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Air-Conditioning, Heating, and Refrigeration Institute

October 31, 2011

California Energy Commission
Dockets Office, MS-4
1516 Ninth Street
Sacramento, CA 95814-5512

Re: Docket No. 10-BSTD-01

To Whom It May Concern,

Supplementing our August 31, 2011 comments, AHRI has the following comments based on the information presented at the October 13-14, 2011 Efficiency Committee Workshop on Draft 2013 Building Energy Efficiency Standards.

COMMERCIAL BOILER PROPOSALS

Although some modifications have been made to the proposed revisions being added for commercial boilers, we reaffirm our recommendation that none of the proposed measures be included in the proposed 2013 edition of the Title 24 Building Energy Efficiency Standards.

The analysis done for these measures is fundamentally flawed. It is a theoretical discussion that did not address the particular characteristics of the California commercial boiler market. The Codes and Standards Enhancement Initiative (CASE) study for these measures states that the methodology for evaluating the cost effectiveness of these measures used the eQuest model to generate boiler loads to identify the number of hours within each part-load range by climate zone. Yet, the cost/benefit information presented in the CASE study uses the same value for boiler operating hours in every climate zone. The assumption of the same number of hours of operation annually in every climate zone may be acceptable for a process boiler, but it cannot be used for commercial boilers. By definition, commercial boilers are a type of space heating equipment. The annual hours of operation of a commercial boiler depends on the climate conditions of the area in which it is installed. The boiler operating hours will be different in every one of California's 16 climate zones. The following equation to calculate heating load hours (HLH) was developed by the National Bureau of Standards in the late 1970's:

$$HLH = \frac{24 \times HDD}{65 - ODT}$$

where,

24	=	number of hours in one day (h/d),
HDD	=	heating degree days, (d),
ODT	=	outdoor design temperature, (˚F) and
65	=	typical average outdoor temperature at which a furnace or boiler starts operating, (˚F).

Using this equation, the boiler operating hours in California's more temperate climate zones (assumed ODH of 40F and HDD of 500) are about 500 hours. In a colder climate zone (assumed ODH of 28F and HDD of 4000) the boiler operating hours increase to 2595. But this value is still lower than the 2722 hours of operation used in the CASE study. Recognizing the significant percent of California's population that lives in its more temperate regions, the 2722 hours of boiler operation per year cannot be considered as the average annual boiler operating hours in California. More significantly, given the sophisticated tools available for analyzing such things in California, the cost benefit analysis of each of these proposed measures should have been determined using the specific estimated boiler operating hours for each climate zone. The failure of the CASE study to do this renders its conclusions insufficient to justify these proposed changes.

The report is flawed also for its failure to consider the California boiler market. The CEC lists provide a readily available resource of commercial boilers that may be sold in California. Yet, with two exceptions, there was no contact with the major manufacturers of commercial boilers participating in the California market. Furthermore, no attempt was made to assess the current design and performance features of the models available in California.

We have these additional comments specific to the measure noted.

<u>Combustion Air Shut-Off (Flue Damper)</u>

As we understand it this proposed measure now applies to only atmospheric boilers with inputs of 2,500,000 Btu/h or greater. On a technical point, this shut-off is not stopping the flow of combustion air, which is supplied when the burner is on. It is stopping the flow of air through the combustion chamber and up the vent when the burner is off. The term "combustion air shut-off" is a misnomer.

The cost benefit analysis has been adjusted to recognize that the benefit occurs only when the boiler is not firing. However, the cost of a flue damper for a boiler firing in the millions of Btu/h

is higher than the cost of a flue damper on a lower input boiler. The cost benefit should be redone with adjusted flue damper costs and the appropriate heating load hours for each California climate zone. It is likely that this measure will not be cost effective for a 2.5 million Btu/h boiler or even a 5 million Btu/h boiler in several climate zones.

Combustion Fan VFD

The specific errors of the analysis for this proposed measure are that the combustion air fan does not operate during standby periods. Thus, the use of the 2722 hours of boiler operation per year overestimates the benefit of the measure. Furthermore, the annual operating hours for commercial boilers varies by the climate zone, further overestimating the benefit of the measure for many of California's climate zones. The statewide benefit is similarly overestimated.

