

**DOCKETED**

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<b>Filer:</b>	Alexandra Kovalick
<b>Organization:</b>	California Energy Commission
<b>Submitter Role:</b>	Commission Staff
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**CALIFORNIA ENERGY COMMISSION**

715 P Street  
Sacramento, California 95814

[energy.ca.gov](http://energy.ca.gov)

CEC-70 (Revised 11/2021)



*IN THE MATTER OF:*

*Request for Comments on Forthcoming  
Solicitation Regarding Quantification of  
Indoor Air Pollutants in Multifamily Homes  
that Cook with Gas Stoves or Alternatives*

Docket No. 19-ERDD-01

NOTICE OF REMOTE-ACCESS  
WORKSHOP

RE: Forthcoming Solicitation Regarding  
Quantification Indoor Air Pollutants in  
Multifamily Homes that Cook with Gas  
Stoves or Alternatives

**Notice of Staff Workshop: Quantify Indoor Air Pollutants in  
Multifamily Homes that Cook with Gas Stoves or Alternatives  
March 4, 2022**

10:00 a.m. – 12:00 p.m.  
**Remote Access Only**

The California Energy Commission (CEC) will host a workshop to seek public comment on an upcoming solicitation for research to quantify indoor air pollutants in multifamily homes that cook with gas stoves or alternatives.

The workshop will be held remotely, consistent with Assembly Bill 361 (Rivas, Chapter 165, Statutes of 2021) as extended by Governor Newsom’s Executive Order N-1-22 to improve and enhance public access to state agency meetings during the COVID-19 pandemic. The public can participate in the workshop consistent with the direction provided below. Please note that the CEC aims to begin promptly at the start time posted and the end time is an estimate based on the agenda proposed. The workshop may end sooner or later than the posted end time depending on various factors.

**Agenda**

CEC staff seek input from a broad set of energy sector stakeholders such as researchers, state agencies, investor-owned utilities (IOUs), industry leaders, equity experts, and community-based organizations to inform the scope of an anticipated research solicitation planned for release in the second quarter of 2022. Research supported by this solicitation will quantify exposures to kitchen-generated air pollution in California homes and the results will help assess the potential health benefits associated with transitioning to alternatives to gas cooking in multifamily housing.

The workshop will provide an overview of the Gas Research and Development Program Fiscal Year 2021-2022 initiative that supports this research, some highlights regarding the broader policy context for this research, and objectives for the solicitation. Staff will invite participants to discuss questions and offer suggestions for consideration as staff refine the upcoming solicitation's focus and scope (see [Appendix](#) for workshop discussion questions).

### **Background**

Funding for this anticipated research solicitation is \$2,000,000 from the Natural Gas Research and Development Program Funding Plan for Fiscal Year 2021-2022 approved by the California Public Utilities Commission (CPUC). This research directly addresses CPUC's Resolution G-3571, which provided guidance for the Fiscal Year 2021-2022 research plan. Specifically, Resolution G-2571 requests that the CEC support research to "*Quantify and document impacts to indoor air quality from natural gas appliances and the potential technically feasible improvements and potential risks to indoor air quality that could be achieved from fuel blending or electrification.*"

The [Appendix](#) below contains additional information regarding key activities expected of applicants for these efforts and the specific questions on which stakeholder feedback will be solicited at this workshop.

### **Remote Attendance Instructions**

The workshop may be accessed by clicking the Zoom link below or visiting [Zoom](#) at <https://join.zoom.us> and entering the ID and password for the workshop listed below. If you experience difficulties joining, contact Zoom at (888) 799-9666 ext. 2, or the Public Advisor at [publicadvisor@energy.ca.gov](mailto:publicadvisor@energy.ca.gov) or at (916) 957-7910.

### **Link to Workshop:**

<https://energy.zoom.us/j/96564702234?pwd=Y29lU0RPaUZuUkI0NHpBVUs3YTUxdz09>

**Workshop ID:** 965 6470 2234

**Workshop Password:** gas-stoves

Use the "raise hand" feature to indicate you want to speak and the event facilitator will indicate when your line is open and ready for you to make comment.

**To Participate by Telephone**, dial (669) 219-2599 or (888) 475-4499 (Toll Free). When prompted, enter the ID: 965 6470 2234. To comment, dial \*9 to "raise your hand" and \*6 to mute/unmute your phone line.

**Zoom's closed captioning service** will be enabled for the meeting. Attendees can use the service by clicking on the "live transcript" icon and then choosing either "show subtitle" or "view full transcript". The closed captioning service can be stopped by exiting out of the "live transcript" or selecting the "hide subtitle" icon. Closed captioning cannot be stopped by phone.

## **Public Comment**

**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. If participating via Zoom's online platform, use the "raise hand" feature so the administrator can announce your name and unmute you. If you are participating by telephone, press \*9 to "raise your hand" and \*6 to mute/unmute.

**Written comments** must be submitted to the Docket Unit by 5:00 p.m. on March 18, 2022.

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.

