

DOCKETED

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Voltu Motor Onboard High-Power V2GV2X for Electric Vehicles

Additional submitted attachment is included below.



Electric Program Investment Charge 2026–2030 (EPIC 5) Research Concept Proposal Form

The California Energy Commission (CEC) is currently soliciting research concept ideas and other input for the Electric Program Investment Charge 2026–2030 (EPIC 5) Investment Plan. For those who would like to submit an idea for consideration, please complete this form and submit it to the CEC by **August 8, 2025**. More information about EPIC 5 is available below.

To submit the form, please visit the e-commenting link:
<https://efiling.energy.ca.gov/EComment/ECommentSelectProceeding.aspx> and select the Docket **25-EPIC-01**. Enter your contact information and then use the “choose file” button at the bottom of the page to upload and submit the completed form. Thank you in advance for your input.

EPIC 5 Research Concept Proposal Form

- 1. Please provide the name, email, and phone number of the best person to contact should the CEC have additional questions regarding the research concept:** George Gebhart, jgebhart@voltumotor.com, (415) 963-2206
- 2. Please provide the name of the contact person’s organization or affiliation:** VOLTU MOTOR INC
- 3. Please provide a brief description of the proposed concept that you would like the CEC to consider as part of the EPIC 5 Investment Plan. What is the purpose of the concept, and what would it seek to do? Why are EPIC funds needed to support the concept?**

Project Title: Onboard High-Power V2G/V2X for Electric Vehicles

Project Summary

Voltu Motor proposes to develop a revolutionary vehicle onboard vehicle-to-everything (V2X) technology for electric vehicles, leveraging its patented Initio™ bidirectional inverter. This project will transform electric vehicles into high-capacity, mobile Distributed Energy Resources (DERs) capable of providing up to 200kW of power directly to the grid (V2G), other vehicles (V2V),

or critical infrastructure (V2X). Unlike competing solutions that require bulky and expensive external DC charging and DC-AC equipment, our onboard system eliminates external hardware, reducing deployment costs, complexity, and footprint. This initiative directly supports California's goals for grid resilience, decarbonization, and energy independence by unlocking the latent energy storage capacity of commercial vehicle fleets.

Technological Innovation

This project builds upon Voltu's core intellectual property: the Initio™ bidirectional inverter. This technology already enables AC fast charging and V2V fast sharing by utilizing the vehicle's own motor and inverter as a high-efficiency, bidirectional power conversion unit. Our current system represents a significant breakthrough, offering power levels an order of magnitude greater than the typical 11 to 19kW onboard chargers.

This grant will fund the critical next steps to improve this proven V2V platform for full V2G and V2X functionality, enabling electric vehicles to serve as flexible, powerful assets to stabilize California's energy grid and provide mobile emergency power.

Project Objectives and Key Activities

To achieve our goal, this project will focus on the following key objectives:

1. **Develop a Certified High-Power 3-Phase Connector:** Engineer and certify a novel 3-phase vehicle connector capable of safely and reliably handling high-power bidirectional energy flow. This development will leverage the North American Charging Standard (NACS) framework as a baseline to ensure future compatibility and widespread adoption.
2. **Develop and Implement V2X Communication and Safety Protocols:** Design the control strategy and firmware to enable secure and seamless interconnection with the grid and other loads. This will be based on established international standards such as ISO 15118 and IEEE 2030.5 to ensure interoperability, cybersecurity, and safe operation.
3. **Engineer Onboard V2X Hardware and Software:** Develop and integrate the necessary onboard circuitry, control units, and embedded software required to manage grid synchronization, power quality, and advanced safety functions within the vehicle.

4. **Create a Comprehensive Energy Management Platform:** Develop a sophisticated software suite for managing energy dispatch. This platform will include a secure cloud backend, a web-based portal for fleet managers, and intuitive mobile applications (iOS and Android) for drivers, enabling multi-vehicle coordination and energy market participation.
5. **Achieve Full System Certification and Validation:** Conduct rigorous testing and validation of the complete system to ensure performance, reliability, and safety. This includes securing all necessary certifications and homologations (e.g., UL, FCC, SAE) to guarantee compliance with grid interconnection and automotive standards.

