HOME VENTILATING INSTITUTE

12 August 2022

Department of Energy Resources
c/o Mr. Ian Finlayson
100 Cambridge Street, Suite 1020
Boston, MA 02114

Re: Stretch Energy Code Comments

Dear DOER Staff:

HVI is an ISO 17065 compliant certification body and a trade association representing over 100 manufacturers located in North America, South America, Asia, and Europe. Our manufacturer members provide the residential and light commercial ventilating products that deliver essential indoor air quality to Massachusetts' homes and businesses. HVI's Certified Product Database contains listings for heat and energy recovery ventilators (HRVs and ERVs), bath/utility room exhaust fans, kitchen exhaust fans, dryer exhaust duct power ventilators, in-line supply and exhaust fans, whole-house fans, duct termination fittings, and soffit vents, among other products.

HVI appreciates the opportunity to present comments on DOER's proposed modifications to the Stretch Energy Code, specifically those that are applicable to residential ventilation. Generally speaking, HVI endorses DOER's draft modifications to the residential ventilation provisions, which bolster the energy efficient provision of outdoor air in support of indoor air quality. Following are several comments which are offered to improve the draft language and align with DOER's intent in this regard.

1. **Permit both HRVs and ERVs to be specified.** Section A3 of DOER's *Summary of MA Draft regulations on Stretch Energy Code and Specialized Opt-in Code – June 2022* notes that, "The updated Stretch Code adds ventilation requirements through either heat recovery or energy recovery…" This is also echoed by Section R403.6.1, which requires that "heat or energy recovery ventilation systems shall be provided…" Prescription of an HRV or ERV is permitted within Section R403.6.1.1, which specifies a minimum enthalpy recovery ratio that can be met by an HRV using sensible heat recovery only or by an ERV using sensible and latent heat recovery. However, prescription of an HRV is prohibited by Section R403.6.1.2, which requires the ventilator to employ both latent and sensible energy recovery (note that HRVs only provide sensible energy recovery). This prohibition of HRVs is likely unintentional because it is not aligned with DOER's intention to "add ventilation requirements through either heat or energy recovery." To correct this oversight, please maintain the existing sensible recovery efficiency metric but remove the proposed latent recovery/moisture transfer metric as follows. Also, to support compliance with Section R403.6.1.2, please change the term "sensible heat recovery efficiency" to "sensible recovery efficiency" in alignment with the use of this metric in HVI's directory and in manufacturers' literature.

   R403.6.1.2 All other dwelling units. Dwelling units shall be provided with a heat recovery or energy recovery ventilation system. The system shall be a balanced ventilation system with a minimum sensible ~~heat~~ recovery efficiency of 65 percent at 32°F (0°C) at a flow greater than or equal to the

design airflow. ~~Energy Recovery Ventilation Latent Recovery/Moisture Transfer (LRMT) shall be no less than 50 percent, at the lowest listed net supply airflow.~~

2. **Base the HRV and ERV performance metric requirements on the test method associated with the equipment and not on the building type.** The proposed language in R403.6.1 requires one performance metric for HRVs or ERVs within R-2 dwelling units adjoining a corridor (i.e., *enthalpy recovery ratio*, which is determined in accordance with AHRI 1060) and another performance metric for HRVs or ERVs in all other dwelling units (i.e., *sensible recovery efficiency* [SRE], which is determined in accordance with CAN/CSA-C439). The minimum performance values for both sets of metrics have been demonstrated to be cost effective through either the IECC or the ASHRAE 90.1 standards development process. Use of CAN/CSA-C439's *SRE* is required by entities such as HVI, ENERGY STAR Canada, and Canada's national Energy Efficiency Regulations. It is applicable for airflow rates up to 300 cfm. AHRI 1060's *enthalpy recovery ratio* is used for larger, central systems and is referenced by ASHRAE 90.1. In alignment with industry convention, please modify this section to reference the different metrics based on the airflow capacity of the equipment. The following suggested modifications are intended to replace HVI's recommended edits provided in bullet #1. Additionally, the proposed modification makes the following changes:
    a. uses the term "sensible recovery efficiency" instead of "sensible heat recovery efficiency" to align with the metric provided in the HVI Certified Products Directory
    b. identifies the relevant test method for determining both SRE and enthalpy recovery ratio
    c. permits interpolation of rated values of SRE, in recognition that SRE typically increases with decreasing airflow. Interpolation of SRE is also approved by the California Energy Commission (see RA3.7.4.4 of Title 24-2022's Reference Appendices for more information).
    d. Uses the term "balanced ventilation system," which is defined in the 2021 IRC as follows, "BALANCED VENTILATION SYSTEM. A ventilation system where the total supply airflow and total exhaust airflow are simultaneously within 10 percent of their averages. The balanced ventilation system airflow is the average of the supply and exhaust airflows." Note that the 2024 IRC improves upon this definition by replacing it as follows, "BALANCED VENTILATION SYSTEM. A ventilation system that simultaneously supplies outdoor air to and exhausts air from a space, where the mechanical supply airflow rate and the mechanical exhaust airflow rate are each within 10% of the average of the two airflow rates" (see proposal RM16-21, which was approved as modified by public comment 1). Massachusetts could use either definition, though the 2024 version is recommended for clarity.

