Proposal Summary

Nonresidential HPWH Ventilation Clean Up

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Measure Description

This measure would simplify the four compliance pathways in the 2025 code to make HPWH installation decision making simpler, as well as improving consumer-sized HPWH performance in nonresidential buildings.

Table 1 summarizes the scope of the proposed code change.

Table 1: Scope of Proposed Code Change

An "X" indicates the proposed code change is relevant.

Building Type(s)	-	single family
	-	multifamily
	X	nonresidential
Type of Change	X	mandatory
	-	prescriptive
	-	performance
Third Party Verification	X	no changes to third party verification
	-	update existing verification requirements
	-	add new verification requirements
Construction Type(s)	X	new construction
	X	additions
	X	alterations
Updates to Compliance Software	-	no updates
	X	update existing feature
	-	add new feature

Justification for Proposed Change

The 2025 energy code was updated to include ventilation requirements for consumer-sized integrated HPWHs. Allowed methods of providing ventilation included those approved by the manufacturer, installing in a large unvented room of minimum size, installing in a closet with minimum ventilation area, and directly ducting the unit. The CASE team recommends improvements to the code language for clarity and adjustments to requirements to reflect new research and better align with other codes in development. This measure also recommends eliminating two ducting configurations from the 2025 code: inlet air ducted from outside with no exhaust duct and exhaust ducted to outside with no inlet duct and two louvered wall/door ventilation configurations from the 2025 code: louvered door/wall for the exhaust of the HPWH to the outdoors and louvered door/wall for the exhaust of the HPWH to a communicating space. These configurations interfere with the operation of balanced central ventilation systems and increase the space conditioning load.

The typical HPWH currently on the market, when installed and vented within conditioned space, presents minimal impact on space conditioning loads when the space is 450 cubic feet or larger. However, ducting only the HPWH inlet or only the HPWH exhaust to outside can negatively impact IAQ and increase heating and cooling load by bringing in as much as 200 cfm of unconditioned air while operating. In addition, inappropriately sized and uninsulated ducting or using louvered door/wall for the exhaust of HPWHs can lead to moisture damage risk inside the conditioned space and/or other small water heater locations which is a health and safety concern. Updated code language in this measure would reduce IAQ issues, moisture damage risk and health and safety concerns by providing updated ventilation language.

Data Needs / Information Requests

The Statewide CASE Team is seeking the following information to inform the code change proposal. Data may be provided anonymously. To participate or provide information, please email Ryan at rallen@frontierenergy.com directly and copy info@title24stakeholders.com.

- Energy Savings
    - Percentage of projects where HPWHs are being installed with ducting and what type of ducting.
- First Costs
    - Absolute and incremental cost for installation of one HPWH ventilation duct (intake or exhaust) and two HPWH ventilation ducts (both intake and exhaust) for common small spaces like closets, basements, mechanical rooms.
- Technical Feasibility
    - Feasibility of installing both intake and exhaust ducts in buildings with HPWHs in small spaces.
- Market Readiness
    - Designer experience specifying ducting for HPWHs installed in small spaces.
- Expected Useful Life and Maintenance Costs

- Maintenance and maintenance costs for HPWHs when operated with two ducts (both intake and exhaust) compared one duct (either intake or exhaust).

Draft Code Language

1.1 Guide to Marked Up Language

The proposed changes to the Standards and Reference Appendices are provided below. Changes to the 2025 documents are marked with blue underlining (new language) and ~~strikethroughs~~ (deletions).

1.2 Title 24, Part 1

There are no proposed changes to Title 24, Part 1.

1.3 Title 24, Part 6

There are proposed changes to Title 24, Part 6, see below.

Title 24, Part 6: 110.3(c)7

Air-Source Heat Pump Water Heaters (HPWHs). HPWH shall meet the following requirements:

A. **Backup Heat.** Backup heat is required for systems when inlet air is unconditioned, unless the compressor cut-off temperature is below the Heating Winter Median of Extremes for the closest location listed in Table 2-3 from Reference Joint Appendix JA2. Backup heat may be internal or external to the HPWH.