The CEC encourages use of its electronic commenting system. Visit the [e-commenting page](https://www.energy.ca.gov/programs-and-topics/topics/research-and-development/energy-research-and-development-ideas-exchange) at <https://www.energy.ca.gov/programs-and-topics/topics/research-and-development/energy-research-and-development-ideas-exchange>, which links to the comment page for this docket. Enter your contact information and a comment title describing the subject of your comment(s). 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.

Written comments may be submitted by email. Include docket number 19-ERDD-01 and "Staff Workshop on Quantifying Indoor Air Pollutants in Multifamily Homes that Cook with Gas Stoves or Alternatives" in the subject line and email to [docket@energy.ca.gov](mailto:docket@energy.ca.gov).

A paper copy may be sent to:

California Energy Commission  
Docket Unit, MS-4  
Docket No. 19-ERDD-01  
715 P Street  
Sacramento, California 95814

## **Public Advisor and Other CEC Contacts**

The CEC's Public Advisor provides the public with assistance in participating in CEC proceedings. For information about how to participate in this workshop or to request interpreting services or other reasonable modification and accommodations, reach out via email at [publicadvisor@energy.ca.gov](mailto:publicadvisor@energy.ca.gov), or by phone at (916) 957-7910. Requests for interpreting services, reasonable modifications and accommodations should be made 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 the availability of the service or resource requested.

**Direct media inquiries** to [mediaoffice@energy.ca.gov](mailto:mediaoffice@energy.ca.gov) or (916) 654-4989.

**Direct technical subject inquiries** to Alex Kovalick at [alexandra.kovalick@energy.ca.gov](mailto:alexandra.kovalick@energy.ca.gov) or (916) 776-0781.

**Direct general inquiries** regarding the workshop to Alex Kovalick at [alexandra.kovalick@energy.ca.gov](mailto:alexandra.kovalick@energy.ca.gov) or (916) 776-0781.

**Availability of Documents**

Documents and presentations for this meeting will be available at docket number [19-ERDD-01](#), at <https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=19-ERDD-01>.

When new information is posted, an email will be sent to those on the Naturalgas, Research, DCAG, Decarbonization, Buildingstandards, and Opportunity list servers. To receive these notices, subscribe at the [CEC List Servers](#) page, [https://ww2.energy.ca.gov/listservers/index\\_cms.html](https://ww2.energy.ca.gov/listservers/index_cms.html).

Dated: February 17, 2022 (of signing), at Sacramento, California



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Jonah Steinbuck, Ph.D.  
Deputy Director | Research and Development Division

List Servers:  
Naturalgas  
Research  
DCAG  
Decarbonization  
Buildingstandards  
Opportunity

## **Appendix of Draft Solicitation Topics on which Staff is Seeking Feedback**

### **Focus of Forthcoming Solicitation**

Research supported by the proposed solicitation will quantify human exposures to health-damaging pollutants from residential cooking in multifamily homes that cook with gas as well as alternatives to gas (e.g., propane, electric resistance, induction). Prior research, including prominent contributions funded by the Gas Research and Development Program, have demonstrated that residential cooking with gas generates pollutants that degrade indoor air quality, including Nitrogen Dioxide (NO<sub>2</sub>) (Logue et al. 2014) and particulate matter (PM) (Torkmahalleh et al. 2017). Unlike other gas appliances, gas cooking appliances are not vented directly to the outdoors. With less volume for dilution, smaller homes—including apartments typically occupied by low-income residents—are associated with higher pollutant concentrations. In the absence of adequate mechanical ventilation, tightly sealed homes with gas cooking appliances can exceed thresholds set for ambient air quality for NO<sub>2</sub> (1-hour basis) and PM<sub>2.5</sub> (24-hour basis) (Fortmann et al. 2001). Unlike NO<sub>2</sub>, which is generated by the combustion of fossil gas, PM is typically generated by cooking events regardless of cooking fuel (e.g., gas vs. electric) since the interaction of heat, water, oil, and food can create particles (Buonanno et al. 2009). NO<sub>2</sub> and PM<sub>2.5</sub> have been associated with health impacts including asthma, cardiopulmonary disease, and premature birth (World Health Organization, 2021). Results of this research will support the assessment of potential health benefits associated with transitioning to alternatives to gas cooking in multifamily homes.

This anticipated research will also support improved characterization of combustion from cooking fuel-type and cooking-generated (regardless of fuel-type) PM, including chemical composition, size distribution, and impacts to health. Improved characterization of cooking-generated PM, as well as characterization of the chemical constituents, size distribution, or other attributes that factor into health impacts, will inform a more realistic assessment of the health implications of using gas for cooking and may also inform low-cost strategies for accurately and reliably monitoring PM in residential households. The availability of low-cost sensors has led to a proliferation of monitoring devices and air pollution data. However, the accuracy of these monitors across various settings is uncertain (Li et al. 2020).

