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Berkeley Lab Comments - CEC Staff Workshop MAQCEET (23-ERDD-01)

Please see Berkeley Lab's comments attached.

Additional submitted attachment is included below.

February 13, 2024

Jonah Steinbuck
Director, Energy Research and Development Division
California Energy Commission
715 P Street
Sacramento, CA 95814

Subject: Lawrence Berkeley National Laboratory Comments on CEC Staff Workshop Regarding Modeling and Monitoring Air Quality and Co-Benefits of Energy Interventions to Inform a Clean and Equitable Energy Transition (MAQCEET)

Director Steinbuck,

On Tuesday, January 30th, Commission staff hosted a workshop regarding Funding to Support Modeling and Monitoring Air Quality and Co-Benefits of Energy Interventions to Inform a Clean and Equitable Energy Transition (MAQCEET). Berkeley Lab is pleased to share our comments in response to the aforementioned workshop.

Ling Jin, a researcher in the Energy Technologies Area at Berkeley Lab, participated in the workshop that took place on January 30th and provided a comment. Brett Singer, leader of Berkeley Lab's Indoor Environment Group, also contributed to this document.

> **Question 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?**
> In response to the CEC's first question, Berkeley Lab notes that their incoming funding to support improvement of InMAP (Intervention Model for Air Pollution) includes (1) black carbon as an additional species; and (2) sub-grid resolution near roadway pollution to capture the sharp spatial gradient. The current geographic focus of this project is the Bay Area. This effort can be leveraged and expanded to the entire state of California with additional support from the CEC.
>
> **Question 2b. What are the challenges in the existing low-cost air quality sensor technology(ies) and validation?**
> We recommend that the research concept be further aligned with CEC priorities. Berkeley lab suggests there should be a direct connection to parameters that could be impacted by efficiency improvements or decarbonizing building-related services (e.g. space heating and cooling, water heating, cooking) or reducing the energy demand of buildings. Additionally, deficiencies and improvements to the sensor technologies should be linked to that goal.

The most important indoor air quality (IAQ) parameters that can be impacted by energy efficiency and decarbonization retrofits are the cost and complexity of measuring nitrogen dioxide and ultrafine particles. Electrochemical sensors are available for NO2, which is emitted during unvented gas cooking and can be reduced by cooking electrification. However, these sensors require calibration, adjustment for environmental conditions, and are expensive to produce (e.g., hundreds of dollars). Ultrafine particles (UFP) are also emitted during unvented gas cooking and from woodstoves during fuel addition; most UFP monitors are also very expensive to produce, often costing thousands of dollars.

Question 3: For Group 2, should the focus of a low-cost air quality sensor be for research use and/or public and user-based to collect household air quality data?
There is a need not only for new sensors, but investments in research for how to more efficiently process sensor measurements into useful information for decision-makers. To do this, it is important to develop deployment protocols and metrics. In addition to households, contractors working on home retrofits for energy or decarbonization could serve as collectors of air quality data. Ideally, sensor packages would be deployable by residents and/or contractors with anonymized data contributed to a publicly-available (online) database. If such a database was available, then residents across California could receive information about how their air quality ranks compared to their peers– much like utilities provide energy consumption statistics for similar households. The [ROCIS program](#) for providing low-cost sensor packages and information about IAQ in homes and buildings is a resource that should be reviewed by the Commission.

Thank you for giving us the opportunity to provide these comments around Funding to Support Modeling and Monitoring Air Quality and Co-Benefits of Energy Interventions to Inform a Clean and Equitable Energy Transition (MAQCEET).

Please do not hesitate to contact us if you have any additional questions based on the comments provided above.

Sincerely,
Alecia Ward
Leader, Program and Business Development
Energy Technologies Area
award@lbl.gov