ENERGY BY THE NUMBERS

Energy by the Numbers focuses on the metrics and data available to track how Oregon produces, purchases, and uses various types of energy.

This section includes energy use data on electricity, transportation energy, and direct use fuels by resource and by sector. Where possible, data showing how Oregon's energy system has changed over time have been included to provide context and history. We also discuss energy production — where and what kind of energy Oregon produces, where and how we generate electricity, and what direct use and transportation fuels are produced in state.

Readers will find data on what Oregon spends on energy, how some Oregonians experience energy burden, and what the energy industry gives back to Oregon in terms of jobs. The section also demonstrates how energy efficiency continues to serve as an important resource for Oregon. It concludes with highlights on the four end use sectors: residential, commercial, industrial, and transportation, including energy use, expenditures, and greenhouse gas emissions – and how each sector uses energy to provide goods and services.

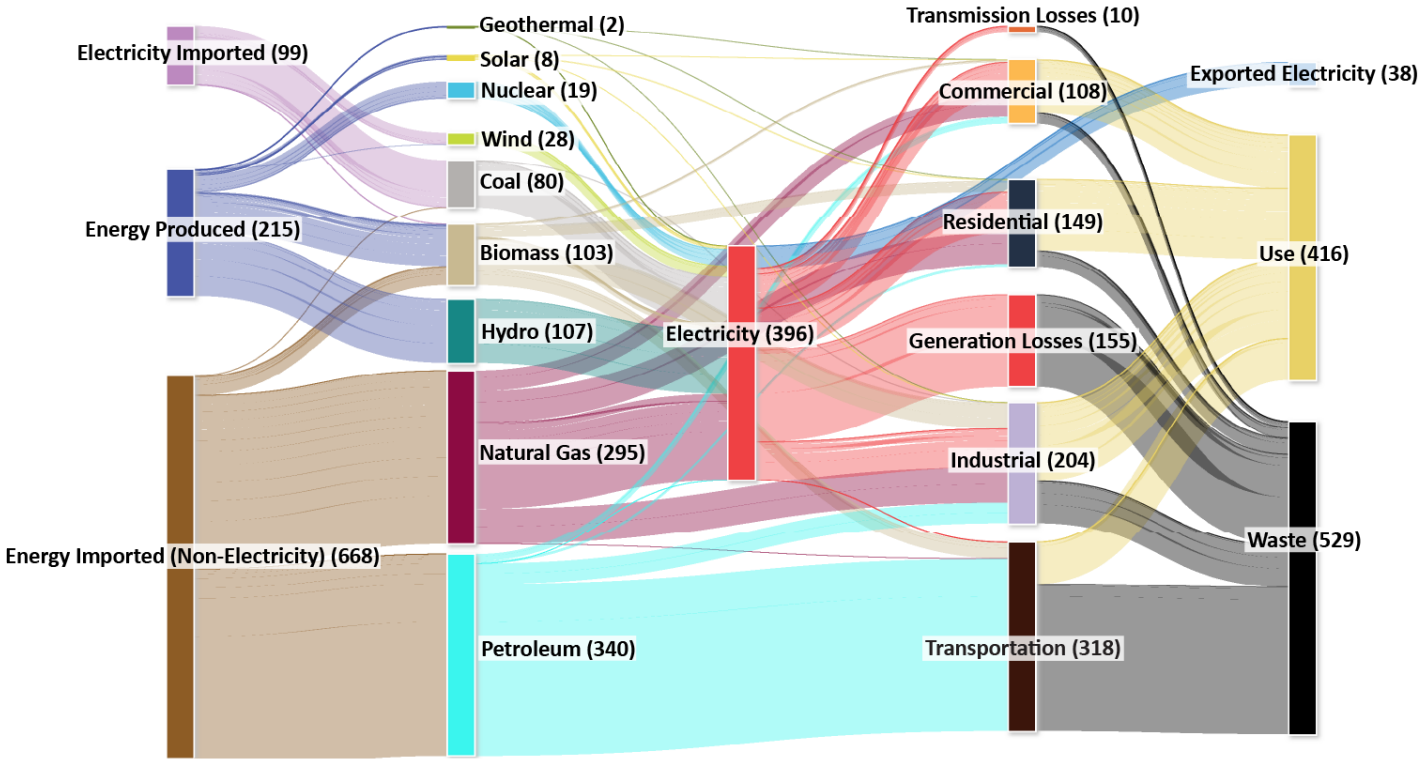
Key Energy Indicators

The Oregon Department of Energy's Strategic Plan includes an initiative to develop Key Energy Indicators that will help the state monitor and assess Oregon's energy landscape, progress on energy-related goals, and general status of Oregon's energy systems. KEIs can indicate progress toward energy-related statutory and administrative targets and goals as well as non-energy goals, such as job creation and economic development. ODOE has been collaborating with partners to identify a set of KEIs to track, and will finalize and share an initial list soon. In the meantime, look for this special symbol in this section to see some of the data points we expect to include as key indicators for energy in Oregon.

TABLE OF CONTENTS

Understanding Oregon's Energy Story

Oregon's energy story has evolved over time to include new technologies, address changes in the availability of different generation resources, and to meet state energy goals. The Pacific Northwest has a long history of using hydropower resources, but 20 years ago, solar- and wind-generated energy was scarce.



Numbers represent trillions of Btu of energy.

Today, Oregon's energy resources are more diverse. In the chart above, start at the left to see imported energy and energy produced in Oregon. **The numbers represent trillions of Btu of energy.** The energy lines flow through to show the different types of resources we use – including the energy produced in Oregon and what is imported as direct fuels or electricity – and where they end up in Oregon's energy story.

The energy we produce and import helps meet various needs, from in-state electricity generation to transportation fuels to the natural gas and electricity that supply homes and businesses. Some energy ultimately goes unused due to system inefficiencies, and some is exported to other states.

Btu or **British Thermal Unit** is a measurement of the heat content of fuels or energy sources. Btu offers a common unit of measurement that can be used to count and compare different energy sources or fuels. Fuels are converted from physical units of measurement, such as weight or volume, into Btu to more easily evaluate data and show changes over time.

The chart provides a macro level look at the energy Oregonians produce, import, consume, and export. **Energy Produced** includes forms of energy that Oregon produces in-state, such as hydroelectric, wind, and biomass energy. **Electricity Imports** includes electricity that is generated in other states and brought in for use in Oregon. **Energy (non-electric) Imports** includes the other forms of energy brought into the state for various uses, such as gas to power transportation and fuels to heat Oregon homes.

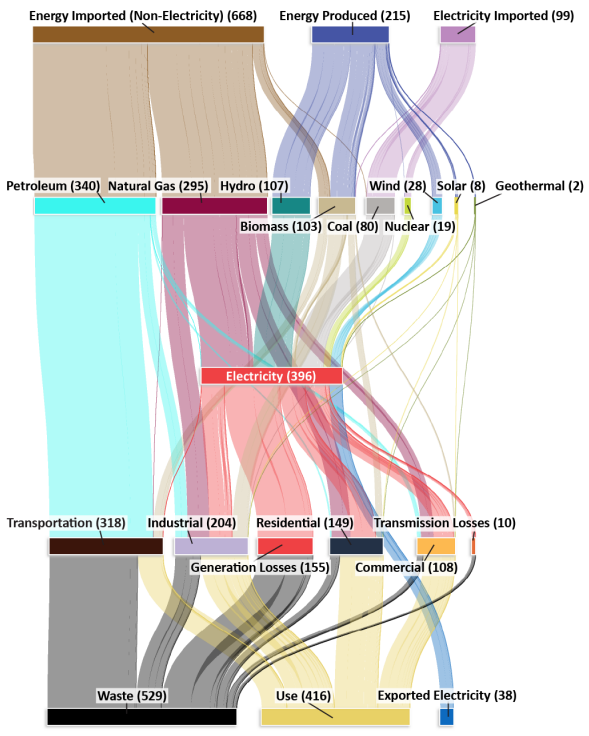
The flow to **Waste Energy** includes all the energy that is not harnessed, from the point of extraction to the point of use. This amounts to 54 percent of our energy use (529 trillion Btu). This includes energy lost as heat during combustion or transformation into electricity, transmission losses, and many other factors.[i] Learn more about waste energy in the Energy 101 section of this report.

Between 2020 and 2022, the residential and commercial sectors experienced shifts in energy consumption. **Residential** sector energy consumption increased from 144 to 149 trillion Btu (an increase of about 3.5 percent), while **commercial** sector energy consumption increased from 101 to 108 trillion Btu (nearly 7 percent increase) as more people and businesses have recovered from the COVID-19 pandemic. Meanwhile, **industrial** sector energy consumption increased from 187 to 203 trillion Btu, an increase of about 8.5 percent. **Transportation** energy consumption experienced the largest change, decreasing to 281 trillion Btu in 2020 and then increasing to 307 trillion Btu in 2022 (over a 9 percent increase), likely due to factors such as shifts away from telecommuting and increasing travel opportunities as the state recovered from the pandemic.[1]

Changes in the Energy Flow Chart Methodology and Design

This report relies on data from the U.S. Energy Information Administration. In September 2023, the EIA changed its methodology for the way primary energy is calculated for renewable resources. This change from a fuel equivalency method to a direct conversion using the heat content of electricity resulted in a reduced amount of energy attributed to the waste energy category, and reduced electrical system losses associated with energy use in the Energy Flow Chart.[3]

Read more about this change in the About the Data section of this report.



[i] Electrical system losses for various generation sources are estimated using methods that match with those used by the U.S. Energy Information Administration.[1]

Energy Sources Used in Oregon

Petroleum. Fossil fuel extracted from beneath the earth's crust. It includes gasoline, diesel, heating oil, lubricants, and other fuels used for space heating, industrial equipment, and transportation. Oregon imports the petroleum that it uses.

Natural gas. Fossil fuel extracted from beneath the earth's surface. Oregon has a single natural gas field located in Mist, and imports most of the natural gas the state consumes for electricity and as a direct fuel. Oregon has 16 natural gas electricity generation facilities with a combined capacity of 4,384 MW.[4] Natural gas is also used directly for residential, commercial, industrial, and transportation uses.

Hydropower. Electricity generation from the flow of water through dams. Oregon has 105 hydropower facilities of varying sizes, including four federal facilities on the Columbia River that span the Oregon and Washington border, and two facilities that span the Oregon and Idaho border.[4]

Biomass. Includes renewable biogas and biofuels derived from the energy of plants and animals. Wood and wood waste is Oregon's greatest source of biomass, which is used for space heating, cooking, electricity generation, and transportation. Oregon has 12 biomass and 45 biogas operating facilities converting waste products to electricity.[4] Oregon produces some renewable natural gas, a biogas that has been purified to be a substitute for fossil natural gas, often to meet specifications required for injection into a natural gas distribution pipeline. Oregon also produces plant-derived ethanol fuel and biodiesel from used cooking oil to be used as transportation fuels.

Coal. Combustible rock burned to support industrial processes and create electricity. Oregon's last coal-fired power plant, the 575-MW Boardman facility, closed in October 2020 and was demolished in September 2022.[5] The state imports coal-generated electricity from neighboring states.

Wind. Generation of electricity by the force of wind turning turbines. As of 2022, Oregon has 50 operating facilities in the state with a total capacity of 3,981 MW.[4]

Nuclear. Generated electricity from a nuclear reactor where thermal energy is released from the fission of nuclear fuel. Oregon's nuclear power comes from the Columbia Generating Station in Washington State, and the electricity produced is marketed by the Bonneville Power Administration.

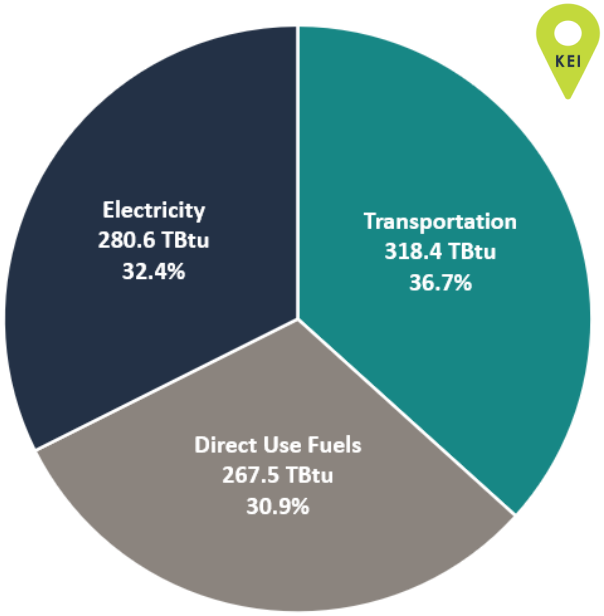
Solar. Photovoltaic technology converts energy radiating from the sun into electricity. Solar systems are located on homes, businesses, and large utility-scale arrays. From 2012 to 2022, annual solar generation in Oregon increased from 95,100 megawatt-hours to about 2.2 million MWh (a 23-fold increase).[4]

Geothermal. Energy extracted from hot water or steam from natural underground sources can be used for water/space heating or the generation of electricity. Oregon has three geothermal electricity generation facilities with a capacity of 38.5 MW.[4]

Note: *Since the 2022 edition of this report, some energy facilities were retired and no longer serve Oregon load. Please see the About the Data section for more information.*

Energy Use in Oregon

Consumption by Source



Oregon relies on energy from a variety of resources. The state imports energy such as gasoline, natural gas, propane, and other fuels, and uses electricity from both in- and out-of-state sources — including hydropower, natural gas, coal, nuclear, wind, and other renewable resources.[1] In 2022, Oregon used a total of 866.5 trillion Btu of energy. The pie chart to the right shows energy use by source for the primary energy required to meet demand in Oregon.

For this introduction to Oregon's energy use, the report separates energy into three main types:

32.4%

of Oregon's 2022 energy consumption[1]

Electricity: this is where most people begin when thinking about energy — the critical resource that powers our day-to-day lives. The electricity Oregonians use comes from facilities across the western United States, including Oregon. This percentage also accounts for the energy in fuels that come from out of state but generate electricity in state, such as natural gas, as well as the energy losses associated with electricity generation.[ii]

30.9%

of Oregon's 2022 energy consumption[2]

Direct Use Fuels: this category includes fuel oil and natural gas used to heat homes and commercial spaces; fuels used for other residential purposes, such as gas stoves; solar thermal heating; and fuels used directly in industrial processes.

