# SCALE 2030

Clean Energy Transition Institute

2050 INSTITUTE

## Clean Buildings Ecosystem Assessment for Washington

# Acknowledgments


### About the Clean Energy Transition Institute

The Clean Energy Transition Institute (CETI) is a Seattle, WA–based nonprofit organization whose mission is to accelerate an equitable clean energy transition in the Northwest (Idaho, Montana, Oregon, and Washington). We provide unbiased research and analytics and convene decisionmakers to evaluate decarbonization strategies with the goal of steering limited resources toward affordable solutions that will best reduce greenhouse gas emissions.

### About the 2050 Institute

The 2050 Institute is a Seattle, WA–based clean buildings research and policy consulting company. The Institute partners with utilities, policymakers, and market actors to deliver building efficiency and decarbonization at scale in the Northwest and beyond. The Institute uses a "2050" lens and whole systems design to develop strategies, frameworks, policies, codes, and programs that interlock across regional, state, local, community, and utility programs and policies.

### Authors

Poppy Storm, Principal Investigator, 2050 Institute

Jeanne Currie, Research Analyst,
Clean Energy Transition Institute

Ruby Moore-Bloom, Research Analyst,
Clean Energy Transition Institute

### Production

Jamie Ptacek, Communications Manager & Editor,
Clean Energy Transition Institute
Carol Maglitta, Designer, One Visual Mind
Karen Beck, Designer, One Visual Mind
Shari Miranda, Copyeditor
Eileen V. Quigley, Executive Director & Editor,
Clean Energy Transition Institute

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- In October 2022, the Bullitt Foundation awarded CETI a grant for $30,000 to support the organization's building decarbonization projects, specifically *Operation 2030*, the precursor project to SCALE 2030.


Photo above: Boats on the water outside Bellingham, WA. Photo credit: Pavł Polø/Unsplash
Cover photo: Tacoma Washington on a fall day. Photo credit: Reagan/Adobe Stock
Opposite: The Hans Rosling Center for Population Health, University of Washington, Seattle campus. Photo credit: sea turtle

# SCALE 2030

**Washington state is at a pivotal moment in its clean buildings transition.** To meet the state's greenhouse gas emission reduction targets by 2050, the building sector must dramatically scale up efforts to achieve equitable clean buildings at pace by 2030. Accelerating the pace of change will require a radical shift in the way buildings are built and retrofitted, and how their emissions are accounted for.

SCALE 2030 is a Clean Energy Transition Institute and 2050 Institute project that aims to shift Washington from an approach focused on incremental energy efficiency and emissions reductions to a systemic framework that will enable the rapid market transformation needed to decarbonize buildings in just over 25 years.

**SCALE 2030 is guided by five key organizing principles:**

**S**implicity
**C**ost reductions
**A**lignment
**L**everage
**E**quity

### Current SCALE 2030 initiatives include:

- Clean Buildings Ecosystem Assessment for Washington
- Clean Buildings Transition Framework for Washington
- Clean Buildings Transition Roadmap for Washington

### Future SCALE 2030 initiatives may include:

- Clean Buildings Cost Reduction Blueprint for Washington
- Clean Buildings Strategic Investment Plan for Washington
- Clean Buildings Planning Framework for Washington
- Clean Energy Regions Model for Washington

**Significant systemic barriers stand in the way of decarbonizing buildings at scale by 2030:**

- Complexity and friction across the building sector ecosystem
- High upfront costs, split incentives, and financing barriers
- Lack of alignment across policies, programs, and market activities
- Incremental-change approach with high administrative burden
- Inadequate funding to transition the building sector market and ensure a stable workforce and equitable distribution of benefits

Working with market actors and subject matter experts, SCALE 2030 is analyzing and prioritizing policy and investment recommendations to remove systemic barriers and inform policy, planning, and budgeting efforts. This critical analysis and engagement will support policymakers working on strategies and regional efforts aimed at rapidly modernizing the building sector and reducing emissions across Washington.

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Downtown Tacoma, WA. Photo credit: Jon Lanzieri

# Executive Summary

*Scale 2030: Clean Buildings Ecosystem Assessment for Washington* informs the strategies and focus areas presented in *SCALE 2030: Clean Buildings Transition Framework for Washington.*[1] It is critical to understand the current state of the building ecosystem before developing a framework, roadmap, or other work connected to achieving clean buildings. This paper compiles existing data and research from state, regional, and federal sources to develop a holistic view of the existing building ecosystem in Washington.

Walkway between two buildings in Spokane, WA. Photo credit: Jaydn Scandora/Unsplash

## Population

People need to be centered as part of an equitable clean buildings transition. How population is distributed across the state offers insight into how to support the clean buildings transition equitably.

**Table 1. Population highlights**

| Highlights | Key Takeaways |
|---|---|
| About 90% of Washington's population lives in urban areas; 10% of the population lives in rural areas.[2] | Including rural areas in the clean buildings transition is critical despite their smaller share of the population. Both rural areas and the majority of cities may lack capacity or resources to support large-scale transition activities, meaning that utility, county, regional, state, and federal support is more important. |
| Washington cities are relatively small. Only one has a population greater than 250,000; three range from 200,000 to 250,000; 84% of Washington's 281 cities and towns have less than 25,000 people.[3] | |

## Building Stock

The state's existing building stock offers insights into which efforts can have the greatest impact on clean buildings.

**Table 2. Building stock highlights**

| Highlights | Key Takeaways |
|---|---|
| 92% of housing units are single-family or low-rise multifamily.[4] | Solutions for certain building segments and types can address a large portion of the clean buildings transition—single-family and low-rise multifamily for residential and the top five types for commercial. While all buildings need a path to transition, solutions for these key building types could have an outsized impact.<br><br>Similarly, the Puget Sound region can address more than 50% of the clean buildings transition and can be used to pilot and establish strategies that can inform tailored approaches in other regions of the state. |
| Only 1/3 of residential units are rentals.[5] | |
| 55% of residential units[6] and 2/3 of commercial floor area are in the Puget Sound region.[7] | |
| 75% of all Washington commercial floor area is retail, mixed-use, warehouses, offices, or schools.[8] | |

## Energy Use and Emissions

Electricity and natural gas are the two main forms of energy used in buildings. The clean buildings transition must to address emissions from natural gas use, while the Clean Energy Transformation Act (CETA) will reduce emissions from electricity.[9]

### Table 3. Emission and energy use highlights

| Highlights | Key Takeaways |
|---|---|
| Emissions from residential and commercial buildings increased 62% between 1990 and 2021.[10] This is an average increase of 1.56% per year (1.50% annual increase for the residential sector and 1.65% increase for the commercial sector). | A significant shift in the trend of building emissions is needed to reach the statutory goal of 95% reductions by 2050. Nearly half of all natural gas consumption—and resulting emissions—can be eliminated by removing natural gas use from buildings. Shifting from natural gas to electricity in buildings also shifts expenditures from foreign imports to mostly Washington- or U.S.-produced electricity. |
| Residential buildings consume 44% of Washington's electricity. Commercial buildings consume 33%. Together, the two sectors consume 77% of the state's electricity.[11] | |
| Residential and commercial buildings combined comprise 43% of Washington's total natural gas consumption, making them the state's largest end use for natural gas. Residential buildings are 25% of natural gas consumption and commercial buildings are 17%.[12] | |
| In 2022, the residential and commercial sectors spent nearly $2 billion on natural gas and nearly $7 billion on electricity.[13] Most natural gas in Washington is imported from Canada, while Washington is a net exporter of electricity.[14, 15] | |

Tacoma, WA in front of Mt Tahoma. Photo credit: Wei Zeng

## Building Sector Policies

While existing state climate policies establish high-level goals for clean buildings, large gaps in building sector policies exist that need to be addressed. The SCALE 2030 Team review indicates that no building segments have a complete regulatory pathway to transition by 2050, and most existing buildings are almost totally unregulated.

*Table 4* summarizes current critical building sector policy levers (blue boxes) and needed policies (dashes). The table presents all Clean Buildings Performance Standard (CBPS) tiers, including a proposed future Tier 3 for small commercial and residential buildings. These tiers collectively cover all segments of the residential and commercial building population in Washington.

As the table shows, very few building sector policies are in place to support the clean buildings transition by 2050.

### Table 4. Building sector policy gap analysis

| | Building Sector Tiers & Segments | | | | |
|---|---|---|---|---|---|
| **Critical Policy Levers** | **Tier 1: Commercial (>50k sq.ft.)** | **Tier 2: Commercial (>20k ≤50k sq.ft)** | **Tier 2: Multifamily (>20k sq.ft.)** | **Tier 3 (Future): Commercial (≤20k sq.ft.)** | **Tier 3 (Future): Residential (≤20k sq.ft.)** |
| State Clean Buildings Transition Target (New Construction) | — | — | — | — | — |
| State Clean Buildings Transition Target (Existing Buildings) | — | — | — | — | — |
| Transition Rate and Milestones | — | — | — | — | — |
| Annual Building Sector GHG Inventory and Progress Reporting | — | — | — | — | — |
| Zero-Emission Appliance Standard | — | — | — | — | — |
| Energy Code | ■ | ■ | ■ | ■ | ■ |
| Performance Benchmarking (for real estate transactions) | ■ | ■ | ■ | — | — |
| Performance Benchmarking (publicly disclosed) | — | — | — | — | — |
| Standardized Mandatory Performance Labeling | — | — | — | — | — |
| CBPS Targets by Building Type, *2025 BPS Cycle* | ■ | — | — | — | — |
| CBPS Targets by Building Type, *2030 BPS Cycle* | — | — | — | — | — |
| CBPS Targets by Building Type, *2035 BPS Cycle* | — | — | — | — | — |
| CBPS Targets by Building Type, *2040 BPS Cycle* | — | — | — | — | — |
| CBPS Targets by Building Type, *2045 BPS Cycle* | — | — | — | — | — |

— No current policy ■ Policy in place

*Table 5* presents key highlights and takeaways of current policies, programs, market transformation, and funding.

### Table 5. Summary of policy and program highlights

| Highlights | Key Takeaways |
|---|---|
| Existing programs, largely implemented by utilities, are designed to deliver energy efficiency and are not structured to deliver the whole-building performance or depth of efficiency needed for a complete clean buildings transition by 2050. Programs often do not address fundamental barriers such as split incentives between building owners and renters, economic pressures that limit the ability to obtain credit, and short ownership durations that require short payback periods. | In addition to aligning existing programs and policies across all levels, there is a need to shift focus to the end goal of a highly efficient, flexible, and zero-emissions building stock by 2050 and to how programs can address split incentives and financing barriers.<br><br>The cost of decarbonization and other clean building technologies is an obstacle for many residential and commercial buildings, even when combining federal, state, and local incentives.<br><br>Washington will need new sources of funding to cover the costs of the clean buildings transition. In Washington, four million residential units will need to be efficient, zero-emissions, and grid-interactive by 2050. |
| Market transformation has been a key strategy for reducing building energy use over several decades. Increased funding, incentives, financing, and industrial policy-level interventions are necessary to scale the supply and widespread adoption of clean building technologies. | |
| Currently, many of the interventions in the building sector are fragmented and lack clarity and interconnectivity in terms of goals, targets, metrics, communication formats, etc. For example, major policies like the CBPS are not aligned with emissions reductions suggested by the Washington 2021 State Energy Strategy.[16] | |


Brick building in Bellingham, WA. Photo credit: Pavt Polø/Unsplash

Downtown Walla Walla, WA. Photo credit: Brent Bergherm/Danita Delimont/Adobe Stock

## Barriers and Opportunities

In addition to presenting an ecosystem assessment, this paper synthesizes key barriers and opportunities to the clean buildings transition.

Existing policies, programs, and market transformation efforts provide starting points for the clean buildings transition. However, changes are needed to deliver complete policies and regulatory pathways for buildings to reach targets while increasing the supply of key clean buildings technologies and available funding for the transition. Successfully making these changes in the building sector is critical to meeting the state's goal of 95% emissions reductions from 1990 levels and net-zero emissions by 2050.

### Table 6. Barriers and opportunities to the clean buildings transition

| Barriers | Opportunities |
|---|---|
| ■ No Targets or Tracking | ■ Priority Building Segments |
| ■ Lack of Building Market Segmentation Data | ■ Program Alignment |
| ■ Policy Gaps | ■ Policies to Scale Demand |
| ■ Lack of Coordinated Planning | ■ Market Transformation to Scale the Supply Chain |
| ■ Siloed Utility Programs | ■ Increased Interconnectivity and Interoperability |
| ■ High Incremental Costs | ■ Bold New Funding Sources |
| ■ Market Transformation Gaps | ■ Coordinated Planning |
| ■ No Standardized Performance Labeling | ■ Regional Implementation |
| ■ Lack of Emissions Data | |
| ■ Limited Incentives | |
| ■ No Large-Scale Funding Sources | |

# Glossary of Acronyms

**BUILT** – Building Utilities and Infrastructure Living Together

**CBPS** – Clean Buildings Performance Standard

**CBSA** – Commercial Building Stock Assessment

**CCA** – Climate Commitment Act

**CCAP** – Comprehensive Climate Action Plan

**CETA** – Clean Energy Transformation Act

**CETWAC** – Clean Energy Technology Workforce Advisory Committee

**CPA** – Conservation Potential Assessment

**C-PACER** – Commercial Properties Assessed Clean Energy and Resilience

**DSMPA** – Demand-Side Management Assessment

**EIA** – Energy Information Administration

**ESA** – Energy Service Agreements

**ESPC** – Energy Savings Performance Contracting

**EUI** – Energy Use Intensity

**GHG** – Greenhouse Gas

**HEAL** – Healthy Environment for All Act

**HVAC** – Heating, ventilation and air conditioning

**IRA** – Inflation Reduction Act

**IRP** – Integrated Resource Plan

**LP gas** – liquified petroleum gas

**MESA** – Managed Energy Service Agreements

**MMT $CO_2e$** – Million metric tons of carbon dioxide equivalent

**NEEA** – Northwest Energy Efficiency Alliance

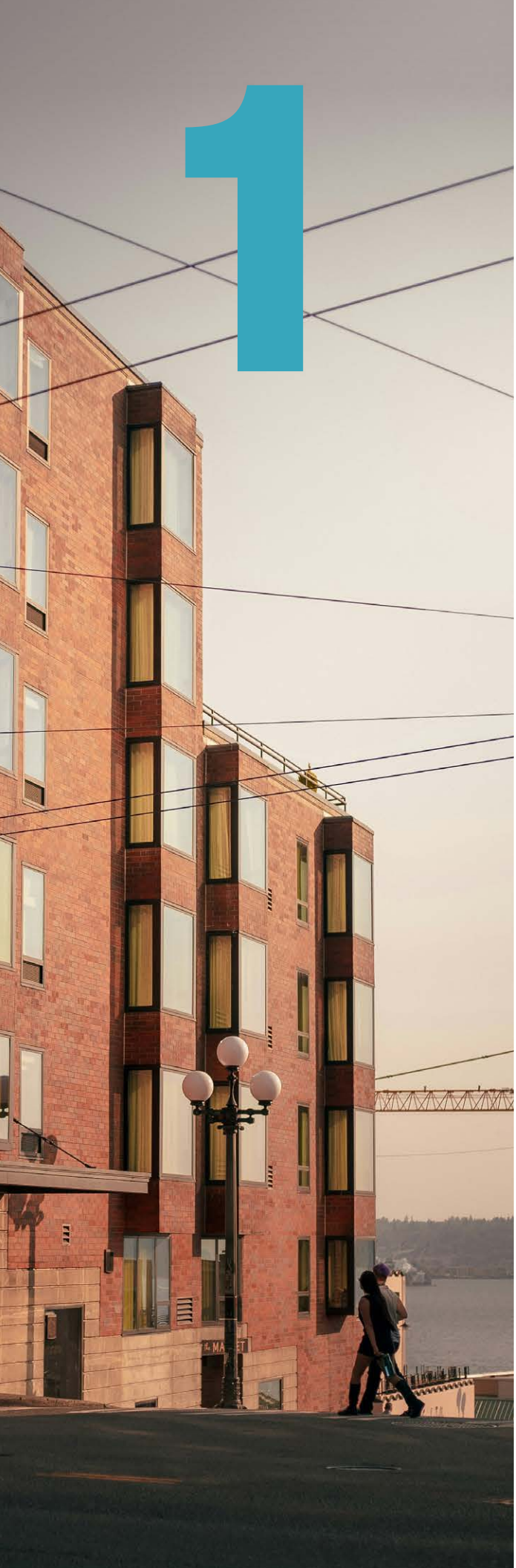
**NREL** – National Renewable Energy Laboratory