B. Ventilation **– Residential.** Consumer integrated HPWHs serving single-family or multifamily dwelling units shall meet one of the ventilation requirements below. Minimum volume and opening size requirements shall be the sum of all HPWHs installed within the same space. Compressor capacity shall be determined using AHRI 540 Table 4 reference conditions for refrigeration with the “High” rating test point:

1. Installed using a method provided by the manufacturer to meet or exceed the level of performance provided by the ventilation requirements of Section 110.3(c)7B2 through Section 110.3(c)7B4.
2. For HPWH installation without ducts, the installation space shall have a volume not less than the greater of 100 cubic feet per kBtu per hour of compressor capacity, or the minimum volume provided by the manufacturer for this method; or
3. For HPWH installation without ducts, the installation space shall be vented to a communicating space via permanent openings,

according to the following requirements:

i. Communicating space shall meet the minimum volume of Section 110.3(c)7B2 above, minus the volume of the HPWH installation space; and

ii. Permanent openings shall consist of a single layer of fixed flat slat louvers or grilles, with a total minimum Net Free Area (NFA) the larger of 125 square inches plus 25 square inches per kBtu per hour of compressor capacity, or the minimum provided by the manufacturer for this method. The permanent openings shall be fully louvered doors or two openings of equal area, one in the upper half of the enclosure and one in the bottom half of the enclosure. The top of the upper opening must be 12 inches or less from the enclosure top and the bottom of the lower vent must be 12 inches or less from the enclosure bottom; or

4. For HPWH installations with ducts, the following requirements shall be met:

i. The space joined to the installation space via ducts shall meet the minimum volume of Section 110.3(c)7B2 above, minus the volume of the HPWH installation space; and

ii. All duct connections and building penetrations shall be sealed; and

iii. Exhaust air ducts and all ducts which cross pressure boundaries shall be insulated to minimum of R-6; and

iv. Where only the HPWH inlet or outlet is ducted, installation space shall include permanent openings that consist of a single layer of fixed flat slat louvers or grilles in the bottom half of the room, and/or a door undercut. With a ducted inlet, the minimum NFA shall be equal to the cross-sectional area of the duct. With a ducted exhaust, the minimum NFA shall be the larger of 20 square inches or the minimum NFA provided by the manufacturer for this method; and

v. Where the inlet and outlet ducts shall both terminate within the same pressure boundary, airflow from the termination points shall be diverted away from each other; or.

Note: Ducting only the inlet or the exhaust across the pressure boundary could interfere with balanced ventilation systems. This should be considered when specifying HPWH location and ventilation method.

C. **Ventilation – Nonresidential.** Consumer integrated HPWHs serving nonresidential occupancies shall meet one of the ventilation requirements below. Minimum volume and opening size requirements shall be at least the sum of the required openings and volumes for all HPWHs installed within the same space. Compressor capacity shall be determined using AHRI 540 Table 4 reference conditions for refrigeration with the “High” rating test point:

1. Installed using a method not covered by Section 110.3(c)7B2 through Section 110.3(c)7B3 provided by the manufacturer to meet or exceed the level of performance provided by the ventilation requirements of Section 110.3(c)7B2 through Section 110.3(c)7B3; or
2. Installed without ducts in an unvented room, the installation space shall have a volume not less than the greater of 100 cubic feet per kBtu per hour of the combined compressor capacity for all HPWHs in the space or the minimum unvented room volume provided by the manufacturer; or
3. Installed with ducts, the following requirements shall be met:
    i. Where both the inlet and outlet are ducted, all ducts shall terminate on the same side of the building pressure boundary (both outside or both inside the building) with airflow at the termination points diverted away from each other and/or separated by a minimum of 24 inches; and
    ii. The space joined to the installation space via ducts shall meet the minimum volume of Section 110.3(c)7B2 above; and
    iii. All duct connections and building penetrations shall be sealed to prevent air and moisture ingress; and
    iv. All ducts shall be insulated to minimum of R-6; and
    v. Where only the HPWH outlet is ducted to a communicating space, installation space shall include permanent openings for HPWH inlet air. Permanent openings shall be the larger of the Net Free Area (NFA) provided by the manufacturer or a minimum NFA not less than the cross-sectional area of the HPWH manufacturer's exhaust duct kit flange. NFA refers to the unobstructed open space in a vent, grille or louver which is a fraction of the total vent, grille or louver total gross area. Permanent openings shall consist of a single layer of fixed flat slat louvers or grilles 12 inches or less from the enclosure/door bottom and/or a door undercut. Exhaust air shall exit the installation space to the communicating space through a duct 12 inches or less from the enclosure top; and
    vi. Where the HPWH uses an axial fan, the minimum nominal duct diameter shall be not less than 8 inches for a duct length no longer than 0.66 times the manufacturer specified length for a nominal duct diameter of 8 inches.

1.4 Reference Appendices

There are no proposed changes to the reference appendices.