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Submitted On: 3/17/2021
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**on Staff Workshop Randomized Trial Study to Determine the Impact
of Gas Stove Interventions on Children with Asthma**

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Additional submitted attachment is included below.



March 16, 2021

Electronically Submitted to:
Docket Log (19-ERDD-01),
California Energy Commission
1516 9th Street
Sacramento, CA 95814

Subject: Comments on the “Staff Workshop: Randomized Trial Study to Determine the Impact of Gas Stove Interventions on Children with Asthma,” March 2, 2021, Docket Log (19-ERDD-01)

Dear Sir/Madam:

The American Gas Association (AGA), founded in 1918, represents more than 200 local energy companies that deliver clean natural gas throughout the United States. There are more than 76 million residential, commercial and industrial natural gas customers in the U.S., of which 92 percent — more than 72. million customers — receive their gas from AGA members. Today, natural gas meets more than thirty percent of the United States' energy needs.

AGA thanks the Commission for the opportunity to participate remotely in the subject Staff Workshop and provide comments during the event and through this comment submission process. As Senior Director of Codes and Standards at AGA, I have been working on indoor air quality (IAQ) issues and natural gas-fired appliances for over 30 years, including work on the following technical areas:

- Unvented gas-fired heaters and carbon monoxide (CO) and nitrogen dioxide (NO₂) emissions in conjunction with efforts of the U. S. Consumer Product Safety Commission (CPSC) and for revision of the American National Standards Institute (ANSI)-recognized national consensus standard, Z21.11.2, “Gas-fired Room Heaters, Volume II, Unvented Room Heaters.”
- Development of CO alarm performance requirements standardized within Underwriters Laboratories (UL) Standard 2034, “Standard for Single and Multiple Station Carbon Monoxide Alarms” and based upon safety and health-related exposure tolerances to CO in residential environments and among sensitive populations.

- Natural gas fired residential gas cooktop and oven appliance testing in conjunction with parallel CPSC-performed testing and evaluation of Standard Z21.1, “Household Cooking Gas Appliances” for relevance of air-free emission rate requirements for CO in that standard and for consideration of revisions to the standard’s requirements.
- AGA-sponsored laboratory testing of natural gas residential ranges for air-free NO₂ and CO emission rates by a nationally recognized testing laboratory (NRTL) for developing public data on air-free emission rates.
- Technical evaluation of venting performance for vented residential appliances, building depressurization, and potential household concentrations of combustion emission products.
- Membership on the ASHRAE Standing Standard Project Committee (SSPC) for Standard 62.2, “Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings” and technical working groups on related coverage of IAQ issues in standards developed by the Air Conditioning Contractors of America (ACCA) and Building Performance Institute (BPI).

As a participant in the Staff Workshop, the American Gas Association offers the following comments¹:

- The project presumes a causal relationship between use of gas-fired residential cooking appliances and childhood asthma. However, CEC has relied upon a biased selection of study literature to make that presumption, ignoring other important studies of gas combustion and childhood asthma and lack of federal health and consumer agency concerns with gas-fired cooking appliances as a source of asthma development or attacks. In the Workshop presentation and presenter comments, uncritical deference was given to literature citations of organizations actively promoting policy-driven electrification of California residents, in part to achieve carbon emission reduction goals, and that use IAQ arguments generally and asthma development and exacerbation in particular as a basis for justifying removal of gas-fired cooking appliances.

This presumption for a causal relationship between cooking appliance combustion emissions and asthma (development as well as exacerbation) carries forward in the face of conflicting observations in the childhood

¹ These comments represent the views of the American Gas Association not necessarily those of all of its member companies.

asthma literature such as those of Wong, *et. al.*,² which from the International Study of Asthma and Allergies in Childhood (ISAAC) study, observes that:

*“...512,707 primary and secondary school children from 108 centers in 47 countries were included in the analysis...In both age groups, **we detected no evidence of an association between the use of gas as a cooking fuel and either asthma symptoms or asthma diagnosis.**”*

In addition, the CEC project presumption of a causal relationship is unsupported by national health organization activities on childhood asthma documented by the federal Interagency Committee on Indoor Air Quality (CIAQ), which combines the efforts of 22 federal agencies concerned with indoor air quality and childhood health and the Asthma and Allergy Network, which is an international exchange of clinicians and practitioners addressing childhood asthma. Both organizations track causes of asthma development and exacerbation but do not cite the use of gas-fired residential cooking appliance combustion emissions as a cause or “trigger” for childhood asthma.

