STATE OF WASHINGTON

STATE BUILDING CODE COUNCIL

Washington State Energy Code Development

Standard Energy Code Proposal Form

Jan 2025

Log No. _____267 v2_____

Code being amended: ☐ Commercial Provisions ☐ Residential Provisions

Code Section # _C503.4.7_____

Brief Description: High-performance replacement equipment for existing heating appliances

- "Future decarbonization plan" requirement eliminated
- Allowance of existing equipment type that can remain increased from 50% to 67%

Proposed code change text:

~~**C503.4.7 Addition or replacement of heating appliances.** Where a mechanical heating appliance is added or replaced, the added or replaced appliance shall comply with Section C401.3, Section C403.1.4, or with an alternate compliance option in Table C503.4.7. Where use of heat pump equipment for space heating is required by this section, it is permissible to utilize the Fossil Fuel Compliance Path in Section C401.3 to attain the credits required for building additions shown in Table C401.3.3.~~

~~**Exceptions:**~~

~~1. Terminal unit equipment including, but not limited to, hydronic VAV boxes, electric resistance VAV boxes, electric duct heaters, water source heat pumps, fan coils, or VRF indoor units that are served by an unaltered central system.~~

~~2. Air handling equipment with hydronic coils.~~

~~3. Air handling equipment designed for 100 percent outdoor air that is not subject to the requirements in Section C403.3.5 or that qualifies for an exception to Section C403.3.5.~~

~~4. Replacement of existing oil-fired boilers.~~

~~5. Replacement of existing steam boilers with steam distribution to terminal units and the associated boiler feed equipment.~~

~~6. Where compliance with Section C403.1.4 would trigger an unplanned utility electrical service upgrade based on the NEC 220.87 method for determining existing loads.~~

~~7. Replacement of heating equipment with equipment that is the same type as where the rated capacity of the new equipment does not exceed the rated capacity of the existing equipment.~~

C503.4.7 Replacement or additional HVAC heating appliances. Where an existing HVAC heating appliance is replaced with a new appliance, or a new space heating appliance is added to increase the total heating capacity serving an existing thermal zone, the new HVAC heating appliance shall comply with either Section C403.1.4, Section C407 or with an alternate compliance option in Table C503.4.7. Where the use of heat pump equipment for HVAC heating is required by this section, it is permissible to provide additional efficiency credits equal to the number of credits listed in Item 5a of Table C406.2(4) for air source heat pump minimum efficiency, in lieu of providing heat pumps and complying with this section. Replacement or additional HVAC heating appliances shall comply with Sections C501.6 and C506.1. Additions, alterations, or replacements shall not be made to an existing HVAC heating system that will cause the existing system to become out of compliance.

Exceptions:

1. Exempt buildings ~~and occupancies~~. Replacement HVAC heating equipment serving any of the following building categories is permitted to use the same fuel type as the existing equipment, provided the replacement equipment complies with the minimum efficiency in Table C503.4.6 and the same or lower capacity than the existing.
    1. *Affordable housing*.
    2. Group I-1, I-2, and I-3 occupancies.
    3. Buildings with more than 50 percent of conditioned floor area occupied by organizations recognized as nonprofit by the State of Washington or by federal tax law.
    4. Buildings with no more than 20,000 square feet of conditioned floor area.
2. Retention of a portion of existing HVAC heating system capacity. For buildings not exempted by Exception 1 above, a maximum of 67 percent of the existing fossil fuel or electric resistance HVAC heating capacity in existence prior to the effective date of this code is permitted to be retained or replaced to serve as supplemental heat for the new HVAC heating system, provided that the supplemental heat is controlled to be used only when the heat pump system capacity is insufficient to meet the HVAC heating load, in compliance with the applicable Exception 5, 6, or 7 to Section C403.1.4. Where an alteration replaces less than 67 percent of the existing fossil fuel or electric resistance space heating capacity, the remaining HVAC heating appliances are permitted to be retained. Where the alteration project decreases the peak HVAC heating load, the fossil fuel or electric resistance HVAC heating capacity shall be limited to 67 percent of the calculated peak HVAC heating load.
3. Temporary replacement of failing equipment. Temporary like-for-like replacement of one or more HVAC heating appliances, in excess of the 67 percent capacity permitted by Exception 2 above, is permitted where those appliances require immediate replacement, and where no other work on the HVAC system is planned. When using this exception, it is acceptable to replace a single appliance with two or more smaller appliances, provided the total capacity is not greater than that of the original appliance. In addition, the applicant shall ensure completion of the required heat pump system in compliance with one of the following options.
    a. The code official will issue a temporary certificate of occupancy (TCO), which will remain in force until the heat pump heating system is installed and the final inspection of the system has been completed.
    b. Applicant shall post a performance bond in the amount of the full estimated cost of installation of the required heat pump system, to ensure completion of the heat pump system within 48 months.
4. Utility electrical service upgrade. Compliance with Section C403.1.4 is not required where such compliance would trigger an unplanned utility electrical service upgrade, based on the Washington State Electrical Code Section 220.87 method for determining existing electrical loads, where one or more of the following is required:
    a. A new utility transformer vault located in the existing building or on the site, or an enlargement of the floor area of such a vault.
    b. Trenching across the vehicle lanes of a public way.
    c. The estimated construction cost for the required utility electrical service enlargement exceeds 50 percent of the project valuation for the remainder of the work, as determined as approved by the *code official* Construction cost shall be documented by an AACE Level 3 or equivalent cost estimate, including required demolition, construction, site work, and utility fees.
5. Exempt ~~equipment~~ systems. Alterations to the following equipment types are not required to comply with this section.
    a. Terminal unit equipment including but not limited to hydronic VAV terminal units, electric resistance VAV boxes, electric duct heaters, water source heat pumps, fan coils, or VRF indoor units, except such modifications to terminal equipment with hydronic heating coils as are required to accommodate lower-temperature fluids circulated from new central heat pump systems in accordance with Section C403.3.8.2.
    b. Air handling equipment with hydronic heating coils, except such modifications to the air handling equipment as are required to accommodate lower-temperature fluids circulated from central heat pump systems in accordance with Section C403.3.8.2.
    c. Replacement of existing steam boilers with steam distribution piping to terminal units and replacement of the existing associated boiler feed equipment where the existing steam systems includes steam distribution piping to space heating terminal units.
    d. Replacement of existing electric resistance space heating appliances, other than electric space heating hydronic boilers, with a new appliance with a capacity no greater than the existing appliance. Replacement electric resistance heating appliances shall be provided with thermostatic controls that comply with Section C403.4.
    e. Standby space heating equipment. Standby fossil fuel or electric resistance space heating equipment in excess of the permitted capacity in Exceptions 2 and 3 of Section C503.4.7 is allowed to remain to backup the

