

November 14, 2018

Dear VGIWG sponsoring agencies:

Thank you for the opportunity to respond with comments to the California Public Utilities Commission's (CPUC) and the California Air Resource Board's (CARB) staff proposal to futureproof the EVSE and refocus the work plan of the Vehicle Grid Integration (VGI) working group ("agency proposal") as presented during the October 30<sup>th</sup> VGI working group meeting. These comments represent the individual views of many utility and automaker members of the VGI working group.

We view the agency proposal as positive because it:

- Is not requiring a specific VGI communications protocol
- Is trying to find a common ground among the various stakeholders in order to accelerate VGI by recognizing
  - more time is needed to understand the various VGI issues and determine which VGI solutions will best accelerate EV adoption, including "policy" solutions that are part of Deliverable 3
  - that the EV manufacturers must decide what to put on their EVs as far as a VGI communication protocol
- Is continuing the VGI working group process in 2018 with quarterly meetings and helping to update the 2014 VGI roadmap and implement it
- Is focused on multi-user, public-access level 2 charging and would not mandate futureproofing of charging stations in other tailored charging applications including such as DC charging (home, fleet, corridor and other locations), V2G,<sup>1</sup> wireless (inductive) charging and single-use and private charging stations using AC conductive connectors.<sup>2</sup>

**A compromise solution is the right direction:** Both the stakeholders and the agencies appreciate the complexity of the VGI communication protocol issue as a result of the working group's process. We agree with the agencies that we need a path forward that involves futureproofing of the EVSE and that allows all promising VGI communication pathways to go forward; the working group cannot select a 'winning' VGI communications protocol at this time.

Lack of a uniform communication standard is not the key barrier to VGI, we think that most of the issues in the working group come down to needing to understand cost-effective implementation of VGI solutions for AC charging and that valuing VGI benefits should be the focus going forward.

**The most important part of the path forward is to understand the value of VGI benefits:** In order to make a business case and determine the best VGI communication protocol(s) for their EVs, most automakers need a better understanding of the VGI benefits. We believe the automakers can figure

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<sup>1</sup> The standard development process essentially moves this to out-years.

<sup>2</sup> Fleets, single family detached homes, and single family attached homes are included in the definition of single-use, private charging stations.

out the cost part on their own. Once the automakers and utilities understand the VGI benefits more clearly, then they can develop business cases and improve utility programs. By adopting the agency proposal, we believe that provides the working group with some time to help enable new large scale demonstrations and other actions that can help stakeholders understand the value of VGI. Demonstrations will allow us to understand more about the ability of EV-centric VGI communication solutions (e.g. telematics) and EVSE-centric solutions (e.g., IEC/ ISO 15118 with OCPP or IEEE 2030.5) to connect EVs to the grid in a useful way.<sup>3</sup> This approach also allows a more level playing field for different business models from the automakers and EVSE providers by including communication solutions such as telematics that are not directly affected by the agency proposal.<sup>4</sup>

Two key steps are needed based on similar experience with the stationary storage efforts. We support a VGI value study that looks at promising services and benefit streams in the consolidated VGI benefits framework from Deliverable 1.1.<sup>5</sup> Also we would be supportive of the CPUC, CEC, or other agency authorizing funding for large-scale demonstrations by utilities and others (up to 2000 EVs) of promising use cases in several different charging market segments (including public, fleet, workplace and homes) in order to get validation of the realizable benefits of VGI as well as costs of implementing VGI in real world situations.<sup>6</sup> Timely and coordinated approval of cost recovery or funding would facilitate near-term validation of this VGI value.

**We support the agency proposal on future-proofing the EVSE with the IPv6<sup>7</sup> simplification:** We believe it is important to have a compromise solution for a VGI communication pathway that does not pick a winning communication protocol or combination of protocols and likely avoids risk of costly or underused assets. We believe the agency proposal (including IPv6) should be able to achieve this. However, we caution that a futureproofed charging station in the agency proposal is not a functional station and will require additional costs (e.g. software, certification, physical security) to be implemented in utility programs. These costs should be monitored to the degree possible in case they turn out to be too high.

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<sup>3</sup> By EV to the grid we mean from the PFE to the EV. Demonstrations will also allow better understanding of “one-step”, end-to-end solutions (PFE to EV) and “two step” end-to-end solutions (PFE to EVSE to EV) that require protocol translation, decryption/encryption, etc. Note: PFE is a term the VGI working group developed and it means power flow entity. The PFE is broad term that may include the aggregator, utility, site host, EV service provider, energy service company, alternative energy supplier, energy portal, or clearing house.

<sup>4</sup> One of the most promising solutions is to use automaker telematics solutions as the VGI communication pathway (PFE to EV) where the automaker (or their partner) is the aggregator and no EVSE is needed. Automakers such as General Motors, Ford, BMW, Honda, Tesla, Fiat Chrysler America and potentially others are all pursuing this low cost, low risk solution.