- While the presumption of a causal relationship between the use of gas-fired residential cooking appliances and childhood asthma is not supported by the established, consensus-based health community generally, the study could provide yet another set of observations to help test the hypothesis that such a relationship exists and do so with respect to the California population of asthmatic children. The proposed study could be viewed in that light **but requires** complete control of known and well-documented intervening variables associated with asthma development and exacerbation, discussed later in these comments. As such, the study should focus on recommendations that would test that hypothesis rather than test gas cooking appliance removal as an “intervention.”
- Based upon staff unwillingness or inability during the workshop to describe elements of the study that would impose clear scope and requirements (beyond those raised in staff questions in the Workshop), it is strongly recommended that CEC develop an multi-disciplinary oversight committee with a strong background in epidemiology to help develop greater specificity for the project scope, participate in the view of applicants, review the progress of the project over its course, and review results and suggest study conclusions. The restructuring of the study around this organizational approach is needed to maintain rigorous scientific validity and to accurately account for cost-effectiveness and understanding of

² Wong, G. W. K., *et. al.*, “Cooking Fuels and Prevalence of Asthma: A Global Analysis of Phase Three of the International Study of Asthma and Allergies in Childhood (ISAAC),” *The Lancet Respiratory Medicine*, vol. 1, July 2013, pp. 386-394.

basic issues of asthma cause and effects and efficacy of interventions. More than citation of peer-reviewed literature, the performance of the study should be managed by peer review of the project development, implementation, and development of conclusions.

- In following with the recommendation above regarding clearer scope and requirements, it was observed in the Workshop as it progressed a general opinion that the project was underfunded at the proposed \$1 million funding level. This opinion was highlighted by commentors on the Workshop. Clearer scope and accounting for minimum requirements would impose discipline in the development of the study and match activities to meet the funds available. However, the constraint of the study to the current budget is likely to impose restrictions on controls for intervening variables in childhood asthma and impose other effects that would bias the study results. Staff presenting the study plan repeatedly deferred essential technical questions to how the “applicants” for the funding award would address them, but no essential minimum requirements for key study controls (discussed below) were defined. It is highly doubtful that even a very efficiently defined applicant submission will address what most experts would set as minimum requirements. In view of this constraint, the question will become what generally accepted professional procedures and processes for an objective analysis and study will not be met or what critical corners will be cut.
- In response to questions raised by AGA during the Workshop, the following points are important with respect to the process of implementing the study in view of conventional considerations of childhood asthma and field studies:
 - “How will study subjects (e.g., children with diagnosed asthma) be selected for the study?” (Staff response: as applicant-proposed).

Selection of study subjects will be key to the evaluation of any intervention-based response and evaluations of both the control group and the experimental group. It is expected that the study would at least screen subjects according to normal asthmatic criteria such as phenotypes represented by atopic burden, degree of airway obstruction, and history of exacerbation prior to selection for the study and for evaluation in the course of and at conclusion of the study. The approach used should not be left to the caprice of the applicant, which could lead to biased or incomplete results.
 - “Will subject outcomes be evaluated for asthma development, asthma exacerbation, of both?” (Staff response: Hospitalization will account for outcomes in the case of triggered asthma events).

Evaluation of asthma development in non-asthmatic children and exacerbation of asthmatic children events require entirely different approaches, but the staff response appeared only to address exacerbation outcomes and it was done utilizing an approach that does not agree with standard methods for evaluating incidence and severity of attacks. At a minimum, the study evaluation of exacerbation should propose field evaluation methods such as peak respiratory flow measurement, spirometry, nitric oxide measurement in exhalation, or pulse oximetry. However, establishing minimums should be set by CEC prior to soliciting applicant proposals.

- “Will stove use be documented according to usage pattern of the combustion appliance, appliance inputs rates, and occupancy of the subjects? (Staff response: as applicant-proposed).

The study as proposed makes no mention of measurement of these factors that are directly associated with exposures to combustion emission from gas-fired cooking appliances, and as such, it might be presumed that CEC would fund a study without collecting this data. If true, the study would make the fundamental mistake of many other childhood asthma studies of failing to account for exposures associated with the hypothesized source: use of the gas-fired cooking products. If CEC is to avoid this error, it should be providing explicit guidance to applicants on the link of gas-fired cooking appliance use to exposure and minimum requirements for a measurement plan for accounting to these usage pattern-related variables.

- “How will other known causes of asthma development and asthma exacerbation be documented and controlled for (e.g., dust mites, secondary tobacco smoke, pet dander)? (Staff response: as applicant-proposed).