36.7%

of Oregon's 2022 energy consumption[2]

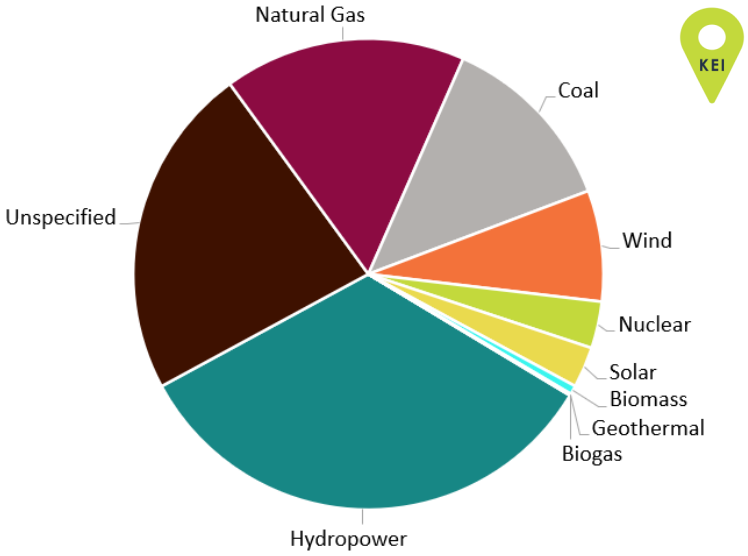
Transportation Fuels: this includes personal, passenger, and commercial vehicles, both on and off the roads, plus airplanes, boats, barges, ships, and trains. Nearly all transportation-related sources of energy are imported from out of state for in-state use.

[ii]The decrease in electricity use here from 45 percent in 2020 reflects the change in EIA methodology for estimating the source energy for renewable resources. See the About the Data section of this report for more information on this change.

Electricity

32.4%
of Oregon's 2022 energy consumption[4]

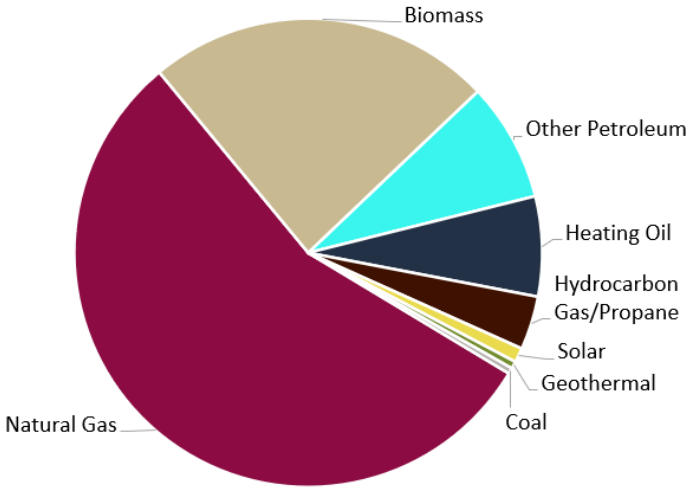
33.4%	Hydropower
22.8%	Unspecified[iii]
16.6%	Natural Gas
12.6%	Coal
7.6%	Wind
3.2%	Nuclear
2.8%	Solar
0.6%	Biomass
0.1%	Geothermal
0.02%	Biogas



Direct Use Fuels

30.9%
of Oregon's 2022 energy consumption[2]

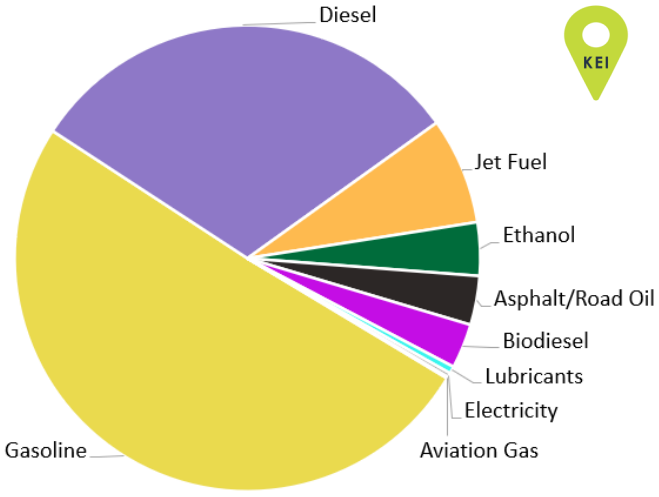
55.4%	Natural Gas
23.9%	Biomass
8.2%	Other Petroleum
6.9%	Heating Oil
3.7%	Hydrocarbon Gas Liquids Including Propane
1.0%	Solar
0.5%	Geothermal
0.4%	Coal



Transportation Fuels

36.7%
of Oregon's 2022 energy consumption[3]

50.6%	Gasoline
30.9%	Diesel
7.4%	Jet Fuel
3.7%	Ethanol
3.4%	Asphalt/Road Oil
3.1%	Biodiesel
0.5%	Lubricants
0.3%	Electricity
0.1%	Aviation Gas



Note: *Fuel percentages are rounded to the nearest tenth and not all are listed.*

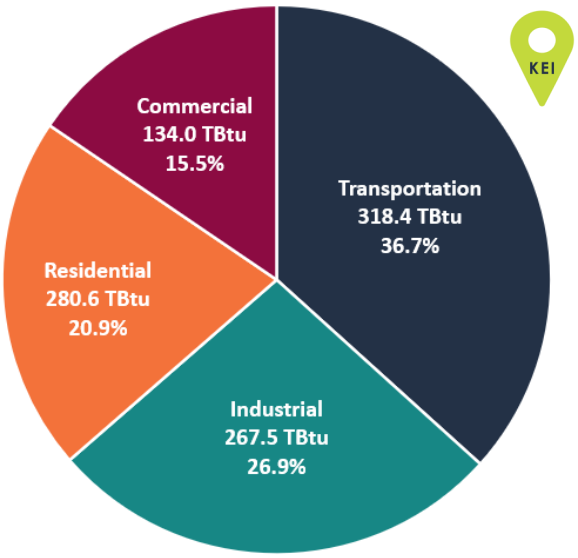
[iii]Unspecified includes real-time supplemental market purchases of electricity that utilities make to meet demand. More information about the methodology change that led to inclusion of the unspecified category in the Electricity Resource Mix data represented here can be found in the Electricity Use section of this Report.

Energy Use in Oregon

Consumption by Sector

Energy consumption is also tracked by how it is used among four main end-use sectors: Residential, Commercial, Transportation, and Industrial.

In Oregon in 2022, those four sectors combined consumed 866.5 trillion Btu of energy,[2,3] including each sector's respective share of electrical system losses,[iv] as discussed earlier in *Understanding Oregon's Energy Story.*



20.9%

of Oregon's 2022 energy consumption[2]

Residential: this category includes single-family, multifamily, and manufactured homes for Oregonians. Energy is used for lighting, heating and cooling living spaces, cooking, and operating appliances. Electricity is the most used energy resource in homes – with heat pumps, electric furnaces, and electric resistance heaters as examples of primary electric heat options.

15.5%

of Oregon's 2022 energy consumption[2]

Commercial: this category includes businesses that provide goods and services, government and office buildings, grocery stores, and shopping malls. Energy is used to heat and cool spaces, power equipment, and illuminate facilities. It is Oregon's smallest energy-consuming sector, supported by the adoption of advanced energy codes, energy efficiency programs, and advancements in equipment and processes.

26.9%

of Oregon's 2022 energy consumption[2]

Industrial: this category includes facilities used to produce, process, and manufacture products – including agriculture, fishing, forestry, manufacturing equipment (including chip manufacturing), mining, data centers, and energy production. Energy powers industrial equipment and machinery to manufacture products. This sector has seen contractions in aluminum, forestry, and manufacturing, and expansions in technology manufacturing and data centers. The change in use happened along with improvements in efficiency of industrial facilities and equipment.

36.7%

of Oregon's 2022 energy consumption[3]

Transportation: personal cars, fleets, shipments, airline travel, and more make up Oregon's transportation energy use. Petroleum is the most used resource and the largest contributor of greenhouse gas emissions in Oregon. Alternative fuels like electricity and biofuels are a growing part of this sector.

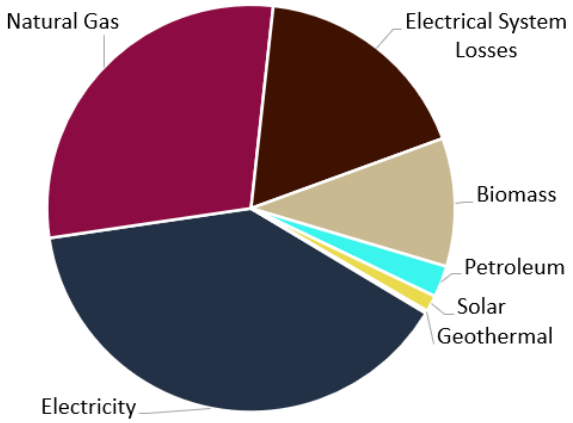
[iv] Electricity generation and transmission result in energy losses that are estimated and included in EIA consumption data. In 2023, the EIA changed the methodology for calculating primary energy from renewable resources (further explained in About the Data). Electrical system energy losses account for energy lost during generation, transmission, and distribution of electricity.

Residential

20.9%

of Oregon's 2022 energy consumption

39.1%	Electricity
29.1%	Natural Gas
17.7%	Electrical System Losses
10.2%	Biomass
2.5%	Petroleum
1.3%	Solar
0.2%	Geothermal

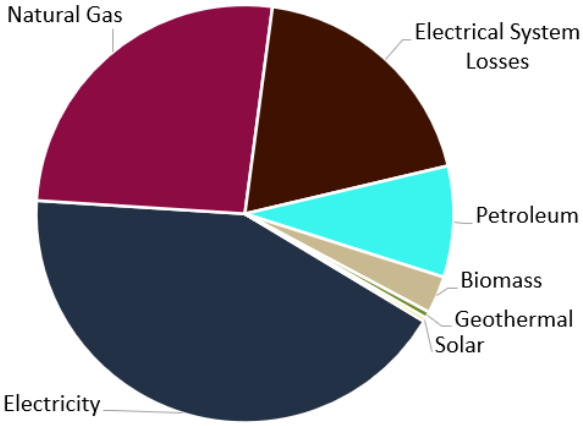


Commercial

15.5%

of Oregon's 2022 energy consumption

42.4%	Electricity
26.1%	Natural Gas
19.2%	Electrical System Losses
8.6%	Petroleum
2.5%	Biomass
0.4%	Geothermal
0.3%	Solar

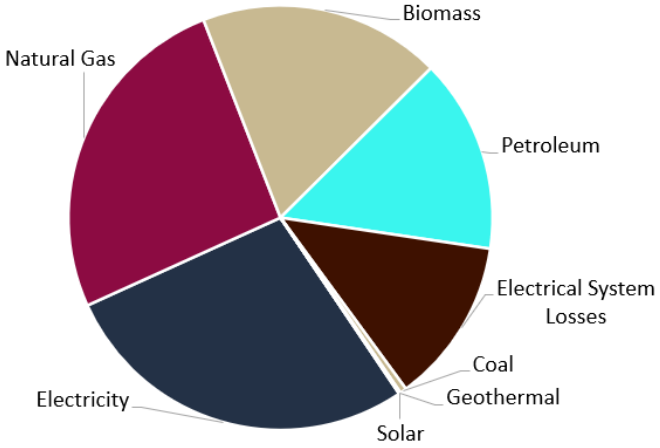


Industrial

26.9%

of Oregon's 2022 energy consumption

27.7%	Electricity
25.9%	Natural Gas
18.5%	Biomass
12.6%	Electrical System Losses
14.8%	Petroleum
0.5%	Coal
0.1%	Geothermal
0.03%	Solar

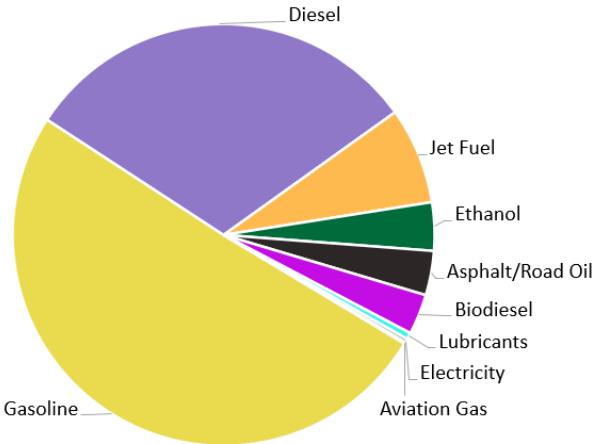


Transportation

28.6%

of Oregon's 2022 energy consumption

50.6%	Gasoline
30.9%	Diesel
7.4%	Jet Fuel
3.7%	Ethanol
3.4%	Asphalt/Road Oil
3.1%	Biodiesel
<1%	All Other Sources



Energy Use in Oregon

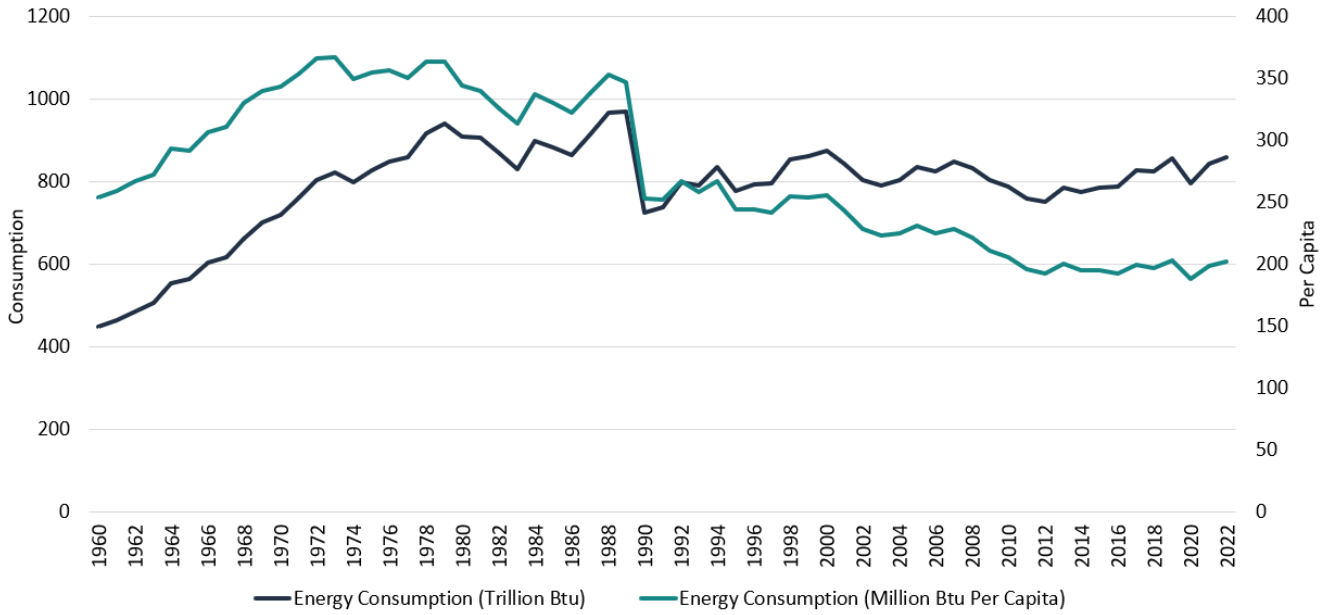
10th

Oregon's rank for lowest per capita energy use among states in 2022.[2]