**PCAP** – Priority Climate Action Plan

**PSE** – Puget Sound Energy

**RBSA** – Residential Building Stock Assessment

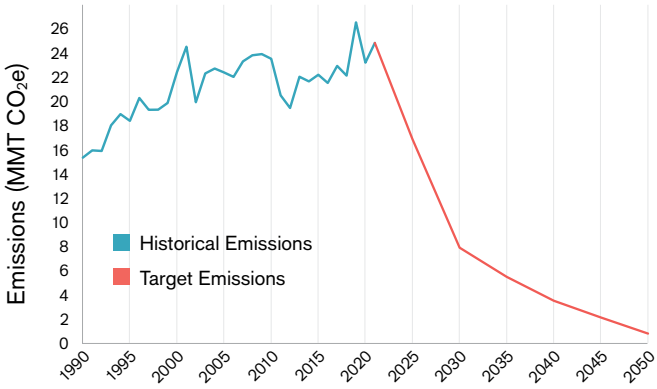
**TBtu** – Trillion British thermal units



# 1 Introduction

In the 31 years between 1990 and 2021, the building sector increased emissions by 62%, or 1.56% annually.[17] To meet Washington's statutory, economy-wide, net-zero emissions limits by 2050, the building sector must reduce emissions to nearly zero in just 25 years (*Figure 1.1*). Transitioning to a clean building sector by 2050 will require a dramatic transformation of the building sector market. To achieve this, all regions across Washington must have the tools, resources, tailored design strategies, and implementation capacity to successfully decarbonize buildings at the necessary pace and scale.

**Figure 1.1. Washington building sector emissions trajectory**




Source: 2050 Institute and CETI analysis using Washington Greenhouse Gas Emissions Inventory data; and projected energy use from deep decarbonization modeling performed for the Washington 2021 State Energy Strategy by Evolved Energy Research. Target emissions for 2021-2024 are adjusted to reflect updated emissions published after the State Energy Strategy.

To inform SCALE 2030's *Clean Buildings Transition Framework for Washington*, this paper assesses the current ecosystem, including the distribution of building stock, energy use, and emissions. The paper also explores current market actors; market interventions, such as policies and programs; interoperability across market actors and interventions; and the overall funding landscape and limitations.

Understanding the specific points of performance and success factors within the current ecosystem, and the relationships and interconnectivity among various ecosystem actors and resources, is critical to develop a transition framework capable of delivering on the state's 2050 goals. Based on key findings from the current ecosystem, the paper summarizes systemic barriers and opportunities that should be addressed by a 25-year clean buildings transition framework.

Brick building in downtown Seattle, WA. Photo credit: Josh Hild

This assessment consulted existing research and resources, including the Northwest Energy Efficiency Alliance's Residential Building Stock Assessment and Commercial Building Stock Assessment; the Washington State Greenhouse Gas Emissions (GHG) Inventory; the Washington 2021 State Energy Strategy; CETI and 2050 Institute's *Operation 2030* white paper; and several resources and datasets from other states and from federal sources, such as the U.S. Energy Information Administration.

New primary research or analysis was not conducted for this assessment, which resulted in some data limitations. For example, commercial building stock data is either modeled or sampled across the four Northwest states rather than just for Washington. The most recent state emissions data is from 2021, meaning that emissions remain unknown for 2022–2024, during which Washington adopted new climate policies and saw post-COVID economic growth.

Additionally, data on the geographic distribution of building emissions by building segment or occupancy type in the state is not available, so the SCALE 2030 team used the distribution of the building stock itself as an interim proxy for distribution of emissions. The paper also does not attempt to provide a comprehensive survey of all policies, programs, market interventions, and funding. Instead, it focuses on key strategies and actions to drive large-scale transformation of the building stock. For future initiatives, the SCALE 2030 team plans to conduct more in-depth technical and policy analysis to address some of these limitations.

Townhouses in Tacoma, WA. Photo credit: Jacob Rose/Wikimedia Commons

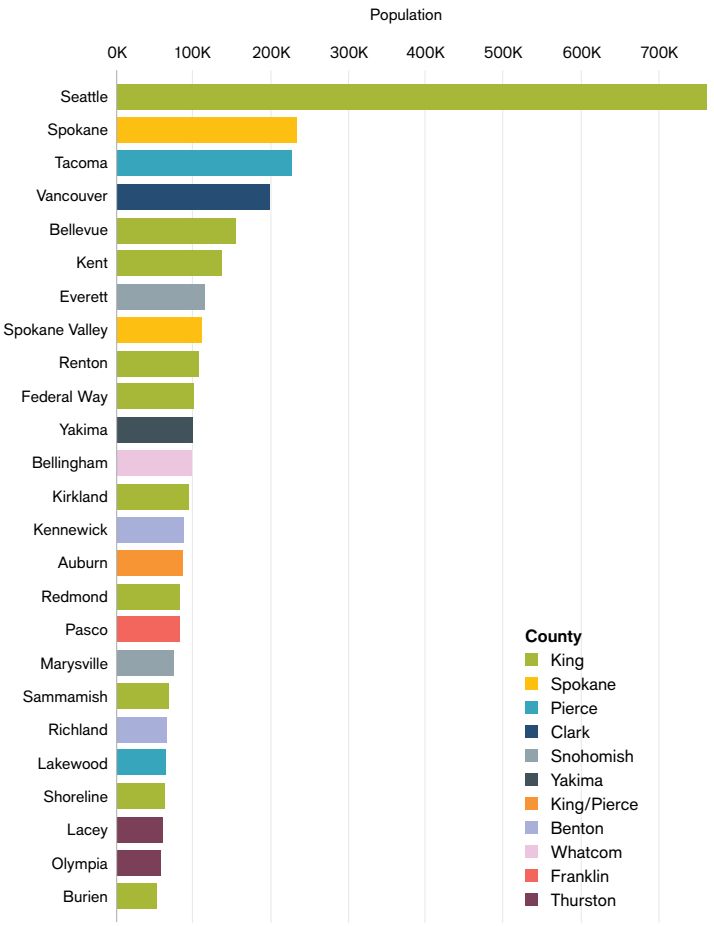
# 2

# Current Building Sector Ecosystem

## Population

Washington has a population of 8 million people.[18] While geographically rural, nearly 90% of the state's population lives in urban areas.[19] Nearly 80% of the population lives on the west side of the state, and over half of the population lives in the Puget Sound region. Washington is composed of 281 incorporated cities and towns, and all but three have a population of less than 200,000. Seattle is the only city with a population of over 250,000. Two other cities—Spokane and Tacoma—have populations over 200,000 (see *Figure 2.1*). Eighty-four percent (237) of Washington's 281 cities and towns are populated by fewer than 25,000 people.[20]

### Figure 2.1. Distribution of Washington's largest cities by population




**Source:** US Census Bureau, Population Division. 2020-2023 Annual Estimates of the Resident Population for Incorporated Places in Washington.

Downtown Spokane, WA. Photo credit: agnormark

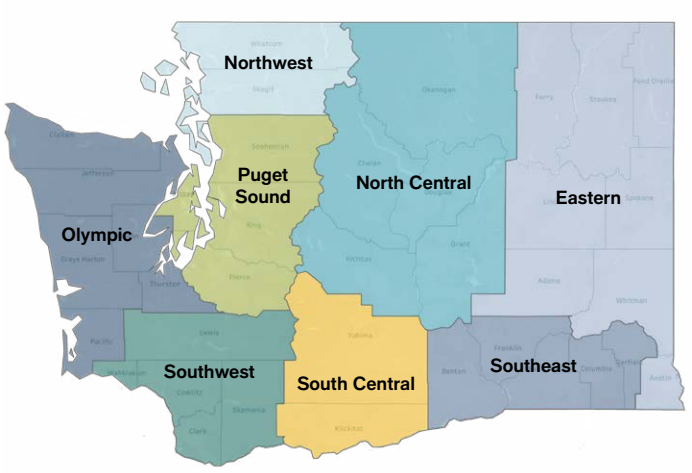
The size of a city has implications for the role it can play in decarbonizing Washington's building sector and impacts the level and type of regulatory and financial support it might need from county, state, and federal governments, or other regional organizations. Initiatives and strategies that encourage building decarbonization may need to approach cities differently based on their size and resource availability. Rural areas may also require a separate approach, as program implementation can be harder across wide geographic areas and rural populations face different climate and resiliency challenges.

To better understand how the population and buildings are distributed across the state, the SCALE 2030 team broke the state into eight Clean Energy Regions (see *Figure 2.2*). These regions can be further subdivided with four comprising the East region of the state (North Central, South Central, Eastern, and Southeast) and the other four comprising the West region (Olympic, Northwest, Puget Sound, and Southwest).

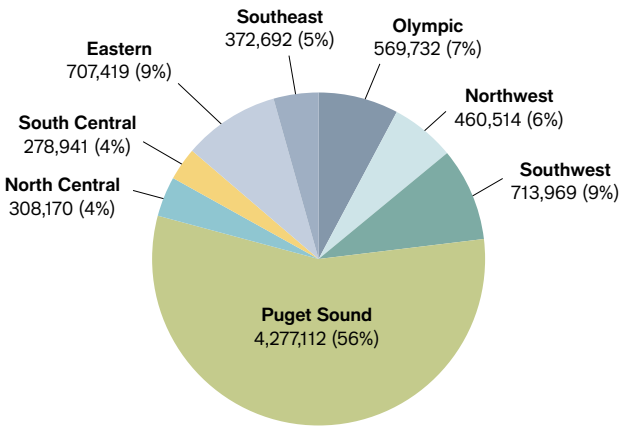
These regions provide a basis for analyzing building distribution, types, energy use, and emissions based on population, geography, and utility service territories. This information can in turn inform decarbonization strategies tailored to each region's buildings and needs.

In the transition framework proposed in *SCALE 2030: Clean Buildings Transition Framework for Washington*, the SCALE 2030 team further defines the regions and recommend that Washington use them as a central mechanism for rolling out key elements of the clean buildings transition.[21]

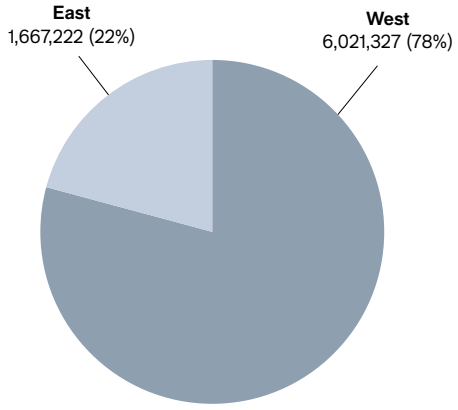
**Figure 2.2. Proposed Clean Energy Regions, and population by region and by East/West**




**Population by Region**




**Population by East/West**




**Source:** Population data from https://www.washington-demographics.com/counties_by_population WA Clean Energy Regions developed by SCALE 2030 team.

## Building Stock

The majority of Washington's commercial and residential buildings are located in western Washington, where the majority of the state's residents live and work, with a concentration in the Puget Sound region, which includes 56% of the state's housing units[22] and 65% of its commercial floor area.[23] The challenge of scaling the clean buildings transition and the resources to accomplish this vary greatly between building types and geographic areas.

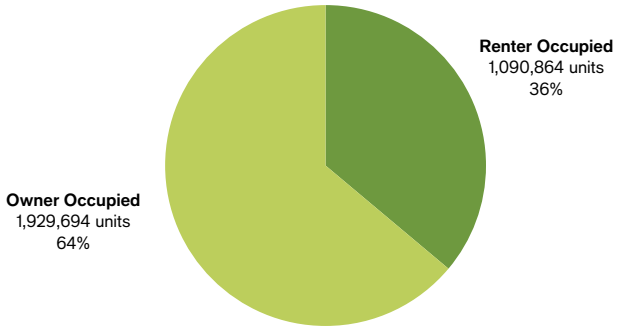
### Residential

As of 2023, Washington had 3.3 million housing units, of which nearly 2 million were owner-occupied and 1.1 million were renter-occupied (*Figure 2.3*).[24] Residential buildings represent approximately half of the emissions from Washington's building sector.[25]

#### *Geographic Distribution*

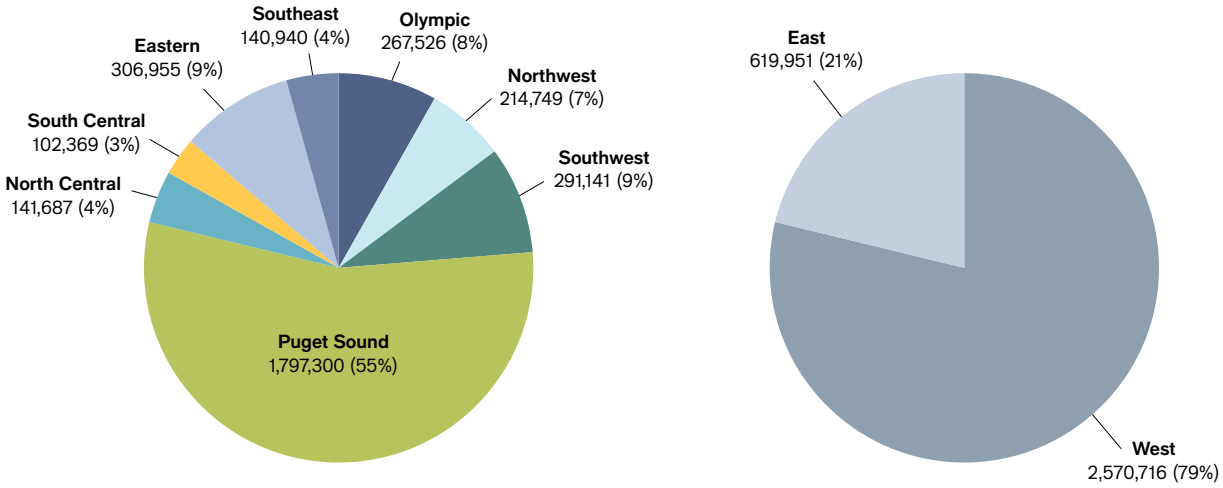
Over half of housing units are concentrated in the Puget Sound region and 79% of housing units are in western Washington (*Figure 2.4*).[26]

