BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Continue the Development of Rates and Infrastructure for Vehicle Electrification.	Rulemaking 18-12-006 (Filed December 13, 2018)

COMMENTS OF THE VEHICLE-GRID INTEGRATION COUNCIL ON THE TRANSPORTATION ELECTRIFICATION FRAMEWORK (SECTIONS 7 AND 8)

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In accordance with Rules of Practice and Procedure of the California Public Utilities Commission ("Commission"), the Vehicle-Grid Integration Council[1] ("VGIC") hereby submits these comments on the *Administrative Law Judge's Ruling Adding Staff Proposal for a Draft Transportation Electrification Framework to the Record and Inviting Party Comments* ("Ruling") issued by Administrative Law Judge ("ALJ") Patrick Doherty on February 3, 2020. Pursuant to *Email Granting Request for Extension of Time to Submit Comments on Sections 7 and 8 of the Transportation Electrification Framework* issued by ALJ Sasha Goldberg on July 2, 2020, VGIC timely files these comments on Sections 7 and 8 of the Draft Transportation Electrification Framework ("Draft TEF") on July 14, 2020.

I. INTRODUCTION.

A. Overview of VGIC

VGIC is a 501(c)6 membership-based advocacy group committed to advancing the role of electric vehicles ("EVs") and vehicle-grid integration ("VGI") through policy development,

[1] VGIC member companies and supporters include American Honda Motor Co., Inc., Connect California LLC, Enel X North America, Inc., Fiat Chrysler Automobiles, Ford Motor Company, General Motors Company, Nissan North America, Inc., Nuvve Corporation, and Toyota Motor North America, Inc. The views expressed in these Comments are those of VGIC, and do not necessarily reflect the views of all of the individual VGIC member companies or supporters. (https://www.vgicouncil.org/).

education, outreach, and research. VGIC supports the transition to decarbonized transportation and electric sectors 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.

B. Organization of VGIC's Comments

VGIC's comments are organized as follows:

- First, VGIC addresses a **specific recommendation from Section 7** of the Draft TEF posed by the Commission related to IOU roles in pilot programs to evaluate pre-commercial technologies. In responding to this recommendation, VGIC provides several recommendations for the Commission's consideration.
- Second, VGIC addresses **several critical questions and recommendations from Section 8** of the Draft TEF posed by the Commission which pose both material challenges and opportunities to accelerate transportation electrification. VGIC provides several recommendations for the Commission's consideration.
- Finally, VGIC provides a **summary of recommendations** from its answers to the questions.

II. COMMENTS ON DRAFT TEF SECTION 7: SAFETY.

A. Section 7.1, Recommendation 4: Consider limited roles for IOU pilot programs to evaluate pre-commercial technologies and associated safety needs.

VGIC supports the development of a well-balanced, limited role for IOUs in the evaluation of pre-commercial TE technologies and associated safety needs. IOUs are tasked with maintaining a safe and reliable grid, which includes the safety needs associated with grid-

connected technologies. Deployment of many new grid-connected technologies is inevitable as California ramps up to achieve its TE goals. As such, it is appropriate for the IOUs, as operators of the distribution grid, to contribute productively to the evaluation of pre-commercial technologies in the TE industry and associated safety needs. Several VGI-related technologies may require safety needs assessments either now or in the future, and VGIC believes IOUs can and should pursue pilot scale implementation of novel or untested technologies to evaluate their impacts on grid safety reliability in anticipation of larger scale deployment.[2] However, this testing phase must be well designed to ensure that it is does not impose new barriers technology deployment at scale. To that end, the Draft TEF states:

> "For example, the IOUs may propose pilots to test pre-commercial technologies that do not fall within existing safety certification systems. Pre-commercial stationary EVSE prototypes may contain features or configurations that appear promising but have not yet completed certification by a Nationally Recognized [Testing] Laboratory ("NRTL")." [3]

VGIC supports IOU involvement in testing pre-commercial technologies, especially those with configurations not yet certified by a NRTL, as part of pre-commercial technology demonstrations. In fact, VGIC believes the TE industry would be well-served if IOUs were obligated to provide this support function, in response to reasonable requests from industry participants. Thus, VGIC recommends the Commission provide guidance in the TEF that establishes a uniform program and process by which market participants could request to conduct pre-commercial technology demonstrations and evaluations alongside IOUs. Such a