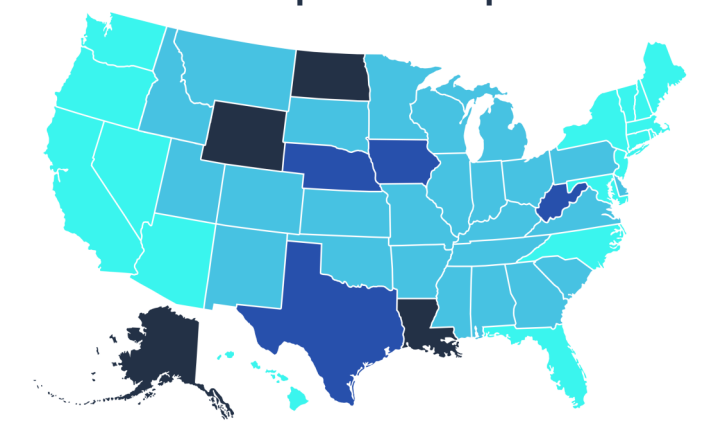
Oregon's Energy Consumption Over Time

Oregon saw increased energy use for almost four decades—an average of 3.6 percent annual growth from 1960 to 1999.[2] During that time, the state shifted from a reliance on fuel oil and wood to natural gas and electricity in homes and businesses. Oregon reached its highest energy consumption for stationary and transportation uses in 1999. Since then, total energy use has been decreasing, though in recent years alternating increases and decreases may indicate the beginning of a plateau. Energy use in Oregon declined by 13.4 percent between 2000 and 2020 and then increased slightly between 2020 and 2022. Energy consumption per capita does not directly correlate with overall energy use. In the last 20 years, Oregon's population has steadily increased while overall energy consumption has slightly declined, driven by energy efficiency savings. This translates to a steady decrease in energy consumption per capita.[2]

Oregon's Total Energy Consumption and Per Capita Energy Consumption Over Time[2] [v]



U.S. Per Capita Consumption[2]



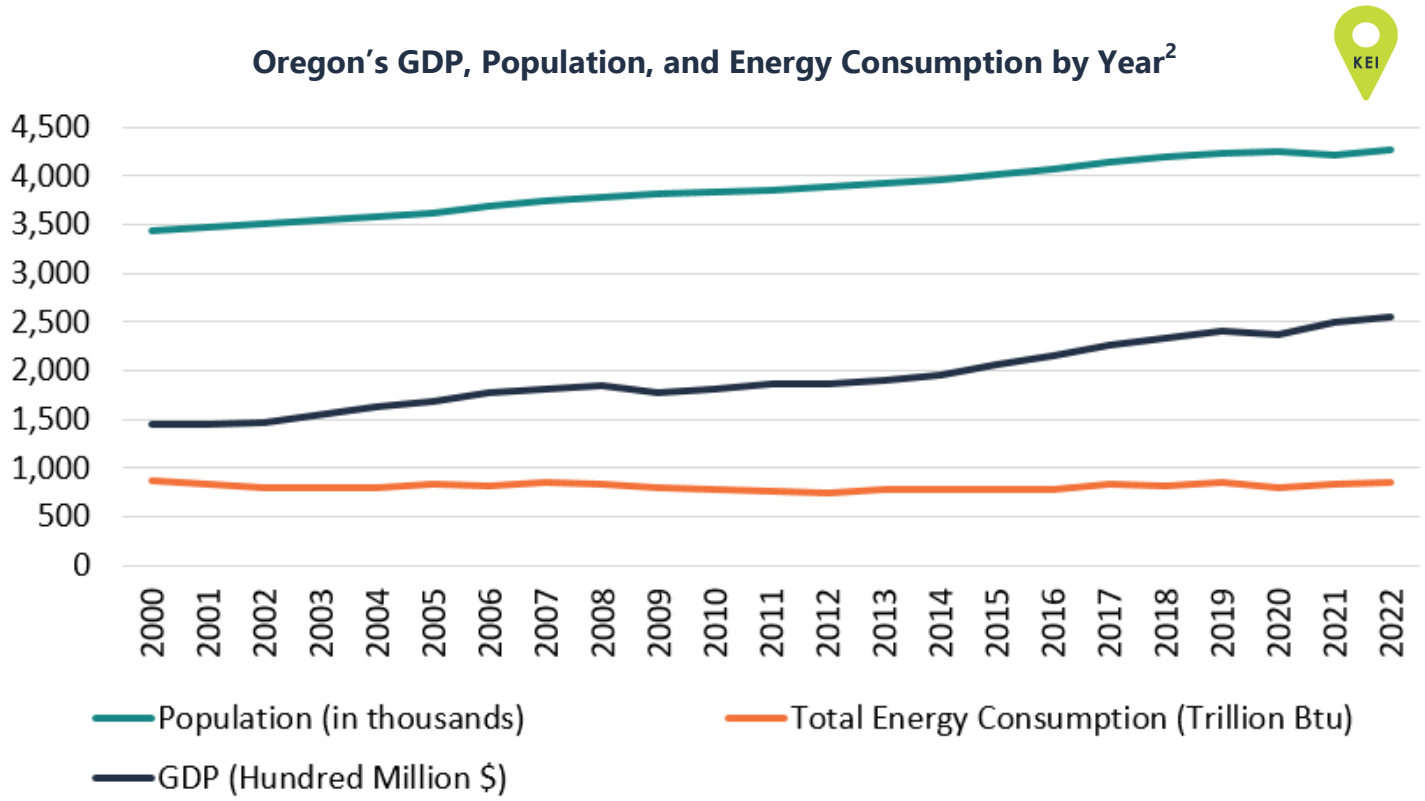
Energy Efficiency

While energy efficiency is not "consumed," it can be considered the second largest resource available in Oregon after hydropower. Increasing energy efficiency effectively reduces overall energy consumption, eliminates waste, and reduces the need to build more energy generation facilities or import fuels — providing the same services for less use and expense. Historically, Oregon has consistently met increased demand for electricity by implementing energy efficiency strategies.

[v] Data are affected by EIA's methodology change for primary energy, so this visual differs from previous versions of this report.

Energy Consumption and Economic and Population Growth

Energy efficiency and changes in our economy have led to decreases in Oregon's total and per capita energy use over time. Oregon's emphasis on energy efficiency has helped reduce both total and per capita energy use despite an increasing population and a growing economy, thereby avoiding the need to build new electricity generation plants to match the growth – though the region has seen some generating facilities closed and new ones come on board during this time. The graph below shows that since about 2000, economic growth (measured by gross domestic product or GDP) does not directly correlate with increases in energy consumption. In fact, as the economy and our population have grown, our energy consumption has stayed relatively flat with a slight decline.[2]



This displays all three data sets on the same axis; refer to the legend to find the units for each. This chart shows overall trends of population, energy consumption, and GDP in comparison to each other. The chart is not adjusted for inflation.

Consumption & Use

In the energy sector, *consumption* typically describes the amount of energy used. *Use* sometimes has the same meaning, but is often specifically applied when talking about the purpose of energy. For example, a home's annual electricity *consumption* goes toward a variety of *uses* like lighting, heating, and appliances. Or a furnace is *used* for heating but *consumes* electricity and natural gas. For this report, consumption and use are included in a wide variety of ways and sometimes interchangeably.

Electricity Use

Resources Used for Oregon's Electricity Mix

In 2022, Oregon used 58.7 million megawatt hours of electricity from both in-state and out-of-state sources. Hydropower, coal, and natural gas make up the bulk of Oregon's electricity resources, commonly called the resource mix, although the share of each resource is constantly changing and evolving.

Renewable energy makes up an increasingly larger share of the mix each year. In 2021, the Oregon Legislature passed House Bill 2021, requiring Oregon's largest electric utilities, Portland General Electric and Pacific Power, to reduce greenhouse gas emissions to 80 percent below baseline emissions levels (average from 2010-2012) by 2030, 90 percent below by 2035, and 100 percent by 2040.[1] The seven largest sources of electricity are labeled below; the other resources not listed in the bubble chart are each under 2 percent.[2]

12.6%

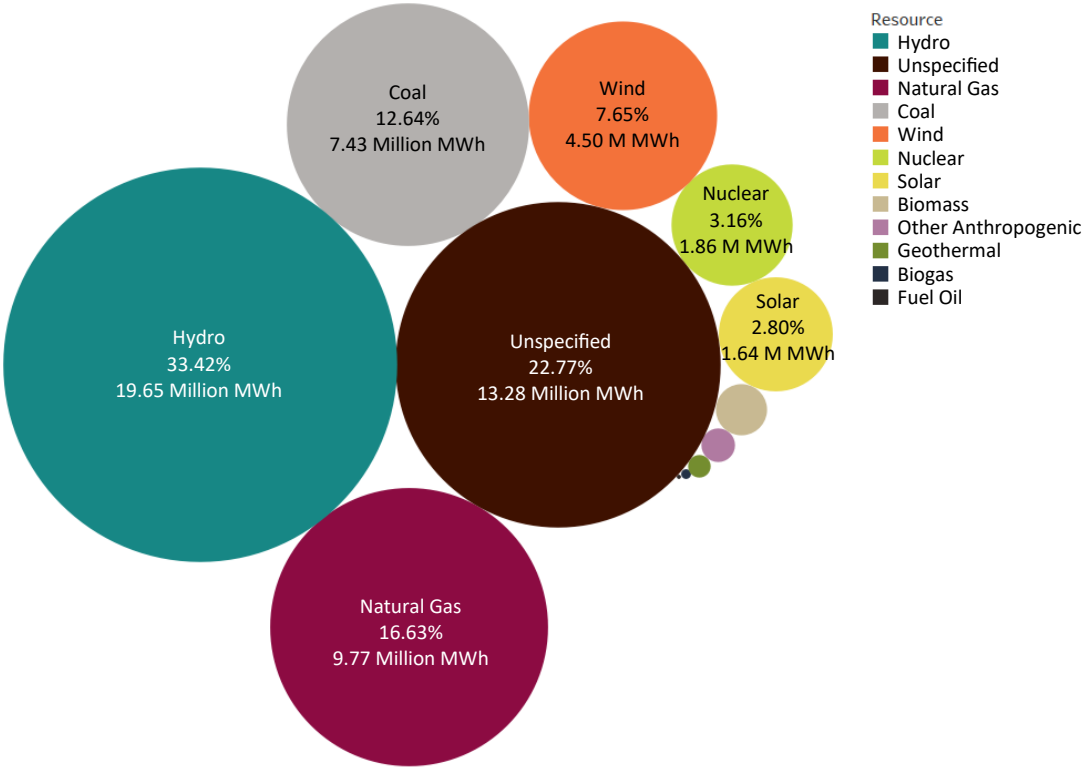
Percentage of Oregon's 2022 electricity mix that came from coal.[2]

2040

Year by which Oregon's two largest utilities and all Electricity Service Suppliers will need to reduce emissions for electricity sold in the state by 100 percent below baseline emissions levels.[1]

Resources Used to Generate Oregon's Electricity[2]

Based on 2022 data, this chart shows the energy resources used to generate the electricity that is sold to Oregon's utility customers.

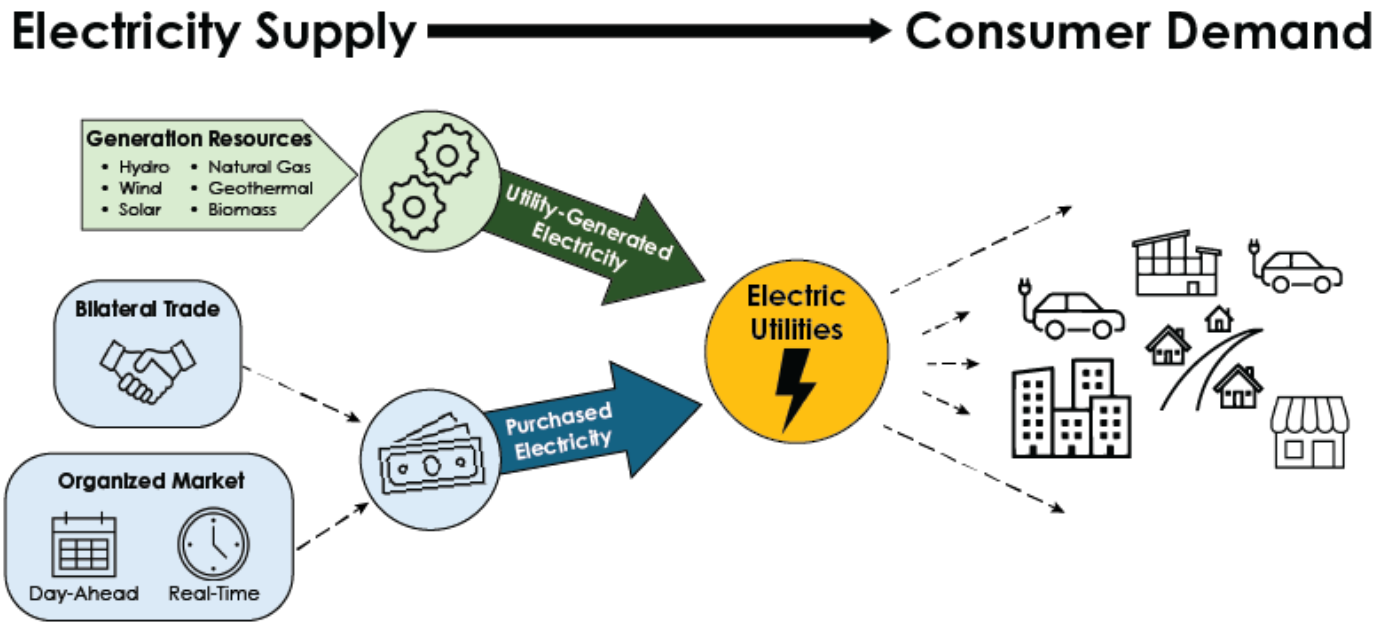


Electric utilities are privately owned electric companies (investor-owned utilities) or consumer-owned utilities that provide electricity to retail electricity consumers. Oregon utilities generate their own electricity, purchase power from wholesale providers, or enter into short- or long-term contracts to buy electricity from third-party owned power plants or regional markets.

