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Vehicle-Grid Integration Council (VGIC) and Alliance for Automotive Innovation Comments on Bidirectional Charging Roadmap

Additional submitted attachment is included below.

June 26, 2026

California Energy Commission
1516 Ninth Street
Sacramento, CA 95814
Docket Number: 22-EVI-06

RE: Comments of the Vehicle-Grid Integration Council and Alliance for Automotive Innovation on “A roadmap to unlocking the benefits of bidirectional charging”

The Vehicle-Grid Integration Council (VGIC) and Alliance for Automotive Innovation (Auto Innovators) appreciate the California Energy Commission’s (CEC) whitepaper ‘A roadmap to unlocking the benefits of bidirectional charging’ (Roadmap). The CEC has deep expertise in advancing bidirectional charging through efforts such as the Vehicle Grid Integration Lab, the Responsive, Easy Charging Products with Dynamic Signals (REDWDS) grant solicitation, and, most recently, the Charging Interoperability and Collaboration Yard. These projects expand the CEC’s technical expertise to inform bidirectional charging policy development, and VGIC and Auto Innovators support the CEC’s continued project work, research, and analysis to mature and scale this technology.

VGIC is a national 501(c)6 member-based association focused on unlocking flexible electric vehicle (EV) charging and discharging to support a more reliable, affordable, and efficient energy future. VGIC accelerates the market for vehicle-grid integration (VGI) solutions through research, education, and policy engagement. Established in 2020, VGIC represents 40 members, including automotive original equipment manufacturers (OEMs), leading electric vehicle service providers (EVSPs) and aggregators, electric vehicle supply equipment (EVSE) manufacturers and site developers, and non-investor-owned utilities. VGIC prioritizes collaborative engagement with all VGI champions and remains business model- and technology-agnostic.

Auto Innovators represents the full auto industry value chain, including the manufacturers producing most vehicles sold in the U.S., equipment suppliers, battery producers, semiconductor makers, technology companies, and autonomous vehicle developers. Our mission is to work with policymakers to realize a cleaner, safer, and smarter transportation future and to ensure a healthy and competitive auto industry that supports U.S. economic and national security. Representing over 5 percent of the country’s GDP, responsible for supporting nearly 11 million jobs, and driving \$1.5 trillion in annual economic activity, the automotive industry is the nation’s largest manufacturing sector.¹

¹ Alliance for Automotive Innovation. (n.d.). *Resources and insights*. [https:// www . autosinnovate . org/resources/insights](https://www.autosinnovate.org/resources/insights)

We share the CEC’s goal to use bidirectional charging to improve grid reliability, reduce peak demand, and provide additional value to EV customers. We offer the following comments to help realize the Roadmap’s identified benefits.

I. Offer rebates for bidirectional charging equipment.

We support the Roadmap’s conclusion that EVs can provide, “by a wide margin,” the largest contribution to demand flexibility among distributed resources, and that bidirectional charging could provide approximately three times the value of unidirectional managed charging alone.² These conclusions are consistent with other analyses: Pacific Gas & Electric (PG&E) found that bidirectional charging systems could create 859 MW of demand flexibility through 2040 beyond managed charging alone.³ Similarly, the California Public Utilities Commission’s (CPUC) latest Integrated Resource Planning assumptions estimate bidirectional charging can provide more than 13,500 MW of capacity by 2045.⁴

Grant solicitations, such as REDWDS, have been valuable in enabling bidirectional charging projects. However, applying for and managing grants can be costly, complicated, and time-consuming. Successful grant administration typically requires dedicated teams and resources. Alternatively, rebate programs, such as CALeVIP and EnergiIZE, are simpler and easier to access. A dedicated rebate program, or a carve-out within an existing program to provide higher incentives for bidirectional charging systems, could help deploy bidirectional charging systems faster, accelerating implementation of pilot projects that ultimately mature the technology’s development.

II. Work with the California Public Utilities Commission to reduce Rule 21 interconnection application fees.

The three large investor-owned utilities in the state impose an \$800 fee to apply to interconnect bidirectional EV charging systems, which is significantly higher than interconnection fees for solar net energy metering (NEM) systems,⁵ and is the highest interconnection application fee we have observed for such sites across the entire U.S. This fee creates an unnecessary, outsized barrier to bidirectional charging adoption. Revisions to the \$800 fee for non-NEM/non-NBT

² Roadmap at 3.

