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Technical Memorandum

DATE: August 30, 2024
TO: Cassie Lacy, Senior Management Analyst, City of Bend
FROM: Maddie Cheek and Tracy Lunsford, Parametrix
SUBJECT: Bend Building Stock Characterization
PROJECT NAME: Bend Electrification Policy Analysis

Purpose

This memo provides an overview of Bend's existing residential and commercial building stock characteristics, energy end uses, and greenhouse gas (GHG) emissions associated with residential and commercial buildings in Bend. It also provides an emissions forecast to illustrate the potential building emissions reduction associated with commercial and residential electrification.

Residential Sector

Residential Summary

- Most of Bend's current housing units are single-family homes (72%), followed by multi-family (25%) and mobile homes (3%). This is expected to change over time to a greater proportion of multifamily compared to single-family.
- About 23% of Bend's residential buildings were constructed prior to the establishment of Oregon's energy conservation requirements.
- A majority of homes use utility gas as their primary heating fuel (54%), followed by electricity (38%).
- The primary end uses for residential natural gas are space heating (55%) and water heating (38%), while the primary end uses for electricity are space cooling (37%), space heating (20%), and water heating (18%).
- Single-family homes have a disproportionate impact on residential building emissions: they drive 87% of residential building emissions but make only up 78% of Bend housing stock.

Building Stock Characteristics

In 2016, Bend conducted a Housing Needs Analysis[1] that found that, "Bend's current housing policies and regulations support the development of a mix of housing that is not consistent with Bend's needed mix for a larger percentage of single-family attached and multifamily housing types (relative to past trends) and a higher percentage of more affordable single-family detached housing types." Over the last eight years, Bend's residential building stock has begun to change as a result of the Housing Needs Analysis and subsequent local policy changes. Figures 1 and 2 below give a summary of Bend's existing housing stock as of 2023.

[1] City of Bend Housing Needs Analysis (2016)

Figure 1 presents a summary of Bend's housing stock by type from the City of Bend. As of 2023, Bend had over 47,200 total housing units. Most of Bend's housing units (72%) were single family (detached and attached). The remaining units are multifamily or ADUs (25%) and mobile homes (just under 3%). The *Energy Trust of Oregon City Report: Bend 2022*[2] reports that 62% of housing units were owned and 28% were rented in 2022.

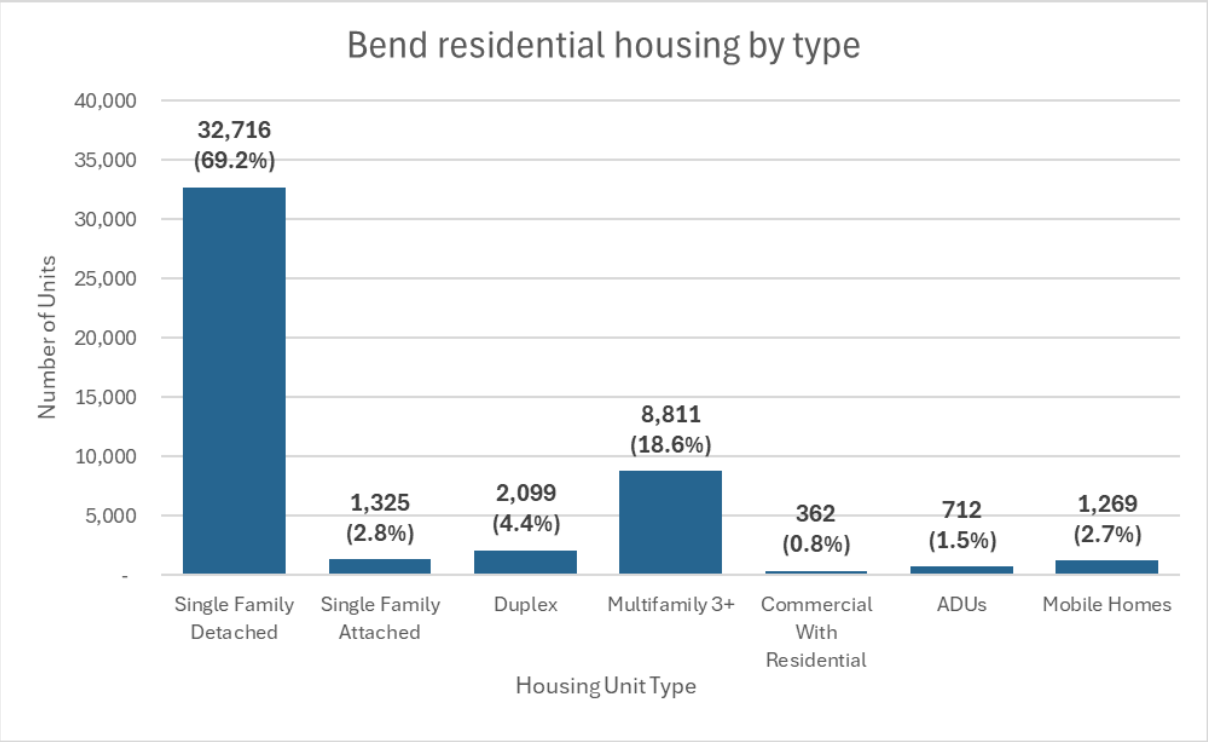

Figure 1: Bend residential housing by type

In addition to building type, building age matters because changes in building standards have tended to make buildings more efficient over time. Oregon's first energy conservation requirements were adopted with the first statewide building code in 1974 and were limited to residential-type occupancies (apartments, hotels, dwellings). With the original statewide code and all future codes, the provisions are mandatory statewide. This code was upgraded in 1978 and again in 1980 to reflect the new editions of the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) standards (90-75, 90A-80, 90B-75). Since 1980, the residential energy conservation requirements have been amended on a three-year cycle in sequence with the Oregon Residential Specialty Code (ORSC). The current code for one- and two-family homes, as well as townhomes is the 2023 ORSC, adopted in October 2023. The ORSC residential energy provisions were developed as Oregon-specific code. Since 2011, each new edition is compared to the current national model code (International Energy Conservation Code (IECC) residential).[3]

Figure 2 shows housing units by age. Roughly 77% of housing units were built after 1980, following the establishment of Oregon's first energy conservation requirements and initial upgrades to ASHRAE standards. About 25% of residential buildings were constructed after 2011, which is the first year that the ORSC was compared to the residential IECC to foster greater energy efficiency in

[2] The Energy Trust of Oregon provided the report to Parametrix upon request.

[3] Office of Energy Efficiency & Renewable Energy – Oregon State Profile

buildings. About 23% of Bend's residential building stock was constructed prior to the establishment of Oregon's energy conservation requirements. These older buildings are likely to be the least efficient in the residential sector.

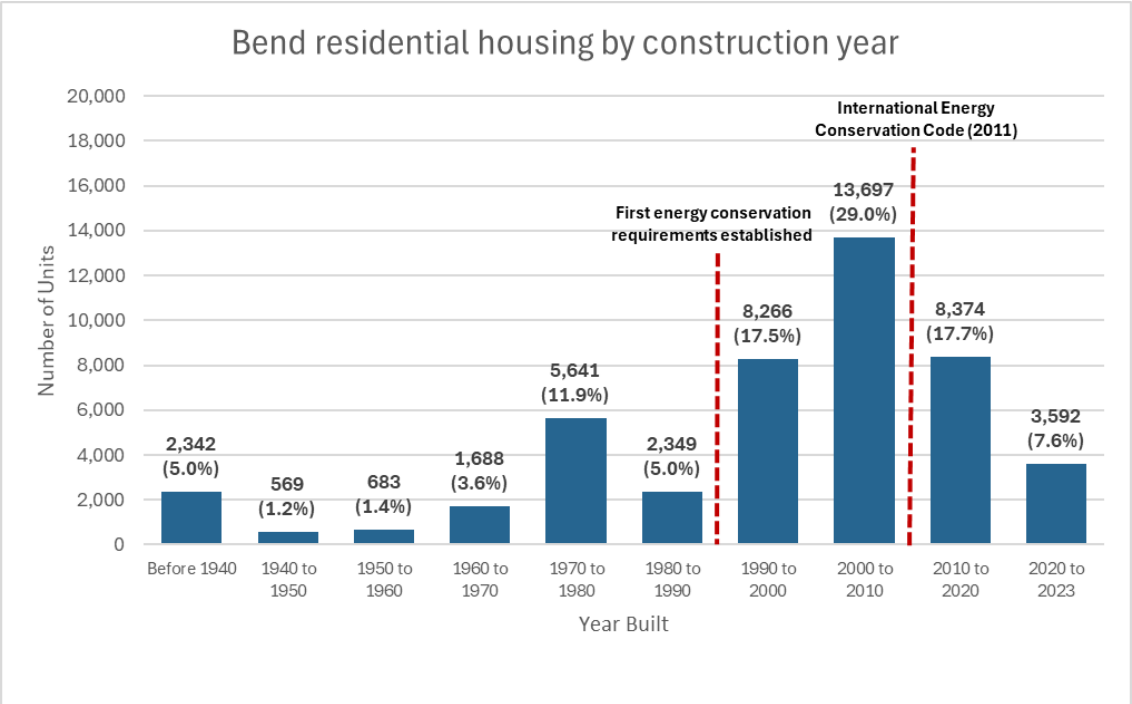

Figure 2: Bend residential housing by construction year

Figure 3 illustrates the breakdown of primary heating fuel in Bend, using data from the Energy Trust of Oregon (ETO)[4]. ETO reports that 54% of housing units (22,468 units) in Bend use natural gas as the primary heating fuel (compared to 38% statewide); while electricity is the primary heating fuel for about 39% of housing units (53% statewide); wood represents 4%; and other fuels (e.g. propane, fuel oil) total 3%.

[4] Note: The ETO report is based on data from the American Community Survey and number of housing units will not match up exactly between ACS data and data from the City of Bend shown in Figures 1 and 2.

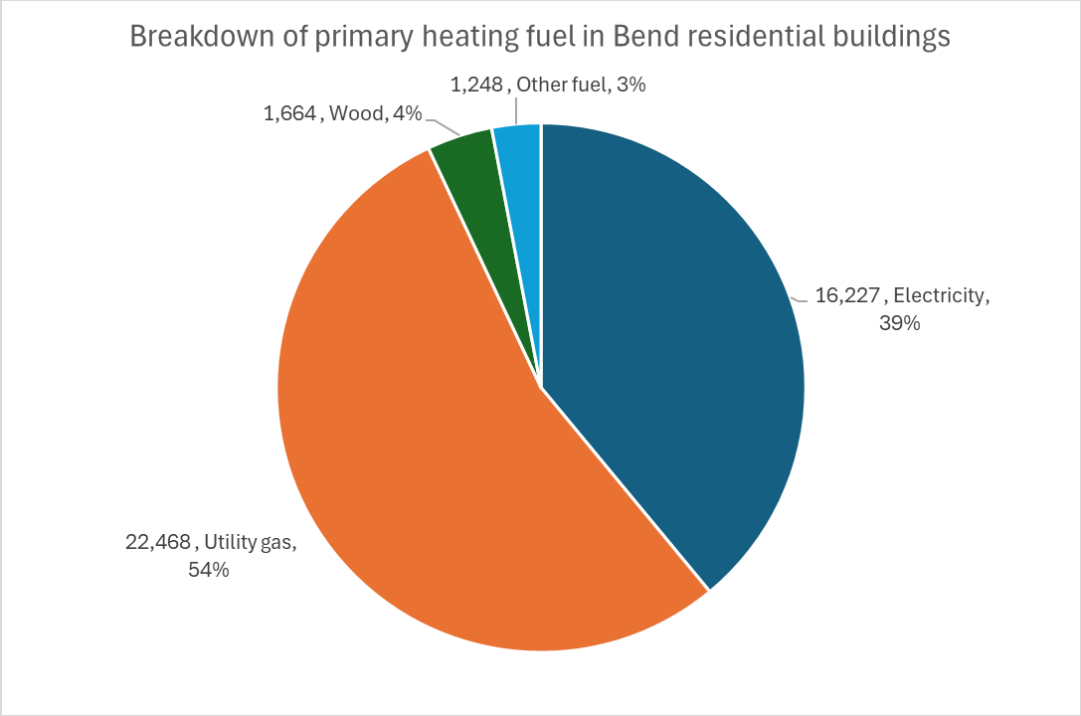

Figure 3: Percent breakdown and number of housing units by primary heating fuel in Bend

Energy End Uses and Greenhouse Gas Emissions

Figure 4 and Figure 5 show the various end uses of natural gas and electricity at residential properties. For electricity, the largest end uses are for space cooling (37%), space heating (20%), and water heating (18%). Other uses include lighting, clothes dryers, humidity equipment, and EV charging.[5] Cooking with electric ovens and stoves is not captured in this data.

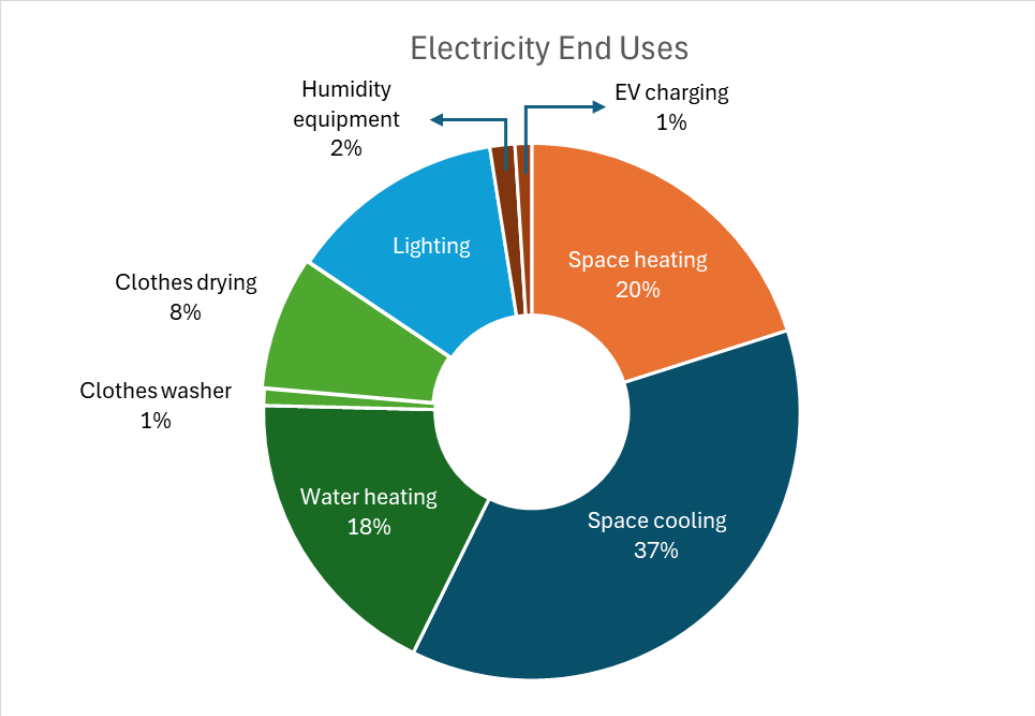

Figure 4: Residential electricity end uses

For natural gas the dominant uses are space heating (55%) and water heating (38%). Cooking, clothes drying, and heating water for hot tubs and pools play a relatively smaller role, although it is unknown from the data how many homes have hot tubs and pools.

[5] From the U.S. Energy Information Administration's Residential Energy Consumption Survey for the Northwest https://www.eia.gov/consumption/residential/

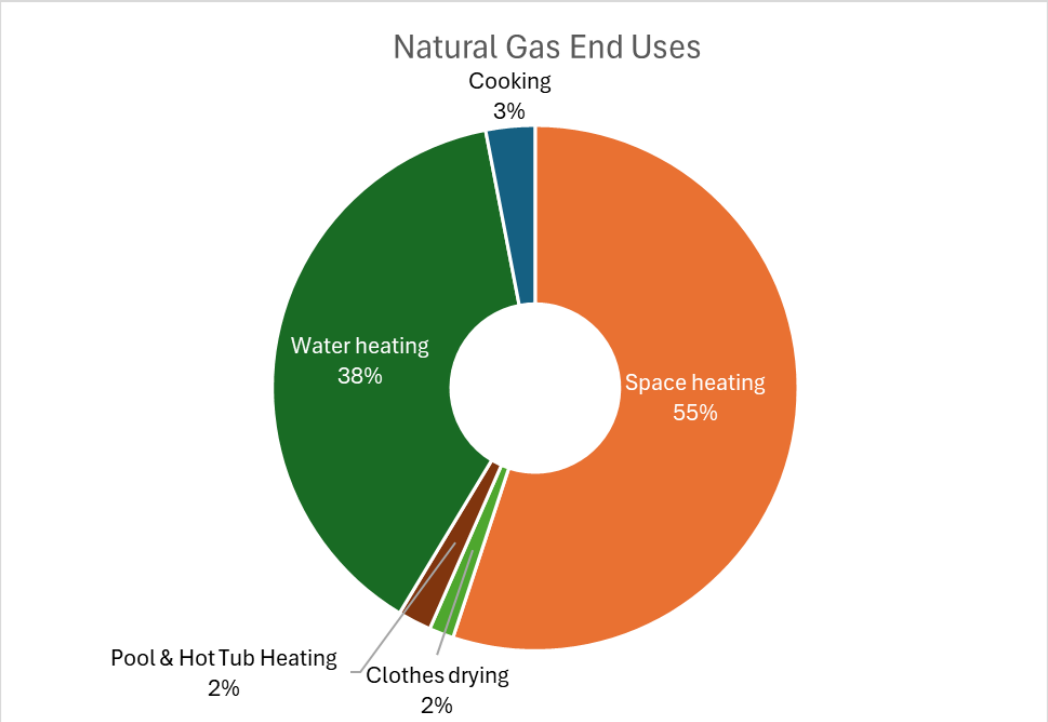

Figure 5: Residential natural gas end uses

Emissions by energy type and housing categories are estimated using data from Bend's 2021 Community GHG Inventory, the Energy Trust of Oregon's 2022 Bend City Report, the American Community Survey, and the Energy Information Administration's Residential Energy Consumption Survey. Housing type data used in Figures 6-9 is based on national datasets and thus differs slightly from the data used in Figures 1 and 2.

Housing categories considered include:

- Single family – detached and attached
- Multifamily – 2-4 units and 5+ units
- Mobile homes

Figure 6 shows that residential emissions in the Bend community are overwhelmingly from electricity and natural gas use in single family (detached) homes. This is being driven by the fact that single family homes (detached) make up the vast majority (74%) of the housing units in Bend (Figure 7). Single family homes have larger square footage per unit than other housing types and require more fuels and energy to heat and cool the larger spaces. Additionally, multifamily and single-family (attached) units benefit from some energy conservation due to shared walls (Figure 8).

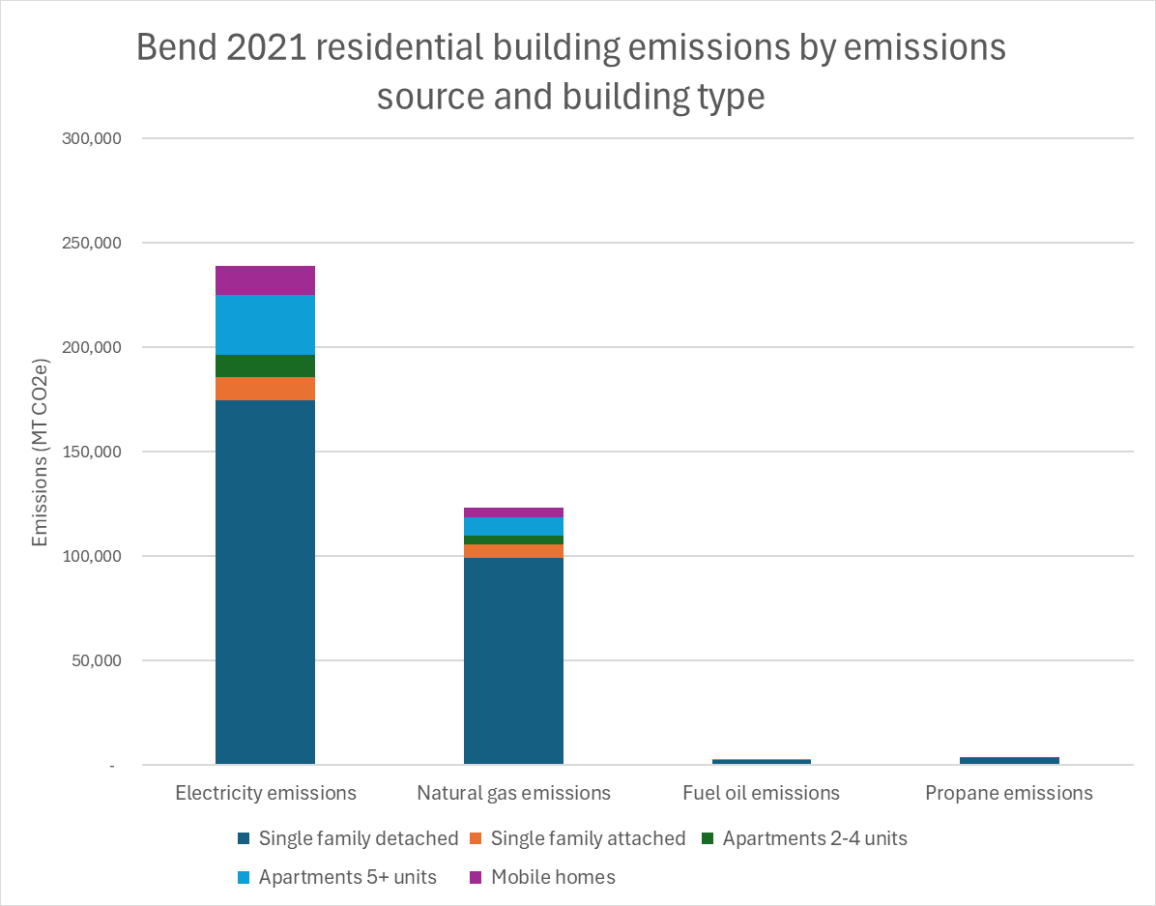

Figure 6: Bend's 2021 residential GHG emissions by energy type and housing category

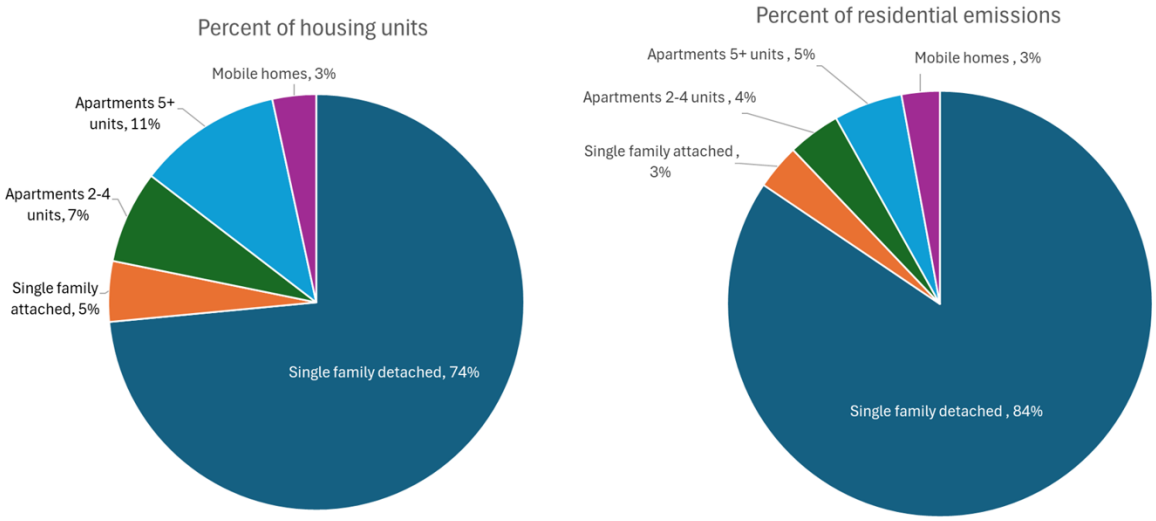

Figure 7: Comparison of housing units by category to GHG emissions by category

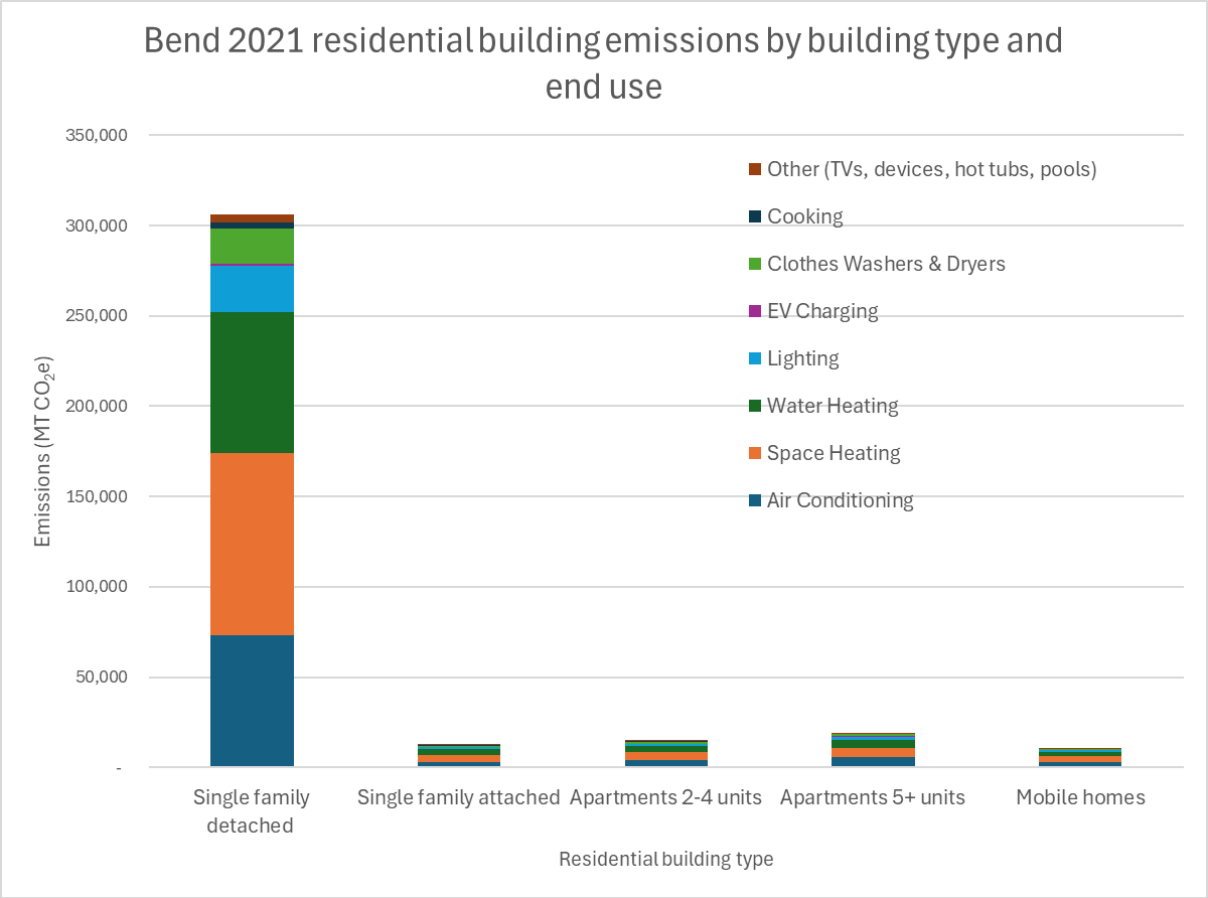

Figure 8: Bend's 2021 residential building emissions by building type and end use

Figure 9 compares average 2021 emissions per type of housing unit. Based on their prevalence – it is unsurprising that single family homes represent large average emissions per home. What is more surprising is the average emissions per square foot for mobile homes. Unfortunately for the residents – mobile homes consume significantly more energy per square foot than other types of housing due to under-insulated building envelopes.

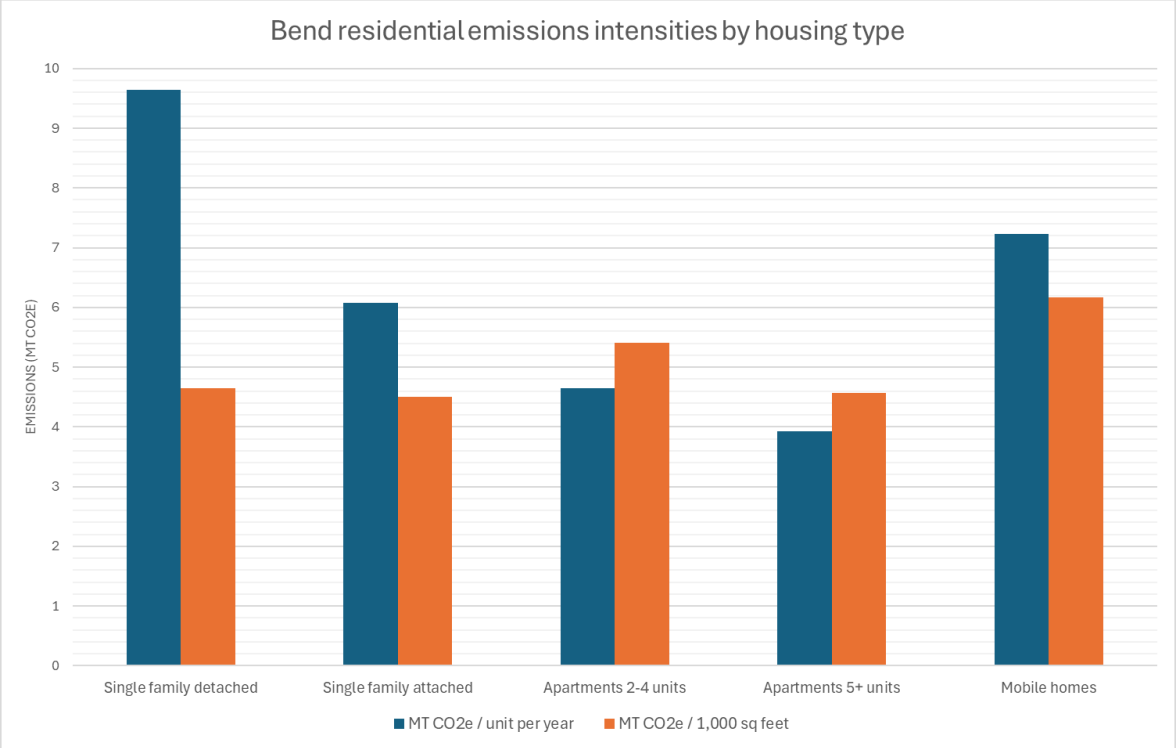

Figure 9: Bend 2021 residential building emissions intensities by housing type. Emissions per housing unit are shown in blue, and emissions per 1,000 square feet are shown in orange.

Commercial Sector

Commercial Summary

- The majority (71%) of commercial floorspace in Bend was built after 1980, when modern energy code standards came into effect.
- The majority (67%) of commercial building floorspace is between 5,000 and 50,000 square feet.
- 85% of commercial building energy emissions are from electricity, followed by 11% from natural gas combustion.
- The commercial segments with the highest emissions are office space (18%), retail space (15%), and education facilities (12%). Lodging and healthcare were also notable at 8% each.

Building Stock Characteristics

The City of Bend provided building stock data, including building types and total square footage. Building types were categorized as follows, in line with the U.S. Energy Administration's Building Type Definitions[6]:

[6] https://www.eia.gov/consumption/commercial/building-type-definitions.php

Building Type	Definition
Education	Buildings used for academic or technical classroom instruction.
Food sales	Buildings used for retail or wholesale of food.
Food service	Buildings used for selling prepared food and beverages.
Healthcare	Buildings used as diagnostic and treatment facilities for inpatient and outpatient care.
Lodging	Buildings used to offer multiple accommodations for short-term or long-term residents, including skilled nursing and other residential care buildings.
Office space	Buildings used for general office space, professional offices, or administrative offices.
Public assembly	Buildings in which people gather for social or recreational activities.
Religious worship	Buildings in which people gather for religious activities.
Retail	Buildings used for the sale and display of goods other than food. Includes shopping malls and strip malls.
Services	Buildings in which some type of service is provided, other than food service or retail sales of goods.
Warehouse & storage	Buildings used to store goods, manufactured products, merchandise, raw materials, or personal belongings (such as public self-storage).
Other	The other category includes laboratories and other miscellaneous buildings that do not fit into any other activity category (E.g., airplane hangars, data centers, public restrooms).

The energy conservation requirements for all buildings constructed under the commercial building code were developed in 1978 and upgraded in 1980. From 1980 until 2021, the energy conservation requirements have been upgraded in sequence with the Oregon Structural Specialty Code (OSSC). From 2011 until 2019, the commercial energy provisions were based on the latest edition of the IECC commercial provisions. Beginning with the 2019 building code, the Division moved to the use of the latest edition of Standard 90.1 as the energy code basis for the Oregon Energy Efficiency Specialty Code (OEESC). Each OEESC provides the administrative sections and Oregon-specific amendments as necessary for use of Standard 90.1 within Oregon's statutory framework. Beginning in 2021, adoption of the energy code is now out-of-sync with the building code adoption cycle. Energy provisions are adopted in alignment with the publication of the latest edition of Standard 90.1. The energy code was updated in 2021 with the to use Standard 90.1-2019.[7]

Additionally, the Oregon Department of Energy is currently in the rulemaking process to establish Building Energy Performance Standards for commercial buildings. The policy will address energy use and emissions from existing commercial buildings, which account for nearly 20% of energy use in Oregon. It will require many large commercial buildings to enhance energy management practices and implement efficiency measures to meet energy use targets. Rulemaking is expected to be complete by the end of 2024, and the new rules are anticipated to take effect in July 2025.

