

DOCKETED

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**Berkeley Lab Comments - Staff Workshop on IAQ & Co-Benefits
(23-ERDD-01)**

Please see comments attached.

Additional submitted attachment is included below.



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Bringing Science Solutions to the World

August 11, 2023
Jonah Steinbuck
California Energy Commission
Docket Unit, MS-4
715 P Street
Sacramento, CA 95814

Re: Lawrence Berkeley National Laboratory Comments on Recent Staff Workshop on Non-energy Impacts and Process Evaluation of Integrated Energy Retrofit Packages in California's Residential Buildings (23-ERDD-01)

Greetings Mr. Steinbuck,

On Friday, July 28th, Commission staff hosted a workshop regarding Non-energy Impacts and Process Evaluation of Integrated Energy Retrofit Packages in California's Residential Buildings. Berkeley Lab is pleased to present our comments in response to the aforementioned workshop.

Iain Walker, a researcher in the Energy Technologies Area at Berkeley Lab, participated in the workshop and provided a comment. Berkeley lab has summarized that comment below as well as provided additional comments.

1. What ongoing or planned research efforts should this work coordinate with or leverage to help inform research goals and increase the impact of this effort?

The U.S. Department of Energy (DOE) is starting some very similar efforts on non-energy benefits and has ongoing work addressing costs and affordability (Walker, I., N. Casquero-Modrego, and B. Less, 2023; DOE Office of Energy Efficiency & Renewable Energy, 2022; Walker, I., B. Less, and N. Casquero-Modrego, 2022; and Walker, I., Less, B., Casquero Modrego, N. and Rainer, L., 2022). They won't be California focused given that DOE has more of a national perspective. It is also important to be aware that DOE is very interested in the same issues regarding the non-energy impacts of these sorts of retrofits. Particularly looking at things like health, while also including things like safety, comfort, and resilience. In summary, there are other agencies, in this case DOE, who are also interested in and funding research in this area.

References:

- Walker, I., N. Casquero-Modrego, and B. Less. *Challenges and Opportunities for Home Decarbonization*. 2023. Lawrence Berkeley National Laboratory.
- DOE Office of Energy Efficiency & Renewable Energy. *DOE Launches EAS-E Prize to Accelerate Equitable, Affordable, and Simple Solutions for Home Electrification*. December 2022. (Last accessed August 9, 2023.) <https://www.energy.gov/eere/articles/doe-launches-eas-e-prize-accelerate-equitable-affordable-and-simple-solutions-home>.
- Walker, I., Less, B., and Casquero Modrego, N. (2022). Pathways to Home Decarbonization. Proc. ACEEE 2022 Summer Study. ACEEE Washington, DC. doi.org/10.20357/B7JG7
- Walker, I., Less, B., Casquero Modrego, N. and Rainer, L. 2022. The Costs of Home Decarbonization in the US. Proc. ACEEE 2022 Summer Study. ACEEE Washington, DC. doi.org/10.20357/B7DP43

2. Which retrofit measures should be prioritized in the homes?

Priority should be given to measures which have the greatest impacts on either indoor or outdoor air quality. Unvented combustion cooking and unvented heaters are some of the



biggest contributors to poor indoor air quality. Similarly, combustion heating and domestic hot water are among the largest contributors to poor outdoor air quality. From a resiliency point of view, the two measures that merit a high priority are heat pumps for the provision of cooling and batteries to reduce the impacts of power outages.

Additionally, the following measures should be prioritized:

Passive measures, (which don't need energy/power to function) include window solar films, dynamic coatings, solar shading devices, insulation, and operable windows for natural ventilation should be prioritized as they provide significant benefits and mitigate the damage from extreme indoor environments due to power outages. The metrics should include benefits of improving health and thermal resilience from passive measures.

Low-energy measures, e.g., ceiling or portable fans, mist cooling, personalized cooling devices that can be powered with a battery for a few hours can be effective in preventing mortality from extreme indoor temperatures.

Compact packages of on-site PV+Battery can provide clean power for critical services during extreme conditions (power outages, PSPS). Potential integration of second-hand EVs for such purposes should be explored.

5. Should a specific housing type be targeted?

Single Family and Multi Family buildings in DACs as well as social housing tend to be poorly designed, operated, and maintained resulting in degraded envelope insulation, envelope leakiness, and faulty HVAC equipment. These housing types should be targeted because they are much more vulnerable to the risks posed by wildfires, extreme weather events, and power outages.

6. The proposed funding for this solicitation is \$3 million for one award. Is this funding amount sufficient to support a meaningful study? If not, are there partnerships that could provide additional support?

\$3 million is enough funding to develop the needed evaluations and guidance. In terms of partnerships: as noted in response to Question 1, DOE is funding research in this area. If specific housing types are targeted then partnerships with representative organizations will be needed, whether this is builders (CBIA) for new construction, affordable property developers for new multifamily buildings, or organizations involved in large scale home retrofit/decarbonization activities, such as BayRen, TECHClean CA, the Building Decarbonization Coalition, Build it Green, etc. There are also national organizations that would make good partners: National Center for Healthy Housing, New Buildings Institute, Rocky Mountain Institute, etc.

Berkeley Lab appreciates the opportunity to provide these comments.

The following individuals contributed comments: Iain Walker and Tianzhen Hong.

Sincerely,
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