³ PG&E, Electrification Impacts Study Part 2 Report, January 28, 2026, filed in Rulemaking (“R.”) 21-06-017, [https:// docs . cpuc . ca . gov/PublishedDocs/Efile/G000/M596/K907/596907812.PDF](https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M596/K907/596907812.PDF)

⁴ CPUC, Draft Inputs & Assumptions, 2024 – 2026 Integrated Resource Planning (IRP) at p.111. [https:// www . cpuc . ca . gov/-/media/cpuc-website/divisions/energydivision/documents/integrated-resource-plan-and-long-term-procurement-plan-irp-ltpp/2024-2026-irp-cycle-events-and-materials/2025_draft_inputs_and_assumptions_doc_20250220.pdf](https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energydivision/documents/integrated-resource-plan-and-long-term-procurement-plan-irp-ltpp/2024-2026-irp-cycle-events-and-materials/2025_draft_inputs_and_assumptions_doc_20250220.pdf)

⁵ The current NEM interconnection fees are \$145 (PG&E), \$132 (SDG&E), \$94 (SCE).

systems (such as bidirectional charging systems) are currently being discussed in the CPUC's latest Rule 21 interconnection proceeding.⁶ This is a prime opportunity to address this cost barrier to bidirectional charging. From VGIC's and Auto Innovator's understanding, this \$800 application fee was adopted in 2000⁷ with the assumption that mostly large stand-alone battery storage systems would apply under the non-NEM/non-NBT pathway. The fee was set at this high amount arbitrarily. Given the industry has evolved, and small-scale bidirectional charging systems are put into this category and require an \$800 fee to apply for interconnection, we encourage the CEC to work with the CPUC to right-size this cost in the Rule 21 update so that it does not create an unnecessary financial barrier to deploy bidirectional charging systems.

III. Work with the California Public Utilities Commission to develop rates and/or programs that compensate bidirectional charging customers for exports.

We agree with the Roadmap that drivers are not well compensated for exporting power to the grid from bidirectional charging systems. Without export compensation or participation pathways for grid services, customers may increasingly use these systems for onsite consumption and backup power. While these use cases are still valuable, they are less likely to support the grid during peak periods, exacerbating electricity affordability concerns.

We encourage the CEC to work with the CPUC to expand export rates, programs, and/or market integration opportunities for bidirectional charging systems, which will encourage technology providers to continue developing grid-supportive products, and ensure that California captures substantial reliability and ratepayer benefits identified throughout the Roadmap.

We also encourage the CEC to advance export credit opportunities beyond those considered by the CPUC. For example, the CEC's Demand Side Grid Support program is an important opportunity to create export credits for these systems; it's Load Management Standard also drives modernized utility rate design across the state, and updating the standard may be an appropriate place to discuss export credit opportunities.

IV. Adopt low-cost alternatives to deploy solar-paired bidirectional charging systems.

Based on input from our members, we estimate that 50 to 70 percent of California's early adopters of residential bidirectional charging systems also have rooftop solar. Currently,

⁶ Alice Reynolds. California Public Utilities Commission. *Assigned Commissioner's Scoping Memo and Ruling*. Rulemaking 25-08-002. Issued March 3, 2026. [https:// docs. cpuc. ca. gov/PublishedDocs/Efile/G000/M601/K158/601158095.PDF](https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M601/K158/601158095.PDF)

⁷ Loretta M. Lynch et al. California Public Utilities Commission. *Decision Adopting Interconnection Standards*. Rulemaking 99-10-025. Issued December 21, 2000. [https:// docs. cpuc. ca. gov/PublishedDocs/WORD_PDF/FINAL_DECISION/4117.PDF](https://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/4117.PDF)

investor-owned utility customers using both legacy NEM tariffs and the latest net billing tariff (NBT) who install bidirectional charging systems, **including non-export, grid-parallel systems**, must install a net generation output meter (NGOM) on the NEM/NBT-eligible system.⁸ The NGOM data measures the customer's NEM/NBT credits, ensuring "NEM integrity."

Installing residential NGOMs increases costs (by hundreds to, in some cases, thousands of dollars) and delays for customers, which erases the value of residential bidirectional charging systems.

The CPUC has adopted policies to allow other technologies to use low-cost alternatives to NGOMs, but currently excludes bidirectional charging systems, creating an artificial cost barrier that picks technology winners and losers. We encourage the CEC to work with the CPUC to create parity between technologies; we offer some options below for consideration.

Option 1: Today, small NEM or NBT residential solar customers who add stationary energy storage can maintain NEM integrity using a zero-cost estimation methodology, which credits the NEM/NBT system based on estimated production. A customer's measured exports could exceed solar production, but their NEM/NBT credit would never exceed the estimated NEM/NBT production. However, because California's large investor-owned utilities do not, based on our understanding, consider bidirectional charging systems as NEM/NBT-eligible energy storage systems, they cannot use the estimation methodology, trapping them into using NGOMs via NEM/NBT-Multiple Tariff. The CEC should work with the CPUC to explore the necessary policy changes to expand the use of the zero-cost estimation methodology for NEM/NBT-paired bidirectional charging systems. One change could be to revise the language of NEM/NBT-Multiple Tariff so that NEM/NBT-paired bidirectional charging customers could use the estimation methodology. Another change could be to deem bidirectional charging systems as NEM/NBT-eligible energy storage systems, thereby allowing NEM/NBT-paired bidirectional charging systems to use the estimation methodology as existing small NEM/NBT-paired stationary storage systems do today. There may be other policy solutions to unlock the estimation methodology treatment for NEM/NBT-paired bidirectional charging systems, and Auto Innovators and VGIC are available to work with CEC, CPUC, and other stakeholders to consider them.

