Seattle
Office of Sustainability
& Environment

Building Seattle Better

How Seattle's municipal buildings support a carbon-neutral future

Reducing Climate Impacts

Over 90 percent of building-related greenhouse gas (GHG) emissions in Seattle come from burning fossil fuels like gas and oil for hot water, space heating, and appliances. The City of Seattle is committed to a clean energy future—free from the harmful public health and climate impacts of fossil fuels. Our goal is to reduce emissions from both public and private buildings by 40 percent by 2030, and be net-zero carbon emissions by 2050.

Leading by Example

The City understands that its own facilities are part of the solution. That's why we've significantly improved energy efficiency—**reducing energy use 23.5 percent from 2008 to 2020**—and why we've set ambitious goals for transitioning all municipal buildings to carbon-neutral electricity.

- Beginning in 2020, the City stopped using fossil fuels in all municipal new construction and major renovations.
- For existing buildings, Phase I (2020–22) of the Municipal Buildings Electrification Strategy calls for **transitioning more than 30 buildings**, which are projected to reduce GHG emissions by approximately 3 percent.
- Phase 2 of the strategy (ready by December 2022) will outline how **all remaining municipal buildings will be upgraded to operate without fossil fuel systems and appliances by 2035.** The strategy will also consider future electric vehicle charging needs when projecting for electric service upgrades.

Keeping It Cool

The City is adding cooling, a critical public health need during extreme heat and annual rising temperatures, to many facilities such as community centers and libraries as they transition to fully electric.

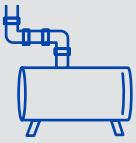
Municipal Building Portfolio

650
Total buildings

The approximate number of buildings the City owns (or about 10 million sq. ft.).

200
Largest buildings

The municipal buildings that use the most fossil fuels (8.5 million sq. ft.) and have the greatest climate impact among the City's portfolio.



On-site
Gas

The most common fossil fuel source, with a few sites served by gas-fired district steam, fuel oil, waste oil, or propane.

Municipal Project Highlights

Credit: Erik Stuhaug

Seattle City Hall

180,000 sq. ft. | Partial electrification

As gas and electric resistance water heaters at City Hall reach the end of their useful life, the City is replacing them with efficient electric heat pump water heaters. Currently, the building has electric resistance units in the basement that serve most of the building and gas water heaters in the penthouse that serve the upper third of the building.

Incremental electrification cost estimate:[1] $87,000
Annual Energy Savings: 1.9%
Annual Emissions Savings: 2.8%

Credit: City of Seattle Office of Sustainability and Environment

The Brig at Magnuson Park (Building 406)

28,000 sq. ft. | Full electrification

Seattle Parks and Recreation converted the existing gas heat to an electric heat pump system as part of an asset renewal project that included a roof replacement and accessibility improvements. The building tenant is Outdoors for All, an adaptive recreation provider.

Incremental electrification cost: $300,000
Annual Energy Savings: 40.0%
Annual Emissions Savings: 66.0%

Credit: Erik Stuhaug

Seattle Justice Center

298,000 sq. ft. | Partial electrification

This project will replace damaged drainpipes that were etched by boiler condensation and will replace two large gas water heaters that are at the end of their useful life with three integrated heat pumps. The heat pumps will provide about 50 percent of the original capacity based on load studies, which showed that the original equipment was oversized.

Incremental electrification cost: $55,000
Annual Energy Savings: 1.0%
Annual Emissions Savings: 5.1%

1 Incremental electrification cost estimate = the additional cost of electric heat pumps vs. gas equipment

Tracking Progress

Phase 1 of the Municipal Buildings Electrification Strategy is on track with these projects:

- [x] Full electrification of The Brig at Magnuson Park
- [x] Replacing gas water heaters with electric heat pumps at five fire stations
- [x] Converting the energy intensive gear-drying room at Fire Station 17 to a more efficient, all-electric system
- [ ] Full electrification of the Capitol Hill and Broadview libraries
- [ ] Full electrification of Seattle Public Utilities' Tunnel Effluent Pump Station in Ballard
- [ ] Partial electrification of the Yesler Community Center, Seattle City Hall, and Seattle Justice Center

- [x] Projects Completed
- [ ] Projects In Progress

Lessons Learned: Electrification Strategy Tips

Asset Management Planning

Energy Load Reduction: Planning energy efficiency projects with a goal of right-sizing future electric equipment can reduce or eliminate the need to increase the electric service capacity.

Plan Before Failure: Don't wait until gas equipment fails to begin electrifying. Begin your system design well before equipment is at the end of its useful life so that it's not a cost or technical barrier when a replacement is needed. Seattle Energy Code requires heat pumps when most space and water heating equipment is replaced.

Leverage Existing Projects: For example, the Greenlake Library electrification plan was incorporated into existing plans for seismic upgrades for earthquake protection and improved ADA access. Roofing projects are a prime opportunity to upgrade insulation that will help reduce energy loads and right-size future electric systems.

Equipment Type

Heating and Cooling (HVAC): The easiest baseline HVAC equipment to electrify is a Packaged Gas Roof Top Unit (RTU) with cooling, or "gas packs." These systems provide heat via gas and provide cooling via electricity, and are common in smaller offices, warehouses, and retail spaces. In most cases, they can be replaced with an all-electric heat pump RTU, which has integrated heat recovery, without increasing electric service capacity.

Domestic Water Heating (DHW): For smaller DHW needs, the City has replaced gas-fired units with "integrated" heat pump water heaters in buildings such as fire stations. Integrated DHW heat pumps include the heat pump, storage tank, and electric back-up all in one unit, and are similar to "hybrid" heat pumps.

Equipment Sizing

Specs: Don't rely on the existing space heating load specifications when sizing your new electric system, as most gas equipment is oversized. Take time to do new heating and cooling load calculations so you can size accordingly.

Cooling Needs: If you have equipment size constraints, consider reducing the amount of air conditioning (AC) provided, especially if the space only needs it occasionally. The space will be comfortable on most days and on hot days, spaces can be kept at least 5–7 degrees cooler than without AC. Passive measures, like window films, attic insulation, and fin shades can also keep spaces cool.

Heat Recovery Benefits:
In many buildings, the upfront cost of a system that recovers heat from at least 80 percent of the space is more cost-effective and logistically easier than increasing the electric service capacity down the road.

Hot Water Needs: Many existing DHW systems are oversized, and new systems can be up to 75 percent smaller. This is because older DHW systems were specified before "low-flow" fixtures became standard and/or the current DHW use is less than what was expected when the old system was planned.

Equipment Location

Refrigerant Type: CO_2, the least climate-polluting heat pump refrigerant, is also the most flexible for equipment location. It can tolerate temperatures down to 20 degrees Fahrenheit below zero. Other refrigerants start to struggle below 40 degrees Fahrenheit, so equipment using these refrigerants is best placed in parking garages or inside areas where the air is warmer.

Air Volume Needs: Mechanical room size can be a constraint due to the volume of ambient air required by heat pumps. Ducting to bring in more tempered air and installing fans to generate air movement are good solutions.

Staff Training

Heat pumps and other electric technologies may be new to some staff, so plan time for upskilling and training. Involving your staff in planning and explaining the long-term and community benefits of emissions reductions can build support.

Get started today.

Electrifying buildings is one of the most powerful levers for reducing climate emissions. Get started on your own path by talking with your facility staff and independent service providers to explore energy efficiency and electrification options well before you need to replace equipment. Contact **cleanbuildings@seattle.gov** for more information.