Although field work and modeling efforts have established that tightly sealed homes with gas cooking can frequently exceed health-based air pollutant thresholds, less is known about pollutant distribution and exposure. Exposure assessment is a critical step in assessing actual health risks as well as benefits of eliminating sources of indoor NO<sub>2</sub> pollution. Without this assessment, the potentially adverse health impacts of cooking generated NO<sub>2</sub> cannot be quantified. This characterization will inform the potential need for updated ventilation requirements and strategies in multifamily homes. While research funded by the Gas Research and Development Program supports development of Title 24 standards that protect human health through ventilation requirements for new homes, the issue of exposures to vulnerable populations in existing homes requires further exploration to support appropriate interventions.

The proposed solicitation will complement CEC-funded research designed to illuminate human health effects of exposure to indoor pollutants generated by gas combustion in California’s residential sector (Please see [GFO-21-301](https://www.energy.ca.gov/solicitations/2021-09/gfo-21-301-randomized-trial-study-investigate-impact-gas-stove-interventions) at <https://www.energy.ca.gov/solicitations/2021-09/gfo-21-301-randomized-trial-study-investigate-impact-gas-stove-interventions>.) The proposed solicitation will also provide foundational knowledge to support anticipated CEC-funded research to quantify health benefits of electrifying homes in California.

### **Key Activities**

At a minimum, applicants shall do the following:

- Quantify actual human pollutant exposure from gas cooking appliances.
- Identify differences in potential health impacts of cooking-generated PM in multifamily homes that burn gas (including propane) versus electricity.
- Provide an empirical basis for exposure assessment from a large sample of multifamily units.

Additionally, successful applicants must demonstrate:

- The capacity to coordinate a large field study, air quality monitoring, and statistical data analysis across multiple years.
- A clearly articulated approach to community engagement including dedicated funding and expertise.
- A skilled, well-resourced management team to ensure coordination between the different aspects of the proposed research.

It is also desirable that applicants:

- Evaluate and determine the best tools and methods for measuring source pollutants.

### **Workshop Questions that will Inform a Future Solicitation:**

- 1) How should the study approach and sample design be structured to provide insights on the following?
  - a. Quantify actual human exposures to indoor air pollutants, including PM<sub>2.5</sub> and NO<sub>2</sub>, in multifamily homes.
  - b. Improve characterization of chemical composition, size distribution, concentrations, and characteristics that relate to health impacts of combustion and cooking-generated PM in kitchens, including:
    - Inform a more accurate assessment of the health implications.
    - Inform low-cost strategies for monitoring PM in home kitchens.
  - c. Assess indoor exposures to PM<sub>2.5</sub> associated with cooking episodes.
  - d. Understanding the differences in the potential health impacts of cooking generated PM<sub>2.5</sub> in homes that burn gas relative to alternatives (i.e., fuel type, cooking style).
- 2) What factors should be considered when determining which communities should be selected for sampling multifamily units?

- 3) What housing type(s) and/or factors should be considered in the study sample?
  - a. Mobile homes, town homes, apartments, designated square footages, air exchange?
- 4) What chemical attributes of particles would be beneficial to measure?
- 5) Are there other research study areas or programs that could inform or be leveraged to fulfill the goals and requirements of this research effort?
- 6) The proposed research will aim to measure ultrafine (less than 0.1  $\mu\text{m}$ ) particles from cooking food. Limited research has been done on particulates of that size. Are there other research efforts on ultrafine particles that we should be aware of?
- 7) What confounding variables/factors (such as contribution of outdoor air) should the study design consider or be aware of for measuring actual exposure to indoor pollutants?

## References

Buonanno, G., L. Morawska, and L. Stabile, "Particle Emission Factors During Cooking Activities," *Atmospheric Environment* 43, no. 20 (2009): 3235–42. doi:10.1016/j.atmosenv.2009.03.044.

Fortmann, R., Kariher, P., Clayton, R., "Indoor air quality: residential cooking exposures," State of California Air Resources Board. (2001). [https://www.arb.ca.gov/research/single-project.php?row\\_id=60171&\\_ga=2.35534433.1716406002.1643664297-1075391328.1611265277](https://www.arb.ca.gov/research/single-project.php?row_id=60171&_ga=2.35534433.1716406002.1643664297-1075391328.1611265277).

Li, J., Mattewal, S.K., Patel, S. and Biswas, P., "Evaluation of Nine Low-cost-sensor-based Particulate Matter Monitors," *Aerosol and Air Quality Research* 20, no. 2 (2020): 254-270. <https://doi.org/10.4209/aaqr.2018.12.0485>.

Logue, J.M., Klepeis, N.E., Lobscheid, A.B., Singer, B.C., "Pollutant exposures from natural gas cooking burners: a simulation-based assessment for Southern California," *Environmental Health Perspective* 122, no. 1 (2014): 43–50. <http://dx.doi.org/10.1289/ehp.1306673>.

Torkmahalleh, M.A., Gorjinezhad, S., Unluevcek, H.S., Hopke, P.K., "Review of factors impacting emission/concentration of cooking generated particulate matter," *Science of The Total Environment* 586, (2017): 1046-1056. ISSN 0048-9697, <https://doi.org/10.1016/j.scitotenv.2017.02.088>.

Geneva: World Health Organization. *WHO global air quality guidelines. Particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide*, 2012. License: CC BY-NC-SA 3.0 IGO.