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CALIFORNIA ENERGY COMMISSION
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CEC-70 (Revised 7/22)

IN THE MATTER OF: *Request for Comments on Forthcoming Solicitation Regarding Indoor Air Quality and Co-Benefits of Integrated Energy Retrofit Packages in California's Residential Buildings*	DOCKET NO. 23-ERDD-01 NOTICE OF "REMOTE-ACCESS" WORKSHOP RE: Forthcoming Solicitation Regarding Indoor Air Quality and Co-Benefits of Integrated Energy Retrofit Packages in California's Residential Buildings

Notice of Staff Workshop: Indoor Air Quality and Co-Benefits of Integrated Energy Retrofit Packages in California's Residential Buildings

July 28, 2023
10:00 a.m. – 12:00 p.m.
Remote Access Only
See Attendance Instructions.

California Energy Commission (CEC) staff will host a remote-access staff workshop to seek public input on an upcoming solicitation for research to quantify indoor air quality and co-benefits of integrated energy retrofit packages in California's residential buildings.

The public can participate in the staff workshop consistent with the attendance instructions below. The CEC aims to begin promptly at the start time posted, and the end time is an estimate based on the proposed agenda. The workshop may end sooner or later than the posted end time.

Agenda

CEC staff are seeking input from researchers, industry leaders, equity experts, tribes, government agencies, investor-owned utilities (IOUs), and other interested members of the public to inform the scope of an anticipated solicitation.

The proposed solicitation will support research efforts to assess impacts of consolidated packages of electrified retrofit measures on indoor air quality and other related impact categories, including resiliency to extreme heat, indoor comfort, and energy and cost savings in California homes. This

research will provide guidance for cost-effective building electrification, mapping out the non-energy benefits of home electrification (e.g., health, comfort, and household economics) and how these benefits could be considered in strategies and decisions to retrofit or replace gas fueled appliances with electric appliances.

The workshop will introduce staff's initial ideas on the scope and focus of the proposed solicitation, planned for release by the fourth quarter of 2023. Staff will invite participants to discuss posed and other public questions and offer suggestions for consideration as staff refines the upcoming solicitation's focus and scope (see attached appendix for workshop discussion questions).

Background

The proposed solicitation will contribute to implementation of the Electric Program Investment Charge (EPIC) 2021-2025 Investment Plan. The proposed research responds to the strategic objective: "Inform California's Transition to an Equitable, Zero-Carbon Energy System that is Climate-Resilient and Meets Environmental Goals" (Chapter 7) and will support Initiative 44, "Evaluating Air Quality, Health, and Equity in Clean Energy Solutions".

CEC's Assembly Bill 3232[1] California Building Decarbonization Assessment report suggests that efficient electrification in California's buildings presents the most readily achievable pathway for this sector to achieve 40 percent reduction in greenhouse gases relative to 1990 levels by 2030.[2] The same report acknowledges significant challenges associated with residential building decarbonization including high upfront costs, potential for increased utility bills, limited awareness of technology options and their benefits, constraints faced by renters, and systemic inequality faced by low income and disadvantaged communities. There are also many non-market factors to consider in decisions to retrofit or replace appliances, such as the non-energy benefits of home electrification (e.g., health, comfort, and household economics), that many households are not aware of. Additionally, there are many not-yet characterized potential benefits of electrified retrofits in existing homes (e.g., range hood capture efficiency requirements for electric and gas stoves). These existing homes pose particular challenges—as well as, potentially, enormous benefits—related to electrification.

California's energy planning agencies are working to address these issues through ambitious programs such as CEC's Equitable Building Decarbonization Program, which will include a Direct Install Program to provide decarbonization retrofits to low- and moderate-income households as well as a Statewide Incentive Program to incentivize increased adoption of low-carbon residential technologies. Understanding the benefits of electrification may accelerate adoption of electrification retrofits.

To support design and implementation of residential decarbonization programs, it is important to empirically validate and build on prior modeling results. When retrofits are selected and implemented in homes, they have the potential to improve or degrade both indoor air quality and

[1] AB-3232 Zero-emissions buildings and sources of heat energy. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180AB3232. Accessed 6-28-2023.

[2] Kenney et al. 2021 *California Building Decarbonization Assessment*. California Energy Commission. Publication Number: CEC-400-2021-006-CMF.

comfort. An important next step is to implement and evaluate installations of integrated clean energy packages, given that decarbonization programs are expected to support installation of multiple technologies and building interventions, rather than single, isolated elements. In evaluation of the installations, there is a need to evaluate indoor air quality, comfort, and heat resilience impacts of the packages, as well as to fill data gaps on the installation costs.

