



Role of buildings in climate change and opportunities for action

LEGISLATIVE BRIEF

Spring 2021



Photo credit: Earth Advantage



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On average, we spend approximately 90 percent of our time indoors,¹ yet many of the buildings in which we live and work are harming our health, wasting energy, and deepening the climate crisis. We can retrofit and build more efficient buildings that will help address the climate crisis and deliver additional benefits including public health improvements, equity, and jobs. Homes, apartments, and commercial buildings constructed today will last for generations, making our choices now even more important. Challenges, opportunities, strategies, and policy tools for decarbonizing our buildings are detailed below.

Today's buildings are worsening the climate crisis

Our homes and commercial buildings need a lot of power. In fact, they consume nearly half of all the energy used in Oregon.² This energy use accounts for

about one-third of our state's greenhouse gas emissions due to our reliance on burning fossil fuels.⁵ As a result, burning fossil fuels to power our homes and businesses is the second-largest source of climate pollution after the transportation sector. If changes are not made, these numbers are only expected to increase in the coming years as our state's cities and towns continue to grow.

Burning fossil fuels to power our homes and businesses is the second-largest source of climate pollution after the transportation sector.

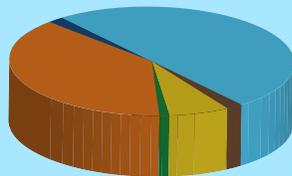
Unfortunately, instead of reducing our reliance on fossil fuels, buildings are currently using an increasing amount of so-called "natural gas" (a harmful fossil fuel more aptly called fossil gas). Fossil gas use (including its production and transport) releases methane—a particularly potent greenhouse gas. The amount of fossil gas we use to generate electricity in Oregon has increased significantly over the past decade.⁶ Fossil gas is also increasingly burned on-site to cook, heat homes, and provide hot water.⁷ As can be seen in the charts below, fossil gas is the second most popular fuel for heating homes in Oregon and the vast majority of commercial building heating and cooling is done with fossil gas. In addition to its climate impacts, fossil gas has additional drawbacks as noted in the next section.



Oregon buildings snapshot

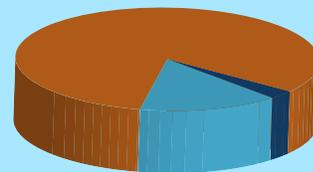
There are approximately 1.6 million housing units in Oregon³ and approximately 3.4 billion square feet of commercial space. By 2050, more than 700,000 new residences and an estimated 800 million square feet of new commercial building space (about the size of 4,444 Walmart Supercenters) are expected to be built.⁴

Heating and cooling is the largest use of energy in Oregon's buildings. Much of that is currently done with fossil gas.



- electricity - 50%
- natural gas - 38%
- wood - 7%
- propane - 2%
- heating oil - 2%
- other - 1%

average heating types across Oregon homes



- natural gas - 82%
- electricity - 15%
- other (oil, LP, wood) - 3%

energy use breakdown for commercial HVAC⁸

Today's buildings negatively impact health and equity

Inefficient buildings exacerbate health problems and are more costly to heat and cool. Concentrations of some pollutants indoors are already often 2 to 5 times higher than typical outdoor concentrations⁹ and Oregonians already spend \$4.7 billion a year powering their homes and businesses. Furthermore, inefficient buildings and using fossil gas appliances in buildings disproportionately impact low-income and Black, Indigenous, and People of Color (BIPOC) communities:

- **Inadequate housing:** Due to historically racist housing and economic policies, disproportionately high numbers of low-income and BIPOC families live in inadequate housing that is more costly to operate and less healthy for occupants.
- **Chronic disease:** Inadequate housing conditions in turn exacerbate chronic diseases (such as asthma) that already occur at higher rates in low-income and BIPOC communities. Individuals and families living in inadequate housing have greater difficulty escaping the effects of outdoor air pollution from factories, highways, or wildfires and experience additional indoor air quality issues from mold and other sources. Further compounding these disparities, cooking on gas stoves can spike indoor air quality to unhealthy levels.¹⁰
- **Energy cost burden:** Low-income households also must spend a larger portion of their monthly income on electricity, gas, and heating. While the average American household typically spends only about 3.5% of their income on utilities; this spikes upwards of 10% for low-income households.¹¹ Part of this disparity is due to low-income households having the least access to energy-efficient appliances and other clean energy technologies.



