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Description:	Appendix B to Rocky Mountain Institute (RMI), Redwood Energy, Guttmann & Blaevoet Consulting Engineers, Mothers Out Front, Natural Resources Defense Council (NRDC), and Sierra Club Response to SoCalGas's Comments on Indoor Air Quality
Filer:	Brady Seals
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California Codes and Standards Enhancement ("CASE") Team
info@title24stakeholders.com

Re: Comments on Multifamily Indoor Air Quality (2022-MF-IAQ-D), Codes and Standards Enhancement (CASE) Initiative, California Energy Commission (CEC) Docket No. 2019-BSTD-03

Dear Statewide CASE Team:

[redacted] Rocky Mountain Institute ("RMI"), and [redacted] respectfully submit the following comments on the Statewide Utility Codes and Standards Enhancement ("CASE") Team's Multifamily Indoor Air Quality draft report prepared for the California Energy Commission's ("CEC") 2022 Energy Code Pre-Rulemaking. [redacted] RMI is an independent, nonpartisan nonprofit whose mission is to transform global energy use to create a clean, prosperous, and secure low-carbon future. [redacted]

The stated goal of the report is to recommend a code change for multifamily indoor air quality,[1] and submeasure B in the draft report "addresses kitchen ventilation to reduce pollution from cooking and kitchen appliances, and primarily provides indoor air quality benefits."[2] Yet, the current ventilation proposal falls short of ensuring that indoor air quality benefits will be achieved.

An increasing amount of scientific research is raising concerns that the indoor air quality guidelines being used to set ventilation standards are outdated and fail to protect the health of Californians. Additionally, the current proposal assumes the user will turn on the fan while using the stovetop, which has been found to be untrue in most cases.

In order to achieve the goal of promoting healthy indoor air quality for all Californians, the final CASE report should recommend that the CEC:

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[1] Pacific Gas and Electric Company, Southern California Edison, San Diego Gas & Electric Company, Los Angeles Department of Water and Power, and Sacramento Municipal Utility District, *2022 Title 24, Part 6 Draft CASE Report*, TN#232909 2022-MF-IAQ-D 10 (2020), *available at* https://efiling.energy.ca.gov/GetDocument.aspx?tn=232909&DocumentContentId=65349

[2] *Id.* at 11

- Strengthen the indoor air quality guidelines used to model ventilation standards to reflect the latest science
- Require automatic control and hood capture design for gas kitchen appliances

Mounting Evidence of Harm Due to Indoor Air Pollution from Gas Stoves

A recent report from Rocky Mountain Institute, Physicians for Social Responsibility, Mothers Out Front, and the Sierra Club synthesized decades of evidence on the health impacts of gas stoves and found that gas stoves release toxic pollutants at levels that can damage human health.[3]

Unvented gas combustion in homes can release more nitrogen dioxide ("NO_2") and carbon monoxide indoors than the U.S. Environmental Protection Agency allows outdoors.[4] Meanwhile, we spend the vast majority—nearly 90%—of our time indoors.[5] According to a study by the Lawrence Berkeley National Laboratory, 12 million Californians in homes with gas stoves are breathing levels of NO_2 that would be illegal outdoors, while 1.7 million Californians are breathing levels of carbon monoxide that exceed outdoor limits.[6] Recent research from the University of California, Los Angeles reinforced these troubling findings.[7]

Children and low-income communities are particularly susceptible to the harmful effects of indoor air pollution from unvented or poorly vented gas stoves. The EPA found that short term exposure to NO_2 from sources including gas stove cooking directly contributes to respiratory health effects, such as asthma.[8] Children living in homes with gas stoves are 42% more at risk of experiencing asthma symptoms

[3] BRADY ANNE SEALS & ANDEE KRASNER, HEALTH EFFECTS FROM GAS STOVE POLLUTION (2020), https://rmi.org/insight/gas-stoves-pollution-health .

[4] Jennifer M Logue et al., *Pollutant Exposures from Natural Gas Cooking Burners: A Simulation-Based Assessment for Southern California*, 122 ENVIRONMENTAL HEALTH PERSPECTIVES 43 (2014), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3888569/.

[5] Neil K. Klepis et al., *The National Human Activity Pattern Survey (NHAPS): A Resource for Assessing Exposure to Environmental Pollutants*, 11 JOURNAL OF EXPOSURE ANALYSIS AND ENVIRONMENTAL EPIDEMIOLOGY 231 (2001), https://www.ncbi. nlm.nih.gov/pubmed/11477521.

[6] Jennifer M Logue et al, *Pollutant Exposures from Natural Gas Cooking Burners: A Simulation-Based Assessment for Southern California*, 122 ENVIRONMENTAL HEALTH PERSPECTIVES 49 (2014), *available at* https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3888569/.

[7] UCLA FIELDING SCHOOL OF PUBLIC HEALTH, EFFECTS OF RESIDENTIAL GAS APPLIANCES ON INDOOR AND OUTDOOR AIR QUALITY AND PUBLIC HEALTH IN CALIFORNIA (2020), https://coeh.ph.ucla.edu/effects-residential-gas-appliances-indoor-and-outdoor-air-quality-and-public-health-california .

