



STATE OF WASHINGTON

STATE BUILDING CODE COUNCIL

Washington State Energy Code Development Standard Energy Code Proposal Form

065

Proponent Revision

Received 6/01/22

Received 6/07/22

TAG Modification

6/7/22

Code being amended: Commercial Provisions Residential Provisions

Code Section # R403.13, R405.2, R503.1.2

Brief Description:

This code proposal would require new residential buildings to install heat pump space heaters for space conditioning.

Proposed code change text: (Copy the existing text from the Integrated Draft, linked above, and then use underline for new text and ~~strikeout~~ for text to be deleted.)

Delete section R403.7.1 and remove 4 from Table R406.2 and renumber subsequent system types.

Add new section as follows:

R403.13 Heat pump space heating. Space heating shall be provided by an electric-heat pump system.

Exceptions

~~1. Up to 1000 watts~~1.1W of electric resistance heating per square foot of dwelling unit conditioned floor area in climate zone 4 and up to 1.3W of electric resistance heating per square foot of conditioned floor area in climate zone 5.

1. Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) up to three stories in height above grade having an installed HVAC heating capacity no greater than 1.5 W of electric resistance heating per square foot of dwelling unit conditioned floor area, or up to 500 W, whichever is greater.

~~1. Group R-3 dwelling or sleeping units having an installed HVAC heating capacity no greater than~~Up to 1.1 1.5 W of electric resistance heating per square foot of dwelling unit conditioned floor area in climate zone 4 and up to no greater than 1.3 2W of electric resistance heating per square foot of conditioned floor area in climate zone 5. For homes or 500 square feet or less, 3W, whichever is less.

2. Group R-2 dwelling or sleeping units having an installed HVAC heating capacity no greater than 750 watts in Climate Zone 4, and 1000 watts in Climate Zone 5, in any separate habitable room with exterior fenestration are permitted to be heated using electric resistance appliances. For buildings in locations with exterior design conditions below 4°F, an additional 250 watts above that allowed for Climate Zone 5 is permitted.

2.1. A room within a dwelling or sleeping unit that has two primary walls facing different cardinal directions, each with exterior fenestration, is permitted to have an installed HVAC heating capacity no greater than 1000 watts in Climate Zone 4, and 1300 watts in Climate Zone 5. Bay windows and other minor offsets are not considered primary walls. For buildings in locations with exterior design conditions below 4°F, an additional 250 watts above that allowed for Climate Zone 5 is permitted.

2.3. Resistance heating elements integrated into unitary-heat pump equipment.

3.4. Solar thermal systems.

4.5. Waste heat, radiant heat exchanger, and energy recovery systems.

6. Supplementary heat in accordance with Section R403.1.2.

7. Where there is no electric utility service available at the building site.

8. Heating systems that rely primarily on biomass are allowed in Climate Zone 5.

Modify Table R405.2 as follows:

Systems	
R403.1	Controls
R403.1.2	Heat pump supplemental heat
R403.3.2	Sealing
R403.3.1	Equipment and system sizing
R403.3.3	Duct testing
R403.3.4	Duct leakage
R403.3.5	Building cavities
R403.4	Mechanical system piping insulation
R403.5.1	Heated water circulation and temperature maintenance system
R403.6	Mechanical ventilation
R403.7	Equipment sizing and efficiency rating
R403.8	Systems serving multiple dwelling units
R403.9	Snow melt system controls
R403.10	Pool and permanent spa energy consumption
R403.11	Portable spas
R403.13	Heat pump space heating

Modify the section as follows:

R503.1.2 Heating and cooling systems. New heating, cooling and duct systems that are part of the alteration shall comply with Section R403.

Exceptions:

1. Where ducts from an existing heating and cooling system are extended, duct systems with less than 40 linear feet in unconditioned spaces shall not be required to be tested in accordance with Section R403.2.2.
2. Existing duct systems constructed, insulated or sealed with asbestos.
3. Replacements of space heating equipment shall not be required to comply with Section R403.13 where the rated capacity of the new equipment does not exceed the rated capacity of the existing equipment.

Reason for revisions

We met with several interested parties who expressed concerns with the proposal. We addressed as many of those concerns as possible by making the following edits to the proposal:

- There was a concern that buildings with very low heating demand like those built to the Passive House standards would be required to install oversized heat pump equipment that would not run very often and justify the additional expense. The proposal was updated to allow up to 1.1Wsf in CZ4 and 1.3W/sf of electric resistance for those types of buildings.
- It was noted that this proposal made R403.7.1 redundant, therefore the section and entry from Table R406.2 were eliminated.
- There was a concern that the proposal completely eliminated natural gas options, particularly in light of the increasing availability of natural gas heat pumps. As the proposal is focused primarily on efficiency, it was

[revised so that either an electric or gas heat pump can be used to meet the requirement. This revision also made it unnecessary to modify the fuel normalization table.](#)

- [There was a concern that the “other systems as approved” was too broad, so it was eliminated.](#)

Original Reason Statement

Purpose of code change:

Requiring space heating to be all-electric eliminates a significant source of fossil fuel combustion in buildings, and is generally 2-4x more energy efficient than either fossil fuel or electric resistance heating. This proposal aligns with [State policy to increase energy efficiency](#) by 70% by 2031. Additionally, this proposal will significantly reduce emissions and is aligned with [State policy to achieve the broader goal](#) of building zero fossil-fuel greenhouse gas emission homes and buildings by the year 2031. According to analysis done using data from the 2021 Washington State Energy Strategy, we need to reduce the commercial buildings sector emissions by 44% to keep on track to meet our 2050 climate goals. To achieve this, the State will need to double the proportion of annual sales of heat pumps from 21% of all residential space heating equipment in 2020 to 39% by 2030. To get to this increase in market penetration of heat pumps, the Washington State Energy Code should require all residential space heating to be all-electric in the 2021 code cycle. See Supplemental Attachment for further details on economics, emissions reduction and market penetration.

