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Docket Number:	25-EPIC-01
Project Title:	Electric Program Investment Charge 2026–2030 Investment Plan (EPIC 5)
TN #:	270842
Document Title:	Lawrence Berkeley National Laboratory Comments - LBNL Comments on EPIC 5 Investment Plan
Description:	N/A
Filer:	System
Organization:	Lawrence Berkeley National Laboratory
Submitter Role:	Public
Submission Date:	6/18/2026 4:37:06 PM
Docketed Date:	6/18/2026

*Comment Received From: Lawrence Berkeley National Laboratory
Submitted On: 6/18/2026
Docket Number: 25-EPIC-01*

LBNL Comments on EPIC 5 Investment Plan

Please comments in attached document.

Additional submitted attachment is included below.

June 18th, 2026
Jonah Steinbuck
Director of the Energy Research and Development Division
California Energy Commission
715 P Street
Sacramento, California 95814

Re: Lawrence Berkeley National Laboratory Comments: Electric Program Investment Charge
2026 - 2030 Investment Plan Public Workshop

Director Jonah Steinbuck,

On Thursday, June 11th, Commission staff hosted a workshop regarding the Electric Program Investment Charge 2026 - 2030 Investment Plan (EPIC 5). Lawrence Berkeley National Lab (LBNL) is pleased to present our comments in response to the aforementioned workshop.

First, we continue to be inspired by the compelling research portfolio curated and administered by the CEC in the EPIC program. Over the past 4 EPIC Investment Plans we have observed the investments made via EPIC result in impactful research, demonstration projects, and real savings to consumers and businesses in California. CEC's coordinated investments have led to the advancement and the meaningful contribution of technologies ranging from microgrids that enable grid flexibility and increase resilience to energy storage breakthroughs that have extended the range of electric vehicles. From avoidance of infrastructure upgrade costs to wildfire forecasting tools, EPIC investments generate tangible benefits for ratepayers and society at large spanning safety, affordability, and environmental quality.

Our comments on this most recent workshop previewing the final EPIC V Investment Plan initiatives and goals focus on these 6 topics:

- Customer-sited Resource Integration and Interoperability
- Scaling Energy Resources and Load Flexibility
- Pre-commercial Grid Tech Incubator
- Whole Home Retrofits
- Thermal Energy Networks and Energy Resource Coordination
- Wildfire Mitigation and Risk Reduction

Regarding **Advancing Customer-Sited Resource Integration and Interoperability** presented on Slide 20, we would like to highlight for the Energy Commission that recent research from the CalFlexHub project has shown that nonconformance with communication protocols prevents implementation of demand flexibility in some devices. Funding the investigation and development of a performance rating system, development of standardized test procedures, performing laboratory testing and a formal certification ecosystem to verify devices as being “demand-flexibility” ready to provide objective information on the conformance of individual devices is needed. This could go a long way to help end users select devices that are better suited to support demand flexibility and load shifting.

Also within the topic of Customer-Sited Resources, we note research is needed across residential, commercial, and industrial sectors. With communication protocols and control systems, for example, it might be advantageous to consider whether a singular, unified interoperability framework might unlock greater value, or if there are benefits to sector-specific solutions. We encourage the Commission to provide additional clarity on the vision for the role of third-party aggregators and DR providers in this space. We also seek clarification if industrial-scale facilities are intended to be within the scope of this particular research initiative.

With respect to **Scaling Energy Resources and Demand Flexibility as Grid Resources** presented on Slide 21, we note that the gaps identified the fragmented and utility-specific nature of customer enrollment in DR programs, which require significant manual intervention in asset identification, enrollment coordination, participation, bidding, and settlement processing workflows. California will benefit from pioneering the development and deployment of a digital DR marketplace to automatically evaluate customer loads and explore which DR programs will provide the most mutually beneficial value to both customers and the electric grid. We encourage the funding of research into the digitization of these workflows to simplify and engage far greater levels of customer participation. The research fund would support: 1) standardizing and formalizing DR program requirements (eligibility criteria, flexibility metrics, compensation models, data protocols); 2) characterizing building asset capabilities in a machine-readable format; 3) developing tools that automatically identify which building assets qualify for which DR programs based on program requirements; and 4) creating interoperable frameworks that automate enrollment, participation decisions, bidding, flexibility forecasting, billing, settlement, and payment processing. We view interoperability and digital frameworks as key infrastructure that could unlock the scaling of demand flexibility technologies broadly and

ultimately support grid stability at scale. Moving from the siloed complex DR rules of today to a digital automated valuation and transaction DR marketplace will revolutionize DR and load flexibility programs, enabling a huge increase in participation rates, awareness, and engagement. Please review this related publication for additional information:

<https://arxiv.org/pdf/2509.01459>

Another identified gap in this area is how the lack of visibility into current and forecasted consumption patterns leads to unreliable delivery of DR performance during actual events. We encourage funding research in advancing real-time energy awareness and forecasting. Developing tools to provide building operators with the visibility they need to affect change is important. Developing investment grade analysis tools will also enable new business models for 3rd parties to help building owners and operators identify load flexible technologies that can be automatically enrolled in a digital DR marketplace. Program participation and reliability could be greatly improved by characterizing the relationship between operational modes, control variables, and actual flexibility delivery capabilities. The addition of forecasting methodologies that account for weather, occupancy, and operational constraints could further enable increased reliability of the demand flexibility.

Further to the topic of load shifting, we encourage the inclusion of new slab-on-grade construction as a cooling thermal energy storage strategy. This may enable shifting larger cooling loads than current technologies allow without impacting occupant comfort.

With respect to the **Pre-Commercial Grid Tech Incubator** presented on Slide 28 and Slide 58, we would like to highlight the potential synergies that may be available through the IP pipeline within the National Laboratories, especially through the Cradle 2 Commerce (C2C) and Incubating Market-Propelled Entrepreneurial-mindset at the Labs (IMPEL) programs, funded by the US Department of Energy. These programs could aid the Commission through matchmaking of technically vetted startups across a number of relevant domains. These programs also serve as an engine to pair entrepreneurs with our network of experts across not only science, but finance, permitting and other pilot and development opportunities. Additionally, technically vetted startups that have completed IMPEL/C2C and are market-ready could be nominated to participate in First-of-a-kind (FOAK) demonstration opportunities or pursue follow-on funding from EPIC funds.

With respect to **Whole-Home Retrofit Solutions** presented on Slide 37, specifically the proposed activity to “Demonstrate nondestructive and nondisruptive diagnostic tools”, we note that it would be good to fund earlier stage technologies as well as the demonstration and deployment of high-TRL technologies at or near commercial availability. Further, we would like to encourage the inclusion of the transparent building envelope, (Windows and their retrofits), in this topic area. Effective window retrofits require accurate characterization of existing windows, yet documentation is often unavailable. Current diagnostic tools are often costly and provide limited information. We recommend funding innovation to make in situ window diagnostics more affordable and accessible.

With respect to **thermal energy networks (TENs) and DER coordination at neighborhood scale** on Slide 38, funding for developing design workflows for the district energy system that include system configuration selection and detailed design, with the help of the dynamic simulation for integrating the thermal and grid modeling would help lower long term energy costs and improve resilience.

With regard to **Supporting Wildfire Mitigation that Manages Risk and Advances Affordability** presented on Slide 61, specifically the proposed activity on “Technology innovation for wildfire risk reduction”, we strongly recommend that the program consider funding the investigation of building materials, technologies and practices that harden the building and make it less likely to be damaged or destroyed by wildfire.

General comments:

LBNL is encouraged by the list of project areas that align very well with current USDOE research priorities that are investigating cost and infrastructure reductions through lowering peak power in homes, lowering the cost of home retrofits, and fully quantifying the non-energy impacts of home energy retrofits - with a focus on IAQ and health (quantifying healthcare and social benefits).

We encourage CEC to consider avenues to facilitate or streamline IOU partnership requirements for EPIC solicitations that require mandatory IOU participation. IOUs may not have the bandwidth to respond to several partnering requests by multiple potential teams applying to EPIC solicitations. The internal approval processes/timelines of IOUs may not always align with the short response window for proposal development after the solicitation is released.

LBNL appreciates the opportunity to provide these comments in response to the Electric Program Investment Charge 2026 - 2030 Investment Plan (EPIC 5) Public Workshop.

The following individuals contributed comments: Luis Fernandes, Peter Grant, Jianjun Hu, Mary Ann Piette, Marco Pritoni, and Reshma Singh.

Sincerely,

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