[8] U.S. ENVIRONMENTAL PROTECTION AGENCY, INTEGRATED SCIENCE ASSESSMENT (ISA) FOR OXIDES OF NITROGEN – HEALTH CRITERIA (2016), https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=310879.

compared to children living in homes with electric stoves.[9] Meanwhile, having a gas stove increases the risk of being diagnosed with asthma by a doctor by 24%.[10]

One in eight Californians—5 million people—have asthma.[11] Asthma rates are even higher in low-income communities and communities of color; consequently, these communities may be at higher risk of harms resulting from exposure to pollution from gas appliances in the kitchen, as some of the most susceptible populations are those with existing asthma.[12]

Additionally, multifamily households, which are commonly low-income, are at higher risk of exposure to gas stove pollution in the first place, as factors that contribute to higher levels of NO_2 in homes are most common in multifamily housing. These factors include smaller unit size, more people per home, and inadequate ventilation.[13]

Indoor Air Quality Guidelines Used in CASE Modeling Should Be Strengthened to Reflect the Latest Science

The indoor air quality guidelines that the CASE team relies upon in modeling its ventilation standards are outdated, and there is reason to believe that they may not sufficiently protect the public, especially vulnerable communities. The CASE team should run its modeling scenarios using indoor air quality guidelines that are based on the latest science and protect all members of the public, including sensitive populations.

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[9] Weiwei Lin et al., *Meta-Analysis of the Effects of Indoor Nitrogen Dioxide and Gas Cooking on Asthma and Wheeze in Children*, 42 INTERNATIONAL JOURNAL OF EPIDEMIOLOGY 1724 (2013), *available at* https://doi.org/10.1093/ije/dyt150.

[10] *See id.*

[11] CALIFORNIA DEP'T OF PUBLIC HEALTH, ASTHMA'S IMPACT ON CALIFORNIA: RECENT DATA FROM THE CALIFORNIA BREATHING ASTHMA PROGRAM (2013), https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHIB/CPE/CDPH%20Document%20Library/AsthmaImpactFactSheet.pdf.

[12] *See, e.g.*, Michael Guarnieri & John R. Balmes, *Outdoor Air Pollution and Asthma*, 383 LANCET 1581 (2014), *available at* https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4465283; Christina M. Pacheco et al., *Homes of Low-Income Minority Families with Asthmatic Children Have Increased Condition Issues*, 35 ALLERGY AND ASTHMA PROCEEDINGS 467 (2014), *available at* https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4210655/#!po=78.0000; Cheryl Katz, *People in Poor Neighborhoods Breathe More Hazardous Particles*, SCIENTIFIC AMERICAN (Nov. 2012), https://www.scientificamerican.com/article/people-poor-neighborhoods-breate-more-hazardous-particles; Hatice S. Zahran et al., Vital Signs: Asthma in Children – United States, 2001 – 2016, Centers for Disease Control and Prevention Morbidity and Mortality Weekly Report (Feb. 9, 2018), http://dx.doi.org/10.15585/mmwr.mm6705e1; Centers for Disease Control and Prevention, Summary Health Statistics: National Health Interview Survey: 2015 at tbl. C-1 (2017), http://www.cdc.gov/nchs/nhis/shs/tables.htm.

[13] Gary Adamkiewicz et al., *Moving Environmental Justice Indoors: Understanding Structural Influences on Residential Exposure Patterns in Low-Income Communities*, 101 Am. J. Public Health S238 (2011), *available at* https://www.ncbi.nlm.nih.gov/pubmed/21836112#.

The California Air Resources Board ("CARB") recently began a process[14] to revise indoor air quality guidelines for NO_2 emissions that date back to 1994.[15] Meanwhile, the CASE team[16] is proposing to apply the U.S. Environmental Protection Agency's ("EPA") 2010 outdoor NO_2 standards for use indoors.[17] Numerous scientific studies have found that EPA's 2010 outdoor NO_2 standard is not sufficiently protective of health indoors, especially for the most sensitive populations. As a result, government officials in Canada and at the World Health Organization have adopted significantly more stringent guidelines for indoor air quality than EPA's outdoor standards.[18]

In setting ventilation standards, the CASE team and the CEC should apply indoor air quality guidelines that reflect the latest science and protect all Californians, including the most sensitive populations. CEC should work with public health and indoor air quality experts—including CARB staff and academic researchers—to review the best available science on indoor air pollution and health. This work is urgently needed, in order to ensure that the ventilation requirements in the 2022 Title 24 Standards are providing indoor air quality benefits in multifamily homes.

CEC Should Implement Control Measures that Ensure Public Health and Safety

The current ventilation proposals for hood capture and other methods do not ensure the sought-after indoor air quality benefits because they do nothing to ensure that the fans are actually turned on during the use of the stovetop. We recommend the CEC implement automatic control and hood capture design, especially for gas appliances.