Bend's building stock data showed that 29% of commercial building square footage was built prior to 1980 (Figure 10), meaning that **the majority of commercial floorspace in Bend was built after modern energy code standards came into effect.**

[7] Office of Energy Efficiency & Renewable Energy – Oregon State Profile

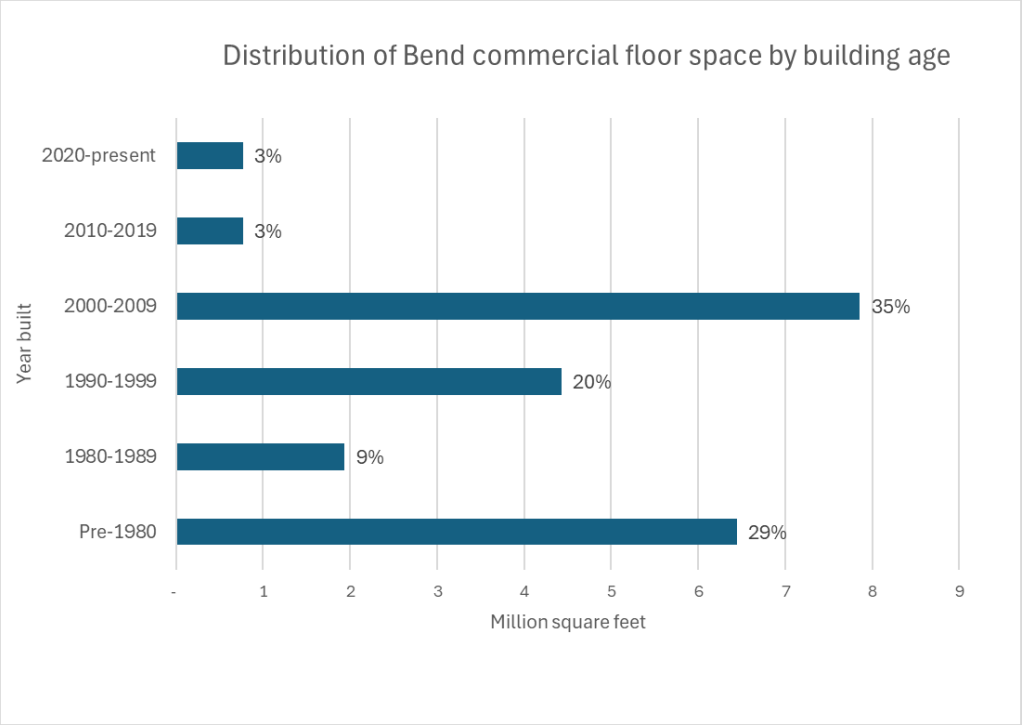

Figure 10: Distribution of Bend floor space by building age

Figure 11 shows the distribution of commercial building square footage in Bend. **The majority (67%) of commercial building floorspace is between 5,000 and 50,000 square feet.**

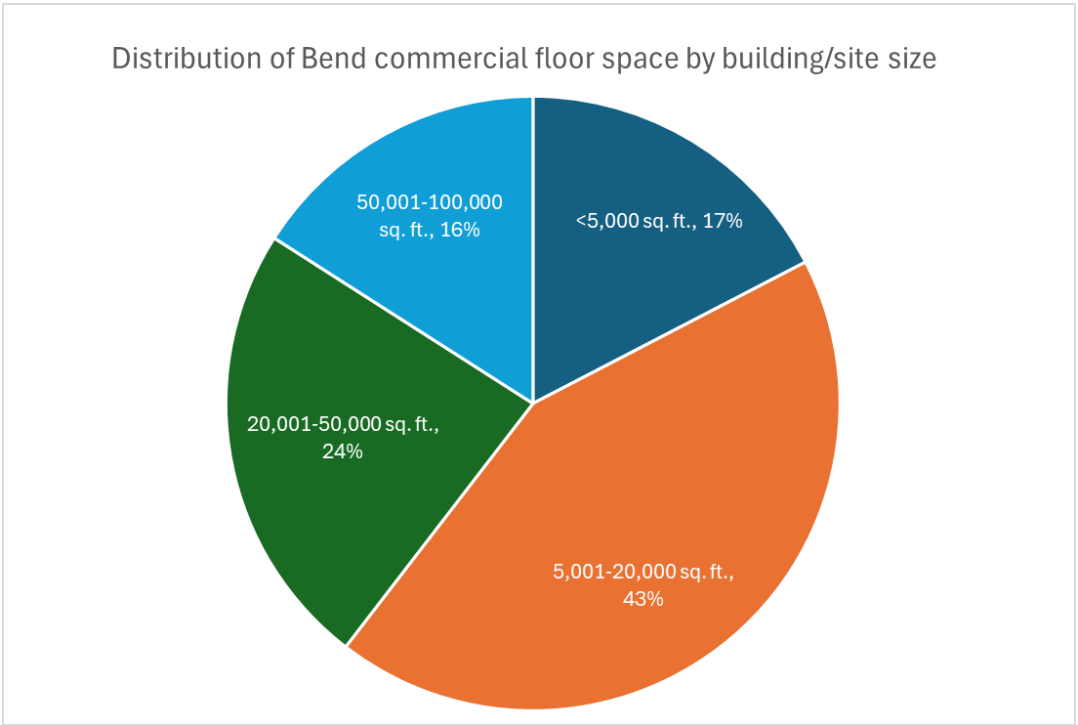

Figure 11: Distribution of Bend commercial floor space by building size

Energy End Uses & Greenhouse Gas Emissions

Based on the 2021 Bend Community Greenhouse Gas inventory, **85% of commercial building energy emissions are from electricity, followed by 11% from natural gas combustion** and 4% from fuel oil and propane combustion.

Office buildings (18%), retail buildings (15%), and educational facilities (12%) had the highest building emissions in the commercial sector (Figure 12). Note the graphic's legend for end use colors (e.g., space heating (dark blue) is the bottom-most segment in each bar).

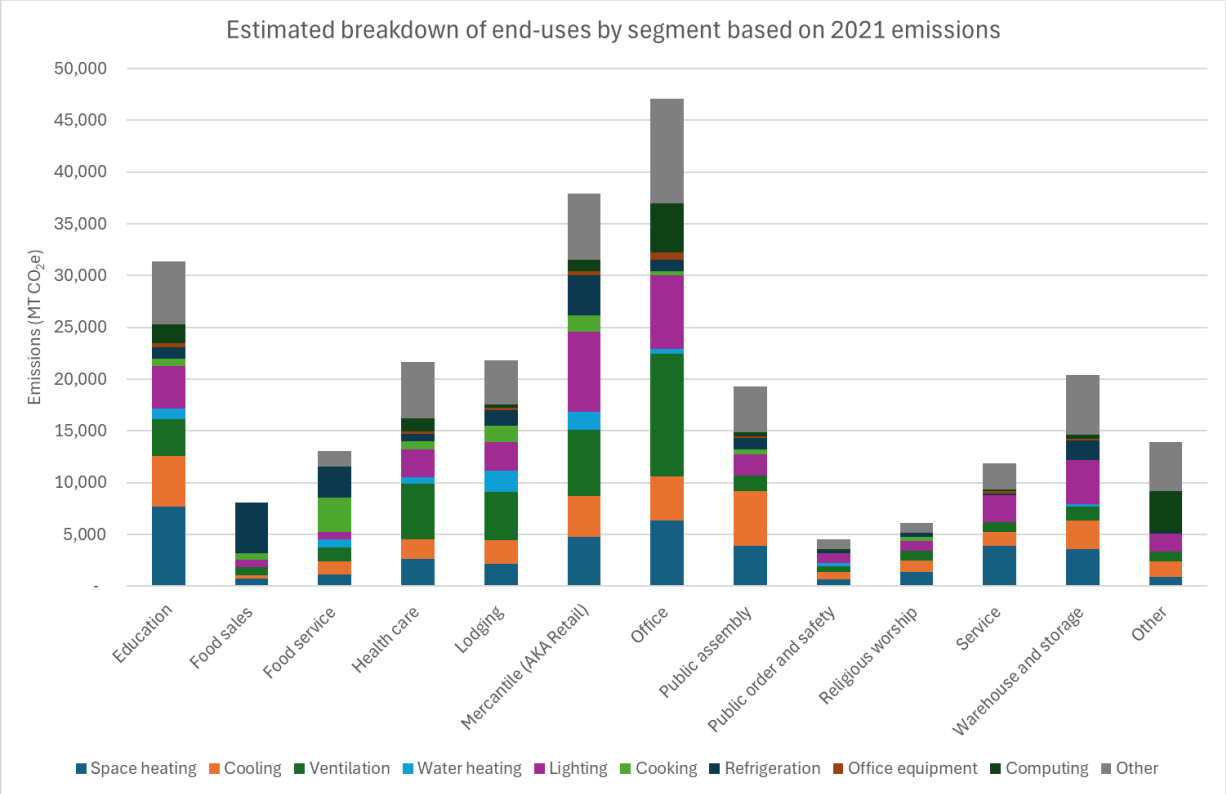

Figure 12: Estimated breakdown of end-uses by segment based on 2021 emissions, MT CO_2e

Figure 12 shows the estimated breakdown of emissions by end use for each segment in the commercial sector[8]. Ventilation, space heating, lighting, and space cooling were the end uses most responsible for driving commercial emissions across sectors. However, other uses were also significant in some commercial segments (e.g., education, office, retail).Other uses include things like air purifiers, digital display screens, décor, ceiling fans, and other miscellaneous uses not captured in the CBECS data.

[8] Using data from the Commercial Buildings Energy Consumption Survey (CBECS)

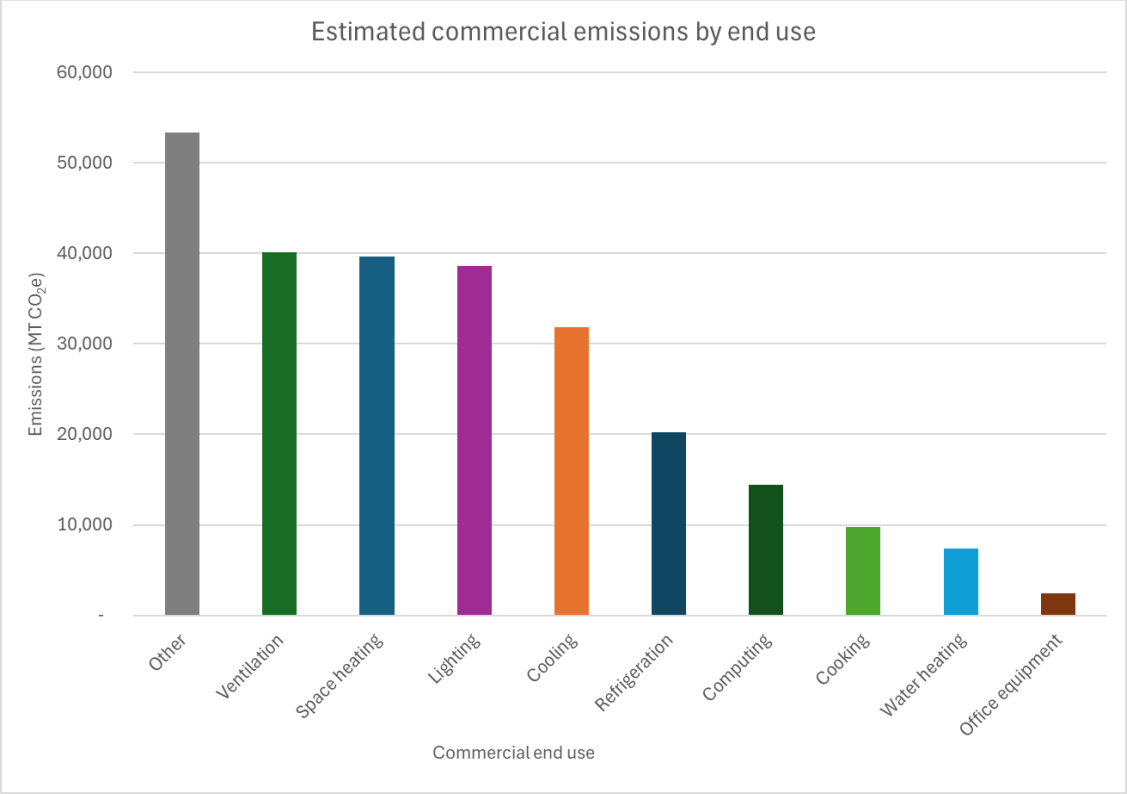

Figure 13: Estimated commercial emissions by end use, MT CO_2e

Commercial natural gas use is driven by space heating (69%), followed by cooking (17%), and water heating (10%). Commercial electricity use is driven by ventilation (18%), lighting (17%), and space cooling (14%). It is notable that miscellaneous other uses are also significant (24%), when added together. See Figure 14.

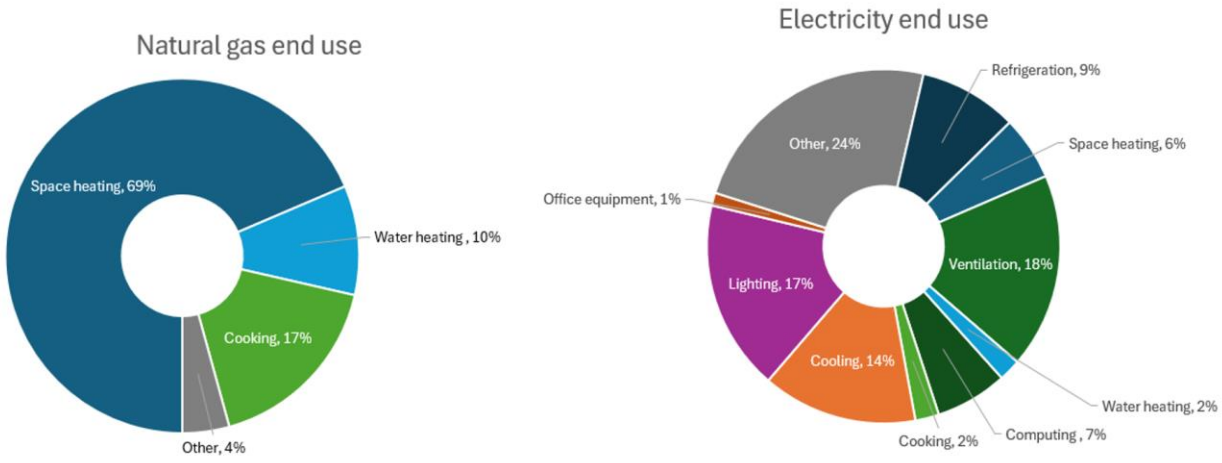

Figure 14: Estimated breakdown of end-uses for commercial natural gas and electricity

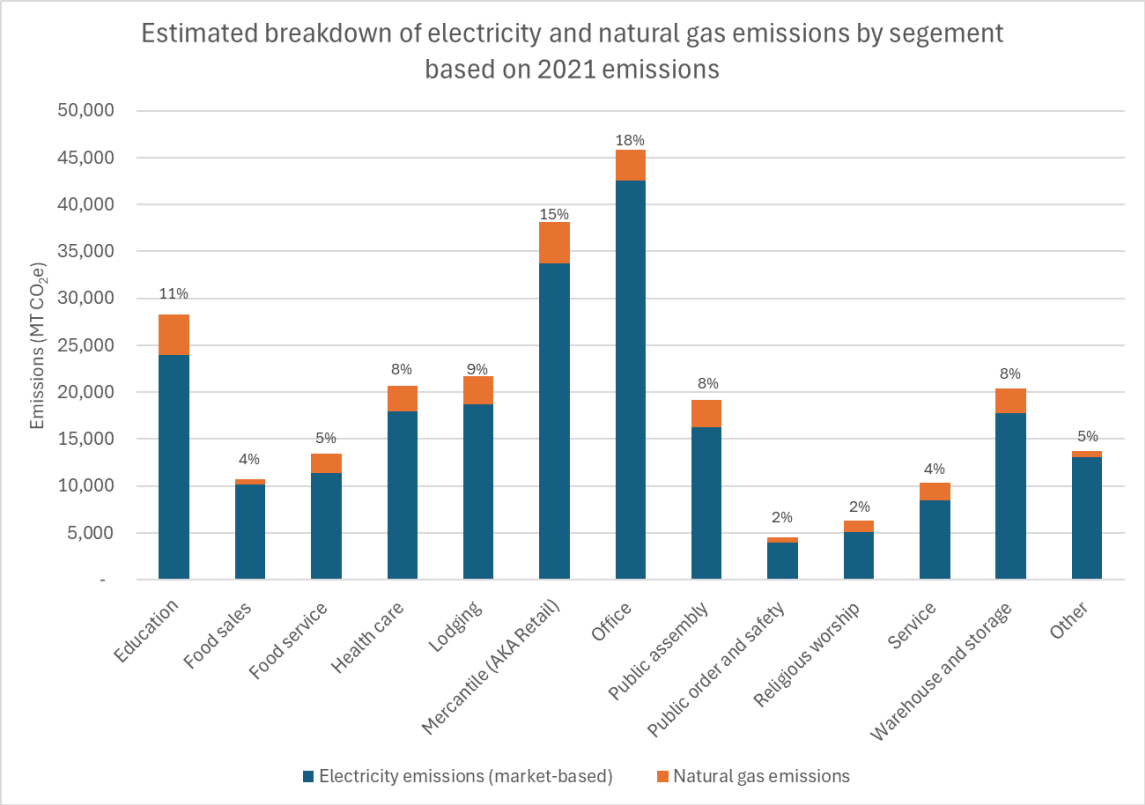

Figure 15: 2021 emissions breakdown for commercial electricity and natural gas use

When looking at fuels across segments, 85% of commercial building emissions are from electricity, 11% from natural gas, and 4% from fuel oil and propane. It is worth noting that electricity emissions will decrease over time in line with Oregon's Clean Energy Targets[9] which created targets for investor-owned utilities like Pacific Power to reduce the greenhouse gas emissions from electricity sold in Oregon to:

- 80 percent below baseline emissions levels by 2030;
- 90 percent below baseline emissions levels by 2035; and
- 100 percent below baseline emissions levels by 2040

[9] https://www.oregon.gov/deq/ghgp/pages/clean-energy-targets.aspx

Electrification and Bend's Building Emissions

If Bend were to electrify the residential and commercial sectors by 2050, it could reduce emissions from buildings by over 90% compared to baseline.

Under the current scenario (known as "Business as Usual" or "BAU"), building emissions will fall from around 536,000 MT CO_2e in 2025 to just below 290,000 MT CO_2e by 2050. This reduction is driven by a decrease in electricity emissions due to Pacific Power meeting its Clean Energy Targets.

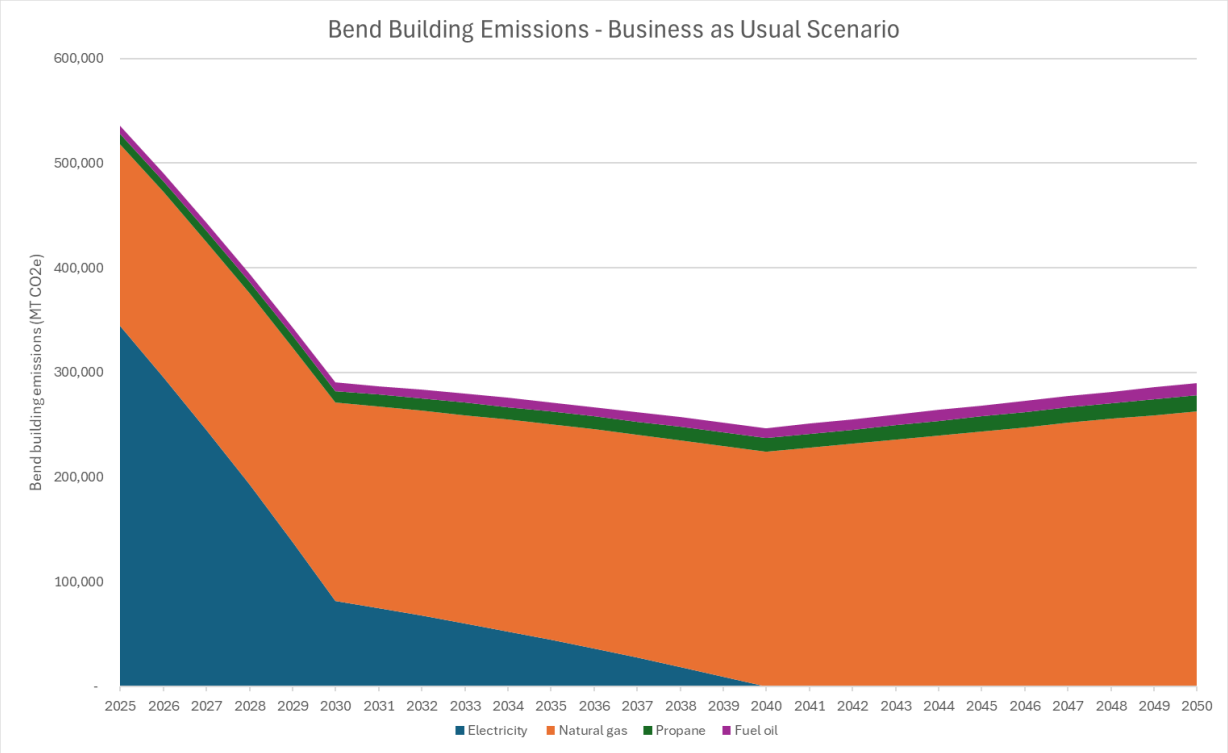

Figure 16: Bend building emissions 2025-2050, business as usual scenario

Alternatively, if Bend reduces residential and commercial natural gas use to zero by 2050, building emissions will fall from around 536,000 MT CO_2e to 14,000 MT CO_2e by 2050. This reduction would be driven by a decrease in electricity emissions due to Pacific Power meeting its Clean Energy Targets, as well as fuel switching from fossil fuels (natural gas, fuel oil, and propane) to low-to-zero-carbon electricity supply.

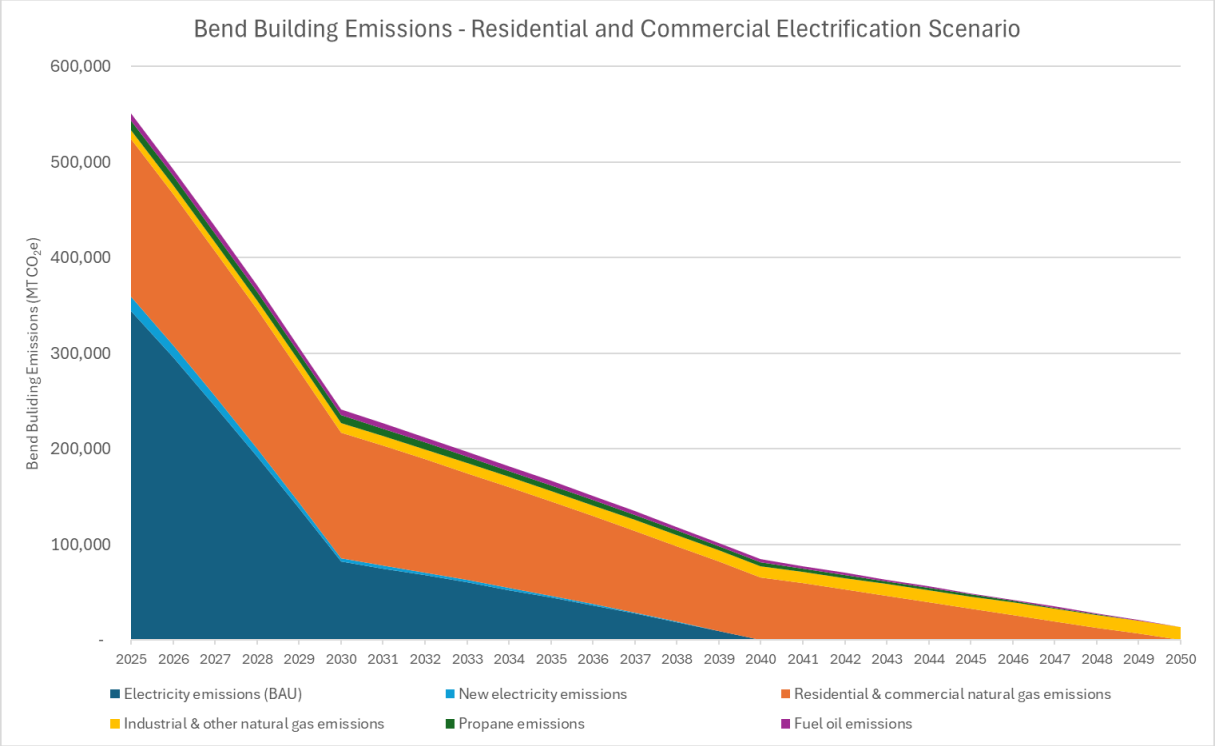

Figure 17: Bend building emissions 2025-2050, residential and commercial electrification scenario

This high-level analysis assumes the following:

- Pacific Power achieves its Clean Energy Targets set out by the Oregon legislature.
- All residential and commercial natural gas, fuel oil, and propane use is electrified by 2050 and electrification occurs linearly between 2025 and 2050.
- Industrial and other uses continue to use natural gas, fuel oil, and propane at the current rate, scaled with population growth over time.

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Technical Memorandum

DATE:	December 2, 2024
TO:	Cassie Lacy, Senior Management Analyst, City of Bend
FROM:	Maddie Cheek and Tracy Lunsford, Parametrix
SUBJECT:	Bend Electrification Engagement Summary
PROJECT NAME:	Bend Electrification Policy Analysis

Engagement Summary

The project team engaged with the following groups of interested parties during Phase 1 of the Electrification Policy Analysis process.

- City of Bend Environment and Climate Committee (ECC)
- Environmental Advocates
- Business Community
- Central Oregon Builders' Association (COBA)
- Cascade Natural Gas
- Pacific Power
- Central Electric Cooperative

Key Themes of Engagement

Environment and Climate Committee (ECC)

Members of the ECC were engaged throughout Phase 1 of the policy analysis process. The project team met with two members of the ECC in August 2024, then with the full ECC in October 2024. A sub-committee of the ECC continued to meet in October 2024 to determine the ECC's recommendation to the City Council regarding which policy options to pursue during Phase 2 of the electrification policy analysis.

August 2024 Interview Summary

Input on electrification policy options was gathered from two representatives of the ECC. Key themes from this interview included:

- The importance of considering policies that affect both new *and* existing buildings.
- The importance of considering policies that affect both the natural gas distribution network (i.e., leakage) *and* natural gas end uses.
- The importance of keeping the purpose of the policy(ies) in mind (i.e., to reduce emissions in a meaningful way such that Bend meets its emissions reduction goals as outlined in the CCAP).
- An interest in focusing on options that build electrification into city policies, regulations, and codes (vs. voluntary options) and have legal merit (given the Berkeley decision). Example policies

included NO_x policy to regulate air pollution, charging a carbon pollution fee for buildings that install new natural gas hookups, regulating natural gas infrastructure via the right-of-way, and assessing charges and fees as part of the city's regular fee update schedule (e.g., SDCs, permit fees, service fees).

- An emphasis on affordability throughout the life cycle of buildings, including highlighting that building all-electric from the start is the most affordable option, all-electric buildings result in net savings over time, and affordable energy is part of the affordable housing conversation.
- Funding and education to support electrification efforts is needed. Things that contribute to successful programs include simple programs that are easy to navigate and easily accessible information (one stop shop), workforce development, and overlapping incentives.

Environmental Advocates

Input on electrification policy options was gathered from representatives of four local environmental advocacy groups (350 Deschutes, Energize Bend, Bend Citizens' Climate Lobby, the Deschutes Youth Climate Coalition, and Fridays for Future) in August and October 2024.

Key themes from the interviews included:

- Indicated that the environmental advocacy community's highest priority initiatives are low NOx standards, setting electrification goals, and reconsidering right-of-way policies with legal backing.
    - Discussed low NOx standard: Noted as a public health issue with no state or federal prohibition. Considered a legally low-risk policy that allows keeping one gas appliance, making it politically favorable.
    - Suggested setting a voluntary but aspirational goal for electrification to help measure progress. Identified key areas: new construction, retrofits, and raising revenues to subsidize the transition.
    - Stressed the importance of stopping new gas hookups and reconsidering the use of right-of-way to halt gas infrastructure. Highlighted the risks of inaction, such as gas leaks and inequitable impacts on communities.
- Expressed that the group would like the City of Bend to:
    - Enact mandatory policies to reduce fossil fuel use in buildings (as opposed to voluntary options).
    - Act quickly (i.e., now) given the urgency of climate change.
    - Frame electrification as an exciting benefit rather than a scary change, highlighting the opportunities and making it easy for people to understand.
    - Ensure the energy transition is just (e.g. Climate Justice Fund to subsidize the transition).
    - Focus on both new and existing buildings, with an acknowledgement that focusing on new buildings first may be the most practical (affordability, low-hanging fruit, opportunity to lock in lower-carbon buildings for decades to come).
- Expressed opposition to fossil fuel options (e.g. RNG, offsets, hydrogen blending) and concerns about utility companies' influence over the policy process.

- Discussed funding options, including:
    - Proposed government investments to incentivize upgrades, such as SEED loans in Corvallis, which use lending capital to help low- to moderate-income households cover upfront costs. Mentioned potential funds from ODOE and suggested providing 1,000 free home energy audits as part of a campaign accessible to all income levels.
    - Expressed support for revenue sources, such as raising right-of-way processing fees, creating permit fees for new construction with fossil fuel infrastructure, and using these revenues to subsidize upgrades for low-income communities. Suggested a high energy use fee similar to Boulder, Colorado's model.
    - Suggested additional incentive policies such as slowing down permitting for gas construction, expediting electric permitting, and providing home energy coaching and education.
- An emphasis on the importance of mentioning co-benefits in all climate policies, such as reducing pollutants, improving air quality, lowering energy costs, and enhancing public health and safety by reducing pipeline gas leaks and preventing explosions. Noted Bend's high fire risk and poor air quality, stressing the health risks. Suggested joining with other cities for more impactful policies.

Business Community

An interview was conducted in October 2024 with members of the business community, including representatives from the Bend Chamber of Commerce, Economic Development for Central Oregon (EDCO), and the City's Business Advocate.

Key themes from this interview included:

- A desire to go slowly and make data-driven decisions regarding any policy changes.
- Concern about how policy changes, and any unintended consequences because of those changes, might impact business owners and/or the business environment in Bend (e.g., people choosing to do business in a town nearby instead of in Bend because of policy changes).
- A preference for outreach, education, and incentive programs rather than regulatory options, as well as leveraging existing programs (e.g., Energy Trust of Oregon programs) and funding sources.
- Concern about taking action before the Climate Protection Program (CPP) comes back into play and questions about how the CPP would interact with or influence local policy options.
- Acknowledgement that low-margin businesses like mom-and-pop shops and businesses that reside in older buildings would probably need the most support in an electrification scenario, although everyone will likely need some support.

Central Oregon Builders' Association (COBA)

An interview was conducted in October 2024 with a representative from the Central Oregon Builders' Association and the City's Business Advocate.

Key themes from this interview included:

- Building electrification on its own isn't an issue. However, there was some concern about how building electrification efforts or policies may impact housing availability/affordability goals. There is a way to ensure these goals are not in conflict with one another.
- The most concerning policy options from the COBA perspective are:
    - Adding additional fees or increasing existing fees
    - Advocating for changes to the construction excise tax (depending on the specifics)
- The biggest opportunity areas around electrification include:
    - Educating the building community by partnering with COBA and others.
    - Urban renewal assistance – tiered system for benefits for electric buildings, buildings with solar.
    - Other financial incentives for developers. In particular, incentives for builders of market-rate, workforce housing would likely be the most enticing. High end homes tend to be built more efficient and subsidized affordable housing is required to meet high energy efficiency requirements already.
- Expedited permits would likely be a less impactful policy option from the COBA perspective.
- Future (phase 2) stakeholder involvement should be more focused with smaller, industry-specific groups/people (e.g., Affordable Housing Advisory Committee).

Cascade Natural Gas

Several representatives from Cascade Natural Gas provided input and comments on the list of draft electrification policy options provided by the City.

- A preference for taking a collaborative approach to meet the decarbonization goals, voluntary measures and incentives, open communication, and a fuel-neutral approach (i.e., electrification is not the only pathway to decarbonization).
- An expectation that the Climate Protection Program will come back into play in the near-term.
    - Short-term decarbonization efforts include expanding renewable natural gas (RNG) supply, improving efficiency of the gas system, and pursuing a pilot program to explore electric heat pump usage paired with backup natural gas for home heating and cooling.
    - Longer-term decarbonization efforts could include pursuing hydrogen.
- Confirmation that natural gas hookups and natural gas usage are decoupled from a revenue perspective – the number of hookups is more important to CNG than the volume of usage.
- Concerns about the policy options list included:
    - Reducing energy reliability and affordability if the City pursues electrification over decarbonization.
    - Meeting customers' needs without backup natural gas power given Bend's cold climate.
    - The electric utility not meeting its state-mandated Clean Energy Targets.
- Opportunities include:

- Partnering with the City of Bend on the heat pump pilot program to achieve the "highest and best use" of natural gas.
- State-level advocacy for thermal energy network pilot programs, such as in Washington State.

Pacific Power

Three representatives from Pacific Power provided input and comments on the list of draft electrification policy options provided by the City. The discussion focused primarily on the broader context of the electric system and the utility's ability to meet increasing electricity loads and decarbonization requirements.

- An acknowledgement that the electric system is currently constrained. Constraints can be sorted into two major buckets: local constraints and regional constraints.
  - Local constraints are easier to address – these projects are smaller and take less time to complete (e.g., local transmission and substation upgrades). Many projects are planned to ease local constraints through 2032, when regional constraints can be adequately addressed.
  - Regional constraints are more challenging to address – the projects are bigger, require significantly more coordination and materials, and take longer to complete.
    - "Project Blueprint" is a large (500 kV) transmission project to connect Central Oregon and Southern Oregon. This project will be completed by 2032 and is expected to ease regional constraints.
- An explanation that what's included in the IRP and what happens in the market are two different things.
  - The IRP is a planning tool that provides signals to the market about the direction of the company. The amount and types of projects that actually get built depend on the market's response to the utility's requests for proposals.
  - Pacific Power serves 6 states, but Oregon Clean Energy Targets (and Washington state Clean Energy Transformation Act Targets) are factored into company-wide integrated resource plan (IRP) modeling.
- Input on how the utility plans to meet its Clean Energy Targets, including:
  - An acknowledgement that Pacific Power has been working to increase the amount of renewable energy in its portfolio in recent years.
  - A statement that the utility does not intend to build projects that will hinder the company in meeting its state-mandated clean energy targets.
- Concerns about the challenges and risks of electrification and meeting clean energy targets, including:
  - Increased electricity demand from many sectors, including artificial intelligence and data centers, electric vehicles, electrification of heating equipment for buildings, and more large, multi-story buildings being built.