primary heat pump space heating system where provided with new automatic controls that all it only be used when the primary heating equipment is not available.

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TABLE C503.4.7
COMPLIANCE OPTIONS FOR MECHANICAL HEATING EQUIPMENT ALTERATIONS

	Proposed Heating Equipment Type[a]	Heating Efficiency Table Reference	Alternate Compliance Options to Section C403.1.4
1	Air-Cooled Unitary Heat Pumps	Table C403.3.2(2)	1. Compliance with C403.1.4, except heat pump rated capacity in accordance with Section C403.1.4 exception 5d is permitted to be sized equal to the supplemental internal resistance heating capacity in Climate Zone 4 or 5[c] 2. Compliance with C403.1.4, except electric resistance mixed air preheat is permissible[c]
2	Packaged terminal, single- package vertical, and room air-conditioner heat pumps	Table C403.3.2(4)	1. Compliance with C403.1.4, except heat pump rated capacity in accordance with Section C403.1.4 Exception 5d is permitted to be sized equal to the supplemental internal resistance heating capacity in Climate Zone 4 or 5
3	Furnaces, duct furnaces, and unit heaters	Table C403.3.2(5)	1. Permitted only when qualifying for and complying with Section C503.4.6 Exceptions 1, 2, 3 or 4 1. 2. Efficiency: +5%[b]
4	Gas-fired hot water boilers with fewer than 80% of served coils replaced	Table C403.3.2(6)	1. Permitted only when qualifying for and complying with Section C503.4.6 Exceptions 1, 2, 3 or 4 1. 2. Efficiency: +5%[b]
5	Variable refrigerant flow air-to-air and applied heat pumps	Table C403.3.2(9)	No alternate compliance option
6	DX-DOAS equipment	Table C403.3.2(12) and Table C403.3.2(13)	1. DX-DOAS is provided with heat recovery if not required by C403.3.5.1.
7	Water-source heat pumps	Table C403.3.2(14)	No alternate compliance option

a. Includes replacement of equipment with a unit that is the same type or higher efficiency and the same or lower capacity, or a replacement of one equipment type with a different equipment type.
b. Equipment shall have a capacity-weighted average heating system efficiency that is five percent better than that shown in the reference table (1.05 x values in reference table).
c. Option 1 and Option 2 can be combined.

Purpose of code change:

Incrementally reduce energy use of existing buildings, at the time of replacement of individual heating appliances when it's most economical.

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

- ☐ Addresses a critical life/safety need.
- ☐ The amendment clarifies the intent or application of the code.
- ☒ Addresses a specific state policy or statute. (Note that energy conservation is a state policy)
- ☐ Consistency with state or federal regulations.
- ☐ Addresses a unique character of the state.
- ☐ Corrects errors and omissions.

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

- ☐ Single family/duplex/townhome
- ☒ Multi-family 1 – 3 stories
- ☒ Multi-family 4 + stories
- ☒ Commercial / Retail
- ☒ Institutional
- ☒ Industrial

Your name Duane Jonlin

Your organization Seattle Department of Construction and Inspections

Other contact name

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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.

High-efficiency equipment replacements will be more expensive that simple like-for-like replacements of existing gas and electric resistance equipment. This will help with eventual compliance with CBPS.

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**)

$Click here to enter text./square foot (For residential projects, also provide $Click here to enter text./ dwelling unit)

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

For many buildings, the only cost will be that of the "Future Decarbonization Plan."
Exemptions for several occupancy types & several equipment types, or expensive electrical utility service upgrades. Allows retention of 50% of existing gas or electric resistance heating capacity.

For others:
150 kW heat pump for 40,000 sf building maybe $20,000, not a lot more than a 500 Btu/h gas boiler at $20,000
(300 sf / ton capacity)
Not clear whether hybrid system (half gas and half heat pump) would be any less expensive.

Future Decarbonization Plan requires an engineered schematic-level plan for eventual decarbonization.
Design is typically 10% of construction cost, and the schematic design phase is typically 10% of design fee.
If remainder of decarbonization work will cost $5.00/sf, then the FDP would cost **$0.05/sf**

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

1.9 KWH/ square foot

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

Heat pump heating will reduce HVAC heating energy use by 65%
If EUI is 40 and if heating is 25% of EUI, 65% = 40 x .25 x .65 = 6.5 kBtu/sf/yr = 1.9 kWh

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

Will require additional plan review and inspection time.

Small Business Impact. Describe economic impacts to small businesses:

None

Housing Affordability. Describe economic impacts on housing affordability:

May impact market rate housing cost, although affordable housing is exempt.

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.

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:

Compliance with CBPS. More economical to do the upgrade at the time of equipment replacement than at any other time.

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