



Comments of the Vehicle-Grid Integration Council
on the Proposed Advanced Clean Cars II Battery Durability Requirements

I. Introduction

The Vehicle-Grid Integration Council (VGIC)¹ is a 501(c)(6) membership-based trade association committed to advancing the role of electric vehicles (EVs) and vehicle-grid integration (VGI) through policy development, education, outreach, and research. VGIC supports the transition to a decarbonized transportation and electric sector by ensuring the value from EV deployments and flexible EV charging and discharging is recognized and compensated in support of achieving a more reliable, affordable, and efficient electric grid. VGIC appreciates the opportunity to provide comments to the California Air Resources Board (CARB) on the proposed Advanced Clean Cars (ACC II) regulations, particularly those regarding battery durability requirements.

II. VGI technologies and services stand to play a pivotal role in helping California achieve several important policy goals, including global leadership on greenhouse gas reductions

VGI is a broad term that includes a variety of possible technologies and use cases for EVs to employ unidirectional managed charging (V1G), provide on-site backup power and behind-the-meter customer bill management (Vehicle-to-Building, or V2B), or export power to the grid (Vehicle-to-Grid, or V2G). Additional applications include residential emergency power backup during blackouts and the use of EVs for powering homes during on-peak hours (Vehicle-to-Home or V2H). Importantly, these technologies and services operate at the intersection of two of the largest sectors contributing to California’s overall greenhouse gas (GHG) emissions contribution. Thus, VGI stands to play a fundamental role in helping California achieve its ambitious GHG emissions reduction goals for both of these sectors as described below.

1. VGI aids decarbonization of the transportation sector by accelerating EV adoption

The transportation sector is the largest source of GHG emissions in California, accounting for almost 40% of statewide emissions in 2019.² To address this Governor Newsom’s Executive Order N-79-20 sets a target for 100% of in-state sales of new passenger cars and trucks be zero-emission by 2035

¹ VGIC member companies and supporters include American Honda Motor Co., Inc., dcbel, Enel X North America, Inc., Fermata, LLC., FlexCharging, Inc., Ford Motor Company, General Motors Company, Nissan North America, Inc., Nuvve Corporation, Stellantis N.V., The Mobility House, Toyota Motor North America, Inc., and Veloce Energy, Inc. The views expressed in these comments are those of VGIC, and do not necessarily reflect the views of all individual VGIC member companies or supporters. (<https://www.vgicouncil.org/>).

² CARB. *California Greenhouse Gas Emissions for 2000 to 2019: Trends of Emissions and Other Indicators*. https://ww3.arb.ca.gov/cc/inventory/pubs/reports/2000_2019/ghg_inventory_trends_00-19.pdf

and for 100% of medium- and heavy-duty vehicles in the state be zero-emission by 2045.³ VGI can directly help California achieve these goals by accomplishing the following:

- Reducing the total cost of EV ownership by lowering charging costs and unlocking new revenue streams for EV owners and fleet operators
- Unlocking new customer value proposition beyond mobility, such as home backup power and grid services when a vehicle is not in use
- Unlocking new revenue streams for vehicle manufacturers, thereby improving the business case for scaling up EV product design, manufacturing, marketing, and sales
- Improving the utilization of public charging infrastructure so that investments in charging equipment can stretch further.

2. VGI aids decarbonization of the power sector by providing essential grid services as renewable energy penetration increases

SB 100 requires 100% of electric retail sales to customers in California to be from renewable and zero-carbon energy resources by 2045.⁴ As the share of solar and wind power on the grid increases in support of this goal, a number of essential grid reliability services will need to be provided by clean resources instead of traditional fossil fuel resources. VGI-enabled EVs can play an important role in this transition by providing these services, including:

- Resource adequacy
- Flexible operating reserves (spin and non-spin)
- Frequency regulation
- Frequency response.