- A tumultuous political and regulatory climate can make it difficult for the utility to plan for and be compliant with changing requirements.

Central Electric Cooperative

Three representatives from Central Electric Cooperative (CEC) provided input and comments on the list of draft electrification policy options provided by the City. The discussion focused primarily on the broader context of the electric system.

- Background on CEC and how it sources its power: As a not-for-profit electric utility, CEC operates and sources its power differently than an investor-owned utility like Pacific Power.
  - CEC sources power from the Bonneville Power Association (BPA). BPA power is broken into two tiers.
    - Tier 1 energy is mostly from hydropower. There is a limit to how much Tier 1 energy a utility is entitled to. Energy demand for CEC has surpassed that threshold and CEC must source additional Tier 2 energy to meet that demand.
    - Tier 2 energy is market-purchased power, which can be more expensive and have a higher emissions intensity. Work is ongoing to establish more renewable options and facilitate power purchase agreements. Fixed costs of Tier 2 purchases are distributed across the customer base, raising prices for everyone.
  - CEC is concerned about the cost of infrastructure upgrades for consumers and interested in facilitating electrification equitably.
- Insight into how CEC is thinking about electrification, including an acknowledgement that new construction is not a monolith – there are different considerations for new construction in new neighborhoods than for new construction in legacy neighborhoods.
  - For new construction in new neighborhoods, CEC can work with developers and others to ensure the electric infrastructure is sufficient from the outset and plan for future demand.
  - For new construction in existing neighborhoods, existing transmission infrastructure like transformers and conductors can limit the ability to add electrical demand – even for new construction – without also completing costly transmission upgrades outside of the home. These costs are borne by the homeowner or developer.
- Support for pursuing the following opportunities:
  - Focusing on new construction in new neighborhoods.
  - Partnering with the City and other organizations that already have existing programs to support electrification (e.g. Energy Trust of Oregon) to amplify those programs instead of reinventing the wheel at the city level.
  - Expanding CEC's "deep retrofit" program to provide significant energy efficiency improvements to moderate-income households. The current program serves low-income households.

- Concerns about encountering the following barriers:
    - Existing buildings in legacy neighborhoods are particularly difficult to electrify from an electric capacity perspective.
    - The high cost of local electricity transmission infrastructure for consumers who opt to electrify in existing neighborhoods may be a disincentive to electrification, even if incentives are offered for electric equipment (like a heat pump).

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Technical Memorandum

DATE: December 20, 2024
TO: Cassie Lacy, Senior Management Analyst, City of Bend
FROM: Maddie Cheek and Tracy Lunsford, Parametrix
SUBJECT: Electrification Policy Options
PROJECT NAME: Bend Electrification Policy Analysis

Background

In March 2024, the Bend City Council directed staff to research electrification policy options in response to community interests related to electrification and natural gas policy, and in alignment with the City's climate action goals. This research was scoped to be completed in two phases, with phase 1 focusing on higher-level policy research and phase 2 focusing on a deeper exploration of policy options and a broader public and stakeholder engagement process. This memo details a list of electrification policy options for the City of Bend's consideration as part of phase 1 of the electrification policy analysis.

The electrification policy options included in this memo were generated by researching existing policies that other jurisdictions are pursuing – both locally and nationally – in line with promoting electrification. The initial list was then vetted for feasibility, cost, and risk within Bend's specific context. This memo presents a list of potential electrification policy options the City of Bend could pursue to facilitate electrification in Bend. This list will serve as a starting point for phase 2 research, analysis, and engagement with the public and stakeholders.

The policy options included in this report are grouped and presented in the following 7 categories:

1. State-level advocacy: regulations
2. State-level advocacy: support
3. Education and support programs
4. Incentives
5. Local regulations
6. Fees
7. Building code

For each of the options, this memo provides a description of the policy option, relevant background information, and examples of other jurisdictions that have pursued a similar policy, as applicable. This information is intended to serve as a starting point for discussion of these options; more analysis will need to occur before moving forward with policy selection.

Two of the policy options and initiatives that were considered at the start of the policy analysis have been completed recently. These items include adopting policies committing the City of Bend to eliminate fossil fuels in new and existing City-owned or operated buildings and advocating for the state to reinstate the Climate Protection Program. More information about these options can be found in the Recently Completed Efforts section at the end of this document.

Table 1 is a policy options matrix that includes the full list of policy options and a high-level assessment of each option's characteristics, including building type, time, cost, greenhouse gas (GHG) impact, risk, departments involved, and other cities. The definitions and color key are below, the policy options matrix is on page 3.

Definitions:

- **Building Types**: policy addresses new **(N)** or existing **(E)** buildings
- **Time**: staff time needed to accomplish policy or initiative
- **Cost**: cost to City to accomplish policy or initiative
- **GHG impact**: anticipated greenhouse gas emissions reduction impact, assuming policy goals are met through initiative
- **Risk**: legal and practical risk associated with policy or initiative
- **Departments involved**: the number of departments that need to be involved in developing or executing the policy or initiative. A proxy for overall complexity of executing the policy or initiative.
- **Other cities**: whether there is precedent in other cities to accomplish this action and a model to follow

Key:

Time	<6 mo	6 mo – 2 yr	2+ yrs
Cost	Low	Med	High
Impact	High	Med	Low
Risk	Low	Med	High
Departments Involved	1	2	3+
Other Cities	Yes	Considering	No

Table 1: Bend Electrification Policy Options Matrix

Category	Description	Policy Options	Building Type	Time	Cost	GHG Impact	Risk	Depts	Cities
State-level advocacy: regulations	State level policies often preempt local ability regulate fossil fuel reduction or use. City can advocate for changes to state law or policy to support local efforts to restrict fossil fuel use.	Advocate for updated state building code to increase energy-efficiency requirements for new construction and major renovations	N						
		Advocate for legislation expressly authorizing municipal prohibitions or limitations on use of fossil fuels	N						
		Advocate for legislation requiring cooling in rental properties	E						
State-level advocacy: support	State legislation can provide and enable ways to facilitate electrification through expanded incentives and new programs. This may include new funding pools and revenue streams for financial incentives or policies that enable different infrastructure. City can advocate for new state law or policy that provides this kind of support for electrification.	Advocate for new state incentives for all-electric construction	N						
Education & support programs	Establish new education and outreach programs to help increase public awareness, support informed decision making, and encourage voluntary upgrades to electric equipment and appliances in homes and commercial buildings. Includes both passive education, such as websites, social media, and coordinated campaigns as well as active outreach, such as workshops, technology demonstrations, technical assistance, and project management to facilitate electrification upgrades.	Navigation support programs to help community members identify, understand, and access financial and contractor resources to install heat pumps, heat pump water heaters, and electric stoves in existing homes.	E						
		Provide technical assistance on building electrification and decarbonization for builders and developers	N						
		Create new educational materials to encourage residential and commercial construction in both new construction and existing homes	N, E						
		Promote state and federal incentives or tax credits	N, E						
Incentives	Develop voluntary programs to incentivize the adoption of electric technologies in new construction, major remodels and in existing homes (at the time of replacement). Incentives will reduce the financial or other costs associated with electrification.	Prioritize or expedite permit applications for all-electric development projects	N						
		Development incentives, such as floor-to-area (FAR), height, or density bonuses to encourage all-electric developments	N						
		City-funded financial incentive for all-electric new construction	N						
		City-funded ductless heat pump and heat pump water heater purchase and installation incentive for existing homes	E						
		Provide additional urban renewal assistance for all-electric buildings	N						
Local Regulations	Implement new restrictions or requirements to reduce fossil fuel use in new or existing residential or identified commercial construction.	Establish nitrogen oxide (NOx) emissions standards for new appliances in existing buildings or for new buildings	N, E						
		Restrict or limit natural gas infrastructure in the right-of-way in new residential developments.	N						
		Enact benchmarking, energy performance, or greenhouse gas reduction standards for commercial and multifamily buildings as allowed under HB 3409, the State of Oregon Building Performance Standards Program	E						
Fees	Implement financial disincentives to using fossil fuels in new construction. Proceeds of fees could fund staff investment in outreach and support programs or financial incentives.	Charge a new building permit fee for non-electric infrastructure in new construction. Fee may be determined in relation to anticipated gas use of the building.	N						
		Increase franchise fee on natural gas utility	N, E						
Building Code	Request local authority to amend building code to promote electrification.	Pursue local amendment to state building code to require electrification in new residential construction and major remodels	N						

State-level Advocacy: Regulations

State or federal law often preempts local ability to regulate fossil fuels. Preemption is when a higher level of government expressly or impliedly removes or limits the authority of a lower level of government. Where the City is preempted from taking action, the City can advocate for changes to state or federal law or policy to support local efforts to restrict fossil fuel use and/or electrify buildings. While there is an opportunity to advocate at the federal level, this report focuses on state-level advocacy. There are three policy options included in the State-level Advocacy: Regulations category.

Category	Policy Options	Building Type	Time	Cost	GHG Impact	Risk	Depts	Cities
State-level advocacy: regulations	Advocate for updated state building code to increase energy-efficiency requirements for new construction and major renovations	N						
	Advocate for legislation expressly authorizing municipal prohibitions or limitations on use of fossil fuels	N						
	Advocate for legislation requiring cooling in rental properties	E						

Advocate for updated state building code to increase energy-efficiency requirements for new construction and major renovations.

Policy description

This initiative would involve City staff advocating at the state level for changes to the Oregon building codes that would increase energy efficiency requirements for buildings that are subject to the building code (i.e., new construction and major renovations), or for other code updates, such as making the Oregon Reach Code mandatory.

Background

In Oregon, building codes are set at the state level by the Building Codes Division of the Department of Consumer and Business Services and/or the Legislature. Cities must adhere to state building codes and are preempted from adopting local changes to the state code unless they get permission from the state.[1] Energy efficiency measures can help to ensure that electricity being used in buildings is being used efficiently. Energy efficiency is important to pursue in parallel with electrification to minimize the additional demand on the electricity grid as electricity demand is increasing in various ways: from electrification of appliances, with population growth, electrification of vehicles, and an increase of data centers coming online.

[1] See the Building Code category for more information on what options are available to cities that are considering deviating from the state building code.

Though Oregon's residential and commercial building codes are based on the most recent and advanced national energy code, there is still room for further efficiency, which is why this action suggests that the City advocate for updates to the state building code that increase energy efficiency requirements.

For example, Oregon has a Reach Code, which is a set of statewide *optional* construction standards and methods designed to increase energy efficiency beyond the standard building code. The 2023 Oregon Residential Reach Code was adopted and became effective on July 1, 2024. The Oregon Commercial Reach Code is in the process of being adopted, and can provide 5% - 10% improved efficiency over the 2021 Oregon Energy Efficiency Specialty Code (OEESC).

Achieving the specifications in the Reach Codes are optional, but meeting the specifications of the state building codes is required. Therefore, the City could advocate for future updates to the state level building code to require the specifications included in the Reach Code and maximize efficiency in new construction and major renovations by setting higher base efficiency standards at the state level.

This initiative would mostly affect new buildings but could affect existing buildings undergoing major renovations as well, providing an opportunity to lock in higher levels of building efficiency as Bend continues to grow.

Example efforts

It is common for cities to advocate for their preferred policy options at the state level to attempt to influence decision-making. However, it is often most effective to advocate along with other cities or through the League of Oregon Cities. There is no available information to indicate that this issue will be tackled during the next legislative session.

Advocate for legislation expressly authorizing municipal prohibitions or limitations on use of fossil fuels.

Policy description

This initiative would involve advocating for changes in state law that would authorize municipalities to limit or prohibit the use of fossil fuels in buildings. For example, advocating for a change in the state law that would authorize cities to require heat pumps for space heating or cooling in new residential construction.

Background

Berkeley adopted a natural gas ban in new buildings in 2019. That law was challenged in court by the California Restaurant Association. In 2023, as later amended in 2024, the Ninth Circuit Court of Appeals held that a Berkeley, California ordinance completely prohibiting the installation of natural gas piping within newly constructed buildings was preempted by The Energy Policy and Conservation Act ("EPCA"), 42 USC § 6297(c) ("Berkeley Decision").[2] The Ninth Circuit Court of Appeals covers many western states, including Oregon. State legislation expressly authorizing municipal limitations on the use of fossil fuels may provide a less legally risky path for cities to restrict natural gas use.

[2] Ninth Circuit Court of Appeals, Case No. 21-16278 - https://cdn.ca9.uscourts.gov/datastore/opinions/2024/01/02/21-16278.pdf

This initiative would only affect new buildings that would have otherwise installed natural gas hookups. Further research on the prevalence of natural gas hookups in new buildings would help the City better understand the potential emissions reduction impacts of prohibiting or limiting natural gas in new construction.

Example efforts

Our research found no examples of current legislative efforts for authorizing municipal prohibitions or limitations on use of fossil fuels.

Advocate for legislation requiring cooling in rental properties.

Policy description

This initiative would involve City staff advocating for legislation that requires cooling in rental properties to be paired with incentives for ductless heat pumps. Ductless heat pumps provide both heating and cooling. By helping rental property owners and managers meet cooling requirements with this electric technology, some of the gas that is being used in homes for heating can be replaced by electricity, further reducing emissions.

Background

The policy option of advocating for legislation requiring cooling in rental properties as a method of encouraging electrification has been explored and implemented by cities as a way of introducing electric heating and cooling equipment into more homes while providing cooling benefits to renters. When paired with incentives and other programs to meet the cooling requirement with ductless heat pumps, this can be an opportunity to introduce a heat pump into a home that currently uses gas for heat, with the intention of shifting some of the gas heating load to using the efficient electric heat pump. This is a relatively large opportunity given that, on average, 55% of residential natural gas use is directed toward space heating.[3]

Ductless heat pumps are an energy efficient way to heat and cool indoor spaces. Required cooling in rental properties would also improve resilience for renters, particularly during times of extreme heat.

However, the City is proposing potential advocacy at the state level instead of a direct regulation because the City does not regulate landlord-tenant relationships and state law very likely preempts the City's ability to regulate in this area.

Example efforts

Examples of other jurisdictions who have pursued requiring cooling in rental properties include:

- Chicago, IL – 2022 Cooling Ordinance: The Chicago City Council adopted an ordinance requiring certain new and existing residential buildings to install air conditioning equipment in indoor common gathering areas and to make these areas available to building residents as cooling centers when the outdoor heat index exceeds 80°F. The ordinance allowed temporary (portable)

[3] Building Stock Characterization Memo

air conditioning equipment to be used to meet this requirement until April 30, 2024. Permanent equipment was required to be installed by May 1, 2024.

- Montgomery County, MD – Bill 24-19: In 2020, the Montgomery County Council enacted Bill 24-19, Landlord – Tenant Relations – Obligations of Landlord – Air Conditioning, which requires landlords to provide and maintain air conditioning service for rental housing in the County. If a landlord does not comply with the new law, tenants may file a complaint with the Department of Housing and Community Affairs and the landlord may face a fine of $500.
- New Orleans, LA – Healthy Homes Program and Minimum Rental Standards. The Healthy Homes Program was put in place to protect the health, safety and welfare of the public by ensuring people who reside in Orleans Parish occupy safe and habitable rental housing, including cooling among other things. As of January 2024, owners of rental properties are required to register for a Healthy Homes Certificate of Compliance. Rental property owners must have a Certificate of Compliance in order to rent housing units to tenants in New Orleans, and renewal of the certificate is required every two years.

State-level Advocacy: Support

The state can provide non-regulatory support for electrification, such as incentives and pilot projects. The City can advocate to the state in support of programs and initiatives that support the goal of electrification locally. There is one policy option included in the State-level Advocacy: Support category.

Category	Policy Options	Building Type	Time	Cost	GHG Impact	Risk	Depts	Cities
State-level advocacy: support	Advocate for new state incentives for all-electric construction	N						

Advocate for new state incentives for all-electric construction.

Policy description

This initiative would involve City staff advocating at the state level to establish new incentives for all-electric construction to reduce construction costs for developers who choose to build all-electric.

Background

A statewide incentive program for all-electric construction would help to level out the playing field between municipalities by reducing construction costs for contractors across the state, instead of having a patchwork of incentives (or lack of incentives) and associated construction costs between neighboring jurisdictions, as may occur if individual municipalities develop their own incentive programs. This

statewide continuity could help increase the overall awareness and experience levels with all-electric construction across the development industry.

This initiative would only apply to new buildings and incentive uptake would depend on a variety of factors, including how attractive the incentive is to contractors and other market factors.

Example efforts

Examples of existing state programs that provide incentives for all-electric construction:

- California Electric Homes Program (CalEHP). Provides technical assistance and financial incentives to residential developers and builders constructing new, market-rate homes with all-electric appliances and equipment. The program supports all-electric new construction practices, drives energy savings, and supports California's advanced energy efficiency policy goals.

Education and Support Programs

The policy options in the Education and Support Programs category would establish new education and outreach programs to help increase public awareness, support informed decision making, and encourage voluntary upgrades to electric equipment and appliances in homes and commercial buildings.

The options considered here cover a spectrum of activities that include both passive education, such as websites, social media, and coordinated campaigns, as well as active outreach, such as workshops, technology demonstrations, technical assistance, and project management to facilitate electrification upgrades. In some cases, there are existing programs that the City would aim to expand by identifying and filling gaps in services from those existing programs. There are four policy options included in the Education and Support Programs category.

Category	Policy Options	Building Type	Time	Cost	GHG Impact	Risk	Depts	Cities
Education & support programs	Navigation support programs to help community members identify, understand, and access financial and contractor resources to install heat pumps, heat pump water heaters, and electric stoves in existing homes.	E						
	Provide technical assistance on building electrification and decarbonization for builders and developers	N						
	Create new educational materials to encourage residential and commercial construction in both new construction and existing homes	N, E						
	Promote state and federal incentives or tax credits	N, E						

Navigation support programs to help community members identify, understand, and access financial and contractor

resources to install heat pumps, heat pump water heaters, and electric stoves in existing homes.

Policy description

This initiative would involve the City establishing a navigation support program to serve as a one-stop-shop where residents can get trustworthy information and technical assistance related to installing new electric equipment and/or securing outside funding to help pay for that new equipment. Establishing a navigation support program could include gathering and sharing information in various formats, providing technical assistance, tracking program participation and/or maintaining an approved contractor list.

Background

Navigation support programs provide technical assistance to help community members improve their understanding of electric options, identify, understand, and apply for relevant financial incentives, and connect with qualified contactors for equipment installation. These programs acknowledge that navigating the process of installing new technology and pursuing outside funding opportunities can be complex and confusing and offer support for community members who are interested in installing electric equipment. Electrification is a growing topic of discussion and there are external funding resources available for building electrification at this moment in time. At the same time, electric options – like heat pumps, heat pump water heaters, and electric stoves – are still new or unfamiliar to many people. Financial incentives are currently available from multiple sources (i.e., federal government, state government, non-profit organizations, and utilities). It can be difficult to understand if and how these incentives stack. Navigation support programs provide one-on-one direct assistance to help community members navigate these processes and make it easier for community members to install electric equipment in their homes.

On average, space and water heating account for 93% of natural gas use in homes.[4] Because navigation support programs are focused on helping community members upgrade equipment like gas furnaces and gas water heaters to electric options in existing homes, these programs provide a large opportunity to reduce emissions from natural gas.

Example efforts

Examples of other jurisdictions that have established navigation support programs include:

- Shoreline, WA – Energize Shoreline program: Qualifying participants are required to attend a workshop and complete a site assessment with a contractor from an approved list of heat pump installers. Once those steps are completed, the participant will receive a $1,000 discount on their installation of a heat pump. Residents must meet eligibility requirements to qualify for this program.
- Olympia, WA – Energize Olympia program: Financial assistance ranges from $800 to full coverage for income-qualified applicants. To receive the incentive, applicants must attend an educational workshop, get a free assessment and quote from an installation partner, and review and sign a contract.

[4] Bend Building Stock Characterization Memo

Provide technical assistance on building electrification and decarbonization for builders and developers.

Policy description

This initiative would involve the City developing a technical assistance program for builders and developers to offer guidance on building electrification and decarbonization. This program could provide support, including information on the latest technologies, best practices for implementation, and available financial incentives.

Background

The goal of providing technical assistance is to help builders and developers confidently incorporate electrification into their projects. Builders and developers play a pivotal role in the electrification transition but can face challenges in understanding and implementing the latest technologies and practices. There are numerous resources and incentives available to support these efforts, including federal and state programs, utility rebates, and non-profit initiatives. However, navigating these resources and integrating them into building projects can be complex and challenging. Providing technical assistance to builders and developers can bridge this gap, ensuring they have the knowledge and support needed to adopt electrification and decarbonization measures effectively. Technical assistance offerings could include providing project assistance from subject matter experts, hosting designer and developer roundtable discussions, and/or providing technical training for contractors.

This initiative would only apply to new buildings and the uptake of technical assistance support would likely depend on a variety of factors, including how well the program is advertised, trust that participating in the program will be a good use of time and resources for builders and developers, and other market factors.

Example efforts

While this research did not uncover any examples of municipalities offering technical assistance for electrification, there are examples of nonprofit organizations offering technical assistance programs:

- Silicon Valley Clean Energy is a non-profit agency in California that offers free technical assistance for building design and upgrades to support building electrification through its Building Electrification Support program.

- Peninsula Clean Energy, a community-controlled, not-for-profit, Community Choice Aggregation program in San Mateo County, California, provides free design technical assistance for all-electric buildings and upgrades.

Create new educational materials to encourage residential and commercial electrification in both new construction and existing homes.

Policy description

This initiative involves creating new educational materials highlighting the benefits of electrification and information about incentives to encourage residential and commercial electrification in both new

construction and existing homes. This information could be shared digitally on the City's website or social media platforms, in print (e.g., informational flyers available at popular community destinations), and/or in person at community events.

Background

Many electric options – like heat pumps, heat pump water heaters, and electric stoves – are still new or unfamiliar to many people. Providing educational materials about what electrification is, the benefits of electrification, and key considerations for people considering electrification can help to raise awareness about electric options, their benefits, and relevant financial incentives that might make electrification a more cost-effective option.

Providing education for both new construction and existing homes can help to ensure that electrification resources are available to all who may be interested in pursuing electrification. While education on electrification alone is unlikely to result in emissions reductions, providing this information is a good first step to increasing community awareness of electric options and their benefits.

Example efforts

Many other jurisdictions and organizations are providing education to their communities about electrification in addition to other climate-friendly behaviors or changes. Some examples include:

- Seattle City Light– Tips for Saving on Heating and Cooling Your Home: This webpage provides tips for saving on heating and cooling homes and information on local discounts and rebates for upgrades.
- City of Eugene – Financial Incentives for Building Owners: This webpage offers information about technology and energy upgrades that can help a home's energy performance (including but not limited to incentives).

Promote state and federal incentives or tax credits.

Policy description

This initiative involves City staff helping to raise awareness around the financial incentives that are available at the state and federal level through local promotion of existing programs that help reduce electrification costs for community members. This information could be shared digitally on the City's website or social media platforms, in print (e.g., informational flyers available at popular community destinations), and/or in person at community events.

Background

As mentioned above, electrification is a growing topic of discussion and there are external funding resources and tax credits available for building electrification.

Current and upcoming State of Oregon rebate and incentive programs include:

- Community Heat Pump Deployment Program – provides financial assistance to homeowners towards the purchase and installation of heat pumps in owner-occupied residences.
- Home Efficiency Rebate Program (HOMES) – provides performance-based rebates for energy efficiency retrofits in single-family and multi-family homes. This can include installing more

efficient equipment like a heat pump or on-demand water heater, weatherization measures like insulation or air sealing, smart thermostats, and more. HOMES rebates are funded by a grant from the federal Department of Energy.

- Home Electrification and Appliance Rebate Program (HEAR) – provides point-of-sale rebates to low- and moderate-income households to install eligible high-efficiency electric appliances and associated upgrades, as well as insulation and air sealing measures.

Current Federal tax credits include:

- Energy Efficient Home Improvement Credit - Beginning Jan. 1, 2023, the credit equals 30% of certain qualified expenses, including: qualified energy efficiency improvements installed during the taxable year, residential energy property (HVAC units and water heaters), and home energy audits.

By sharing this information through its communication channels, the City can help to promote these programs to save community members money on electrification projects. Electrification of space and water heating equipment in existing residential buildings provides a large opportunity for emissions reduction given that, on average, space and water heating account for 93% of natural gas use in homes.[5]

Example efforts

Other Oregon cities are promoting existing state and federal programs that provide incentives or tax credits for electrification. Examples include:

- Ashland, OR – State and Federal Rebates/Incentives: Provides hyperlinks to relevant incentives and notes that state and federal incentives may be used alongside local incentives.
- Eugene, OR – Financial Incentives for Building Owners: Offers information about technology and energy upgrades that can help a home's energy performance (including but not limited to incentives).

[5] Bend Building Stock Characterization Memo

Incentives

The options in the Incentives category would result in the City of Bend developing voluntary programs to incentivize the adoption of electric equipment technologies in new construction, major remodels, and in existing buildings at the time of equipment replacement. Incentives are meant to reduce the financial, time, or other costs associated with electrification. There are five policy options included in the Incentives category.

Category	Policy Options	Building Type	Time	Cost	GHG Impact	Risk	Depts	Cities
Incentives	Prioritize or expedite permit applications for all-electric development projects	N						
	Development incentives, such as floor-to-area (FAR), height, or density bonuses to encourage all-electric developments	N						
	City-funded financial incentive for all-electric new construction	N						
	City-funded ductless heat pump and heat pump water heater purchase and installation incentive for existing homes	E						
	Provide additional urban renewal assistance for all-electric buildings	N						

Prioritize or expedite permit applications for all-electric development projects.

Policy description

This initiative would involve City staff prioritizing or expediting permit applications for all-electric development projects. The goal is to entice developers to build all-electric by reducing project wait times for qualifying projects.

Background

In Oregon, local governments must take final action on permits, limited land use decisions and zone changes within 120 days of receiving a complete application. In addition, the City of Bend has been and continues to undergo process improvements to reduce the permitting time periods, particularly for residential development. As a result of Council directive, the City has expedited permitting for qualified residential and commercial affordable housing projects since 2023. The ability to provide additional expedited permitting is likely limited and would be extremely difficult to implement for the wide variety of development types and permitting processes. Further research and analysis of staffing and feasibility would be required before deciding to implement this incentive. If this incentive could be implemented, it would be geared toward developers and would incentivize electrification by reducing the amount of time it takes for permit applications for all-electric development projects to be processed by the City.

This incentive would encourage all-electric development for new construction, not existing buildings. This provides an opportunity to lock in lower emissions buildings over time, but the overall emissions

reduction impact from this action would ultimately depend on how much developers utilize the incentive.

Example efforts

Another jurisdiction that offers expedited or priority permit review for developers who choose to build all-electric includes:

- Seattle, WA – The Priority Green Expedited program shortens the time it takes developers to get a construction permit in exchange for meeting a green building certification and other criteria. The program sets goals for energy efficiency, embodied carbon, indoor air quality, resource conservation, and lead hazard reduction.

Development incentives, such as floor-to-area (FAR), height, or density bonuses to encourage all-electric developments.

Policy description

This policy would involve the City establishing nonfinancial development incentives for all-electric developments.

Background

The goal of a development incentive is to provide a benefit to the developer, that would not otherwise be granted, in exchange for the developer making a design choice that is preferred by the City, like building all-electric. Development incentives could include granting permission to the developer to increase the floor-to-area ratio, height, and densities over the regularly allowed amounts.

For example, by granting a density bonus to the developer in exchange for all-electric development, the developer may be able to build and ultimately sell more housing units on a given parcel of land than they otherwise would have been able to.

This incentive would apply to new construction, not existing buildings. This provides an opportunity to lock in lower-emissions buildings over time, but the overall emissions reduction impact from this action would ultimately depend on which building type(s) are eligible for the incentive (e.g., residential and/or commercial) and how much the incentive is utilized by developers.

Example efforts

One example of a municipal development incentive is Portland's Planned Development process, which allows developers to obtain additional floor area and an increase in height for commercial buildings in exchange for providing public benefits, including energy-efficient buildings. Bonuses are dependent on meeting specified energy use intensity standards and participating in established building efficiency programs (e.g. Energy Trust of Oregon, LEED).

City-funded financial incentive for all-electric new construction.

Policy description

This initiative would involve the City providing a City-funded financial incentive to developers that choose to build all-electric new construction. To provide a new, City-funded incentive, the City would need to identify and/or develop a funding source.

Background

As a local alternative to advocating that the State create financial incentives for all-electric new construction, the City can create its own financial incentive to help lower construction costs for developers that choose to build all-electric new construction. A new financial incentive would require a revenue source to fund the incentive.

This initiative would only apply to new buildings and incentive uptake would depend on a variety of factors, including how attractive the incentive is to developers and other market factors.

Example efforts

This research did not uncover examples of other jurisdictions that currently provide City-funded financial incentives for all-electric new construction.

City-funded ductless heat pump and heat pump water heater purchase and installation incentive for existing homes.

Policy description

This initiative would involve creating a program to provide City-funded incentives for the installation of ductless heat pumps and heat pump water heaters. To provide a new, City-funded incentive like this one, the City would need to identify and/or develop a funding source.

Background

A City-funded incentive could help reduce the price of new ductless heat pumps and heat pump water heaters making the purchase of electric systems more feasible or appealing to potential buyers. By focusing on individual appliances rather than all-electric building, these incentives could help convert existing homes to electric. Programs already exist to help residents to upgrade their home heating and water heating. The City would work with existing providers to identify gaps in those programs (such as supporting middle-income residents) that the City program could fill. On average, space and water heating account for 93% of natural gas use in homes[6] and encouraging electrification of these systems provides a large opportunity to reduce emissions from natural gas.

[6] Bend Building Stock Characterization Memo

Example efforts

Examples of programs from other jurisdictions include:

- Tigard, OR – Heat Pump Cash-In Program: Funding from the Oregon Department of Energy was administered by Earth Advantage, a nonprofit organization that works on housing and the climate impacts of housing. Note: as of June 2024, this program is on hold after receiving the maximum number of applications allowed by Earth Advantage.
- Seattle, WA – Clean Heat Program: This program offers a $2,000 instant rebate when applicants switch from heating their homes with oil to heating with an electric heat pump. The rebate can be combined with federal tax credits. Participants must select a participating contractor to install the heat pump, complete a participation form to provide to the contractor, install the heat pump, and decommission their oil tank.

Provide additional urban renewal assistance for all-electric buildings.

Policy description

This initiative would involve the City providing additional urban renewal financial assistance for all-electric buildings by adding all-electric buildings as an approved activity for Tax Increment Financing (TIF)/urban renewal funding. This change could help to reduce electrification costs for recipients of TIF/urban renewal funding.

Background

Urban Renewal is a state-authorized redevelopment finance program. Urban renewal areas use TIF to reinvest or rebuild parts of cities that are physically deteriorated, economically stagnated, unsafe or where the old urban layout no longer works. There are currently three established TIF/urban renewal areas in Bend: Core Area, Juniper Ridge, and Murphy Crossing. These TIF/urban renewal areas are managed by the Bend Urban Renewal Agency (BURA). The City hopes to use TIF/urban renewal as a tool to achieve the urban changes needed to accomplish the city's growth plan.[7]

TIF/urban renewal funds are available to developers and business owners that are working towards reinvesting or rebuilding in the designated urban renewal areas. Examples of current TIF investments in Bend include:

- Capital improvement loans for small or startup businesses
- Storefront improvement grants for improvements to existing properties
- Streetscape improvements and transportation enhancements, including new lighting, trees, sidewalks, and intersection improvements
- Redevelopment projects, such as mixed-use or infill housing developments

[7] City of Bend – Urban Renewal/Tax Increment Financing

- Historic preservation projects
- Parks and plazas
- Utility or infrastructure projects to support new development

TIF/urban renewal funds can be targeted to encourage certain types of development aligned with the City's goals. Therefore, all-electric buildings could be added into a TIF/urban renewal incentive program to encourage all-electric development.

Example efforts

Our research did not identify any jurisdictions in the U.S. that have pursued incentivizing all-electric buildings through urban renewal.

Local Regulations

The Local Regulations category includes three policy options that would implement new restrictions or requirements to reduce fossil fuel use in new or existing residential or commercial construction.

Category	Policy Options	Building Type	Time	Cost	GHG Impact	Risk	Depts	Cities
Local Regulations	Establish nitrogen oxide (NOx) emissions standards for new appliances in existing buildings or for new buildings	N, E						
	Restrict or limit natural gas infrastructure in the right-of-way in new residential developments.	N						
	Enact benchmarking, energy performance, or greenhouse gas reduction standards for commercial and multifamily buildings as allowed under HB 3409, the State of Oregon Building Performance Standards Program	E						

Establish nitrogen oxide (NOx) emissions standards for new appliances in existing buildings or for new buildings.

Policy description

This initiative would involve the City establishing nitrogen oxide (NO_x) emissions standards for new appliances. Electric appliances do not emit NO_x emissions, while fossil-fuel powered appliances do. NO_x emissions standards set limits on the amount of NO_x that certain new appliances can emit to improve outdoor air quality and combat negative public health impacts from exposure to NO_x.

Background

NO_x emissions come from the combustion of fossil fuels, including passenger vehicles and gas-powered appliances. NO_x emissions impact air quality and contribute to the formation of ozone and particulate matter, or $PM_{2.5}$. Exposure to NO_x has been linked to coughing, wheezing, difficulty breathing, asthma, and increased susceptibility to respiratory infections. Exposure to particulate matter has been linked to

asthma and other respiratory conditions, neurological disease, heart attack, stroke, lung cancer, and premature death. Generally, air quality is regulated under the local public health or air quality authority.

Phased standards have been adopted under the authority of state law and the Clean Air Act and set outdoor air quality standards for targeted appliances at a regional level under rules adopted by air quality districts in other parts of the Country, such as in California. Because these NO_x standards have had the effect of encouraging electric appliances in place of natural gas appliances, several cities are exploring establishing NO_x regulations to encourage electrification of homes and buildings as a climate action strategy. Since the only examples of NO_x regulation occur through air quality districts, regulating NO_x through City regulations would be a novel and untested approach. The City would need to establish new mechanisms in its development processes to create an enforceable regulation.