[2] See, for example, Connect California's proposal for the use of smart meters for intentional islanding of customers in advance of a public safety power shutoff event to enable vehicle-to-home backup power solutions. See *Administrative Law Judge's Ruling Requesting Comments on Track 1 Microgrid and Resiliency Strategies Staff Proposal* January 21, 2020 in R.19-09-009, Attachment A at 14. https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M324/K963/324963031.PDF

[3] Draft TEF at 74.

program can result in stepwise advances in IOU understanding of safety and reliability issues related to new equipment and technologies developed by vehicles OEMs and EVSE companies.

A standardized pilot program could be created that strikes a balance for IOU involvement, allowing demonstrable progress to be made without overcommitting IOU resources. For example, requests for demonstration projects could be capped, such that a given entity seeking testing and evaluation for a pre-commercial technology/equipment could only submit a maximum number of projects per year. A cap on the quantity of vehicle or charge ports could also be explored. As an illustrative example of the standardized pilot approach, a given OEM might be able to apply for a maximum of two demonstration projects per year or for up to 20 ports in total for demonstrations that deepen IOU understanding of safety and reliability needs associated with a pre-commercial technology. A budget cap could also be an important consideration to ensure that standardized pilot requests do not lead to excessive costs to IOU ratepayers. Any standardized pilot program should also consider how to utilize existing IOU testing labs for reliability and safety.

The creation of a standardized pilot program should also draw from past or existing approaches to TE pilots and demonstrations, such as the California Energy Commission's ("CEC") BESTFIT Innovative Charging Solutions solicitation for demonstrating innovative technologies.[4] However, the Commission must also ensure that technologies are not "over-

[4] The CEC's Built-Environment Electrification Solutions & Form Factors for Fitting Infrastructure to Transportation ("BESTFIT") Innovative Charging Solutions solicitations will fund projects that demonstrate technologies and business models that are "best fit" for the local built environment, use case, and vehicle type. Along with the CEC's ViGIL Solicitation, which addresses testing, certification, data, and technology gaps for EVSE, BESTFIT may meaningfully accelerate VGI in California. However, these programs as proposed pose risks of over-piloting technologies and funding duplicative pilots, and the Commission should consider this aspect of program design to avoid such risks. See https://www.energy.ca.gov/event/workshop/2020-05/staff-solicitation-scoping-workshop-pre-solicitation-concept-bestfit and https://www.energy.ca.gov/event/workshop/2020-05/staff-solicitation-scoping-workshop-pre-solicitation-concept-vehicle-grid

piloted," and that pilot programs do not present a new barrier to commercial scale implementation. In some instances, IOUs may have a financial interest in limiting certain customer-sited technologies or use cases from deploying at scale. VGIC is concerned that this could lead to a scenario where pilot programs are used as a means to delay or constrain market development beyond the demonstration phase. Thus, VGIC cautions against authorizing redundant or duplicative pilot programs beyond what is reasonable to understand basic safety and reliability considerations. Additionally, a standardized pilot program should operate in coordination with pilot programs administered by the CEC, to further mitigate risks of requiring redundant or duplicative pilots. The Commission should consider providing guidance on how to determine whether technologies that have achieved certain milestones, whether through CEC-funded pilots or the standardized pilot program, can advance to larger scale deployments or warrant further testing. VGIC recommends that this guidance include processes and metrics to ensure pilots result in either tangible progress toward commercialization or concrete recommendations for next steps a pre-commercial technology should take toward market readiness. Finally, VGIC recommends the initial implementation of this standardized pilot program framework be focused on safety and near-term strategies to mitigate the impacts of wildfires and public safety power shutoff ("PSPS") events.

III. COMMENTS ON DRAFT TEF SECTION 8: TECHNOLOGY AND STANDARDS.

A. Section 8.1, Question 5: What are the expected costs of requiring vehicle-grid integration (VGI)-enabled electric vehicle supply equipment (EVSE) across all investor-owned utility (IOU) EVSE investments?