Change in Methodology

In 2024, in response to feedback from utilities and after consultation with other state agencies and community partners, ODOE changed the way it calculates the Electricity Resource Mix, which is the data source for this section on Electricity Use. Instead of doing a detailed, complex analysis of the specific resources that make up the "unspecified" market purchases by utilities (a calculation only used by ODOE to develop the ERM), ODOE now uses the same data reported in the Oregon Department of Environmental Quality's Greenhouse Gas Emissions Reporting program. The change was necessary due to the inability to access the increasingly complex data sets necessary to accurately calculate a resource mix for market purchases.

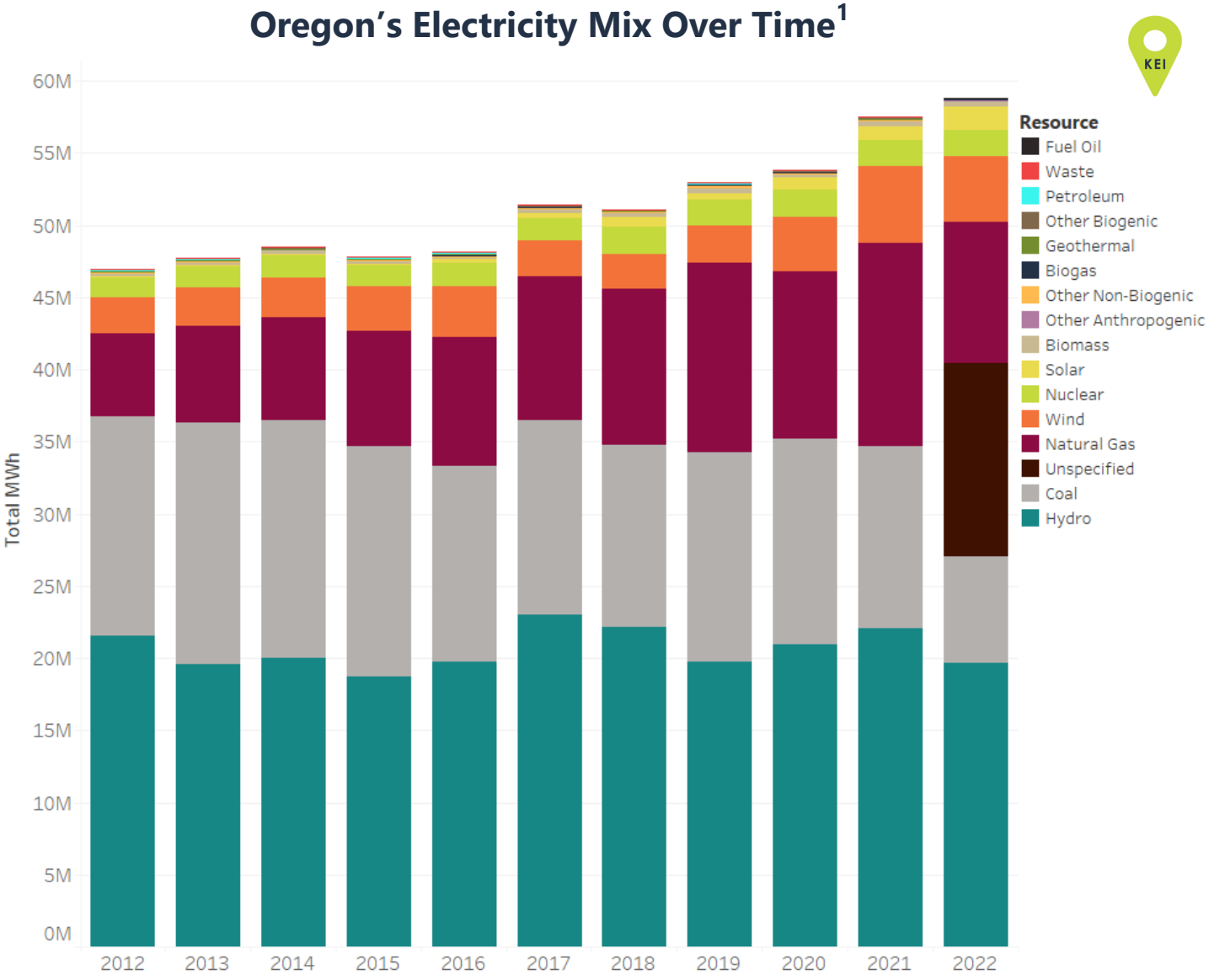
While DEQ's program provides emissions factors for the resources Oregon's utilities use to meet load, they do not assess or report the resources and emissions from utility purchases or sales in the real-time[vi] and day-ahead markets. Instead, DEQ assesses greenhouse gas emissions from all these market purchases using a single emission rate.[vii] They use the default emissions rate that California calculates and uses to estimate emissions from "unspecified" market purchases of electricity. It is based on the average emissions from a natural gas combined cycle power plant.[5] [6] ODOE's previous analysis showed that the unspecified market purchases included diverse resources available across the western U.S., such as hydro, coal, and natural gas. Since resources contributing to market purchases are now combined into the less specific "unspecified" category, the total amounts of individual resources may appear lower than in previous years. However, as utilities in states with clean electricity standards work to achieve their targets, and market purchases are used more and more, there may be a future need for more transparency in the resources and emissions that make up these electricity market purchases.



[vi] Real-time markets support electricity sales across multiple utility service territories to balance fluctuations in supply and demand within the current hour.[3]

[vii] The DEQ Greenhouse Gas Emissions Inventory program refers to market purchases as "unspecified emissions," and assigned an emissions rate of 0.428 metric tons of carbon dioxide equivalent per megawatt-hour.[4]

Oregon's Electricity Mix Over Time[1]



Oregon's electricity resource mix displays the proportion that each resource (solar, wind, hydropower, etc.) contributes to the total amount of electricity that Oregonians consume each year. The chart above presents Oregon's mix from 2012 to 2022 and shows two notable trends. First, total annual electricity consumption has increased from 47 to 59 million megawatt hours between 2012 to 2022, driven by factors like economic and population growth and increased customer demand. Second, the percentage that each resource contributes to total electricity for consumption changes year to year. Although the methodology for calculating the resource mix changed between 2021 and 2022 to include a bulk category for unspecified market purchases, some trends are still evident in the data. Hydro is still a predominant resource for the region. Coal continues to decline as plants are shuttered, and natural gas, wind, and solar are increasingly a larger proportion of the mix.

Note that changes to the methodology that occurred in 2024 and affect data starting in 2022 make this comparative analysis more complicated. The addition of the "unspecified" category does not attribute use to a particular resource, though this portion is likely made up of the most abundant resources in the region, including hydro, natural gas and coal.

Fluctuations in the sources of electricity consumed in Oregon are the result of several factors, including the regional nature of energy markets, resource availability, market dynamics and utility contracts, public policy, and other factors.[2]

Hydropower availability drives year-to-year fluctuations in Oregon's electricity resource mix. Oregon and the Pacific Northwest are rich in hydropower, which is consistently a low-cost resource. In energy markets, utilities typically prioritize using the lowest cost generating resources, dispatching them to meet customer demand at least cost. This often results in prioritization of hydropower, wind, and solar. These types of resources are used first when they are available, and then, if unmet customer demand remains, utilities will look to other types of sources, such as natural gas power plants, to meet additional demand. It is worth noting that the availability of renewable resources — such as wind, solar, and hydropower — also vary over the course of a day, from season-to-season, and year-to-year based on natural cycles, weather patterns, and changing climate conditions.

Utilities also meet customer demand through real-time supplemental purchases from regional markets. These real-time purchases typically come from resources that the utility does not own or for which it does not have any prior contractual arrangement. This electricity is considered "unspecified," signifying that the purchasing utility does not have a right to designate the electricity as coming from a particular resource.

Learn more about Oregon's Electricity Resource Mix

The Oregon Department of Energy updates the state's electricity resource mix each year. On the agency's website, find the state's overall mix, a map of generation facilities, electricity mixes by utility, greenhouse gas emissions, and more.

www.tinyurl.com/OregonERM

Electricity Imports and Exports

Oregon is fortunate to have an abundance of renewable energy resources and is one of the leading producers of renewable energy in the country.[7] This abundance is one of the reasons Oregon can export significant amounts of the renewable electricity it generates — particularly from hydropower.

Oregon imports all its petroleum and coal, and nearly all the natural gas fuels used to generate electricity at in-state facilities. Oregon does not have any coal mines and only extracts small amounts of natural gas at one facility in Oregon.[8]

Oregon also imports electricity from all over the western U.S.; this imported electricity comes from various resources.[8]

Oregon 2022 Exports

45.1% of wind generation[9]

37.2% of hydroelectric generation[9]

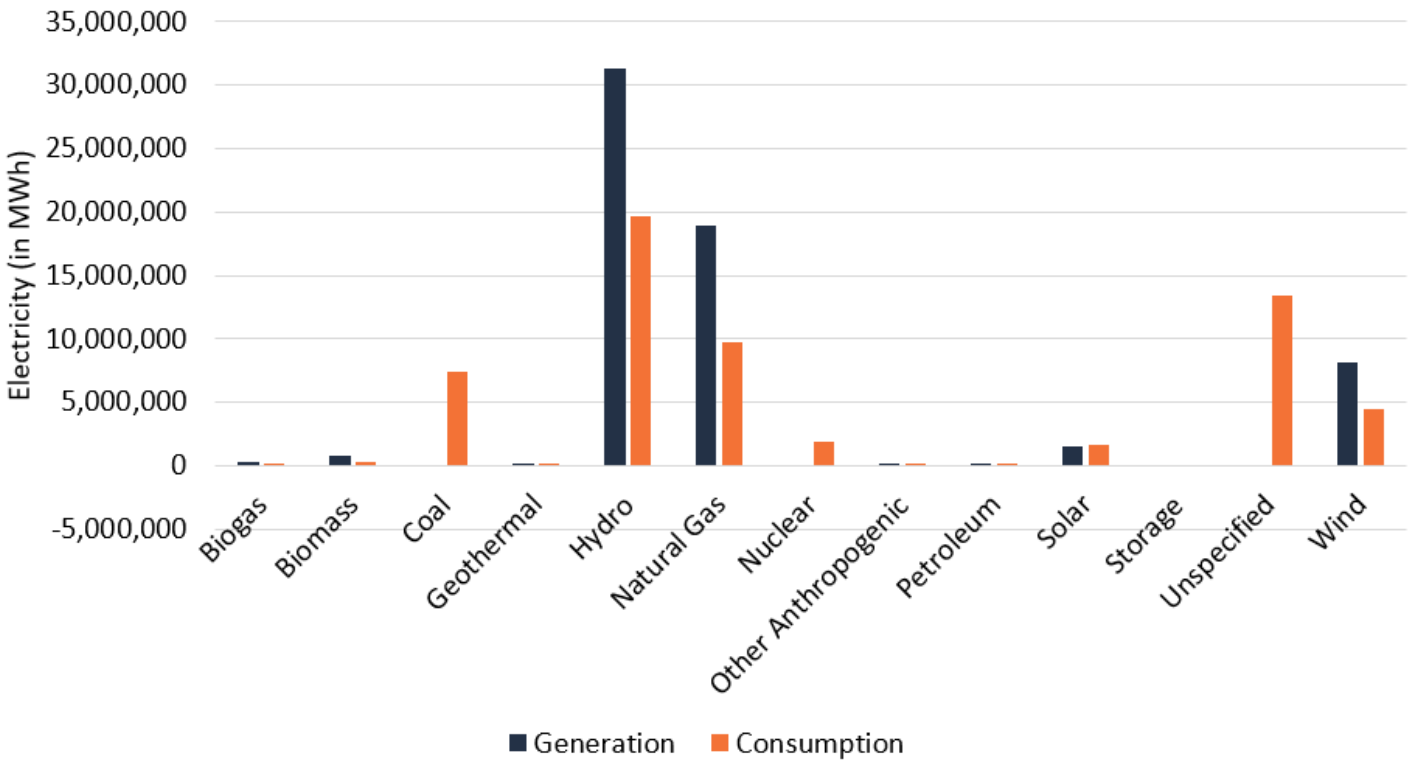
Oregon 2022 Imports

100% of coal based electricity[9]

100% of nuclear electricity[9]

8.4% of solar electricity[9]

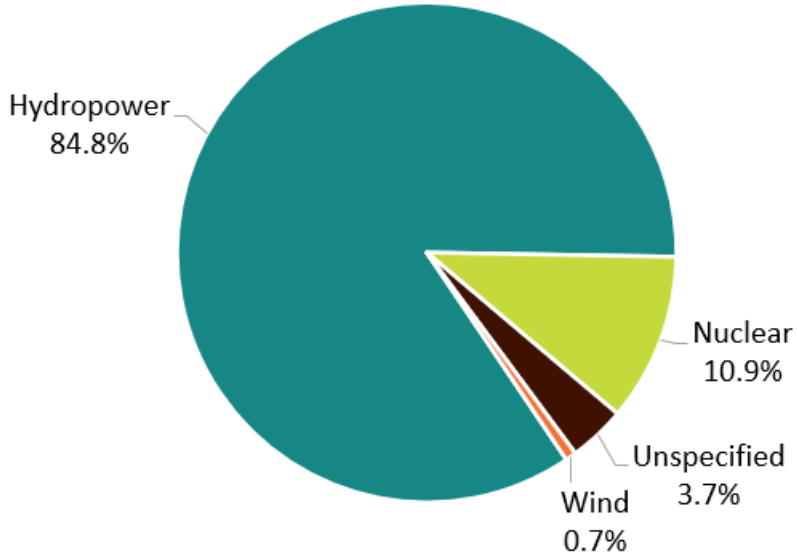
Oregon's Electricity Generation and Consumption (2022)[10 11]



Megawatt (MW): One million watts of electricity capacity—the equivalent of 1,340 horsepower, or enough power to simultaneously illuminate more than 100,000 standard 60-watt-equivalent LED lightbulbs. **Megawatt Hour (MWh):** A unit of measurement for energy output that represents the amount of energy supplied continuously by 1 MW of capacity for one hour. **Average Megawatt (aMW):** Represents 1 MW of energy delivered continuously 24 hours/day for one year, or 8,760 MWh.

