STATE OF WASHINGTON

STATE BUILDING CODE COUNCIL

Washington State Energy Code Development

Standard Energy Code Proposal Form

Log No. 24-GP1-232 Vers 2
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Code being amended: ☒ Commercial Provisions ☐ Residential Provisions

Code Section # **C404.2.1, C404.2.1.1,**

Brief Description:

The purpose of this proposal is to clarify code intent for the service water heating system type and sizing provisions in the 2024 WSEC-C. SBCC draft opinions discussed by the MVPE committee are the basis of this proposal. Future MVPE and SBCC official opinions may impact this proposal.

This proposal re-orders the provisions so the requirements specifically for air-source heat pump water heaters (HPWH) are grouped and the other requirements, such as supplemental heating, are independent.

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.)

C404.2.1 Service water heating system type. Primary service hot water capacity shall be provided by an ~~electric~~ air-source or ground-source heat pump water heating (HPWH) system sized to deliver no less than 50 percent of the calculated demand for service hot water production during the peak demand period. ((~~meeting the requirements of this section.~~)) The HPWH system shall be configured to provide the first stage of heating capacity. The remaining primary service water heating output capacity is permitted to be met by any type of service water heating system.

((~~Supplemental service water heating equipment is permitted to use electric resistance or fossil fuel in compliance with Section C404.2.1.4.~~))

A base site allowance of 24 kW (82 kBtu/h) plus 0.1 watt (0.3412 Btu/h) per square foot of the total building area is permitted for electric resistance service water heating capacity per building.

Exceptions:

((~~24 kW plus 0.1 watts per square foot of building area of electric resistance service water heating capacity is allowed per building.~~))

1. ((~~Solar thermal, wastewater heat recovery, other *approved* waste heat recovery, ground source heat pumps, water-source heat pump systems utilizing waste heat, and combinations thereof, are permitted to offset all or any portion of the required HPWH capacity where such systems comply with this code and the *Uniform Plumbing Code*.~~))

   The following sources of heat energy, and combinations thereof, are permitted to satisfy all or any portion of the required HPWH primary output capacity where such systems comply with this code and the *Uniform Plumbing Code*, and the same heat energy capacity is not used to demonstrate compliance with Sections C406.2.5, C407, or C411:

   1.1. Solar thermal systems

   1.2. Heat recovery chillers

   1.3. Waste heat recovery from water-to-water heat pumps

   1.4. Wastewater heat recovery systems

1.5. Condenser heat recovery in accordance with Section C403.9.2.1

1.6. Steam condensate water heat recovery in accordance with C403.9.2.2

1.7. Refrigeration condenser heat recovery in accordance with C403.9.2.3

1.8. Other *approved* sources of waste heat energy

2. Systems that comply with the Northwest Energy Efficiency Alliance (NEEA) Commercial Electric Advanced Water Heating Specification (AWHS). All specified equipment under this exception shall be products listed in the Qualified Products List (QPL) for commercial and Group R-2 occupancies, excluding hybrid electric heat pump water heaters. Project compliance documentation shall include a list of all applicable AWHS criteria and the project design elements that meet the specified criteria.
3. Service hot water systems served by a district energy system that serves multiple buildings and that was in service before the effective date of this code.
4. Commercial dishwashers, commercial food service equipment, and other *approved* process equipment are permitted to utilize electric booster heaters for supply water temperatures 120°F (49°C) or higher.
5. Systems connected to a *low-carbon district energy exchange system* or a *low-carbon district heating and cooling or heating only system*.
6. ~~Essential facilities. Groups I-2 and I-3 occupancies that by regulation are required to have in place redundant emergency backup systems.~~ Emergency back-up service water heating capacity provided in addition to the primary service water heating capacity is permitted in Group I-2 and Group I-3 essential facilities. This additional capacity is permitted to be met by any type of service water heating system and shall be controlled to operate only when the primary service water heating system is not available.

C404.2.1.1 Primary heat pump system ((~~sizing~~))**.** Primary heat pump water heating systems shall comply with Sections C404.2.1.1.1 through C404.2.1.1.4.

