Reducing Portland's Carbon Emissions

The City of Portland declared a climate emergency in 2020 and **set goals to cut carbon emissions by half** (compared to 1990 levels) by 2030 and achieve net-zero emissions by 2050.

To get there, the City has been doing its homework—researching best practices, collaborating with like-minded cities across the country, and working with stakeholders and residents to develop policies that can reduce carbon emissions from building, transportation, and industry sectors. A key theme in this process was to improve the comfort and health of frontline communities and other residents who are affected the most by climate change.

Buildings are a key focus area. From 2019 through 2023, the Bureau of Planning and Sustainability (BPS) collaborated with Black, Indigenous, and People of Color (BIPOC) community members to develop an equitable building decarbonization policy concept called the HEART Standards. This policy concept proposed minimum requirements for rental housing to achieve community objectives: **reduce carbon emissions, advance healthy housing and energy affordability, consider anti-displacement in policy design, and enhance climate resilience.** BPS is also exploring how to push new buildings toward net-zero carbon emissions by 2030. A big piece of that puzzle is getting building owners to swap out natural gas appliances for electric ones.

To support BPS in developing policies that are a win-win for the environment and for Portland's community members, ECOnorthwest analyzed **three policy topics answering important questions.**

- **Building Carbon Performance Standards**
  What emissions targets should the City set? What are the anticipated costs for property owners? What are the likely impacts on renters?
- **Cooling Temperature Standards**
  What would a cooling requirement for rental housing mean for the costs on property owners and renters?
- **New Construction Electrification**
  Does installing energy-efficient electric appliances rather than natural gas based appliances result in lower costs and greater savings over the long-term?

Building Carbon Performance Standards

Residential and Commercial Buildings Account for

of Portland's Emissions[1]

How do buildings contribute to greenhouse gas emissions?

Buildings emit greenhouse gases when using energy for **heating, cooling, water heating, lighting, and other electricity uses,** known as operational emissions. Building design, ventilation, and insulation also affect energy use and emissions. In Portland, residential and commercial buildings make up about 39 percent of city's emissions.[1] The construction process also produces emissions, known as "embodied carbon," however, this analysis focuses on operational emissions.

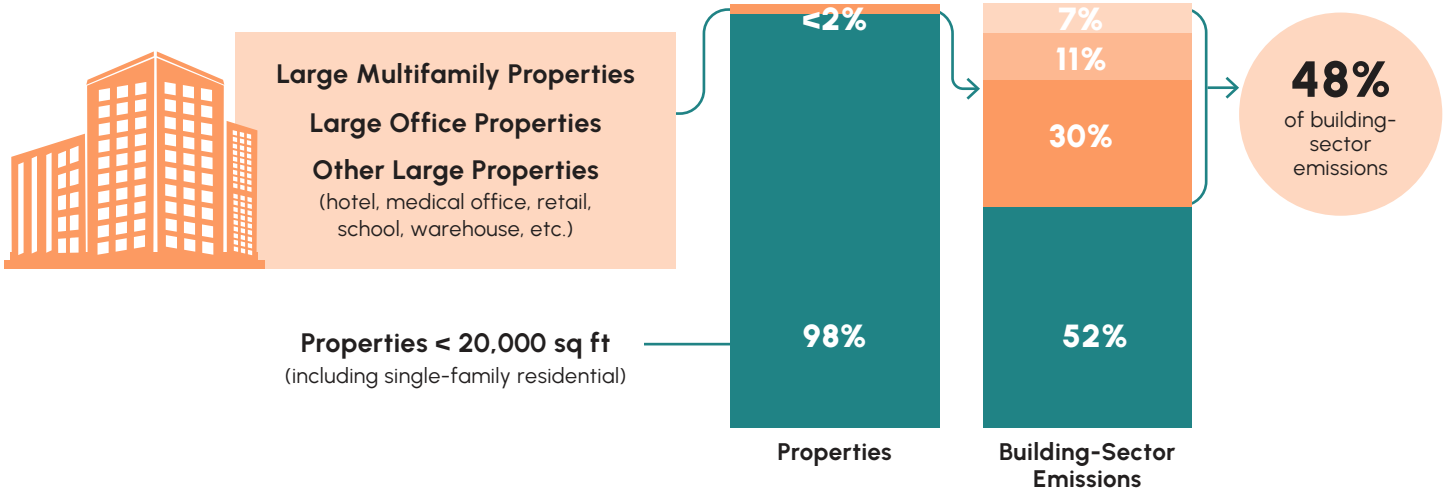
What is the role of electrification in reducing greenhouse gas emissions?