Option 2: Another alternative is to use embedded submetering in the customer's equipment. Under subtractive billing, which the large investor-owned utilities have been directed to establish under an August 2022 CPUC Decision, NEM/NBT-eligible energy (kWh) could be separated

⁸ The NGOM is required under NEM-Multiple Tariff (NEM-MT) and NBT-Multiple Tariff (NBT-MT), which was created in anticipation that customers may install exporting non-NEM/NBT systems beside NEM/NBT-eligible systems.

from bidirectional charging system energy (kWh) to determine appropriate compensation for each system.⁹ However, the August 2022 CPUC Decision denied an extension of eligibility for Plug-In Electric Vehicle Submetering to customers with NEM systems, noting that it “presents a complex situation.”

Lastly, California’s transition from legacy NEM to newer marginal-cost-based export credits, such as NBT (based on the CPUC’s Avoided Cost Calculator) and, eventually, dynamic export rates, fundamentally eliminates the need to ensure NEM integrity. NEM integrity is important when customers receive export credits that exceed the marginal benefits they provide to the grid. Measures to ensure NEM integrity, such as the estimation methodology or the installation of a costly NGOM, ensure that only energy from the NEM-eligible system (i.e., renewable generation) receives NEM credit. However, when customers receive export credits equal to the marginal benefit to the grid, for example, NBT credits based on the CPUC’s adopted Avoided Cost Calculator (ACC), the source of energy is no longer relevant. An April 2026 CPUC Decision rejects one such proposal, which would have applied CPUC ACC -based values, using the same averaging methodology for NBT customers, to bidirectional charging customers.¹⁰ We recommend that the CEC work with the CPUC to consider expanding technology-specific marginal cost-based export compensation to a technology-agnostic model.

V. Work with the California Air Resources Board (CARB) to ensure its impending EV battery durability and warranty requirements properly account for bidirectional charging use.

When CARB first adopted Advanced Clean Cars II, it required automotive manufacturers to:

- Warrant that EV battery state of health would not deteriorate to less than 70 percent (which increased to 75 percent over time) for eight years or 100,000 miles, whichever occurred first.¹¹
- Design EV batteries so that they retain at least 70 percent of the certification range value (which increased to 80 percent over time) for a useful life of 10 years or 150,000 miles, whichever occurred first.¹²

As CARB begins its new Drive Forward rulemaking, it may again consider EV battery durability and warranty requirements. However, the original requirements did not fully account for bidirectional charging’s effect on battery state of health. If future requirements similarly do not

⁹ See CPUC Decision 20-08-024. *Decision Adopting Plug-In Electric Vehicle Submetering Protocol and Electric Vehicle Supply Equipment Communication Protocols*. [https:// docs. cpuc. ca. gov/PublishedDocs/Published/G000/M496/K419/496419890.PDF](https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M496/K419/496419890.PDF)

¹⁰ See CPUC Decision 26-04-033. *Decision Regarding Southern California Edison Company’s Application to Establish Marginal Costs, Allocate Revenues and Design Rates*. [https:// docs. cpuc. ca. gov/PublishedDocs/Published/G000/M606/K032/606032513.PDF](https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M606/K032/606032513.PDF)

¹¹ California Air Resources Board. Section 1962.8, Title 13, California Code of Regulations.

¹² California Air Resources Board. Section 1962.4, Title 13, California Code of Regulations.

account for bidirectional charging, they could create significant financial risk for automotive manufacturers. Replacing an EV battery can cost \$5,000 to \$25,000^{13,14}, so replacing even a small number of battery electric vehicles through recalls or warranty claims could, in a worst-case scenario, total hundreds of millions of dollars. This uncertainty may discourage manufacturers from broadly offering bidirectional charging features across EV models or significantly increase EV prices to account for these risks, which could inhibit EV adoption and undermine the state's broader clean energy, grid reliability, and resiliency goals.

We believe including virtual miles in any durability and warranty mileage requirements best accounts for bidirectional charging impacts. When discharging energy from a battery for bidirectional charging purposes, the energy (kWh) can be accurately converted into an equivalent mile traveled. Including this calculation more accurately reflects a battery's state of health and could be easily accessible to the driver through the vehicle display. We look forward to discussing this methodology further and encourage the CEC to work with CARB to ensure their requirements do not unintentionally inhibit the development of bidirectional charging features.

Conclusion

VGIC and Auto Innovators appreciate the opportunity to provide these comments and commend the CEC for continuing to advance bidirectional charging in California. The Roadmap appropriately recognizes the substantial reliability, affordability, and resilience benefits that bidirectional charging systems can provide. Continued coordination across state agencies to reduce interconnection barriers, expand compensation opportunities, and support scalable deployment will be critical to ensuring California captures the full value of this growing flexible energy resource.

Respectfully submitted,

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¹³ Recharged. *How Much Does It Cost to Replace an Electric Car Battery in 2025?* <https://recharged.com/articles/how-much-to-replace-electric-car-battery>.

¹⁴ Witt, J & Najman, L. *Electric Car Battery Replacement Costs*. Recurrent. December 3, 2024. <https://www.recurrentauto.com/research/costs-ev-battery-replacement>.