Parallel Position Control

The overarching errors discussed at the beginning of these comments apply here. The failure to go beyond a theoretical consideration to consider the boilers being sold in California today is particularly significant for the analysis done for this measure.

When we searched the CEC database of commercial boilers on the CEC website, we found 467 listings of commercial hot water (or hot water and steam) boilers with inputs of 5,000,000 Btu/h or greater. All but seven listings are from two companies that are AHRI members: Laars (Waterpik Technologies Inc) and Weil-McLain. We have consulted with those two companies. Laars Heating Systems does not manufacturer boilers with inputs above 5,000,000 Btu/h. That eliminates 440 of the listings as being in some way incorrect. Of the 20 Weil-McLain listings, only 3 models (1688, 1788 and 1888) have inputs of 5 million Btu/h or greater. None of those three models employ parallel positioning controls. The remaining 7 models are listed by Weber-Jarco. We could not find any information to confirm that those models do, in fact, have inputs over 5,000,000 Btu/h.

Clearly, there are some issues with the CEC commercial boiler listings. However, the analysis should have attempted to define the characteristics of commercial boilers with inputs over 5,000,000 Btu/h per hour that are being sold in California. They do not appear to be very many such models. Of those few, it is likely that many already employ some type of proportioning control process to maintain efficient operation as the input rate varies. The base case boiler in the analysis is assumed to operate at 40% excess air at high fire and 80% excess air at low fire. There is no information presented to show that this base case is representative of the typical 5,000,000 Btu/h, multiple input rate, commercial boiler available in California today. We do not think it is.

The estimate of statewide savings in the analysis is based on buildings that might use a 5,000,000 Btu/h boiler. This is not a valid substitute for an estimate of savings based on the number and characteristics of such models currently sold in California.

Also, we have consulted further with our members regarding the statement in the CASE study that parallel positioning control is standard with low and ultra-low NOx burners. They have confirmed our prior statement. Insofar as new commercial boilers are concerned, parallel positioning control is not used to any significant extent to complying with NOx emission regulations in California.

WATER HEATER PROPOSALS

Proposed subsection 150.0 (n) requires the installation of a gas water heater in an individual dwelling unit to include: a 120V electrical receptacle near the water heater; a Category III or IV vent unless the building plan includes plans for a future upgrade to a Category III or IV vent; a condensate drain and a gas supply line with a capacity of at least 200,000 Btu/hr. We support the concept of this proposal but suggest that the vent requirement can be more simply and precisely stated as: "For gas water heaters using a natural draft venting system, the building plan shall include a vent retrofit plan identifying a horizontal vent path less than 12 feet without any interior walls along the path and a side-wall vent location in compliance with the National Fuel Gas Code." For a gas water heater using any other type of vent system, regardless of category, there will be the potential for future upgrade to a more efficient, replacement water heater. Also, the requirement for a gas supply line with capacity of at least 200,000 Btu/h may need some refinement. For example, if the new home installation is a condensing storage model or a condensing tankless model at some input lower that 200,000 Btu/h or a multi-unit installation, there may be no need to address any future increase in the gas line to the water heater.

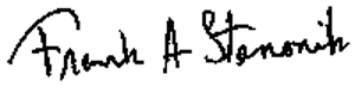
Proposed subsection 150.1 (c)(8)(D) allows the installation of electric-resistance water heaters in individual dwelling units only if natural gas is unavailable; the water heater is located within the building envelope; and at least 50 percent of the annual water heating energy is provided by a solar water-heating system. This proposal requires clarification on two issues.

Most heat pump water heaters use electric resistance elements as the backup heat source. If these heat pump water heaters are considered a form of electric-resistance water heaters in Title 24, then this provision should be modified to recognize heat pump water heaters as an alternative to a solar water-heating system. If heat pump water heaters are considered as a separate product type, then a provision should be added to allow the use of heat pump water heaters with electric-resistance backup in individual dwelling units.

The proposal does not appear to be specific to electric-resistance storage water heaters. If electric tankless are covered by this proposed requirement, we suggest that it be so stated to eliminate any ambiguity. If electric tankless are not covered by this proposed requirement, we suggest that it be modified to add such coverage.

We appreciate this opportunity to submit comments. If you have any questions or require additional information, please contact us.

Respectfully submitted,



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