Please modify R403.6.1 as follows:

R403.6.1 Heat or energy recovery ventilation. *Heat or energy recovery balanced ventilation systems shall be provided for dwelling units as specified in either Section R403.6.1.1 or R403.6.1.2, as applicable.*
R403.6.1.1 ~~Group R-2 occupancy dwelling units adjoining a corridor.~~ Large systems. *~~Within Group R-2 buildings, dwelling units adjoining a corridor shall be provided with a balanced ventilation system having~~ Systems with a rated airflow exceeding 300 cfm shall have an enthalpy recovery ratio of not less than 50 percent at cooling design condition and not less than 60 percent at heating design condition, determined in accordance with AHRI 1060 at an airflow not less than the design airflow.*

~~R403.6.1.2 All other dwelling units~~ Other systems. *~~Dwelling units shall be provided with a heat recovery or energy recovery ventilation system in Climate Zones 7 and 8. The system shall be balanced with a minimum sensible heat recovery efficiency of~~ Systems with a rated airflow of 300 cfm or less shall have a sensible recovery efficiency (SRE) of not less than 65 percent at 32°F (0°C) at an airflow not less than ~~greater than or equal to~~ the design airflow. SRE shall be determined in accordance with CAN/CSA-C439 and shall be listed. Linear interpolation of listed values for SRE shall be permitted. ~~Energy Recovery Ventilation Latent Recovery/Moisture Transfer (LRMT) shall be no less than 50 percent, at the lowest listed net supply airflow.~~*

If accepted, this change would be complemented by adding the following reference standards:

a. CSA Group
8501 East Pleasant Valley Road
Cleveland, OH 44131-5516
CAN/CSA-C439-18. Laboratory methods of test for rating the performance of heat/energy-recovery ventilators.

b. AHRI Air-Conditioning, Heating & Refrigeration Institute
2311 Wilson Blvd., Suite 400
Arlington, VA 22201
1060-2018. Performance Rating of Air-To-Air Exchangers for Energy Recovery Ventilation Equipment.

3. **Clarify that a balanced ventilation systems is required for dwelling units**. Section R403.6.1 requires an HRV or an ERV to be specified for all dwelling units complying with Chapter 4 of the Stretch Energy Code. This provision presupposes that a balanced ventilation system is specified to provide the ventilation required by Section R403.6. However, Section R403.6 states that the required ventilation can be provided by an "exhaust, supply, or balanced" system. To align R403.6 with R403.6.1, please modify R403.6 as follows:

   R403.6 Mechanical ventilation. *Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating. Each dwelling unit of a residential building shall be provided with continuously operating ~~exhaust, supply or~~ mechanical balanced ~~mechanical~~ ventilation system that has been site verified to meet a minimum airflow per: …"*

   Note to DOER: The modifier "mechanical" should be moved in front of "balanced ventilation system" to align with the 2021 IRC defined term, "balanced ventilation system." If DOER adopts the 2024 IRC definition of "balanced ventilation system" as suggested in comment 2, the modifier "mechanical" can be removed from the body of R403.6 since it is included in the 2024 IRC definition of "balanced ventilation system."

4. **Consider aligning the airflow rate calculation formula with ASHRAE 62.2-2019/62.2-2022**. The formula provided in Section R403.6.3 is aligned with ASHRAE 62.2-2019 (and 62.2-2022) for detached dwelling units, but it differs from ASHRAE's requirements for townhomes and two-family dwellings and from ASHRAE's requirements for R-2 dwelling units. A simplification of ASHRAE's airflow calculations for all residential dwelling units would be as follows:
   a. one- and two-family dwelling units and townhouses of three or less stories above grade plane: $Q = 0.03 \times CFA + 7.5 \times (Nbr +1) - 0.052 \times Q50 \times S \times WSF \times A_{ext}$

where: A_{ext} = 1 for detached dwelling units and, for other cases, A_{ext} equals the ratio of dwelling-unit boundary area that is not attached to garages or other dwelling units to total dwelling-unit boundary area

b. all other residential dwelling units (e.g., R-2 occupancy): Q = 0.03 x CFA + 7.5 x (Nbr +1)

ASHRAE provides different equations for different dwelling unit types to account for the expected contribution of infiltration to the total ventilation rate required. Equation A provides full credit for infiltration through the dwelling-unit boundary area for detached dwelling units. Equation A provides a portion (i.e., the A_{ext} ratio) of the infiltration credit for dwelling units that are horizontally attached to other dwelling units (i.e., townhomes and two-family dwellings). This credit is essentially proportional to the ratio of the dwelling-unit boundary area that is exposed to the outdoors. Equation B provides no credit for infiltration through the dwelling-unit boundary area for other dwelling units (i.e., stacked dwelling units where infiltration is likely to be from a neighboring unit, corridor, or other adjacent space). If DOER elects to align with ASHRAE 62.2 in this regard, the following definition could be used for dwelling-unit boundary (based on the ASHRAE 62.2-2022 definitions of "dwelling-unit boundary area" and "dwelling unit boundary").
dwelling-unit boundary area*: the total surface area of the primary air enclosure boundary separating the air in the dwelling unit from all other air. This is sometimes referred to as the "air barrier" or "enclosure."*

