NEWPORT VENTURES

April 14, 2008

CALIFORNIA ENERGY COMMISSION
Docket Office
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

Re: Docket Number 07-BSTD-1 "Building Energy Efficiency Standards 15-Day Language Express Terms"

Dear Energy Commission Representatives:

We appreciate the opportunity to provide comments on the proposed language for the 2008 Building Energy Efficiency Standards. As related to indoor air quality in residential units, this language does well to introduce requirements for mechanical ventilation in residential construction. As no template exists for introduction of mechanical ventilation requirements in the International codes, California should be commended for blazing new trail in this area. While the effort has been laudable, there are a few details that remain to be sorted out, especially as related to computing and reporting the energy use of mechanical ventilation systems. The comments given below are intended to clarify the intention of the code by ensuring that proper comparisons can be made between the energy consumption of ventilation systems and that designers can be incentivized to use the most energy efficient systems based on modeled performance. All comments within this letter address the language contained in the 2008 Residential Alternative Compliance Manual.

Section 3.3.3
Within this section, some guidance is provided to calculate the space conditioning load incident to mechanical ventilation. As currently provided, the language appears to over-penalize the space conditioning load caused by introducing outdoor air under operation of a central fan integrated (CFI) system. This penalization for CFI systems is buried within the definition of the variables $MECH_{bal}$ and $MECH_{unbal}$. These variables are defined in terms of "total supply fan cfm" and "total exhaust fan cfm". For CFI systems, the total supply fan cfm (which incorporates ventilation air as well as recirculated air) will be much higher than what should be computed here, which is the total ventilation air supply in cfm. For example, a CFI's blower may have a total supply fan cfm of 1200, but total ventilation air supply cfm of 100 – smaller by an order of magnitude. This difference can have a significant effect on the energy consumption projections for CFI systems.

This is one example of several given within this comment where the ACM would benefit by providing more clearly defined terminology as related to mechanical ventilation systems. If this language is made more precise, the user will be less likely to draw false conclusions regarding the specification, modeling, and energy use projections of mechanical ventilation systems.

Section 3.13
Currently, the 15 day language states: *"If the Central Fan Integrated Ventilation ~~central air handler fan~~ system is configured to mix the indoor air without introducing outdoor air, ~~the energy to run the central air handler fans must be included. In this~~*

~~case,~~ *a standalone IAQ system must also be modeled."* This language is confusing in that it does specify how to model an IAQ system. One example of such a central fan integrated (CFI) system would have an electronically actuated damper on the outdoor air duct and controls that strategically engage this damper when ASHRAE 62.2 ventilation rates are not satisfied. Is this language requiring that the energy use of the CFI system be modeled when outdoor air is being introduced by the CFI system, but that a standalone system be modeled when no outdoor air is being introduced by the CFI system? If so, such a requirement would overestimate the ventilation energy use of the CFI system. Further, it is not clear what is meant by "must be modeled". Does this refer to modeling the amount of ventilation air supplied, the incident space conditioning load of the ventilation air, or the fan energy use of the ventilation system, or all of the above? Should this modeling of the standalone system be done to draw comparisons to the energy use of the CFI system, or is the energy use of the standalone system to be summed to that of the CFI? Please clarify the intention and the requirements of this section.

Section 3.13.1 Proposed Design

A. *"If a standalone IAQ fan system is installed then the fan system is assumed to be on continuously..."* This modeling assumption would not permit some innovative and energy efficient systems to receive credit for their performance in this area. For example, some manufacturers provide Energy Star rated exhaust fans that have a high ventilation rate (e.g. up to 110 cfm), but are equipped with controls and timers to ensure that ASHRAE 62.2 ventilation rates are met and not automatically overrun. Assuming that this type of system runs at 110 cfm at all times would result in modeling over twice as much ventilation as would be delivered under this system for an ASHRAE 62.2 compliant 3 bedroom, 2000 sqft home. The proposed design should permit specification and capture the energy conservation benefits of such market-available products.