Rural Oregonians experience the most energy burden

Households in rural areas of the state are more likely to be energy burdened, and regions with the largest burden are located in central and eastern Oregon. In one such county—Malheur County—almost half of all households are energy burdened.¹² At the same time, energy efficiency programs are investing less in rural areas, leaving critical cost savings for these households on the table.¹³

The COVID-19 pandemic has further exacerbated these disparities. People with underlying health conditions due to or exacerbated by inadequate housing are more vulnerable to developing complications from COVID-19.¹⁴ In addition, impacts of the pandemic such as job and income loss are resulting in an increasing energy cost burden for families who were already struggling to pay their bills.¹⁵

Clean Buildings → multiple benefits

Moving forward, shifting to Clean Buildings can help us build back better—addressing climate and air pollution, reducing health costs, saving Oregonians money on their utility bills, creating good jobs, and enhancing community resilience. We must build significantly cleaner, better-performing, fossil-free homes and buildings now, or the pollution and energy waste will be locked in for generations (or require costly retrofits to undo later on).

- **Clean Buildings reduce climate and air pollution:** More efficient buildings and appliances use less energy, reducing the amount of fossil fuels that need to be burned for power. Even better, buildings powered by clean electricity instead of burning fossil fuels, can significantly reduce climate and air pollution.
- **Clean Buildings are healthier:** Buildings with pollutant-free indoor air, effective ventilation, and comfortable temperatures are better for health



What are Clean Buildings?

There are a number of terms to describe cleaner buildings, including net-zero, zero carbon, and zero energy ready. While there are nuances to each, these terms generally refer to homes or buildings which maximize energy efficiency, possess the capacity to meet the building's energy needs with renewable energy sources, and prioritize the use of on-site and community-based renewables.



Clean Buildings are possible

Pacific Crest Affordable Housing, a Bend, Oregon-based developer of housing for low-income seniors, set out to make a highly energy-efficient multifamily building to keep operating costs low and more predictable for its fixed-income residents. With the assistance of Energy Trust's Path to Net Zero initiative, the developer built a 26-unit project in Prineville—the Iron Horse Lodge—which exceeds Oregon energy efficiency code requirements by at least 40 percent and generates its own solar energy. With its energy-efficient features and solar power, the Iron Horse Lodge conservatively expects to save and generate enough energy to cut down on its annual expenses by more than \$9,000—which helps keep rents affordable for low-income seniors. In addition, the energy-efficient design helps keep monthly utility costs at a minimum for residents.¹⁶

and productivity. Having no gas-burning appliances cuts down on pollution inside the home or building. Clean Buildings also keep outdoor air pollution, pollen, moisture, and noise out because of better insulation and windows. These benefits result in less sick days and reduced medical expenses.

- **Clean Buildings save Oregonians money:** More efficient buildings can save Oregonians money on their utility bills. For example, Oregon state agencies estimate that energy efficiency improvements such as improved heating, cooling, and weatherization in homes can save \$113 million per year in utility costs for low-income households.¹⁷ It is also much more cost effective to build Clean Buildings from the start than to retrofit buildings to try to recoup savings and benefits later.
- **Clean Buildings create good jobs:** More than 55,000 Oregonians work in clean energy jobs, with more than 80 percent employed by small businesses with 20 or fewer employees.¹⁸ Energy efficiency