C404.2.1.1.1 Primary heat pump system sizing. ((~~The primary heat pump service water heating system shall be sized to deliver no less than 50 percent of the calculated demand for service hot water production during the peak demand period. Demand~~)) The heat pump capacity shall be calculated using the equipment manufacturer's selection criteria or another *approved* methodology with entering dry bulb or wet bulb outdoor air temperature at 40°F (4°C) for air-source heat pumps, or 44°F (7°C) ground temperature for ground-source heat pumps. Electric air source heat pumps shall also be sized to deliver no less than 25 percent of the calculated demand for service hot water production during the peak demand period when entering dry bulb or wet bulb outdoor air temperature is 24°F (-4°C). ((~~The remaining primary service output may be met by fossil fuel, electric resistance, or heat pump water heating systems.~~))

Exception: Twenty-five percent sizing at entering dry bulb or wet bulb air temperature of 24°F (-4°C) is not required for air-source heat pumps located in a below-grade enclosed parking structure or other ventilated and unconditioned space that is not anticipated to fall below 40°F (4°C) at any time.

C404.2.1.1.2 Primary hot water storage sizing. The system shall provide sufficient hot water to satisfy peak demand period requirements.

C404.2.1.1.3 System design. The service water heating system shall be configured to conform to one of the following provisions:

1. For *single-pass heat pump water heaters*, *temperature maintenance* heating provided for reheating return water from the building's heated water circulation system shall be physically decoupled from the primary service water heating system storage tank(s) in a manner that prevents destratification of the primary system storage tanks. *Temperature maintenance* heating is permitted to be provided by electric resistance, fossil fuel, or a separate dedicated heat pump system.
2. For *multi-pass heat pump water heaters*, *recirculated temperature* maintenance water is permitted to be returned to the primary water storage tanks for reheating.
3. For unitary heat pump water heaters, located in conditioned space, are permitted, where they are sized to meet all calculated service water heating demand using the heat pump compressor, and not supplementary heat.

C404.2.1.((~~3.1~~))1.4 Mixing valve. A thermostatic mixing valve capable of supplying hot water to the building at the user temperature setpoint shall be provided, in compliance with requirements of the *Uniform Plumbing Code* and the HPWH manufacturer's installation guidelines. The mixing valve shall be sized and rated to deliver tempered water in a range from the minimum flow of the *temperature maintenance* recirculation system up to the maximum demand for the fixtures served.

C404.2.1.((~~4~~))**2 Supplemental water heating.** Total supplemental water heating ((~~equipment shall not have an~~)) output capacity ((~~greater than~~)) shall not exceed the total summed capacity of all primary water heating equipment. Supplemental capacity is permitted to be provided by any type of service water heating system. For the purposes of determining this supplemental water heating allowance, the capacity of primary water heating equipment shall be evaluated at 40°F (4°C) entering dry bulb or wet bulb outdoor air temperature for air-source heat pumps, 44°F (7°C) ground temperature for ground-source heat pumps. ((~~, and~~)) For other primary water heating system types, the capacity shall be based on the nameplate input rating of the equipment. ((~~for all other water heater system types.~~)) Sources of service hot water exempted under C404.2.1 shall not be included in the supplemental water heating allowance.

Supplemental heating is permitted for the following uses:

1. *Temperature maintenance* of heated-water circulation systems, physically separate from the primary service water heating system.
2. Defrost of compressor coils.
3. Heat tracing of piping for freeze protection or for *temperature maintenance* in lieu of recirculation of hot water.
4. Backup or low ambient temperature conditions, where all of the following are true:
   4.1. During normal operations, the supplemental heating is controlled to operate only when the entering air temperature at the air-source HPWH is below 40°F (4°C), and the primary HPWH compressor continues to operate together with the supplemental heating.
   4.2. The primary water heating equipment cannot satisfy the system load due to equipment failure or entering air temperature below 40°F (4°C).

C404.2.1.((~~5~~))**3 System fault detection.** The control system shall be capable of and configured to send automatic error alarms to building or maintenance personnel upon detection of equipment faults, low leaving water temperature from primary storage tanks, or low hot water supply delivery temperature to building distribution system.

Purpose of code change:

Clarify code intent for service water heating systems.

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

☐ Industr

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Your organization **Evergreen Technology Consulting**

Other contact name Click here to enter text.

Email address **lrosenow@evergreen-tech.net**

Phone number **360-539-5202**

Your name **Lisa Rosenow**

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.

This is a clarifying proposal based on SBCC official opinions that does not add a new prescriptive or mandatory requirement or associated costs

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

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

Click here to enter text.KWH/ square foot (or) Click here to enter text.KBTU/ square foot

(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:

May reduce project review time by providing better clarity about what requirements to verify for plan review and inspection.

Small Business Impact. Describe economic impacts to small businesses:

No change.

Housing Affordability. Describe economic impacts on housing affordability:

No change.

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:

NA

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.