By focusing on individual appliances rather than all-electric building, these regulations could help convert equipment in existing homes to electric over time.

Example efforts

No other cities in Oregon (or elsewhere, based on the research the City has done) have enacted a NO_x regulation, but some (like Ashland) are considering this policy option.[8] Whether cities have the authority to regulate air quality in Oregon remains an open question.

In California, the Bay Area Air Quality Management District (BAAQMD), which includes Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, southwestern Solano and southern Sonoma counties) has enacted NO_x regulations that require new commercial and residential gas furnaces and water heaters to be zero- NO_x. The Appliance Rules would apply only to new appliances and do not mandate the immediate change out of existing appliances, nor will they apply to appliances used for cooking, such as gas stoves. NO_x-emitting natural gas furnaces and water heaters will be phased out over time, beginning in 2024, and phasing in for various types of development and water heaters or furnaces through 2031.

The South Coast Air Quality Management District (SCAQMD) also adopted air quality rules in 2022, which include NO_x emission standards for space heating, water heating and other appliances for installation in new commercial and residential buildings and at the end of useful life for units in existing buildings. They are working on incentive programs to encourage the early transition to zero-emission appliances.

To reduce NO_x pollution from fossil fuels, the California Air Resources Board (a statewide board) voted in September of 2022 to ban the sale of new gas furnaces and water heaters beginning in 2030.

Restrict or limit natural gas infrastructure in the right-of-way in new residential developments.

Policy description

This initiative would involve the City establishing regulations that apply to the installation of natural gas infrastructure through the right-of-way. This could include requiring natural gas distribution networks in

[8] Ashland Climate and Clean Air Ordinance Appendices – Appendix 5: Emissions-based Ordinance

the right-of-way to be right-sized or decommissioned, or prohibiting the installation of new distribution lines in new developments.

Background

In Oregon, a city can determine the terms and conditions under which a utility may use its streets, highways, or other public property within the city. To provide service to customers, gas utilities in Oregon need to install and maintain infrastructure (e.g., gas distribution or service lines) on or beneath public rights-of-way (e.g., public streets and sidewalks) to connect to the gas meter outside the building. Notwithstanding the authority in ORS 221.420, the City could expect to see various concerns related to potential EPCA preemption, as well as potential equal protection, takings, and anti-trust arguments as to why removing natural gas infrastructure from the right-of-way is not permissible.

Example efforts

Our research did not identify other jurisdictions pursuing regulation of natural gas via the right-of-way at this time, although it was mentioned as a potential alternative to the franchise agreement by the City of Ashland in May 2024, while noting this is uncharted territory with legal concerns. Since that time, the Ashland City Council hired outside council to review several paths to regulation; to date they have not yet considered any right-of-way regulations in a public setting.[9]

Enact benchmarking, energy performance, or greenhouse gas reduction standards for commercial and multi-family buildings as allowed under HB 3409, the State of Oregon Building Performance Standards Program.

Policy description

This initiative would involve the City enacting benchmarking, energy performance, or greenhouse gas reduction standards for commercial and multi-family buildings that are stringent enough that they heavily favor all-electric buildings.

Background

A Building Performance Standard (BPS) sets performance targets for existing buildings to meet over time. Local governments can adopt performance standards addressing energy use, carbon emissions, or public health impacts that result in eliminating or reducing natural gas. Unlike prescriptive approaches that tell building owners what to do in a top-down manner, performance standards are flexible and customizable. BPS programs are generally directed at commercial buildings, which can include multi-family housing.

[9] Ashland Climate and Clean Air Ordinance Appendices – Appendix 7: Upcoming Franchise Agreement or Ordinance in Lieu

In 2023, the Oregon Legislature passed House Bill 3409, establishing an Energy Performance Standard policy for commercial buildings.[10] This policy addresses energy use and emissions from existing commercial buildings and will require many large commercial buildings to enhance energy management practices and implement efficiency measures to meet energy use targets.

Additionally, HB 3409 explicitly allows municipalities to adopt energy or greenhouse gas performance standards so long as the standards are more stringent or apply more broadly than the state law and do not exceed the state building code for new buildings.[11]

Establishing a local BPS would allow the City to focus on decreasing natural gas emissions from existing buildings in the commercial sector (including multi-family housing, where applicable).

Example efforts

Many other jurisdictions are developing or have adopted a BPS, including:

- Vancouver, WA – Green Building Policy (developing): The Green Building Program will introduce new building and development code standards and incentives to significantly reduce energy use and emissions. These changes will happen gradually, helping Vancouver reach its goal of zero carbon emissions by 2040. The program will apply only to new buildings, not to existing buildings or remodels.
- Portland, OR – Climate and Health Standards for Existing Buildings (developing): These climate and health-related performance standards would apply to existing rental apartments as well as large commercial and multifamily buildings. Buildings covered by these policy requirements would have to meet minimum standards for the building's carbon emissions, indoor air quality, and indoor temperature by certain dates.
- Seattle, WA – Building Emissions Performance Standards (BEPS) (adopted): Adopted in 2023, the BEPS includes verification and reporting requirements and sets emissions targets for existing nonresidential and multifamily buildings larger than 20,000 square feet. A building's particular emissions targets and compliance deadlines are determined by the use and size of the building and become gradually stronger every five years. Most buildings covered by BEPS should reach net-zero emissions in the 2040s, making it one of the most impactful climate actions the City of Seattle is taking to tackle the climate crisis.
- Denver, CO – Energize Denver, Existing Buildings (adopted): Buildings 25,000 square feet or larger must submit annual benchmarking data. They must also meet specific energy efficiency requirements.

Fees

There are two policy options in the Fees category. These would result in the City of Bend implementing financial disincentives to limit fossil fuel use in new construction. Proceeds of fees could potentially help

[10] Oregon Department of Energy – Building Performance Standards Rulemaking: https://www.oregon.gov/energy/Get-Involved/Pages/BPS-Rulemaking.aspx

[11] Institute for Market Transformation – Ten Points on the Beaver State's New Building Performance Standard

fund policy options that introduce new costs, such as staff investment in outreach and support programs or financial incentives.

Category	Policy Options	Building Type	Time	Cost	GHG Impact	Risk	Depts	Cities
Fees	Charge a new building permit fee for non-electric infrastructure in new construction. Fee may be determined in relation to anticipated gas use of the building.	N						
	Increase franchise fee on natural gas utility	N, E						

Charge a new building permit fee for non-electric infrastructure in new construction. Fees may be determined in relation to anticipated gas use of the building.

Policy description

This initiative would involve the City establishing and charging a new building permit fee for non-electric infrastructure in new construction. The goal is to disincentivize non-electric construction by making it more expensive. This a new permit fee would be in addition to existing permit fees for new homes and commercial buildings. The fees could be determined based on the anticipated gas use of the building.

Background

This policy option addresses the challenge that is posed when new sources of greenhouse gas emissions are added, since it creates additional work to reach the City's climate goals. This option would create a funding stream to help pay for the actual costs of mitigating the added carbon emissions from new non-electric buildings. The idea behind this policy option is that if a resident or developer chooses to install natural gas in their new home or commercial building instead of a low carbon option, the homeowner or developer should take responsibility for the costs and effort the city will have to undertake to mitigate that carbon and meet its climate goals and pay upfront. Since fees in Bend are charged to cover the actual or average cost of providing the service, careful consideration would need to be given to the policy basis for a different approach under the city's home rule authority and regulation of the public health, safety and welfare. Further consideration would need to be given to the legal basis and nexus for charging such a fee.

Example efforts

Ashland, OR – Is analyzing establishing a "carbon charge" that would be imposed on those who choose to install natural gas infrastructure in their home during construction. Under this theory, the charge would be created by weighing 3-4 variables. The first three variables include the social cost of greenhouse gas emissions, the average gas usage of an Oregon home serviced by Avista (Ashland's natural gas utility), and the average lifespan of major appliances. The fourth variable could be utilized to

better size the mechanism for different sized homes. This was one of the options presented to the Ashland City Council for further review in May 2024.[12]

Increase the right-of-way use fee on the natural gas utility.

Policy description

This initiative would involve the City increasing the right-of-way use fee on the natural gas utility. The goal is to disincentivize expanding the natural gas system by making it more expensive.

Background

Bend Municipal Code Chapter 3.20 (Regulation of Utility Use of City Rights-of-Way) governs franchise utility access to and use of the right-of-way to provide electric and natural gas service to residential and commercial customers. Utilities with facilities in City rights-of-way, such as Cascade Natural Gas, pay an annual fee to the City based on a percentage of gross revenue. This fee is known as the "Rights-of-Way Use Fee." The Use Fee is currently set by Council resolution at 7% of gross revenues.

This initiative would involve the City increasing the right-of-way use fee on the natural gas utility to disincentivize expanding the natural gas system by making it cost more to operate in Bend.

Increasing the right-of-way use fee could result in higher costs being passed along to consumers and may or may not result in decreased natural gas use.

Example efforts

Examples of other jurisdictions that have considered or enacted increased franchise fees on natural gas utilities include:

- Ashland, OR is considering enacting an increased franchise fee on natural gas utilities. The City's Electric Department pays a franchise fee of 10%, while the natural gas utility, Avista, pays 5%.[13]
- Gresham, OR has a utility licensing fee that applies to electric and gas utilities, set at 10%.

Building Code

The Building Code category includes one option, which is for the City of Bend to request local authority to amend the building code to promote electrification.

Category	Policy Options	Building Type	Time	Cost	GHG Impact	Risk	Depts	Cities
Building Code	Pursue local amendment to state building code to require electrification in new residential construction and major remodels	N						

[12] Ashland Climate and Clean Air Ordinance Appendices – Appendix 6: Carbon Charge

[13] Ashland Climate and Clean Air Ordinance Appendices – Appendix 7: Upcoming Franchise Agreement or Ordinance in Lieu

Pursue local amendment to state building code to require electrification in new residential construction and major remodels.

Policy description

This initiative would involve the City applying to the Oregon Building Codes Division for a local amendment to adopt an ordinance that differs from the state building code. Specifically, this amendment would require electrification in new residential construction and major remodels.

Background

In Oregon, building codes are set at the state level by the Building Codes Division of the Department of Consumer and Business Services or the state legislature. Cities must adhere to state level building codes and do not have much flexibility in adopting codes that differ from the state building code.

Local governments seeking to electrify structures by imposing different requirements from the construction standards in Oregon's building code could pursue this policy option through a local amendment. To obtain a local amendment, a local government must follow a regulatory process, including holding meetings and submitting required materials to the Oregon Building Codes Division, who will either approve or deny the request[14].

This process is lengthy and complex. Local amendments are generally accepted when a local government has unique conditions that warrant a different building code than the rest of the state. According to state building officials, it is not intended to be used for policy matters but instead is intended to accommodate local conditions. Outside of this scenario, the Oregon Building Codes Division has a strong preference for uniformity in the state building code. In addition, a local amendment to the building code would also need to be compliant with the Energy Policy and Conservation Act. Even if a local amendment were granted for the City of Bend, the City would need to undergo the entire local amendment process to make any changes to this code in the future.

Example efforts

Our research did not identify any municipalities that have *applied* for a local amendment for the purposes of prohibiting natural gas or requiring electrification.

Ashland, Oregon considered this option, but it was deemed to be less viable given the length of the process and subsequent Energy Policy and Conservation Act compliance requirements.[15]

[14] Regulating Natural Gas in Oregon Buildings: A Guide for Local Governments – Green Energy Institute at the Lewis & Clark Law School, Breach Collective (2023)

[15] Ashland Climate and Clean Air Ordinance Appendices – Appendix 9: Building Code Amendment

Recently Completed Efforts

City-owned Buildings

The City-owned Buildings category includes options focused on the City of Bend adopting policies committing the City of Bend to eliminate fossil fuels in new and existing City-owned or operated buildings. As of November 2024, the City has adopted policies to commit the City to eliminate fossil fuel use in City buildings. On October 2, 2024, the Bend City Council adopted Resolution 3400 to commit to avoiding the use of fossil fuels in new City buildings and to explore opportunities to retrofit existing City buildings with electric alternatives to fossil fuel equipment, and to implement opportunities identified where feasible. With this policy in place, the City is committed to building any new facilities to be all-electric, demonstrating leadership in electrifying buildings communitywide.

Climate Protection Program

This initiative would have involved City staff advocating at the state level for the reinstatement of the Climate Protection Program (CPP), but the CPP was reinstated on November 21, 2024 and state-level advocacy to reinstate it is no longer needed.

The 2024 CPP rules set an enforceable declining cap on greenhouse gas emissions from fossil fuels used throughout Oregon, including diesel, gasoline, and natural gas. The program is designed to reduce these emissions by 50% by 2035 and 90% by 2050. Gas utilities may be able to comply with CPP rules by increasing the proportion of renewable natural gas in their product mix or improving system efficiency to minimize leaks, as opposed to eliminating natural gas usage.

ECOnorthwest

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Bend Sector Analysis

City of Bend

Prepared for: The City of Bend

ECOnorthwest
920 SW 6th Ave • Suite 1400 • Portland, OR 97204 • 503-222-6060

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This work was financially supported by the City of Bend, and the analysis drew on data, reports, and input from government agencies, private statistical services, and other trusted sources. While ECOnorthwest relied on these contributions, we take full responsibility for the content and conclusions of this report.

That assistance notwithstanding, ECOnorthwest is responsible for the content of this report. The staff at ECOnorthwest prepared this report based on their general knowledge of the economics of recreation, amenities, and regional economies. ECOnorthwest staff contributing to this study included Beth Goodman, Natalie Walker, Willa Van Liew, and Rebecca Chen. ECOnorthwest also relied on information derived from government agencies, private statistical services, the reports of others, interviews of individuals, or other sources believed to be reliable. ECOnorthwest has not independently verified the accuracy of all such information and makes no representation regarding its accuracy or completeness. Any statements nonfactual in nature constitute the authors' current opinions, which may change as more information becomes available.

For more information about this report please contact:

Beth Goodman	**Cyrus Mooney**	**Damian Syrnyk**
goodman@econw.com	cmooney@bendoregon.gov	dsyrnyk@bendoregon.gov
ECOnorthwest	City of Bend	City of Bend
503-222-6060	503-841-9793	541-312-4919

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Executive Summary

Purpose

This report provides an overview of the city's economic landscape, by placing Bend in the context of regional and national economic trends, and identifies target sectors to inform future growth strategies. ECOnorthwest approached the selection of target sectors through an understanding of the broader economic trends in Bend and regionally, industry and sector employment data analysis, and stakeholder engagement.

This report will support the development of Bend's Economic Opportunities Analysis (EOA) and a long-term economic development strategy. The information in this report will provide a factual basis to support discussions of Bend's vision for economic development and potential economic development policies in the economic development strategy and EOA. This report provides the data necessary to support the upcoming policy discussion and questions.

Findings

Economic Landscape and Trends

Bend's economy supports 57,494 employees, earning an average annual wage of $62,630, with private-sector jobs comprising 91% of total employment. In this analysis, we highlight the industries that have employment growth and concentration in Bend:

- **Health Care and Social Assistance:** This is Bend's largest employment sector, accounting for 18% of jobs (10,202 jobs) in 2022 with an employment concentration of 1.3 (30% more concentrated than the U.S. average). The sector experienced strong growth of 23% from 2015 to 2022, driven by population dynamics and Bend's role as a regional healthcare hub for Central and Eastern Oregon.
- **Retail Trade:** Retail accounts for 14% of employment (8,035 jobs) in Bend, with an employment concentration of 1.4 (40% more concentrated than the U.S. average). The sector grew by over 25% between 2015 and 2022, but wages remain below average, posing affordability challenges for workers in Bend's high-cost housing market.
- **Tourism-Related Industries:** Food service and accommodation represents 12% of Bend's employment (6,686 jobs), with an employment concentration of 1.3. Arts, entertainment, and recreation, although smaller in size with 1,478 jobs, has the highest employment concentration of all industries and relatively higher growth compared to other industries. While industries that support tourism play a central role in Bend's economy, wages in these industries lie below Bend's average. Bend's competitiveness in these sectors is high with over 85% of employment growth in amusement and recreation and food and beverage retailers attributable to Bend's unique characteristics.

- **Professional, Scientific, and Technical Services:** This high-wage sector accounts for 7% of jobs in Bend, offering an average annual wage of $93,000. Employment in this sector grew significantly from 2015 to 2022, and its employment concentration increased from 0.85 to 1.04. An estimated 66% of the employment growth in this sector can be attributed to Bend's competitive advantage.
- **Construction:** Construction accounts for 4,810 jobs in Bend with an employment concentration of 1.4. The sector has grown significantly in recent years, driven by housing demand and infrastructure investment, making it a critical part of Bend's local economy.

ECOnorthwest compiled research and conducted data analysis to provide insight into the broader economic trends that may impact Bend's economy in the future. The most significant key trends include:

- **Availability of Labor:** Oregon's aging Baby Boomer population creates a tight labor market as retirements outpace the inflow of younger workers. Key sectors like healthcare, manufacturing, and education face significant challenges, as one-third of their workforce is nearing retirement within the next decade.
- **Regional Commuting Patterns:** Bend serves as a regional employment hub, with 61% of residents working in the city compared to 39% who commute to other areas like Redmond and Portland. Meanwhile, 51% of Bend's workforce commutes from outside city limits, reflecting both economic integration and housing affordability challenges.
- **Changing Places Where Work is Being Done:** Remote work has grown significantly in Bend, with 28% of employees working from home, higher than the state average of 18%. This trend benefits skilled workers in industries like professional services but raises equity concerns and drives up housing costs for on-site workers.
- **Shifts in Oregon's High-Growth Industries:** Bend's economy is shifting away from traditional industries like timber and certain manufacturing sectors toward high-growth industries like healthcare, food and beverage manufacturing, and professional services. These emerging sectors are driving diversification and job growth, significantly outpacing state and national averages in some cases.
- **Growth of Entrepreneurship and Small Businesses:** Bend's small businesses account for 33% of the workforce and 79% of all business establishments, underscoring their importance to the local economy. Strong venture capital networks and public-private partnerships have positioned Bend as a leader in innovation and start-up activity.
- **Potential Impacts of Global Climate Change:** Rising temperatures, reduced snowpack, and extreme weather events threaten key industries like tourism, agriculture, and forestry in Bend. Investments in climate resilience and adaptive infrastructure are essential to mitigate risks and ensure long-term economic sustainability.

Target Sectors

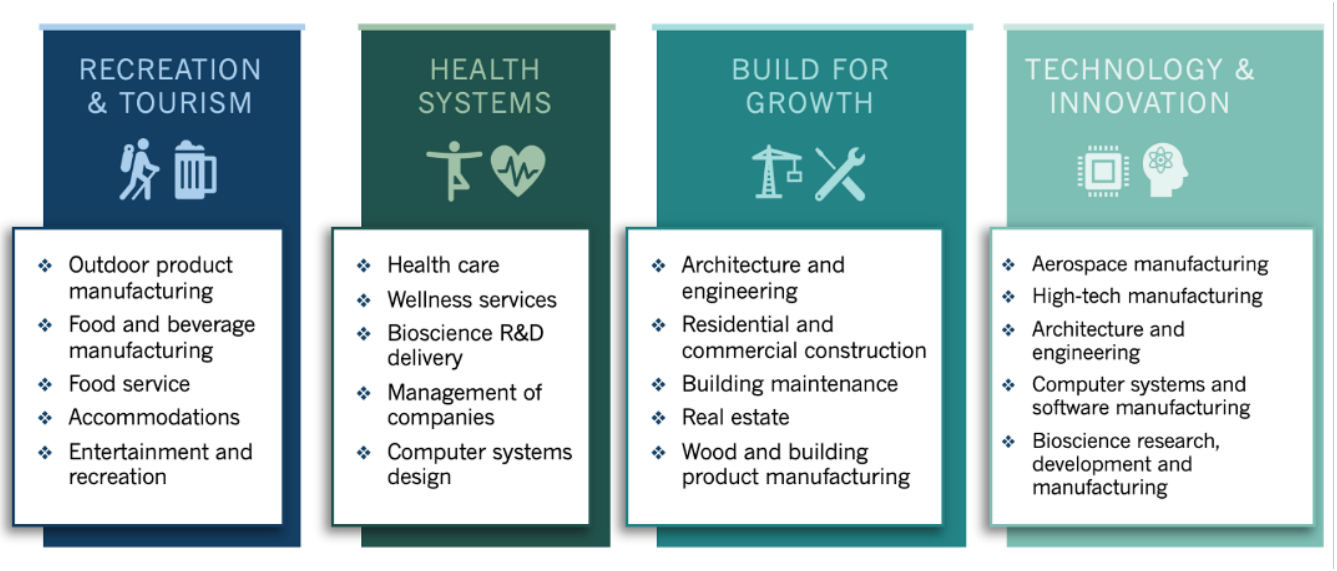
The target sector analysis for Bend utilized a combination of quantitative and qualitative methodologies to identify industries that align with the city's unique assets and future opportunities. The resulting target sectors balance locally serving industries with export-oriented ones to ensure economic resilience and growth.

- **Locally serving sectors** include health care, wellness services, construction, and tourism-related sectors, which address the needs of Bend's changing population and ensure regional stability.
- **Export-oriented sectors** drive diversification and innovation, such as high-tech manufacturing (aerospace, advanced manufacturing, and clean technology), biosciences delivery and research and development, and professional Services (software publishing, R&D, architecture, and management). Additionally, industries like outdoor gear and apparel and food and beverage manufacturing leverage Bend's natural and cultural resources, enhancing its competitive position in recreation and tourism-related markets.

This strategy aligns with regional and statewide priorities, incorporating insights from Business Oregon's Target Industry Groups and the Central Oregon Intergovernmental Council's (COIC) Comprehensive Economic Development Strategy (CEDS). Business Oregon emphasizes groupings like outdoor gear and apparel, food and beverage, forestry and wood products, high-technology, and biosciences, while the CEDS highlights advanced manufacturing, technology, outdoor equipment, and health sciences. Similarly, the OSU-Cascades Innovation District aims to support sectors such as high-tech, renewable energy, biotechnology, and tourism-related industries.

To implement these findings effectively, ECOnorthwest groups the proposed sectors into cross-sector clusters: **Recreation and Tourism, Health Systems, Build-for-Growth, and Technology and Innovation**. This approach integrates complementary sectors to support economic sustainability, innovation, and adaptability, positioning Bend for long-term success in both regional and global markets.

ES Exhibit 1. Proposed Target Sectors



Source: ECOnorthwest, 2024

Considerations for Policy Discussions

Reviewers: This will be filled in in the next draft of the report.

1. Introduction

The City of Bend needs to understand the types of businesses that have the potential for growth in Bend. The City plans to develop an economic development strategy, which will focus on policies and actions that the City can take to support economic growth, with a special focus on the types of businesses that have the most growth potential in Bend. The economic development strategy will consider incentives that support the growth of businesses in Bend. In addition, the City plans to update its Economic Opportunities Analysis (EOA), which will determine whether Bend has enough land within its urban growth boundary (UGB) to accommodate expected employment and business growth over the next 20 years.

The information in this report will provide a factual basis to support discussions of Bend's vision for economic development and potential economic development policies in the economic development strategy and EOA. Both the economic development strategy and the EOA benefit from a common understanding about the types of businesses that have potential for success in Bend, considering Bend's existing resources, infrastructure, role in the Central Oregon economy, and competitive advantages for business growth. This report focuses on sector-level data, to support discussions of potential economic development policies and provides information to help the City identify target sectors and industries with growth potential in Bend. The report includes information to:

- **Understand Economic Trends**: This report assesses current and historical economic trends in Bend and the broader Central Oregon region, focusing on industries with significant growth, employment contributions, and future potential.
- **Identify Target Sectors**: Conducts analysis to pinpoint target sectors for strategic economic growth, considering Bend's competitive advantages and regional economic dynamics.
- **Support Strategic Planning**: Provides insights that will serve as the foundation for Bend's EOA and guide economic development initiatives to foster a resilient and sustainable economy.

Approach

Bend's economic development strategy and EOA rely on identification of sectors that align with the city's strengths and have the potential to drive sustainable growth. ECOnorthwest identified target sectors the city may want to prioritize for investment and support by analyzing economic trends and understanding Bend's competitive position for business growth. This analysis combines quantitative data analysis with qualitative insights from local stakeholder interviews to identify industries and sectors that would enhance economic resilience and leverage Bend's unique characteristics.

The analysis begins with a review of economic data, including population growth, commuting patterns, workforce participation, and broader economic trends, all which shape Bend's industry dynamics. ECOnorthwest examined employment trends to identify sectors with the largest presence in Bend, those with the fastest growth, and those that demonstrate high employment concentrations compared to state and national benchmarks. To further refine sectors, we assessed how much of Bend's sector growth stems from local competitive advantages versus broader regional or national trends.

Additionally, we interviewed stakeholders for input about the analysis and the preliminary findings. These discussions provided insights into emerging opportunities as well as barriers, including housing affordability, workforce availability, and industrial land constraints. These insights provided context for the data analysis described above. Engaging stakeholders in discussion provided essential information to fill in gaps in the data and helped us better understand the employment growth dynamics in Bend and Central Oregon.

ECOnorthwest conducted outreach to stakeholders ranging from those involved in business retention and recruitment to those engaged in supporting the next round of entrepreneurs and innovators. This ensured the analysis and recommendations reflect a comprehensive understanding of Bend's economy. Stakeholders included those at the following organizations: Economic Development for Central Oregon (EDCO); Central Oregon Intergovernmental Council (COIC); Oregon Employment Department (OED); Business Oregon (aka Oregon Business Development Department); Bend Chamber of Commerce; and OSU Cascades.

2. Economic Trends

This section describes the relevant economic trends that shape Bend's economy and informed the target sector analysis by identifying both the challenges and opportunities that influence Bend's evolving economic landscape. Employment patterns, sector performance, and regional dynamics are also examined in this section, providing a foundation for understanding the city's labor market and economic structure. These insights aid in determining Bend's competitive advantages, assessing workforce needs, and aligning economic development strategies with high-growth and resilient industries. Appendix A presents additional details on these trends.

Employment in Bend

Bend's economy supports a total of 57,494 employees, with private-sector jobs accounting for 91% of total employment (Exhibit 1).[1] The city's workforce spans a diverse mix of industries, reflecting its role as a regional economic hub. The average wage across all industries in Bend was $62,630 in 2022, similar to Oregon's statewide average of $66,340. Key contributors to employment include health care, retail, hospitality, construction, professional services, and manufacturing industries, which collectively provide nearly two-thirds of all jobs in the city.

- Health care and social assistance are Bend's largest employment industry in 2022, accounting for 18% of jobs (10,202 jobs). This industry's steady growth is driven by regional population expansion and the city's role as a health care hub, providing health care services to Central Oregon and Eastern Oregon.
- Retail and hospitality industries are central to Bend's economy, supported by its status as a tourist destination. Retail trade (14% of employment or 8,035 jobs) and accommodation and food service (12% of employment or 6,686 jobs) account for a significant amount of employment in Bend. However, wages in these industries remain below average, posing challenges for workers given Bend's high cost of housing.[2]
- Professional, scientific, and technical services (7% of jobs) offer the highest wages at $93,000 annually. Construction has also seen significant recovery and growth, benefiting from Bend's rising housing and infrastructure demands.

[1] Oregon Employment Department Quarterly Census of Employment and Wages measures employment covered by the state's unemployment insurance program. This is commonly referred to as covered employment.
[2] Up for Growth. *State of Housing 2023: Policy Framework and Recommendations.* October 2023. https://upforgrowth.org/wp-content/uploads/2023/10/Brooks-Article.pdf.

Exhibit 1. Covered Employment and Pay per Employee, Bend, 2022

INDUSTRY	2022 AVERAGE ANNUAL EMPLOYMENT	SHARE OF COVERED EMPLOYMENT	2022 AVERAGE PAY PER EMPLOYEE
Health Care and Social Assistance	10,202	18%	$79,850
Retail Trade	8,035	14%	$44,730
Accommodation and Food Services	6,686	12%	$29,890
Professional, Scientific, and Technical Services	4,192	7%	$93,000
Construction	4,051	7%	$66,340
Manufacturing	3,413	6%	$59,270
Administrative and Waste Management Services	2,918	5%	$49,580
Other Services (except Public Administration)	1,781	3%	$46,730
Wholesale Trade	1,635	3%	$85,700
Finance and Insurance	1,631	3%	$106,490
Arts, Entertainment, and Recreation	1,478	3%	$25,510
Information	1,303	2%	$94,630
Transportation and Warehousing	1,047	2%	$60,420
Management of Companies and Enterprises	907	2%	$105,380
Real Estate and Rental and Leasing	876	2%	$53,990
Educational Services	610	1%	$31,430
Agriculture, Forestry, Fishing and Hunting	220	0.4%	$44,250
Unclassified	172	0.3%	$73,440
Utilities	143	0.2%	$113,070
Total Private Employment	**52,193**	**91%**	**$62,220**
Total Government Employment	**5,301**	**9%**	**$66,660**
Total Covered Employment	**57,494**	**100%**	**$62,630**

Source: Oregon Employment Department, Quarterly Census of Employment and Wages, 2022

Narrowing in on the top six industries by employment level, Exhibit 2 illustrates the average annual employment and pay per employee for these industries. Health care and social assistance have become Bend's largest employment sector (10,202 jobs in 2022), driven by population growth and the city's position as a regional healthcare provider for Central Oregon and Eastern Oregon. Exhibit 3 shows that the sector grew at an average annual rate of close to 4% since 2007 and offers the second highest wage of the top six industries ($79,850) — both metrics being above the citywide average. As the city grows and its population ages, demand for health services is likely to continue to expand, cementing its importance to the local economy.

The professional, scientific, and technical services industry offers a high average annual wage of close to $93,000. The industry saw significant growth over the past decade (5.5% per year between 2007 and 2022) and employed close to 4,200 workers in 2022.

Retail and hospitality remain central to Bend's economic structure, supported by its role as a regional retail center and a popular tourist destination. Retail provides a large share of jobs (14% of covered employment or 8,035 jobs in 2022), serving both residents and visitors. Employment in retail trade remained stable, with an average annual growth rate of 0.7% over the 2007 to 2022 period. In contrast, the accommodation and food services sector grew by closer to 3% per year and currently accounts for 12% of covered employment (6,686 jobs in 2022). However, wages in these service-based industries are below the citywide average, presenting challenges for workers as housing costs and living expenses rise.

Construction also regained strength after job losses during the Great Recession, supported by Bend's population growth and demand for housing and infrastructure. Employment in this sector has rebounded strongly from roughly 1,660 jobs in 2012 to over 4,000 in 2022. The average annual wage for workers in construction is slightly above the Bend average, at approximately $66,000.

Manufacturing also experienced a loss of employment during the Great Recession, but has rebounded to slightly above 2007-levels, with approximately 3,400 employees in 2022.

Exhibit 2. Top Six Industries by Employment, Bend, 2022

Source: Oregon Employment Department, Quarterly Census of Employment and Wages, 2022

Between 2007 and 2022, both the labor force[3] and employment level in Bend grew by approximately 2% per year. To contextualize this growth, Bend's population grew roughly 3% annually (between 2000-2023), with the individuals aged 65 or older accounting for 22% of that population growth. Bend's average annual employment growth, as well as current labor force participation rate[4], outpaces Central Oregon and statewide averages (see Appendix A for detailed population and labor force trends). Exhibit 3 shows the average annual change in nominal employment by industry grouping. Light green bars in the chart indicate the growth rate was higher than the average 2% per year growth rate in Bend.

- Health care and education, and professional and business services, led the way by adding over 200 employees per year (average annual growth rate of 3.5%), driven by steady population growth and the city's position as a regional service hub.
- Leisure and hospitality followed closely with 190 employees (average annual growth of roughly 3%).
- Wholesale trade (2.5%) and transportation, warehousing, and utilities (3%) also showed above-average employment growth but represent a smaller number of employees.
- Sectors like information experienced a slight decline while financial services and manufacturing remained relatively stable. However, Exhibit 1 shows that these three industries account for a much smaller share of Bend's employment, with approximately 7,220 employees combined in 2022.

These trends indicate a shift toward high-skill, service-oriented, and tourism-driven industries, with slower or stagnant growth in legacy sectors such as manufacturing and information.

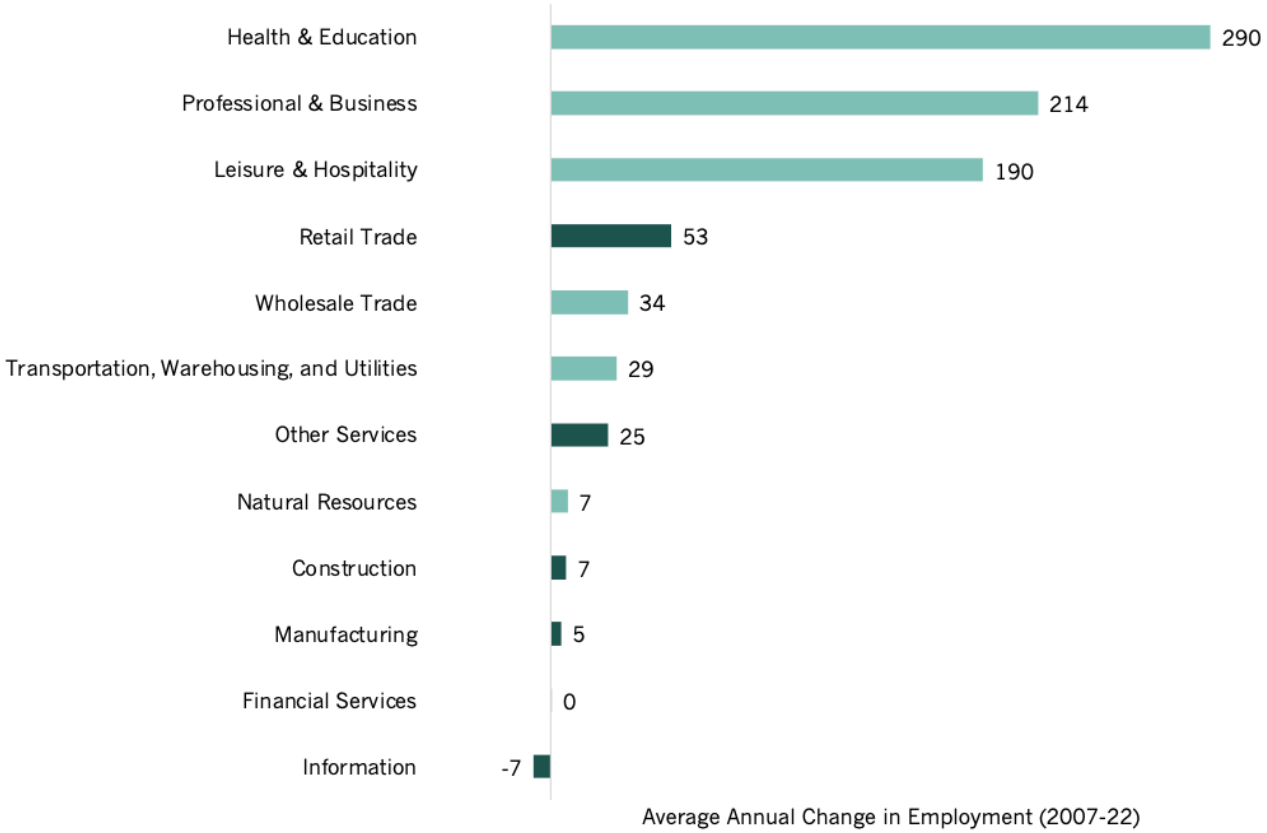
The Oregon Employment Department (OED) publishes industry employment projections for the Central Oregon region (Deschutes, Jefferson, and Crook counties) for the 2022 to 2032 period.[5] Exhibit 39 in Appendix A shows that OED projects that overall private payroll employment will grow by approximately 10.9% or 1% per year over the period. Leisure and hospitality and healthcare are projected to have significantly higher average annual growth rates of 1.7 and 1.5%, respectively, adding over 2,000 jobs in each sector from 2022 to 2032.