Bonneville Power Administration

Consumer-owned utilities in Oregon purchase most of their electricity from the Bonneville Power Administration, a federal agency that markets wholesale electric power from 31 federal hydroelectric facilities in the Northwest, a non-federal nuclear power plant, and several other small non-federal power plants. The dams generating the hydroelectric power are operated by the U.S. Army Corps of Engineers and the Bureau of Reclamation, while the nuclear facility is operated by Energy Northwest. BPA provides about 29 percent of the electricity used in Oregon.[2]



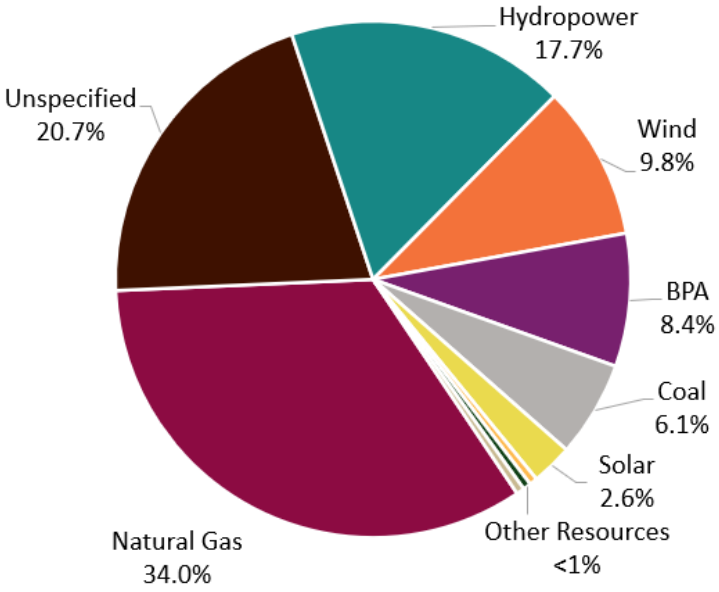
Bonneville Power Administration 2022[2]

Market Purchases

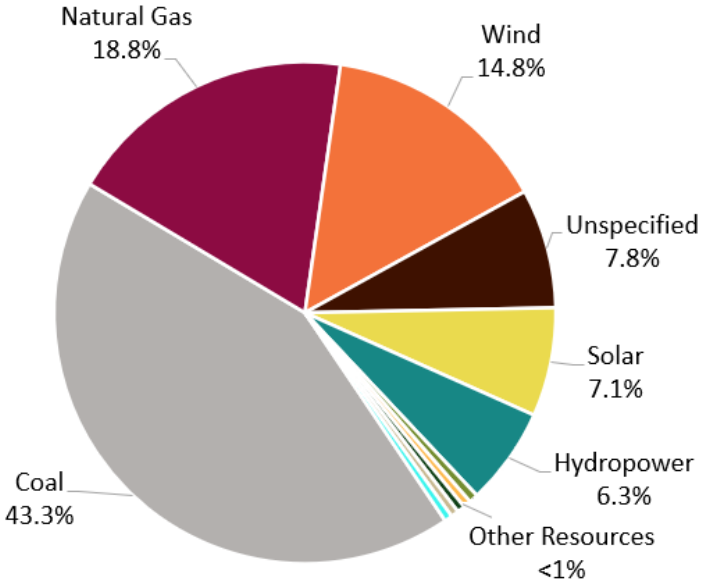
Oregon generation facilities sell electricity to Oregon utilities and the regional power market. Oregon electric utilities own facilities that generate power, but they also purchase power from the regional market to meet customer demand. Some market purchases can be tied to specific resources, but in most cases the specific generation resource is not known. In Oregon, these unspecified purchases accounted for 12.8 million megawatt hours in 2022.[2]

Investor-Owned Utility Resource Mix

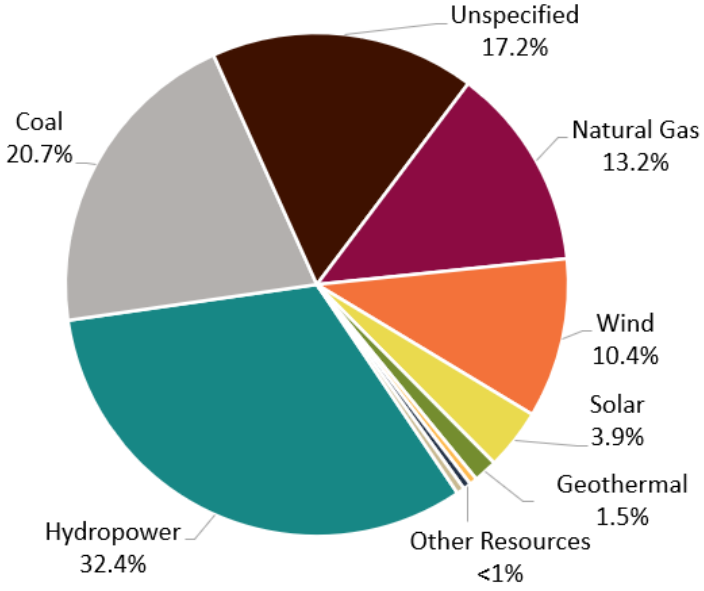
The resources utilities use to generate electricity consumed in Oregon vary depending on the utility provider. The electricity resource mixes for Oregon's three investor-owned utilities are shown below. Only 2022 data are shown for each utility; mixes will fluctuate over the years depending on the availability of certain resources like hydro or, increasingly, solar. The dark brown wedge labeled as "unspecified" represent the real-time market purchases to meet demand.[2]



Portland General Electric
2022



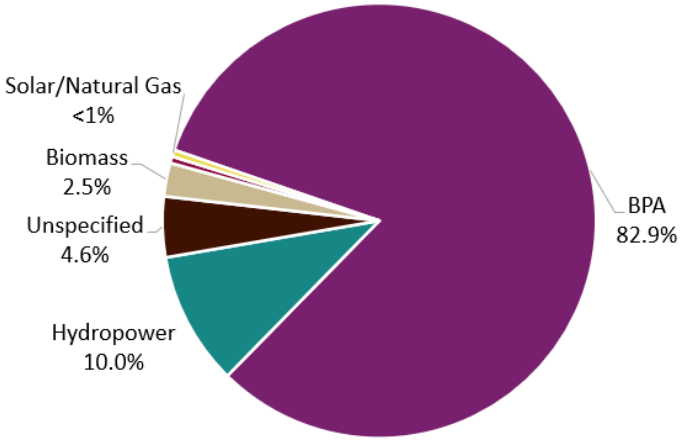
Pacific Power
2022



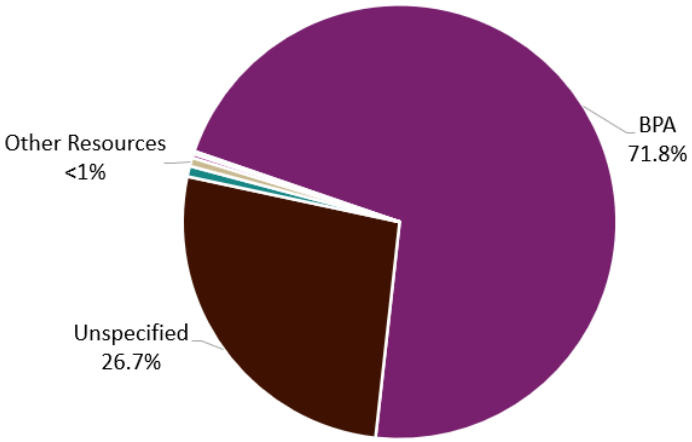
Idaho Power
2022

Consumer-Owned Utility Resource Mix

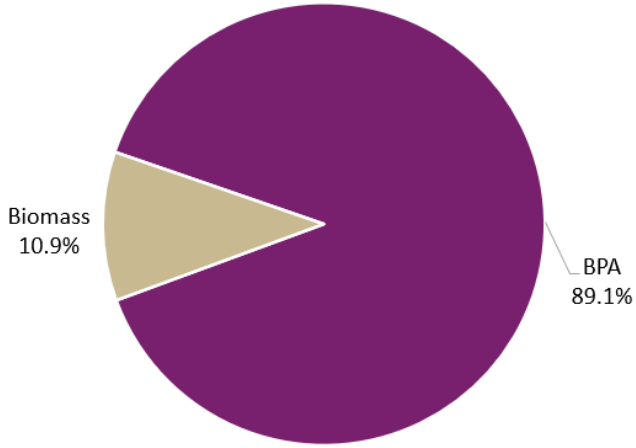
The electricity resource mixes for the Eugene Water & Electric Board (the largest consumer-owned utility by number of customers) and a composite of other COUs operating in Oregon are below. Clatskanie People's Utility District is also included as an example. Only 2022 data are shown for the utilities; COU mixes fluctuate less over the years as many depend on the Bonneville Power Administration to provide their electricity and BPA's mix is consistent year to year.[2]



Eugene Water & Electric Board
2022



Composite of Consumer-Owned Utilities (not including EWEB)
2022



Clatskanie PUD
2022

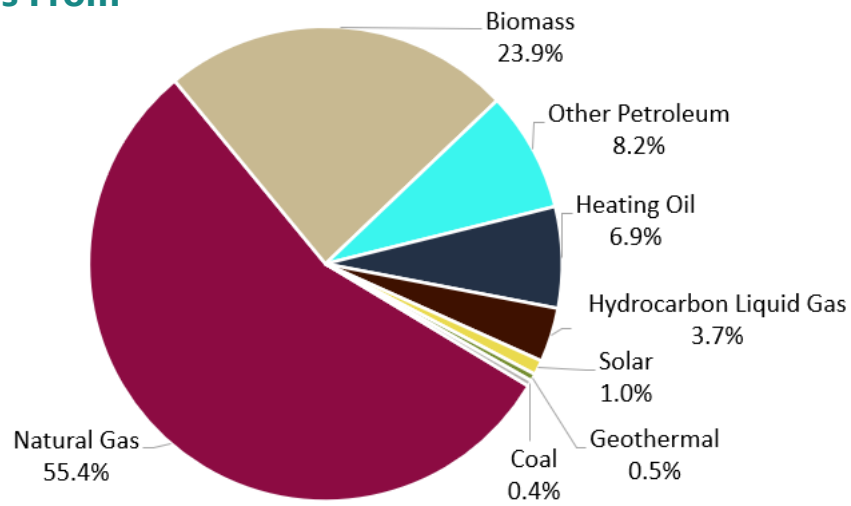
While the majority of power supplied by Oregon's consumer-owned utilities comes from the Bonneville Power Administration, **COUs have also invested in their own energy-generation sources**. For example, Clatskanie PUD supplements the electricity it buys from BPA with purchase agreements for biomass and biogenic facilities.[viii] Thanks to the BPA-supplied power – which is mostly from federally owned dams – and their own resources, COU electricity mixes have very low greenhouse gas emissions.

[viii] Biogenic facilities produce energy from waste materials breaking down in a landfill.[10]

Direct Use Fuels

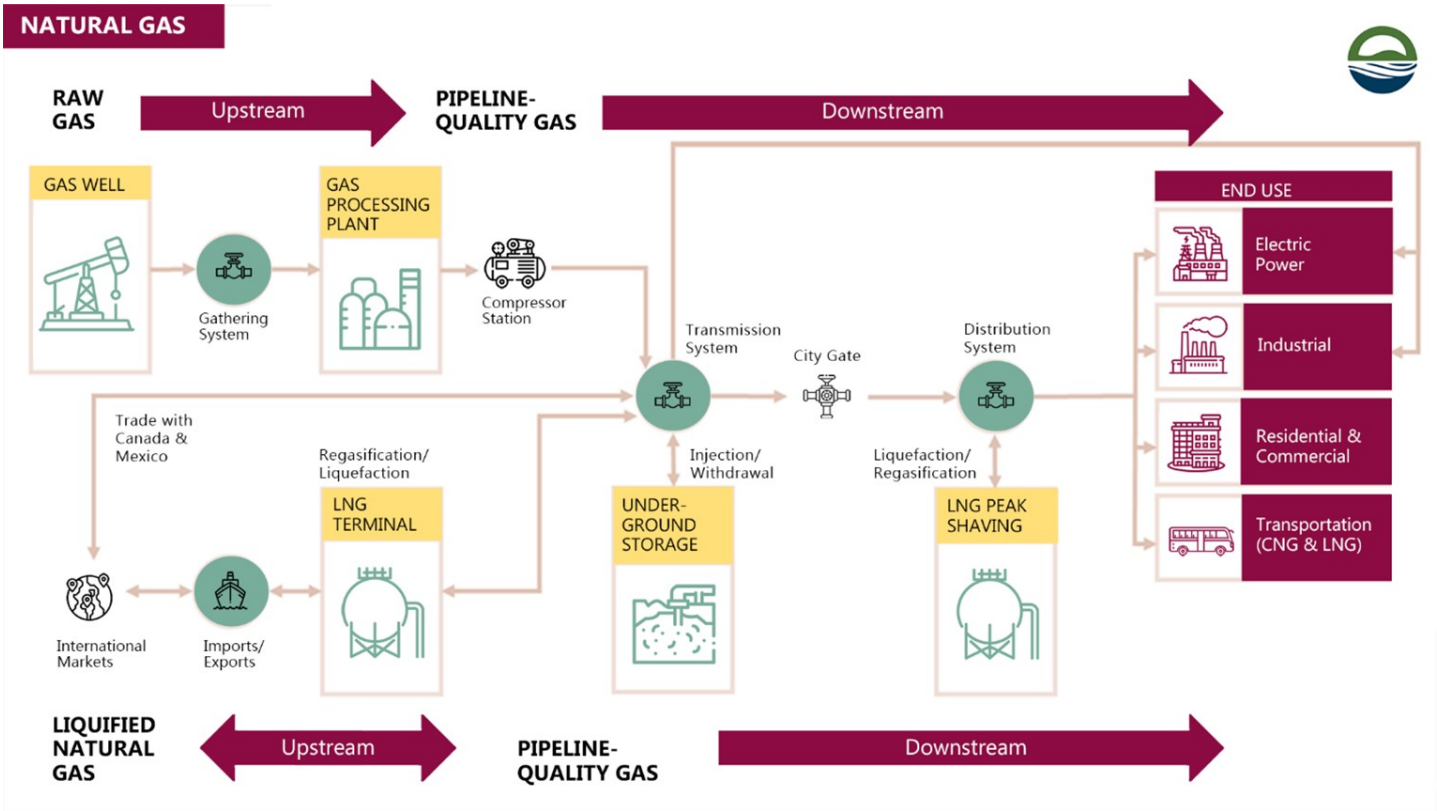
What We Use and Where it Comes From

In 2022, Oregon used 267.5 trillion Btu of direct use fuels to heat buildings, cook food, and support commercial and industrial processes.[1] Direct use fuels make up about 30.9 percent of the total energy consumption in Oregon.[2] These fuels are used on-site in the residential, commercial, and industrial sectors. They do not include fuels used to generate electricity or support the transportation sector.