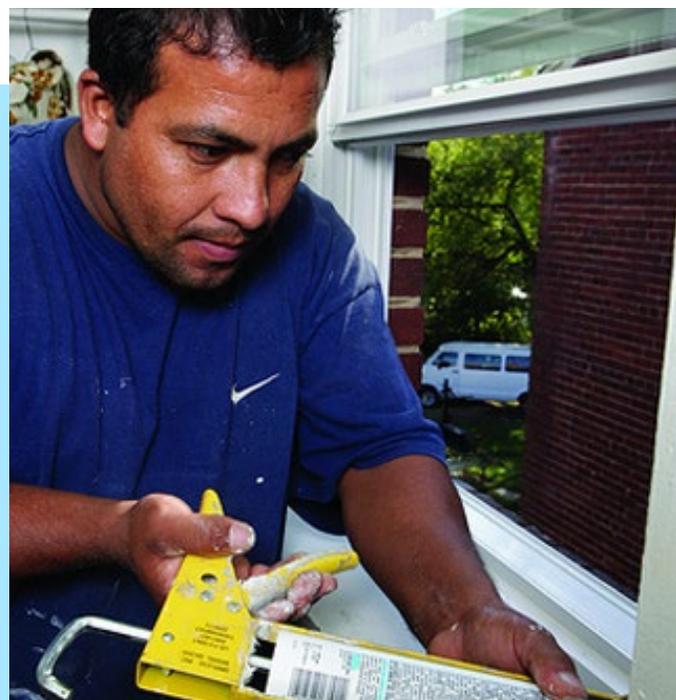
and renewable energy will be job recovery engines as we work to get our state's economy back on track from the COVID-19 pandemic. Investing in Clean Buildings can create family wage local jobs in construction, electrical, manufacturing, design, engineering, sales, and more. With the right workforce programs and incentives in place, these jobs can offer lifelines for low-income and Black, Indigenous, and People of Color (BIPOC) communities.

- **Clean Buildings are more resilient:** Buildings that generate the energy they need onsite can provide refuges in the midst of natural disasters or widespread power outages. Home hardening efforts also can make buildings more resilient in the face of storms and wildfires, which are predicted to continue to be even more intense over the coming years due to climate change.

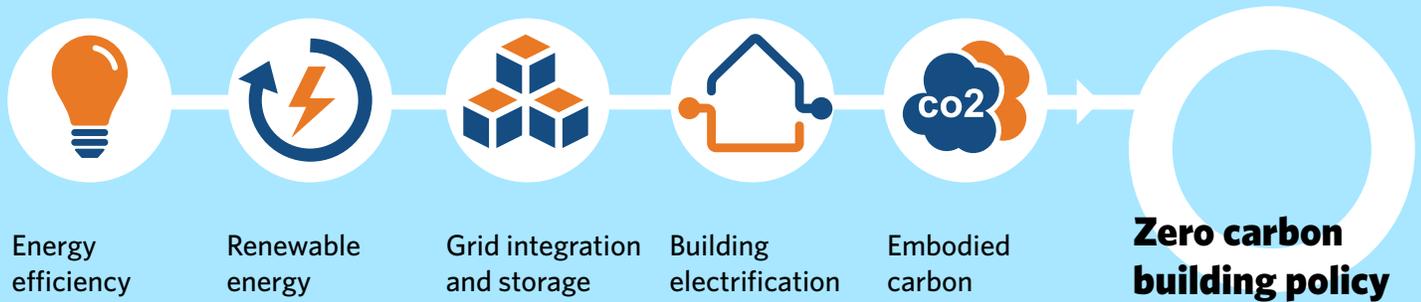
Spotlight on energy efficiency

Energy efficiency has been a cornerstone of Oregon energy policy and planning. But, according to the Oregon Department of Energy, "energy efficiency is at a crossroads." "The region is no longer on track to meet its electricity energy efficiency goals for everything from greenhouse gas reductions to equity, and at the same time, Oregonians are recognizing and seeking co-benefits of energy efficiency."¹⁹ As a result, efforts to maximize energy efficiency moving forward are critical.

Energy efficiency can contribute to desired outcomes around public health, equity, and climate change. Building energy efficiency is also an integral policy action to larger decarbonization efforts. For example, more efficient homes will demand less from the electricity grid, which can in turn help make room for the increasing demand from electric vehicles and other electric applications and reduce the overall costs of transitioning to a less carbon-intensive energy grid.