[3] The U.S. Bureau of Labor Statistics defines labor force as "...all people age 16 and older who are classified as either employed and unemployed... Conceptually, the labor force level is the number of people who are either working or actively looking for work." For more information see the BLS webpage, https://www.bls.gov/cps/definitions.htm#laborforce

[4] The U.S. Bureau of Labor Statistics defines labor force participation rate as "...the number of people in the labor force as a percentage of the civilian noninstitutional population. In other words, the participation rate is the percentage of the population that is either working or actively looking for work." For more information see the BLS webpage, https://www.bls.gov/cps/definitions.htm#laborforce

[5] Oregon Employment Department, "Oregon Industry Employment Projections, 2022-2032," December 2023, https://www.qualityinfo.org/data

Exhibit 3. Average Annual Change in Number of Employees by Industry Grouping, Bend, 2007-2022



Source: Oregon Employment Department, Quarterly Census of Employment and Wages, 2022

Note: Light green indicates an average annual % change above Bend's overall employment growth (2%).

Factors Affecting Economic Growth in Bend based on National, State, and Regional Trends

This section focuses on five key trends affecting economic growth in Bend. Appendix A presents more information regarding these and other trends affecting economic growth in Bend.

SUMMARY:

- Bend faces a growing need for workforce replacement as the baby boomer generation retires, as 24-29% of workers in healthcare and manufacturing in Bend are aged 55 and older. Strategic recruitment and knowledge transfer programs will be vital to sustaining these industries.
- Bend's position as a regional employment hub draws 51% of its workforce from outside the city, while 39% of Bend residents commute to jobs outside of Bend. Addressing commuting challenges through housing and transit solutions is key to ensuring businesses in Bend can attract and retain employees.
- The increase of remote work across the U.S. has shifted economic trends such as real estate prices and commuting patterns. Bend stands out with a higher percentage (28%) of remote workers than the statewide average.
- Historically strong growth industries in Oregon are changing from timber and high-tech. Bend is well-positioned for this change, diversifying further into sectors like bioscience and professional services.
- Bend is a hub for entrepreneurship, with 79% of businesses classified as small. Initiatives such as the Bend Venture Conference and the Bend Entrepreneur Lab support entrepreneurship and early-stage businesses by providing mentorship, funding, and a collaborative platform for innovators.
- Climate change threatens Bend's economy as reduced snowpack, wildfire risks, and heat negatively impacts businesses in tourism, agriculture, and forestry. Proactive investment in climate adaptation and resilience is critical for long-term stability.

Availability of Labor

THE AGING OF THE BABY BOOMER GENERATION AND THE NEED FOR REPLACEMENT WORKERS

The Oregon Office of Economic Analysis anticipates Oregon will continue to face a tight labor market due to demographic trends.[6] Labor force inflows, primarily young adults, now match outflows of retiring workers. Projections of retirements and young adults entering the labor market show a gap between workforce supply and demand through 2030.[7] Consequently, Oregon's labor force growth will rely heavily on in-migration and the re-entry of middle-aged workers attracted by improved job opportunities and higher wages.

The aging workforce in Oregon presents significant challenges, particularly in sectors with a high concentration of older employees. A report to the Oregon Legislative Assembly highlights that one-third of the workforce in certain sectors is nearing retirement within a decade. Industries most affected include health care and social assistance, manufacturing, and education. In 2022, 24% of all jobs in Oregon were held by workers aged 55 and older.[8] Notably, real estate and manufacturing are above the average with 29% and 26% of the workforce above the age of 55, respectively.

The COVID-19 pandemic may have accelerated job losses in sectors such as education, community services, and health support roles. According to the Oregon Office of Economic Analysis, between 2020 and 2021, these occupations experienced higher-than-average job losses among older workers, accounting for 70% of the difference in job losses between older workers and the overall workforce.[9] This was driven in part by retirements.

For Bend, these trends suggest that sectors like healthcare and manufacturing are particularly vulnerable to the impacts of an aging workforce. As a regional hub, Bend relies heavily on these industries. The impending retirements could lead to labor shortages, loss of institutional knowledge, and potential disruptions in service delivery. Proactive workforce planning, including strategies for knowledge transfer and recruitment of younger workers, will be essential to mitigate these challenges and ensure the continuity and growth of these critical sectors.

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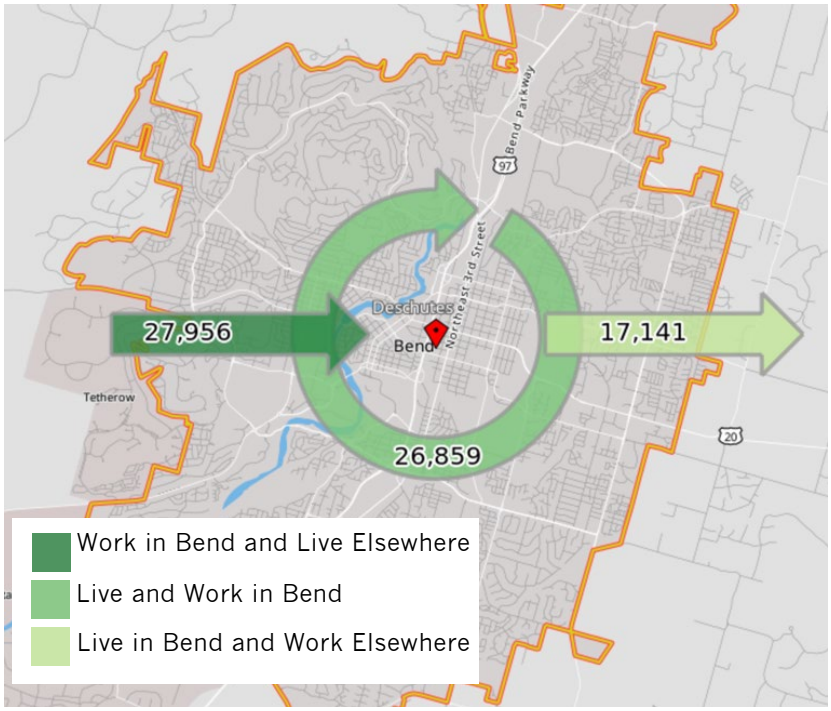
[6] Oregon Office of Economic Analysis, "Older Workers and Retirements," *Oregon Economic Analysis Blog*, May 12, 2021, https://oregoneconomicanalysis.com/2021/05/12/older-workers-and-retirements/.
[7] Ibid.
[8] Oregon Legislative Assembly, "Aging Workforce Trends and Sector Impacts," Joint Legislative Committee Report, 2024, https://olis.oregonlegislature.gov/liz/2023I1/Downloads/CommitteeMeetingDocument/279593.
[9] Oregon Office of Economic Analysis, "Older Workers and Retirements," *Oregon Economic Analysis Blog*, May 12, 2021, https://oregoneconomicanalysis.com/2021/05/12/older-workers-and-retirements/.

REGIONAL COMMUTING PATTERNS

Bend's commuting patterns illustrate its role as an employment hub in Central Oregon, with significant movement of workers both into and out of the city. In 2021 (the most recently available year of data), most Bend residents (61%) both lived and worked within the city, while 39% commuted to jobs outside of Bend.[10] Exhibit 4 illustrates the number of workers commuting into, within, and out of Bend in 2021. Common destinations for outbound commuters include Redmond, Portland, and Salem, highlighting Bend's economic integration with larger urban areas and nearby towns.

At the same time, Bend attracts many workers from surrounding areas. Approximately 51% of workers employed in Bend live outside the city limits. Many workers commute from nearby locations such as Redmond, parts of unincorporated Deschutes County, Portland, and Prineville. This inflow of workers supports Bend's growing economy and emphasizes its status as a regional employment center. However, it also underscores challenges related to transportation infrastructure and housing availability, as many workers live outside the city due to cost or accessibility considerations impacting the availability of workforce.[11]

Exhibit 4. Commuting Inflow and Outflow, Bend, 2021



Source: U.S. Census Bureau, LODES, 2021

[10] U.S. Census Bureau, "Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics (LODES), 2021," accessed September 2024, https://lehd.ces.census.gov/data/.
[11] Mia Swinburne, "Bend Grapples with Soaring Housing Costs and Affordability Crisis," *OPB*, November 30, 2022, https://www.opb.org/article/2022/11/30/bend-oregon-housing-costs-crisis-affordability/.

CHANGING PLACES WHERE WORK IS BEING DONE

Remote work trends illustrate how workforce dynamics have shifted in recent years, particularly following the COVID-19 pandemic. Nationally, the share of employees working remotely rose significantly, from 24% in 2019 to 34% in 2022, and decreased to 23% in 2024, according to the Bureau of Labor Statistics.[12] This growth reflects increased adoption of remote-friendly work practices, especially in industries like professional and business services.

According to 2023 U.S. Census Bureau data, 28% of Bend employees work from home[13], compared to 24% in Deschutes County and 18% statewide in Oregon.[14] In Deschutes County, approximately 30% of all remote workers are employed in professional, scientific, and technical, and administrative services, 18% in healthcare and education, and 11% in information, finance, and real estate.[15] These industries employ the largest number of remote workers. Exhibit 5 shows the share of industry workers that are remote. Of all workers in professional and business services 45% are remote and 35% of workers in wholesale trade are remote (see Exhibit 5).

These sectors, characterized by higher education requirements and above-average wages, demonstrate how remote work opportunities often favor skilled, higher-income workers. However, this trend also highlights equity concerns, as access to remote work tends to be unevenly distributed by demographics, including educational attainment and race. Those most likely to have remote work opportunities tend to have higher educational attainment, be white or Asian, and be over 25 years old.[16] This uneven access to remote work highlights potential inequity, as certain demographic groups may be disadvantaged in accessing these flexible work arrangements.

Additionally, recent academic research points to reductions in quality of life for those unable to work remotely.[17] Recent studies show that increases in remote and hybrid work have increased housing and rental prices spurred by the productivity increase for remote-capable occupations. This has led to those in on-site occupations spending a higher share of their incomes on housing and a reduction in their consumption spending. Appendix B expands upon these trends.

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[12] Bureau of Labor Statistics. American Time Use Survey. 2023. https://www.bls.gov/news.release/atus.htm; Bureau of Labor Statistics, Labor Force Statistics from Current Population Survey: LNU0201B46B. 2024. https://data.bls.gov/timeseries/LNU0201B46B

[13] Note: the U.S. Census Bureau American Community Survey does not distinguish between remote and hybrid workers. Home-based workers are identified through a question on transportation to work: "The American Community Survey includes a question asked of those ages 16 and over who were employed and at work in the previous week, on the method of transportation usually used to get to work. Home-based workers are those who reported ''work from home'' on this question." For additional details, see the U.S. Census Bureau webpage on Home-based Workers, https://www.census.gov/topics/employment/commuting/guidance/home-based-workers.html.

[14] U.S. Census Bureau, American Community Survey, 1-year estimates, 2023.

[15] U.S. Census Bureau, American Community Survey, 1-year estimates, 2023.

[16] Ben Casselman, Emma Goldberg, and Ella Koeze. "Who still works from home?" *New York Times,* March 8, 2024.

[17] Davis, Morris A., Andra C. Ghent, and Jesse M. Gregory. "Winners and Losers from the Work-From-Home Technology Boon". NBER Working Paper No. 33284. Cambridge, MA: National Bureau of Economic Research, December 2024. https://doi.org/10.3386/w33284.

Exhibit 5. Remote Worker Share within Industry, Deschutes County

INDUSTRY	REMOTE WORKER SHARE WITHIN INDUSTRY
Professional, Scientific, and Technical, and Administrative Services	45%
Wholesale Trade	35%
Information, Finance and Insurance, and Real Estate	30%
Manufacturing	23%
Health Care and Social Assistance and Education	18%
Retail Trade	10%

Source: U.S. Census Bureau, ACS 1-year 2023

Shifts in Oregon's High Growth Industries

Oregon's historically dominant timber and high-tech industries are projected to see slower job growth, despite investments such as the Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act and the Build Back Better Grant benefiting these sectors. The Oregon Employment Department expects higher-than-average employment growth in industries like healthcare, professional and technical services (specifically computer systems design services), and leisure and hospitality in Oregon over the next 10 years.[18]

Bend has seen rapid growth in management of companies[19], food and beverage manufacturing, and healthcare in the recent past while employment has declined in wood products and certain high-tech industries, as presented in Exhibit 6. These trends indicate a shift in Bend's economic structure, with high-growth sectors driving diversification away from legacy industries.

- Management of companies grew by 382% (an increase of 719 jobs), surpassing growth of the sector in Oregon (13%) and the U.S. (14%).
- Healthcare, a critical sector for both the local and regional economy, grew by 23% in Bend, also outpacing the state (7%) and national (11%) averages.
- Food and beverage manufacturing in Bend expanded by 43%, significantly outperforming the sector's growth in Oregon (6%) and the U.S. (16%).
- Traditional manufacturing sectors contracted in Bend but saw moderate growth statewide and across the U.S. Employment in wood product manufacturing in Bend

[18] Oregon Employment Department, Oregon Industry Employment Projections, 2023-2033, https://www.qualityinfo.org/data

[19] U.S. Bureau of Labor Statistics defines Management of Companies and Enterprises (North American Industry Classification System Code 55) as "establishments that hold the securities of (or other equity interests in) companies and enterprises for the purpose of owning a controlling interest or influencing management decisions or establishments (except government establishments) that administer, oversee, and manage establishments of the company or enterprise and that normally undertake the strategic or organizational planning and decision making role of the company or enterprise." For more details see https://www.bls.gov/iag/tgs/iag55.htm

decreased 37% and 33% in computer and electronic product and machinery manufacturing (industries involved in semiconductor production).

Exhibit 6. Shift in High Growth Industries, Bend, Oregon, and U.S., 2015-2022

INDUSTRY	BEND EMPLOYMENT CHANGE	BEND % CHANGE	OREGON % CHANGE	US % CHANGE
Management of Companies	719	382%	13%	14%
Food and Beverage Manufacturing	324	43%	6%	16%
Health Care	1,243	23%	7%	11%
Computer and Electronic Product and Machinery Manufacturing	-88	-33%	13%	1%
Wood Product Manufacturing	-240	-37%	4%	12%

Source: Oregon Employment Department and U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 2015-2022
Note: Food and Beverage Manufacturing combines NAICS 311 and 312; Computer and Electronic Product and Machinery Manufacturing combines NAICS 333 and 334.

Growth of Entrepreneurship and Small Businesses

Creation of small businesses, which account for 99.9% of U.S. companies and employ 46% of the workforce, are essential to Oregon's economic growth. Following decades of declining start-up activity, the pandemic spurred a surge in new business formation, which remains elevated. High inflation, interest rates, and tighter financing conditions could slow growth, but increased personal savings, home equity, remote work opportunities, and Millennials entering their entrepreneurial prime years are expected to sustain start-up activity in Oregon.[20]

Small businesses (1-25 employees) dominate Bend's economy, employing 33% of the workforce and making up 79% of all business establishments (see Exhibit 7). Large businesses (500 or more employees) also play a significant role, employing 29% of workers despite comprising only 5% of establishments. The average firm size in Bend is 60 employees, larger than in Deschutes County (44 employees) but smaller than in Jefferson and Crook counties (more than 100 employees). Industries like real estate, professional services, and other services—such as equipment and machinery repairing, grantmaking, advocacy, laundry services, and personal care services—have the highest share of small businesses. In contrast, sectors such as manufacturing, retail, and wholesale trade tend to require larger workforces with over 50 employees.

[20] Josh Lehner. "Strong Startup Activity Continues" Oregon Office of Economic Analysis, May 3, 2023. https://oregoneconomicanalysis.com/2023/05/03/strong-start-up-activity-continues/

Exhibit 7. Employment and Establishment Shares by Firm Size, Bend, 2022

Source: Oregon Employment Department, Quarterly Census of Employment and Wages, 2022

Bend's attributes, such as its abundant natural amenities and a culture of innovation, have helped transform Bend into a regional leader in fostering startups, drawing both talent and investment. Venture capital plays a role in this growth, with local initiatives such as Seven Peaks Ventures, Cascade Seed Fund, and the Bend Venture Conference Fund leading the way. Seven Peaks Ventures focuses on disruptive industries such as AI, fintech, and renewable energy, while Cascade Seed Fund has invested over $15 million in early-stage software companies since 2014, with an average investment of $200,000.[21] [22] The Bend Entrepreneur Lab helps innovators and entrepreneurs launch their businesses by acting as their "co-founders".[23] The Bend Venture Conference (BVC) Fund complements these efforts by co-investing alongside other regional funds, often identifying promising startups through the annual Bend Venture Conference, which is the largest angel investment conference in the Pacific Northwest.[24]

Public agencies, including the City of Bend, play a vital role in supporting Bend's venture capital ecosystem. Organizations like OSU-Cascades foster innovation through research and entrepreneurship programs, and Economic Development for Central Oregon (EDCO)

[21] Seven Peaks Ventures, "Investing in Category-Leading Businesses," Accessed November 2024, https://www.sevenpeaksventures.com/
[22] Cascade Seed Fund, "About Cascade Seed Fund," accessed November 2024, https://cascadeseedfund.com/.
[23] Bend Entrepreneur Lab, "Empowering Entrepreneurs in Central Oregon," Accessed November 2024, https://bendentrepreneurlab.com/.
[24] Bend Venture Conference. "The Bend Venture Conference Fund." Accessed November 2024. https://bendvcfund.com/.

connects startups with resources, mentorship, and funding opportunities to accelerate business growth.

Potential Impacts of Global Climate Change

Climate change is expected to bring significant challenges to Central Oregon, including Bend, where rising temperatures, reduced snowpack, and extreme weather events will have profound effects on ecosystems, infrastructure, and human health. Statewide, Oregon has experienced an increase in high-heat events, droughts, and wildfires over the last few decades, with projections indicating average temperatures could rise by 5°F by the 2050s and 8.2°F by the 2080s.[25]

In Bend, the annual number of dry days is projected to increase to 192 by mid-century, up from 186 in the 1990s, and the number of days above 90°F is expected to rise significantly.[26] Snowpack, critical to water availability, has already decreased, with summer streamflow in the Cascades projected to decline up to 80% by 2080.[27] These changes will directly impact Bend's water resources and energy consumption, and exacerbate risks like wildfires, flooding, and habitat disruption, in and around Bend.

The economic implications for Bend are equally significant, as climate change threatens key sectors such as agriculture, forestry, and tourism. A longer fire season and more intense wildfires have already increased the number of unhealthy air quality days 24-fold over the past decade.[28] Reduced snowpack will negatively affect winter sports, which are integral to Central Oregon's tourism economy, while increasing temperatures could drive up energy costs for cooling and heating systems. Agriculture and rangeland productivity may see short-term gains from longer growing seasons but face long-term challenges from heat stress, invasive species, and water scarcity. Adapting to these changes will require significant investment in infrastructure, land use planning, and climate resilience strategies to mitigate economic disruptions and ensure long-term sustainability for the region.

Potential impacts of increased drought and natural hazards include the following threats for economic activities:

- **Tourism**: Declining snowpack and reduced streamflow could negatively impact recreation and tourism, reducing revenues for local businesses; Wildfires and poor air quality may disrupt outdoor activities, while warmer temperatures could open opportunities for more or longer warm-weather recreation.

[25] Fleishman, E., editor. 2023. Sixth Oregon Climate Assessment. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. https://blogs.oregonstate.edu/occri/oregon-climate-assessments.
[26] Oregon Watershed Enhancement Board. 2023. Region 4: Observed and Projected Climate Changes. https://www.oregon.gov/oweb/Documents/climate-R4-variables.pdf
[27] USDA. 2019. "Climate Change Vulnerability and Adaptation in South-Central Oregon". US Forest Service. https://www.fs.usda.gov/pnw/pubs/pnw_gtr974.pdf
[28] Oregon Health Authority. 2023. Climate and Health in Oregon: 2021-2022 Report. https://sharedsystems.dhsoha.state.or.us/DHSForms/Served/le-105251_23.pdf

- **Utility Costs**: More extreme heat days and drought will drive up utility costs for households and businesses.
- **Public Health:** Increased heat waves will burden the healthcare system with more cases of heat-related illnesses, impacting worker productivity and leading to higher healthcare costs.
- **Agriculture and Water Resources**: Increased aridity and reduced snowpack will strain water availability, reducing agricultural productivity. This leads to higher costs for irrigation, potential crop losses, and impacts on farm revenue.
- **Property Damage and Insurance Costs:** Increased risk to damage from wildfire, extreme winter storms, and floods may increase insurance and repair costs for households and businesses.
- **Emergency Response:** Extreme weather events can require emergency response, increasing expenses and putting financial burden on the state, county, and city.
- **Forestry:** Higher wildfire risks will result in significant financial losses for the timber industry and could cause fluctuations in timber pricing.

3. Target Sector Analysis

This section identifies sectors that align with Bend's competitive strengths and economic priorities, ensuring sustainable growth and resilience. Using data-driven methodologies and stakeholder input, this section highlights sectors poised for expansion, balancing local needs with opportunities in regional and global markets. The selected target sectors reflect Bend's evolving economic landscape, emphasizing innovation, workforce development, and adaptability to future challenges. For additional information on methods and data, see Appendix B.

SUMMARY:

- Bend's target sector selection focused on employment growth, concentration, and competitiveness. Sectors that were prioritized in the analysis accounted for at least 1% of 2022 employment, grew faster than the citywide rate of 19% (2015–2022), and demonstrated specialization with employment concentration above 0.75, where 1.00 equals the U.S. average. Selection of target sectors also factored in stakeholder input.
- High-growth industries like construction, healthcare, and professional services showed regional advantages and comprise a large share of Bend's employment. Industries like arts, entertainment, and recreation almost doubled over the period and have higher than average employment concentration but comprises a smaller share of Bend's employment.
- Specific sectors within manufacturing and professional services emerged as key areas. This includes scientific R&D in professional services (100% employment growth between 2015-2022) and beverage manufacturing (40% employment growth and an employment concentration of 5.7 in 2022). Conversely, wood product manufacturing faced stagnation despite a relatively high employment concentration.
- Competitive effects analysis highlighted local strengths in Bend driving growth in sectors like management of companies (96% competitive growth, adding 719 jobs), recreation-related industries (94% competitive growth, adding 659 jobs), and professional and technical services (66% competitive growth, adding 1,645 jobs).
- The identified target sectors balance industries like healthcare and tourism that provide local services with export-oriented sectors such as aerospace and outdoor product manufacturing, supporting both regional stability and economic diversification.

Target Sectors Selection Process

The target sector analysis began with a comparative assessment of employment growth and concentration in Bend, utilizing 3-digit North American Industry Classification System (NAICS) industry codes.[29] Quantitative analysis focused on historical trends in employment and establishment growth, with key metrics including sector employment growth and location quotient analysis to identify regional strengths. The analysis prioritized sectors accounting for at least 1% of Bend's 2022 employment and those with employment growth exceeding Bend's overall rate of 19% (2015-2022). Competitive effects, calculated using shift share analysis, highlighted the sectors that thrive due to local factors like workforce skills and infrastructure.

Stakeholder input added qualitative insights, validating findings and helped identify opportunities in sectors such as biosciences, professional services, and specialty manufacturing. Feedback also highlighted challenges like land availability, workforce supply, and the cost of living.

ECOnorthwest narrowed final target sectors to those meeting criteria for employment concentration, growth, and competitive effects while considering sector trends provided by stakeholders. For detailed methodology and additional data, see Appendix B.

Sector Employment Growth and Concentration

One approach to understanding the strengths and weaknesses of Bend's economy is to measure the concentration of employment in a specific industry within Bend relative to another selected geography (like Oregon or the U.S.), referred to as a location quotient. Exhibit 8 compares the industry employment concentrations in Bend to the U.S., with a concentration of 1.0 indicating that the industry's share of local employment matches the U.S. average.

Industries with higher concentration have more employment in Bend than the national average, indicating a strength in employment in that industry. In Bend, the highest concentration of employment is found in the arts, entertainment, and recreation sector (1.7), indicating that employment in this industry is 70% more concentrated in Bend than nationwide, likely reflecting the city's tourism and outdoor recreation focus. Construction (1.4), retail trade (1.4), health care and social assistance (1.3), and accommodation and food services (1.3) also show specialization, further emphasizing Bend's role as a regional hub for residential and tourism-driven economic activity.

Conversely, industries such as transportation and warehousing (0.4), agriculture, forestry, fishing, and hunting (0.5), and educational services (0.5) have much lower concentrations, indicating these sectors are underrepresented in Bend compared to the national average.

[29] North American Industry Classification System standardizes how businesses classify themselves across the U.S. For more information on NAICS codes, see https://www.naics.com/search/.

When comparing Bend to Oregon's average employment concentration by industry, where a concentration of 1.0 indicates the statewide average, health care and social assistance (1.5) and professional services rise (1.4) to the top in terms of concentration. This indicates that Bend stands out within Oregon for companies within professional services and health care industries.

Exhibit 8. Employment Concentration by Industry, Bend Compared to the U.S., 2022

Source: Oregon Employment Department and U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 2022

This analysis considers employment concentration (Exhibit 8) and growth (Exhibit 3) considered at both the industry and the sector level. Beginning with the broader industry classifications, Exhibit 9 compares Bend's industry-level employment growth over 2015-2022 with the employment concentrations relative to the U.S. average for industries that have over 0.75 employment concentration.

Industries in the top-right quadrant in Exhibit 9 **demonstrate both high growth and high specialization**. Industries with the largest number of employees include retail trade, health care and social assistance, and accommodation and food services, all of which have employment concentration above 1.25, and employment growth above 25%. Professional, scientific, and technical services and construction have grown faster than the largest industries, and account for a significant amount of Bend's employment. Additionally, professional, scientific, and technical services have become more concentrated in Bend since 2015, increasing from 0.85 to 1.04 in 2022, signaling competitive regional advantages.

In comparison, management of companies[30] and arts, entertainment, and recreation experienced the highest employment growth (382% and 108%, respectively) but are relatively small industries with 907 and 1,478 employees, respectively. Additionally, arts, entertainment, and recreation has the highest employment concentration (1.7).

Exhibit 9. Employment Concentration and Growth, Bend Compared to U.S., 2015-2022

Note: Numbers in parentheses show Bend's 2022 sector employment. Chart presents industries defined by 2-digit NAICS codes and that have 0.75 or higher employment concentration.
Source: Oregon Employment Department and U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 2022

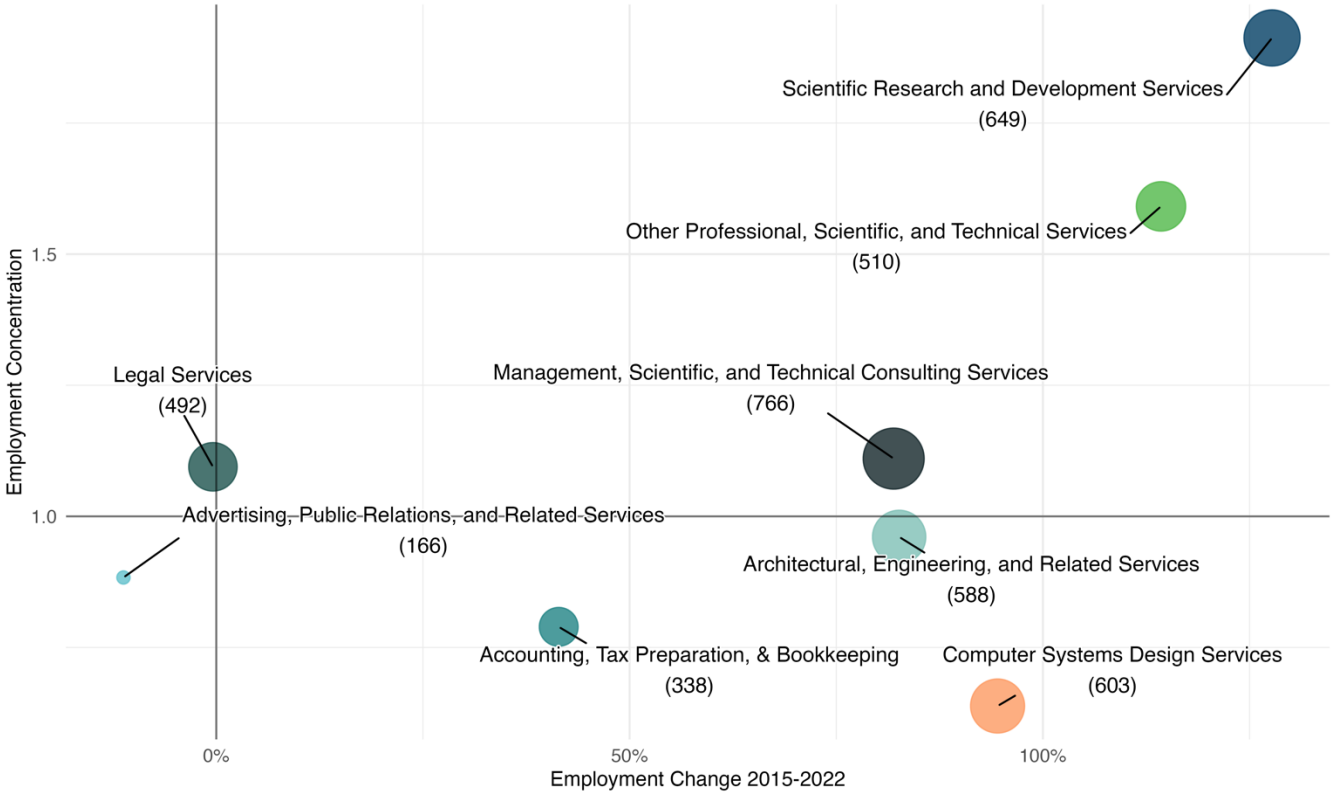
Professional, scientific, and technical services and manufacturing industries encompass many different types of businesses and warrant further disaggregation to better inform the

[30] The management of companies industry is not presented in Exhibit 9 to avoid distortion of scale.

target sector selection. Exhibit 10 and Exhibit 11 show the employment concentration and growth for the sub-sectors that comprise professional, scientific, and technical services and manufacturing.

Exhibit 10 shows growth in scientific research and development services, which demonstrates a concentration of 1.9 and a growth rate of over 100%, indicating expansion and a regional specialization. As noted in multiple stakeholder interviews, research and development in biosciences has emerged as a core strength in Bend. Similarly, computer systems design, professional consulting services, and architectural and engineering services are less regionally specialized but have seen significant growth, **marking them as newer and emerging sectors** in Bend's economy. In contrast, sectors such as accounting, tax preparation, payroll, and legal services exhibit lower growth and less regional specialization.

Exhibit 10. Employment Concentration and Growth in Professional Services, Bend Compared to U.S., 2015-2022



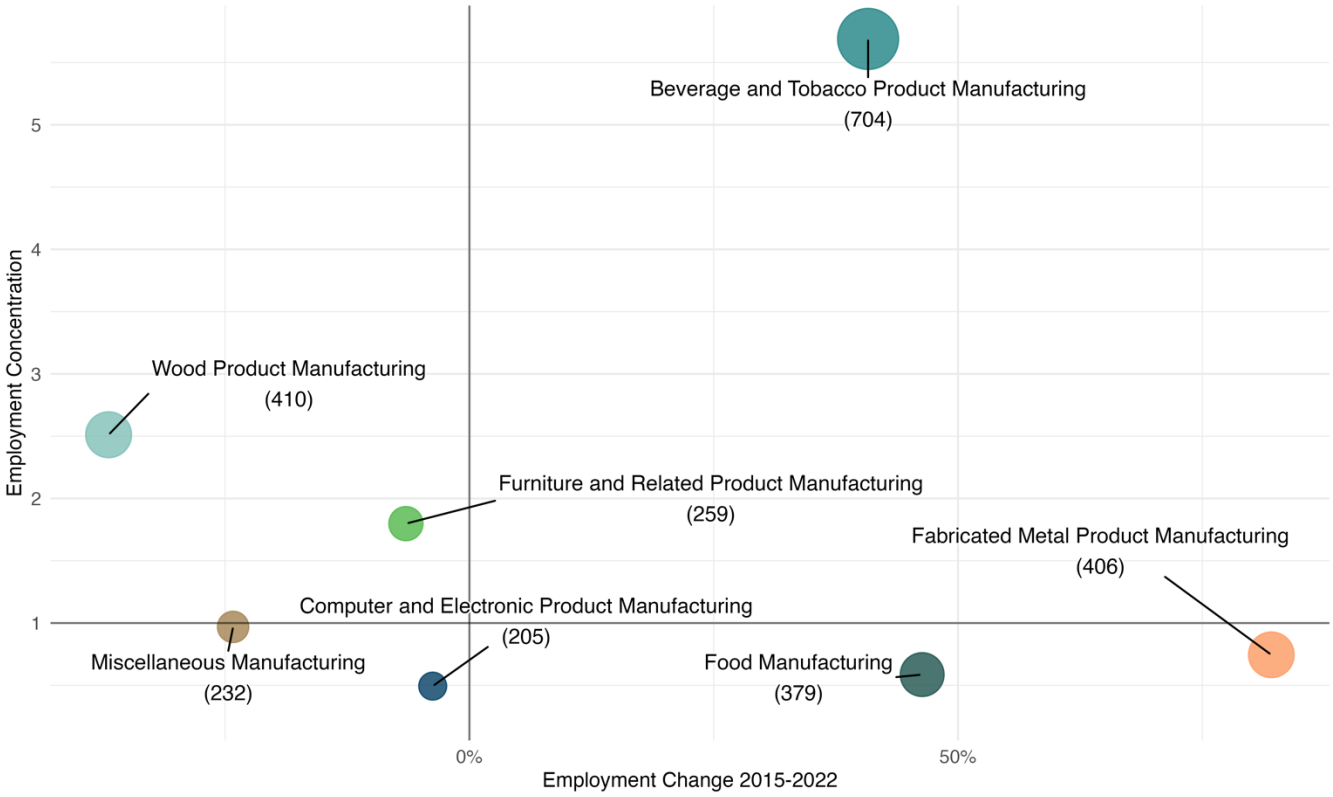
Note: Numbers in paratheses show Bend's 2022 sector employment. Sectors shown above are defined by 4-digit NAICS codes. Sectors with 150 employees or less are excluded.

