storage). This multiple standard approach also works today for other types of DERs and takes advantage of existing trends to keep costs low, like lowering cost by piggybacking on existing computing power in EVs, EVSE, phones, and home Wi-Fi. In the long-term, avoiding a one-size-fits-all approach is consistent with the directives to state agencies in SB 676.¹⁵

¹¹ Many example pilots of VGI telematics with the Open VGI Platform exist including [Xcel's](#) and [SCE's](#). Also see this presentation by [EPRI and seven automakers](#). Other examples of telematics with VGI include automakers who generate Low Carbon Fuel Standard smart charging credits, or Fleet Carma pilots.

¹² Definition: The Interagency VGI Working Group defined self-managed charging as indirect or passive managed charging. It includes shifting kWh through a vehicle app in response to time-variant rates, or reducing kW by purchasing lower-kW charging stations, and kiosks or building energy management system to control a bank of charging stations or stations that manage charging in two to four connectors.

¹³ Definition: IEEE 2030.5 is IEEE 2030.5 is a standard for communications between the smart grid and consumers. The standard is built using Internet of Things (IoT) concepts and gives consumers a variety of means to manage their energy usage and generation. Information exchanged using the standard includes pricing, demand response, and energy usage, enabling the integration of devices such as smart thermostats, meters, plug-in electric vehicles, smart inverters, and smart appliances. See <https://resourcecenter.smartgrid.ieee.org/education/webinar-videos/SGWEB0043.html>.

¹⁴ Definition: Open ADR 2.0b details are available at <https://www.openadr.org/specification-download> and is now approved as International Electrotechnical Commission (IEC) standard 62746-10-1 ED1. See https://www.openadr.org/index.php?option=com_content&view=article&id=174:openadr-2-0b-receives-approval-as-iec-standard&Itemid=121.

¹⁵ Public Utilities Code 740.16(b)(2). "Electric vehicle grid integration strategies shall not require the use of any specific technology." For full context, the prior section 740.16(b)(1) adds: "For purposes of this section, 'electric vehicle grid integration' means any method of altering the time, charging level, or location at which grid-connected electric vehicles

CARB has an acceptable regulation addressing payment at public charging stations and is willing to update it as new information becomes available. Additional requirements from the CEC on payment (e.g., Plug and Charge) are not necessary with this regulation in place, risk adding cost, and limit the industry's ability to use voluntary, competitive payment solutions. We believe strongly that non-public charging does not need payment requirements.

The interim solution for VGI with AC level 2 and level 1 charging is the current market, which has adapted to the many unique needs of the different charging market segments, including self-managed with time varying rates, non-networked solutions such as power sharing charging stations, low-kW charging, or linking with solar and stationary batteries. Also, network charging and demand response programs today work with the J1772 connector and PWM either at the charging station or by controlling banks of charging stations with a building energy management system. Several utilities have two to three years of experience with demand response and EVs at workplaces, fleets, and long-dwell public charging locations.

In the long-term, EV-based solutions using telematics to cloud aggregators for most, if not all, charging segments at different charging levels can provide the "high-level" functions mentioned in the draft AB 2127 report and provide them at low-costs. Because telematics on EVs will soon be ubiquitous, and because automakers want to maintain relationships with customers and deliver added services, providing payment and VGI services via the EV will continue to expand. The potential exists for telematics to provide VGI to legacy EVs and work with both networked and non-networked charging stations. However, other solutions should continue to be supported, including the many types of self-managed charging, some networks providing payment, VGI services with ISO 15118 and Plug and Charge, and other solutions for fleets and public DC fast charging as discussed earlier.

Automakers, utilities, and non-governmental organizations below do not support an ISO 15118 mandate and recommend a flexible, low-cost, best-fit approach as a viable long-term option, particularly in situations where charging infrastructure is sparse, e.g., disadvantaged communities, low-income communities, rural communities, and multi-unit dwellings or homes with only streetside parking. Some automakers have put the 2014 version of ISO 15118 on their EVs because it is inherent in DC fast charging and some have chosen to implement Plug and Charge (at a significant degree of difficulty). However, mandating ISO 15118 as a single solution for AC charging or adding on payment applications, such as Plug and Charge, is problematic and unnecessary as a requirement for advancing EV adoption. We respectfully request that the sections on ISO 15118 and Plug and Charge be removed from the draft AB 2127 report and instead the report should recommend that the interagency effort to update the VGI roadmap examine the issues around VGI and charging

charge or discharge, in a manner that optimizes plug-in electric vehicle interaction with the electrical grid and provides net benefits to ratepayers by doing any of the following: (A) Increasing electrical grid asset utilization. (B) Avoiding otherwise necessary distribution infrastructure upgrades. (C) Integrating renewable energy resources. (D) Reducing the cost of electricity supply. (E) Offering reliability services consistent with Section 380 or the Independent System Operator tariff."

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station payment for each charging market segment and make recommendations including ranking of competing priorities.

Thank you for considerations of our comments and do not hesitate to contact Kristian Corby at Kristain@CalETC.com if you have any questions.

Best regards,

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