The five foundations of zero carbon building policies



Adapted from New Buildings Institute, 2020

The fundamentals of decarbonizing buildings

Reducing emissions in the built environment requires the following five foundational strategies:

- **Energy efficiency:** Using less energy to power our buildings continues to offer many of the most affordable ways to achieve cost savings and carbon reductions. In fact, energy efficiency is the cornerstone of a Clean Building. By ensuring energy efficiency savings, each of the next three foundations also become easier to meet.
- **Renewable energy:** Even efficient buildings need energy. But that energy can and should come from renewables like solar and wind that do not emit GHGs. Renewable energy can be provided by utilities, community solar, or through on-site sources. On-site generation of renewable energy (e.g. rooftop solar) can also help reduce energy bills and improve resilience.
- **Building electrification:** On-site combustion of fossil gas contributes to local pollution, GHG emissions, and indoor air quality issues. Building electrification aims to eliminate most, if not all, on-site combustion of fossil fuels by replacing traditional fossil gas applications (e.g. gas furnaces) in buildings with electric options (e.g. heat pumps). Significant cost savings can also accrue to new buildings that choose not to install gas infrastructure.²⁰
- **Grid integration and storage:** Buildings need more or less power depending on the time and day. At the same time, renewable power generation can also be variable (e.g. less solar at night). Building design and operational improvements, as well as things like batteries and grid-integrated water heaters, can help align energy use with carbon free electricity sources while not overwhelming the grid.
- **Embodied carbon:** Greenhouse gas emissions result from the mining, harvesting, processing, manufacturing, transportation and installation of building materials. These embodied carbon emissions from the building sector produce 11% of annual global GHG emissions.²¹ Using more sustainable building materials and sourcing them from closer to where the building is constructed can help reduce the building sector's contribution to the climate crisis.

Oregon's policy toolbox for Clean Buildings

Oregon has some policies in place to help move us towards cleaner buildings, but additional action is needed. Key tools in the policy toolbox include:

- **Energy-efficient building codes** can ensure new buildings and major renovations are built to be healthy, safe and efficient. The state has both a base building code and a voluntary "Reach code" that is supposed to provide for even more energy efficiency.²² Unfortunately, the state Building Codes Division under its former director failed to maximize the potential of these codes, stacking their advisory boards with industry interests and actively working to hold back local governments

from moving further and faster.²³ The Governor's Executive Order on climate change (EO 20-04) directs the Building Codes Division to make improvements to the codes over the next decade, but the Legislature can accelerate these improvements and fill in the gaps.

- **Appliance efficiency standards** require home and commercial appliances bought and sold are as energy efficient as possible. These standards save Oregonians money on their utility bills—to the tune of tens of millions of dollars per year. The Oregon Department of Energy (ODOE) updates appliance efficiency standards, but not on a consistent basis, which leaves our standards lagging behind other West Coast jurisdictions. In addition, they need legislative approval each time they try to make an update. The Governor's Executive Order on climate change (EO 20-04) directs ODOE to more regularly update the standards, but these updates still require legislative approval.
- **Financial incentives** (grants, loans, tax credits, rebates, etc.) can help building owners and renters improve energy efficiency with lighting, equipment, or weatherization upgrades; power their homes and businesses with renewable energy; and install grid-integrated appliances and storage systems. Oregon currently has a few programs that provide these incentives, but they are limited in reach (the Energy Trust of Oregon program is limited in geographic scope) and amount (ODOE's Solar + Storage Rebate program had only \$1.5 million to distribute). These incentives also can and should be better targeted to low-income communities and communities of color.
- **Renewable energy standards** that help clean up the power grid, ensuring buildings are powered with clean energy. Oregon has had a Renewable Portfolio Standard on the books, but it only gets us part of the way there. Seven other states, including our neighbors to the north and south, have already leap-frogged us with standards that require

100% clean electricity by 2050 or earlier.

- **Additional policy tools** that could further Clean Buildings include: building performance standards that require energy-efficiency improvements for existing buildings; facilitating fuel switching from fossil gas to electric appliances; incentives/requirements for home hardening efforts that protect homes from wildfires and also improve energy efficiency; as well as purchasing standards that encourage the use of more sustainable building materials.