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[14] Emily C. Dooley, *California Wants to See How Cooking With Gas Affects Indoor Air*, BLOOMBERG GREEN (May 8, 2020), https://www.bloomberg.com/news/articles/2020-05-08/california-wants-to-see-how-cooking-with-gas-affects-indoor-air.

[15] California Air Resources Board, Combustion Pollutants in Your Home (1994), *available at* https://ww3.arb.ca.gov/research/indoor/combustf.htm; see California Air Resources Board, Report to the California Legislature: Indoor Air Pollution in California 136-37, 144 (2005), *available at* https://ww2.arb.ca.gov/sites/default/files/classic//research/apr/reports/l3041.pdf.

[16] Codes and Standards Enhancement ("CASE") Initiative team on Multifamily Indoor Air Quality, https://title24stakeholders.com/measures/cycle-2022/multifamily-indoor-air-quality/.

[17] Draft CASE Report, *supra* note 1, at 46. Report cites CARB 2016 but it appears to be a 2010 standard from EPA. See earlier draft of report: Marian Goebes et al., 2022 California Energy Code (Title 24, Part 6), Multifamily Indoor Air Quality – Kitchen Range Hood Capture Efficiency Requirement (Mar. 23, 2020), *available at* https://title24stakeholders.com/wp-content/uploads/2020/01/T24-2022-Submeasure-Summary_KITCHENRANGEHOOD.pdf..

[18] *See* Health Canada, Residential Indoor Air Quality Guideline: Nitrogen Dioxide (2015), *available at* https://www.canada.ca/en/health-canada/services/publications/healthy-living/residential-indoor-air-quality-guideline-nitrogen-dioxide.html; World Health Organization (Regional Office for Europe), WHO Guidelines for Indoor Air Quality: Selected Pollutants (2010), *available at* https://apps.who.int/iris/handle/10665/260127. *Compare* U.S. EPA, NAAQS Table, https://www.epa.gov/criteria-air-pollutants/naaqs-table (Apr. 10, 2020).

While all stoves produce emissions, only gas stoves (not electric) emit NO_2 and carbon monoxide. It is true that properly designed ventilation, when used, can reduce exposure to pollution from gas stoves. However, survey results have shown that fewer than half of Californians use their range hoods when cooking.[19] NO_2 and carbon monoxide are odorless and colorless,[20] and so can be emitted at levels that cause respiratory harm while cooking with a gas stove or oven, without visible evidence of pollution. Most occupants do not understand that the purpose of the exhaust hood is to ventilate the space to evacuate these invisible and harmful emissions and not just smoke or heat from cooking surfaces that they can readily see and feel.

In addition, the continuous kitchen exhaust requirement only in enclosed or semi enclosed kitchens exacerbates wasted energy on a 24/7/365 basis even when the home is completely unoccupied. This strategy does nothing to improve air quality in other kitchens when cooking is occurring.

In order to maintain indoor air quality and protect residents' health, the CEC should require automatic control and hood capture design, particularly for gas appliances emitting NO_2 and carbon monoxide. While current laws requiring carbon monoxide alarms are enforced, there are no direct requirements to place them near cooking devices or to trigger controls for exhaust air to remedy the alarm. Pairing an automatic control for cooking devices with occupant or heat sensing technology would be the optimal approach to ensure that residents are always protected from harmful pollutants while cooking. While there are currently no integrated sensors on residential exhaust hoods, there are already stringent requirements on commercial kitchens in Title 24, Part 6. Control of the residential kitchen exhaust hood could be accomplished with an off the shelf thermal occupancy sensor located beneath the exhaust hood over the cooking surface to automatically control the fan. Both motion and infrared (heat sensing) occupancy sensors on the market for lighting, mechanical, and even receptacle loads are common in the California market and could be employed for this purpose with minimal cost and disruption to existing technologies. A similar approach has been used with humidistat controls for bathroom exhaust required under Title 24, Part 11, CALGreen for residential buildings.

Mounting scientific research finds that millions of Californians are living in buildings where the indoor air pollution threatens their families' health, and those in multifamily housing are particularly susceptible to negative health effects. It is essential that the CEC implement protective control measures for ventilation that

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[19] *See* UCLA FIELDING SCHOOL, *supra* note 7, at 16 (and citations therein).

[20] *See* U.S. Envt'l Prot. Agency, Care for Your Air: A Guide to Indoor Air Quality, https://www.epa.gov/indoor-air-quality-iaq/care-your-air-guide-indoor-air-quality (June 1, 2020) ("Carbon monoxide. . . is a colorless, odorless gas that interferes with the delivery of oxygen throughout the body [and] causes headaches, dizziness, weakness, nausea and even death. . . . Nitrogen dioxide (NO_2). . .is a colorless, odorless gas that causes eye, nose and throat irritation, shortness of breath, and an increased risk of respiratory infection.").

are rooted in the latest science on indoor air quality in order to ensure that all Californians are able to live in safe and healthy buildings.

Respectfully submitted,

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Rocky Mountain Institute