Benefits to California

This technology will deliver significant benefits to California by:

- **Improved Grid Resilience and Stability:** By empowering electric vehicles to dispatch energy during peak demand hours, this technology will help mitigate strain on the grid, reduce the reliance on carbon-intensive peaker plants, and decrease the frequency of grid-related disruptions.
- **Accelerating Decarbonization:** The V2G capability directly contributes to a cleaner grid by facilitating greater absorption of intermittent renewable energy sources (solar and wind) and displacing fossil-fuel-powered peaker plants, significantly reducing CO₂ emissions.
- **Providing Mobile Emergency Power:** V2X-ready trucks will serve as reliable, mobile power stations during public safety power shutoffs (PSPS), natural disasters, or other emergencies, providing power to critical facilities, businesses, and off-grid consumers without the need for diesel generators.

Justification for EPIC Funding

EPIC funds are crucial for overcoming the significant financial barriers associated with this pioneering development. Specifically, funding will be allocated to the complex and capital-intensive tasks of: (1) research and development of the novel V2X hardware and software stack; (2) the design, prototyping, and testing of the specialized high-power 3-phase connector; and (3) navigating the costly and lengthy process of system-level

certification and homologation with multiple regulatory bodies. This investment will accelerate the deployment of a critical grid-stabilizing technology, creating a template for the electrification and grid integration of commercial fleets across California.

4. In accordance with Senate Bill 96¹, please describe how the proposed concept will "lead to technological advancement and breakthroughs to overcome barriers that prevent the achievement of the state's statutory energy goals." For example, what technical and/or market barriers or customer pain points would the proposed concept address that would lead to increased adoption of clean energy technology or innovation? Where possible, please provide specific cost and performance targets that need to be met for increased industry and consumer acceptance. For scientific analysis and tools, provide more information on what data and information gaps the proposed concept would help fill, and which specific parties or end users would benefit from the results, and for what purpose(s)?

The Voltu Initio™ Technology Platform represents a significant technological advancement by integrating patented, high-power (up to 200kW) bidirectional inverter hardware with a comprehensive new software, communications, and safety framework. This complete system is a breakthrough that overcomes critical barriers to achieving California's statutory energy goals.

- **Infrastructure-Light Solution:** This provides potential savings exceeding "\$100,000 per charger", which is a major financial roadblock to widespread EV adoption.
- **Grid Interconnection and Flexibility:** This allows vehicles to serve as powerful Distributed Energy Resources (DERs) that can provide up to 200kW of power to the grid (V2G).
- **Widespread Interoperability:** The development and certification of a novel 3-phase vehicle connector and adherence to international standards like ISO 15118 and IEEE 2030.5 will

¹ See section (a) (1) of Public Resources Code 25711.5 at: https://leginfo.ca.gov/faces/codes_displaySection.xhtml?lawCode=PRC§ionNum=25711.5.

ensure interoperability, cybersecurity, and safe operation across the grid and various loads.

This complete V2X solution will enhance grid flexibility and resilience, addressing challenges like "long timelines for energizing and interconnecting new clean loads and resources".

The following key activities are targeted for increased industry acceptance and will be measured by the project:

- Engineering and certifying a novel 3-phase vehicle connector.
- Developing the control strategy, firmware, and embedded software for secure and seamless interconnection.
- Creating a comprehensive software suite for managing energy dispatch.
- Achieving all necessary certifications and homologations (e.g., UL, FCC, SAE) to guarantee compliance.

5. **Please describe the anticipated outcomes if this research concept is successful, either fully or partially. For example, to what extent would the research reduce technology or ratepayer costs and/or increase performance to improve the overall value proposition of the technology? What is the potential of the innovation at scale? How will the innovation lead to ratepayer benefits in alignment with EPIC's guiding principles to improve safety,² reliability,³ affordability,⁴ environmental sustainability,⁵ and equity?⁶**

² EPIC innovations should improve the safety of operation of California's electric system in the face of climate change, wildfire, and emerging challenges.