Crucially, electric vehicles with VGI capabilities stand to provide a new source of generation to the grid during critical peak load hours. This can assist in avoiding heat wave-driven blackouts, such as those California experienced in August 2020. In fact, in July 2021, Governor Newsom signed an emergency proclamation to expedite clean energy projects that relieve demand on the electrical grid during extreme weather events this summer and in coming years.⁵ In response, the California Public Utilities Commission issued a proposal that included a prominent role for electric vehicles to contribute to this effort.

³ Executive Order N-79-20. <https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf>

⁴ SB 100. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB100

⁵ <https://www.gov.ca.gov/2021/07/30/governor-newsom-signs-emergency-proclamation-to-expedite-clean-energy-projects-and-relieve-demand-on-the-electrical-grid-during-extreme-weather-events-this-summer-as-climate-crisis-threatens-western-s/>

In addition to GHG reductions in the transportation and power sectors, VGI also can assist the achievement of other important policy goals described below.

3. VGI can increase energy affordability by reducing electricity bills for all customers

VGI can increase the affordability of electricity bills in two distinct ways. First, VGI can help limit overall electricity system cost increases and, in turn, limit future customer bill increases. By leveraging already deployed EVs to provide necessary grid services, VGI offers an approach that can be more cost-effective than traditional means of providing the same services. For example, it can reduce the need to build new power plants to meet peak demand. VGI can also provide more flexible resources to manage the integration of wind and solar, and it can take advantage of abundant, low-cost solar energy in the daytime to power EV charging at night. Second, in addition to directly reducing system costs, VGI can help reduce electricity bills, even for non-EV owners. Because VGI plays a role in accelerating EV adoption, it also helps place downward pressure on overall electricity rates by increasing the total volume of electricity sales (i.e., kWh) relative to the grid's fixed costs.

4. VGI can improve grid resiliency and security, including during wildfire risks events

The prospect of more frequent grid reliability events, such as extreme weather events and wildfire risk, creates an urgent need to enhance grid resiliency, as expressed by Governor Newsom's July 31st Emergency Proclamation.⁶ VGI capabilities can be leveraged to reduce EV charging load as well as export power to the grid to help ease peak demand and thus are particularly suitable to support contingency programs under the Emergency Proclamation. Additionally, California's public safety power shutoff (PSPS) events highlight the need for microgrids to support vulnerable communities, as well as the value of on-site backup power for customers experiencing an outage. VGI-enabled vehicles can offer a solution by using EV batteries as a source of backup power during outage events. This approach could provide a relatively cost-effective microgrid solution as well as unlock a new value proposition for customers seeking backup power during a planned or unplanned outage. Meanwhile, by using EVs as sources of backup power, this can provide a cleaner alternative to fossil fuel backup generators in support of state microgrid and resiliency priorities.

5. VGI can foster economic activity through innovation, competition, and market transformation

The multifaceted ecosystem of firms engaged in the VGI marketplace reflects the depth and diversity of private investment. As an example, over 50 automotive original equipment manufacturers (OEMs), EV supply equipment companies, and EV service providers are engaged on the topic of VGI in California. These market participants engage with equipment and software providers, project developers, financiers, engineering, procurement, and construction companies, and operations &

⁶ Proclamation of a State of Emergency. <https://www.gov.ca.gov/wp-content/uploads/2021/07/Energy-Emergency-Proc-7-30-21.pdf>



maintenance experts. VGI is well positioned to leverage existing strengths in the high-tech industry to build a vital new segment of the clean energy and transportation economies.

III. Battery durability requirements set by CARB through ACC II should account for VGI activities

Battery degradation is a complex topic and depends on chemistry, temperature, use case, and other factors. Some VGI activities, especially those utilizing V2B or V2G capabilities, will require additional battery cycling that will impact long-term battery durability. While the exact level of cycling will depend on the specific VGI use case and could vary based on customer behavior, it is reasonable to expect that in the future most EVs could experience some incremental level of degradation due to VGI activities.

Given the extensive public and private benefits that VGI can offer, as detailed above in Section II, it is paramount that any battery durability and warranty requirements CARB establishes for EVs not inadvertently foreclose VGI opportunities. Setting overly-stringent durability requirements that limit VGI activities – whether intentionally or not – conflicts with CARB’s larger mission of reducing emissions and accelerating EV adoption.