**Figure 2.3. Occupied residential housing units by occupancy type**




**Source:** Occupied Housing Units data from American Community Survey 2023 5-year estimates.

**Figure 2.4. Residential housing units by Clean Energy Region and by East/West**




**Source:** Total Housing Units data from American Community Survey 2023 5-year estimates.

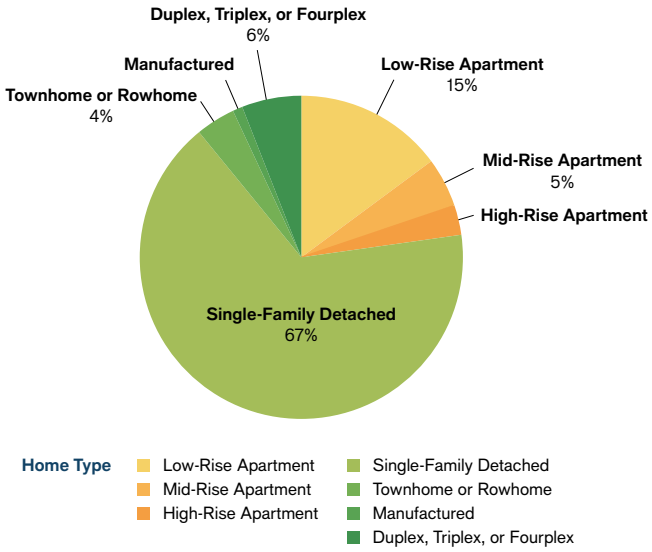
### *Housing Unit Type*

The vast majority of residential buildings are single-family homes. Single-family units, including detached, townhomes/rowhouses, and homes within two-unit, three-unit, or four-unit housing structures, make up 77% of the state's housing stock (*Figure 2.5*).

The second-most common housing type is low-rise multifamily (15%), which is defined as one to three stories. Combining these two types, 92% of the residential building stock is either single-family or low-rise multifamily.[27] Accordingly, addressing the need for decarbonization pathways in these housing types will be essential for the state's path to zero emissions in buildings.

Mid-rise and high-rise multifamily buildings represent ~10% of residential units and have a unique set of energy characteristics and resulting decarbonization challenges, such as lower use of natural gas for heating and higher use of central water heaters.[28] Multifamily buildings also have higher rates of renter-occupied units,[29] which face a split-incentive challenge[30] with investing in energy upgrades such as more efficient or electrified equipment. Even though multifamily buildings represent a smaller portion of residential units, having solutions that will work for multifamily buildings and for renter-occupied units is a key aspect of an equitable transition for buildings.

**Figure 2.5. Washington housing units by type**




**Source:** Northwest Energy Efficiency Alliance's Residential Building Stock Assessment.
**Note:** Percentage breakdown for Manufactured and High-Rise Apartments not available.

Spokane, WA suburb. Photo credit: Kirk Fisher

## Commercial

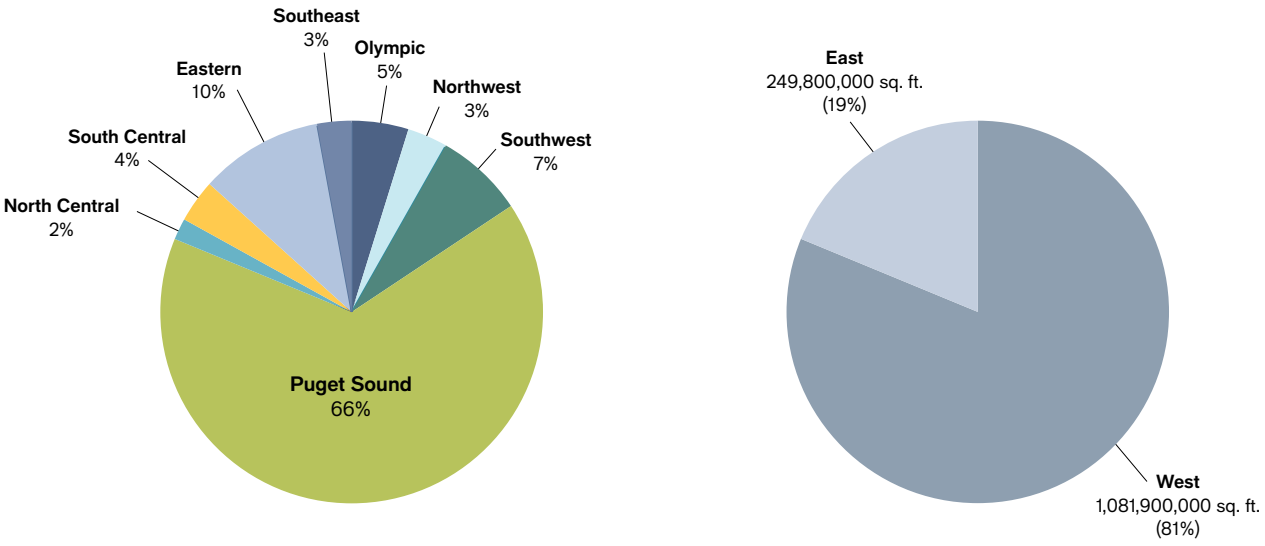
As of 2019, Washington had 1.6 billion square feet of commercial floor area, as estimated by Northwest Energy Efficiency Alliance (NEEA)'s Commercial Building Stock Assessment.[31] Commercial buildings generated 43% of total emissions from Washington's building sector in 2021.[32] The concentration of commercial buildings follows the distribution of population, with most floor area in western Washington.[33]

### *Geographic Distribution*

An estimated 66% of commercial floor area is in the Puget Sound region. The Eastern region, which includes Spokane, has the second-largest concentration of commercial buildings, with 10% of the state's total floor area (*Figure 2.6*). Most other regions have less than 5% of the state's total floor area.[34] This points to two major geographic areas to focus on to address more than 75% of commercial building decarbonization—the Puget Sound region and the Eastern region, concentrating mainly in the Spokane area.

Spiral drive down from parking garage in downtown Spokane, WA.
Photo credit: Danita Delimont

**Figure 2.6. Geographic distribution of commercial floor area by region and by East/West**



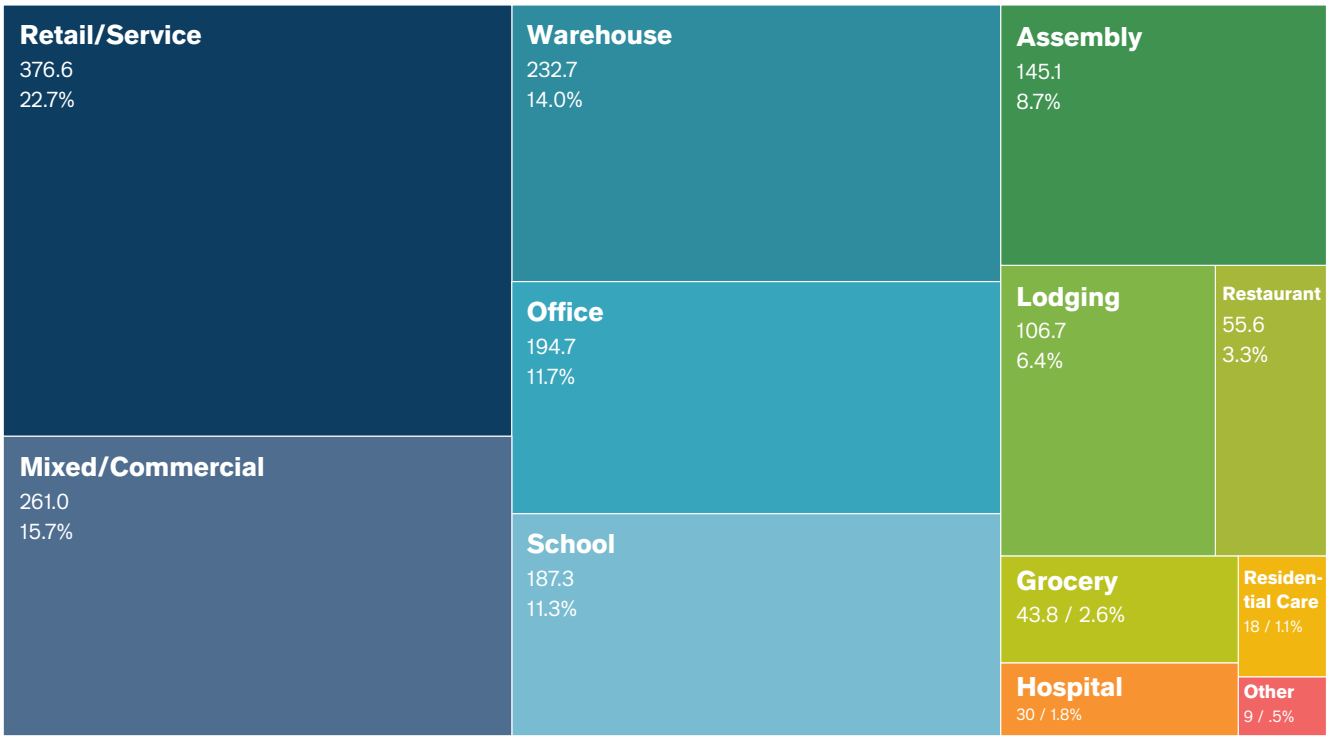

**Source:** Commercial Floor Area data from the US Department of Energy's City and County Commercial Building Inventories.

### *Building Types*

Statewide, the largest commercial building types by floor area are retail/services, mixed commercial use, and warehouses (*Figure 2.7*). These three types make up 52% of commercial floor area, with 870 million square feet of space. With offices and schools added, these five building types make up 75% of the state's commercial floor area.[35]

Modeling from the National Renewable Energy Laboratory (NREL) suggests that building types vary between Clean Energy Regions, although the top three remain consistent between eastern and western Washington.[36] While efforts to decarbonize buildings need to include these top building types, it will also be important to address building types that represent less floor area but higher energy-use intensity. In future analyses, SCALE 2030 will assess the distribution of energy use and emissions by building type.

**Figure 2.7. Commercial floor area by building type (in millions of square feet and % of total)**




**Source:** Northwest Energy Efficiency Alliance. 2019 Commercial Building Stock Assessment.

## Energy Use and Emissions

Commercial and residential building emissions in Washington increased 62% between 1990 and 2021, from 15.4 million metric tons of carbon dioxide equivalent (MMT $CO_2e$) to 24.9 MMT $CO_2e$, while the state's total emissions increased by only 2.3%. For buildings, this counts direct emissions from on-site fossil fuel consumption and indirect emissions from electricity consumption. Looking only at emissions from on-site fossil fuel consumption, combined emissions from residential and commercial buildings increased by 59% from 1990 to 2021.[37] The growth in building emissions since 1990 translates to an average increase of 1.56% per year. Looking only at the most recent decade available (2012-2021), the rate of increase is higher, at 2.74% annually. This trend shows a need for a significant reduction in emissions to achieve Washington's statutory economy-wide emissions limit of 95% below 1990 levels and net-zero emissions by 2050. Examining the building sector specifically, emissions must decrease by approximately 96% below 2020 levels to achieve Washington's 2050 goals.[38]

In 2021, the most recent year reported in Washington's GHG Inventory, residential buildings were estimated to comprise 15% of statewide emissions (14.4 MMT $CO_2e$ out of 96.1 MMT $CO_2e$ total). Commercial buildings were estimated to comprise 11%, or 10.6 MMT $CO_2e$.[39] This accounts for emissions from on-site fossil fuel consumption as well as indirect emissions from electricity consumption.

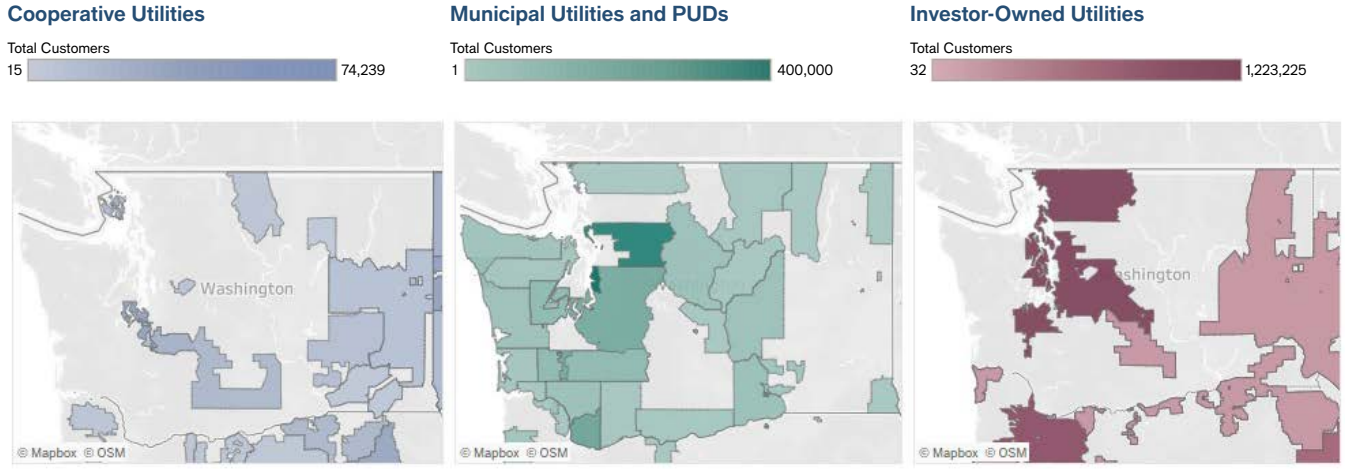
Within the residential sector, electricity accounts for approximately 49% of energy use, while natural gas contributes 37% and biomass contributes 8%.[40] In the commercial sector, electricity accounts for 53% of energy use, with natural gas contributing 36% and petroleum contributing 8%.[41] To reduce emissions, both sectors must significantly reduce on-site natural gas use and the carbon intensity of electricity.

Data availability currently limits our understanding of the geographic distribution of energy demand and emissions from buildings. Washington's GHG Inventory provides emissions data for the residential and commercial sectors in aggregate, without details by building segment, occupancy type, or location throughout the state. In the future, the SCALE 2030 project will aim to identify the geographic distribution of energy demand and emissions from both residential buildings and commercial buildings in Washington. This information will be critical to refining the strategies for Washington to decarbonize buildings across all eight Clean Energy Regions.