Shifting from gas-powered appliances to electric ones can reduce emissions because electric options—like heat pumps—use less energy. Furthermore, while Oregon's electric grid is not free of greenhouse gas emissions, electric service providers are required to reduce their carbon emissions by 80 percent by 2030 and by 100 percent by 2040.[2] **So, building electrification is a way for Portland to lower operational emissions and move closer to meeting its climate goals.**

How can policy help curtail building carbon emissions?

While energy use in buildings cannot be eliminated, policies that improve energy efficiency can make a big impact on carbon emissions. Portland has many policy tools to incentivize energy efficiency. ECOnorthwest and its partners analyzed compliance costs, greenhouse gas emission savings, and potential financial implications for renters. **The analysis focused on large properties (20,000 sq ft or greater) because they make up less than two percent of buildings in Portland but produce about half of building-sector emissions.** More specifically, the analysis was for large office and large multifamily properties.

In Portland, large properties (20,000 ft^2 or greater) make up less than **2%** of buildings, but produce **48%** of building-sector emissions.



1 City of Portland Bureau of Planning and Sustainability, Summary of 2022 Multnomah County Carbon Emissions and Trends (October 2024).

2 The Oregon Legislature passed the Clean Energy Targets bill (House Bill 2021) in 2021, establishing a requirement for investor-owned electric utility companies like Portland General Electric (PGE) and Pacific Power to meet carbon emissions reduction targets. Electricity used in Portland almost entirely comes from the two companies.

What will carbon emissions from large office and multifamily properties look like in 2030?

Grid decarbonization could reduce emissions by 67 percent in large offices and by 60 percent in large multifamily properties by 2030 (compared to a 2024 baseline). Emissions from these properties were estimated to be about 460,400 MT CO2e in 2024.[3] If electric service providers reduce emissions from the grid as required, the emissions could be lowered to about 164,400 MT CO2e by 2030.

What carbon performance standards can help the City reduce carbon emissions by about 20 percent from where they would otherwise be in 2030?

To further reduce carbon emissions by 2030, BPS could establish new carbon performance standards that require each property to reduce its annual emissions level below key greenhouse gas intensity (GHGI) targets:

- **2.05 kg CO2e per sq ft** for large office properties
- **1.01 kg CO2e per sq ft** for large multifamily properties

These targets would reduce carbon emissions by about 20 percent compared to a business-as-usual scenario in 2030. Properties already operating below the target levels would not need to take any action. Compliance measures will largely depend upon a building's use, size, and the condition of its systems, including lighting, envelope, heating, cooling, and ventilation. Building age is also a major factor, as energy efficiency has improved over time with the advancement of state building code requirements.

What measures could office property owners implement? How much would they cost?

There are two likely paths for carbon emissions reductions in large office properties.

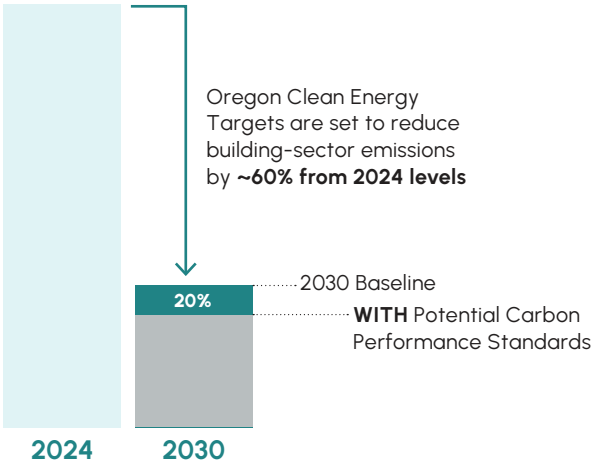
- **Air sealing improvements** may be sufficient for some buildings. Cost estimate: $1.30 and $2.53 per sq ft, depending on the property size and current emissions.
- **Heat pumps** would be the next best option. Cost estimate: $8.15 per sq ft.

About 290 properties (21 million sq ft) would need to reduce their emissions to reach the GHGI target. Looking across the Portland market, sealing improvements alone could cost about $45 million, whereas heat pumps could cost about $165 million.

3 Based on building inventory data from the City of Portland and ECOnorthwest's analysis of 2024 Clean Energy Plans (CEPs) and Integrated Resource Plans (IRPs).

Air sealing improvements

2030 Multifamily Emissions



Heat pump installations

What measures could multifamily property owners implement? How much would they cost?

Compliance with carbon performance standards would likely result in replacing natural gas furnaces and/or electric resistance baseboard heaters with heat pumps.