Natural Gas. A gaseous mixture of hydrocarbon compounds, primarily methane, natural gas is a fossil energy source from beneath the earth's surface that is produced abundantly in the United States. Natural gas is used directly for space and water heating, cooking, and many agricultural, commercial, and industrial processes. Natural gas can be cooled to a liquid state which is called Liquefied Natural Gas or LNG. LNG is about 600 times smaller in volume than in a gaseous state, making it more efficient to transport or store. Oregon does not have an LNG import or export facility, but may be affected by export capacity expansion in North America as natural gas becomes more of a global commodity and Oregon utilities compete for fuel supply.[3]

Natural Gas Supply Chain



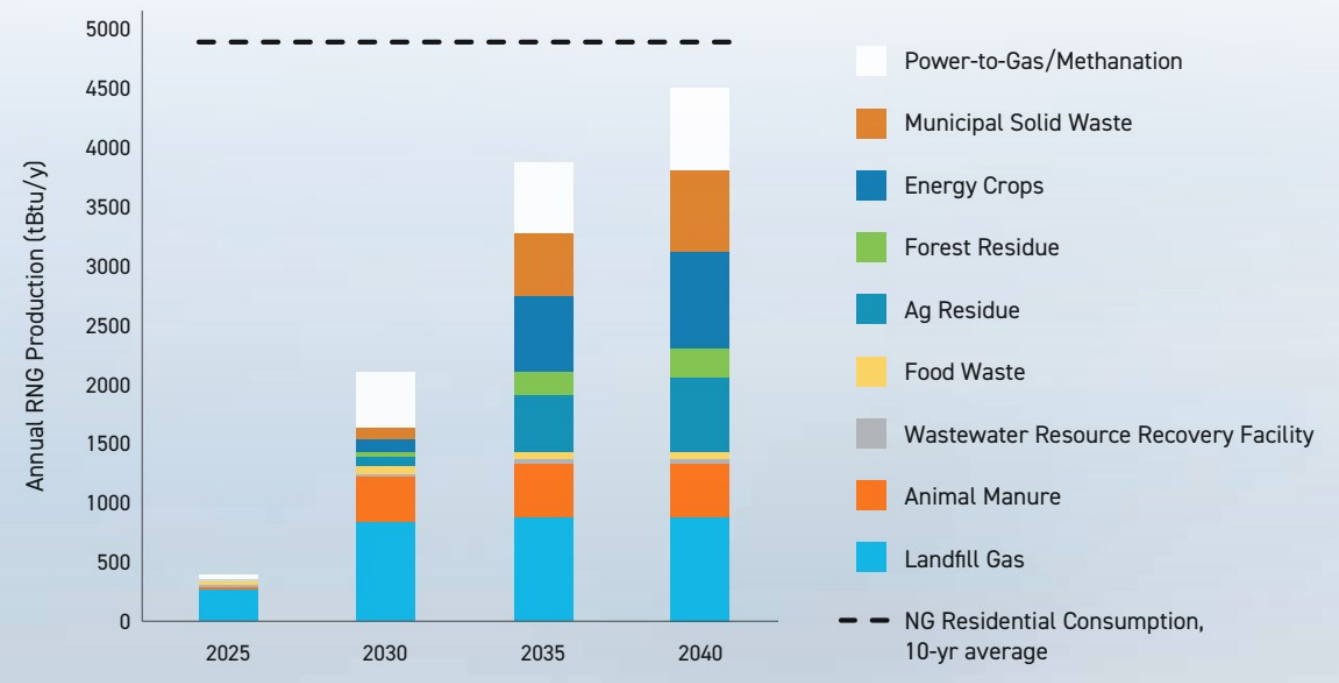
In 2022, Oregon used 148.1 trillion Btu of natural gas for direct uses — nearly all of it imported from Canada and the Rocky Mountain states.[1] The Pacific Northwest's only natural gas extraction facility is located near Mist, Oregon and its resources go to NW Natural, one of three investor-owned gas companies serving the state.[4] The Mist field is primarily used for natural gas storage and produced only 0.027 trillion Btu of natural gas in 2022, representing 0.01 percent of Oregon's annual use.[1]

Natural Gas Consumption by Sector[1]

Commercial Sector | 35.0 trillion Btu
Residential Sector | 52.6 trillion Btu
Industrial Sector | 60.5 trillion Btu

Renewable natural gas, a low carbon-intensity alternative to fossil natural gas, is made by capturing methane biogas emitted from decomposing food waste, agricultural manure, landfills, and wastewater treatment plants. Biogas is processed to remove non-methane elements and can then be added to a pipeline or used onsite as natural gas.[5] Oregon natural gas utilities are investing in RNG projects in and outside the state to reduce the greenhouse gas emissions attributed to natural gas combustion.[6]

Potential National Annual Renewable Natural Gas Production[6]



NW Natural VISION 2050 Destination Zero Complete Carbon Neutrality Scenario Analysis Report.

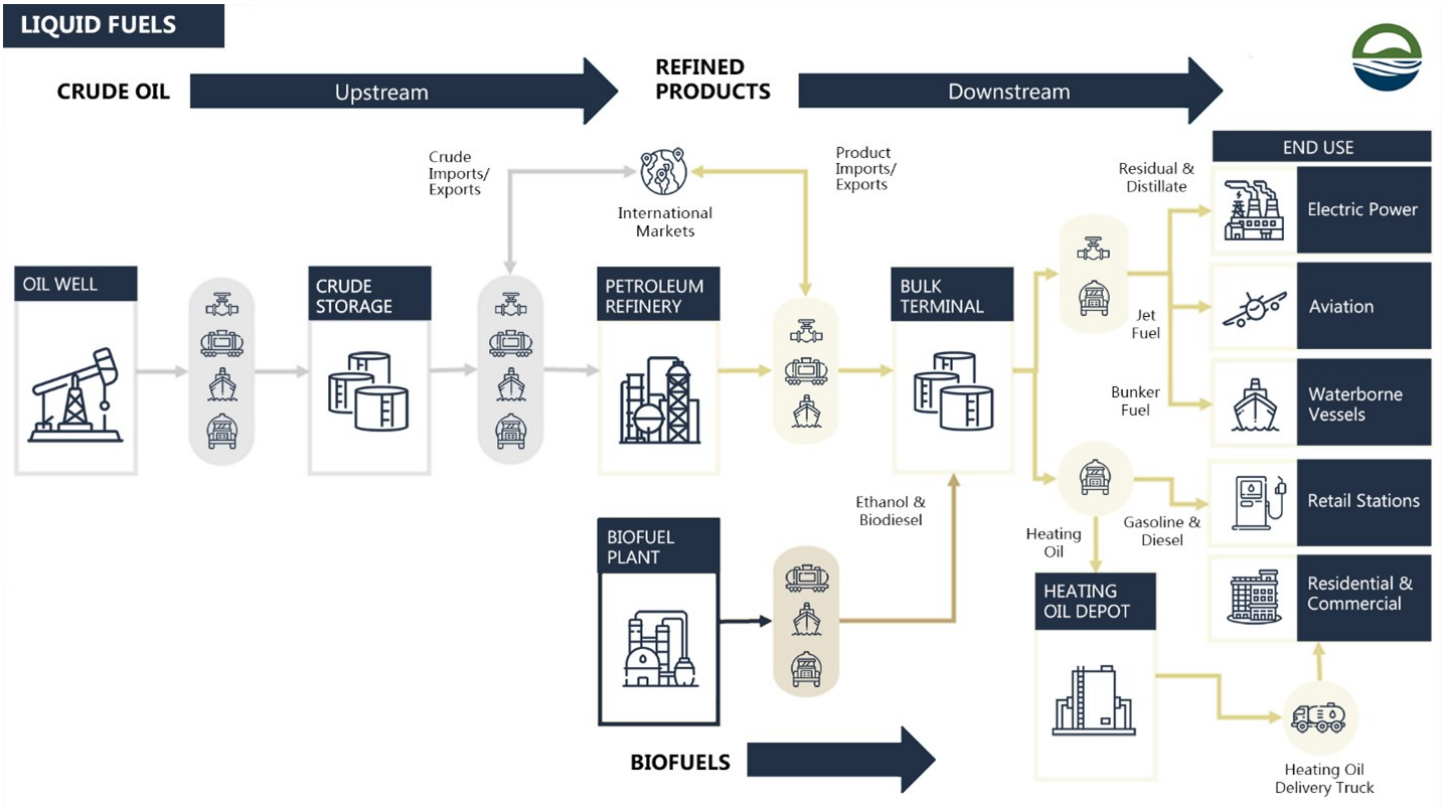
Biomass. Biomass is an organic material that comes from plants and animals that is burned to create energy. Biomass is considered a renewable source of energy, and comes from resources like wood, agricultural crops and waste, food or yard waste, and animal and human waste. Organic materials are collected and combusted to make energy that can be used on site or distributed to a facility instead of filling space in a landfill. Biomass also commonly refers to end-products such as wood chips, wood pellets, and charcoal that are used for thermal energy. Many industrial facilities in Oregon burn woody biomass to generate electricity using waste products that would normally go to a landfill. Biomass is also used as a thermal energy source at commercial facilities, including schools and hospitals.[7] Oregon has 12 wood and wood waste biomass-generating facilities.[8] In 2022, Oregon consumed 64 trillion Btu of biomass as a direct use fuel.[1]

Biomass Consumption by Sector[1]

Commercial Sector | 3.8 trillion Btu
Residential Sector | 18.4 trillion Btu
Industrial Sector | 41.7 trillion Btu

Heating Oil. Heating oil is a petroleum distillate fuel that is used primarily to heat buildings; some buildings also use it to heat water. Because space heating is the primary use for heating oil, demand is highly seasonal and affected by the weather. Most Oregon heating oil use occurs during the heating season: October through March.

Liquid Fuels Supply Chain



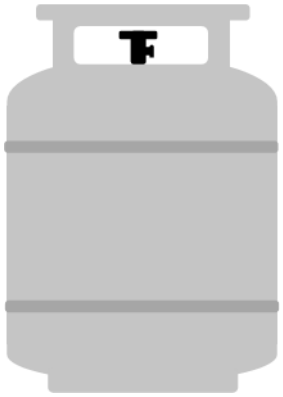
In 2022, Oregon used 18.5 trillion Btu of heating oil for direct uses, and 3 percent of Oregon homes use fuel oil for heating.[1 9] It is also used to heat commercial buildings and for industrial applications. Oregon does not produce any heating oil in the state, so most of Oregon's petroleum supply comes from refineries in Washington.[7]

Biodiesel heating oil is a renewable fuel made from vegetable oils, like soy and canola, that are grown domestically. Biofuels are mixed with regular heating oil to create blends of 5 to 20 percent to create a cleaner burning alternative fuel. The mixes can be used by typical oil furnaces in homes, but increasing the portion of vegetable oils in the blends does require adjustments to home oil furnaces. Policies such as the Oregon Renewable Fuel Standard and Oregon Department of Environmental Quality's Clean Fuels Program are driving increased demand for biodiesel and other biofuels as they displace petroleum fuels used for transportation and heat.[10 11] For more information about biofuels powering transportation in Oregon, see the 2022 Transportation Resource and Technology Review.

Heating Oil Consumption by Sector[1]

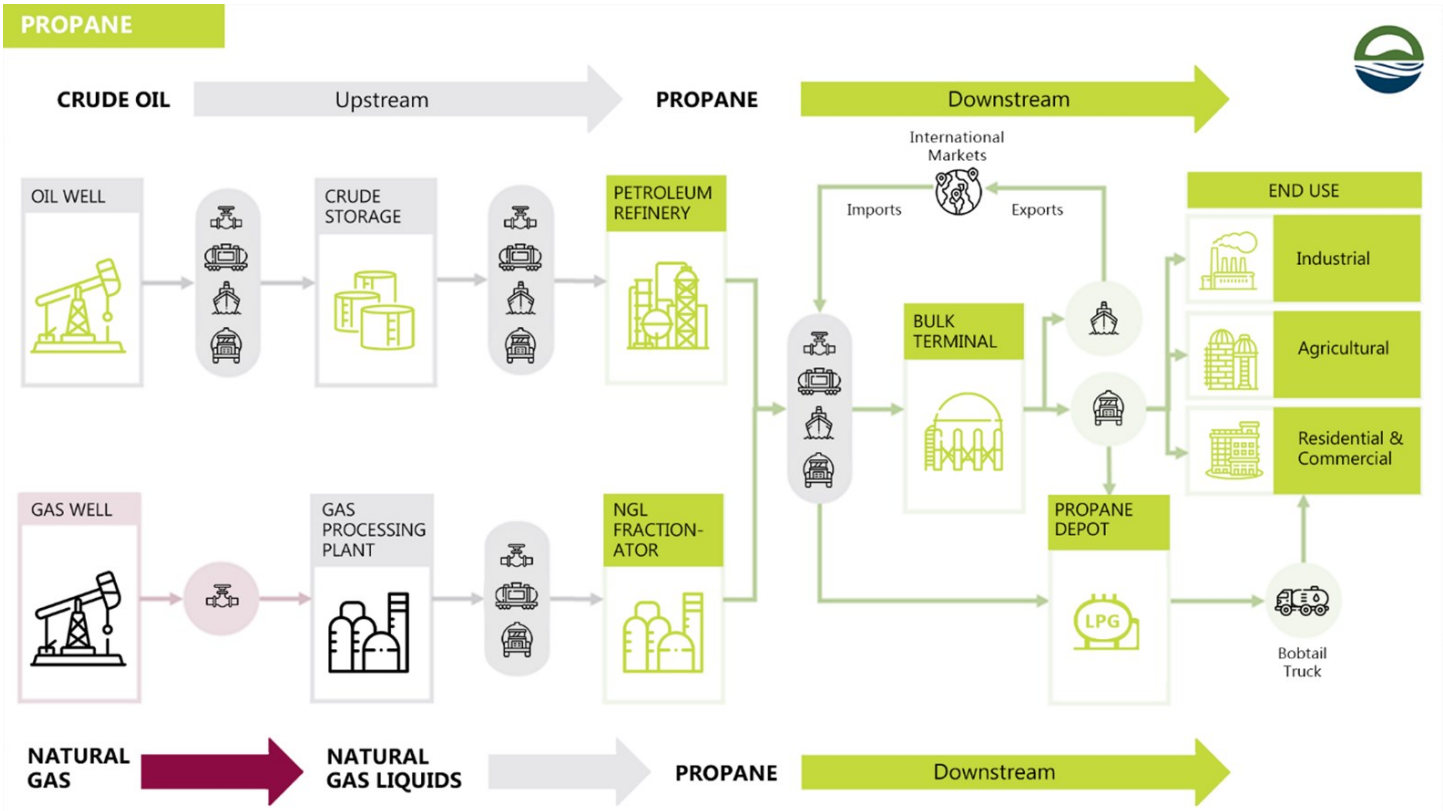
Commercial Sector | 2.4 trillion Btu
Residential Sector | 1.9 trillion Btu
Industrial Sector | 14.3 trillion Btu

Hydrocarbon Gas Liquids and Propane. HGLs are gases at atmospheric pressure and can be liquefied by cooling and pressurizing. Their versatility and high energy density in liquid form make them useful for many purposes, including as feedstock in petrochemical plants, as fuel for home space and water heating or cooking, and as transportation fuels, additives, or as a diluent. Propane is a hydrocarbon gas liquid that can be used to power farm and industrial equipment, backyard barbeques, and Zamboni machines at ice skating rinks. Propane remains a viable fuel over long periods of storage, making it a common backup fuel for essential facilities like hospitals and a potential resource in response to an emergency. Propane is a byproduct of natural gas production.[12] As U.S. natural gas production has increased, the supply of propane has followed, making it an affordable and attractive option for many Oregonians.[13]



Propane consumed in Oregon is imported. Based on the available data on propane production, imports, exports, and transportation, the Pacific Propane Gas Association estimates that more than 95 percent of the propane consumed in Oregon is sourced from natural gas processing plants in Alberta and British Columbia, Canada.[14]

Propane Supply Chain



Renewable propane is a lower carbon form of propane made from a mix of waste residues and sustainably sourced materials, including agricultural waste products, cooking oil, and animal fats. Renewable propane production is in its early stages, with the first commercial production in the United States beginning in 2018. It is most often created as a byproduct of renewable diesel or sustainable aviation fuel production. Other methods for producing renewable propane are being studied and tested.[15] Renewable propane is imported into Oregon from production facilities in Los Angeles, California. It is currently available only in limited quantities and is typically mixed into existing propane supplies for distribution to propane vehicle fleets.[15]

Oregon consumed 9.8 trillion Btu of propane in 2022 as a direct use fuel.[7] About 1 percent of Oregon residents use propane boilers or furnaces to heat their homes; even more use it for cooking.[9] While propane use on-road as a transportation fuel is a small segment of the total fuel usage in Oregon, some school districts use propane as a fuel for bus fleets.

