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High-power energy storage for peak load reduction

See attached

Additional submitted attachment is included below.

CALIFORNIA ENERGY COMMISSION

CALIFORNIA NATURAL RESOURCES AGENCY

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:
   Dr. James Clegern, james@kineticcore.com, 970-685-2583

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

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?
   KCS is preparing to field a high-power, non-chemical energy storage to make electrification affordable for commercial and industrial customers, cost-effectively lowering their peak power use from the electrical grid. In California, lowering customer peak power use reduces up to 250 kW and saves $110k on yearly electrical bills for each high-power battery deployed, strengthening budgets and profitability, while improving local grid stability
   KCS also empowers upcoming deployments of pollution reducing advanced electrification, like HVAC, heat-pumps, electric boilers, fluid pumping systems and EV Fast Chargers to be located anywhere with basic grid power access, minimizing grid upgrades that can easily cost more than the electrification upgrade. Our 25-year life, 93% carbon fiber Kinetic Battery is easy to deploy, operates outside in any weather, and eliminates fire, freezing and explosive hazards seen by competing energy storage systems.
   EPIC funding would accelerate entry into the Californian market and initially support public and fleet EV Fast Charger "Boosting". This would pair at least one Kinetic Battery to each of the 200,000+ expected fast chargers,

and at scale providing up to a 71%reduction in the expected ~50 GW of added CA peak power distribution infrastructure through 2035.

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)?

   Advanced electrification to meet Californian commercial, industrial and political pollution reduction goals by 2035 requires significant access to grid power that current grid distribution infrastructure is just not prepared for. California needs approximately 53 GW and $51B to meet this challenge (CPUC 2023). Across the US, over 5.9M commercial facilities and 1,200,000 EV Fast Chargers will challenge the ~3,000 utility companies to meet this additional "peak power" demand by 2035 and not spread the full $2.5 Trillion price tag (IEEE, 2024) to the over 108 million US utility customers users (~$23,150 each).

   To tackle this "everyone pays for it" pain point situation, KineticCore Solutions (KCS) is preparing to field a cost-effective "Kinetic Battery" solution that allows commercial and industrial high-power users to reduce peak power demands up to 80%. By allowing customers to control their own peak power, the need for new power installation by utilities drops 60%, existing monthly electrical bills drops 40% and customers will see an unprecedented ROI of under 12-months in nearly every Californian market.

   The high-power Kinetic Battery can be a planned or additional "add-on" to help reduce customer periodic peak power loads. Priced under $200/kW and under $0.02/kWh over its 25-year operational life, Kinetic Batteries can be operated in any weather, contain no hazardous materials, can be deployed with a light forklift, and have greatly improved fire safety compared to their Lithium battery counterparts.

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]

Our high-power, non-chemical Kinetic Batteries will allow three key advancements:
1) Provide customers with existing periodic high-power use an affordable means to lower high power demand charges on their utility bills
- Saving up to $110k per year per battery deployment
2) Reduce grid power access and upgrade costs up to 80% for new Behind-The-Meter customer advanced electrification projects
- Saving new projects or upgrading existing facilities up to $200k per battery deployment
3) Allow utilities to minimize distribution grid infrastructure upgrades, meet Demand Reduction goals and improve existing equipment utilization
- At scale utilization, national grid upgrades required over the next 10-years could be reduced $80B to $480B (CA about 10% of the reference number).
Additional benefits beyond just "cost savings" include the improved safety of the Kinetic Batteries (no fire, freezing, HAZMAT or explosive risks), improved grid reliability by reducing peak load power spikes that disrupt grid regulation and overloading, and provides a path for all communities to have adequate power access by reducing the financial burden associated with high-power access.

6. Describe what quantitative or qualitative metrics or indicators would be used to evaluate the impacts of the proposed research concept.
   1) **Reduction of peak power utilized by customer (kW)**
   2) **Reduction of yearly utility bill costs with reduced peak loads**
   3) **Reduction of distribution grid infrastructure upgrade costs to support customer's advanced electrification projects**
   4) **Reduction of local grid power variability (usually frequency) with reduced peak power demand**
   5) **Supporting utility Demand Reduction programs and goals (peak kW reduced)**
   6) **Direct displacement of chemical batteries (Li-ion) with use of Kinetic Batteries. Li-ion at 1C must be oversized by a factor of five to meet the same power throughput capacities of Kinetic Batteries. Li-ion can be better served in longer-duration energy storage or directly in EVs instead of stationary peak power shaving applications.**

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.
   - **Eric Wood, et al, "The 2030 National Charging Network: Estimating U.S. light duty demand for electric vehicle charging infrastructure," NREL report 2023.**
   - **"Potential Benefits of High-Power, High-Capacity Batteries," DOE Report, January 2020.**
   - **"Identifying Potential Markets for Behind-the-Meter Battery Energy Storage: A Survey of U.S. Demand Charges," NREL report 2017.**

- **Clegern, James, "Advanced Electrification Peak Power Support (PPS)," IEEE-PES meeting proceedings, July 2025.**

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.

    1) Investment in Kinetic Batteries would allow the accelerated deployment of EV fast chargers for light, medium and heavy-duty applications that are currently challenged to access adequate power from a strained utility distribution grid. Reducing the peak power draw up to 80% would allow wider rural and urban EV fast charger deployments and encourage EV adoption with easy access to fast charging.

    2) Wide spread "boosted" EV fast chargers also have the potential to become a high-power Distributed Energy Resource (DER) that could be coordinated for utility grid support (like regulation services and black-start) as a secondary income stream.

    3) Expanding beyond the EV fast charger peak load shaving, the same concept could be applied to commercial and industrial facilities which account for ~60% of the grid power use. Providing access to higher power with minimal grid upgrades would allow wider deployments of pollution reducing advanced electrification, like HVAC, heat-pumps, electric boilers, fluid pumping systems.

About EPIC

The CEC is one of four EPIC administrators, funding research, development, and demonstrations of clean energy technologies and approaches that will benefit electricity ratepayers of California's three largest investor-owned electric utilities.

EPIC is funded by California utility customers under the auspices of the California Public Utilities Commission.

To learn more about EPIC, visit: https://www.energy.ca.gov/programs-and-topics/programs/electric-program-investment-charge-epic-program

EPIC 5 documents and event notices will be posted to: https://www.energy.ca.gov/proceeding/electric-program-investment-charge-2026-2030-investment-plan-epic-5

Subscribe to the EPIC mailing list to stay informed about future opportunities to inform the development of EPIC 5: https://public.govdelivery.com/accounts/CNRA/signup/31897

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

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

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

iv 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.

v 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.

vi 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.

vii In 2024 the CPUC adopted five Strategic Goals to guide development of the EPIC 5 Investment Plan. A description of the goals can be seen in Appendix A of CPUC Decision 24-03-007 available at: https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M527/K228/527228647.PDF