5. **Simplify the sound rating requirements.** Because their fans are located within a closed and insulated container that is typically installed in a remote location (e.g., mechanical room, crawl space, attic, etc.), there is no test method used to determine the sone rating of HRVs or ERVs, and HRVs and ERVs are not listed for sound performance by HVI. In recognition of this, ASHRAE 62.2 exempts remote-mounted ventilation systems from sound rating requirements. Because the Stretch Energy Code requires an HRV or an ERV to be installed, and because sone ratings are not provided for HRVs or ERVs, Section 403.6.5 can be simplified as follows:

   R403.6.5 Sound ~~Rating~~Performance. *~~Sound ratings for fans used for whole building ventilation shall be rated at a maximum of 1.0 sone.~~*
   ~~Exception: HVAC air handlers and remote-mounted fans need not meet sound requirements.~~ ~~There must be~~ HRVs and ERVs shall have at least 4ft of ductwork between the remote-mounted fan and intake grille.

6. **Recognize advanced controls that provide system documentation.** R403.6.6 requires that "ventilation controls shall be labeled with regard to their function, unless the function is obvious." In the case of a simple on/off switch, a physical labeling requirement is critical. However, HRVs and ERVs are often provided with advanced controls containing a user interface with information that obviates the need for an external physical label. Please permit such controls to be installed without external labels by modifying R403.6.6 as follows: "…*Ventilation controls shall be labeled with regard to their function, unless the function is obvious or unless the function is communicated through a user interface provided with the control.*"

   HRV and ERV manufacturers now provide advanced controls that can diagnose system faults as well as provide in-situ measurements of airflow. Such controls, commonly referred to as "fault indicator" or "onboard diagnostic" displays are now recognized by the California Energy Commission, which maintains a database of certified products. Please modify R403.6.3 as follows to permit the use of these controls when testing and verifying design airflow. The suggested modification also updates

the RESNET reference to Standard 380, which is the consensus standard for measuring airflow of mechanical ventilation systems.

R403.6.3 Testing and Verification. *Installed performance of the mechanical ventilation system shall be tested and verified by a HERS Rater, HERS Rating Field Inspector, or an applicable BPI Certified Professional, and measured using a flow hood, flow grid, Residential IAQ Fault Indicator Display certified to the California Energy Commission, or other airflow measuring device in accordance with either RESNET Standard 380 ~~Chapter 8~~ or ACCA Standard 5.*
A list of Residential IAQ Fault Indicator Displays certified to the California Energy Commission is available at https://www.energy.ca.gov/rules-and-regulations/building-energy-efficiency/manufacturer-certification-building-equipment-5.

7. **Provide an exception to the minimum separation requirement between air inlets and exhausts for factory-built intake/exhaust combination termination units.** Section R403.6.7 establishes minimum separation distances between air inlets and exhausts, with exceptions. Please expand the exceptions to include factory-built intake/exhaust combination termination units, which are regularly installed with HRVs and ERVs. This change would align the Stretch Energy Code with the 2024 IRC and IMC, that both waive separation requirements "between intake air openings and living space exhaust air openings of an individual dwelling unit or sleeping unit where a factory-built intake/exhaust combination termination fitting is used to separate the air streams in accordance with the fan manufacturer's instructions." This text was sourced from the 2024 IMC (see proposal M16, as modified for the full proposal and rationale; similar text is provided in the 2021 IMC Section 401.4). The 2024 IRC also has similar text (see proposal RM12, as modified).

8. **Update references to ASHRAE 62.2**. Both the 2013 and 2019 versions of ASHRAE 62.2 are referenced by the Stretch Energy Code. The latest published version is 62.2-2019. However, the 2022 version is expected to be published by the end of August with multiple addenda that clarify the provisions of the 2019 version. HVI recommends referencing the most recent version of 62.2 that is published at the time that the Stretch Energy Code is published. To ensure that R403.6.4 is compatible with backward and forward versions of 62.2, please make the following modifications:

R403.6.4 Air-moving equipment, selection and installation. *As referenced in ASHRAE Standard 62.2~~-2013,~~ Section 7.1, ventilation devices and equipment shall be tested and certified in accordance with HVI 920, or equivalent, ~~by AMCA (Air Movement and Control Association) or HVI (Home Ventilating Institute)~~ and the certification label shall be found on the product…*

Thank you for the opportunity to present these comments. Should DOER have any additional questions, HVI would be happy to discuss further.

Kind regards,

Jacki Donner, CEO