Hydrocarbon Gas Liquids and Propane Consumption by Sector[1]

Commercial Sector | 4.0 trillion Btu
Residential Sector | 2.5 trillion Btu
Industrial Sector | 3.3 trillion Btu

Other Petroleum. These are petroleum fuels like kerosene or lubricants that are not propane or heating oil, and are used, for the most part, in Oregon's commercial and industrial sectors to fuel machinery and manufacturing processes. In 2022, Oregon consumed almost 22.0 trillion Btu of Other Petroleum fuels.[1]

Other Petroleum Consumption by Sector[1]

Commercial Sector | 5.0 trillion Btu
Residential Sector | 0.1 trillion Btu
Industrial Sector | 16.9 trillion Btu

Solar Thermal. While solar is commonly thought of as a resource to generate electricity, Oregon also uses sunlight to produce energy to heat spaces and water in homes and businesses. Over 2.8 trillion Btu of solar thermal energy was consumed in Oregon in 2022.[1] Solar thermal is most used as a direct use fuel in solar water heating systems in buildings. Solar water heating systems collect and transfer thermal energy to preheat water for the building, which reduces natural gas or electricity consumption.

Solar Thermal Consumption by Sector[1]

Commercial Sector | 0.42 trillion Btu
Residential Sector | 2.28 trillion Btu
Industrial Sector | 0.07 trillion Btu

Geothermal. In 2022, Oregonians consumed 1.2 trillion Btu of geothermal energy for heating and cooling residential, commercial, and industrial spaces.[1] Geothermal energy is a renewable fuel that comes from the internal heat of the earth and is produced in Oregon. While geothermal is often used to generate electricity, it can also be used for thermal energy applications such as heating spaces and keeping bridges and sidewalks from icing over.[16]

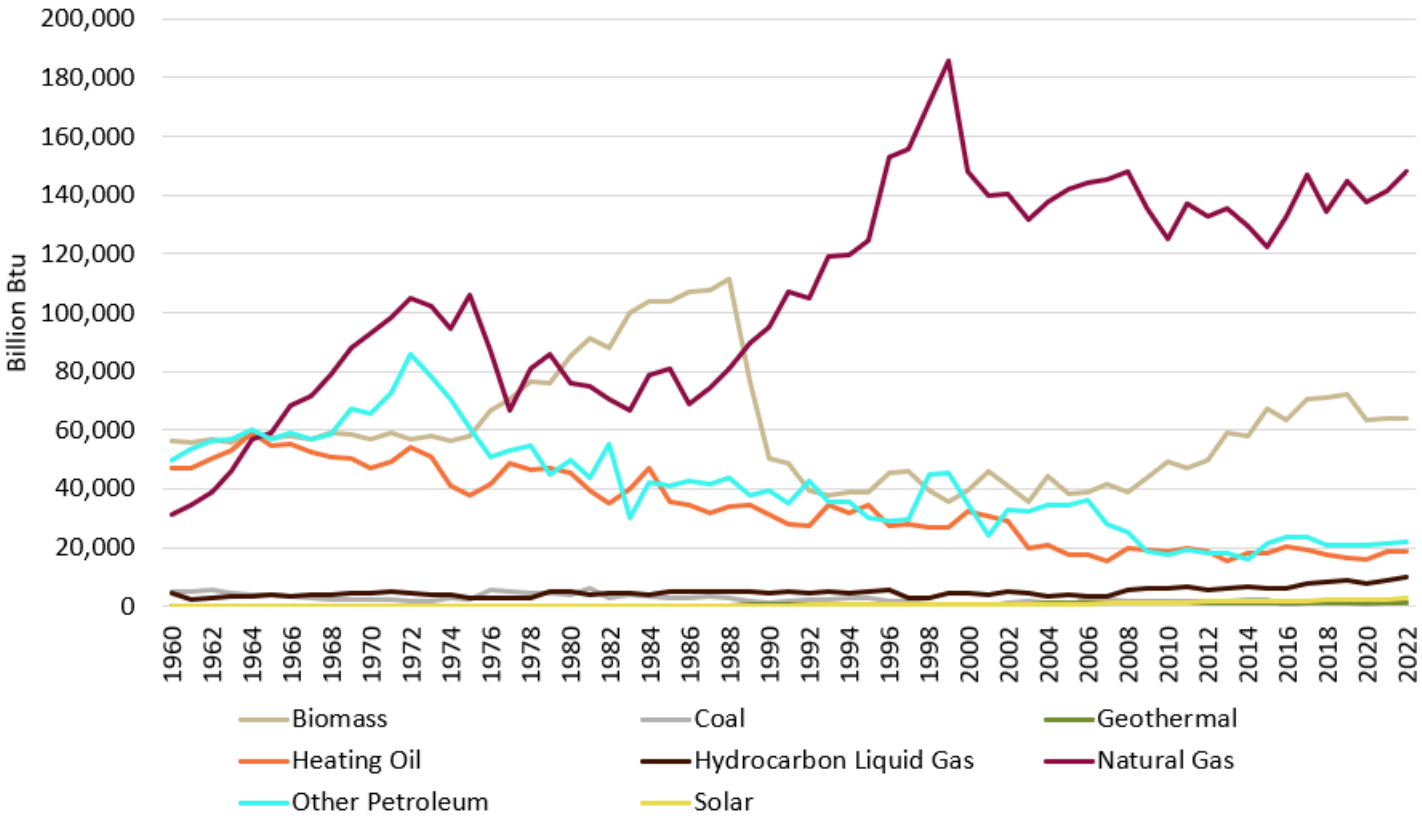
Coal. Coal is imported to Oregon for use as a direct fuel in the industrial sector. Oregon consumed 1.1 trillion Btu in 2022. While coal can also be used to generate electricity, there are no coal-fired power plants operating in Oregon. Most applications of coal as a direct use fuel in Oregon have been replaced by other fuels such as natural gas, which has led to a general decrease in coal use since the 1990s.[1]

Geothermal and coal direct use fuels represent
less than 1 percent of Oregon's direct use fuels.[1]

Direct Use Fuels Over Time

Oregon's energy consumption has evolved over time. For direct use fuels, that has meant decreasing wood and fuel oil use and an increase in relatively inexpensive natural gas. The chart below uses data from the U.S. Energy Information Administration to compare total consumption of direct use fuel types in Oregon's residential, commercial, and industrial sectors from 1960 to 2022. The chart does not include transportation fuels or fuels used to generate electricity used in those sectors.

Oregon Direct Use Fuels Consumption: 1960-2022 (Billion Btu)[1]



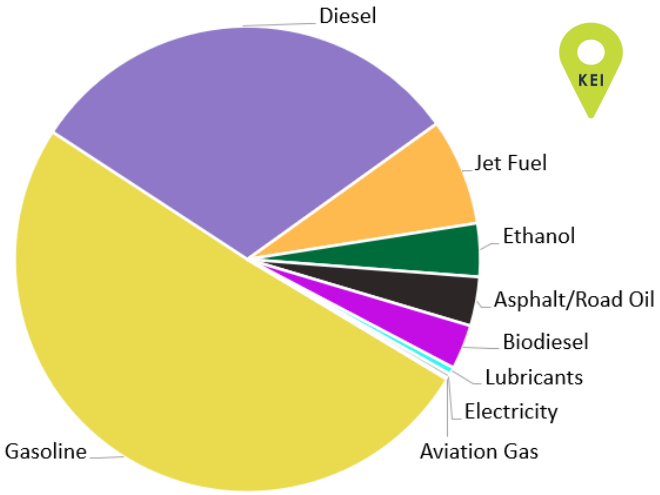
Natural gas has replaced heating oil and coal use in many Oregon buildings and industrial processes as a cleaner-burning and in many cases less expensive alternative. Oregon's natural gas utilities have already begun planning for the blending of lower carbon alternative fuels such as renewable natural gas and hydrogen with fossil natural gas.

Geothermal consumption is one of the smallest of Oregon's direct use fuels in the chart above, but it has the potential to be a greater clean energy resource in the future. EIA began tracking geothermal consumption in 1989 with 0.38 trillion Btu. In 2022, Oregon consumed over 1.2 trillion Btu of energy from geothermal, an increase of 224 percent over that 30-year period.[1] See the Energy Resource and Technology Reviews section of this report to learn more about enhanced geothermal electricity generation.

Oregon industry consumes a significant amount of biomass energy from secondary waste products, like lumber mill residue, logging slash, and animal manure. Biomass energy consumption has increased steadily since 2002, due almost entirely to increased demand for biofuels.[1]

Transportation Fuels

What We Use



In 2022, Oregon's transportation sector used 36.7 percent — or 318.4 trillion Btu — of the energy consumed in Oregon. Transportation was the largest share of energy use among the sectors in 2022.[1] Petroleum-based products accounted for 91 percent of fuel consumed in this sector. Alternative fuels or biofuels like ethanol, biodiesel, and renewable diesel accounted for 8.6 percent, and electricity and natural gas accounted for 0.3 percent of the fuels consumed.[2]

Oregonians consume many different types of transportation fuels:

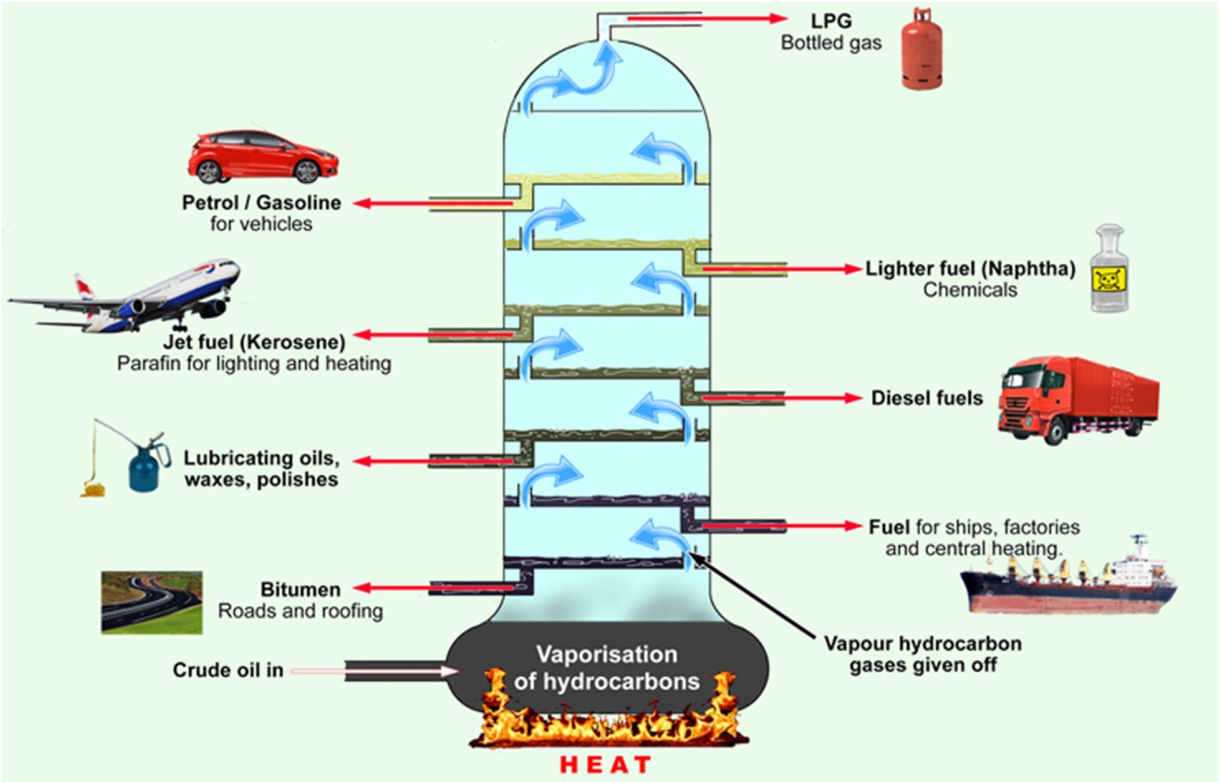
Petroleum-based products make up 91 percent of Oregon's transportation fuel use. They are processed by heating crude oil and separating components by weight, sometimes referred to as fractionations (of the crude oil).

Gasoline. Lighter distillate of petroleum used by cars, motorcycles, light trucks, airplanes, and boats.

Diesel. Heavier distillate of petroleum used by trucks, buses, trains, boats, and ships.

Propane. A light petroleum hydrocarbon gas liquid fuel used to power cars, buses, trucks, and some non-road vehicles.

Uses for Petroleum Distillates in the Transportation Sector[3]



Alternative fuels (to petroleum) used in Oregon are produced by various means, usually by collecting and processing crops, byproducts, or waste streams.

Ethanol. Fuel produced from agricultural crops or wood that is blended with gasoline and used by cars and trucks.

Biodiesel. Fuel from organic oils and fats that can be blended with diesel fuel (up to 20 percent) and used by trucks, buses, trains, and boats.

Electricity. Fuel that powers some public mass transit systems, school buses, port equipment, and passenger electric vehicles.