According to the California Energy Commission ("CEC") Staff Presentation for the CALeVIP Future Equipment Technology Workshop, deploying VGI-enabled EVSE may amount to *de minimus* incremental costs at scale, costing $5 to $25 per EVSE.[5] VGIC supports the notion of encouraging IOU EVSE investments to include some form of VGI functionality to maximize the value of these assets. However, VGIC cautions against making this a requirement for IOU EVSE deployments absent a clear definition of "VGI-enabled."

B. *Section 8.1, Question 5(a): What are the projected costs of requiring all ratepayer funded EVSE meet International Organization for Standardization (ISO) standard 15118, and aligning with the protocol updates currently underway?*

The Draft TEF's second recommendation in Section 8.1 is to:

> "Require that EVSE funded through [IOUs'] transportation electrification (TE) programs contain networking capabilities and can implement International Organization for Standardization (ISO) standard 15118 and other communication enabling requirements adopted by the California Energy Commission."

We reiterate that, at this time, the CEC is only considering ISO 15118 for publicly-accessible EV chargers funded through the CALeVIP program. VGIC believes the projected costs of requiring *all* ratepayer funded EVSE meet ISO 15118 are significantly higher than the incremental $5 - $25 per EVSE finding referenced above, as the opportunity cost resulting from such a mandate would be significant. Two primary factors contribute to this potentially high opportunity cost:

1. *The current state of the ISO 15118 standard*

[5] CEC Docket 17-EVI-01 https://efiling.energy.ca.gov/GetDocument.aspx?tn=230794&DocumentContentId=62410

The Draft TEF notes "the standard is under review and not fully implemented in the US yet." [6] ISO 15118-20, the specific standard with which market actors are being asked to comply, is not a complete standard, and may not be until 2021 or later, and therefore mandated compliance for IOU EVSE may stall expeditious progress on TE efforts in California. The Draft TEF correctly states that some auto manufacturers ("OEMs") have "indicated they intend to deploy ISO 15118 as a communication solution…and generally do not want to support multiple protocols."[7] However, requiring all ratepayer funded EVSE to meet ISO 15118 is premature and unwarranted given the current state of the standard.

The Draft TEF states the Energy Division Staff "finds that establishing a standard communication pathway could send a strong signal to the EVSE market that public charging stations deployed in California must be capable of these types of functions."[8] However, by requiring compliance with an incomplete standard to participate in IOU TE programs, VGIC believes the Commission would instead send a signal that restricts, rather than accelerates VGI market development. TE deployment may be stalled as some EVSE manufacturers wait for the standard to be complete before developing products. Others may exit the California market in favor of a less restrictive marketplace. It is worth noting that VGIC does not believe communications protocols require regulatory intervention to advance the marketplace in a common direction. This contrasts with the situation the EV industry faced in recent years regarding physical form factors for charging devices, which benefited from more direct intervention.

[6] Draft TEF at 82.
[7] Draft TEF at 83.
[8] Draft TEF at 84.

VGIC members and supporters have encountered EVSE manufacturers that have delayed entrance into the California marketplace over concerns that the ISO 15118 standard will be required. For some, their business model, which may leverage pathways that render ISO 15118 unnecessary, could be made infeasible because of the proposed requirement. Through this lens, the opportunity cost associated with a contraction in available EVSE suppliers could have a significant impact on competition in the space, which in turn impacts the ability to provide VGI solutions through the most innovative and cost-effective means. VGIC strongly urges the Commission remain open to the concerns of the broader VGI industry and the practical, ground-truthing perspectives that industry participants can provide.

2. The current state of the VGI market

The proposal to require ISO 15118 does not consider the level of appropriateness that one standard may provide for a given use case. There exists a wealth of resources, including California ratepayer-funded research and stakeholder reports, such as the recently filed VGI Working Group Final Report[9], that supports the following hypothesis: California's transportation and electric sector decarbonization goals require the implementation of a diverse set of VGI functionalities and use cases. The ISO 15118 standard is a communications protocol that can enable important VGI functions and use cases, but it does not constitute a functionality or a use case on its own. Furthermore, ISO 15118 is not necessarily the best fit for all VGI use cases across all customer segments and charging levels. If the Commission were to require ISO 15118 functionality for all EVSE at this time, it will likely bypass opportunities to save customers money, reduce rates, support the grid, and/or reduce greenhouse gas ("GHG") emissions that may be achieved with existing or emerging functionalities and communication protocols. Thus,