Source: Oregon Employment Department and U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 2022

Within manufacturing (in Exhibit 11), beverage manufacturing stands out with a concentration of 5.7 and employment growth of approximately 40%, reflecting its strong specialization and rapid expansion in the region. Food manufacturing shows moderate specialization (concentration above 0.6) with growth of 46%, suggesting its increasing importance to the local economy. Related to food and beverage manufacturing, the food and

beverage retailer sector, with 1,640 jobs in 2022, and an employment concentration of 1.4, has increased by 25% and has a high competitive effect (see Exhibit 13). Other highly concentrated sectors, such as other wood product manufacturing with a concentration of 2.4, demonstrate specialization but have experienced stagnant or declining employment, indicating challenges in maintaining growth.

Exhibit 11. Employment Concentration and Growth in Manufacturing, Bend Compared to U.S., 2015-2022



Note: Sectors shown above are defined by 3-digit NAICS codes. Sectors with 150 employees or less are excluded.

Source: Oregon Employment Department and U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 2022

Exhibit 12 groups the sectors in Bend's economy that have more than 0.5% of Bend's employment into four categories—stable, established, emerging, and leading. The categories are based on growth rates and concentration relative to U.S. benchmarks and to Bend's average employment growth. This classification provides insight into each sector's role within the local economy and its potential for future development.

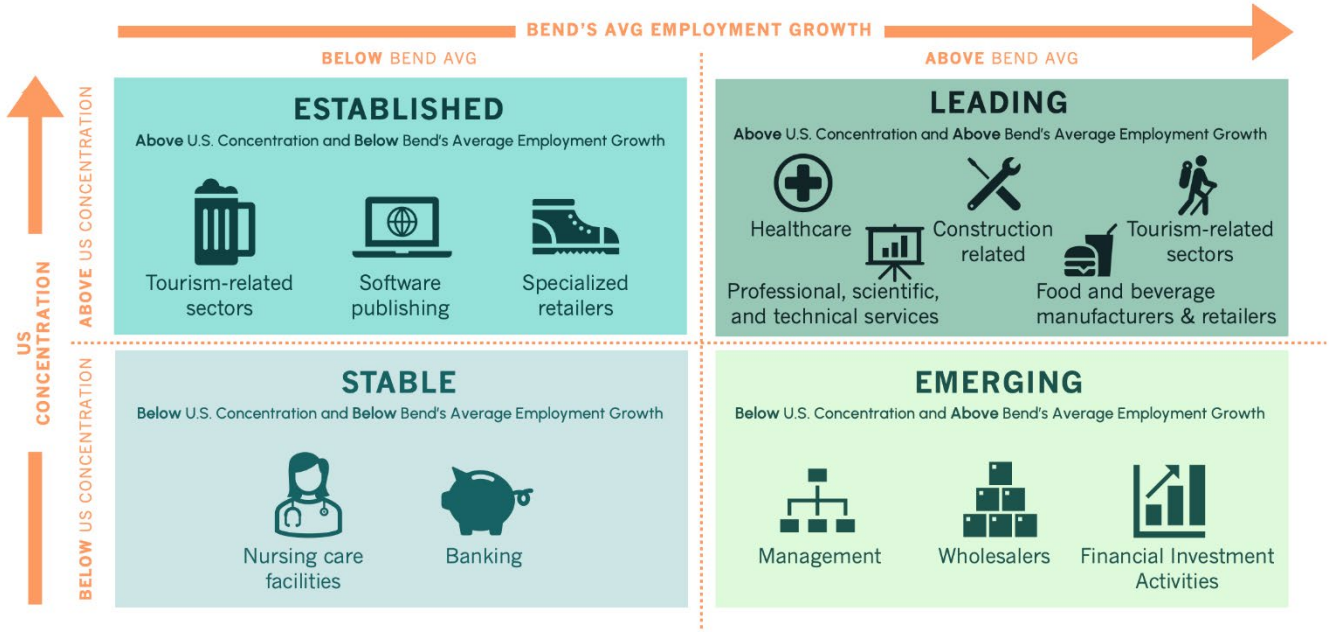
1. **Established Sectors**: Industries in this category have above-average concentration but below-average growth. They represent mature sectors that are already well-integrated into Bend's economy but are growing more slowly than the local average. Examples include tourism-related sectors, specialized retailers, and software publishing.

2. **Stable Sectors**: These industries have below-average growth and concentration, indicating limited specialization or competitive advantage in Bend. Examples include nursing care facilities and banking. While these sectors may provide steady employment, they are not major drivers of local economic growth.

3. **Leading Sectors**: Leading industries have both above-average growth and concentration, making them pivotal to Bend's economic strength. These include healthcare, professional, scientific, and technical services, construction-related industries, food and beverage manufacturers and retailers, and tourism-related sectors. These industries combine robust expansion with established regional specialization, highlighting their importance to Bend's economy.

4. **Emerging Sectors**: These sectors show strong employment growth despite having below-average concentration. Their rapid growth indicates increasing competitiveness, and they represent opportunities for diversification and expansion. Key examples include management, wholesalers, and financial investment activities.

Exhibit 12. Sector Specialization and Growth



Source: ECOnorthwest, 2024

Sector Competitive Effects

Economic competitiveness highlights a region's capacity to drive industry growth through unique local advantages rather than relying on broader national or industry trends. In Bend, factors such as an entrepreneurial culture, strong regional demand, and a tourism-driven economy have enabled several sectors to outperform broader trends. Analyzing the share of employment growth tied to local factors reveals how Bend's strengths contribute to its thriving industries. For further details on this analysis, see Appendix B.

Exhibit 13 presents 2022 employment level, nominal employment change from 2015, and the share of that growth attributable to Bend's competitive effect for the top 10 sectors that have a competitive effect over 50% and the highest nominal changes in employment.

A competitive effect equal to 100% indicates that all the employment growth in Bend between 2015 and 2022 is attributable to local factors. An effect greater than 100% indicates that at the national level employment in the sector declined while it increased in Bend (see Appendix B for details).

Several industries in Bend demonstrate significant shares of employment growth attributable to local competitive factors, emphasizing the city's unique economic strengths. For example, management of companies and enterprises experienced a 96% share of growth due to competitive effects, adding 719 jobs between 2015 and 2022. Similarly, the amusement, gambling, and recreation industries achieved 94% of their employment growth from local factors and added 659 jobs over the period.

Other sectors with a high proportion of growth attributable to Bend's competitive effect include merchant wholesalers, nondurable goods (86%), food and beverage retailers (85%), and truck transportation (92%). Sectors like professional, scientific, and technical services (66%), construction of buildings (67%), and food services and drinking places (61%) have a lower share of employment growth due to competitive factors but have experienced a large nominal growth in employment.

Exhibit 13. Top 10 Sectors with High Competitive Effects Relative to U.S., Bend, 2015-2022

SECTOR	2022 AVERAGE ANNUAL EMPLOYMENT	2015-2022 NOMINAL EMPLOYMENT CHANGE	SHARE OF GROWTH ATTRIBUTABLE TO COMPETITIVE EFFECT
Professional, Scientific, and Technical Services	4,192	1,645	66%
Food Services and Drinking Places	5,832	742	61%
Management of Companies and Enterprises	907	719	96%
Amusement, Gambling, and Recreation Industries	1,318	659	94%
Construction of Buildings	1,422	578	67%
Food and Beverage Retailers	1,640	330	85%
Merchant Wholesalers, Nondurable Goods	639	205	86%
Fabricated Metal Product Manufacturing	406	183	102%
Truck Transportation	352	179	92%
Food Manufacturing	379	120	74%

Source: Oregon Employment Department and U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 2022

Summary of Sectors with High Growth, Concentration, or Competitive Effects

The analysis to identify sectors with strong economic potential in Bend used the following criteria:

- **High Growth:** Sectors with employment growth exceeding Bend's citywide average (19%) between 2015 and 2022.
- **High Concentration:** Sectors with employment levels more concentrated locally than the U.S. average (location quotient greater than 1.0).
- **Significant Employment:** Sectors accounting for more than 0.5% of Bend's total employment in 2022.
- **Competitive Advantage:** A share of employment growth attributable to local competitive effects exceeding 50%.

Exhibit 14 presents the subset of sectors that meet this criterion and their competitive effect, growth, and concentration. As presented throughout this section, many sectors are vital to Bend's economy but highlighting those that meet all criteria helps focus the final proposed target sector list. Additionally, understanding the wage dynamics across the sectors meeting the criteria informs discussions about equity and economic well-being, ensuring that growth benefits a broad segment of the community.

Exhibit 15 details the associated average annual wage levels in 2022 for the subset of sectors meeting the criteria. At the lower end of the wages range are food services and drinking places ($29,100), and amusement, gambling, and recreation ($25,300). Professional, scientific, and technical services, ambulatory health care services, and construction of buildings are at the high end of the range and combine their higher-than-average wages with competitive effects, growth, or concentration advantages.

Exhibit 14. High Competitive Effect, Growth and Concentration Sectors, Bend

SECTOR	SHARE OF GROWTH ATTRIBUTABLE TO COMPETITIVE EFFECT	2015-2022% GROWTH	2022 EMPLOYMENT CONCENTRATION
Amusement, Gambling, and Recreation Industries	94%	100%	2.1
Food and Beverage Retailers	85%	25%	1.4
Construction of Buildings	67%	68%	2.1
Professional, Scientific, and Technical Services	66%	65%	1.0
Repair and Maintenance	54%	20%	1.0
Real Estate	45%	31%	1.1

Source: Oregon Employment Department and U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 2022

Exhibit 15. Wages for High Competitive Effect, Growth and Concentration Sectors, Bend, 2022

Source: Oregon Employment Department, Quarterly Census of Employment and Wages, 2022

Proposed Target Sectors

Exhibit 16 shows the proposed target sectors based on the information presented in the report, including consideration of regional economic trends, stakeholder input, and sector specialization analysis. The result of the analysis presented in this report is a refined list of target sectors that leverage Bend's unique assets, including its skilled workforce, natural resources, and regional connectivity.

The proposed target sectors for Bend represent a strategic balance between locally serving and export-oriented sectors, reflecting the city's dual role as a regional hub and a contributor to broader markets. Sectors like healthcare and wellness, construction, and tourism primarily serve local and regional demand, addressing the needs of residents, businesses, and visitors. These sectors are essential for maintaining Bend's quality of life and supporting its growing population. In contrast, sectors such as manufacturing (high-tech[31], aerospace, food and beverage, and outdoor products) and professional and business services (R&D bioscience, computer systems design, software publishing, and architecture) are more export-oriented, driving economic diversification by producing goods and services for national and global markets. This balance ensures a resilient economy, with locally focused sectors providing stability and export-oriented industries generating external revenue and fostering innovation. Other sectors exist in-between locally serving and export-oriented depending on the businesses that comprise them. For example, management of companies represents headquarters of businesses and thus depends on the type of business being conducted.

To ensure alignment with statewide and regional efforts, we considered the Target Industry Groups selected by Business Oregon as well as the sectors highlighted in the Central Oregon Intergovernmental Council (COIC) Comprehensive Economic Development Strategy (CEDS) and the OSU-Cascades Innovation District Master Plan.

- **Business Oregon** identifies seven **Target Industry Groups** that support Oregon's economic growth, innovation, and high wage jobs:[32]
  - **Metals & Machinery** includes advanced materials, aerospace and defense, and machinery manufacturing, with competitive export-driven growth. Aerospace manufacturing emerges as one of Bend's target sectors within Technology and Innovation, presented in Exhibit 16.
  - **Business Services** includes company management, customer support, and professional, scientific, and technical services, which is the "largest fastest growing emerging industry in Oregon". This Target Industry Group overlaps considerably with Bend's economic strengths in company management and

[31] In this report, ECOnorthwest defines high-tech manufacturing as advanced manufacturing and clean-technology sectors. Historical economic data does not show these sectors as particularly concentrated or competitive in Bend, but through input from stakeholders and future investment opportunities (such as the Innovation District), we identify them as important to Bend's economic growth.

[32] Business Oregon. *Oregon's Target Industries.* N.d. https://www.oregon.gov/biz/programs/homeareas/byboregon/targetindustries/Pages/default.aspx

professional and technical services, with these sectors appearing in Health Systems, Build for Growth, and Technology and Innovation.

- **Food & Beverages** includes manufacturing of craft beer and wine, and diverse food products; these industries foster rural economic growth and exports. Bend's beverage manufacturing employment is highly concentrated compared to Oregon and U.S. averages and supports the Recreation and Tourism group.
- **Forestry & Wood Products** positions Oregon as an internationally recognized producer of softwood lumber production. Rural Oregon has the highest concentration of forestry and wood product employment out of all the Target Industry Groups. In Bend, wood product and furniture manufacturing support the Build for Growth group.
- **High Technology** includes semiconductors and software IT and defines one of Oregon's key competitive advantages. Oregon hosts major companies like Intel, Tektronix, and HP which have helped the creation of hundreds of start-ups. Bend has high employment concentration in software publishing and computer system design services supporting the Health Systems and Technology and Innovation groups.
- **Outdoor Gear & Apparel** includes apparel, footwear, and outdoor gear manufacturing, wholesaling, and corporate headquarters. Similar to the High Technology Target Industry, growing companies in this industry benefit from the presence of recognized brands like Nike and Columbia. Although Bend's employment in outdoor gear and apparel manufacturing is small, Bend has a history of design and innovation in these industries and has employment concentration in both wholesale and retail sectors related to sporting goods.
- **Bioscience** is the newest Target Industry and includes medicine manufacturing and wholesaling, research and development, and medical devices. Oregon exports of bioscience-related products and services has increased significantly in the last decade. Bioscience manufacturing and delivery are also emerging in Bend, with scientific research and development services growing both in terms of overall employment and concentration.

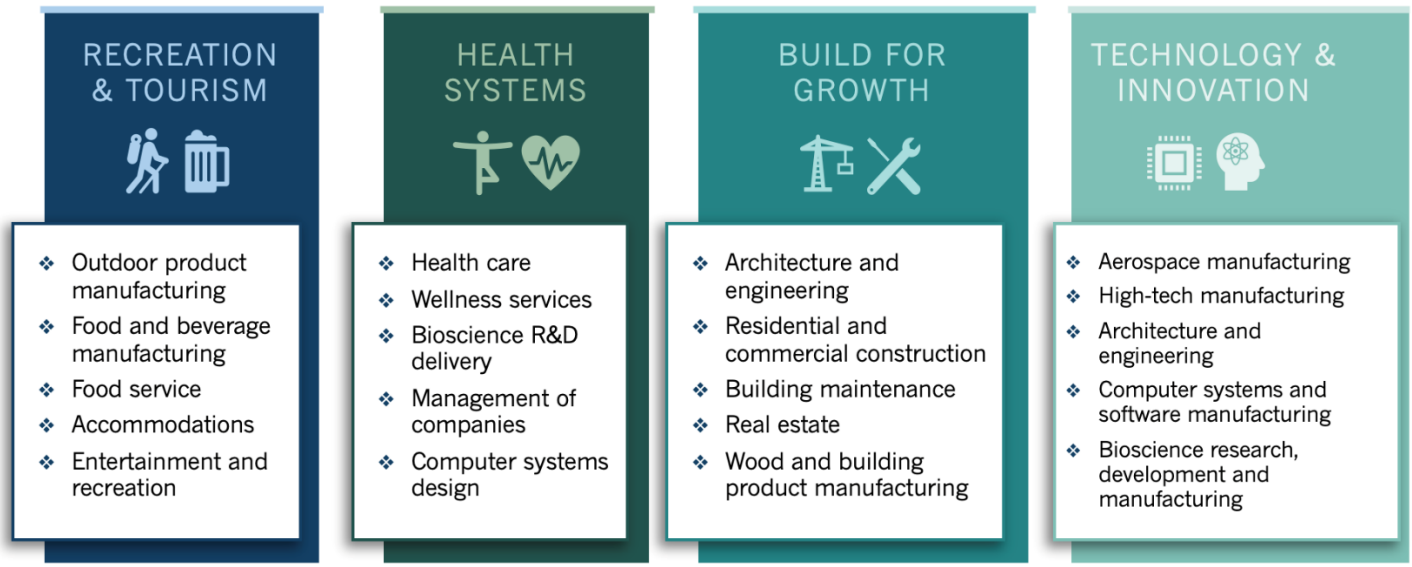
- The **CEDS** highlights innovative and emerging sectors critical to the region's economic growth. These include advanced manufacturing, biosciences, technology, aviation/aerospace, outdoor equipment and apparel, and health sciences.[33] The proposed target sectors in Exhibit 16 align with the sectors identified in the CEDS, with these sectors integrated into the cross-sector groupings, with additional target sectors identified as growth opportunities in Bend.
- The **OSU-Cascades Innovation District** will prioritize space and resources to support key sectors including high-tech (software and hardware), biotechnology, healthcare, outdoor equipment and apparel design and manufacturing, aerospace, renewable

[33] Central Oregon Intergovernmental Council. *2024–2028 Central Oregon Comprehensive Economic Development Strategy*. June 6, 2024. https://www.coic.org/wp-content/uploads/2024/07/Final-CEDS-2024-6-6-24.pdf.

energy, breweries, and other tourism-related sectors.[34] [35] The District aims to provide support to early-stage entrepreneurs, partner with businesses, and provide hands-on learning opportunities within these sectors.[36] The proposed target sectors in Exhibit 16 align with the sectors identified for the Innovation District. The focus on entrepreneurship of expected economic development activities supported by the Innovation District fits with Bend's strengths for growing entrepreneurial businesses.

ECOnorthwest categorizes selected sectors into cross-sector groupings to provide a broader perspective on the sectors' complementary functions and growth potential: Recreation and Tourism, Health Systems, Build-for-Growth sectors, and Technology and Innovation. Sectors computer systems design, and bioscience appear across groupings because they support multiple functions across the economy. This approach ensures flexibility in the specific sectors within groupings as Bend continues to refine economic development strategies and incentives in the future.

Exhibit 16. Proposed Target Sectors



Source: ECOnorthwest, 2024

Considerations for Policy Discussion

Reviewers: This will be filled in in the next draft of the report.

[34] Oregon State University-Cascades. *Innovation District: Creating a Hub for Innovation and Economic Growth.* Bend, OR: OSU-Cascades, January 3, 2023. https://osucascades.edu/sites/osucascades.edu/files/innovation_district_pdf_2023-01-03_lwv.pdf.
[35] Rebecca Robinson (Oregon State University). Interview by ECOnorthwest. November 12, 2024.
[36] Oregon State University. *Capital Project: OSU-Cascades Phase II and Innovation District.* August 2023. https://leadership.oregonstate.edu/sites/leadership.oregonstate.edu/files/2023-08/bot-5b-capital_project_sgii_osu-cascades_phase_ii_and_id.pdf.

Appendix A: Regional and Local Trend Data

National and Statewide Trends

Economic development in Bend over the next 20 years will occur in the context of long-run national and state trends. The most important of these trends are as follows:

- **Slower labor force growth will be offset by increased productivity gains.** According to the Oregon Office of Economic Analysis (OEA), economic growth is determined by two key factors: the number of workers and their productivity levels. While Oregon's labor force growth is slowing due to low birth rates and pandemic related migration changes, this will be offset by increased productivity gains as businesses seek to operate more efficiently in a tight labor market.
    - Employment in Oregon is expected to increase but at a slower rate than it has in the past. The OEA forecasts that total nonfarm employment in Oregon will increase by 5.1% from 1.95 million in 2022 to 2.05 million in 2027. Similarly, total *private* nonfarm employment is projected to grow by 5.4% from 1.65 million in 2022 to 1.74 million in 2027.[37]
    - Nationally, growth in productivity (as measured by output per hour of labor input) was slower between 2005 and 2018, averaging an annual rate of 1.3%, compared to 2.1% over the longer period from 1947 to 2018.[38] However, productivity experienced a rebound, rising in 2019-2020 before dipping in 2021-2022, then increasing by 5% in Q3 2023. [39] In Oregon specifically, productivity grew by nearly 3% per year from 2019-2022.[40]

      Looking ahead, Oregon's economic growth over the next decade is anticipated to be driven by faster productivity gains. These gains are expected to stem from an increase in start-ups, possible increased federal investment, and the transformative potential of generative artificial intelligence (AI) technologies, which will help offset the impact of a slower-growing labor force.[41]

[37] Oregon Economic Analysis, Oregon Economic and Revenue Forecast, March 2024. Vol. XLIV, No. 1. Release date February 2024, https://www.oregon.gov/das/oea/Documents/OEA-Forecast-0324.pdf
[38] Bureau of Labor Statistics. "The U.S. Productivity Slowdown: The Economy-Wide and Industry-Level Analysis". *Monthly Labor Review.* April 2021. https://www.bls.gov/opub/mlr/2021/article/the-us-productivity-slowdown-the-economy-wide-and-industry-level-analysis.htm.
[39] Bureau of Labor Statistics. News Release. December 2023 https://www.bls.gov/news.release/pdf/prod2.pdf
[40] Lehner, Josh. "State Productivity and Labor Growth – Graph of the Week." *Oregon Office of Economic Analysis,* August 25, 2023. https://oregoneconomicanalysis.com/2023/08/25/state-productivity-and-labor-growth-graph-of-the-week/.
[41] Oregon Economic Analysis, Oregon Economic and Revenue Forecast, March 2024. Vol. XLIV, No. 1.

- **Manufacturing remains an important part of Oregon's economy.** Between 2010 and 2019, Oregon added 34,000 manufacturing jobs, an increase of 21%. Despite a decrease of about 5,500 jobs (3%) between 2019 and 2022, manufacturing remains a crucial component of Oregon's economy.[42]

  Oregon's manufacturing sector grew slightly faster than the national average between 2010 and 2022, with 9.9% growth compared with the national average of 8.4%. The sectors with the largest shares of manufacturing employment in Oregon are computer and electronics components, food manufacturing, wood products, and fabricated metals and machinery.[43]

- **Shifts in Oregon's high growth industries.** Looking ahead, the state's traditionally strong timber and high-tech industries are expected to experience slower job growth in the future. While the semiconductor industry will benefit from the CHIPS Act investments, employment gains are expected to lag productivity increases.[44][45] Similarly, the timber sector is expected to remain under pressure from both market-based conditions and federal regulations. However, investments like the Economic Development Administration's $41.4 million Build Back Better Grant to the Oregon Mass Timber Coalition are expected to benefit the industry and potentially drive job growth.[46]

  Despite slowing employment growth in the high-tech and timber industries, many of the state's other larger industries like management of companies, food/beverage manufacturing, published software, and healthcare are expected perform well over the next decade. Other opportunities will come in industries where Oregon has less employment currently. These industries, like consulting, computer system design, financial investment, and scientific R&D, are expected to grow quickly in the decade ahead.[47]

- **Increases in automation across sectors.** Automation has been a long-running trend in employment, leading to productivity gains across sectors. Additionally, the enhancement of artificial intelligence (AI) is expanding automation possibilities beyond routine tasks to jobs previously thought infeasible to automate, such as office and cognitive roles (however, complete job replacement due to AI is expected to be minimal with task efficiencies and a shifting of tasks within jobs as

[42] Oregon Employment Department Covered Employment and Wages, 2010 to 2022
[43] Oregon Employment Department, Made in Oregon: A profile of the State's Manufacturing Sector, August 2022.
[44] Oregon Economic Analysis, Oregon Economic and Revenue Forecast, March 2024. Vol. XLIV, No. 1.
[45] The federal CHIPS Act (2022) was passed to spur investment in advanced manufacturing, including supply chain improvements and research and development. Because of Oregon's prominent semi-conductor industry, the State has taken a proactive approach by initiating a coordinated strategy for pursuing and leveraging CHIPS funds.
[46] Oregon Mass Timber Coalition, https://www.masstimbercoalition.org/
[47] Oregon Economic Analysis, Oregon Economic and Revenue Forecast, March 2024. Vol. XLIV, No. 1.

more likely outcomes).[4849] The U.S. Government Accountability Office (GAO) reports that automation could be widespread, with anywhere from 9% to 47% of jobs being automated in the future according to academic research.[50]

The GAO identified that jobs requiring a blend of soft skills (management, interpersonal), process skills, and technical expertise face lower automation risks. Most of the top 20 in-demand jobs share this mixed skillset trait, including nurse practitioners, statisticians, occupational therapy assistants, home health aides, physical therapist assistants, medical managers, physician assistants, information security analysts, and data scientists, among others.[51] Lower-wage jobs are the most likely to be automated. The GAO reported that over 80% of jobs paying less than $20 per hour are susceptible to automation over the next two decades. About 30% of jobs paying $20 to $40 per hour and 4% of jobs paying $40 or more per hour were also identified as at risk.[52]

Oregon's automation trajectory mirrors national trends, with lower and middle-wage jobs facing higher automation potential. The state's tight labor market may further drive productivity and efficiency gains bolstered by AI's transformative potential.

- **The aging of the baby boomer generation and the need for replacement workers.** As the baby boomer generation continues to retire, the number of Social Security recipients is expected to increase from over 65 million in 2022 to over 86 million in 2045, a 32% increase. In 2022, there were 36 Social Security beneficiaries per 100 covered workers, but by 2045, there will be 45 beneficiaries per 100 covered workers. This will increase the percent of the federal budget dedicated to Social Security and Medicare.[53]

  While the Bureau of Labor Statistics (BLS) projects total U.S. employment to grow by 4.7 million jobs from 2022 to 2032, this job growth is unlikely to be sufficient to replace all the baby boomer retirees leaving the workforce during that period. The BLS estimates there will be 18.6 million annual job openings arising from the need to replace retiring workers and workers changing occupations, in addition to openings from newly created positions.[54] The sectors expected to grow the fastest

[48] BLS, Growth Trends for Selected Occupations Considered at Risk from Automation, July 2022, https://www.bls.gov/opub/mlr/2022/article/growth-trends-for-selected-occupations-considered-at-risk-from-automation.htm
[49] Manhattan Strategy Group, Job Automation Risk and the Future of Skills: Skills and Competency Change in the U.S. Workforce, May 2023, https://www.dol.gov/sites/dolgov/files/OASP/evaluation/pdf/FutureofSkillsLitScan-20230515.pdf
[50] Government Accountability Office, Workforce Automation, August 2022, https://www.gao.gov/assets/gao-22-105159.pdf
[51] Government Accountability Office, Workforce Automation, August 2022.
[52] Executive Office of the President. (2016). Artificial Intelligence, Automation, and the Economy.
[53] The Board of Trustees, Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds, 2023 https://www.ssa.gov/oact/TR/2023/tr2023.pdf
[54] Bureau of Labor Force Occupational Separations and Openings, 2022-2032 https://www.bls.gov/emp/tables/occupational-separations-and-openings.htm

are: health care support, computer and mathematical occupations, healthcare practitioners, and community and social service.[55]

- **Growth of entrepreneurship and small businesses.** The creation of new businesses plays a vital role in driving Oregon's economic growth. Start-ups generate employment opportunities, introduce innovative products and services, and help better serve local communities. According to the 2023 Small Business Profile from the U.S. Small Business Administration Office of Advocacy, small businesses (defined as having between zero and 500 employees) account for 99.9% of total businesses in the United States and employ 46% of the American workforce. Oregon's performance in early-stage entrepreneurship activity, as measured by the Kauffman Early-Stage Entrepreneurship (KESE) Index, ranked 25th in the country in 2020. [5657]

  Start-up activity had been trending down for decades in Oregon and across the nation leading up to the pandemic, but since the pandemic, new business formation has increased and appears to be maintaining this higher rate.[58] In terms of outlook for startups, several key factors are at play. High inflation, rising interest rates, and recession risks, along with tighter venture capital and banking lending conditions will likely slow new business formation. However, several favorable factors could mitigate these impacts and support continued strength in entrepreneurship and small business formation in Oregon. These include increased personal savings and home equity levels, which are common funding sources for new businesses, along with the shift towards remote work opportunities and the large Millennial generation entering their prime entrepreneurial years (late 30s and early 40s, according to Census Bureau research).[59]

- **Continued transformation of retail.** In the last two decades, retail sales by e-commerce and warehouse clubs/supercenters (a lower-cost model to the traditional department store) have increased steadily. Online retail purchases increased from about 6% of all retail purchases in 2014 to about 16% of retail purchases in 2023.[60] Ultimately, the growth in online shopping and the increasing dominance of large supercenters has made it difficult for small and medium-sized retail firms (offering a narrower selection of goods) to compete. Declining net profits and increased competitive pressures have led many well-known retailers

[55] Bureau of Labor Statistics Employment Projections – 2022-2032, September 2023 https://www.bls.gov/news.release/pdf/ecopro.pdf
[56] Kauffman Foundation. *Kauffman Indicators of Entrepreneurship*. Early-Stage Entrepreneurship. The Kauffman Index, Oregon. https://indicators.kauffman.org/.
[57] This index comprises four statistics: the rate of new entrepreneurs, the opportunity share of new entrepreneurs, startup density, and startup early survival rate.
[58] Josh Lehner. "Strong Startup Activity Continues" Oregon Office of Economic Analysis, May 3, 2023. Retrieved from https://oregoneconomicanalysis.com/2023/05/03/strong-start-up-activity-continues/
[59] Josh Lehner. "Strong Startup Activity Continues" Oregon Office of Economic Analysis, May 3, 2023. Retrieved from https://oregoneconomicanalysis.com/2023/05/03/strong-start-up-activity-continues/
[60] U.S. Census Bureau News, Quarterly Retail E-Commerce Sales, 4th Quarter 2023 https://www.census.gov/retail/mrts/www/data/pdf/ec_current.pdf

(e.g., JCPenney, Macy's, Sears) to declare bankruptcy or to scale back their operations.

In the future, the importance of e-commerce will likely continue to grow. However, despite the highly publicized closures of brick-and-mortar stores, physical retail is likely to remain an important part of the retail sector as well. Since modern consumers are increasingly price sensitive, less brand loyal, and (since the advent of internet) able to substitute between retailers easily, retailers must be nimble and able to adjust to the changing needs of their customers if they are to remain competitive. The types of brick-and-mortar retail and related services that are likely to remain viable are those offering goods that consumers prefer to purchase in person or goods that are difficult to ship and return such as large furniture items. Additionally, retailers specializing in groceries, personal goods that are needed immediately, restaurants, and experiential offerings like entertainment or social activities are expected to maintain their presence. According to the Urban Land Institute, large retailers such as Macy's, Nordstrom, Kohl's, and Ikea are experimenting with downsizing storefronts to operate spaces that can be flexible to changing consumer needs. These locally scaled shops feature in-person merchandise and services that are in demand for modern consumers: curated inventory, tailored services, and e-commerce fulfillment.[61]

- **Changing places where work is being done.** The COVID-19 pandemic accelerated the trend of remote work. According to the Bureau of Labor Statistics' American Time Use Survey, the share of employees working from home rose from 24% in 2019 to 34% in 2022. [62] However, the ability to work remotely is not equally distributed. Those most likely to have remote work opportunities tend to have higher educational attainment, be white or Asian, and be over 25 years old.[63] This uneven access to remote work raises equity concerns, as certain demographic groups may be disadvantaged in accessing these flexible work arrangements.

  Remote work trends have consequences for downtown health and recovery. OEA found that downtown recoveries are not driven by regional economic changes but rather are impacted by the strength of three components: workers, residents, and visitors.[64] If a significant portion of previous downtown workers are now working remotely from other locations, downtowns need to capture or bolster resident and visitor spending to counteract this shift.

  Recent studies show that increases in remote work reshaped demand for housing, with workers favoring larger homes in suburban and rural areas, driving up prices in these regions while lowering demand in urban cores. This redistribution benefits some local economies but can exacerbate affordability issues in high-demand

[61] Holly Dutton. "More Retailers Are Rolling out Small-Format Stores" *Urban Land Institute*, January 8, 2024. https://urbanland.uli.org/economy-markets-trends/more-retailers-are-rolling-out-small-format-stores
[62] BLS, American Time Use Survey, 2023, https://www.bls.gov/news.release/atus.nr0.htm
[63] Ben Casselman, Emma Goldberg, and Ella Koeze. "Who still works from home?" *New York Times,* March 8, 2024.
[64] Oregon Office of Economic Analysis, Downtown Recoveries 2023 Update, https://oregoneconomicanalysis.com/2023/07/18/downtown-recoveries-2023-update/

areas.[65] In the 2024 paper, *Winners and Losers from the Work-from-Home Technology Boon,* researchers explore how the increase in work-from-home jobs impacts different types of workers.[66] They categorize workers into three groups: those who cannot work remotely, those who can adopt hybrid schedules, and those who work fully remotely. The rise of remote work increases housing demand for remote-capable workers, driving up housing prices due to limited housing supply. While remote workers benefit from increased productivity and flexibility, workers in jobs that cannot be done remotely face challenges. These workers still need housing but do not experience the same productivity boost, meaning their quality of life (a term economists call *welfare)* may decline even if their income rises slightly.