### Electricity Utilities and Sources

Sixty-two electricity utilities serve various areas of Washington. A map of utility service areas is available on CETI's Northwest Clean Energy Atlas (*Figure 2.8*).[42] Only three of the electric utilities are investor-owned, while the rest are a mix of municipal utilities, public utility districts, cooperatives, and Tribal utilities.

**Figure 2.8. Maps of Washington's electric utilities, by type[43]**




**Source:** Northwest Clean Energy Atlas, https://www.nwceatlas.org/visualization/northwest-electric-utilities-overview.

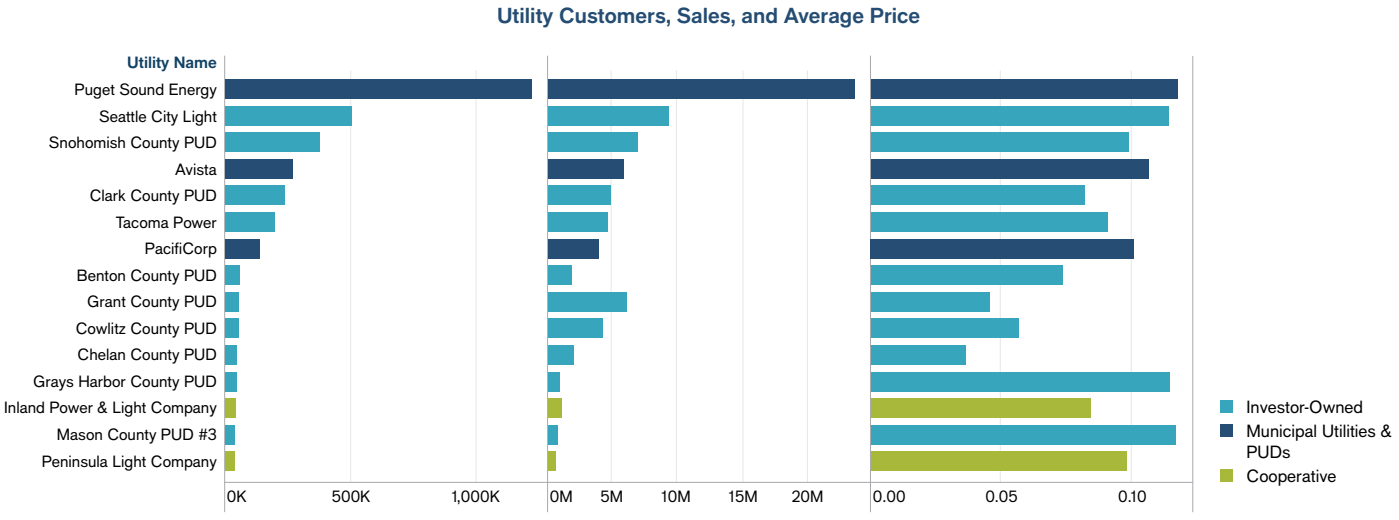
The state's largest utilities by number of customers are Puget Sound Energy, Seattle City Light, and Snohomish PUD (*Figure 2.9*). The graphs below exclude some smaller utility service areas that are not included in the U.S. Energy Information Administration (EIA)'s service territory data set.[44]

Statewide, the electricity fuel mix in 2022 was 54% hydro, 13% unspecified purchases, 10% natural gas, 9% coal, 8% wind, and 4% nuclear. Solar and biomass each contributed less than 1% of the fuel mix. Biogas, waste, geothermal, and petroleum each contributed less than .5%.[45] Overall, Washington's electricity generation currently exceeds demand. Domestically, the state is a net exporter of electricity, exporting 117.7 trillion British thermal units (TBtu) in 2022 to other states. Internationally, the state imports only a small amount of electricity (12.5 TBtu in 2022).[46] [47] Approximately 4% of Washington's electricity supply is lost in transmission and distribution.[48]

Residential and commercial buildings together consumed 77% of Washington's electricity in 2023; residential buildings consumed 44% and commercial buildings consumed 33%.[49] Electricity expenditures by Washington's residential sector totaled just over $4 billion in 2022.[50] Electricity expenditures by the commercial sector totaled $2.8 billion.[51]

Brown brick house with solar panels on roof. Photo credit: Vivint Solar

**Figure 2.9. Number of customers, annual retail sales, and average price of Washington's top 15 electric utilities**




**Source:** Northwest Clean Energy Atlas, https://www.nwceatlas.org/visualization/northwest-electric-utilities-overview.

## Natural Gas Utilities and Sources

Washington has four investor-owned natural gas utilities. Puget Sound Energy (PSE) is the largest, followed by Cascade Natural Gas, Avista, and Northwest Natural Gas (*Figure 2.10*). PSE and Avista are both dual-fuel utilities, providing electricity as well as natural gas.[52] Pipeline gas distribution and use are concentrated in urban areas, with most of the rural parts of the state lacking access. In addition to the four investor-owned gas utilities, Enumclaw and Ellensburg have municipally-owned gas utilities.

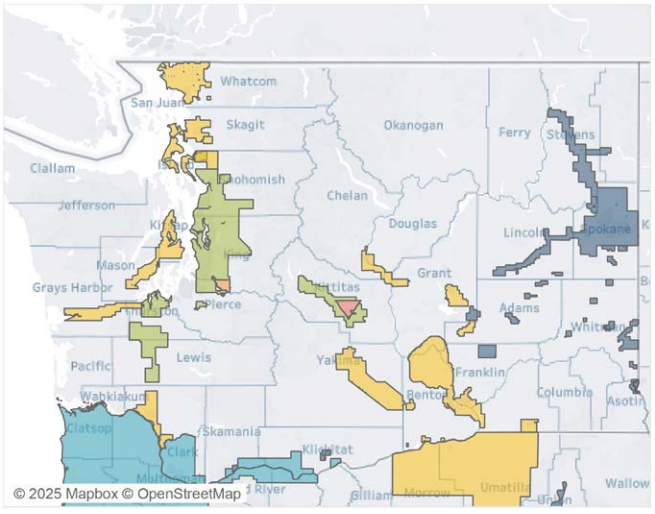
Most of the natural gas that enters Washington originates in Canada.[53] It is imported either directly from Canada or via Idaho.[54] Eighty-six percent of natural gas that enters Idaho is imported from Canada.[55] Two-thirds of the natural gas that enters Washington continues to travel to Oregon or other states, while the remaining one-third is consumed in Washington.[56]

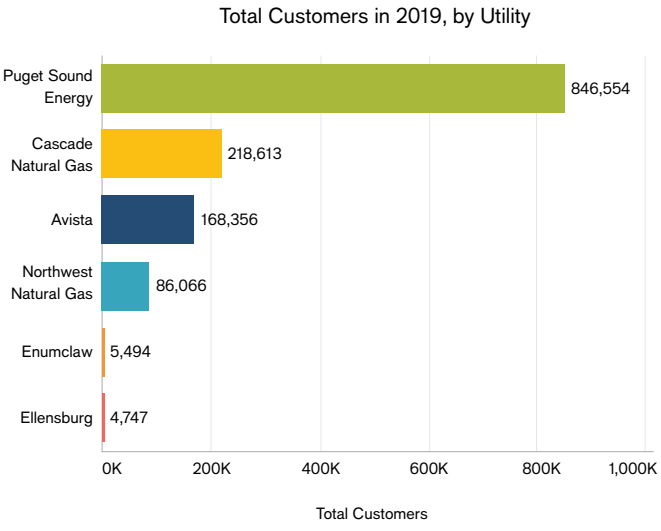
The building sector is the largest consumer of natural gas in Washington, with residential buildings accounting for 25% of natural gas use and commercial buildings accounting for 17%.[57] Accordingly, eliminating natural gas use in residential and commercial buildings would address 43% of the state's natural gas consumption.

The electric power sector follows, accounting for 30% of the state's natural gas use.[58] As the state's electricity sector moves away from natural gas to meet a 100% renewable or non-emitting electricity standard by 2045, as set by Clean Energy Transformation Act (CETA),[59] that share of gas use is expected to be eliminated.

In 2022, Washington's residential sector spent $1.2 billion on natural gas,[60] while the commercial sector spent $671 million.[61] Electrifying buildings, and thereby eliminating the use of natural gas, would shift expenditures of nearly $2 billion annually from mostly foreign-imported gas to mostly Washington- or U.S.-produced electricity as well as high-efficiency electric equipment, other energy efficiency measures and materials, and Washington companies and installers. The SCALE 2030 team will investigate the impacts of this shift in two upcoming initiatives—the Clean Buildings Transition Roadmap and the Clean Buildings Cost Reduction Blueprint.

### Figure 2.10. Distribution of Washington's gas utilities and customer numbers




**Source:** Northwest Clean Energy Atlas, https://www.nwceatlas.org/visualization/oregon-and-washington-natural-gas-utilities

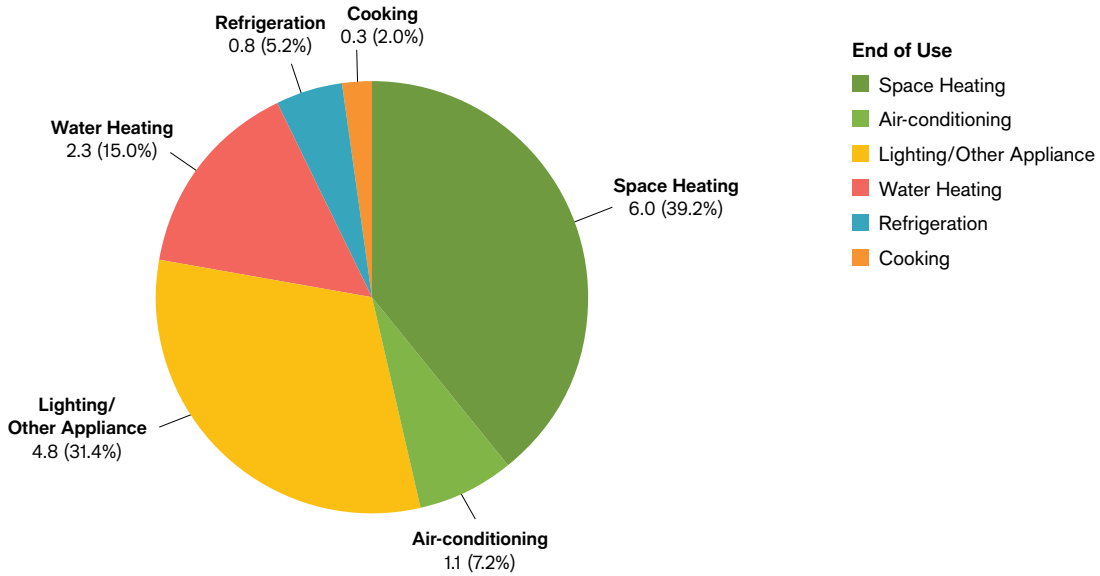
## Residential Sector Energy Use and Emissions

Emissions from residential buildings totaled 14.1 MMT $CO_2e$ in 2021.[62] This represents a 59% increase since 1990, or an average of 1.5% increase annually. While end-use data is not available for 2021, the previous Washington State GHG inventory included end-use emissions data for 2019. In 2019, it was estimated that the largest contributions to residential emissions were space heating, non-HVAC appliances and lighting, and water heating (*Figure 2.11*).[63] To reach the state's targets, emissions from the residential sector need to reduce 60% from 2020 levels by 2030, and 95% by 2050.[64] Much of the reduction by 2030 will result from the decarbonization of electricity as required by CETA.

NEEA's Residential Building Stock Assessment (RBSA) estimates that total energy use across single-family homes in Washington in 2011 was 84,810 kBtu per home. This decreased 3.4% to 81,909 kBtu in 2017, and remained steady at 81,833 kBtu in 2022.[65] During the same period, natural gas energy use intensity (EUI) across single-family homes remained constant at .4 therms/square foot. Electric EUI was 7.7 kWh/square foot in 2011, increased slightly to 7.9 kWh/square foot in 2017, and returned to 7.7 kWh/square foot in 2022.[66] These findings indicate that there have not been significant decreases in home energy use. Both electric and natural gas use appear to be relatively steady over time, but significant annual decreases in energy use will be required to meet Washington's 2050 emissions limits.

Mobile home. Photo credit: nito

### Figure 2.11. Residential emissions by end use (MMT $CO_2e$ and % of total)




**Source:** Washington State Department of Ecology. Washington State Greenhouse Gas Emissions Inventory 1990-2019.

## *Heating Systems and Fuel*

### Single-Family

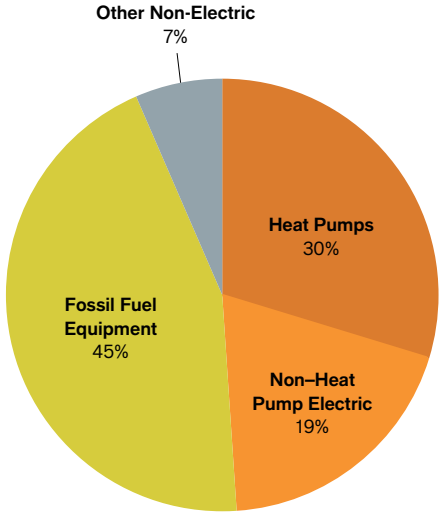
Given that most housing in Washington is single-family, this subsector provides a significant opportunity to address building emissions in homes.

Approximately 45% of single-family homes in the state have fossil fuel equipment as their primary heating source. An additional 7% of homes use some other non-electric heating, such as a fireplace or stove[67] (see *Figure 2.12*). For these homes, which together represent 52% of single-family homes in the state, the path to reducing emissions is conversion to electric heating.