[9] See VGI WG Final Report, filed in R.18-12-006 on June 30, 2020 at 7. https://gridworks.org/wp-content/uploads/2020/07/VGI-Working-Group-Final-Report-6.30.20.pdf

there is an opportunity cost of unknown scale associated with focusing on one communications protocol or standard rather than focusing on achieving specific VGI use cases some of which might be delivered through more than one protocol. Furthermore, by imposing a standard on all segments, use cases, and charging levels, regardless of which business model may work most cost-efficiently for each, the requirement for ISO 15118 compliance in all IOU EVSE would directly impede the implementation of SB 676, which calls for strategies that maximize the use of cost-effective VGI.

The 2017 Staff VGI Communication Protocols Working Group Report determined that "markets, protocols, and technology are rapidly developing and at this time we do not want to preclude any protocols or use cases that can deliver VGI value."[10] These domains continue to evolve at a rapid pace, and requirements that unnecessarily stifle progress represent significant barriers to achieving TE, VGI, decarbonization, and economic growth goals.

Furthermore, the Draft TEF states that the CEC has proposed a similar requirement for EVSE supported by the CALeVIP program beginning in 2021.[11] However, CALeVIP funding is only available to publicly-accessible chargers, while the Draft TEF proposes IOU roles for applications other than publicly-accessible chargers.[12] The Draft TEF further explains that a standard communication pathway is needed to "send a strong signal…that public charging stations deployed in California must be capable of these types of functions."[13] VGIC believes this further conflates publicly-accessible chargers with ratepayer-funded chargers. It is important to note that the Draft TEF Section 4 on IOU Roles does not propose limiting potential IOU

[10] VGI Communication Protocol Working Group Energy Division Staff Report, October 2018 https://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442460144 at 18.
[11] Draft TEF at 83.
[12] Draft TEF at 33-42.
[13] Draft TEF at 84.

EVSE to publicly-accessible charging stations. Therefore, VGIC does not believe that the desire to have standardization among publicly-accessible charging stations constitutes a reasonable justification for the proposed requirement that all IOU EVSE, regardless of use case, meet a particular standard.

VGIC believes that the deployment of VGI-enabled EVs and EVSE should be generally encouraged, but cautions against over-prescriptive mandates. To avoid commoditization of devices, and allow innovation to continue, VGIC prefers minimum functionalities that enable EVSEs to facilitate some set of appropriate use cases. This preference was revealed by the Commission in its May 31, 2018 *Decision on the Transportation Electrification Standard Review Projects (D. 18-05-040)*, which found "Networked L2" charging can enable VGI services and rates.[14] Rather than mandating use of a specific standard, Ordering Paragraph ("OP") 10 of D. 18-05-040 states:

> "SDG&E must conduct an ongoing Requests for Qualifications to qualify L2 EVSE and corresponding network services from which participating customers can choose. SDG&E should ensure all qualified L2 EVSE are networked, include metering capabilities, and are NRTL certified."[15]

This language directed the IOU to focus on minimum functionalities (i.e., networked, metering capabilities), rather than requiring the EVSE to meet a specific standard. VGIC urges the Commission to act in accordance with the precedent set in D. 18-05-040, by continuing to focus on generally ensuring minimum capabilities, rather than implementing a specific standard. VGIC recommends the Commission explore levers to promote VGI strategies through the TEF and beyond that are based on best practices in clean energy and transportation policy design.

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[14] *Decision on the Transportation Electrification Standard Review Projects* (D.18-05-040) May 31, 2018 in *Application of San Diego Gas & Electric Company (U 902E) for Approval of SB 350 Transportation Electrification Proposals* (A.17-01-020) *And Related Matters* (A.17-01-021; A.17-01-022) at 137.
[15] *Ibid at 154.*

Programs aimed toward accomplishing identified outcomes by incentivizing the adoption and use of VGI functionalities and use cases, such as the 320 identified in the VGI Working Group Final Report as "able to provide value now"[16], are likely to be far more effective levers than those requiring EVs and EVSE be compliant with specific standards.

C. Section 8.1, Question 6: How can IOUs account for and/or project the scale of vehicle-to-grid enabled EVs in their service territories within their TEPs?