The attached appendix contains additional information regarding key activities expected of applicants for these efforts and the specific questions on which feedback will be solicited at this workshop.

Attendance Instructions

Remote participants may join via Zoom by internet or phone.

- **To join via Zoom.** Click on https://energy.zoom.us/j/85479801058?pwd=a3pJV0xZamplSi83L1daTnFFN2s0UT09 or navigate to https://join.zoom.us/ and enter the Webinar ID 854 7980 1058 and passcode retrofit and follow all prompts.
- **To join by telephone.** Call toll-free at (888) 475-4499 or toll at (669) 219-2599. When prompted, enter the Webinar ID 854 7980 1058 and press "#."

Zoom Closed Captioning Service. At the bottom of the screen, click the Live Transcript CC icon and choose "Show Subtitle" or "View Full Transcript" from the pop-up menu. To stop closed captioning, close the "Live Transcript" or select "Hide Subtitle" from the pop-up menu. If joining by phone, closed captioning is automatic and cannot be turned off. While closed captioning is available in real-time, it can include errors.

Zoom Difficulty. Contact Zoom at (888) 799-9666 ext. 2, or the CEC Public Advisor at publicadvisor@energy.ca.gov, or by phone at (916) 957-7910.

Public Comment.
The CEC encourages the use of its electronic commenting system. Visit the e-commenting page for this docket 23-ERDD-01 at https://efiling.energy.ca.gov/EComment/EComment.aspx? Enter your contact information and a subject title that describes your comment. Comments may be included in the "Comment Text" box or attached as a downloadable, searchable document in Microsoft® Word or Adobe® Acrobat®. The maximum file size allowed is 10 MB.

Oral comments will be accepted at the end of the workshop. Comments may be limited to three minutes or less per speaker and one person per organization. To comment via Zoom, use the "raise hand" feature so the administrator can announce your name and unmute you. To comment via telephone, press *9 to "raise your hand" and *6 to mute/unmute.

Written comments may be submitted to the Docket Unit by 5:00 p.m. on August 11, 2023.

Written and oral comments, attachments, and associated contact information (including address, phone number, and email address) will become part of the public record of this proceeding with access available via any internet search engine. Written comments may also be submitted by email. Include docket number 23-ERDD-01 and "Staff Workshop on Indoor Air Quality and Co-Benefits of Integrated Energy Retrofit Packages in California's Residential Buildings" in the subject line and email to docket@energy.ca.gov.

A paper copy may be mailed to:
California Energy Commission
Docket Unit, MS-4
Docket No. 23-ERDD-01
715 P Street
Sacramento, California 95814

Public Advisor. The CEC's Public Advisor assists the public with participation in CEC proceedings. To request assistance, interpreting services, or reasonable modifications and accommodations, call (916) 957-7910 or email publicadvisor@energy.ca.gov as soon as possible but at least five days in advance of the workshop. The CEC will work diligently to meet all requests based on availability.

Media Inquiries. Email mediaoffice@energy.ca.gov or call (916) 654-4989.

Technical Subject Inquiries. Email Maninder Thind at Maninder.thind@energy.ca.gov or call (916) 776-0819.

General Inquiries: Email Maninder Thind at Maninder.thind@energy.ca.gov or call (916) 776-0819.

Availability of Documents: Documents and presentations for this meeting will be available at 23-ERDD-01, at https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=23-ERDD-01.

When new information is posted, an email will be sent to those subscribed to the EPIC, Research, DCAG, Decarbonization, Climate Change, and Opportunity list servers. To receive these notices or notices of other email subscription topics, visit Subscriptions, at https://www.energy.ca.gov/subscriptions.

Dated: July 13, 2023, at Sacramento, California.

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Jonah Steinbuck

Director, Energy Research and Development Division

Subscriptions:

EPIC
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Research
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Decarbonization
Climate Change

Appendix of Draft Solicitation Topics on which Staff is Seeking Feedback

This proposed solicitation will fund research to assess impacts of consolidated packages of electrification retrofit measures on indoor air quality and other related impact categories including resiliency to extreme heat, indoor comfort, and energy and cost savings in the California homes.