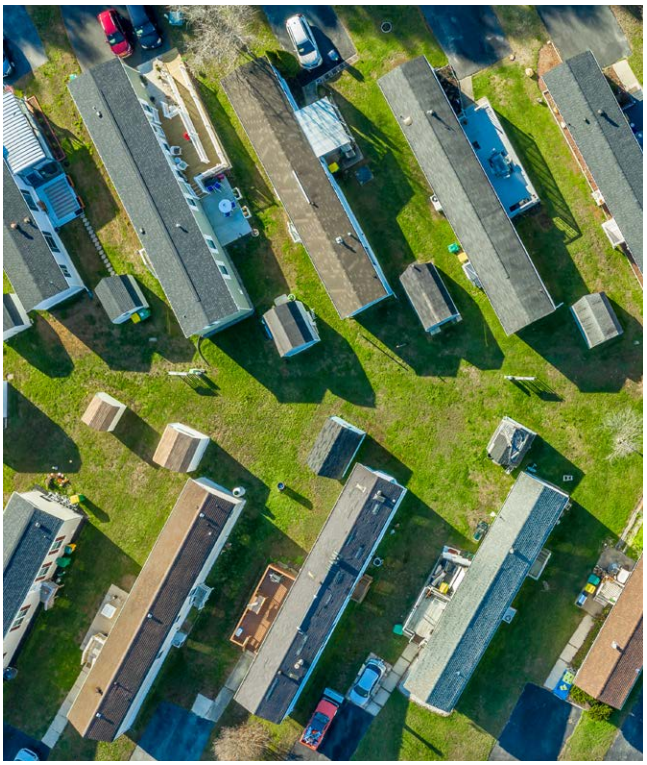
The remaining nearly half of single-family homes already use electricity as a heating fuel; 19% use less efficient electric heating equipment, such as a furnace or baseboard heating. For this 19%, there is an opportunity for increased efficiency by switching to heat pumps. The final 30% use heat pumps, which are the optimal equipment choice for efficiency and emissions reductions. Correct installation and operation of heat pumps, particularly central heat pump systems, offer an additional opportunity to minimize energy use.[68]

Electricity is growing as the fuel type for primary heating systems in Washington's single-family homes. NEEA's 2011 RBSA estimated that 38% of Washington single-family homes used electricity for heating,[69] which increased to 42% in 2017,[70] and 49% in 2022.[71] While these suggest a trend towards electric heating adoption, the increases are slower than needed to meet 2050 emissions targets. NEEA also suggests that methodological and sampling differences between years may account for some of the increase.[72]

**Figure 2.12. Single family residential heating equipment, by category (% of total)**




**Source:** Northwest Energy Efficiency Alliance. 2022 Residential Building Stock Assessment.

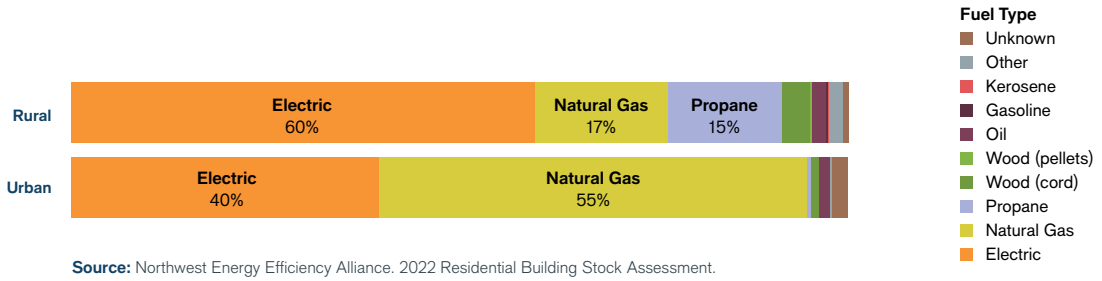


Aerial view of mobile homes. Photo credit: tamas

It is worth noting that in the Northwest, a greater share of homes in rural areas (60%) already use electricity as their primary heating fuel as compared to homes in urban areas (40%). Rural homes also have significantly lower use of natural gas; 17% of rural homes have natural gas as their primary heating fuel, as opposed to just over half of urban homes (see *Figure 2.13*).

In addition to a higher prevalence of electric heating, rural homes also have a higher rate of propane use for heating than urban areas at nearly 15%. Overall, this indicates that a greater reduction of natural gas use is possible by focusing on electrifying urban areas. However, there is greater need to electrify from propane in rural areas.[73] Owner-occupied single-family homes are also more likely to use natural gas than renter-occupied single-family homes,[74] which is an important consideration in program design.

**Figure 2.13. Heating fuel types in rural and urban single-family homes in the Northwest**



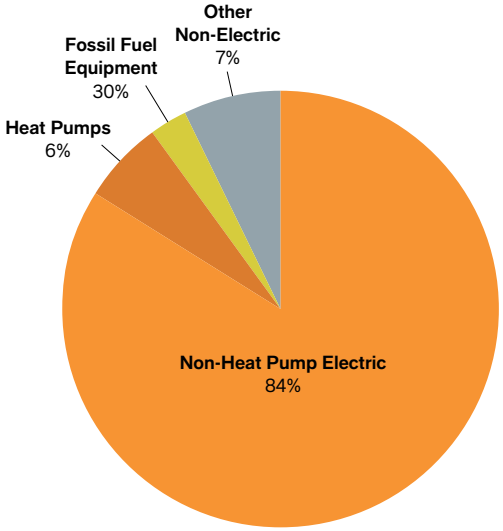

**Source:** Northwest Energy Efficiency Alliance. 2022 Residential Building Stock Assessment.

## Multifamily

In contrast to single-family homes, over 90% of multifamily homes use electricity as their heating source (*Figure 2.14*). Multifamily HVAC systems are primarily room-level heating equipment, such as baseboards, wall heaters, and unit heaters.[75]

The existing prevalence of electric heating in multifamily homes points to the need for increased efficiency more than simply electrifying. Significant efficiency opportunities exist by switching from electric resistance heating to heat pumps in multifamily homes, which also offer the added benefit of introducing cooling to multifamily homes, 65% of which do not have cooling equipment.[76]

**Figure 2.14. Multi-family residential heating equipment, by category (% of total)**



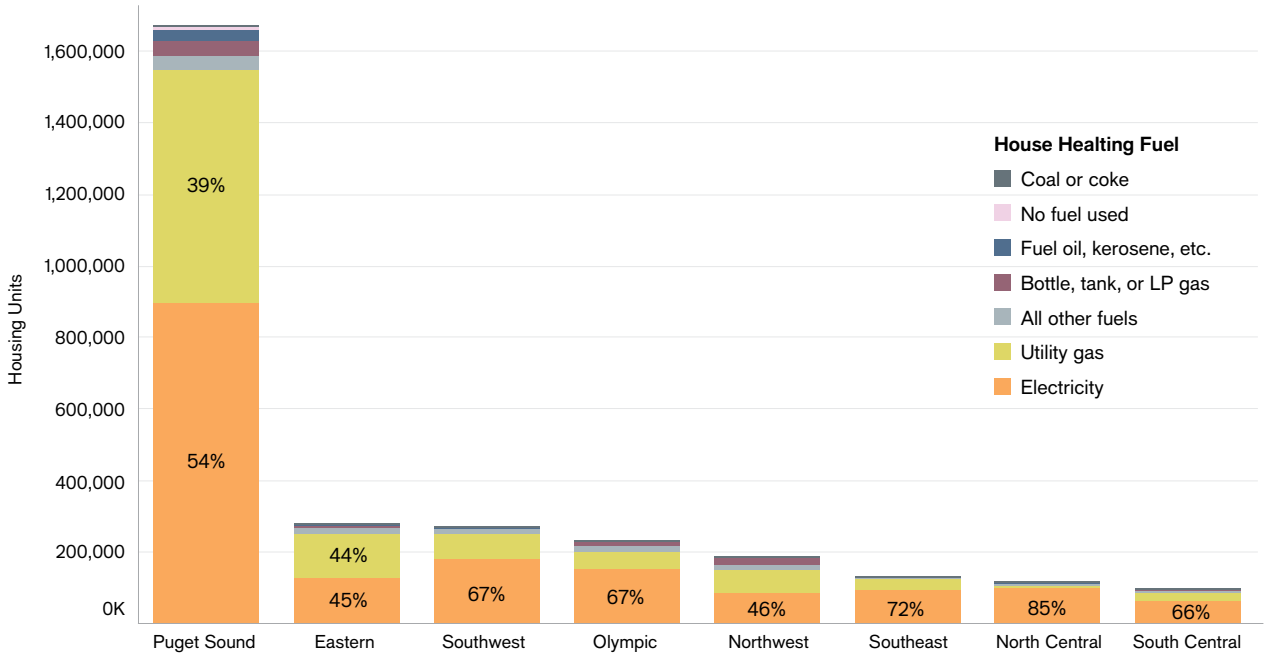

**Source:** Northwest Energy Efficiency Alliance. 2022 Residential Building Stock Assessment.

### Geographic Distribution of Heating Fuels

Looking at total occupied housing units in each Clean Energy Region, as well as the heating fuel used in each, allows for some geographical comparison (*Figure 2.15*). The North Central region has the highest proportion of homes using electricity for heating. In the Puget Sound region, where the majority of housing units are located, electricity heats just over half of housing units at 54%, with utility gas serving nearly 40% of units.[77]

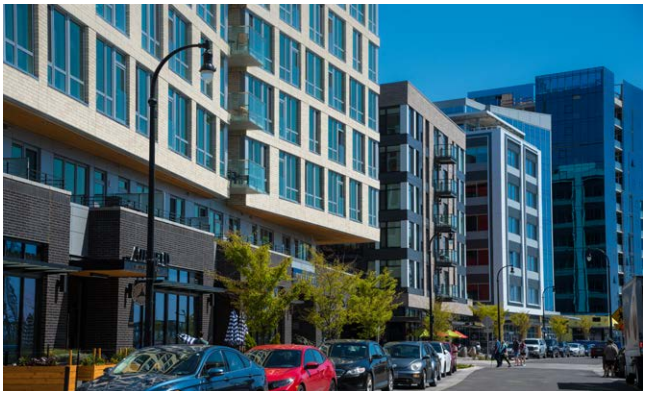
Downtown Spokane, WA in the fall. Photo credit: Sydney Angove

**Figure 2.15. Heating fuels in occupied housing units across the eight Clean Energy Regions**



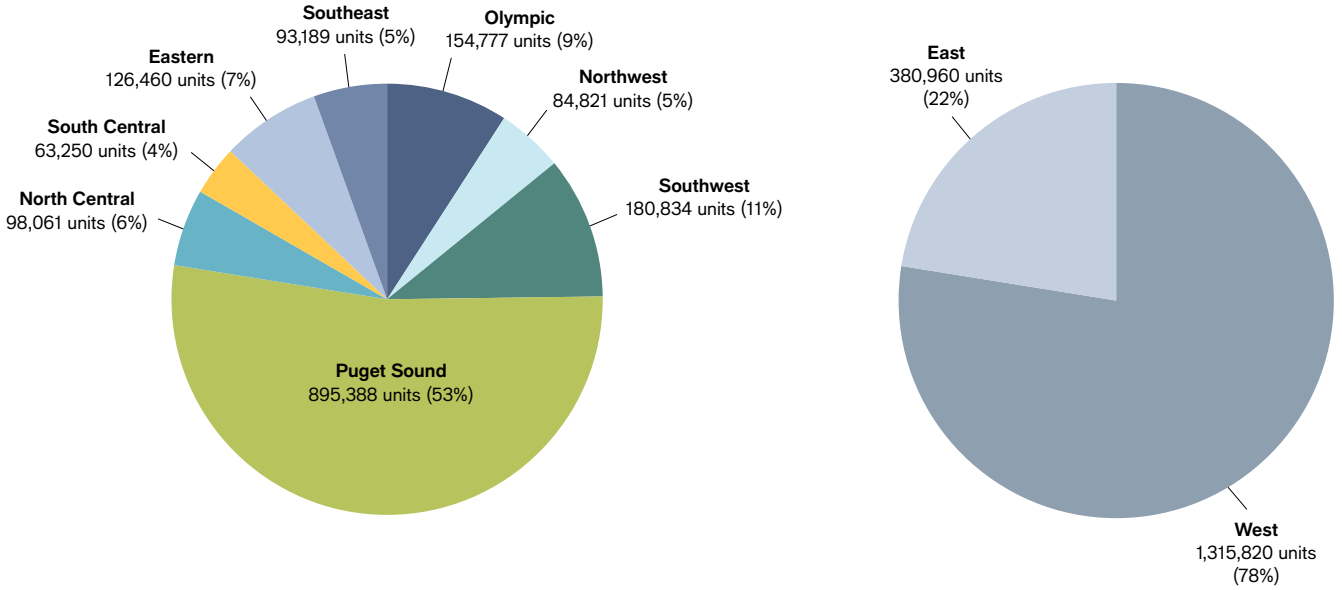

**Source:** American Community Survey 2022 5-year estimates: https://www.census.gov/programs-surveys/acs/data/data-tables.html

The share of electric and gas heating in the East and West in Washington is proportionate to the share of housing units. Seventy-nine percent of occupied housing units are in the West, as are 78% of units using electricity (*Figure 2.16*) and 82% of units using utility gas for heating (*Figure 2.17*).[78]



Waterfront park in Vancouver, WA. Photo credit: Laura Dutelle, WSU Vancouver

## Figure 2.16. Distribution of occupied housing units with electric heating by Clean Energy Region

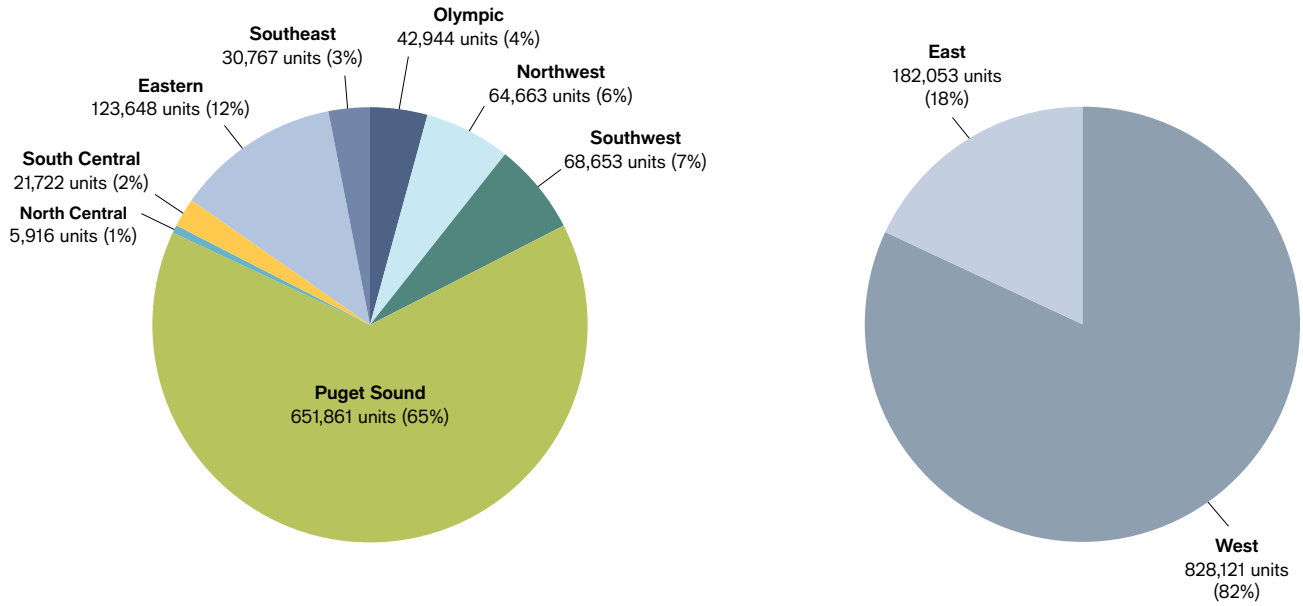



**Source:** Occupied Housing Units data from American Community Survey 2022 5-year estimates.

While the distribution of utility gas follows the distribution of housing units between East and West, it is concentrated in some Clean Energy Regions. Utility gas (*Figure 2.17*) is over-represented in the Puget Sound region (56% of statewide housing units but 65% of housing units using utility gas for heat) and in the Eastern region (9% of housing units but 12% of housing units using utility gas for heat).