- **Continued increase in demand for energy even as the sources supplying that energy shifts.** The 2022 Inflation Reduction Act aims to drive increased investments in climate and energy projects across the United States.[67] As a result of the renewable energy investments and subsidies introduced by this legislation, the nation's energy consumption pattern is anticipated to undergo a shift over the coming years. There is an expected move away from traditional fossil fuels like crude oil and natural gas towards renewable energy sources.[68]

  However, this shift is not expected to reduce overall energy consumption. From 2022 to 2050, the U.S. Energy Information Administration (EIA) estimates that total energy consumption will rise due to population growth and economic expansion outpacing efficiency gains. This increasing demand is anticipated to be driven primarily by the industrial sector and to a lesser extent, transportation.

- **Impact of rising energy prices on commuting patterns.** As energy prices increase over the planning period, transportation energy consumption is expected to shift to electric or fuel-efficient vehicles.[69] The share of electric vehicles is expected to grow from less than 6% in 2022 to 19% in 2050.[70] The EIA estimates an 8% increase in transportation energy consumption partially attributable to increasing vehicle miles travels (VMT) that offset efficiency upgrades. With expected increases in fuel economy, people may commute farther while consuming less

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[65] Delventhal, Matt, and Andrii Parkhomenko. "Spatial Implications of Telecommuting." SSRN, March 27, 2023. https://doi.org/10.2139/ssrn.3746555; Gupta, Arpit, Vrinda Mittal, and Stijn Van Nieuwerburgh. "Work From Home and the Office Real Estate Apocalypse." NBER Working Paper No. 30526, September 2022. https://doi.org/10.3386/w30526; Howard, Greg, Daniel Liebersohn, and Adam Ozimek. "The Short- and Long-Run Effects of Remote Work on U.S. Housing Markets." Economic Innovation Group, November 2022. https://eig.org/wp-content/uploads/2022/11/The-Short-and-Long-Run-Effects-of-Remote-Work-on-U.S.-Housing-Markets.pdf; Van Nieuwerburgh, Stijn. "The Remote Work Revolution: Impact on Real Estate Values and the Urban Environment." NBER Working Paper No. 30662, November 2022. https://doi.org/10.3386/w30662.

[66] Davis, Morris A., Andra C. Ghent, and Jesse M. Gregory. “Winners and Losers from the Work-From-Home Technology Boon”. NBER Working Paper No. 33284. Cambridge, MA: National Bureau of Economic Research, December 2024. https://doi.org/10.3386/w33284.

[67] Energy Information Administration, Inflation Reduction Act of 2022

[68] Energy Information Administration, Inflation Reduction Act of 2022

[69] Energy Information Administration, 2023, *Annual Energy Outlook 2023 with Projections to 2050*, U.S. Department of Energy, March 2023.

[70] Energy Information Administration, 2019, *Annual Energy Outlook 2019 with Projections to 2050*, U.S. Department of Energy, January 2019.

energy. Nationally, VMT for passenger vehicles is forecasted to increase between 12% and 33% through 2050.[71] Lower-income households may face financial barriers to efficiency upgrades and tend to have longer commutes, which may force them to face the brunt of rising energy prices.

- **High rates of inflation.** For the last several decades, inflation rates have generally stayed below 3% in the United States. Inflation started to increase in 2021 reaching a level of 9.1% in 2022, the highest levels in about 40 years. [72] In 2023 the annual inflation rate was 3.4%, a marked reduction from the 2022 inflation rate.[73] Continued high rates of inflation may slow economic growth, further erode purchasing power, discourage savings, and lead to a national recession.
- **Income gains in Oregon.** Oregon's economic growth in the past decade has led to improvements in the state's income and wage levels relative to the rest of the nation. Notably, Oregon's median household income has surpassed the national level for the first time in over 50 years.[74] Higher incomes can have positive impacts on an economy through improved standards of living and higher consumer spending, increased tax revenue potential, and talent attraction and retention, among others.
- **Potential impacts of global climate change**. Oregon and the Pacific Northwest has been experiencing the impacts of global climate change over the past 30 years, exacerbated by extreme events such as the 2020 Labor Day fires that burned over 840,000 acres in Oregon, and the June 2021 heat dome that caused temperatures to soar to 111°F in Eugene and 116°F in Portland.[75] According to the National Oceanic and Atmospheric Administration (NOAA), between 1980 and 2023 the U.S. experienced an average of 8.5 weather-related disasters per year where overall damages/costs reached or exceeded $1 billion (adjusted for inflation). However, the number of such events has increased in the last five years, with an average of 20.4 events per year.[76] The Pacific Northwest is not only experiencing an increased frequency and severity of extreme weather events but also long-term climatic changes. These long-term changes include:
    - **Increased average annual day and nighttime temperatures.** If greenhouse gas (GHG) emissions continue at the current rate, temperatures in Oregon are projected to rise approximately 5°F by the 2050s and 8.2°F by the

[71] Federal Highway Administration. *2024 Vehicle Miles Traveled (VMT) Forecast Summary*. U.S. Department of Transportation, 2024. https://www.fhwa.dot.gov/policyinformation/tables/vmt/2024_vmt_forecast_sum.pdf.
[72] Bureau of Labor Statistics, U.S. Department of Labor, *The Economics Daily*, Consumer prices up 9.1% over the year ended June 2022, largest increase in 40 years at https://www.bls.gov/opub/ted/2022/consumer-prices-up-9-1-percent-over-the-year-ended-june-2022-largest-increase-in-40-years.htm (visited *July 25, 2022*).
[73] Bureau of Labor Statistics, U.S. Department of Labor, *The Economics Daily*, Consumer Price Index: 2023 in Review, https://www.bls.gov/opub/ted/2024/consumer-price-index-2023-in-review.htm
[74] Oregon Economic Analysis, Oregon Economic and Revenue Forecast, March 2024. Vol. XLIV, No. 1.
[75] National Centers for Environmental Information. *National Climate Report - June 2021: Supplemental Page 6.* June 2021. https://www.ncei.noaa.gov/access/monitoring/monthly-report/national/202106/supplemental/page-6.
[76] National Centers for Environmental Information. *U.S. Billion-Dollar Weather and Climate Disasters.* Accessed October 2024. https://www.ncei.noaa.gov/access/billions/

2080s. [77] These higher overall temperatures can have consequences, including increased mortality rates, the spread of diseases, and the forced migration of plants and animals as ecosystems undergo changes. Vegetation may become stressed and die, leading to an accumulation of fuel loads that heighten the risk of wildfires. Some areas that were once forestlands are transitioning into shrublands after being affected by forest fires.

- **Reduced snowpack and increased drought conditions.** As temperatures increase, snowpack is anticipated to decrease, reducing stream levels and water availability in the summer months.[78] Drought conditions can reduce surface water availability, reduce hydropower generation, and reduce recreational activities.[79]
- **Increased risk of high heat events.** Climate change increases the likelihood of experiencing high heat events like the June 2021 extreme heat wave that resulted in temperatures ranging from 110 to 120 degrees Fahrenheit in Oregon and Washington. This heat event caused approximately 159 deaths in Washington and more than 100 deaths in Oregon.[8081]
- **Increased risk of wildfire.** Changing precipitation patterns and drought conditions are increasing fuel loads in wildland areas, increasing the risk of wildfires throughout the Pacific Northwest. Wildfire intensity, duration, and size has increased.
- **More days of poor air quality from wildfire smoke.** In 2021, people in Deschutes County, Klamath County, and Jackson County experienced 83 days of air quality at or above unhealthy levels for sensitive groups due to wildfire smoke.[82]
- **More floods and atmospheric rivers.** The University of Washington's Climate Impact Group forecasts that the Pacific Northwest will experience slightly more precipitation in the fall, winter, and spring and less in the summer.[83] Extreme precipitation events are more likely to produce flooding, erosion, and

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[77] Fleishman, E., editor. 2023. Sixth Oregon Climate Assessment. Oregon Climate Change Research Institute, Oregon State University, Corvallis, Oregon. https://blogs.oregonstate.edu/occri/oregon-climate-assessments.

[78] WASHINGTON Assessment work. TBD.

[79] Bumbaco, K.A., C.L. Raymond, L.W. O'Neill, A. Mehta, D.J. Hoekema. 2023. *2022 Pacific Northwest Water Year Impacts Assessment*. A collaboration between the Office of the Washington State Climatologist, Climate Impacts Group, Oregon State Climatologist, Idaho Department of Water Resources, and NOAA National Integrated Drought Information System. https://doi.org/10.6069/T5Q5-TT59

[80] Joan A. Casey, Robbie M. Parks, Tim A. Bruckner, Alison Gemmill, and Ralph Catalano, *2023: Excess Injury Mortality in Washington State During the 2021 Heat Wave*. American Journal of Public Health 113, 657_660, https://doi.org/10.2105/AJPH.2023.307269

[81] Vital Statistics Report. Oregon: Oregon Health Authority, Public Health Division, Center for Health Statistics. Prepared September 2021; data are preliminary and subject to change.

[82] Barnack, A. Wildfire Smoke Trends and the Air Quality Index. Oregon: Department of Environmental Quality, Laboratory and Environmental Assessment Division. March 2024. https://www.oregon.gov/deq/wildfires/Documents/WildfireSmokeTrendsReport.pdf.

[83] University of Washington Climate Impact Group. *How Will Climate Change Affect Northwest Water?* N.d. https://express.adobe.com/page/C5CQaxjHUmGQ7/

landslides. These changes can threaten salmon and other species. Adaptation to extreme events could require expensive upgrades to stormwater systems.

Climate change will have a wide range of impacts on industries and communities throughout the Pacific Northwest. While some industries are more resilient to climate change, others that require predictable delivery of water, such as agriculture and hydropower, are more vulnerable to climate change. Climate change and extreme weather events also impact human health and disrupt travel. Land use planning, in part, determines the risk that homes, businesses, schools, hospitals, and other buildings face from climate change. Development patterns in at-risk areas like tsunami zones, floodplains, wetlands, wildland-urban interfaces, and other hazardous locations will impact the economic vitality and resilience of communities as climate change accelerates.

- **Agriculture.** Climate change impacts the quality and quantity of agricultural products. For example, exposure to cold weather during dormancy is important for fruit set and quality in many perennial crops. Exposure to cold weather may increase in northern areas of the Pacific Northwest and decrease in southern areas.[84] A study by the Washington State Department of Agriculture found that a drought in 2015 caused $633 to $773 million in agricultural losses.[85] Drought and shifting precipitation patterns represent major threats, as drought reduces feed on rangelands for livestock and decreases water available for irrigation.
- **Aquatic/Fishing.** Marine heatwaves impact fresh and saltwater habitats and species. In 2021, algal blooms exacerbated by increased temperatures resulted in a $641.1 million (in 2022 dollars) loss of commercial fishing revenue.[86] Tribes are often disproportionately impacted, accounting for half of fishery loss requests and experiencing losses from Dungeness crab fisheries. [87][88]
- **Forestry.** Forest plants and animals vulnerable to temperature and drought stresses are undergoing climate-induced die-offs. Five fir species in Oregon, Washington, and Northern California are experiencing severe mortality

[84] Noorazar, H., L. Kalcsits, V.P. Jones, M.S. Jones, and K. Rajagopalan, 2022: Climate change and chill accumulation: Implications for tree fruit production in cold-winter regions. *Climatic Change,* **171** (3), 34. https://doi.org/10.1007/s10584-022-03339-6

[85] Raymond, C.L, T.P. Nadreau, M. Rogers, Z. Kearl. 2022. Biophysical Climate Risks and Economic Impacts for Washington State. Report prepared for the Washington State legislature. Climate Impacts Group, University of Washington, Seattle.

[86] Bellquist, L., V. Saccomanno, B.X. Semmens, M. Gleason, and J. Wilson, 2021: *The rise in climate change-induced federal fishery disasters in the United States*. PeerJ, 9, e11186. https://doi.org/10.7717/peerj.11186

[87] Ibid.

[88] Schlinger, C., O. Conroy-Ben, C. Cooley, N. Cooley, M. Cruz, D. Dotson, J. Doyle, M.J. Eggers, P. Hardison, M. Hatch, C. Hogue, K. Jacobson Hedin, C. Jones, K. Lanphier, D. Marks-Marino, D. Mosley, F. Olsen Jr., and M. Peacock, 2021: Ch. 4.2. Water. In: *Status of Tribes and Climate Change Report.* Marks-Marino, D., Ed. Institute for Tribal Environmental Professionals, Flagstaff, AZ, 98–141. http://nau.edu/stacc2021

dubbed "Firmageddon."[89] Species at the edges of their ranges are expected to succumb first and may shift to higher elevations or northward. Die-offs include Douglas fir, a primary commercial timber species. Die-offs and stressed trees face higher risks of pest infestations and increase the risk of wildfires.

- **Human health.** With many Pacific Northwest households lacking air conditioning, higher summer temperatures and extreme heat events endanger vulnerable groups like older adults, low-income residents, those with disabilities, and individuals living alone who face heightened risks of heat stroke and death.
- **Tourism, Recreation, and Service Industries.** The Northwest tourism and recreation industry employs about 588,000 people and supports almost $60 billion (in 2022 dollars) in annual expenditures.[90] Climate impacts will vary as decreased snowpack will make trails and camping accessible later in the fall and earlier in the spring, however, increased extreme events from atmospheric rivers may increase maintenance costs due to flooding and erosion. Higher temperatures will increase demand for water-based recreation; however, droughts may decrease lake, reservoir, and river levels during peak recreation season.
- **Infrastructure.** Water, sewer, roads, utilities, and other infrastructure face risks if not designed to withstand climate change and extreme events. During the June 2021 heat dome, roads buckled near Everett, WA and a Portland streetcar cable melted.[91] Damaged power lines can lead to wildfires (a problem utility companies have started to mitigate by preemptively shutting down power when windy and dry conditions occur).[92] Rural communities relying on single water sources may be in jeopardy as droughts reduce groundwater aquifers or surface water availability. Sea level rise and flooding also threaten septic wastewater treatment systems. Atmospheric rivers and flooding can damage highways and streets through inundation and landslides, temporarily halting travel access to jobs, schools, healthcare, grocery stores, etc., necessitating expensive repairs and long detours. Additionally, the Pacific Northwest's hydropower dependency means the region may see fluctuations in electricity availability and costs as

89 Nickel, Robert. "Climate Change Is Hastening the Demise of Pacific Northwest Forests." The Seattle Times, October 15, 2023. https://www.seattletimes.com/seattle-news/climate-change-is-hastening-the-demise-of-pacific-northwest-forests/.

90 Mojica, J., K. Cousins, and T. Madsen. Economic Analysis of Outdoor Recreation in Oregon. Earth Economics. 2021. https://static1.squarespace.com/static/561dcdc6e4b039470e9afc00/t/5ffe3084ce56a6552b7a3c71/1610494115376/EconomicAnalysisofOutdoorRecreationinOregon_OTC-EarthEconomics_SmallRes.pdf

91 Fischels, Josie. “The Record-Breaking Heat Wave That’s Scorching The Pacific Northwest”. National Public Radio. June 29, 2021. https://www.npr.org/2021/06/29/1011269025/photos-the-pacific-northwest-heatwave-is-melting-power-cables-and-buckling-roads

92 EPI. “Wildfire-Grid Risk, Power Talk”. Boise State University, Energy Policy Institute. 2023. https://www.boisestate.edu/epi/upcomingevents/

altered snowpack and precipitation patterns make the water supply less predictable.

- **Insurance Premiums.** With the risk of natural disasters increasing, home insurance providers attempt to guard against the risk by raising premiums. Between 2020 and 2023, the U.S. average home insurance costs increased by 13%, after adjusting for inflation, or from $1,902 to $2,530.[93] Homeowners in high disaster risk areas bear the burden of cost more. With a 1 standard deviation increase in disaster risk in a ZIP code, the average insurance premium increases by $500.[94] Oregon ZIP codes show a $2,000 or less premium increase. Home insurance companies face unprofitability with insurance premiums not covering payouts in 18 states in 2023, compared to only 8 in 2013.[95] Oregon has implemented legislation that requires insurers to notify property owners when premium increases are caused by wildfire and prohibits insurers from utilizing the Oregon Statewide Wildfire Hazard Map.[96]

Potential impacts of climate change, specific to Bend:

Extreme heat, drought, and reduced snowpack:

- Bend has a reliable supply of surface water and groundwater. Although this has generally reduced the city's vulnerability to periods of drought and low precipitation, such events can nevertheless increase the aridity of regional soils, thereby increasing the probability of other natural hazards and climate impacts. For instance, forests in Central Oregon will face higher wildfire risk as a result of a warmer climate and reduced moisture levels in the soil.[97] Rising temperatures and water scarcity can also increase the vulnerability of trees to pests and diseases.[98]
- The Oregon Watershed Enhancement Board projects that Bend will see an increase in the annual number of dry days by the 2050s compared to the 1990s, with an average of 192 dry days expected by 2050, up from 186 days in the 1990s.[99]
- Projections indicate that Central Oregon will experience an increase in the annual number of days above 90°F (32°C) by mid-century, compared to 1971-2000 levels. Bend currently experiences about 12 additional days of

[93] National Bureau of Economic Research. "Disaster Risk and Rising Home Insurance Premiums." *NBER Digest*, October 2024. https://www.nber.org/digest/202410/disaster-risk-and-rising-home-insurance-premiums.
[94] Ibid.
[95] Flavelle, Christopher. "How Weather Is Changing Home Insurance Costs in the U.S." *New York Times*, May 13, 2024. https://www.nytimes.com/interactive/2024/05/13/climate/home-insurance-profit-us-states-weather.html.
[96] Oregon State Legislature.
[97] City of Bend. Bend Community Climate Action Plan: Climate Mitigation Strategies and Actions, 2020-2025. 2019. https://www.bendoregon.gov/home/showpublisheddocument/52799/637856320279630000.
[98] Fleishman, Erica, ed. Sixth Oregon Climate Assessment. Oregon Climate Change Research Institute, 2023. https://ir.library.oregonstate.edu/concern/technical_reports/gt54kw197.
[99] Oregon Watershed Enhancement Board. Region 4: Observed and Projected Climate Changes. 2023. https://www.oregon.gov/oweb/Documents/climate-R4-variables.pdf.

extreme heat in the 2020s compared to 1971-2000 levels, and this is projected to increase to around 26 additional days by the 2050s.[100] Heat waves pose a significant risk to older adults, infants, individuals with chronic illnesses, low-income communities, and outdoor workers.[101]

- Current snowpack levels in Central Oregon are much lower than historical averages. Climate change will significantly impact hydrology, with reduced snowpack and earlier snowmelt altering streamflow patterns, leading to higher peak flows and lower summer flows. The Oregon Cascade Range will be especially affected, with snow residence time decreasing by 7 to 8 weeks and minimal snow presence by April 1. On the eastern slopes of the Cascades, summer streamflow could decline by 40-60% by 2040 and 60-80% by 2080 due to earlier snowmelt, affecting agricultural irrigation and municipal water use.[102] Reductions in snowpack are also expected to have a profound negative effect on winter sport (i.e. skiing, snowboarding, snowmobiling) conditions in some parts of the Western US.[103] A recent study conducted by researchers at Lawrence Berkeley National Laboratory indicates that the Cascades could experience a complete loss of snowpack by 2070.[104]
- Increasing temperatures are expected to impact thermoregulatory processes among pollinators, altering insect physiology and behavior. Concurrent climate-change-induced shifts in plant phenology may create mismatches in the timing of flowering and pollinator emergence, thereby affecting essential processes of plant reproduction.[105] [106]
- Although there is limited literature or data pertaining to the impacts of climate change on Bend's economy, the city's Climate Action Plan suggests that rising temperatures may in time lead to increased electricity bills for residents. Rising temperatures and climate change are expected to significantly impact building energy consumption, largely due to the increased use of heating and cooling systems.[107] Strategies developed by the city to combat climate impacts could have further costs.

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[100] Ibid.
[101] FEMA. *Oregon Natural Hazards Mitigation Plan*. 2020. https://www.oregon.gov/lcd/NH/Documents/Approved_2020ORNHMP_00_Complete.pdf
[102]U.S. Department of Agriculture. Climate Change Vulnerability and Adaptation in South-Central Oregon. U.S. Forest Service, 2018. https://www.fs.usda.gov/pnw/pubs/pnw_gtr974.pdf.
[103] Miller, Anna B., Patricia, L. Winter, José J Sánchez, David L Peterson, Jordan W Smith. 2022. "Climate Change and Recreation in the Western United States: Effects and Opportunities for Adaptation. Journal of Forestry, Volume 120, Issue 4. https://academic.oup.com/jof/article/120/4/453/6530105
[104] Siirila-Woodburn, Erica R., Alan M. Rhoades, Benjamin J. Hatchett, et al. 2021. "A Low-to-No Snow Future and Its Impacts on Water Resources in the Western United States." *Nature Reviews Earth & Environment* 2: 800–819. https://doi.org/10.1038/s43017-021-00219-y.
[105] Scaven, Virginia L., and Nicole L. Rafferty. 2013. "Physiological Effects of Climate Warming on Flowering Plants and Insect Pollinators and Potential Consequences for Their Interactions." *Current Zoology* 59: 418–426.
[106] Fagan, William F., Sharon Bewick, Robert S. Cantrell, Christopher Cosner, Isabela G. Varassin, and David W. Inouye. 2014. "Phenologically Explicit Models for Studying Plant-Pollinator Interactions under Climate Change." *Theoretical Ecology* 7: 289–297.
[107] City of Bend. Bend Community Climate Action Plan: Climate Mitigation Strategies and Actions, 2020-2025. 2019. https://www.bendoregon.gov/home/showpublisheddocument/52799/637856320279630000.

- Changes in winter and spring precipitation could cause major changes in the composition and distribution of rangeland vegetative species, thereby impacting forage availability and quality.[108] While research indicates that Central Oregon may experience longer growing seasons and increased productivity in the short term due to heightened precipitation and temperature changes, long-term challenges such as drought, heat stress, water shortages, and the proliferation of invasive weeds, along with other impacts of climate change, are likely to diminish the productivity of farms and ranches in the region.[109]

Climate change-induced natural hazards: wildfires, winter storms, and floods:

- Owing largely to reduced snowpack and early spring snowmelt, the duration of the fire season in Central Oregon has increased from around 23 days in the 1970s to about 116 days in the 2000s,[110] and is expected to increase by another 15 days by the 2050s.[111] As a result of fire suppression practices during the 20th and 21st century, the forests in Central Oregon are densely packed and full of dead, unhealthy flora, rendering the area increasingly susceptible to wildfire.[112]
- Time series data from 2010 through 2020 demonstrates that smoke from wildfires has significantly affected air quality. In Bend, the number of days qualifying as "unhealthy for sensitive groups" or worse has increased 24-fold.[113]
- Climate change is likely to shift the timing and nature of precipitation in Central Oregon, which has historically received most of its precipitation as snowfall in the winter. As winter temperatures rise, rain and melting snow may overwhelm streams and rivers, thereby increasing the risk of flooding. Flooding can be more intense if the soil is frozen and unable to absorb additional precipitation.[114] Winter storms, characterized by rapid temperature shifts that cause flooding of streets and prevent drainage when frozen, can shut down transportation routes, damage power lines, and cause outages.[115] Such hazards pose a significant health and safety risk to households powered by electric heat, and especially to those individuals who

[108] USDA. "Climate Change Vulnerability and Adaptation in South-Central Oregon". US Forest Service. 2019. https://www.fs.usda.gov/pnw/pubs/pnw_gtr974.pdf
[109]Deschutes Land Trust. "Climate Change: Impacts on communities we love." N.d. https://www.deschuteslandtrust.org/about-us/our-work/climate-change/climate-change-impacts-communities
[110] "City of Bend. 2019. "Bend Community Climate Action Plan - Climate Mitigation Strategies and Actions: 2020-2025". https://www.bendoregon.gov/home/showpublisheddocument/52799/637856320279630000
[111] Oregon Watershed Enhancement Board. Region 4 Observed & Projected Climate Changes. September 2023. https://www.oregon.gov/oweb/Documents/climate-R4-variables.pdf
[112] City of Bend. 2019. "Bend Community Climate Action Plan - Climate Mitigation Strategies and Actions: 2020-2025". https://www.bendoregon.gov/home/showpublisheddocument/52799/637856320279630000
[113] Oregon Health Authority. 2023. Climate and Health in Oregon: 2021-2022 Report. https://sharedsystems.dhsoha.state.or.us/DHSForms/Served/le-105251_23.pdf
[114] City of Bend. 2019. "Bend Community Climate Action Plan - Climate Mitigation Strategies and Actions: 2020-2025". https://www.bendoregon.gov/home/showpublisheddocument/52799/637856320279630000
[115] Ibid.

are unable to drive, with people with disabilities and elderly people at the greatest risk.[116]

- A rise in the frequency and intensity of such weather events may impact the quality and availability of certain recreational activities. For instance, wildfires may damage trails and campgrounds, and smoke can limit scenic views and visibility.[117] Concurrently, warmer temperatures may create opportunities for warm-weather activities.[118]
- Increased wildfire and other natural disaster risk impacts influence the cost and coverage of home insurance. In Central, Southern, and Eastern Oregon, property owners experience rising premiums and policy non-renewals.[119]

[116] FEMA. *Oregon Natural Hazards Mitigation Plan*. 2020. https://www.oregon.gov/lcd/NH/Documents/Approved_2020ORNHMP_00_Complete.pdf

[117] "Climate Change and Recreation in the Western United States: Effects and Opportunities for Adaptation". https://academic.oup.com/jof/article/120/4/453/6530105

[118] USDA. "Climate Change Vulnerability and Adaptation in South-Central Oregon". US Forest Service. 2019. https://www.fs.usda.gov/pnw/pubs/pnw_gtr974.pdf

[119] Grable, Juliet. "Southern Oregon Property Owners Grapple with a Shifting Insurance Market." *Jefferson Public Radio*, July 10, 2024. https://www.ijpr.org/wildfire/2024-07-10/southern-oregon-property-owners-grapple-with-a-shifting-insurance-market.; Baumhardt, Alex. "Oregon Homeowners Face Soaring Premiums, Few Property Insurance Options over Wildfires." *Oregon Capital Chronicle*, February 24, 2024. https://oregoncapitalchronicle.com/2024/02/26/oregon-homeowners-face-soaring-premiums-few-property-insurance-options-over-wildfires/

Regional and Local Trends

Throughout this section of Appendix A., Bend is compared to the Central Oregon region and the State of Oregon. These comparisons are meant to provide context for changes in Bend's socioeconomic characteristics.

Availability of Labor

The availability of trained workers in Bend will impact the development of its economy over the planning period. A skilled and educated populace can attract well-paying businesses and employers and spur the benefits that follow from a growing economy. Key trends that will affect the workforce in Bend over the next 20 years include its growth in its overall population, growth in the senior population, and commuting trends.

POPULATION CHANGE

Population growth in Oregon tends to follow economic cycles. Oregon's population grew from 3.4 million people in 2000 to 4.3 million in 2023, an increase of more than 870,000 people or 1.0% each year.

Between 2000 and 2023, Bend's population increased by more than 54,000 people at an average annual growth rate of 3.2% exceeding the growth rates of neighboring counties and the state of Oregon, as shown in Exhibit 17.

Exhibit 17. Population Growth, Bend, Deschutes County, Jefferson County, Crook County, and Oregon, 2000–2023

	Population			Change, 2000 - 2023		
	2000	2010	2023	Number	Percent	AAGR
Bend	52,029	83,125	106,275	54,246	104%	3.2%
Deschutes County	115,367	172,050	212,141	96,774	84%	2.7%
Jefferson County	19,009	22,865	25,878	6,869	36%	1.4%
Crook County	19,182	27,280	26,583	7,401	39%	1.4%
Oregon	3,421,399	3,831,074	4,291,525	870,126	25%	1.0%

Source: U.S. Census Bureau, 2000, and 2010. Portland State University Population Estimates, 2023.

AGE DISTRIBUTION

The number of people ages 65 and older in the United States is projected to increase from 58 million in 2022 to 82 million by 2050, representing a 47% increase.[120] The economic effects of this demographic change include a slowdown of labor force growth, the need for workers to replace retirees, an aging workforce as seniors continue working after age 65, an increased demand for healthcare services, and a larger portion of the federal budget dedicated to Social Security and Medicare.[121]

Exhibit 18 through Exhibit 21 show the following trends:

- Bend has a younger population than the counties in Central Oregon and the state overall. In 2022, only 23% of Bend's residents were 60 years and older compared to 28% in Central Oregon (Exhibit 20). Bend is growing across all age groups, but older age groups are experiencing much faster growth. The increase in median age between 2000 and 2022 suggests that Bend is attracting or retaining older adults.
- The Central Oregon region's population is aging, with the population aged 60 and over projected to increase from 29% in 2022 to 31% in 2040. Central Oregon may continue to attract those in their late adult years (i.e., 40 years and older) over the planning period. While the share of retirees in these respective areas may increase over the next 20 years, the share of youth (i.e., under 20 years old) or people in their early adult lives (i.e., 20 to 39 years old) is likely to decrease. This demographic shift can provide a valuable source of skilled labor and experienced mentorship for younger generations entering the workforce. However, it also raises concerns about a potential labor shortage as a significant portion of the workforce approaches retirement age and is not being replaced by younger workers.

[120] Mather, M. & Scommegna, P. (2024). Fact Sheet: Aging in the United States. https://www.prb.org/aging-unitedstates-fact-sheet/

[121] The Board of Trustees, Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds, 2022. The 2022 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Insurance Trust Funds, June 2, 2022. The Budget and Economic Outlook: Fiscal Years 2024 to 2034, February 2024.

Bend's median age increased between 2000 and 2022 but remained lower than both the county and state.

Bend's increase in median age of five years is comparable to counties in Central Oregon and Oregon's increase of median age.

Exhibit 18. Median Age, Bend, Counties in Central Oregon, and Oregon, 2000 to 2018–2022

Source: U.S. Census Bureau, 2000 Decennial Census, Table P013; American Community Survey 2018–2022 5-Year Estimates, Table B01002.

2000	34.8 Bend	37.2 Deschutes County	34.8 Jefferson County	38.6 Crook County	36.3 Oregon
2022	39.5 Bend	42.6 Deschutes County	41.1 Jefferson County	47.0 Crook County	39.9 Oregon

From 2000 to 2022, the population aged 35 to 44 in Bend experienced the largest nominal increase among all age groups.

However, the age group that saw the highest percentage increase during this period was the population aged 65 and over.

Exhibit 19. Bend Population Change by Age Group, 2000 to 2018–2022

Source: U.S. Census Bureau, 2000 Summary File P012; American Community Survey 2018-2022 5-Year Estimates, Table B01001.

55% of Bend residents were between 20 to 59 years of age.

The proportion of Bend's older residents was lower than that of the state and Central Oregon.

Conversely, the proportion of Bend's residents 59 years of age and younger was higher relative to Central Oregon and Oregon.

Exhibit 20. Population Distribution by Age, Bend, Central Oregon, and Oregon, 2018–2022

Source: U.S. Census Bureau, American Community Survey, 2018–2022 5-Year Estimates, Table B01001.

By 2044, Central Oregon will have a significant lower share of residents under 20 years than it does today.

The share of residents under 20 in the Central Oregon region will drop from 22% to 17% while the share of residents 60 years and older will account for 31% of the region's population in 2040, compared to 29% in 2024.

Exhibit 21. Population Share by Age Group, Central Oregon, 2024–2044

Source: Portland State University, College of Urban & Public Affairs: Population Research Center, Population Forecast, 2024.

RACE AND ETHNICITY

Exhibit 22 and Exhibit 23 show the change in the share of Hispanic/Latino and people of color in Bend, compared to Central Oregon and Oregon, between 2000 and 2022. Bend and the Central Oregon region are becoming more racially and ethnically diverse, though less so than Oregon in the past two decades. From 2000 to 2022, the share of the Hispanic/Latino population in Bend grew from 5% to 9% of the total population, and the share of people of color increased from 6% to 12%. In the Central Oregon region, the share of people of color rose from 6% to 10% of the total population, while the share of the Hispanic/Latino population grew from 9% to 13%.

Statewide, Hispanic and Latino Oregonians have employment rates that are slightly above average compared to the overall population in recent decades, but the higher employment rates are primarily concentrated in low- and middle-wage occupations.[122] Providing culturally specific services, particularly for Spanish speakers, can help improve workforce participation and economic contribution from these growing demographic groups.

The share of Bend's residents that identified as Hispanic/Latino increased between 2000 and 2022 from 5% to 9%.

Bend and the Central Oregon region both have a lower share of population identified as Hispanic or Latino compared to state overall.

Exhibit 22. Hispanic or Latino Population as a Percentage of the Total Population, Bend, Central Oregon, and Oregon, 2000, 2018–2022

Source: U.S. Census Bureau, 2000 Decennial Census, Table P008; 2018–2022 American Community Survey, 5-Year Estimates, Table B03002.

[122] Lehner, Josh. "Oregon's Growing Hispanic and Latino Population." Oregon Office of Economic Analysis, 21 June 2023. https://oregoneconomicanalysis.com/2023/06/21/oregons-growing-hispanic-and-latino-population/

The population of people of color is defined as the share of the population that identifies as another race other than "white alone" according to Census definitions. The low percentages of people of color in Bend and Central Oregon result in people of color being combined into one category rather than showing individual races. The margin of error is considerable for the estimate of these populations.

The share of people of color in Bend doubled between 2000 and 2022.

Bend and Central Oregon are less racially diverse than the state. In 2022, the share of people of color in Bend and Central Oregon was 12% and 13%, respectively, compared to 21% statewide.

Exhibit 23. Population of People of Color as a Percentage of the Total Population, Bend, Central Oregon, and Oregon, 2000, 2018–2022

Source: U.S. Census Bureau, 2000 Decennial Census Table P007; 2018–2022 American Community Survey, 5-Year Estimates, Table B02001.

EDUCATIONAL ATTAINMENT

The educational level of a community's workforce is a crucial factor that influences the quality of labor available. Many businesses require access to employees with relevant education and training to meet their staffing needs. A community with a highly educated population is better positioned to attract and retain companies seeking skilled workers.

