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Berkeley Lab EPIC 4 Workshop Comments (June 21s Workshop)

Document attached.

Thank you!

Berkeley Lab

Additional submitted attachment is included below.

BERKELEY LAB
Bringing Science Solutions to the World

June 28, 2021

Chair David Hochschild
Vice Chair Janea Scott
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

RE: Lawrence Berkeley National Laboratory Recommendations for the Development of the EPIC 4 Investment Plan.

Thank you for the opportunity to provide comments on the EPIC 4 Investment Plan and for the CEC's substantial work developing and executing the previous plans. Lawrence Berkeley National Laboratory (Berkeley Lab) applauds the State of California for its leadership in setting some of the most ambitious policy goals in the country and designing a research and deployment roadmap to accomplish those goals in a timeframe that addresses both pressing needs and also allows for progress toward a larger and longer term set of research, and market outcomes that build toward impact.

Mary Ann Piette participated in the workshop that took place on June 21 and provided a variety of recommendations to improve flexible loads and DERs for load management. This letter provides additional examples of R&D needs to enable more load management and DERs in California.

- **Evaluate the capability of deep retrofits that include integrated controls to facilitate flexible loads in buildings**. These retrofits should include facades, HVAC, and lighting. Reducing loads while controls are being installed provides a holistic approach to retrofits. Building owners should see reduced energy bills, improved energy efficiency, and controls that can respond to grid signals.

- **Explore how to provide distributed electric storage for building loads**. Research is needed to explore the feasibility of distributed electricity storage in buildings to improve control and resilience of plug loads. This technology could enable wall outlets to collectively provide demand flexibility and backup power for buildings. A wall outlet could be integrated with battery storage, power conversion electronics, communications functionalities, and standard AC electric supply.

- **Develop and enable smart lighting systems with external drivers.** Today's smart lighting designs involve per-fixture power electronics and networking. However, due to the cost, congestion, and difficulty in networking set up, smart lighting has not yet seen major market penetration. Research is needed to enable external drivers that could provide large scale load flexible lighting systems.

- **Develop and evaluate appliances with embedded grid and price responsive control logic.** There is growing interest in creating appliances that can respond to dynamic electricity prices and other grid signals. Research is needed on residential and commercial appliances to evaluate how to embed the control of the appliance in the

device when it is sold. This R&D should include evaluating the load response strategies and modes of operation that the appliance can provide and describing what information in the communication signal is needed to enable the load response.

- **Develop improved evaluation designs for flexible heat pump water heaters (HPWH) in multifamily buildings.** One of the most challenging areas for retrofits is multifamily homes. There is growing interest in HPWH retrofit concepts. R&D is needed to evaluate the performance of these systems as a function of various factors such as the number of apartments connected and the climate zone. The results will provide recommendations for system designs that 1) Ensure adequate hot water delivery, 2) Minimize use of the backup resistance elements, and 3) Provide full load shifting from the evening peak period to the mid-day solar peak period.

- **Evaluate load flexibility, usability and user interface issues**. As we develop more complex end-use loads that are interacting with DR, grid, and price signals, there is a need to evaluate usability and interfaces. R&D is needed to understand the role of usability in ensuring that we have greater load flexibility. Developing standardized user interfaces may be helpful in improving usability.

Demand management efforts in the past have often focused on industry and large buildings: an important goal is to ensure that new load management technologies can provide tangible financial and comfort benefits for residential consumers and in under-resourced communities.

On behalf of Berkeley Lab, we appreciate the opportunity to provide these comments on the EPIC 4 Investment Plan.

Sincerely,

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