<sup>5</sup> The draft consolidated benefits framework from Deliverable 1.1 lists over 150 types of VGI benefits (monetized and non-monetized) and answers questions such as who needs, what is the need, what meets the need, how is it measured, and how to meet the need.

<sup>6</sup> including determining monetized and non-monetized benefits, costs, performance, trade-offs, and other lessons learned as well as the ability to meet technical and customer requirements

<sup>7</sup> See appendix A discussion on IPv6 and an explanation of what it replaces in the original agency proposal. This IPv6 concept seemed to be the consensus of the VGI working group on the Oct 30 call.

**All the leading contenders for end-to-end VGI communication solutions in AC charging should be accelerated by state agency actions including telematics, IEC/ISO 15118 with OCPP, and IEEE**

**2030.5:** Each of the end-to-end VGI communication solutions have pros and cons and some may best be suited for certain charging market segments. Future proofing the EVSE is not enough to advance VGI communications because some solutions like telematics don't use the EVSE, but the working group has found them to be very promising. Consequently, we believe it is important to try not to advantage EVSE-centric VGI communication solutions over EV-centric ones. Thus, we are recommending a "package solution" to advance both types of VGI communications:

- The agency proposal on EVSE futureproofing<sup>8</sup> should be adopted in the final report as the working group's recommendation to the CPUC
- Along with a commitment to accelerating stakeholder's knowledge of the VGI value proposition in AC charging through large scale demonstrations and other efforts (described above)

Attached in Appendix A are more detailed comments to the specific questions posed on Oct 30 by the sponsoring agencies on the CARB-CPUC agency proposal, including some recommendations for improving the agency proposal.

Again, we appreciate the opportunity to provide these comments.

Sincerely,

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Sunil Chhaya, EPRI

George Bellino, EPRI

Rich Scholer, Fiat Chrysler Automobiles

Dave McCreadie, Ford Motor Company

Jim Tarchinski, General Motors

Robert Uyeki, Honda R&D Americas, Inc.

Mike Bourton, Kitu Systems, Inc.

Lance Atkins, Nissan North America, Inc.

Abigail Tinker, Pacific Gas & Electric

David Goldgraben, San Diego Gas & Electric

Bill Boyce, Sacramento Municipal Utility District

Dean Taylor, Southern California Edison

Dan Mikat, Toyota Motor North America

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<sup>8</sup> Including the recommendations in Appendix A

## **Appendix A**

Please find below our response to questions on the *Concerns to Address* slide as well as technical comments related to the agency proposal and the subsequent discussions from the 10/30/2017 meeting.

### **Would requiring the hardware with the previous criteria encourage scaled EVSP and OEM charging investments that provide VGI capability?**

We suggest one-on-one dialogue with automakers and EVSE providers to answer whether requiring such hardware would lead to investments by them. In addition, we add a word of caution. One of the major concerns with this VGI process and the proposals that have emerged is the unproven assumption that deploying VGI technology will automatically lead to enactment of VGI use cases and provisioning of benefits as described within Deliverable 1 and 2. This question hints at the same conjecture: that deploying this futureproofed EVSE technology will somehow organically lead to VGI. While we agree that this enables the possibility, as do the other proposals to a greater or lesser degree, what will actually need to occur for EVs to be integrated into the grid for VGI purposes is for utility programs to be enabled. This process by necessity involves understanding the VGI benefits/value based on larger demonstrations. This is especially true where new technologies or capabilities are being implemented as is the case with VGI. In short, enabling demonstration of the VGI technologies is just one part of enabling VGI use cases that provide benefits to the grid.

### **How could hardware change over time, given design innovations and new use cases?**

It is unclear if this question refers to the hardware proposed by the PUC and ARB, or to the charging equipment itself. In either case, is it unclear why this is relevant for technologies with limited life span (~10 years). We would instead suggest that the agency proposal to consider a minimum set of hardware (e.g., both the processor and interfaces as proposed and the L2 conductive charger), and defer to future IOU charging infrastructure deployments as it becomes necessary to deploy newer or replacement technologies. In addition, futureproofing is based on what one knows at the time the decision is made, and not based on predicting hardware or software changes. If EVSE hardware upgrades are made within assumed 10 year equipment life, they would be relatively costly, but some EVSE provider business models may include this cost.

### **Do today's commercial EVSEs meet the proposed hardware functions?**

As has been mentioned throughout the VGI Work Group proceedings, outside of small pilots that have been conducted by the utility, EVSP and EV participants, we are unaware of any EVSE to EV VGI communications capable EVSEs that exist in the commercial market today.

### **Can VGI software be implemented within the proposed hardware?**

There is no reason to believe that if designed correctly this proposal would not be able to support any desired VGI software. However, we would again state that the group should be careful not to 'overdesign' the EVSE, thus adding more costs, when it is yet unclear if/how VGI functionality will be adopted and implemented. We would suggest that the CPUC and CARB determine, with clear evidence (and consensus) from stakeholders exactly how much an EVSE that meets this proposal

would cost 'off the shelf' vs baseline costs of EVSEs that IOUs have acquired in their infrastructure programs.