Almost half of Bend's residents have a bachelor's, graduate, or professional degree which is significantly higher share than the county and the state.

Exhibit 24. Educational Attainment for the Population 25 Years and Over Bend, Central Oregon, and Oregon, 2018–2022

Source: U.S. Census Bureau, American Community Survey 2018–2022 5-Year Estimates, Table B15003.

LABOR FORCE PARTICIPATION AND UNEMPLOYMENT

The current labor force participation rate is an important consideration in the availability of labor. The labor force in any market consists of the adult population (16 and over) who are working or actively seeking work. The labor force includes both employed and unemployed people. Children, retirees, students, and people who are not actively seeking work are not considered part of the labor force. In 2023, Central Oregon had 126,123 people in its labor force, and Bend had 57,697 people in its labor force.[123] Population dynamics influence employment and labor force trends specifically in locally serving industries such as health care and social assistance, education, and government.[124]

Bend's labor force increased at a faster rate than Oregon's between 2010 and 2023. On average, Bend's labor force increased by 1.9% per year compared to 0.5% in Oregon.

Exhibit 25. Year-Over-Year Change in Labor Force, Bend, Central Oregon, and Oregon, 2010–2023

Source: U.S. Bureau of Labor Statistics, Local Area Unemployment Statistics, 2010-2023

[123] U.S. Bureau of Labor Statistics. "Local Area Unemployment Statistics." 2023.
[124] U.S. Bureau of Labor Statistics. *News Release: Employment Projections 2023-2033.* August 29, 2024. https://www.bls.gov/news.release/pdf/ecopro.pdf

Bend has a slightly higher labor force participation rate (68%) relative to Central Oregon and Oregon overall (62%).[125]

Exhibit 26. Labor Force Participation Rate, Bend, Central Oregon, and Oregon, 2018–2022

Source: U.S. Census Bureau, American Community Survey 2018–2022 5-Year Estimates, Table B23001.

Central Oregon's unemployment rate was 5.1% in December 2023 which was slightly higher than the state of Oregon (4.0%) and nation (3.5%).

Exhibit 27. Unemployment Rate, Central Oregon, Oregon, and the U.S., 2000–2023

Source: Bureau of Labor Statistics, Local Area Unemployment Statistics, and Labor Force Statistics. Not seasonally adjusted.

[125] According to the 2018–2022 American Community Survey, Central Oregon had 126,907 people in its labor force, and Bend had 55,147 people in its labor force.

COMMUTING PATTERNS

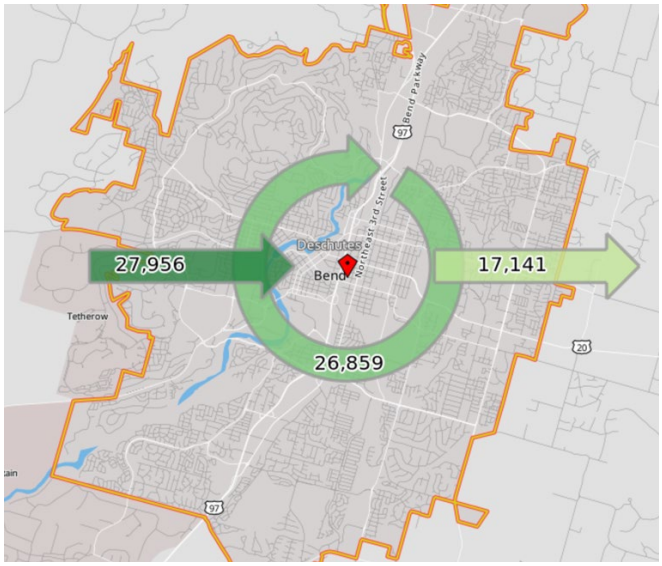
The ability of employers in Bend to draw from a labor pool that extends beyond the city limits into neighboring areas in Central Oregon is a significant factor contributing to the local economy. This access to a broader workforce through commuting allows businesses in Bend to find suitable candidates for available positions, even if the local population alone may not provide enough qualified workers.

Bend is part of an interconnected regional economy.

Approximately 28 thousand people commuted into Bend for work while 17 thousand commuted out of Bend for work. About 26 thousand people both lived and worked in Bend.

Exhibit 28. Commuting Flows, Bend, 2021

Source: U.S. Census Bureau, Census On the Map.



49% of all people who were employed at businesses in Bend also lived in Bend.

Exhibit 29. Places Where Bend Workers Lived,[126] 2021

Source: U.S. Census Bureau, Census On the Map.

49%	8%	2%
Bend	Redmond	Portland

About 61% of residents who lived in Bend also worked in Bend.

Exhibit 30. Places Where Bend Residents Were Employed,[127] 2021

Source: U.S. Census Bureau, Census On the Map.

61%	5%	5%	2%
Bend	Redmond	Portland	Salem

[126] In 2021, 55 thousand people worked at businesses in Bend, with 49% of the total Bend workers both living and working in Bend.

[127] In 2021, 44,000 residents in Bend worked, with 61% of Bend residents both living and working in Bend.

About 88% of Bend's residents had a commute time of less than 30 minutes.

The commute time for Bend's residents is significantly lower than the average for both Central Oregon and Oregon.

Exhibit 31. Commute Time by Place of Residence, Bend, Central Oregon, Oregon, 2018–2022

Source: U.S. Census Bureau, American Community Survey 2018–2022 5-Year Estimates, Table B08303.

Tourism in the City of Bend and Deschutes County

Tourism plays a crucial role in local economies by supporting businesses, creating jobs, and generating tax revenue. Dean Runyan Associates, a travel industry research firm, provides tourism data through Travel Oregon's TravelStats dashboard.[128] According to the dashboard, Deschutes County welcomed 3.2 million overnight visitors in 2023, and these tourists contributed $1.1 billion in direct travel spending in 2023, with the largest expenditures in accommodation, food service, and retail sales. Bend is a popular tourism destination in Deschutes County. In 2023, there was a total of 1,377,400 person trips in terms of overnight visitor volume, generating $383.4 million in direct travel spending.

Direct travel spending in Bend increased 5% from 2016 to 2023 to $383 million.

Exhibit 32. Direct Travel Spending ($ millions), 2016 and 2023

Source: Dean Runyan Associates, The Economic Impact of Travel, 2016-2023p.

2016	$266.7 Bend	$715.8 Deschutes County
2023	$383.4 Bend	$1,111.1 Deschutes County

In 2023, the category that saw the highest level of visitor spending in Bend Accommodation, Food Service, and Food Stores.

Exhibit 33. Largest Visitor Spending Categories ($ millions), Bend, 2023

Source: Dean Runyan Associates, The Economic Impact of Travel, 2016-2023p.

$157.3 Accommodation	$82.7 Food Service	$28.8 Food Stores

The industry with the most employment generated by travel spending in Bend in 2023 was Accommodations and Food services.

Exhibit 34. Largest Industry Employment Generated by Travel Spending, Bend, 2023

Source: Dean Runyan Associates, The Economic Impact of Travel, 2016-2023p.

2,600 jobs Accommodations & Food Services	480 jobs Arts, Entertainment, and Recreation	270 jobs Retail

[128] Travel Oregon. "Oregon Travel Impacts dashboard" Dean Runyan Associates. Retrieved October 23, 2024, from https://www.travelstats.com/impacts/oregon

Employment Trends in Central Oregon

Exhibit 35 shows total employment in Bend, Deschutes County, and the Central Oregon region between 2007 and 2022. Bend accounted for 57% of the Central Oregon employment in 2022, or 57,494 employees of 101,444 in 2022. Bend employment has grown at 2% per year since 2007, compared to 1.9% for Deschutes County and 1.7% for the Central Oregon area — higher than the Oregon statewide average of 0.8% (see Exhibit 36).

Exhibit 35. Covered Employment, Bend, Deschutes County, and Tri-County, 2007-2022

Source: Oregon Employment Department, Quarterly Census of Employment and Wages, 2007–2022

Exhibit 36. Year-Over-Year Change in Employment, Bend, Deschutes County, and Central Oregon, 2007-2022

Source: Oregon Employment Department, Quarterly Census of Employment and Wages, 2007–2022

Employment Trends in Bend

Exhibit 37 shows covered employment[129] in Bend for 2007 and 2022. Employment increased by 14,596 jobs, or 34%, over this period. The industries with the largest increases in numbers of employees were health care and social assistance (4,167 jobs), professional and technical services (2,314 jobs), accommodation and food services (2,298 jobs), and government (1,708 jobs). The average annual wage for covered employment in Bend in 2022 was about $62,600.[130]

Exhibit 37. Covered Employment by Industry, Bend, 2007 to 2022

Source: Oregon Employment Department, Quarterly Census of Employment and Wages, 2007–2022

[129] **Covered** employment includes employees covered by unemployment insurance. Examples of workers not included in covered employment are sole proprietors, some types of contractors (often referred to as "1099 employees"), or some railroad workers. Covered employment data is from the Oregon Employment Department.

[130] Oregon Employment Department, QCEW, 2022.

Exhibit 38 shows covered employment and average wage for the six largest private industries in Bend. Government jobs account for 2% of Bend's employment. Jobs in health care and social assistance accounted for approximately 18% of the city's total covered employment, followed by retail trade and accommodation and food service (14% and 12%, respectively). Of these six sectors, health care, professional and technical services, and construction pay above the county average wage ($79,850, $93,000, $66,340, respectively). Jobs in utilities, wholesale trade, information, finance and insurance, and management of companies paid more per year than the Bend average, but they accounted for a smaller share of covered employment.

Exhibit 38. Covered Employment and Average Pay by Sector, 6 Largest Sectors in Bend, 2022

Source: Oregon Employment Department, Quarterly Census of Employment and Wages, 2022.

Outlook for Growth in Central Oregon

Exhibit 39 shows the Oregon Employment Department's forecast for employment growth by industry for the Central Oregon region (Deschutes, Jefferson, and Crook counties) over the 2022 to 2032 period. Employment in the region is forecasted to grow at an average annual growth rate of 1.0%.

The sectors that are projected to lead employment growth in the region in terms of total jobs for the 10-year period are leisure and hospitality (adding 2,610 jobs); private education and health services (2,600); government (1,360); and professional and business services (1,580). In sum, these sectors are expected to add 6,790 new jobs, or about 56% of employment growth in the Central Oregon region.

Exhibit 39. Regional Employment Projections, Central Oregon Region, 2022-2032

Note: AAGR is the Annual Average Growth Rate
Source: Oregon Employment Department. Employment Projections by Industry 2022-2032.

Appendix B: Target Sector Data

This appendix presents additional data and context for the selection of target sectors.

Methodology

The process of identifying target sectors begins with conducting comparative analyses of sector level employment growth and concentration in Bend. We define sectors utilizing the 3-digit North American Industry Classification System (NAICS) industries. This classification system standardizes the way industries are categorized in U.S., and ranges in detail from 2-digit to 6-digit industry codes. Quantitative analysis played a critical role, beginning with an assessment of historical trends in employment and establishment growth for sectors within Bend. Key metrics included sector employment growth and concentrations (in the form of location quotient analysis), which measures the concentration of industry employment in Bend relative to Oregon and the United States.

The approach to the analysis was to identify and understand:

- **Amount of employment and growth of employment in a sector.** This analysis identified sectors that account for at least 1% of Bend's 2022 employment and sectors with employment increases above Bend's overall growth rate of 19% between 2015 and 2022 prioritized for selection (Exhibit 1 through Exhibit 3 show industry-level employment shares and growth).
- **Concentration of employment.** The analysis identified sectors with employment higher concentrations (greater than 0.75) as having higher-than-average specialization in Bend, signaling regional strengths. Exhibit 8 shows the employment concentration by broader industry.
- **Competitiveness of sectors.** Economic competitiveness refers to Bend's ability to support sectors that thrive due to unique local factors, such as its skilled workforce, entrepreneurial culture, and infrastructure. We identified sectors that grew more than expected in Bend by estimating the share of employment growth that cannot be attributed to overall national growth or growth of the sector. We consider the sectors with a high portion of employment growth due Bend's local strengths as competitive. The Shift Share Analysis section shows the calculations and competitive effects for select sectors.
- **Discussions with stakeholders.** The identification of target industries also incorporated qualitative insights gathered through stakeholder engagement. Organizations provided localized expertise to validate data findings and identify emerging opportunities that might not yet be reflected in employment statistics. Stakeholder feedback highlighted high-growth sectors such as biosciences, professional services, and specialty manufacturing as key targets for Bend. It also flagged critical challenges like industrial land availability, workforce supply, and the cost of living, which were

factored into the final recommendations. Appendix B details the discussions with stakeholders.

This analysis resulted in a filtered and classified list of potential target sectors based on specific criteria: sectors needed to represent at least 1% of Bend's 2022 employment, demonstrate growth above Bend's average, and have a higher-than-average concentration to signal relative specialization while keeping in mind the sectors trends highlighted by stakeholders. We refined these sectors further based on whether their competitive effects were significant and positive. Not all sectors meet all these criteria but have been highlighted by either stakeholders or exist within the ecosystem of other key industries. For example, wood product manufacturing employment has declined in employment and represents 0.7% of Bend's employment, however it remains concentrated and supports other sectors such as construction of residential and commercial buildings. This comprehensive approach ensured that target sectors—such as health care, construction, recreation, and professional services—were not only well-aligned with Bend's current strengths but also poised to support its economic resilience and sustainability.

Tradeoffs Between Locally Serving and Export Oriented Sectors

Bend's economic strategy hinges on balancing locally serving and export-oriented sectors, each of which plays a distinct role in driving growth and stability. Locally serving sectors, such as health care, food service, and recreation, are integral to meeting the needs of Bend's residents and supporting the community's overall well-being. These industries provide accessible employment opportunities, foster economic stability, and enhance quality of life for the local population. However, their growth potential is often more limited, and they tend to offer lower wages and fewer avenues for workforce upskilling compared to other industries.

Export-oriented sectors, including professional and business services, manufacturing, and wholesale trade, serve markets beyond Bend, generating external revenue that diversifies the economic and fiscal base. These industries are critical for fostering innovation, driving economic growth, and positioning Bend as a competitive regional hub. However, they are often more vulnerable to external shocks, such as changes in global demand or supply chain disruptions. Additionally, they typically require advanced infrastructure and a highly skilled workforce, which can lead to inequitable access to opportunities for lower-skilled workers if not managed thoughtfully.

By striking a balance between these two types of sectors, Bend can build an economy that is both resilient and inclusive. Locally serving industries provide a stable foundation for community well-being, while export-oriented sectors drive innovation and diversify revenue streams. This complementary relationship ensures that economic growth benefits a wide range of stakeholders and supports the city's long-term development goals.

Industry Employment Growth and Concentration Data Detail

This section provides additional data on employment growth and concentration. Exhibit 40 presents Bend's employment concentration by industry utilizing Oregon's average as the comparison, as opposed to comparing to the U.S. average, presented in Exhibit 8. Bend has high employment concentration in arts, entertainment, and recreation, health care, and professional and technical services.

Exhibit 41 provides additional context for Bend's industry strengths compared to the region. Bend has higher or similar employment concentration in arts and entertainment, food service and accommodation, retail trade, health care, and professional and businesses services compared to the region. While the region has higher employment concentration in agriculture, forestry, and fishing and hunting, manufacturing, and construction.

Exhibit 42 shows changes in employment concentration and growth across industries in Bend from 2015 to 2022. Professional and business service and arts, entertainment, and recreation increased in both concentration and overall employment. Information saw a decline in both growth and concentration. while construction, retail trade, and health care maintained high concentrations and consistent employment growth.

Exhibit 40. Industry Employment Concentration, Bend Compared to Oregon, 2022

Source: Oregon Employment Department, Quarterly Census of Employment and Wages, 2015 and 2022.

Exhibit 41. Industry Employment Concentration, Region Compared to US, 2022

NAICS	INDUSTRY NAME	CENTRAL OREGON	BEND	PRINEVILLE	REDMOND
11	Agriculture, Forestry, Fishing and Hunting	1.48	0.46	0.74	Confidential
22	Utilities	1.04	0.68	Confidential	Confidential
23	Construction	1.68	1.37	2.29	1.96
31-33	Manufacturing	0.94	0.70	1.17	1.28
42	Wholesale Trade	0.69	0.72	1.29	0.72
44-45	Retail Trade	1.23	1.36	0.98	1.45
48-49	Transportation and Warehousing	0.52	0.43	0.53	0.99
51	Information	1.08	1.12	Confidential	0.15
52	Finance and Insurance	0.56	0.68	0.37	0.68
53	Real Estate and Rental and Leasing	1.01	0.98	0.91	0.81
54	Professional, Scientific, and Technical Services	0.84	1.04	0.61	0.26
55	Management of Companies and Enterprises	0.78	0.95	0.03	1.02
56	Administrative and Support and Waste Management and Remediation Services	0.75	0.80	0.55	0.71
61	Educational Services	0.63	0.53	0.44	0.69
62	Health Care and Social Assistance	0.99	1.31	0.66	0.82
71	Arts, Entertainment, and Recreation	1.46	1.67	0.05	0.44
72	Accommodation and Food Services	1.36	1.30	1.07	1.23
81	Other Services (except Public Administration)	1.19	1.06	1.14	1.58

Note: Some estimates cannot be reported due to size of industry.
Source: Oregon Employment Department and U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 2022.

Exhibit 42. Industry Employment Concentration and Growth, Bend, 2015 and 2022

NAICS	INDUSTRY NAME	2015 EMPLOYMENT CONCENTRATION COMPARED TO US	2022 EMPLOYMENT CONCENTRATION COMPARED TO US	2015-2022 NOMINAL EMPLOYMENT CHANGE	2015-2022 % CHANGE
11	Agriculture, Forestry, Fishing and Hunting	0.05	0.46	198	900%
22	Utilities	0.67	0.68	15	12%
23	Construction	1.32	1.37	1,124	38%
31-33	Manufacturing	0.70	0.70	434	15%
42	Wholesale Trade	0.67	0.72	274	20%
44-45	Retail Trade	1.37	1.36	618	8%
48-49	Transportation and Warehousing	0.47	0.43	308	42%
51	Information	1.63	1.12	-245	-16%
52	Finance and Insurance	0.79	0.68	62	4%
53	Real Estate and Rental and Leasing	0.96	0.98	181	26%
54	Professional, Scientific, and Technical Services	0.86	1.04	1,645	65%
55	Management of Companies and Enterprises	0.25	0.95	719	382%
56	Administrative and Support and Waste Management and Remediation Services	1.06	0.80	-303	-9%
61	Educational Services	0.55	0.53	92	18%
62	Health Care and Social Assistance	1.32	1.31	1,810	22%
71	Arts, Entertainment, and Recreation	0.95	1.67	767	108%
72	Accommodation and Food Services	1.32	1.30	808	14%
81	Other Services (except Public Administration)	1.07	1.06	190	12%
99	Nonclassifiable Establishments	0.05	1.52	168	4200%

Source: Oregon Employment Department and U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 2015 and 2022.

Shift Share Analysis

Shift-share analysis is an economic tool used to evaluate the factors contributing to employment growth in a specific region, such as Bend. The shift-share analysis is the basis for the analysis of competitiveness in Exhibit 13. A shift-share analysis breaks employment growth into three components:

- **National Growth Effect:** This reflects how much employment growth is attributable to overall national economic trends. It assumes all industries in the region grow at the same rate as the national economy. The national employment growth rate between 2015 and 2022 was 7.6%.
- **Industry Mix Effect:** This measures how much growth is due to the specific industry's national performance. For instance, if an industry is booming nationally, it will likely contribute more to the region's growth.
- **Competitive Mix Effect:** This is the most region-specific component and identifies growth driven by the local economy's unique factors. It highlights the "competitive advantage" of the region—employment changes that cannot be explained by national or industry trends by essentially subtracting out the employment growth due to the national and industry effects.
- **Analysis Steps:**
    - Calculate the% change in each sector between 2015 and 2022 for the U.S. and for Bend. For example, food service (NAICS 722) employment increased by 14.6% in Bend and by 5.7% in the U.S.
    - Calculate the **national growth effect** by multiplying the national growth percentage by Bend employment level. For example, Bend's food service sector employment totaled 5,090 in 2015. The national growth effect would be 5,090 multiplied by 5.7%, or 384 employees.
    - Calculate the **industry mix effect** by taking the difference between the national sector's growth rate and the overall national employment growth rate and multiply by Bend's 2015 sector employment. For example, the overall national employment growth rate is 7.6%, which is more than the food service sector growth rate of 5.7%. Thus, Bend's industry mix effect is 5,090 multiplied by-1.9%, or -96.
    - Calculate the **competitive mix effect** by finding the difference between the national sector's growth rate and Bend's sector's growth rate and multiply by Bend's 2015 sector employment. For example, in food service, the difference in growth rate between the U.S. and Bend would be 8.9% (14.6% minus 5.7%). Thus, Bend's competitive mix effect is 5,090 multiplied by 8.9%, or 453.
    - The change in a sector's employment between 2015 and 2022 can be attributed to each of these effects. The food service sector in Bend, for example, grew by 742 employees between 2015 and 2022, with growth of 453

employees attributable to the competitive effect. Thus, 61% of employment growth in food service is attributable to the characteristics of Bend itself, such as growth in population and tourism activity.

Exhibit 43 presents the shift-share analysis components, comparing Bend to the U.S., for all sectors with 0.5% or more of employment in Bend in 2022. Exhibit 44 presents the shift-share analysis components for Bend compared to Oregon.

Exhibit 43. Shift-Share Analysis, Bend Compared to US, 2015-2022

NAICS	INDUSTRY NAME	2015-2022 NOMINAL CHANGE	NATIONAL GROWTH RATE EFFECT	INDUSTRIAL EFFECT	COMPETITIVE EFFECT	COMPETITIVE EFFECT SHARE OF GROWTH
722	Food Services and Drinking Places	742	384	-96	453	61%
621	Ambulatory Health Care Services	1,175	295	426	454	39%
541	Professional, Scientific, and Technical Services	1,645	192	375	1,078	66%
561	Administrative and Support Services	-337	235	12	-584	173%
238	Specialty Trade Contractors	613	143	245	225	37%
445	Food and Beverage Retailers	330	99	-49	280	85%
236	Construction of Buildings	578	64	127	387	67%
713	Amusement, Gambling, and Recreation Industries	659	50	-8	617	94%
441	Motor Vehicle and Parts Dealers	93	81	-38	51	55%
623	Nursing and Residential Care Facilities	89	71	-155	173	194%
551	Management of Companies and Enterprises	719	14	12	693	96%
721	Accommodation	66	60	-123	130	196%
423	Merchant Wholesalers, Durable Goods	106	49	32	24	23%
813	Religious, Grantmaking, Civic, Professional, and Similar Organizations	46	53	-62	55	119%
531	Real Estate	170	42	52	77	45%
424	Merchant Wholesalers, Nondurable Goods	205	33	-5	177	86%
611	Educational Services	92	39	16	37	41%

NAICS	INDUSTRY NAME	2015-2022 NOMINAL CHANGE	NATIONAL GROWTH RATE EFFECT	INDUSTRIAL EFFECT	COMPETITIVE EFFECT	COMPETITIVE EFFECT SHARE OF GROWTH
624	Social Assistance	-21	47	90	-157	749%
811	Repair and Maintenance	88	34	7	47	54%
524	Insurance Carriers and Related Activities	-26	42	21	-90	345%
812	Personal and Laundry Services	56	33	-12	35	62%
332	Fabricated Metal Product Manufacturing	183	17	-21	187	102%
311	Food Manufacturing	120	20	12	89	74%
484	Truck Transportation	179	13	1	165	92%
523	Securities, Commodity Contracts, and Other Financial Investments and Related Activities	63	19	15	29	46%
321	Wood Product Manufacturing	-240	49	31	-320	-133%

Note: Table presents sectors in descending order based on employment.
Source: Oregon Employment Department and U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 2015 and 2022.

Exhibit 44. Shift-Share Analysis, Bend Compared to Oregon, 2015-2022

NAICS	INDUSTRY NAME	2015-2022 NOMINAL CHANGE	OREGON GROWTH RATE EFFECT	INDUSTRIAL EFFECT	COMPETITIVE EFFECT	COMPETITIVE EFFECT SHARE OF GROWTH
722	Food Services and Drinking Places	742	363	-143	522	70%
621	Ambulatory Health Care Services	1,175	278	311	586	50%
541	Professional, Scientific, and Technical Services	1,645	182	368	1095	67%
445	Grocery and Convenience, Specialty Food, and Beer, Wine, and Liquor Retailers	330	93	-28	265	80%
459	Miscellaneous Retailers (Sporting Goods)	421	78	253	91	22%
236	Construction of Buildings	578	60	395	122	21%
713	Amusement, Gambling, and Recreation Industries	659	47	-34	646	98%
441	Motor Vehicle and Parts Dealers	93	76	-5	22	24%
623	Nursing and Residential Care Facilities	89	67	-57	79	89%
551	Management of Companies and Enterprises	719	13	11	694	97%
721	Accommodation	66	56	-79	88	134%
522	Credit Intermediation and Related Activities	25	54	-138	108	433%
423	Merchant Wholesalers, Durable Goods	106	47	34	26	24%
813	Religious, Grantmaking, Civic, Professional, and Similar Organizations	46	50	-87	83	180%
513	Newspaper and Software Publishers	51	49	-25	27	53%

NAICS	INDUSTRY NAME	2015-2022 NOMINAL CHANGE	OREGON GROWTH RATE EFFECT	INDUSTRIAL EFFECT	COMPETITIVE EFFECT	COMPETITIVE EFFECT SHARE OF GROWTH
531	Real Estate	170	39	64	67	39%
312	Beverage and Tobacco Product Manufacturing	204	36	137	32	15%
449	Furniture and Appliance Retailers	22	44	-140	118	537%
424	Merchant Wholesalers, Nondurable Goods	205	31	14	160	78%
611	Educational Services	92	37	-24	79	86%
811	Repair and Maintenance	88	32	22	34	38%
812	Personal and Laundry Services	56	31	-12	37	66%
332	Fabricated Metal Product Manufacturing	183	16	-12	179	98%
311	Food Manufacturing	120	18	-16	118	98%
484	Truck Transportation	179	12	-8	175	98%
523	Securities, Commodity Contracts, and Other Financial Investments	63	18	14	31	49%

Note: Table presents sectors in descending order based on employment. Table presents sectors with 0.5% or more of Bend's 2022 employment and positive growth.
Source: Oregon Employment Department, Quarterly Census of Employment and Wages, 2015 and 2022.

Stakeholder Engagement Summary

In addition to quantitative analysis, ECOnorthwest conducted outreach to the following stakeholders to provide insight into industry trends, workforce dynamics, and the broader factors shaping Bend's economic trajectory:

- Bend Chamber of Commerce, Katy Brooks
- Business Oregon, Damon Runberg
- Central Oregon Intergovernmental Council (COIC), Scott Aycock
- Economic Development for Central Oregon (EDCO), Jon Stark and Don Myll
- Oregon Employment Department, Nicole Ramos
- Oregon State University Cascades, Rebecca Robinson

The insights provided by stakeholders enriched the employment trend analyses as well as highlighted important factors that were not visible through the data. The key points from this outreach are summarized below:

- **Biotech stands out as a growth sector**, with stakeholders citing Bend's success in attracting funding and building a cluster around key companies like Bend Research. This industry is seen as a regional and state-level highlight, with strong potential for further expansion and innovation. Similarly, professional services were described as a critical and fast-growing component of Bend's economy. These sectors are largely export-oriented, with a significant portion of the workforce telecommuting for firms based in larger metropolitan markets. Stakeholders noted this trend as both an opportunity and a challenge, as many high-paying jobs generated locally are not always reflected in regional employment data.

- **Manufacturing emerged as a nuanced topic.** While stakeholders noted the challenges of land availability and high costs in Bend, they highlighted the continued success of small-scale and niche manufacturing operations. Examples include recreational products and consumer goods companies, which benefit from Bend's entrepreneurial culture and high quality of life. However, they also acknowledged that larger-scale manufacturing growth has increasingly shifted to Redmond due to more affordable land and infrastructure.

- **Tourism and recreation were consistently highlighted as essential economic drivers.** Stakeholders pointed to Bend's appeal as a destination and its role in workforce recruitment, often described as offering a "second paycheck" in the form of lifestyle

benefits. However, challenges such as wildfire smoke and rising costs of living pose significant risks to the sustainability of this sector.

- **The availability and affordability of housing were central concerns across all discussions.** Stakeholders emphasized that Bend's high cost of living impacts workforce recruitment and retention, particularly in sectors like healthcare and hospitality, where wages often lag behind housing costs. They also highlighted the importance of addressing childcare availability and affordability to support workforce participation, particularly for families.

- **Aging workforce was identified as a growing issue**, particularly in industries like healthcare and manufacturing, where replacing retiring workers presents a challenge. In healthcare, Bend's role as a regional hub creates a strong demand for services, but stakeholders expressed concern about whether wages in home health and similar fields would rise to meet labor supply shortages.

- **Bend's entrepreneurial ecosystem was frequently mentioned as a defining feature of the local economy.** Stakeholders noted that Bend is a hub for startups, with strong support from organizations like Economic Development for Central Oregon (EDCO) and the OSU Cascades Innovation Hub. However, they also pointed out the need for continued investment in incubator spaces and accelerators to sustain this momentum. Venture capital and angel investor interest in Bend-based companies remain strong, with local networks playing a key role in fostering growth for high-potential startups.
- **Stakeholders also expressed optimism about emerging sectors**, though they noted limitations in the type of developments possible due to municipal water and land availability. The role of bioscience and software development as high-wage, high-growth industries was frequently emphasized, along with the potential to support these sectors through strategic investments in infrastructure and workforce development.
- **Bend's infrastructure capacity emerged as a recurring theme**. Stakeholders pointed to challenges in roads, water, and sewer systems as barriers to sustainable growth. Climate change, particularly the increase in wildfire smoke, was highlighted as a pressing issue impacting tourism, livability, and overall economic stability. Stakeholders urged proactive planning to address these risks and ensure long-term resilience.

Appendix B. Electrification Policy Matrix

Category	Description	Policy Options	Building Type	Time	Cost	GHG Impact	Risk	Depts	Cities
State-level advocacy: regulations	State level policies often preempt local ability regulate fossil fuel reduction or use. City can advocate for changes to state law or policy to support local efforts to restrict fossil fuel use.	Advocate for updated state building code to increase energy-efficiency requirements for new construction and major renovations	N						
		Advocate for legislation expressly authorizing municipal prohibitions or limitations on use of fossil fuels	N						
		Advocate for reinstatement of the Climate Protection Program	N, E						
		Advocate for legislation requiring cooling in rental properties	E						
State-level advocacy: support	State legislation can provide and enable ways to facilitate electrification through expanded incentives and new programs. City can advocate for new state law or policy that provides this kind of support for electrification.	Advocate for new incentives for all-electric new construction	N, E						
Education & support programs	Establish new education and outreach programs to help increase public awareness, support informed decision making, and encourage voluntary upgrades to electric equipment and appliances in homes and commercial buildings. Includes both passive education, such as websites, social media, and coordinated campaigns as well as active outreach, such as workshops, technology demonstrations, technical assistance, and project management to facilitate electrification upgrades.	Navigation support programs to help community members identify, understand and access financial and contractor resources to install heat pumps, heat pump water heaters, and electric stoves in existing homes. Can include project management services to facilitate equipment deployment.	E						
		Provide technical assistance on building electrification and decarbonization for builders and developers	N						
		Create new educational materials to encourage residential and commercial construction in both new construction and existing homes	N, E						
		Promote state and federal incentives or tax credits	N, E						
Incentives	Develop voluntary programs to incentivize the adoption of electric technologies in new construction, major remodels and in existing homes (at the time of replacement). Incentives will reduce the financial or other costs associated with electrification.	Prioritize or expedite permit applications for all-electric development projects	N						
		Development incentives, such as FAR, height, or density bonus for master plan developments or overlay with electrification requirements	N						
		City-funded financial incentive for all-electric new construction	N						
		City-funded ductless heat pump and heat pump water heater purchase and installation subsidy for new construction and/or existing homes	N, E						
		Provide additional urban renewal assistance for all-electric buildings	N						
Local Regulations	Implement new restrictions or requirements to reduce fossil fuel use in new or existing residential or identified commercial construction.	Establish nitrogen oxide (NOx) emissions standards for new appliances in existing buildings or for new buildings	N, E						
		Restrict natural gas infrastructure in the right-of-way in new residential developments	N						
		Enact benchmarking, energy performance, or greenhouse gas reduction standards for commercial and multifamily buildings as allowed under HB 3409, the State of Oregon Building Performance Standards Program	E						
Fees	Implement financial disincentives to using fossil fuels in new construction. Proceeds of fees could fund staff investment in outreach and support programs or financial incentives.	Charge a new building permit fee for non-electric infrastructure in new construction. Fee may be determined in relation to anticipated gas use of the building.	N						
		Increase franchise fee on natural gas utility	N, E						
Building Code	Request local authority to amend building code to promote electrification.	Pursue local amendment to state building code to require electrification in new residential construction and major remodels	N						
City-Owned Buildings	Adopt policies committing the City of Bend to eliminate fossil fuels in new and existing City-owned or operated buildings.	Adopt policy committing to electrify all new City buildings	N						
		Adopt policy committing city to electrify or retrofit existing City buildings	E						

Appendix B. Electrification Policy Matrix

Definitions:

- **Building Types**: policy addresses new **(N)** or existing **(E)** buildings
- **Time**: staff time needed to accomplish policy or initiative
- **Cost**: cost to City to accomplish policy or initiative
- **GHG impact**: anticipated greenhouse gas emissions reduction impact, assuming policy goals are met through initiative
- **Risk**: legal and practical risk associated with policy or initiative
- **Departments involved**: the number of departments that need to be involved in developing or executing the policy or initiative. A proxy for overall complexity of executing the policy or initiative.
- **Other cities**: whether there is precedent in other cities to accomplish this action and a model to follow

Key:

Time	<6 mo	6 mo – 2 yr	2+ yrs
Cost	Low	Med	High
Impact	High	Med	Low
Risk	Low	Med	High
Departments Involved	1	2	3+
Other Cities	Yes	Considering	No