- **Smaller, older properties** are more likely to have higher emissions and require electrical upgrades to accommodate the installation of new heat pumps. Cost estimate: **$10,600 per unit,** which includes $4,400 for an electrical panel upgrade.
- **Larger, newer properties** are likely to have lower emissions and not require upgrades to electrical panels. Cost estimate: **$5,600 per unit.**

Low-emissions properties that are not too far off from reaching the GHGI target may only need sealing improvements or heat pump water heaters. Cost estimate: $2,000 per unit.

Across Portland, there are about 450 large rental multifamily properties, or about 15,260 units, that would need to reduce their emissions to reach GHGI target. Emissions reduction measures for these properties could be about $155 million. Even after accounting for the most likely federal and state funding sources and the Portland Clean Energy Community Benefits Fund (PCEF), the funding gap for multifamily retrofits could be between $62.0 million to $85.5 million.

How will this policy impact renters?

For older rental units, the installation of heat pumps and other emissions reduction measures **could save up to $45 a month for tenants who pay for their own utilities.** However, these savings may be negated by property owners who raise rents to recoup the costs of retrofits. For market-rate properties, the utility savings and rent increases would be smaller.

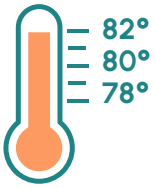
Although landlords might try to recoup the costs of emissions reduction measures, they would not be able to pass the full cost of upgrades to renters. Not all landlords will raise rents the same way or at the same time, and competition in the rental market could limit their ability to do so. Even though renters may benefit from better heating and cooling systems, there is no clear evidence on how much renters value these upgrades or if they're willing to pay more for them.

The 2021 heat dome killed **62** people in Multnomah County, with temperatures reaching **a record 116°F**

Cooling Temperature Standards

Why does Portland need a cooling temperature standard?

Portland's increasing heat waves are a serious public health risk. The 2021 heat dome killed 62 people in Multnomah County, with temperatures reaching a record 116°F. **Many rental units, especially older multifamily properties, lack air conditioning.** A maximum temperature standard would ensure renters have access to cooling, improving both safety and comfort.



Some jurisdictions in the country have passed maximum temperature standards.

What could a maximum temperature standard look like?

Some jurisdictions in the country have targeted 78°F, 80°F, or 82°F. Some requirements are only for summer months (May through September). Other places require indoor temperature to be 20°F below the outside temperature.

How many rental units in Portland lack air conditioning?

About 17 percent (or 25,400 units) do not have air conditioning. Many of these units are in older, smaller multifamily properties or regulated affordable housing.

17%

of Portland's rental units **don't have A/C**

What are the likely compliance options for landlords?

Landlords would need to install either window A/C units or ductless mini-split heat pumps. Mini-split systems are more expensive, but they are more energy-efficient, provide both cooling and heating, and reduce heating bills. However, using A/C would increase energy bills and greenhouse gas emissions.

- **Window A/C units:** around $330 per unit, and up to three times higher if paying for installation
- **Ductless mini-split heat pumps:** around $6,100 per unit, plus $3,900 for electrical upgrades, if needed

What are the estimated citywide compliance costs?

The costs will vary based on whether the requirements apply to shared common areas or individual units. These costs could be reduced by leveraging existing programs like the Portland Clean Energy Community Benefits Fund (PCEF) and other resources.

COOLING REQUIREMENT	WINDOW A/C (NO LABOR)	MINI-SPLIT HEAT PUMP
Common Space	$1.4 million	$39 million
In-Unit	$7.9 million	$50 million

Cooling Requirements **Compliance Costs** after incentives

How will this policy impact renters?

Installing A/Cs can increase annual energy costs for rents. However, installing heat pumps can lower annual energy costs by reducing the energy needed for heating during cooler months. The utility savings could be around $20 per month for multifamily units and $40 per month for single-family homes. However, these savings may be negated by property owners who raise rents to recoup the costs of compliance.

Potential Rent *Increase*

Potential Utility *Savings*

Building new, all-electric homes is cheaper than retrofitting later and is a cost-effective way to cut emissions and energy use.

New Construction Electrification

Why is electrification important for new buildings?

Many homes use natural gas for heating and cooking. **But energy-efficient electric alternatives, like heat pumps and induction cooktops, can reduce utility bills and greenhouse gas emissions, especially when paired with renewable electricity.** Building new homes to be all-electric from the start is cheaper than retrofitting them later. So, switching to electric in new construction is a cost-effective way to cut emissions and energy use. Understanding electrification options and their costs can help determine incentives that might be needed to make sure new buildings are energy-efficient and low in emissions.

What options were compared?

ECOnorthwest looked at three building setups and analyzed both upfront construction costs and ongoing utility bills for single-family and multifamily homes.