### **Will the hardware proposal assist in vehicle/EVSE/utility connectivity across California?**

We believe that this question pertains less to roaming (charging and being billed on the same account wherever you are) than to allowing VGI communications to exist between the grid and the EV,. We believe that the major constraint related to the existence of this architecture is the support by the EV OEMs of the functionality and supporting interfaces. It would make little sense for the IOUs to develop VGI programs without the vehicle included. . This is apparent in the way the IOUs have commenced pilots related to telematics as these capabilities emerge. We would also point out that, similar to the *Future Proofing the EVSE* proposal by the utilities and automakers, the agency proposal would allow EV OEMs to implement differing VGI communications functionality and protocols either through the EVSE or directly to the EV. However, the functionalities and protocols would still need to be validated in demonstrations and larger-scale utility programs. In addition, as addressed in the letter above, VGI telematics communication solutions (should not be disadvantaged by this proposal.

### **How can utilities and regulators best ensure that EVSEs which include the proposed hardware are functional with grid-integrated vehicle charging?**

As mentioned above and during discussions, we believe that if the goal is to support multiple protocols on the EVSE (aka protocol translation, decryption/encryption, storing white lists, etc.), then the required processing power and onboard memory must be sufficient to do this in near-real time. We would suggest that the experts on the Working Group that work in this area make this determination in coordination and with consensus. If this cannot be done then this should be determined via testing. We would reiterate that regardless of supporting the capabilities, it is unclear if and when these functions will be utilized. Thus, larger scale demonstrations are needed for both EV and EVSE VGI communication solutions with AC charging.

### **Further comments**

- Along with the agency proposal, there were some comments from the working group participants on October 30 that suggested EVSEs support specific northbound physical communications. In our experience with existing infrastructure programs (e.g., SCE's Charge Ready) it is clear that EVSPs have differing communication architectures. Some have implemented cellular communications to the EVSE, others use Zigbee IP (802.15.4) or Wi-Fi (802.11). We would concur and reiterate what seemed to be the outcome of the October 30 discussions, that EVSEs should support IPv6 and HomePlug Green Phy (southbound) and allow communications to be chosen by the EVSPs or IOUs in real world deployments.
- Cybersecurity is critical to the deployment of VGI. For this agency proposal, which is not defining any specific standard(s), the ultimate design of real world deployments must include requirements related to securing the hardware (e.g., anti-tampering) including the storage, processor, and communications cards. Penetration and other necessary testing should also be conducted. We would suggest that to determine these requirements, the agency panel assign

the work to a subgroup to determine the requirements by utilizing as source documents existing cybersecurity requirements and best practices available from the government, non-profit and private sectors.

- For application security, we would suggest the group defer to the standard when a single protocol is used from the grid to the EV (no mapping is required), and for multiple standard implementation<sup>9</sup> defer to the standard development organizations that would be working on the mapping standard (which presumably consist of utility, EV and EVSP stakeholders) to determine cybersecurity functionality.
- The coexistence of differing VGI architectures and functionality should be viewed as beneficial. The agency proposal,<sup>10</sup> in effect, allows for this. It may be that many different VGI programs that meet differing grid needs emerge from this, allowing automaker and charging station manufacturers to determine what provides the most value to their company and consumers. While conflicts may emerge, addressing them is best done when protocol applications and standards are implemented in IOU charging infrastructure demonstrations and programs.
- The agency proposal mentions ‘hardware extensibility’. It is unclear what this means and should be clarified by the CPUC and CARB. As we believe that the only way to extend hardware is to manually install or replace a physical device on the EVSE, this would be prohibitively expensive with thousands or tens of thousands of EVSEs that would need to be touched. As mentioned above, we suggest that real world deployments determine hardware (outside of the agency proposal) and differing hardware be used only upon replacement at end of life or when new utility charging infrastructure programs emerge.
- The agency proposal should ensure that investments be secured against the risk of stranded assets. It is not enough to define a generic processor and IP communications. Even defining a standard would not ensure the VGI communication assets are available. The VGI working group should consider how to ensure that these assets are ‘accessible’ should a provider be replaced or removed for any reason. This should be done with awareness of security requirements.
- Finally, we agree with the agency proposal that private-access locations should not be included, except for large apartments and condos that have unassigned parking in common areas (e.g., multi-user charging stations). Private-access AC charging locations can save substantial amount of money by pursuing lower cost options that still have VGI communications. In addition, a home and fleet’s VGI communication needs can be met by many different customized solutions. Thus an EVSE future-proofing solution is not needed in these locations.

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<sup>9</sup> Multiple standards refer to when two different communication protocols must work together to communicate from the PFE to the EV.

<sup>10</sup> And the original utility-automaker “futureproofing the EVSE” proposal.