VGIC posits that the scale of V2G-enabled EVs may not be the most valuable metric for IOU TEPs to track and project. It may be more valuable to understand the scale of V2G-enabled EVSE that exist in an IOU's service territory, as EVs can only export power via compatible EVSE, and at or below the kW rating of that EVSE. IOUs can account for V2G Direct Current ("V2G DC") EVSE by tracking interconnections under Rule 21. For V2G Alternating Current ("V2G AC"), there may exist several data collection pathways to account for future deployment; however, without a viable interconnection pathway it is unclear whether an EVSE capable of V2G AC can or should be tracked.

VGIC also questions whether the scale of V2G-*enabled* systems is as relevant or valuable in IOU TEPs as the scale of V2G-enabled systems that actually *discharge* or otherwise participate in providing V2G functionality. For example, if V2G-enabled systems were widely deployed without adequate tariffs, programs, or market pathways by which to monetize V2G services, a measurement of V2G-enabled systems could provide a false indication of an IOU TE program's success (or potential success) in encouraging beneficial V2G operations. Thus, VGIC recommends the Commission require TEPs track and project V2G participation rather than just

[16] See VGI WG Final Report, filed in R.18-12-006 on June 30, 2020 at 8. https://gridworks.org/wp-content/uploads/2020/07/VGI-Working-Group-Final-Report-6.30.20.pdf

capability. One potential data collection pathway for tracking this V2G activity may be measuring customer participation in relevant V2G rates or programs, including any credits or incentive payments provided to customers. This is consistent with some of the VGI-specific metrics considered during the VGI Working Group.

D. Section 8.1, Question 6(a): Without existing interconnection standards, how can vehicle-to-grid (V2G) technology be tested and scaled?

V2G technology has been tested several times in California for technical feasibility, economic viability, and operational considerations.[17] It is also important to note that there are existing interconnection standards relevant to **V2G DC**. As mentioned in the Draft TEF, the Rule 21 Working Group 3 (R.17-07-007) achieved consensus that Rule 21 – as currently written – sufficiently addresses the V2G DC configuration wherein the inverter is placed inside the EVSE and remains stationary.[18] Additionally, it is worth noting that some existing EV models with bidirectional capabilities (specifically the Nissan Leaf) have already been widely deployed at scale in California and could provide grid services through a V2G DC configuration in the very near term.

Without modifications to the existing interconnection process required under Rule 21, VGIC does not foresee a pathway for **V2G AC** technology to reach scale. This is due to onerous requirements imposed by two separate, misaligned, and potentially opposing regulatory environments in the electricity and transportation sectors. Specifically, the present UL 1741 standard required under Rule 21 is not designed for vehicles and is not practical to incorporate

[17] See, for example, Electric Vehicle Storage Accelerator (EVSA), Intelligent Electric Vehicle Integration (INVENT), Marine Corps Air Station (MCAS) Miramar V2G Microgrid
[18] *Working Group Three Final Report* June 14, 2019 in R. 17-07-007 at 61. https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M309/K943/309943907.PDF

into typical vehicle manufacturing processes. Instead of third party certification, manufacturers rely on a robust process of self-certification to meet the requirements of the regulatory body that oversees automotive product safety outcomes – namely the National Highway Safety Traffic Administration ("NHTSA"). To be clear, the process of self-certification to NHTSA is not a form a "self-regulation" but rather, it reflects strict requirements imposed upon the manufacturer for safety performance and functionality (with severe risks and penalties if these are not met). Under a self-certification approach, the automotive industry is held accountable for meeting certain safety and performance outcomes even in conditions where no standards exist and third-party certification is not possible. Moreover, the NHTSA's regulatory authority is not limited explicitly to driver and passenger safety and as such, its regulatory actions could extend into issues affecting grid safety and reliability. Thus, manufactures are already compelled to ensure their products will not jeopardize those issues. However, we recognize that additional clarity and certainty could aid in the process of gaining trust in the self-certification approach. As such, VGIC has identified several potential pathways that the Commission could pursue to resolve this issue while preserving the ability for OEMs to use self-certification. These pathways were outlined in VGIC's January 6, 2020 comments in response to the V2G AC Subgroup Report and include:

- A CPUC Validation Process
- A Federal Validation Process
- An IOU Uniform Data Request
- Allowing UL 9741 as the Relevant Third-Party Standard

- Establishing OEMs as NRTLs[19]

Several of these pathways contemplate a validated process by which OEMs continue to self-certify to an overseeing regulatory body. This largely builds upon the industry's standard practices for testing, inspection, and compliance with health and safety standards at the existing regulatory body for the transportation sector (i.e. NHTSA), as detailed above.