B. This section provides some guidance for how to calculate the space conditioning energy consumption of standalone mechanical ventilation systems, but no guidance is given for calculating the space conditioning energy consumption of CFI systems. This topic is covered briefly under section 3.3.3, but it is unclear when the space conditioning load must be counted for both standalone systems and CFI systems. Section 3.13.1 would do well to expound more upon these calculations.

C. *"If the central air handler fan is on for more than 20 minutes during an hour to provide heating or cooling, then separate IAQ ventilation is not modeled for that hour."* This 15-day language suggests that the space conditioning load impacts of CFI systems are disregarded when the air handler runs more than 20 minutes during an hour to provide heating or cooling. The space conditioning load of the mechanical ventilation system should be calculated under all conditions, regardless of the type of ventilation system specified. When calculating the energy consumption of central air handler ventilation systems, it is rational to only calculate the fan's energy consumption when the fan is not being used for heating or cooling. However, the energy impact of the ventilation system on heating and cooling loads should be calculated at all times that ventilation air is being introduced, regardless of whether the fan is operating to provide heating or cooling. This approach would be consistent with the treatment of other ventilation systems under the ACM. Further, capturing this space conditioning energy use is significant. An recent LBNL study by Sherman and Walker shows that the space conditioning energy

impact of typical central air handler ventilation systems can be over 750 kWh/yr, about that of a standard refrigerator.[1]

Section 3.13.2 Standard Design
This section requires that the standard design for the mechanical ventilation system be the same as the proposed design. By requiring the standard design's mechanical ventilation system to be the same as the proposed design, the guidelines limit the recognition and reward of those mechanical ventilation systems that save the most energy. The 15 day language recognizes this by stating in section 3.13, *"In many cases, this energy is substantially compliance neutral because the standard design is typically set equal to the proposed design."* The standard design should be set as the most energy inefficient system which is still acceptable for use. If this is the case, designers will be more greatly influenced to specify MV systems that are more energy efficient. Otherwise, there is little to no incentive within the design phase for specifying a more energy efficient system.

Furthermore, within this section, the fan power ratios for stand alone and CFI systems are not comparable, despite apparently having the same units. For stand alone systems, the power ratio is taken as the Watts of fan energy consumed per cfm of *ventilation air*. For CFI systems, the power ratio is taken as the Watts of fan energy consumed per cfm of *ventilation air + recirculated air*. Obviously, these calculations result in different and incomparable values. To facilitate balanced comparisons between the energy consumption of all ventilation system options, the ventilation power ratio should be calculated as the W/cfm of *ventilation* air.

Assuming a consistent definition is adopted for all types of ventilation systems, this would limit the confusion that could be caused by this section while permitting easier comparisons between the energy consumption of mechanical ventilation systems.

3.13.3 Reporting Requirements on CF-1R
Within this section, users are required to report the fan power ratio in W/cfm of the mechanical ventilation system specified. This report will be misleading to the reader unless *ventilation* fan power ratios are reported for the system specified, whether stand-alone system or central air handler system. For example, a reader who specifies a central air handler system may feel that this system is a better performing system than a stand-alone system because the fan power ratio of the central air handler is lower than the fan power ratio of the stand alone system. As it is currently defined, the fan power ratio is not a good indicator of the actual energy consumption of various mechanical ventilation systems. In lieu of the fan power ratio, we recommend calculation and reporting of the *ventilation* fan power ratio.

Again, we are grateful for the opportunity to provide comments and we thank you for your thoughtful consideration.

Sincerely,

Mike Moore

Mike Moore, P.E.

---

[1] Energy use cited is for a single family home in CA's cold climate (zone 16). Source: Sherman, M. and Walker, I. 2007. "Energy Impact of Residential Ventilation Standards in California", LBNL 61282. Lawrence Berkeley National Laboratory, Berkeley, CA.