Buildings in Leavenworth, WA. Photo credit: Rosalie Barley

**Figure 2.17. Distribution of occupied housing units with utility gas heating by Clean Energy Region and by East/West**

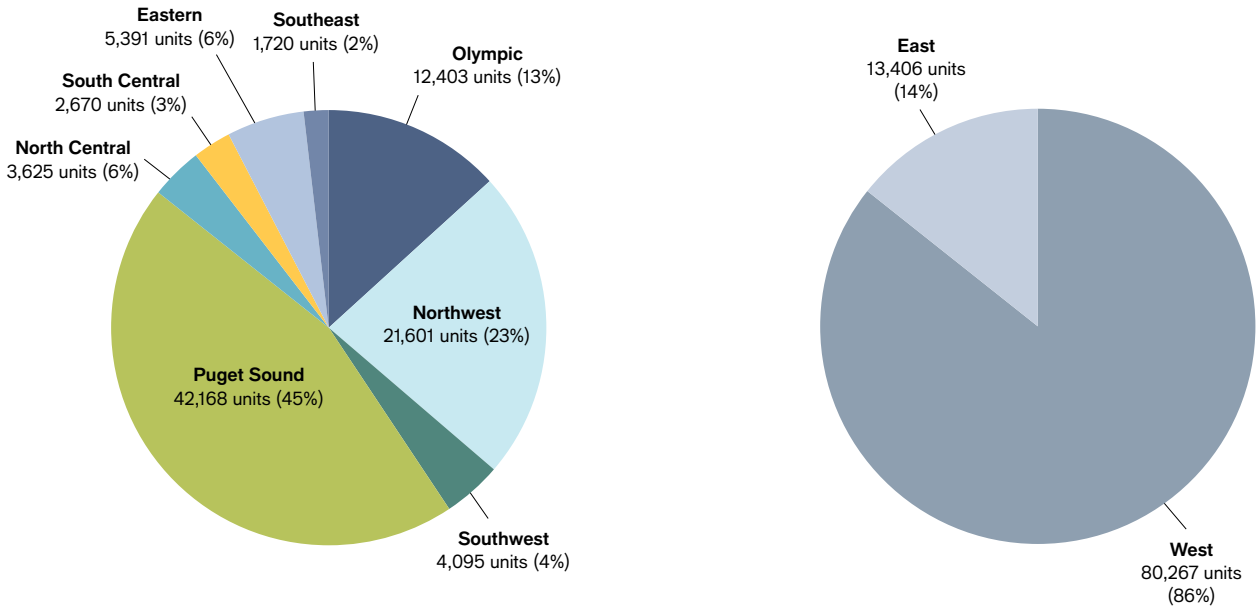



**Source:** Occupied Housing Units data from American Community Survey 2022 5-year estimates.

The distribution of non-utility gas (bottled, tank, or liquified petroleum gas) does not follow the distribution of housing units. In this case, the Puget Sound region makes up less than half of the state's housing units that use bottled, tank, or liquified petroleum gas for heating, despite making up over half of housing units. These fuels are concentrated in the Olympic (13%) and Northwest (23%) Clean Energy Regions (*Figure 2.18*).[79] With over 80% of all units using non-utility gas, the contiguous Clean Energy Regions of Puget Sound, Olympic, and Northwest collectively are a good place to geographically target electrification of non-utility gas.

College of Education and the Quantitative Skills Center at WSU Vancouver, WA.
Photo credit: Laura Dutelle, WSU Vancouver

**Figure 2.18. Distribution of occupied housing units with bottled, tank, or liquified petroleum gas heating by Clean Energy Region**




**Source:** Occupied Housing Units data from American Community Survey 2022 5-year estimates.

## *Water Heating*

### Single-Family

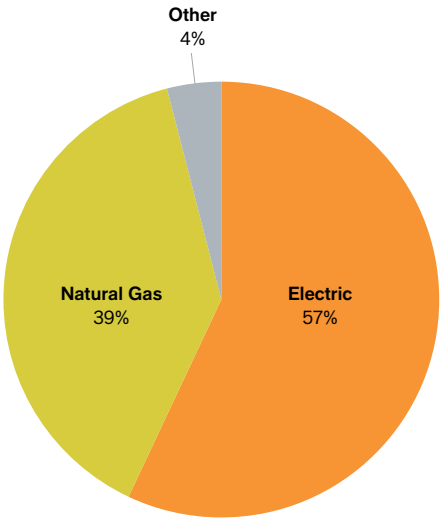
In Washington, 57% of single-family homes use electric water heaters and 39% use natural gas water heaters (*Figure 2.19*).[80] To decarbonize, the 39% using natural gas would need to switch to electrically heated water. Of the 57% that are already electric, under 10% are heat pumps. Close to 90% are relatively inefficient electric resistance storage water heaters. These would ideally switch to heat pump water heaters, which are two to three times more efficient than conventional electric resistance water heaters.[81] Heat pumps offer efficiency gains to balance load growth from electrification, especially at peak periods.

### Multifamily

In multifamily homes in the Northwest, the type and prevalence of in-unit water heating varies with the height of the building. Very few units in high-rises, but approximately 72% of units in low-rises, have in-unit water heating. The remaining water heating is provided to units by central water heating systems.[82]

Overall, 93% of multifamily homes in Washington with in-unit water heating use electric resistance storage water heaters.[83] This points to a huge opportunity for efficiency, rather than electrification, by switching to heat pump water heaters in these homes.

**Figure 2.19. Distribution of water heaters in single-family homes by fuel in Washington**




**Source:** Northwest Energy Efficiency Alliance. 2022 Residential Building Stock Assessment.

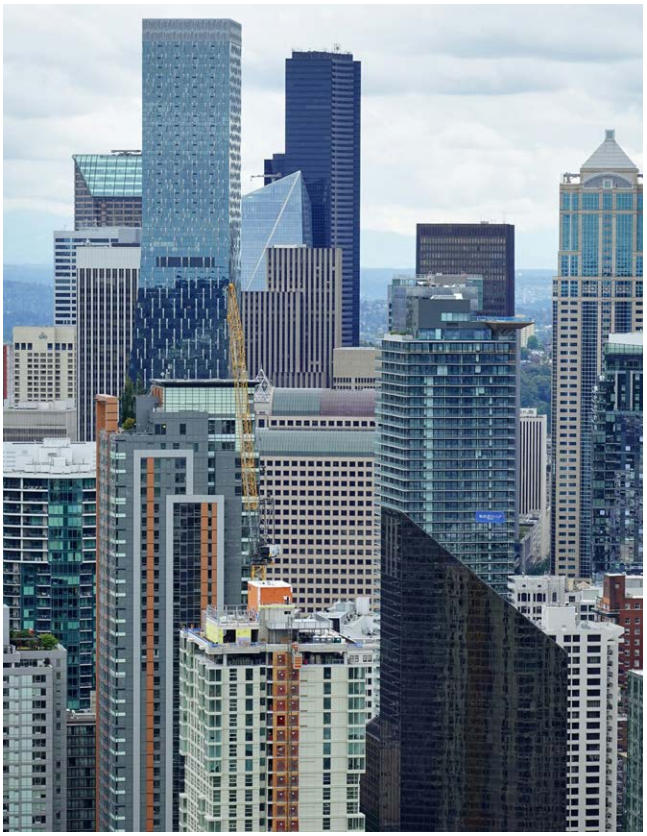
Carol apartments in Seattle, WA. Photo credit: CAST Architecture

## Commercial Sector Energy Use and Emissions

In 2021, statewide emissions from the commercial building sector were 10.8 MMT $CO_2e$.[84] This represents a 66% increase since 1990, or an average of 1.65% increase annually. To reach the state's emissions goals, commercial buildings need to decrease emissions 60% below 2020 levels by 2030, and 96% by 2050.[85]

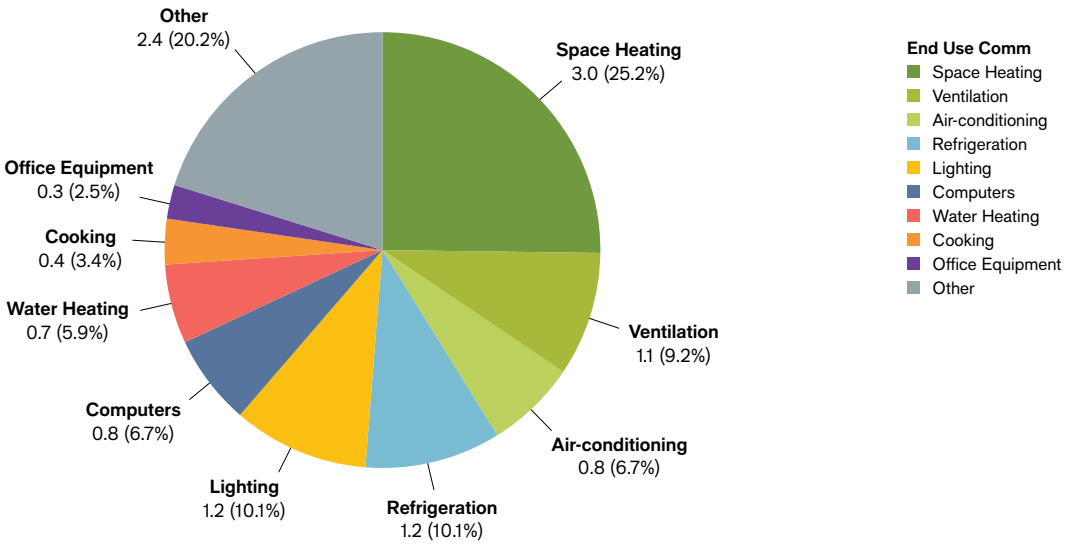
Looking at emissions by end use in 2019—the last year for which end-use data is available—space heating is the largest emitter for commercial buildings, responsible for 25% of emissions (*Figure 2.20*).[86] Lighting and refrigeration are each 10% of emissions.[87] Efforts to decarbonize commercial buildings need to address these end uses, particularly space heating, through a combination of efficiency and electrification.

NEEA's 2019 Commercial Building Stock Assessment (CBSA) provides an estimate of EUI in the Northwest's commercial buildings, although the data is not specific to Washington. The report estimates that commercial electric EUI in the region decreased between 2014 and 2019 from 14.2 kWh per square foot to 11.9 kWh per square foot. Natural gas EUIs increased slightly from .35 therms per square foot to .36 therms per square foot.[88] However, differences in methodology and sample may account for some of these variations.



Downtown Seattle, WA. Photo credit: Richard Lu

**Figure 2.20. Distribution of commercial emissions by end use, in MMT of $CO_2e$ and % of total**




**Source:** Washington State Department of Ecology. Washington State Greenhouse Gas Emissions Inventory 1990-2019.

### *Heating Systems and Fuel*

Limited data are available on heating systems of commercial buildings in Washington. NEEA's 2019 CBSA, which includes data from the four Northwest states combined, finds that natural gas is the predominant heating fuel for 80% of commercial floor area in the region, while electricity is the predominant heating fuel for the remaining 20%. Electricity is significantly more prevalent in two commercial building types—lodging and grocery stores—while restaurants and retail services have over 90% of their floor area heated by natural gas.[89]

### *Water Heating*

Similarly, limited data are available on water-heating fuel type for commercial buildings in Washington, so we have relied on region-wide data. In the future, it would be useful to have data specific to Washington's building stock. NEEA's CBSA found that ~75% of Northwest commercial building service water-heating capacity is fueled by natural gas, while only 25% is fueled by electricity. Sixty-six percent of capacity is from tank water heaters, 19% is tankless water heaters, and 15% of capacity is from boilers.[90]

Out of all building types, only warehouses and retail/service—two of the most common building types—have electricity fueling over 50% of their service water-heating capacity.

### *Cooking and Refrigeration in Commercial Buildings*

Cooking in commercial buildings emitted .4 MMT of $CO_2e$ in 2019, which was 3.5% of the commercial building sector's total emissions (11.9MMT of $CO_2e$). Refrigeration emitted another 1.2 MMT of $CO_2e$, or 10.1% of total commercial building emissions.[91] This may include kitchen refrigeration or other refrigeration in warehouses or labs. For future analysis, it would be useful to have additional data on the ratio of electric to natural gas use in cooking end uses, and how the fuels vary between building types.

## Building Sector Actors

Buildings do not make decisions, invest in infrastructure, or run themselves. Building sector actors are collectively responsible for myriad decisions and actions on a day-to-day basis that lead to the energy use and emissions of individual buildings and in aggregate for the state.

The building sector ecosystem consists of several categories of actors who are all decisionmakers that can influence building performance on some level. The details and behavior of these various actors are different for residential and commercial buildings, but the general categories are the same and are a good starting point for assessing each sector. This ecosystem includes key actors such as:

**Building**

- Developers
- Building owners
- Occupants (owners and tenants)
- Property managers
- Asset managers (commercial)
- Operations and maintenance (commercial)

**Construction and operational services**

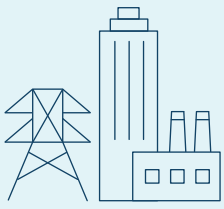
- Contractors
- Architects
- Engineers
- Manufacturers/distributors

**Transactional services**

- Banks, lenders, and other financial actors
- Real estate

**Utilities**

- Electric utilities
- Gas utilities
- Water utilities
- Telecommunication utilities



## Current Interventions

The current ecosystem has several interventions already at play, which support the transition to a clean building sector to varying degrees. The main interventions include economy-wide and building sector–specific policies, programs operated by actors on various levels (state, utility, federal, etc.), and market transformation efforts implemented by the state, utilities, and NEEA. This section provides a high-level overview of these efforts and discusses potential issues and gaps between this landscape of interventions and what is needed to meet the state's 2050 emissions limits and building sector goals as laid out in the Washington 2021 State Energy Strategy.[92]

### Policies

#### *Economy-Wide Policies*

As shown in *Figure 2.21*, several significant economy-wide policies are in place that affect the building sector and provide the overarching policy context for achieving building decarbonization.

The statutory emissions limits of 95% reduction from 1990 levels by 2050 for the Washington economy set the stage for determining sector-level emissions limits and strategies.[93] However, Washington has not yet established sector-level or subsector-level emissions limits, so there is no existing direct

**Figure 2.21. Economy-wide policies impacting the building sector**

| POLICY | KEY POLICY GOAL | IMPACT ON BUILDINGS |
|---|---|---|
| **2019 Clean Energy Transformation Act** | Decarbonize electricity by 2045 | Should reduce building sector emissions by 50% |
| **2020 Statutory Emissions Limits** | Sets economy-wide limits to achieve net-zero emissions by 2050 | Emissions limits should inform building sector targets |
| **2021 Climate Commitment Act** | Caps and reduces emissions from Washington's largest emitters and invests in the clean energy transition | Creates statutory emissions reductions for gas utilities and large emitters that should drive building sector policies, programs, and market development |

statutory requirement, accountability, or tracking of progress for the building sector.