It is important to note the severity of risk for not meeting safety and functionality requirements currently imposed on OEMs. Any vehicle can be recalled for a retroactive design change or even removed from the market if there is an indication of a problem. Additionally, anyone can report product issues with NHTSA. Therefore, it is in the best interest of the OEMs to avoid safety performance issues, and they are inclined to operate within severe safety limits (including grid safety) to ensure the health and safety of their customers.

Given the current NHTSA regulatory framework and the underlying risks and incentives for OEMs, requiring third-party certification for V2G AC configurations will likely create duplicative and potentially opposing or unworkable regulatory processes. As long as third-party certification is required for interconnection, it will serve as a barrier to scaling VGI.

Some of VGIC's recommended self-certification pathways rely upon SAE standards and testing protocols that are currently in the process of being updated. At the time that VGIC's January 6, 2020 comments were written, it was anticipated that these updates to the SAE standards and protocols for V2G AC systems would be ready in the July 2020 timeframe and could help inform further development of appropriate V2G interconnection pathways. Due to

[19] *Comments of the Vehicle-Grid Integration Council on Vehicle to Grid Alternating Current Interconnection Subgroup Report* (January 6, 2020) in R. 18-12-006 at 5-7.
https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M328/K685/328685720.PDF

COVID-19, these updates have been delayed by approximately 2-3 months. VGIC intends to provide additional details to inform the Commission of the progress on these updates in its Reply Comments. However, even as these updates progress, VGIC believes there are steps that the Commission could be contemplating now to facilitate a viable path for V2G AC interconnection at scale. Specifically, upon completion of the relevant SAE standards, the Commission should host a workshop to revisit the gaps listed in the V2G AC subgroup report.

There also exist bi-directional charging configurations that do not require interconnection standards, such as those capable of providing backup power to temporarily islanded customers. These can be scaled through the deployment of enabling technology and the development of necessary programs to allow customers to be intentionally islanded ahead of a PSPS event.[20] VGIC urges the Commission direct IOUs to implement solutions that enable bi-directional charging to mitigate the impacts of PSPS events.

Additionally, scaling any bi-directional program, whether subject to interconnection standards or strictly occurring in situations where customers or segments of the grid are safely islanded, could provide incremental testing and IOU evaluation of bi-directional systems to deepen IOU understanding of the technology. VGIC believes IOU familiarity and experience with bi-directional systems can help build trust and comfort with the technology, which is needed to alleviate barriers to interconnection and widespread adoption of bi-directional systems.

E. Section 8.2, Question 6(b): How should V2G EVs, which can serve power back onto the grid, be forecasted differently than load-only EVs in IOU planning processes

[20] See, for example, Connect California's proposal for the use of smart meters for intentional islanding of customers in advance of a public safety power shutoff event to enable vehicle-to-home backup power solutions. See *Administrative Law Judge's Ruling Requesting Comments on Track 1 Microgrid and Resiliency Strategies Staff Proposal* January 21, 2020 in R.19-09-009, Attachment A at 14.

VGIC recognizes and appreciates the challenging nature of this question and the implications V2G forecasting decisions are likely to have on IOU planning processes in the future. VGIC posits there are two resource classifications to consider:

"Base case" EVs are load-only EVs with predictable charging profiles. These base case EVs should continue to be forecasted as modifications to load. Meanwhile, VGIC recommends that the VGI functionality of **VGI-enabled EVs** should be treated as a resource in IOU planning processes. More specifically, V1G resources – those shifting or modulating charging time, level, or location – can meet IOU needs that may result from their load forecasts, including needs stemming from any projected growth of base case EVs. This is analogous to treating Demand Response as a resource. Similarly, V2G resources – EVs capable of bi-directional power flow – closely resemble other bi-directional DERs, such as behind-the-meter energy storage, and can provide output to the grid at critical times. Therefore V2G should also be included as a resource (rather than a load modifier) in any forecast used to help determine IOU loads, resources, and resource needs.

