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Public Comment on Cooking and Indoor Air Quality

Document attached

Additional submitted attachment is included below.

Dear Commissioners and staff,

I am a family physician with an interest in social and environmental determinants of health. I appreciate your holding this important workshop, with excellent presentations providing current data on the significant indoor air pollution produced by indoor cooking; differential impacts of cooking with gas vs electric coil vs induction; differential impacts on different types and sizes of residences; and hood fan challenges. The hood fan challenges discussed include frequent lack of use due to noise as well as unawareness; significant drawbacks of several automaticity approaches; lack of effectiveness due to installation/duct issues, maintenance issues/clogged screens, and use of inadequate power settings.

I look forward to the CEC's updated regulations and their ultimate effects of improved indoor air quality; improved public health; and cost savings due to decreased health care costs, missed work, and disability.

Should a separate, lower standard should be available for dwellings that do not provide natural gas (or other combustion fuels) for cooking ?

YES. Cooking with gas produces both higher levels of particulate matter and volatile organic compounds, and several harmful pollutants unique to gas (or other on-site combustion) cooking—most concerning nitrogen dioxide, but also other nitrogen oxides, carbon monoxide, formaldehyde, and sulfur oxides. (See Tables 2-2, 2-4, and B-1 of the UCLA study* presented during the workshop.) There is currently no panacea for assuring effective and consistent use of exhaust fans. Therefore, a higher standard must be applied to dwellings with natural gas available for cooking.

Unfortunately, as presented in the UCLA study, indoor gas appliances, including ranges, contribute significantly to ambient air pollution, in turn health impacts, and in turn economic impacts. Kitchen venting impacts the indoor air quality of surrounding residences, especially if their air intakes are near the kitchen exhaust position, as is more likely in multifamily housing. Thus, while more consistent use of a more powerful exhaust fan in kitchens with gas ranges is expected to improve that kitchen's and dwelling's indoor air quality, it would be far more effective to decrease the production of harmful pollutants by requiring, or at least encouraging, all electric kitchens.

The more ventilation required due to more polluting cooking appliances, the more conditioned air is removed from the home, requiring more energy for space heating or air conditioning as well as for the fan itself. Excessively powerful hood fan operation can cause negative pressure, especially in smaller dwellings, pulling in unhealthy air from crawlspaces, from neighbors' smoky apartments, etc. Again, requiring, or at least encouraging, appliances that produce fewer and lower levels of toxic pollutants is far preferable to requiring more effective hood fans.

Cooking with induction cooktops produces less particulate matter than with electric coils (and uses less electricity, so contributes less to ambient pollutant levels due to generation if fossil fuels are part of the electricity mix), but the differences are smaller and less well quantified, and there is likely no mechanism to regulate ventilation requirements between electric cooking appliances differentially.

Should the standard vary according to type or size of dwelling ?

YES. Higher concentrations result from releasing the same quantity of pollutant into a smaller volume of air, so unless more intensive ventilation occurs, residents of smaller homes will be exposed to higher levels of pollutants. Apartments are of course not universally smaller than single family homes, but unless the CEC can regulate based on dwelling volume, single vs multi-family home type should be a criterion.

The UCLA study model used averages of housing volume and ventilation found in the literature to quantify the expected differences in concentrations of CO and NO2 levels produced in different dwelling types by cooking with oven and stove 1 hour or 2 hours; in a typical apartment, townhouse, or single family home. The results, reported in Table 2-6. are striking both for the overall high levels and for the differences between dwelling type.
The average peak NO2 level reached within a typical apartment kitchen during cooking is calculated at 2,400 µg /m3, while that in a single family home kitchen reaches 1,100 µg /m3, This compares with an acute (one-hour) CAAQS of 339 µg /m3. 87% of single family homes, and 98.3% of apartments are predicted to exceed the acute CAAQS.