What the proposal does:

The proposal requires that space heating be provided by heat pump equipment. It includes key exceptions to foster flexibility, usability and enforceability:

- It allows up to 1000W of resistance heating per dwelling unit. This allows for spot heating applications (such as heated floors in a bathroom) and for very well-insulated homes with very small heating loads (such as those built to the PHIUS standard) to be served by inexpensive systems.
- It is explicit that the resistance heating elements that are integrated into unitary heat pumps - such as crankcase heaters - solar thermal systems and waste heat and energy recovery systems are not impacted by this new language
- It allows supplementary heat in accordance with WSEC’s supplementary heat control requirements that already address this system configuration

The proposal then has language in section R503 to ensure that these requirements would not apply to simple equipment replacements. The exception is configured so that it is only available when new equipment is the same size as the equipment being replaced. This ensures that the heat pump requirements will not trigger an electrification retrofit for equipment replacement unless it is a major system reconfiguration with a larger piece of equipment.

This proposal does not impact larger, more complex systems that serve multiple dwelling units since those systems are already referred to the commercial section of the code by R403.8.

Your amendment must meet one of the following criteria. Select at least one:

- | | |
|---|---|
| <input type="checkbox"/> Addresses a critical life/safety need. | (Note that energy conservation is a state policy) |
| <input type="checkbox"/> The amendment clarifies the intent or application of the code. | <input type="checkbox"/> Consistency with state or federal regulations. |
| <input checked="" type="checkbox"/> Addresses a specific state policy or statute. | <input type="checkbox"/> Addresses a unique character of the state. |
| | <input type="checkbox"/> Corrects errors and omissions. |



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Check the building types that would be impacted by your code change:

Single family/duplex/townhome

Multi-family 4 + stories

Institutional

Multi-family 1 – 3 stories

Commercial / Retail

Industrial

Your name Sean Denniston

Email address sean@newbuildings.org

Your organization NBI

Phone number 503-481-7253

Other contact name [Click here to enter text.](#)

Economic Impact Data Sheet

Is there an economic impact: Yes No

Briefly summarize your proposal's primary economic impacts and benefits to building owners, tenants, and businesses. If you answered "No" above, explain your reasoning.

Construction costs for heat pump space heaters are often, but not always, higher than for conventional natural gas or electric resistance space heaters. When eliminating the cost of gas infrastructure running to the building and the cost of a separate air conditioner for space cooling, all-electric homes are generally less expensive than mixed fuel homes. Annual energy costs for heat pump space heaters are much lower than for electric resistance heating, but comparable with gas heating, at current rates (World Bank long term forecasts indicate an increase of over 80% in gas prices over the coming decade.) When including the Washington State social cost of carbon, heat pump space heating is more cost effective than both gas heating and electric resistance heating over the life cycle analysis horizon.

Given the state's climate goals and policy, this Energy Code proposal will help ensure new assets permitted beginning July 1, 2023 will not need to be immediately retrofitted.

Provide your best estimate of the **construction cost** (or cost savings) of your code change proposal? (See OFM Life Cycle Cost [Analysis tool](#) and [Instructions](#); use these [Inputs](#). **Webinars on the tool can be found [Here](#) and [Here](#)**)

Upfront cost savings is \$1.14/ sq ft or \$2,725 per home.

The life cycle cost savings, not including the social cost of carbon, is \$3.41/ sq ft or \$8,192 per home.

The life cycle cost savings, including the social cost of carbon, is \$4.57/ sq ft or \$10,974 per home.

Show calculations here, and list sources for costs/savings, or attach backup data pages

See attached supplemental.

Provide your best estimate of the **annual energy savings** (or additional energy use) for your code change proposal?

Annual energy savings of 5.5 kBTU/ sq ft

Annual energy savings of 13,140 kBTU per home

(For residential projects, also provide [Click here to enter text](#).KWH/KBTU / dwelling unit)

Show calculations here, and list sources for energy savings estimates, or attach backup data pages

List any **code enforcement** time for additional plan review or inspections that your proposal will require, in hours per permit application:

Instructions: Send this form as an email attachment, along with any other documentation available, to: sbcc@des.wa.gov. For further information, call the State Building Code Council at 360-407-9255.

All questions must be answered to be considered complete. Incomplete proposals will not be accepted.

No increase in plan review or inspection time.

Small Business Impact. Describe economic impacts to small businesses:

No impact on small businesses, since this is the residential code.

Housing Affordability. Describe economic impacts on housing affordability:

No impact on housing affordability since this will actually save builders money.

Other. Describe other qualitative cost and benefits to owners, to occupants, to the public, to the environment, and to other stakeholders that have not yet been discussed:

Improve air quality and reduce greenhouse gas emissions.

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