In addition, both pilots and scaled implementation of V2G systems are required to better understand customer behavior, including responsiveness to price signals or programs that incent V2G exports. VGIC recommends the Commission continue to authorize innovative V2G pilots and programs that contribute to stakeholders' collective understanding of EV charging and discharging profiles from learned experience.

F. Section 8.1, Recommendation 2: Require that EVSE funded through their TE programs contain networking capabilities and can implement ISO standard 15118 and other communication enabling requirements adopted by the CEC.

VGIC strongly opposes the proposed requirement for all IOU EVSE to implement specific communication standards. As detailed above in VGIC's response to Question 5(a), requiring the implementation of a single protocol or combination of protocols at this time would pose a significant barrier to VGI market development and broader TE deployment. Different communication protocols enable different business models, and requiring a specific protocol or combination of protocols will limit the overall value of VGI to the state of California.

VGIC strongly urges the Commission not to adopt Recommendation 2 and instead, direct IOUs to propose strategies and planned investments to promote VGI use cases and functionalities. These planned investments should incorporate marketing, education, and outreach efforts to generate customer demand for VGI services. Additionally, IOUs should propose a suite of up-front incentives, performance-based incentives, and other programs in their TEPs that would encourage the deployment of EVSE with VGI capabilities.

G. Section 8.3, Question 5: Should the Rule 15/16 exemption that has been offered to residential customers for over ten years be made permanent, or should other revisions to the IOUs' rules be made to help socialize the cost of upstream upgrades that may be triggered by new residential electric vehicle load?

VGIC believes that a more targeted application of the Rule 15/16 exemption should be considered through the lens of historical and expected upgrade costs that are incurred due to "non-program" EV charging load and pursuant to the IOUs' typical business practices. The three IOUs' most recent *EV Infrastructure Cost Report* (formerly the *Load Research Report*) filed April 1, 2020 reports on the following 2019 upgrade costs across the three IOUs:

Table 1. Summary Stats for Selected 2019 EV Impact Costs ($)[21]

	Residential	**Non-Residential**	**Total**
Total Distribution System Costs Incurred by Utility for Upgrades	41,119	1,354,578	**1,395,697**
Total Service Line costs Incurred by Utility for Upgrades	90,933	2,579,652	**2,670,584**
Total Utility side costs	588,702	4,099,614	**4,688,317**
Total Customer Costs	8,013	491,565	**499,578**

These data suggest that the annual upgrade cost burden of non-program EV upgrades is relatively modest, even before considering the offsetting impact of new EV charging revenue, and that the majority of upgrade costs occur for non-residential segments. These data of course reflect the early days of the market, in which most of the vehicle electrification to date has been centered around light-duty vehicles. We should anticipate that these figures will grow in lockstep with increased deployment, and especially once medium- and heavy-duty charging gets integrated into the system in earnest.

VGIC thus believes it is prudent to extend the residential exemption for above-allowance distribution upgrades as a simple way to continue to reduce barriers to EV adoption in the near term. However, in anticipation of adoption ramping up over the next decade and across vehicle classes – and ideally as part of a holistic examination of how all customer segments can receive streamlined access to the provision of EV infrastructure – the Commission should begin to

[21] *Compliance Filing of San Diego Gas & Electric Company (U 902 E), Southern California Edison Company (U 338 E) and Pacific Gas and Electric Company (U 93 E) Pursuant to Ordering Paragraph 2 of Decision 16-06-011* (EV Infrastructure Cost Report), filed April 1, 2020. Data compiled from Table 3 in Attachments 1, 2, and 3. Data assumptions and methodologies for these categories differed between IOUs, as described in pages 7-19. Note that change in methodologies and sectors for this report also renders difficult year-by-year comparisons with previous years' Load Research Reports that solely focused on residential upgrade costs (e.g., PG&E description found in Section 4 of page 11).

consider the role of VGI in limiting the occurrence of ratepayer-funded upgrade costs in the first place. The potential for VGI solutions to limit the occurrence of upgrade costs is explored in the VGI Working Group Final Report, which describes 320 VGI use cases as "able to provide value by 2022". Many of the use cases considered high-value focus specifically on distribution system upgrade deferral.[22]

A straightforward mechanism to mitigate costly distribution system upgrades would be to offer customers tariff-based solutions that promote VGI capabilities, such as a tariff that enables customer choice of Automated Load Management technologies to ensure site capacity, as measured at the Point of Common Coupling, stays within certain limits and avoids the need to upgrade primary or secondary infrastructure. Such an offering would support the deployment and utilization of the flexible charging capabilities of EVs and networked EVSE and would mitigate the ratepayer impact of the state's deployment of EV infrastructure.