Gas-Heated
gas furnace, gas boiler, gas cooktop, and typical electric panel

Conventional Electric
baseboard or cadet wall heaters, electric boilers, electric cooktops, and upgraded electric panel and wiring

High-Efficiency Electric
heat pumps for heating space and water, induction cooktop, and upgraded electric panel and wiring

Are all-electric single-family homes cheaper to build?

Yes. All-electric homes cost less to build because developers can skip gas hookups and pipes. The savings from not installing gas lines outweigh the extra costs of upgrading electric panels and using more efficient appliances. As line extension allowances—discounts for new natural gas connections—phase out, the cost savings for all-electric buildings will grow.[4]

Will utility bills increase for all-electric single-family homes?

It depends on the type of electric appliances used:

Conventional Electric: Utility Costs Increase

- This option is more energy efficient than gas heating, so the total energy use would be lower. But **utility costs would increase because the cost of electricity is higher than the cost of gas.**

High-Efficiency Electric: Utility Costs Remain Similar

- Heat pumps are about two to three times more energy efficient than conventional electric heating. **Electricity costs would increase and gas costs would decrease by a similar amount.**

4 The cost of gas service is assumed to be about $8,600 per unit based on ECOnorthwest's assessment of the estimated customer contribution costs from NW Natural. Actual costs can vary by location. The estimate does not include line extension allowances (i.e., a credit or a discount) that NW Natural provides to new units to offset the cost of bringing natural gas to the new units. Line extension allowances were $2,875 in 2022, have been $1,840 since November 2023, and were lowered to $1,380 at the end of 2024. A recent decision by Oregon's Public Utilities Commission (PUC) requires the line extension allowances to be phased out by November 1, 2027.

So, which option makes more sense for new, single-family construction?

There could be long-term cost savings with the high-efficiency electric option. Compared to a gas-heated option, it would be cheaper to build (by about $2,200 to $2,500) and utility bills would remain about the same. It remains to be seen whether a few thousand dollars in savings is sufficient to change development decisions.

In contrast, conventional electric appliances would be more costly over the long-term than a gas-heated option. Although upfront costs would be lower (by about $7,400 to $9,000), ongoing costs would be higher (over $1,500 per year). Initial cost savings could disappear after about five or six years of use.

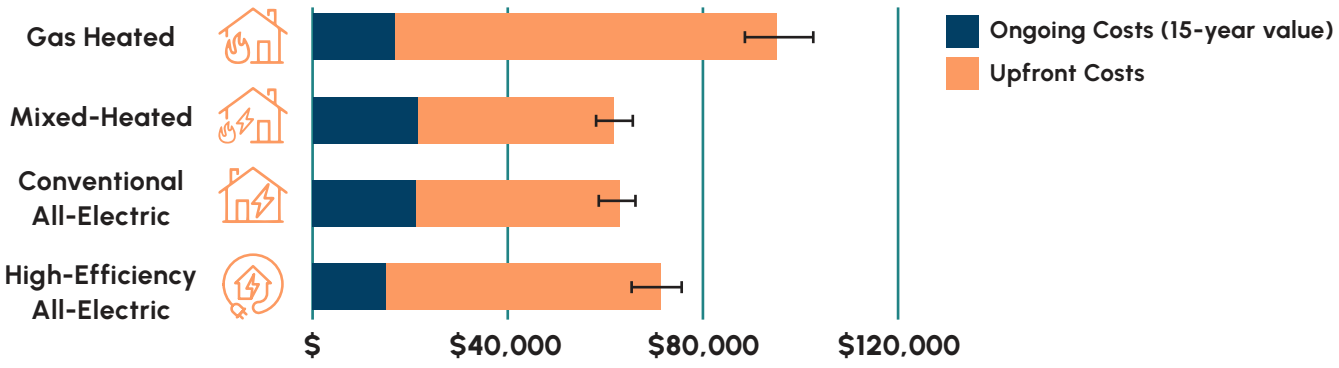
How about multifamily buildings? Are all-electric buildings cheaper to build? Will utility bills increase?

Compared to the gas-heated option, the high-efficiency electric option would be cheaper to build (by about $21,000 to $25,300 per unit) and utility bills would be somewhat lower ($146 per unit per year).

However, many multifamily buildings already use conventional electric space heaters. Gas is typically used for water heaters and cooktops.

Compared to this mixed-heating option, both conventional electric and high-efficiency electric options would be more costly to build. There would be some utility savings with both. But the savings alone would not be large enough to warrant switching to all-electric.

Upfront Construction Costs and Ongoing Utility Bills for Multifamily Buildings



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