CETA requires Washington's electricity to be carbon-neutral by 2030 and zero-carbon by 2045.[94] This law directly affects buildings and, if implemented effectively, should reduce emissions in buildings by 50% by 2030, since electricity use accounts for approximately 50% of building emissions in Washington.[95]

The Climate Commitment Act (CCA) requires the state's largest GHG emitters, including natural gas utilities, to progressively reduce emissions by 2050, with key GHG reduction milestones along the way.[96] By pushing utilities to reduce on-site fossil fuel use in buildings, and by putting pressure on the largest real estate owners to reduce emissions from their portfolios, the CCA begins to address some of the remaining 50% of building emissions.

Washington has tied strong equity action into its climate commitments and supports an equity approach within building decarbonization and electrification. Key policies driving these efforts include provisions of CETA, the CCA, as well as the Healthy Environment for All (HEAL) Act,[97] the Washington 2021 State Energy Strategy,[98] and the Legislature's Rural Clean Energy Study directive to Commerce.[99] All address the need for an equitable distribution of benefits resulting from the clean energy transition, call for the prioritization of environmental justice, and stress the importance of public participation in the formation of programs and policies.

CETA calls for the "equitable distribution of clean energy benefits and reduction of burdens" to vulnerable populations and highly impacted communities and establishes a system of community benefit indicators to be included in Clean Energy Implementation Plans by utilities to report progress on the distribution of these benefits and burdens.[100]

The CCA requires that 35% of funds be allocated to projects serving overburdened communities, while 10% of funds be allocated to projects with Tribal support.[101] The state's HEAL Act supports additional equity focus by establishing an Environmental Justice Council that guides seven state agencies to operationalize environmental justice practices and procedures in their work.

The Washington 2021 State Energy Strategy specifically calls for equity to go beyond just ensuring affordable energy prices to also include energy sufficiency and the health and economic impacts of energy production. It also highlights the value of public participation, inclusion of historically marginalized voices, and engagement with Tribes in forming programs and policies. It specifically calls for increasing funding for low-income weatherization to address at least 10% of eligible households annually.[102] The Washington 2021 State Energy Strategy also recommends the creation of a Washington Building Decarbonization Plan that would set targets, outline a market transformation approach, and establish new programs with inclusive public processes and a focus on equity and inclusion.

The state began this work in the residential sector with its Residential Building Decarbonization Implementation Plan,[103] released in July 2023, which presents recommendations on improving the current system with a focus on energy efficiency and improving access to programs and incentives.

### *Building Sector Policies*

Economy-wide policies such as the emissions limits, CETA, and the CCA can only go so far to eliminate emissions in buildings by 2050. There are significant gaps in Washington's building sector policies. While new construction is mostly covered by a mandate to achieve 70% energy reductions by 2031 from a 2006 baseline,[104] there is not a similar mandated trajectory to progressively reduce energy use and improve performance for existing buildings. This points to the need to establish a long-range pathway for all existing buildings to reduce emissions.

The statewide Clean Buildings Performance Standard (CBPS)[105] provides a good foundation and potential framework for regulating existing building emissions by establishing EUI targets for buildings statewide. However, EUI targets currently only apply to commercial buildings greater than 50,000 square feet (Tier 1 buildings) and have only been established through the first CBPS cycle. Commerce is not required to update the Tier 1 EUI targets, or establish targets for Tier 2 buildings until the late 2020s. Tier 2 buildings include buildings greater than 20,000 square feet up to 50,000 square feet and all multifamily residential buildings more than 20,000 square feet.

The majority of emissions from commercial buildings, nationwide, are from small to medium-sized buildings, while the majority of emissions from residential buildings are from single-family homes.[106] There is no comprehensive combination of policies and programs structured to address these segments by 2050. The SCALE 2030 team proposes a new Tier 3 to apply to commercial buildings and multifamily buildings up to 20,000 square feet, as well as single-family households.

The inclusion of a proposed Tier 3 in this assessment ensures a comprehensive review of all building sector segments. Washington could regulate this tier with performance disclosure and asset-based performance using home energy performance scores. Including smaller commercial buildings and all residential units within the state's CBP framework would ensure a comprehensive approach to regulating all existing buildings at some level.

*Table 2.1* summarizes critical building sector policy levers necessary to provide a comprehensive regulatory pathway for all building segments to transition by 2050. Blue boxes indicate where a policy currently exists, and dashes indicate where there is no policy. The table assesses existing CBPS tiers and the SCALE 2030 team's proposed Tier 3 for small commercial and residential buildings. These three tiers collectively cover all segments of residential and commercial buildings in Washington.

As the table shows, very few building sector policies are in place to support the clean buildings transition by 2050.

**Table 2.1. Building sector policy gap analysis**

| | Building Sector Tiers & Segments | | | | |
|---|---|---|---|---|---|
| **Critical Policy Levers** | **Tier 1: Commercial (>50k sq.ft.)** | **Tier 2: Commercial (>20k ≤50k sq.ft)** | **Tier 2: Multifamily (>20k sq.ft.)** | **Tier 3 (Future): Commercial (≤20k sq.ft.)** | **Tier 3 (Future): Residential (≤20k sq.ft.)** |
| State Clean Buildings Transition Target (New Construction) | — | — | — | — | — |
| State Clean Buildings Transition Target (Existing Buildings) | — | — | — | — | — |
| Transition Rate and Milestones | — | — | — | — | — |
| Annual Building Sector GHG Inventory and Progress Reporting | — | — | — | — | — |
| Zero-Emission Appliance Standard | — | — | — | — | — |
| Energy Code | ■ | ■ | ■ | ■ | ■ |
| Performance Benchmarking (for real estate transactions) | ■ | ■ | ■ | — | — |
| Performance Benchmarking (publicly disclosed) | — | — | — | — | — |
| Standardized Mandatory Performance Labeling | — | — | — | — | — |
| CBPS Targets by Building Type, *2025 BPS Cycle* | ■ | — | — | — | — |
| CBPS Targets by Building Type, *2030 BPS Cycle* | — | — | — | — | — |
| CBPS Targets by Building Type, *2035 BPS Cycle* | — | — | — | — | — |
| CBPS Targets by Building Type, *2040 BPS Cycle* | — | — | — | — | — |
| CBPS Targets by Building Type, *2045 BPS Cycle* | — | — | — | — | — |

— No current policy ■ Policy in place

As *Table 2.1* shows, current building sector policies are not structured to meet state emissions limits. Almost none of the critical policy levers currently exist. This is mainly because the performance standard currently only applies to Tier 1 buildings, only includes targets through the 2025 compliance cycle, and does not regulate emissions or demand flexibility. Without a clear trajectory of performance targets through 2050 it is difficult for building owners to plan capital improvements, for the state to align the energy code with future CBPS targets, and for utilities to support customers through performance-based programs aligned with future targets.

The state also has no sector-specific statutory energy or emissions reduction targets for the building sector, no publicly disclosed building benchmarking for any segments, and no zero-emissions appliance standards. There is also no state-level tracking mechanism for measuring progress against building sector targets and there are no state-level published reports on progress against building sector targets.

As a result, there is no clear way to determine whether the state is on track to implement the building sector energy and emissions reductions identified in the Washington 2021 State Energy Strategy as necessary to meet statutory economy-wide emissions limits. Significant changes must be made by 2030 to position the state to successfully transition all segments of the residential and commercial sectors. Building sector policies must be structured to deliver statutory economy-wide emissions limits by 2050. Recommendations for how to do this are included in *SCALE 2030: Clean Buildings Transition Framework for Washington*[107] and will be explored in more detail in *SCALE 2030: Clean Buildings Transition Roadmap*.

The SCALE 2030 team notes that the uncertainty around I-2066,[108] which would prevent discouraging or disincentivizing natural gas in buildings if implemented, has the potential to complicate Washington's path to decarbonizing the sector, although it is currently facing legal challenges. Even if the legal challenges to 1-2066 are ultimately successful, its passage points to several needs for building sector policies:

- A broader coalition behind the clean buildings transition; for example, deepening alliances with building sector industries and labor based on the need for large-scale investment and deployment.
- Building sector policies, such as building performance standards and energy codes, that focus on performance, performance modeling and rating tools, and building operator training rather than individual fuel types or technologies.
- Development of a workforce of commercial and residential sector modelers and building operators, among others, that can support and benefit from the energy transition in both new and existing construction.


The Doupé building in Ilwaco, Washington. Photo credit: Ian Sane

## Planning

A variety of entities are involved in energy and emissions planning that impacts the clean buildings transition. *Table 2.2* summarizes how each plan impacts clean buildings. Although there is some coordination across these important planning efforts, there is also a lack of tight alignment between the energy focus of regional and utility plans and the emissions focus of economy-wide emissions limits, the Washington 2021 State Energy Strategy, and other climate plans.

### Table 2.2. Building sector planning in Washington

| | |
|---|---|
| **Northwest Power Council's Northwest Power Plan[109]** | The Northwest Power and Conservation Council develops a regional power plan every five years that addresses electricity only and does not include planning recommendations for natural gas or other fuels. The most recent plan is the 2021 Northwest Power Plan (Power Plan). Included in the Power Plan's resource strategy are several resources relevant to clean buildings. The most impactful is an energy efficiency target for the region, with specific recommendations to maintain or increase funding for development of related emerging technologies, regional market research, stock assessments, related analysis, and to support building codes and appliance standards. The Power Plan also specifically mentions the importance of market transformation focused on increasing the availability of efficient products and acceptance by consumers. In the commercial sector, the Power Plan calls for targeting smaller commercial buildings, which tend to have higher energy use than larger commercial counterparts, and using EUI to identify priority buildings. In the Power Plan, the end goal of efficiency is as a resource, with the plan noting that energy efficiency that improves building resilience and grid flexibility should be prioritized, but that this value is currently not well integrated into the Plan. The Plan also recommends development of residential time-of-use rates, and that energy efficiency and demand response should be considered together as part of an integrated demand-side management approach. Beyond energy efficiency targets, it does not set targets for building performance or emissions reduction. |
| **Washington 2021 State Energy Strategy[110]** | Using deep decarbonization pathways modeling, the 2021 State Energy Strategy finds that energy efficiency and electrification are the least-cost strategies to meet the state's emissions limits in buildings. The strategy calls out the need to optimize buildings as grid resources, and for market transformation to increase adoption of high-efficiency equipment, such as heat pumps. The strategy specifically calls out the need to plan for a long-term transition away from natural gas distribution as a result of pursuing electrification and lays out recommendations with the explicit goal of reaching net-zero emissions in buildings by 2050. |
| **Washington's Residential Building Decarbonization Implementation Plan[111]** | The Residential Building Decarbonization Implementation Plan describes a strategy to reduce emissions from residential buildings, within the context of reaching the state's economy-wide net-zero goal by 2050. The plan focuses largely on bundles of energy efficiency measures, with a specific callout that whole-home electrification will be necessary to meet the state's goals. The plan also calls out that clean electricity is essential to reducing building emissions. Looking beyond individual homes, the plan calls for an all-electric construction mandate no later than the 2027 code cycle and calls attention to the need for workforce development and increased funding. The plan also recommends a statewide database that could track progress toward emissions or energy consumption targets, as well as establishing key performance indicators to evaluate the performance of decarbonization programs. |

*continued*

**Table 2.2. Building sector planning in Washington *continued***

| | |
|---|---|
| **Utility Integrated Resource Plans (IRP), Integrated System Plans, Conservation Potential Assessments (CPA), and Demand-Side Management Potential Assessments (DSMPA)** | The Integrated Resource Plans (IRP) developed by utilities may include energy efficiency, distributed energy resources, and demand response; all resources are highly relevant to clean buildings planning. Conservation Potential Assessments (CPA) and Demand-Side Management Potential Assessments (DSMPA) offer further detail on specific targets and strategies for achieving each type of resource. With the end goal of resource adequacy, these assessments do not generally focus on building performance or emissions reductions. |
| **Utility and municipal building electrification plans and decarbonization plans** | One-off strategies from municipalities (Tacoma's Community Building Decarbonization Strategy)[112] or utilities (Seattle City Light's Building Electrification Strategy)[113] offer additional targeted planning for the clean buildings transition. Both identify strategies such as market transformation and reducing upfront costs, expanding funding, adopting comprehensive targets, workforce development, and offsetting electrification with efficiency. They may or may not set specific targets and milestones for EUIs or building emissions. |
| **State and local Carbon Pollution Reduction Grant plans, including Priority Climate Action Plans (PCAP) and Comprehensive Climate Action Plans (CCAP)** | Both Priority Climate Action Plans (PCAP) and Comprehensive Climate Action Plans (CCAP) will include the built environment as a category of greenhouse gas emission. The plans are set to outline specific actions for emissions reductions. Washington's PCAP identified reducing refrigerants and decarbonizing campus energy systems as top building sector priorities for reducing emissions. The CCAP is expected in late 2025 with additional building sector actions.[114] |

Wenatchee, WA. Photo credit: Rick Williams

## Utility Programs

Public and investor-owned utilities have been operating energy efficiency programs for decades that are intended to offset load growth and thereby reduce the need for additional resources. Energy efficiency itself is considered a resource and is assessed against other alternative resources, such as new generating plants or wind power, to determine the lowest-cost alternative.

Utilities develop integrated resource plans and conservation potential plans based on how much energy efficiency is cost-effective and achievable in relation to their projected demand and the cost of alternative resources. Although the cost of carbon is considered when determining the cost-effectiveness of various resource options, the system treats energy efficiency as a resource to offset load growth rather than as a key strategy to decarbonize the building, transportation, and electricity sectors while maintaining grid reliability. This is a self-limiting system and it is not designed to deliver on larger goals, such as the clean buildings transition, without restructuring energy efficiency targets, metrics, financing and transaction structures, and evaluation methods to align with Washington's 2050 emissions limits and related performance outcomes.

In addition, utility programs are often siloed and treat efficiency, electrification, and demand flexibility individually despite the Washington 2021 State Energy Strategy's stated trajectory toward a highly efficient, flexible, and zero-emissions building stock by 2050. Unlike California's Total System Benefit metric,[115] Washington does not have a mechanism for determining the overall grid value of a particular measure or group of measures that delivers a specific performance outcome at a specific time. Utility programs offer incentives but often do not address fundamental barriers such as split incentives where savings mostly benefit tenants; economic pressures that affect building balance sheets and the ability to obtain credit; and short ownership durations that increase expectation for short payback periods on investments.

Ultimately, the scale and pace of change currently supported by utility programs is out of sync with state emissions reduction goals. The current regulatory framework for utility programs must adapt to procure whole-building performance and the large-scale and fast-paced changes that are required to transition every building and home in 25 years.

## Market Transformation

Market transformation has been one of the key strategies in Washington for reducing building energy use. NEEA is a leader in energy efficiency market transformation, with a current emphasis on HVAC and water heating and work on federal standards and codes. These efforts have been essential for supporting continuous improvements in the efficiency of residential and commercial buildings.