Previous CEC-funded research has explored integrated retrofit packages in a variety of contexts.[3,4,5] For example, Fisk et al. (2014) developed a procedure for selecting packages of retrofits in apartments that simultaneously save energy and improve indoor environmental quality and tested in a small sample of apartments.[3] Fisk et al. recommended further work to improve and expand the retrofit selection procedure as well as integrated assessment of retrofits in a large sample of homes. More recently, Wei et al. (in review) showed through building modeling that there is a high first cost for heating electrification (heat pumps), rooftop solar PV, and plug-in electric vehicles (PEV).[4] Roof repair and electric upgrade costs (e.g., panel, circuits) are unaddressed challenges in under-resourced communities, and there is a lack of knowledge and experience for contractors, residents, and program administrators in upgrading homes. The study stressed the need for more demonstration and pilot projects to determine what works best for residents, to understand impacts on indoor air quality and comfort, and to develop best practices for inspection, implementation, and monitoring in terms of building electrification. Currently, CEC-funded research projects are examining the impact of individual and multiple kitchen electrification interventions on air quality and health outcomes in low-income and disadvantaged communities (Cooking Electrification and Ventilation Improvements for Children's Asthma, EPC-21-033, LBNL)[6]; however, a comprehensive examination of consolidated packages is yet to be undertaken.

The proposed research will target multiple policy objectives of decarbonization, equity, improved air quality and health outcomes, heat resilience, and affordability. This proposed research forges a new frontier for EPIC using applied research to delineate impacts of integrated market-available retrofits in a sample of homes. Retrofits may include mechanical ventilation improvements, electric cooking, electric water and space heating, electric vehicle, rooftop solar photovoltaic panels, and energy efficiency upgrades. Impacts of energy-related interventions (electrification and energy efficiency retrofits) will be studied in a diverse sample of households, including single and multifamily homes, to inform equity in benefits.

Research supported by the proposed solicitation aims to understand impacts of integrated packages of electrification retrofits and *must* include:

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[3] Fisk et al. (2014). *Integrating Energy and IEQ Retrofits in Apartments.* CEC-500-2014-084.

[4] Wei et al. *Building Healthier and More Energy-Efficient Communities in Fresno and the Central Valley – Final Report*. California Energy Commission. Contract Number: EPC-17-035 (Under Review)

[5] *Engaging Communities in the Design of Sustainable Energy and Localized Futures (SELF) Models in SJV*. California Energy Commission, Contract Number: EPC-17-048.

[6] The Cooking Electrification and Ventilation Improvements for Children's Asthma (CEVICA), EPC-21-033, LBNL. https://www.energizeinnovation.fund/projects/cooking-electrification-and-ventilation-improvements-childrens-asthma-cevica

- Identification and development of metrics that evaluate air quality and other impacts such as comfort, heat resilience, and energy costs.
- Measurement of performance of new measures for indoor air quality and related impacts such as comfort, energy efficiency, heat resilience, and costs before and after the installations.
- A meaningful sample size, with a majority of homes in low-income and/or disadvantaged communities, to assess impacts in those communities.
- Modelling to illuminate how to scale up an integrated retrofitting approach and the associated costs, barriers, and benefits of scaling up.
- Based on the field data and observations, articulation of strategies for:
    - reducing cost and enhancing benefits of integrated retrofit packages in the homes, especially those in low-income and/or disadvantaged communities,
    - communicating the non-energy and indirect benefits of building decarbonization, and
    - best practices for stakeholders (residents, contractors, policymakers) to save energy and improve the indoor conditions that affect residents' health and comfort.

Specific research projects *may* include:

- Partnership with California's Equitable Building Decarbonization Program to recruit sample homes.
- Development and demonstration of a framework for recruiting households, selecting integrated retrofit upgrade packages, and installing integrated packages in a manner that targets improvements in air quality, energy efficiency, and heat resilience as well as the broader goal of electrification.
- Development and demonstration of pathways for low-cost retrofit upgrade implementation (e.g., rooftop solar, electric vehicles, and heat pump).
- Assessment of individual electrification measures and their impacts on indoor air quality.
- Assessment of the impact of retrofitting on social dynamics and responses of the household.

Solicitation Amount: $3,000,000
Expected Release Date: September 2023

Workshop Questions that will Inform a Future Solicitation:

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?
2) What other impact categories can and should be evaluated?
3) How should the study approach be structured to provide insights on the following?
    a. Measurement of performance of new measures for indoor air quality and related impacts.
    b. Designing buildings and technologies that characterize pollutant chemicals using low-cost air quality sensors.

4) 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?
5) Any other questions from attendees?