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Mobile Battery for Heaby Duty EV Charging

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.

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:

Anthony Wexler, aswexler@ucdavis.edu, +1-530-574-8813

2. Please provide the name of the contact person's organization or affiliation:

EV Everywhere, LLC
312 Pleasant Hill Avenue North, Sebastopol, CA 95472
Professor Anthony Wexler is the co-founder and Chief Technology Officer

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?

The Problem: Due to the rapid electrification of transportation, a mandate to replace fossil fuels with renewable energy, and a record number of major fires, the need to repair and expand the transmission grid has overwhelmed California's utility companies.

As a result, California has a large backlog of projects connecting new infrastructure to the grid. This is limiting the ability of utilities to provide the power needed to charge pollution-reducing electric semi-tractors, buses and heavy-duty equipment. It is also hampering California's economic growth, including delays in construction of new affordable housing developments, bringing new utility scale solar and wind online.

In addition, energy is often needed in places where the electricity supplied by the distribution grid is lacking, due to emergencies, costs or logistics. With the diminished cost of battery storage systems, mobile battery charging stations can be economically and environmentally advantageous for charging vehicles and stationary battery arrays.

The Solution: This proposal is to fund the research and development of “EVE,” a mobile battery charging station that bypasses the distribution grid, An EVE is a 5 MWh battery electric storage system and multiple Megawatt Charging Systems (MCSs) all mounted on a semi-trailer. EVEs can bring affordable electricity to locations where grid capacity is insufficient to meet demand.

Our patent pending solution will capitalize on breakthroughs in the weight and cost of lithium batteries, combined with attached bidirectional MCSs, to form the world’s first high capacity, cost efficient, fully mobile battery charging station.

High-capacity mobile battery charging stations would provide numerous public benefits. These include:

1) Supporting the electrification of the heaviest polluting vehicles and equipment on the road by providing chargers and competitively priced energy where and when it is needed, without infrastructure costs or long wait times for new distribution lines.
2) Providing critical climate adaptation energy resilience by enabling the distribution of energy to islanded energy systems when the grid goes down from disasters such as wildfires, storms or earthquakes.
3) EVEs would assist with decarbonization by alleviating grid demand because it could shift solar energy from overabundant daytime hours to nighttime ones by charging the EVE during the day at utility sub-stations, then driving to locations lacking grid access to charge heavy duty EV’s or battery arrays at night.

EPIC funds are needed to support the development of this concept because battery storage is the fastest growing segment of the renewable energy market, and manufacturers are today fully occupied meeting existing demand with their existing product. This early stage innovation is built around breakthrough technological advances in battery density and MCS charging. The sooner it can be developed, the sooner the significant benefit that a grid-enhancing electricity distribution system can be available to the public.

4. *In accordance with Senate Bill 96[i], 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 current electric grid in California was not built to handle new renewable energy sources, such as utility scale solar, nor new renewable energy uses, such as electric vehicles. It has not been possible for utilities to keep up with the unprecedented demand for new transmission and distribution infrastructure due to other priorities, such as wildfire mitigation. In addition, the nationwide shortage of power engineers, NIMBYism, and regulatory barriers have stalled progress. The proposed technology will overcome these barriers, because it does not need local regulatory approval, since there is no additional infrastructure in locations where the EVEs will charge vehicles or stationary batteries.

The proposed technology will speed the adoption of electric semi-tractors which will decrease both greenhouse gas emissions and the emissions of carcinogenic diesel exhaust.

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,[ii] reliability,[iii] affordability,[iv] environmental sustainability,[v] and equity?[vi]

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

EVEs can be used in disasters to supply electricity until the grid is restored. This is important for critical infrastructure such as hospitals. It is also important for the utilities themselves. When utility trucks are electric, they cannot be charged when the grid is down. A lead innovation officer at a major investor-owned California utility that we discussed this with was excited about this technology because it can be used to bring electricity to their electric truck fleet in the field, supplying them needed power while

they repair the grid.

EVEs can become mission critical safety resources in times of weather emergencies, fires, cyberware, and ransomware, when the transmission grid might be brought down in multiple locations. EVEs will be able to move power from substations or even directly from solar farms to locations where the grid has been shut down, bringing life saving energy and resilience where and when it is most needed.

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

Battery Energy Storage Systems (BESSs) provide grid stability and electricity during times when demand exceeds supply. Having trailer-mounted BESSes with built in bidirectional MCS chargers means that large amounts of power can be deployed quickly to parts of the service territory lacking sufficient power.

Affordability: *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.*

The EVE mobile battery charging station innovation would, by definition, supply energy where transmission or distribution lines are insufficient or too expensive to extend. This could save ratepayers the need to pay billions of dollars for new transmission and distribution lines, which are estimated to cost $3 for every dollar spent.

Business and government truck and bus fleet operating ratepayers would also be spared the cost of installing and maintaining EV charging infrastructure, reducing their cost of converting to electrical vehicles.

Lastly, by charging EVEs during the day when wholesale electricity rates are low, due to large amounts of solar power in California, and using it during the evening and nighttime hours to charge EV trucks and stationary BESSes, EVEs will create an arbitrage for utility companies to utilize excess solar power profitably and efficiently.

Environmental Sustainability: *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.*

The proposed trailer-mounted BESSs would shift renewable solar energy from daytime to nighttime hours and would charge electric semi-tractors and other electric fleet vehicles, thereby reducing dependence on fossil fuels.

Equity: *EPIC innovations should increasingly support, benefit, and engage disadvantaged vulnerable California communities*

During power blackouts caused by fires, weather emergencies, ransomware or cyber warfare, low-income Californians and senior citizens in nursing homes do not have the financial means to travel far from impacted areas and then rent hotel rooms. Mobile battery charging stations can provide a means of delivering clean electricity to power storage batteries at local gyms, public buildings, senior facilities and low-income housing, so that disadvantaged and vulnerable Californians can be safely sheltered for extended periods of time during power outages.