The study description acknowledges none of these causes or variables, either as causes for asthma development or as triggers. Failure to address these and similar variables, would neglect decades of information and data on known causes of asthma and asthma exacerbation. Such omissions would be at odds with modern asthma field research and fundamentally undermine the validity of the study. Also as discussed above, field measurements of these causes need to be documented and explicit guidance provided to applicants in terms of minimum requirements for measurement and documentation.

- “How will outdoor concentrations of PM_{2.5} and NO₂ be measured and used to estimate the contribution to indoor air concentrations? (Staff response: as applicant-proposed).

Beyond some assurance by staff that outside concentrations would be measured, no details on minimum requirements for concentration measurement were provided. Frequency of outdoor measurements, measurement locations, correlations of outdoor and indoor measurements (with and without gas-fired range operation), calibration of sensor-based instruments, and data quality measures all play a critical role in discriminating between the contributions of outdoor air constituents to indoor air concentrations, and efforts and experimental approaches are well documented in the IAQ literature. However, the solicitation does not provide minimum guidance to applicants.

- “How will exposures of subjects be measured for NO₂ and PM_{2.5}?” (Staff response: as applicant-proposed).

Exposures are a consequence of measured concentrations of these products of combustion (and in the case of PM especially, cooking activity and styles) and of occupancy patterns. Measurements of concentrations of either of these airborne materials alone do not define exposures that can be associated with study subject outcomes. Minimum measurement approach requirements are not defined by staff in terms of the occupancy patterns or measurement methods to be used. Evaluation of occupant activity patterns (or indeed the importance of occupancy presence and movements) is not mentioned. These factors are critical in correlations to an asthma outcomes, especially the added complication of trying to account for the removal of the gas-fired cooking appliance as an intervention.

- “How will outcomes for test subjects be assessed, specifically with respect to field and clinical methods and practices?” (Staff response: as applicant-proposed).

Outcomes should be assessed on a consistent basis with the subject selection methods, and while the methods do not need to be identical (subject selection may be based upon more clinically-oriented methods), the phenotypic response of asthmatic children should evaluate the same effects. As a practical matter, one would expect that outcomes would generally make greater use of field measurement techniques. In any case and to avoid past self-reporting biases dominating other studies (e.g., “social desirability bias” and “recall bias”), objective field measurements should be

emphasized. But the solicitation sets no minimum requirements for use of such methods and, indeed, allows for applicants to propose study designs based on self-reporting. In a study presuming reduction in asthma incidence from the “intervention” of removing gas-fired cooking appliances, the self-reporting incidence of “social desirability bias” would be expected.

- “How will cooking effluent emissions be assessed as contributors to asthma from both gas and electric stoves?” (Staff response: as applicant-proposed).

The peer-reviewed literature on residential cooking and IAQ is dominated by studies of the impact of food cooking emissions as the principal determinant of IAQ exposures due to effluent constituents, not associated with gas combustion products. Yet the study as described would not address quantifying cooking emissions, their contribution to IAQ relative to combustion emissions, or the impact of the proposed intervention on children with asthma. This is, perhaps, the greatest omission of the study as proposed. The IAQ-related emissions loadings associated with cooking effluent emissions need to be directly and independently correlated with asthma outcomes prior to consideration of these emissions with combustion emissions. While some specific emission products are present in both cooking effluent and combustion gases (e.g., PM), others may be more specific to gas combustion (e.g., NO₂). However, it is the combined effect of all of these emission products that might serve as exacerbators of asthma; their equivalent toxicity values and concentrations; and the specific effect of removal of gas-fired combustion appliances that need to be assessed conjointly. Doing so requires a multi-variate experimental design that, once reliable and valid data is gathered, can generate a statistically valid conclusion. No such thinking is evidenced in the proposed study description.

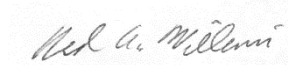
- “How will the asthma intervention presumed by this study be compared to other, consensus-based asthma intervention approaches?” (Staff response: as applicant-proposed).

Conventional asthma interventions (e.g., removal of pets and pests and cessation of household smoking) are actively studied within peer-reviewed literature community and among practitioners. Asthma rates derived from that growing body of work can and should be compared to the proposed intervention of removing gas-fired cooking appliances. This comparison is needed to put intervention strategies at large in their proper context. However, the CEC solicitation treats appliance removal in isolation of these

other intervention measures, which is an unfortunately narrow scope with respect to scientifically justified asthma response measures.

This concludes the comments of the American Gas Association on the Staff Workshop. AGA looks forward to participating in future activities related to this study since national efforts in which AGA is active could well serve the decision-making process in California.

Sincerely,

A handwritten signature in cursive script, appearing to read "Ted A. Williams", is placed over a light gray rectangular background.

Ted A. Williams
Senior Director, AGA Codes and
Standards