Several state efforts have also supported developing new clean energy technologies. These include Commerce's Clean Energy Fund, which has provided funding to companies, universities, utilities, and nonprofits for a range of activities bringing new technologies to market since its inception in 2013,[116] and the Clean Tech Alliance's "Building Utilities and Infrastructure Living Together (BUILT) Cluster," which "accelerates, scales, and replicates sustainable and innovative planning, design, and construction practices/technologies."[117]

Workforce development is an essential element of market transformation. Washington HB 1176,[118] which passed in 2023, focuses on climate-ready communities and established the Clean Energy Technology Workforce Advisory Committee (CETWAC), which is developing research and recommendations focused on workforce needs of the growing clean energy technology sector, associated supply chain industries, and dependent sectors.[119] CETWAC aims to model and analyze the workforce needs associated with state legislation related to clean energy.

While many of the pieces needed for market transformation in Washington exist, there are substantial gaps. Many clean building technologies (e.g., commercial and residential heat pumps for space and water heating) are not yet price-competitive with gas or less efficient equivalents. We lack the policy and funding for market transformation focused on the widespread adoption of existing building decarbonization technologies and solutions, which is needed in addition to market transformation focused on emerging technologies.

Building owners, homeowners, and renters also face many challenges beyond just retrofits, including benchmarking, audits, planning, and the operations and maintenance of cost-saving upgrades.[120] However, many of these additional challenges—along with basic electrification and grid-interactive infrastructure, such as electrical panels, new service, new wiring, modern control systems, and metering equipment—are also not adequately funded to transition the entire building stock.

## Interconnectivity and Interoperability

It is important for various elements in an ecosystem to have some level of standardized communication and interoperability to reduce system friction and allow the ecosystem to adapt and evolve to deliver new outcomes. Currently, many of the interventions in the building sector are siloed and lack clarity and interconnectivity in terms of goals, targets, metrics, communication formats, etc., and therefore lack interoperability, which is likely hindering the clean buildings transition. For example, statutory building sector energy and emission reduction goals and targets could help align all interventions so they can collectively work toward reductions at the required pace.

Washington has a GHG inventory, but it is released every two years, often with a two- or three-year reporting delay from the most recent year of data. The Washington Department of Ecology released the current GHG inventory in January 2025 with 2021 emissions data. There is currently no clear way to quickly recognize when the state needs to make adjustments or dramatically change course. It will be difficult to achieve aggressive statutory economy-wide targets and milestones without a more detailed understanding of what specifically must be done in the building sector from year to year.

As discussed above, major building sector policies like the CBPS are not currently aligned with the building sector emissions and energy reductions identified by the modeling that underpins the Washington 2021 State Energy Strategy. For example, there is no established trajectory of targets that will deliver the modeled commercial sector reductions. The lack of connection between building sector policies and reduction targets hinders the capacity of keystone policies like the CBPS to be maximally effective.

Anderson residence in Seattle, WA. Photo credit: CAST Architecture

In addition, the buildings that must meet the EUI requirements in the CBPS are only required to benchmark their energy use every five years and do not have to report it publicly unless requested by a potential buyer. This lack of broad transparency creates barriers to assessing the progress of the clean building transition. It also fails to send a signal to market actors, whereas easily accessible performance reporting could provide the visibility necessary to support market-driven performance improvements.

County assessor data lacks a common building identifier, such as a state-recognized universal building identification number, that can be used by the CBPS program, utilities, or other market actors to identify buildings across different platforms.

There are also no common metrics or performance reports, such as standardized labeling, to officially characterize building performance that can be used by multiple actors in the ecosystem who all work on the same buildings. A standardized reporting template and labeling for building performance could be used in policies and programs and for industry transactions such as property valuations and capital investment projections.

Standardized performance labeling would also be useful for energy savings performance contracting (ESPC), energy service agreements (ESA), and managed energy service agreements (MESA), etc. Common performance and reporting metrics would make it easier to compare results and progress between individual buildings, add value to building performance through visibility, and potentially increase market demand for building performance by making it easier to understand and compare.

Streamlining interconnectivity and interoperability is critical for transitioning large, complex systems like the building sector to deliver entirely different performance outcomes in the span of only 25 years.

## Funding

Many funding sources are available for clean buildings, including federal, state, and local incentives, tax credits, and more. However, even when funds are combined, the cost of decarbonization remains an obstacle for many residential and split incentives can discourage building owners from investing in retrofits that mostly benefit tenants. Many reports have discussed cost challenges in each sector, including the *Clean Buildings Workgroup Report to the Legislature*[121] specifically in context of costs to commercial buildings of complying with Washington's Clean Buildings Law, and the Lawrence Berkeley Lab's *Challenges and Opportunities for Home Decarbonization* report.[122] This section is not a complete list of clean buildings funding sources. Additional funding sources can be found on tools such as the Washington Department of Commerce's FundHub website.[123]

Federal sources—although their future is uncertain—include credits and incentives through the Inflation Reduction Act (IRA), such as expanded deductions under 179D for commercial building energy efficiency projects[124] and the Home Electrification and Appliance Rebates for residential electrification projects.[125] State funds include Energy Programs in Communities grants,[126] and the Early Adopter Incentive for compliance with the Clean Buildings Performance Standard.[127] Other sources include utility incentives and Commercial Property Assessed Clean Energy and Resilience (C-PACER) programs.[128]

Many of these funding sources fill certain gaps by focusing explicitly on electrification, efficiency, on-site renewables, or demand flexibility. They also are not subject to utility program cost-effectiveness constraints and can be stacked with utility program incentives. However, funding is limited relative to the overall need across Washington and the nation.

For example, Rewiring America estimated that cumulative IRA investment in heat pump space and water heating between 2023 and 2032 could only be as much as $63 billion.[129] While impressive in total, if implemented the direct impact would be relatively small since it would be distributed across 50 states and an estimated more than 65 million housing units.[130]

Rewiring America further estimated that the heat pump space heating tax credits could reach 23 million households nationally and the heat pump water heater tax credits could reach 12 million.[131] However, this only represents 16% and 8% of the country's total housing units, respectively. In addition, the tax credits are voluntary, and these estimates are based on household eligibility, not likelihood of adoption.

Space Needle behind buildings in Seattle, WA. Photo credit: Anthony Fomin

Washington lacks a large-scale funding source capable of supporting a fast-paced clean buildings transition. State programs are not funded at levels that can significantly increase adoption of energy upgrades beyond the federal incentives. Hence, voluntary incentives are an important piece of the clean buildings transition puzzle, but the funding is too low and the administrative burden is too high to be the central strategy to transform the entire building stock by 2050.

How to address funding gaps, uncertainty in federal funding, funding accessibility, and target funds to sectors with the largest emissions reductions possible are questions that inform existing and upcoming SCALE 2030 initiatives, including the *Clean Buildings Transition Framework for Washington*, *Clean Buildings Transition Roadmap for Washington*, and *Cost Reduction Blueprint for Washington*. With these initiatives, the SCALE 2030 team will consider ideas beyond incentives and subsidies that would reduce equipment and installation costs. In Washington alone, nearly four million residential units and billions of square feet of commercial floor area will need to be efficient, zero-emission, and grid-interactive by 2050. The state needs a more comprehensive approach to transition the millions of buildings that existing programs and funding are not structured to address.

# 3 Systemic Barriers and Opportunities

Synthesizing the findings of this ecosystem assessment, the SCALE 2030 team summarized several barriers and opportunities that provide insight into what is needed for a successful clean buildings transition.

## Barriers

**No Targets or Tracking.** The state has no published goals or statutory requirements for building sector–specific emissions or energy reduction targets. There is no state-level tracking mechanism for measuring progress against targets or goals and no clear way to determine whether the state is on track to implement the building sector energy and emissions reductions called for in the Washington 2021 State Energy Strategy.

**Lack of Buildings Market Segmentation Data.** Data on geographic distribution of building emissions, particularly by building segment or occupancy type, is not available. The lack of data complicates efforts to effectively target policies and programs for clean buildings.

**Policy Gaps.** Despite major economy-wide policies, and building sector–specific policies such as the CBPS, most buildings lack a regulatory pathway to reach zero emissions by 2050.

**Lack of Coordinated Planning.** Although there is some coordination across planning efforts, there is a lack of tight alignment between the energy focus of regional and utility plans and the emissions focus of economy-wide emissions limits, the Washington 2021 State Energy Strategy, and other climate plans.

**Siloed Utility Programs.** Utility programs are often siloed and treat efficiency, electrification, and demand flexibility individually despite the Washington 2021 State Energy Strategy's stated trajectory toward a highly efficient, flexible, and zero-emissions building stock by 2050. Programs often do not address fundamental barriers such as split incentives, economic pressures that limit the ability to obtain credit, and short ownership durations that require short payback periods.

**High Incremental Costs.** Incremental costs of key technologies, such as heat pumps, remain high. Additional costs and challenges with basic infrastructure, such as electrical panels, new service, new wiring, modern control equipment, and smart metering equipment, create further barriers to clean buildings.

City of Richland, WA in the Tri-Cities. Photo credit: jdoms

**Market Transformation Gaps.** Market transformation mostly focuses on emerging technologies rather than mass rollout and widespread adoption of existing technologies and solution sets to decarbonize buildings at scale.

**No Standardized Performance Labeling.** There are no common metrics or performance reports, such as standardized labeling, to officially characterize building performance that can be used by multiple actors in the building sector market who all interface with the same buildings.

**Lack of Emissions Data.** Public data on building emissions is limited. The state GHG inventory is released every two to three years and lacks detailed building sector data. There is currently no clear way to quickly recognize when the state needs to make adjustments or dramatically change course.

**Limited Incentives.** Funding for building owners is limited, particularly with federal funding such as the IRA at risk. Current incentives are insufficient to transform the existing building stock and often come with a high administrative burden for the funder and recipient.

**No Large-Scale Funding Sources.** Current funding sources are small relative to the scale and pace of change needed to meet 2050 goals. Washington lacks large-scale funding sources capable of supporting a fast-paced clean buildings transition.

## Opportunities

**Priority Building Segments.** Relatively few types of buildings make up the majority of the building stock and emissions. Solutions developed for these building types can address much of the transition to clean buildings.

**Program Alignment.** Existing programs, such as utility energy efficiency programs, are a useful starting point and could be shifted to focus on whole-building performance, procuring energy efficiency, and reducing emissions.

**Policies to Scale Demand.** Comprehensive building sector policies can dramatically scale demand for clean building retrofits.

**Market Transformation to Scale the Supply Chain.** Rapidly scaling market transformation and focusing on mass rollout of existing high-efficiency solution sets can shift the supply chain and price point of key technologies, such as heat pumps.

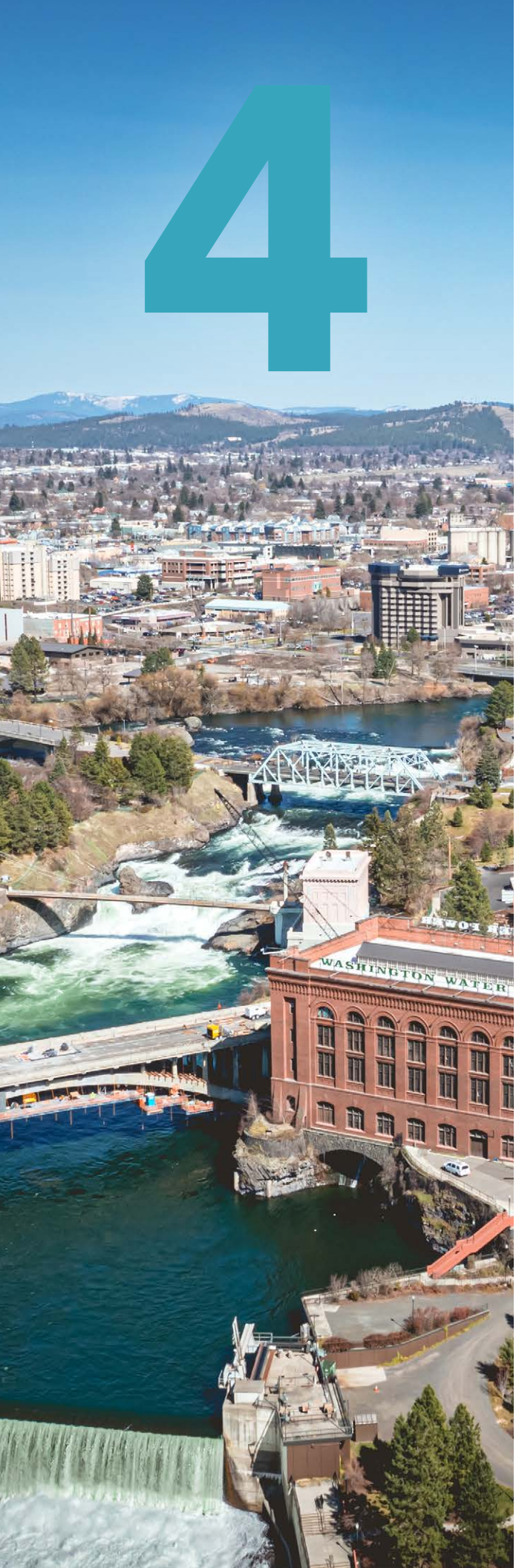

Fairhaven Village in Bellingham, WA. Photo credit: Lorin Lindell

**Increased Interconnectivity and Interoperability.** Creating common metrics and performance labeling can add visibility and value to building performance. Increased visibility and value can bring building performance into real estate transactions, facilitate energy service contracting, and promote higher demand for clean buildings retrofits.

**Bold New Funding Sources.** Identifying bold new funding sources for market transformation, workforce development, and the state and local clean building transition will reduce reliance on federal funding and help Washington create a thriving 21st-century building sector and support vibrant communities.

**Coordinated Planning.** Increasing alignment between regional and utility energy planning and state and local climate planning can create more a coherent planning context for the clean buildings transition, which will drive alignment across policies, programs, and market transformation.

**Regional Implementation.** Taking a regional approach can streamline clean buildings implementation. A regional approach can support the unique needs of regions across the state by adapting strategies that work for their buildings and communities and providing a one-stop shop for information and resources on clean buildings.




# Conclusion

Washington's commercial and residential buildings need a major shift to reach the state's goal of a 95% emissions reduction from 1990 levels and net-zero emissions by 2050. Going from a 62% increase in emissions between 1990 and 2021 to nearly zero emissions by 2050 will require significant changes in the building sector ecosystem.

Assessing the current building sector ecosystem points to the changes needed, and how building sector actors can focus clean buildings efforts. This paper highlights that a focus on single-family homes, low-rise multifamily homes, and small and medium commercial buildings can have an outsized impact on the state's overall progress toward clean buildings.

This paper also introduces the idea of Clean Energy Regions, which provide a new way of understanding the geographic distribution of buildings and emissions in Washington. The Clean Energy Regions also offer a potential way to implement future clean buildings efforts while addressing the unique needs of each region across the state.

Existing policies, programs, and market transformation efforts provide starting points for the clean buildings transition. However, changes are needed to create complete regulatory pathways for buildings to reach targets while increasing the supply of key clean buildings technologies and funding available for the transition.

Spokane, WA downtown and the Post Street Bridge. Photo credit: Myk Crawford

# Endnotes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