VGIC is concerned that the battery durability and warranty requirements currently being considered by CARB under ACC II could place arbitrary restrictions on VGI activities. Based on the public information provided to date, it is not clear to VGIC that CARB has sufficiently accounted for the potential for increased battery cycling that may arise from VGI. VGIC appreciates CARB’s intent to ensure consumer protection and customer satisfaction with EV ownership through robust durability standards. However, overly stringent requirements that constrain battery cycling could also constrain the novel set of value propositions that VGI offers and would otherwise spur EV adoption (e.g., home backup power, payment for grid services, etc.). Overly stringent durability and warranty requirements could drive OEMs to limit the range, performance, and/or state of charge, or take other measures to provide for sufficient degradation margin in later years. As such, VGIC believes that CARB should consider an approach to durability requirements that balances consumer protection via battery longevity with other near-term customer benefits provided through VGI.

To this end, VGIC believes it may be premature for CARB to set durability requirements that are significantly out of step with the international community, which is in the process of trying to address these specific VGI-related concerns. For example, there are ongoing efforts by the Informal Working Group on Electric Vehicles and the Environment under the United Nations Economic Commission for Europe (UN ECE) to develop minimum performance requirements for EV batteries that include V2X considerations. This Working Group is chaired by the US Environmental Protection Agency (EPA) and includes the European Commission, individual European and Asian countries, as well as industry stakeholders from around the world. The overall battery durability requirements currently contemplated by the Working Group is 80% of battery energy after 5 years/100,000 kilometers (km) and

70% after 8 years/160,000 km, much lower than CARB’s proposed durability requirement of 80% of range for 10 years/150,000 miles (240,000 km).⁷ In order to account for VGI activities, the Working Group is also considering a “virtual km” mechanism, in which the energy discharged by the EV battery in V2G/V2B mode is converted to a km equivalent via a predetermined formula.⁸ The total mileage used for confirming the compliance with the performance requirements would consist of the sum of the km driven and the virtual km. While VGIC is not necessarily endorsing this specific approach or methodology, we believe that CARB must implement an agreed upon method to account for VGI battery degradation such as the UN GTR “virtual miles” before adopting a final ACC II regulation. ACC II would then enable manufacturers to determine a path forward for customers to access the various additional services that EVs can provide besides mobility. VGIC believes that reduced stringency on durability standards to accommodate VGI will not only help improve the value proposition of EVs for customers, but will help accelerate California’s transition to a ZEV future.

VGIC is aware that CARB may be considering updates to its current proposal and may share those at the upcoming Fall 2021 workshop. We look forward to reviewing these changes and hope that they will address the issues raised in this letter.

IV. CARB should consider how ACC II could accelerate VGI technologies and services.

CARB has an opportunity in ACC II to not only remove barriers to VGI technologies and services, but also to actively promote VGI as a key strategy to reduce both primary and secondary transportation emissions. VGIC welcomes a more in-depth dialogue on this and offers itself as a resource on VGI topics for ARB staff and decision makers.

V. Conclusion

VGIC appreciates the opportunity to provide these comments and looks forward to working with CARB to ensure that EVs are fully leveraged to support California’s decarbonization goals.

Respectfully submitted,

Ed Burgess

⁷ United Nations Economic Commission for Europe – Informal Working Group on Electric Vehicles and the Environment. *Proposal for a new UN GTR on In-Vehicle Battery Durability for Electrified Vehicles*. <https://wiki.unece.org/download/attachments/128420965/Based%20on%20GRPE-83-09%208%209%20July%202021%20EC%20US%20proposal.docx?api=v2>

⁸ For example, see the following presentation on V2X virtual mileage at the 50th EVE IWG meeting: <https://wiki.unece.org/download/attachments/128420289/Input%20on%20V2X%20virtual%20mileage.pptx?api=v2>



A handwritten signature in black ink, which appears to read "Edward A. Burjan". The signature is fluid and cursive.

Senior Policy Director
Vehicle-Grid Integration Council (VGIC)
vgicregulatory@vgicouncil.org