Conclusion

In all of the policy efforts to decarbonize our buildings, communities most impacted by climate change, indoor and outdoor air pollution, energy burden, and housing instability—particularly low-income communities and BIPOC communities - must be prioritized. Safe and economical Clean Buildings are all the more important for these communities and policymakers must not leave any of these communities out, nor make it worse for any of these communities (e.g. via gentrification). Some of the strategies policymakers can use to ensure these communities are front and center in Clean Buildings policy include:

- **Create and appoint advisory boards** that are representative of these voices
- **Allocate and prioritize program funding** (e.g. grants and loans) specifically for these communities
- **Ensure workforce programs and incentives** result in family-wage jobs for these communities
- **Design programs** to specifically protect and benefit these communities (e.g. differential rates for low-income utility customers)

Prioritizing Clean Building policies, investments, and incentives that benefit communities most impacted will ensure we not only reduce greenhouse gas emissions, but also truly build back better.

The COVID-19 pandemic which has kept us inside, as well as the devastating wildfires that destroyed more than 4,000 homes across Oregon last year and filled our air with harmful smoke, give us an opportunity to appreciate the importance of our buildings and to rethink how we build more healthy, resilient, and equitable buildings and communities moving forward. Let's not squander the opportunity.

— City Councilor Tonya Graham, Ashland, Oregon

Endnotes

- 1 US Environmental Protection Agency. Report on the Environment - Indoor Air Quality. <https://www.epa.gov/report-environment/indoor-air-quality>.
- 2 The residential sector accounts for 24.3% and the commercial sector accounts for 19.3% for a total of 43.6%. See Oregon Department of Energy, Energy by the Numbers. 2020 Biennial Energy Report, Chapter 1, Page 49, 53.
- 3 Oregon Department of Energy. 2020 Biennial Energy Report, Chapter 1, Page 49.
- 4 Zero Energy Ready Oregon Take Action Page. <https://www.zeroenergyreadyoregon.org/take-action>.
- 5 See DEQ's Oregon Greenhouse Gas Sector-Based Inventory Data: <https://www.oregon.gov/deq/aaq/programs/Pages/GHG-Inventory.aspx>. In 2018, the residential and commercial sectors accounted for 21 million of the state's total emissions of 64 million MTCO_{2e}, or 32%.
- 6 Oregon Department of Energy. 2020 Biennial Energy Report, Chapter 1, Page 25.
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- 17 ODOE, PUC, OHCS. Reducing the Energy Burden in Oregon Affordable Housing <https://www.oregon.gov/energy/Get-Involved/Documents/2018-BEEWG-Ten-Year-Plan-Energy-Burden.pdf>.
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- 21 Architecture 2030. <https://architecture2030.org/new-buildings-embodied/>.
- 22 Oregon Department of Energy. 2020 Biennial Energy Report. Energy 101: Codes and Standards. Page 130-134.
- 23 Street Roots. Homebuilders Stall Oregon Climate Goals. <https://www.streetroots.org/news/2020/11/11/homebuilders-stall-oregon-climate-goals>.

Acknowledgments



About the ZERO Coalition

ZERO is working to create the market conditions and regulatory framework for every newly constructed or significantly renovated building in Oregon to be built to zero energy or zero energy ready standards. ZERO has The ZERO Coalition consists of 35 member organizations. Climate Solutions, Earth Advantage, New Buildings Institute, and Northwest Energy Coalition as members of the ZERO Coalition played a lead role in developing this legislative brief.



About Climate Solutions

Climate Solutions advocates for a thriving, equitable Northwest, powered by clean energy, inspiring the transition to sustainable prosperity across the nation and beyond.



About New Buildings Institute

New Buildings Institute (NBI) is a nonprofit organization pushing for better energy performance in buildings. We work collaboratively with industry market players—governments, utilities, energy efficiency advocates and building professionals—to promote advanced design practices, innovative technologies, public policies and programs that improve energy efficiency. We also develop and offer guidance and tools to support the design and construction of energy efficient buildings.



About Earth Advantage

Earth Advantage focuses on a three-pronged approach to addressing the environmental impacts of residential buildings:

- Promoting the use of green home standards
- Linking the availability of green home data to the residential real estate market
- Providing training for key professions on green building approaches, green building standards, and green home data



About NW Energy Coalition

The NW Energy Coalition is an alliance of over 100 environmental, civic, and human service organizations, progressive utilities, and businesses in Oregon, Washington, Idaho, Montana and British Columbia. We envision a 21st century energy system that provides clean, reliable, and affordable energy, sustains our communities, and preserves the region's natural resources.