In addition, low-income renters are less likely than homeowners to shift to electric vehicles because they cannot charge at home. Apartment landlords do not have an incentive to install expensive vehicle charging infrastructure. The proposed technology would enable electric vehicles to be charged in the parking lot of large apartment complexes, with no additional infrastructure or investment by the landlord.

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

The success of our proposed mobile battery charging system will be clearly demonstrable and easy to measure. **Our objective is to overcome the existing challenges to deploying mobile power affordably to locations when and where the transmission grid is inaccessible or inadequate.**

The qualitative metrics of success would be the technological success of integrating MCS chargers onto a mobile 5 MWh BESS mounted on a trailer (an “EVE”), charging it with power at a substation, transporting it on a roadway, quickly conditioning it for discharge without a trained engineer, and then using it to quickly charge a stationary BESS on location or heavy duty EV vehicles.

The quantitative metrics of success would be that EVEs can deliver power at a rate similar to the prevailing rate for end users but with lower infrastructure costs. We are building this to be a market driven solution that can reliably deliver electricity at a cost of about 40 cents a kWh.

Another quantitative measure of success would be market-driven orders placed for mobile battery charging stations placed by utility companies or their clients.

As lithium batteries become lighter per kilowatt, mobile charging of off grid power systems is likely to grow into a multi-billion dollar a year business. The largest qualitative measure of success of this innovation would be that EVE enables California to pioneer an important new renewable energy product category.

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.

During the past year, we have discussed the benefits, cost models, and market demand of our EVE mobile battery charging station with dozens of energy experts in government and industry. We have found a widespread appreciation of the need for quickly deployable, non-polluting off grid mobile charging for heavy duty EV's, off road equipment, and BESSes.

We recently submitted a cost analysis of the EVE innovation to UC Riverside CE-CERT for the Alternative Charging Solutions study that they are currently undertaking for CARB.

Based on a price to a utility client of .40/kWh, we estimate that an EVE could supply 5 MWh of electricity per night, for 250 days a year, resulting in gross revenues of $500,000 per year.

We estimate that a commercial 5 MWH EVE with four on board MCS chargers would, when it became available in 2028, cost a utility company $2 million. Self-amortizing utility bonds at 5% with a 20-year payout would cost $160,000 per year. Filling the batteries with inexpensive solar during peak daytime generation, at a wholesale cost of .05/kWh, would cost utilities $62,500/year. Service contracts with the BESS and MCS charger manufacturers who license our EVE technology would run 5%, adding $100,000 per year. The fourth expense would be utility company union drivers to deliver and pick up the EVEs. We estimate four hours per day of labor per day, at $100 per hour, multiplied by 250 days, amounting to $100,000 per year.

After all expenses, we estimate that a utility company would have a profit of $77,000 per year per EVE, or $0.06 per kWh.

This would be incremental revenue for a utility because by definition EVEs would serve clients who are unable to access sufficient power from the existing grid. It would reduce pressure on utilities to meet some of the new demand for energy. It would, in all cases, be faster to deploy than new transmission and distribution grid capacity. And in some

cases, it might also prove less expensive, and less environmentally damaging, than expanding the grid.

In early discussions, a major California utility expressed an interest in the mobile battery charging station, in prototyping it, and if the innovation is successful, ordering numerous EVEs for its growing fleet of electric utility service vehicles. We were informed that the utility would find EVEs especially helpful in charging their electric trucks that need to work at locations damaged by fires or storms.

We received similar encouragement from the technology director of one of the world's largest real estate companies for warehouses, distribution centers and industrial parks. "The issue of portable power sources that bypass the grid", he said, "is existential if not solved the right way- if it costs $500 to mobilize 500 kilowatt hours of power."

If utilities were able to deliver mobile battery charging for his clients at 40 cents a kilowatt, he said, "Now there's a business opportunity."

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

a. Transportation Electrification
b. Distributed Energy Resource Integration
c. Building Decarbonization
d. Achieving 100 Percent Net-Zero Carbon Emissions and the Coordinated Role of Gas
e. Climate Adaptation

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

The proposed system would support the following Strategic Goals

a. Transportation Electrification. The primary goal of this proposal is to enable charging of electric heavy duty trucks and semi-tractors. Charging electric trucks and semi-tractors would be accomplished by filling the EVE trailer mounted 5 MWh BESS at an existing investor-owned utility substations, then driving to a location where electric trucks and semi-tractors are not able to currently obtain the power they need. There, heavy duty EV trucks and semi fleets would use the on board MCS system to quickly charge, without the need for infrastructure at the charging location.

c. Building Decarbonization. The decarbonization of electricity and transportation requires the largest expansion of grid capacity in history. Supplying power through mobile battery charging, without a transmission or distribution line going to every power source, will be critical to some applications. It is a necessary tool in the toolbox of decarbonization strategy.

d. Achieving 100 Percent Net-Zero Carbon Emissions and the Coordinated Role of Gas. By allowing affordable distributed power alongside the grid, mobile battery charging station technology can overcome the challenging chicken and egg dilemma of charging infrastructure and capacity that is slowing the electrification of the most polluting heavy duty diesel vehicles:

e. Climate Adaptation. During the past decade, California has experienced the largest wildfires in its history, causing widespread blackouts, and long bottlenecks for repairing transmission and distribution lines. The provision of emergency power has been slow, limited, and polluting. Charging electric vehicles and equipment, whether for people, emergency services, farms, or businesses, has been non-existent in areas affected by power outages. Given the likelihood of even more fires and greater climate change triggered storms, mobile battery charging stations would be an important new adaptation tool that does not exist today.