³ EPIC innovations should increase the reliability of California's electric system while continuing to decarbonize California's electric power supply.

⁴ EPIC innovations should fund electric sector technologies and approaches that lower California electric rates and ratepayer costs and help enable the equitable adoption of clean energy technologies.

⁵ EPIC innovations should continue to reduce greenhouse house gas emissions, criteria pollutant emissions, and the overall environmental impacts of California's electric system, including land and water use.

⁶ EPIC innovations should increasingly support, benefit, and engage disadvantaged vulnerable California communities (DVC). (D.20-08-046, Ordering Paragraph 1.) DVCs consist of communities in the 25 percent highest scoring census tracts according to the most recent version of the California Communities Environmental Health Screening Tool (CalEnviroScreen), as well as all California tribal lands, census tracts with median household incomes less than 60 percent of state median income, and census tracts that score in the highest 5 percent of Pollution Burden within CalEnviroScreen, but do not receive an overall CalEnviroScreen score due to unreliable public health and socioeconomic data.

If successful, this research concept will lead to several key outcomes:

- **Enhanced Grid Resilience:** The project will enable trucks to serve as powerful DER. Providing a viable alternative to less-efficient, carbon-intensive solutions.
- **Increased Technology Performance and Value Proposition:** The project will deliver a fully certified and validated V2X system, including a high-power 3-phase connector and a comprehensive software suite.
- **Potential at Scale:** Voltu will deploy over 14,000 units within 36 months, showing broad-scale adoption across diverse commercial sectors.
- **Environmental Sustainability:** The technology's V2G capability reduces the need for carbon-intensive peaker plants, lowering CO2 emissions from energy generation.
- **Equity:** The technology's ability to provide mobile power can serve as a vital resource for communities during outages or emergencies, directly benefiting disadvantaged and low-income communities.

6. Describe what quantitative or qualitative metrics or indicators would be used to evaluate the impacts of the proposed research concept.

- 1. V2X System Development and Certification:**
 - i. Completion of engineering and certification of the 3-phase connector.
 - ii. Successful design and integration of V2X communication and safety protocols (ISO 15118, IEEE 2030.5).
 - iii. Development and deployment of the comprehensive Energy Management Platform software suite.
 - iv. Achievement of all necessary certifications and homologations (e.g., UL, FCC, SAE).
- 2. Pilot project and case study for:**
 - i. **Grid Impact:** Monitoring power quality impacts, demand profiles, and the potential for grid services (e.g., peak load reduction, V2G, V2V support for localized needs).
 - ii. **Environmental Impact:** Calculation of direct and indirect Greenhouse Gas (GHG) emission reductions based on

electricity consumption and the decarbonizing California grid mix, leveraging the project's V2G capability to reduce reliance on peaker plants.

7. Please provide references to any information provided in the form that supports the research concept's merits. This can include references to cost targets, technical potential, market barriers, equity benefits, etc.

The research concept's merits are fundamentally supported by Voltu's patent, US10,252,629B2, which provides the starting point and key differential for the entire project.

The project is a direct extension of this core intellectual property. The patent enables a revolutionary onboard V2X system, allowing electric vehicles to function as high-capacity DERs capable of delivering up to **200kW of power** for V2G, V2V, and V2X applications. The proposal focuses on leveraging this proven platform to achieve full grid integration.

8. The EPIC 5 Investment Plan must support at least one of five Strategic Goals:⁷

Please describe in as much detail as possible how your proposed concept would support these goals.

- **Distributed Energy Resource Integration & Building Decarbonization:** The project's primary goal is to transform the Voltu3 vehicles into a powerful, grid-integrated DER. The high-power V2X capabilities, enabled by the new software platform and certified hardware, will allow the vehicle to provide direct grid support services.
- **Achieving 100 Percent Net-Zero Carbon Emissions and the Coordinated Role of Gas:** Project will enable vehicles to supply energy during peak demand periods, the technology reduces the need for less-efficient, carbon-intensive peaker plants. Also, the direct replacement of diesel trucks with zero-emission Voltu trucks also leads to significant reductions in tailpipe Greenhouse Gas (GHG) emissions.