DOCKETED

Docket Number:	17-BSTD-01
Project Title:	2019 Building Energy Efficiency Standards PreRulemaking
TN #:	217494
Document Title:	Field Verification of HVI Listing for Domestic Range Hoods
Description:	This comment supports the proposed requirement for field verification of HVI listings for domestic range hoods as a method to ensure minimum performance in compliance with ASHRAE 62.2.
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Submitter Role:	Public
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NEWPORT VENTURES

May 9, 2017

California Energy Commission
1516 Ninth Street, MS-34
Sacramento, CA 95814

Re: Docket 17-BSTD-01, Proposed HVI Verification for Range Hoods

Dear CEC Staff and CASE Initiative Team:

This comment supports the proposed requirement for field verification of HVI listings for domestic range hoods as a method to ensure minimum performance in compliance with ASHRAE 62.2.

Dwelling unit ventilation and source-capture of indoor air pollutants are critical components of healthy, tight, and energy efficient homes. Research has identified kitchens as the primary source of the most harmful pollutants generated in the home, "generating PM2.5 at concentrations four times greater than major haze events in Beijing" and increasing "ultrafine particle concentrations in the kitchen by up to a factor of 550".[1,2,3,4] Studies have shown that kitchen range hoods are seldom used and can be ineffective when operated. One of the primary home owner reasons for not operating kitchen range hoods is their belief that the equipment is "too noisy".[5] Ineffective operation is typically a function of inadequate flow rate and/or poor capture efficiency.

For the past several years, California has tried to address the problem of inadequate kitchen ventilation by requiring that kitchen ventilation be provided in new dwelling units in accordance with ASHRAE 62.2-2010. The ASHRAE requirements stipulate minimum performance metrics for range hoods, including noise level (sones) and flow rate. The standard also requires that flow rate and noise be determined in accordance with the Home Ventilating Institute's testing procedures, HVI 916 and HVI 915, respectively. There is currently no requirement for capture efficiency for kitchen range hoods within ASHRAE 62.2, but California's own Lawrence Berkeley National Lab is working on this effort, and it is expected to be referenced in future versions of 62.2.

While California's range hood requirements are some of the most advanced in the nation, enforcement of these requirements is lagging. The proposed requirement to have HERS raters field-verify range hood HVI compliance is a great step towards ensuring that kitchen ventilation systems are tested and listed to meet minimum performance requirements.

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[1] Logue JM, Price PN, Sherman MH, & Singer BC. 2012. A Method to Estimate the Chronic Health Impact of Air Pollutants in U.S. Residences. Environmental Health Perspectives 120(2): 216-222.
[2] Wallace LA, Emmerich SJ, & Howard-Reed C. 2004. Source strengths of ultrafine and fine particles due to cooking with a gas stove. Environmental Science & Technology, 38(8), 2304-2311.
[3] Smith PA. (2013). The Kitchen as a Pollution Hazard. New York Times. http://well.blogs.nytimes.com/2013/07/22/the-kitchen-as-a-pollution-hazard/?_r=0. Accessed December 18, 2015.
[4] Zhang Q, Gangupomu RH, Ramirez D, & Zhu Y. 2010. Measurement of Ultrafine Particles and Other Air Pollutants Emitted by Cooking Activities. Int. J. Environ. Res. Public Health 7: 1744-1759.
[5] Mullen NA, Li J, & Singer BC. 2013. Participant Assisted Data Collection Methods in the California Helath Homes Indoor Air Quality Study of 2011-13. LBNL-6374E.

Thank you for the opportunity to comment.

Sincerely,

Mike Moore, P.E.
ASHRAE 62.2 Indoor Air Quality Subcommittee Chair

Exhibit A – Estimation of Fan Energy Use for a Typical CFI System

CFI ventilation systems are typically designed to limit the outdoor air fraction to 5-20% of the total fan flow. When a call for ventilation overlaps a heating or cooling call, the fan power used for ventilation can be calculated as the total fan power multiplied by the fraction of outdoor air flow to recirculated air flow. When there is no need for heating or cooling, however, the fan power used to provide ventilation is the total fan power.

For example, suppose a 1000 sqft apartment has a 1 ton central heating and cooling system with a central fan that moves 400 cfm/ton at an efficacy of 0.58 W/cfm (typical efficacy based on CA studies). ASHRAE 62.2-2016 would require 52.5 cfm of outdoor air for this dwelling unit on a continuous basis or as a time-weighted average over any four-hour block of time.

Suppose the engineer specifies 60 cfm of outdoor air (i.e., 15% of the total 400 cfm air flow through the air handler) for 3.5 out of every four hours (i.e., the run time required to be considered equivalent to a continuous ventilation rate of 52.5 cfm).

For this system, total central fan run time is 8760*(3.5/4) = 7665 hours/year. Assuming that there is a call for heating or cooling 7.8% of the year (as documented on slide 20 of the Second Stakeholder Meeting for Residential Indoor Air Quality, March 16 pre-rulemaking presentation), the fan energy used for providing outdoor air in heating and cooling modes can be estimated as:
(7.8%)*(7665 hours)*(0.58 W/cfm)*(400 cfm/ton)*(1 ton)*(60 cfm OA/400 cfm total) = 21 kWh.
The fan energy used for providing outdoor air in ventilation-only mode can be estimated as:
(1-7.8%)*(7665 hours)*(0.58 W/cfm)*(400 cfm/ton) = 1639 kWh.
Total fan energy use for ventilation = 1660 kWh.

Alternatively, if an ERV is specified that provides 52.5 cfm continuously at a fan efficacy of 1.2 cfm/W (the minimum permitted by the 2018 IECC, residential), the total fan energy use can be calculated as: (52.5 cfm)*(1/1.2 W/cfm)*(8760 hours) = 383 kWh. This fan energy use is further offset by the ERV's energy recovery.