



Seattle Permits

Part of a multi-departmental City of Seattle series on getting a permit

Alterations to Heating and Water Heating Equipment

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This Tip explains key rules in the 2021 [Seattle Energy Code](#) that apply when you replace existing mechanical equipment in most commercial and multifamily buildings. If you replace a boiler, furnace, water heater, or air cooled chiller, you usually must install an electric heat pump system. Some exceptions allow you to delay the full upgrade or keep part of your existing system. These rules do not apply to single family homes or townhouses.

WHY HAS SEATTLE ENACTED THESE RULES?

Seattle aims to reduce greenhouse gas emissions and improve energy efficiency. Buildings must move away from gas or other fossil fuel systems and shift to efficient electric heat pumps. The most cost effective time to make this change is when replacing existing equipment.

THE FOSSIL FUEL COMPLIANCE PATH

Recent rulings by the U.S. Ninth Circuit Court led Washington State and Seattle to add a new 'Fossil Fuel Compliance Path' to Section C401.3 of their energy codes. This option allows buildings to use gas or electric resistance equipment, even for alterations. However, because these systems use more energy than electric heat pumps, buildings choosing this path must earn extra efficiency credits. To find out how many additional credits are required, use the 'Building Additions' row in Table C401.3.3.

NEW WORK MUST MEET CURRENT CODE REQUIREMENTS

When you replace part of an existing HVAC system, any added, changed, or replaced component has to meet the same rules that apply to new construction under Section C403, along with several sections in Chapter 5. There are two key exceptions:

- If you aren't adding cooling capacity, you don't have to meet the DOAS requirements in Section C403.3.5.
- If you aren't replacing any heating equipment—like a furnace, boiler, or heat pump—you don't have to meet the heating equipment requirements in Section C403.1.4.

HEAT PUMPS MUST REPLACE OTHER SYSTEM TYPES

There are three parts of Chapter 5 that typically require older mechanical equipment to be replaced with heat pump systems:

- replacement of heating equipment such as boilers or furnaces – Section C503.4.6
- replacement of service water heating equipment such as water heaters or boilers – Section C503.5
- replacement of air cooled chillers – Section C503.4.3.1

EXCEPTIONS FOR CERTAIN BUILDING TYPES

Chapter 5 includes three sections that typically require older mechanical equipment to be replaced with heat pump systems:

- replacement of heating equipment such as boilers or furnaces (Section C503.4.6)
- replacement of water heating equipment such as water heaters or boilers (Section C503.5)
- replacement of air cooled chillers (Section C503.4.3.1)

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HVAC heating equipment addition or replacement. When it's time to replace your boiler or furnace, the new equipment must be an electric heat pump unless you qualify for one of the following exceptions:. See Section C503.4.6.

- **Exempt building types.** If your building qualifies under one of the four exempt categories, these rules do not apply.
- **50 Percent rule:** You can keep half of your existing heating equipment if you install heat pumps for the other half and control the system so the gas or electric resistance heat only turns on when the heat pump can't meet the load.
- **Temporary replacements.** If equipment fails, you can replace it with the same type temporarily, as long as you post a performance bond guaranteeing that heat pumps will supply at least 50% of the building's heating capacity within four years. For shorter deadlines, you can use a temporary certificate of occupancy instead.
- **Utility service upgrade.** You do not have to switch to heat pumps if doing so would require a new or larger transformer vault, trenching across a street, or would cost more than half of the remaining project cost. To use this exception, you must verify the building's electrical service capacity using metered peak use data as described in Seattle Electrical Code Section 220.87.
- **Exempt equipment.** Certain equipment can be altered without converting the system to heat pumps, including:
 - Terminal unit equipment. VAV boxes, electric duct heaters, water source heat pumps, fan coils, or VRF units. (You still might have to increase the coil size in hydronic VAV boxes to accommodate the lower temperature fluids circulating from a heat pump.)
 - Air handling equipment with hydronic heating coils. (You still might have to increase the coil size in air handling units to accommodate the lower temperature fluids circulating from a heat pump.)
 - Steam systems. Replacement of steam boilers in buildings that have steam piping.

SERVICE WATER HEATING EQUIPMENT ADDITION OR REPLACEMENT

(These requirements are similar to the rules for replacing HVAC systems.) When a boiler or furnace is replaced, the new equipment must be an electric heat pump, as required in Section C503.5.1. However, several exceptions may apply:

- **Utility service upgrade exception:** You are not required to switch to heat pumps if the additional electrical load would necessitate a new or larger transformer vault, trenching across a street, or would cost more than half of the remaining project work. To use this exception, you must verify the building's electrical capacity using metered peak use data as described in Seattle Electrical Code Section 220.87.
- **Exempt systems:** Some equipment can be replaced without converting to heat pumps, including:
 - small electric water heaters (24 kW or less)
 - small gas storage water heaters (75,000 Btu/h or less)
 - gas instantaneous water heaters (200,000 Btu/h or less)
 - steam systems, including replacement of steam boilers in buildings with steam piping
- **Exempt building types:** These requirements don't apply if your building falls into one of the following categories:
 - affordable housing
 - hospitals and correctional facilities (I-1, I-2, I-3 occupancies)
 - buildings primarily occupied by nonprofits
 - buildings smaller than 20,000 square feet
- **50 percent rule:** You may keep half of your existing heating equipment if you install heat pumps to serve the other half and control the system so that gas or electric resistance heat only runs when the heat pump can't keep up.
- **Temporary replacements:** If equipment fails, you may replace it with the same type temporarily, as long as you post a performance bond guaranteeing that heat pumps will supply at least 50 percent of the building's heating capacity within four years. For shorter deadlines, you can use a temporary certificate of occupancy instead.

REPLACEMENT OF CENTRAL AIR-COOLED CHILLER SYSTEMS

Even though this topic might not seem directly related to 'alterations to heating equipment,' replacing a central air cooled chiller does trigger heat pump requirements. When you replace a chiller, you must install a heat pump system, and the controls must ensure the heat pump provides the first stage of heating. The existing gas or electric resistance system can only provide backup heat. See Section C503.4.3.1.

There are exceptions for the same four exempt building types listed earlier, as well as for three kinds of existing HVAC systems:

- Chillers that only serve spaces with no heating load, such as data centers.
- Buildings with steam heating systems—these don't require the heat pump to operate as the first stage.
- Buildings with HVAC terminal units that use electric resistance heat, such as electric VAV boxes, fan coils, or electric resistance heaters—the heat pump is not required to serve as the first stage in these cases.

FUTURE DECARBONIZATION PLAN

If you add or replace any of the systems listed above (heating equipment, water heating equipment, or an air cooled chiller) in a building larger than 20,000 square feet, and you don't fully convert the system to heat pumps, you must submit a 'future decarbonization plan' as required by Section C503.4.6.2. This plan is a schematic level design and cost estimate showing what would be needed to convert the whole building to heat pumps later. You are only required to prepare and submit the plan—you are not required to complete the upgrade work itself.

SUBSTANTIAL ALTERATIONS

When a building in Seattle undergoes major renovations, it may be classified as a 'substantial alteration.' If that happens, the project must meet nearly all current code requirements. For more details, see SDCI Tip #314 Seattle Existing Building Code Requirements for Buildings that Undergo Substantial Alterations and Section C503.9 for the energy code specifics. If your project is labeled a substantial alteration, the heating and water heating systems generally must meet today's energy code standards.

If they don't, you must use energy modeling to show that the building's carbon emissions in operation will be no more than 10 percent higher than what the code allows for new construction.

CHANGE OF SPACE CONDITIONING

When you add heating to a building that didn't have it before or add cooling to a building that only had heating, the project is treated much like a 'substantial alteration.' In most cases, the HVAC and water heating systems must meet the current energy code.

There is one important exception: If you replace your existing fossil fuel or electric resistance heating system with heat pumps, this does not count as a 'change of space conditioning'—as long as the new heat pump system includes a DOAS (dedicated outdoor air system) with heat recovery. This is true even though the building is technically being upgraded from 'heating only' to 'heating and cooling.' This exception is meant to encourage heat pump conversions because heat pumps are much more efficient. See Section C505.2.

CHANGE OF OCCUPANCY

When a building is changed from an F, S, or U occupancy (factory, storage, or utility) to any other type of use, it is treated much like a 'substantial alteration.' This means the HVAC and water heating systems must meet the current energy code. See Section C505.3.

Does your building really need such a large boiler?

Your current heating or water heating system might be much bigger than necessary, which means you could replace it with a smaller one. In many multifamily buildings, water heating systems are significantly oversized. Also, today's low flow faucets and showerheads in Washington use much less water than older fixtures. For both space heating and water heating, you may be able to install a much smaller heat pump system if you size it based on the building's actual metered peak loads instead of traditional sizing calculations.

Do you really need a larger electrical service?

You can use Section 220.87 of the Seattle Electrical Code to figure out how much capacity is left on your electrical service and main panel by looking at metered peak load data. Your electric utility may

already have this information. Also, Section 220.12 lets you use the maximum lighting loads from the Seattle Energy Code that was in effect when the building was constructed (this doesn't apply to dwelling units). Often, buildings have more available electrical capacity than expected—sometimes enough to avoid needing a service upgrade when switching to heat pumps.

Resources

Lighting Design Lab

There's a lot of helpful information about energy code requirements and heat pump technology on Seattle City Light's Lighting Design Lab website. Just go to the site, click the 'Past Webinars' tab, and browse the recent sessions.

[2023 Classes | Lighting Design Lab](#)

US Department of Energy. Basic course on heat pump technology. [HVAC - Introduction to Heat Pumps | Building Science Education \(energy.gov\)](#)