H. Section 8.4, General Comment:

VGIC recommends the Commission convene a workshop to discuss the next steps for the Revised Strawman for EV Submetering Protocol, to ensure that the protocol practically enables the marketplace for third-party submetering technologies. Submetering provides the lowest-cost means to maximize customer choice of time-varying and dynamic rates for EV charging and enables a wide variety of configurations for flexible EV charging and discharging to provide services in different energy markets.

[22] See VGI WG Final Report, filed in R.18-12-006 on June 30, 2020 at 8. https://gridworks.org/wp-content/uploads/2020/07/VGI-Working-Group-Final-Report-6.30.20.pdf

A. Section 8.5, Recommendation 6: Consider requiring IOUs to consult with the CEC, Energy Division staff and other stakeholders to propose an emerging technology program scope and budget.

VGIC strongly supports this recommendation. Well-coordinated support for emerging TE and VGI technologies is needed to further develop the pipeline of technologies that will lead the way to California's decarbonized energy and transportation future. The standardized pilot program approach VGIC proposed in Section II of these comments should be considered as one component of an overarching emerging technologies program scope.

IV. SUMMARY OF RECOMMENDATIONS.

In responding to the questions above, VGIC proposes several recommendations, which can be summarized as follows:

Section 7

- Based on existing IOU labs and lessons learned from CEC solicitations, a standardized pilot program should be implemented to test pre-commercial technologies for basic safety and reliability considerations. VGIC proposes a balanced approach that could meet the needs of IOUs and industry participants alike while maintaining progress toward statewide TE goals.

Section 8

- VGIC supports the notion of encouraging IOU EVSE investments to include some form of VGI functionality to maximize the value of these assets. However, VGIC cautions against making this a requirement for IOU EVSE deployments absent a clear definition of "VGI-enabled."
- The requirement for all IOU EVSE to implement a specific communication standard should not be adopted. Implementing such a mandate would incur opportunity costs of an unknown scale as it effectively bypasses opportunities to

save customers money, reduce rates, support the grid, and/or reduce GHG emissions. VGIC instead recommends levers to incentivize the adoption and use of VGI functionalities and use cases, rather than pursue compliance with specific standards.

- V2G activity could be accounted for and/or projected within TEPs by tracking interconnected V2G-compatible EVSE and measuring customer participation in V2G incentives, rates, and/or programs.
- "Base case" EVs should be forecasted as load, while V1G and V2G resources should be treated as available resource options within IOU planning processes. For V2G resources, this aligns with current best practices for behind-the-meter stationary energy storage.
- While V2G DC systems can currently interconnect under Rule 21, the Commission should reconvene the V2G AC subgroup upon standard development organizations' completion/revision of the relevant standards.
- Bi-directional charging configurations that do not require interconnection, such as those intended to provide backup power to temporarily islanded customers, should be pursued.
- A targeted application of the Rule 15/16 exemption should be considered to capture the flexibility VGI strategies can offer. VGIC recommends the adoption of a straightforward mechanism to mitigate costly distribution system upgrades, for example through an Advanced Load Management tariff that enables customer choice.
- The Commission should convene a workshop to discuss the next steps for the Revised Strawman for EV Submetering Protocol to ensure that the protocol adequately enables a marketplace third-party submetering technologies, which can lower cost, increase customer choice, and lift existing barriers to VGI strategies.
- VGIC supports the recommendation for a well-coordinated emerging technology program scope and budget and recommends additional coordination with VGIC's Section 7 recommendation for a standardized pilot program.

V. CONCLUSION.

VGIC appreciates the opportunity to submit these opening comments on the Safety, Technology, and Standards sections of the Draft TEF. We look forward to further collaboration with the Commission and stakeholders on this initiative.

Respectfully submitted,

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