The average 24-hour weighted average NO2 level throughout the home produced by one hour of cooking is calculated at 46 µg /m3 for apartments and 33 µg /m3 for single family homes. This compares with a chronic (annual) CAAQS of 57 µg /m3, and 27.2% of apartments and 12.5% of homes exceed the standard. Two hours of cooking produce a 24-hour weighted average NO2 level throughout the average apartment of 85 µg /m3 and throughout the average single family home of 56 µg /m3—two thirds of apartments vs one third of single family homes exceed the chronic CAAQS.

The CAAQS should be updated. They are for ambient air, are not based on the most up to date toxicity data, and are not designed to protect sensitive subjects. We spend most of our time indoors, and the vulnerable need and deserve protection. A recent study showed that children in homes with gas ranges suffer up to 42% more asthma exacerbations than children in homes with electric ranges. This has huge implications for the child's quality of life as well as educational and career prospects; for the child's caretakers' quality of life, ability to consistently attend to work, and other obligations; and for the caretakers and public due to medical and pharmaceutical expenses.
Canada has established the following nitrogen dioxide indoor air quality standards. Compare the peak kitchen concentrations from the UCLA study of 2,400 µg /m3 for apartments and 1,100 µg /m3 for single family homes with the Canadian one-hour standard of 170 µg /m3. Compare the 24-hour weighted average concentrations of 46 for apartments and 33 µg /m3 for single family homes with the Canadian 24-hour indoor standard of 20 µg /m3 Until CARB follows Canada's lead and updates indoor air quality standards, I urge the CEC to take the more current data and Canada's standards into account in your rule making.

Workshop participants addressed the issue of hood fans not being used optimally. This is indeed an enormous problem. It entails not only the fans being turned on when cooking commences and run during cooking and for an appropriate amount of time afterwards, but also being cleaned and maintained well and run at sufficient power for the amount of pollutants being released which vary based on type of stove (gas vs electric coil vs induction), oven vs stove vs both, cooking style (eg boiling vs sauteing vs frying vs broiling), quantity of food being cooked, and duration of cooking. As pointed out by staff, excessive ventilation as well as inadequate ventilation wastes energy, produces useless noise pollution, and is ineffective or counterproductive when outdoor is even worse than indoor air

quality —a condition unfortunately more and more common in California and particularly of concern in communities of color and the poor who are close to polluting industry, gas and oil extraction and refining sites, and diesel-producing ports and freeways.

Automatic hood fan control cannot address most of the above challenges, and they are unwelcome in most households. Motion sensers, humidity sensers, and range control use options were discussed, and none is anywhere near optimal. A panelist stated that sensers for PM2.5, UFPM, and NO2 detectors would be too sensitive, but a monitor of harmful pollutants with either automatic fan control or visible and/or audible alerts to the cook could remind cooks to turn on their fans if they haven't at initiation of cooking and could guide fan power adjustments and shut-off most effectively.

Public education is extremely important.

A panelist made an excellent recommendation of an advisory on appliances. Landlords, home sellers, and appliance sellers could be provided with and required to distribute standard information (similarly to the required distribution of earthquake safety materials to home buyers). This should include information about the indoor air quality and health impacts of indoor gas and propane combustion; how to adjust the fuel and oxygen intake to reduce products of incomplete combustion; air quality and health impacts of different cooking methods (eg steaming vs lower temperature sauteing, vs methods that cause visible smoke); and proper installation, use, and maintenance of hood fans.

Health care providers must be educated. During my decades as a family doctor serving low-income residents in west Contra Costa County, we doctors and our county asthma management nurses and technicians were unaware of the data -- we counseled families about tobacco smoke, cockroaches, dust, mold, and rodents, but not about cooking.

* EFFECTS OF RESIDENTIAL GAS APPLIANCES ON INDOOR AND OUTDOOR AIR QUALITY AND PUBLIC HEALTH IN CALIFORNIA, Yifang Zhu et al, EFFECTS OF RESIDENTIAL GAS APPLIANCES ON INDOOR AND OUTDOOR AIR QUALITY AND PUBLIC HEALTH IN CALIFORNIA1 Fielding School of Public Health Department of Environmental Health Sciences