Natural Gas. Compressed and liquefied natural gas used by cars, buses, trucks, and ships.

Renewable Natural Gas. Biogas from agricultural waste, wastewater, or garbage is collected and refined to power natural gas cars and trucks.

Renewable Diesel. Fuel from organic oils and fats using a different production process than biodiesel to power diesel vehicles.[4,5]

Hydrogen's Potential in Oregon

A potential emerging resource in Oregon and beyond is clean hydrogen, which could be used as a replacement for fossil-based hydrogen currently in use, as a direct transportation fuel (especially for medium– or heavy-duty vehicles), as storage for clean electricity generation, for industrial processes and heat, and other uses. In November 2022, the Oregon Department of Energy published a study on the potential of renewable hydrogen, including opportunities and challenges for using the resource in the state.

In October 2023, the Pacific Northwest Hydrogen Association Hub was selected by the U.S. Department of Energy as one of seven hydrogen hubs throughout the country. The hubs are intended to jumpstart clean hydrogen adoption by encouraging collaboration with suppliers and consumers to develop the new economy. The PNWH2 is a multi-state nonprofit organization made up of Tribal Nations, labor, business and industry, higher education, government, and the environmental community spanning Oregon, Washington, and Montana. By accelerating investment and development of hydrogen production, the association intends to establish a benchmark for successful low-carbon intensity and economically viable hydrogen production to decarbonize hard-to-abate industries.

National Renewable Energy Laboratory (CC BY-NC-ND 2.0)

Use Over Time

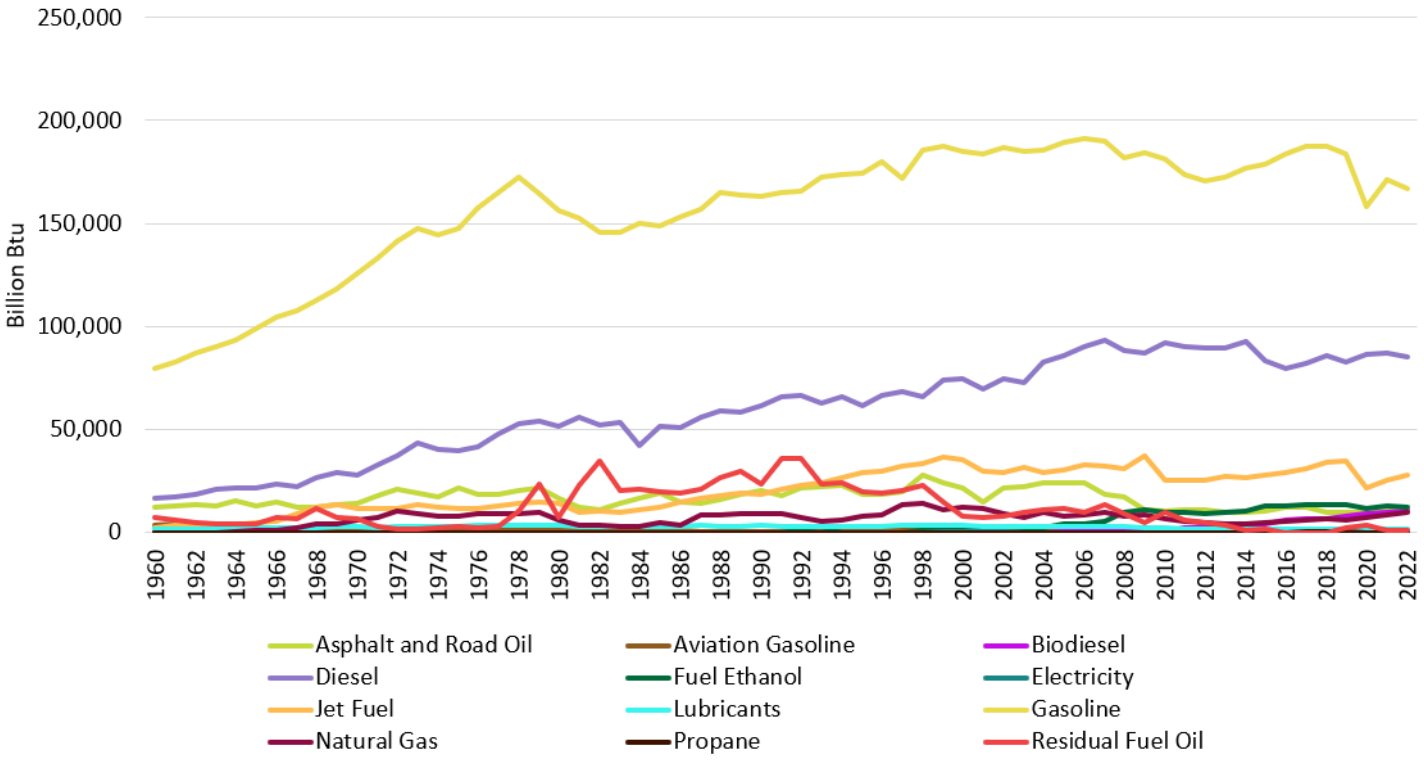
90%

Percent of petroleum fuels delivered and consumed in Oregon come from four refineries in Washington.[2]

The U.S. Energy Information Administration has tracked national energy consumption and individual state consumption since 1960. In Oregon and nationally, overall transportation consumption increased between 1960 to 2018. In 2019 and 2020 there was a 16 percent reduction in the use of gasoline and a 37 percent reduction in jet fuel, but a 3 percent uptick in the use of diesel. Analysis indicates this is due to less personal vehicle travel and more delivered goods.[6 7] In 2020, total use was down to 281.3 trillion Btu (affected by COVID) and the previous peak in 2019 was 314.4 trillion Btu.[2] Since 2020, Oregon's transportation sector has returned to its upward trajectory, consuming 318.4 trillion Btu of energy in 2022.

Except for 2019 and 2020, petroleum product consumption has steadily increased over time and still dominates transportation fuel use in Oregon. Nearly all transportation fuels are imported into Oregon. In 2022, just 1.6 percent of transportation fuel used in Oregon was produced in the state, including 4.6 trillion Btu of biodiesel and fuel ethanol.[8] Oregon electric utilities provided 0.54 trillion Btu of electricity to fuel electric vehicles in 2022.[2] Oregon does not have crude oil reserves or refineries to process petroleum, so over 90 percent of the petroleum products delivered to and consumed in Oregon come from four refineries in Washington state.[9] Crude oil processed at Washington refineries comes from Alaska, western Canada, and North Dakota.

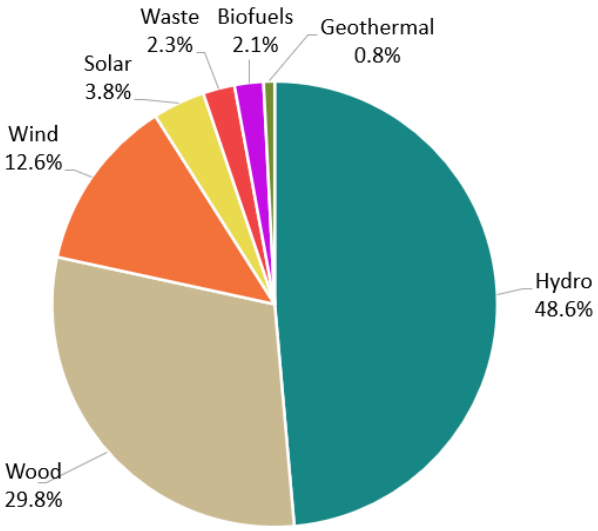
Oregon Transportation Sector Consumption: 1960-2022 (Billion Btu)[1]



Energy Production

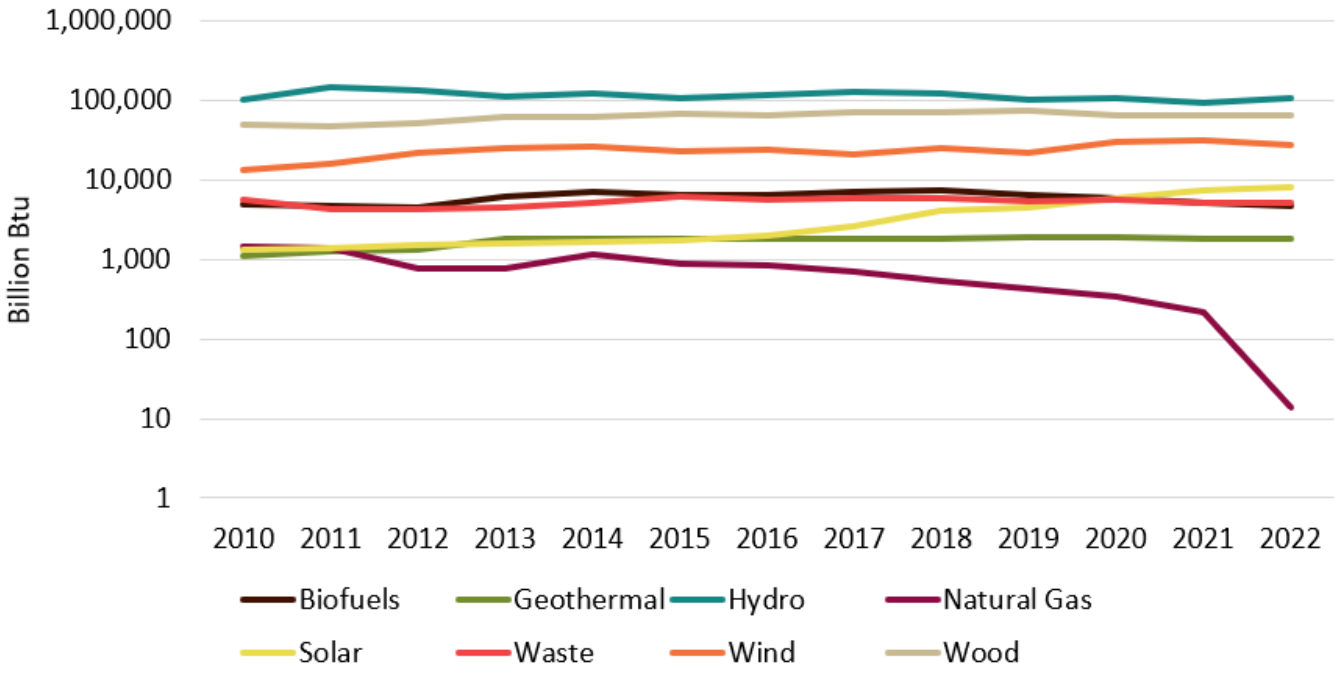
Overview

This section provides energy consumption and energy production data. Energy production focuses on primary and secondary energy produced in Oregon. *Primary* energy represents energy that is collected from Oregon's natural resources — it does not include energy that is imported for consumption or electricity generated in Oregon. *Secondary* energy is consumed in real time, like electricity, or may be stored for later use, like wood pellets.



The chart above shows primary energy produced in Oregon in 2022. Almost all the primary solar, wind, geothermal, and hydro energy is converted to *secondary* energy as electricity. Some of the biomass is used to make a variety of renewable fuels and some is combusted to produce heat and electricity.[1]

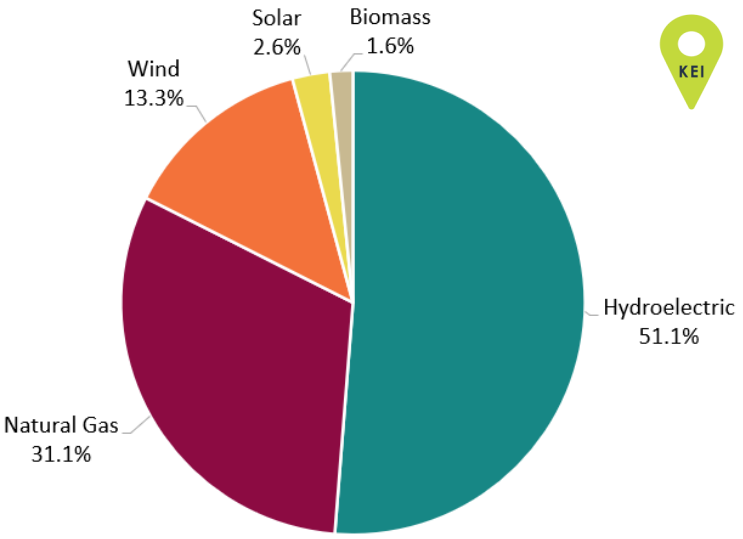
Oregon Primary Annual Energy Production Over Time[1]



The chart above uses a logarithmic scale to compare energy produced in Oregon. Without the logarithmic scale, the resources with the smallest production in Oregon like natural gas and geothermal would be hard to see, as they are proportionately significantly smaller and would be hidden along the bottom of the chart, and hydroelectric would dwarf all others except for wood and wind. Over the last two decades Hydro has been the largest primary energy source in Oregon. Solar power has been steadily increasing since 2012, with faster growth starting in 2015. Wood has remained the second largest primary energy source. Wind energy has grown at a slower rate, and by 2022 was the third largest category. Between 2014 and 2021, natural gas production slowly declined and in the past year has seen a steep decrease.[1]

Electricity

Oregon generates electricity from a variety of resources — hydropower, natural gas, and wind are the largest. In 2022, Oregon's 105 hydroelectric facilities were responsible for 51 percent of the electricity generated in Oregon.[1] The state's four largest electricity generating facilities are federally owned and operated dams on the Columbia River. They account for two-thirds of the generating capacity from the 10 largest power plants in the state.[2] Oregon is the second largest producer of hydroelectric power in the U.S. after Washington.[2]



Oregon's abundance of renewable electricity is used in Oregon and sold on the energy market to utilities in other states. In 2022, 37 percent of Oregon's hydropower and 45 percent of its wind generation were exported.[3] Sixty-nine percent of electricity generated in Oregon in 2022 came from non-greenhouse gas emitting resources.[1]

Natural gas accounted for 31 percent of Oregon's 2022 electricity generation. Nearly all the natural gas used to generate electricity in Oregon is imported. There is only a single natural gas site in Mist, Oregon, but this facility is used primarily for natural gas storage. Oregon has no coal or petroleum resource extraction facilities.

Utility-Scale Solar in Oregon

In February 2018, Oregon's Energy Facility Siting Council approved the first solar energy facility within its jurisdiction. However, that facility did not initiate construction and terminated its approval in March 2024. The first EFSC-jurisdictional facility constructed was the Wheatridge Renewable Energy Facility. Fifty megawatts of the approved 150-MW solar energy facility became operational in March 2022.

As of August 2024, there are 20 EFSC-jurisdiction solar facilities under review, under construction, or operating in Oregon, which amounts to 212 MW of operational solar-generating facilities with another 200 MW in construction. The largest proposed facility to date is the 1,200 MW Sunstone Solar Project in Morrow County.

61.3 Million

Megawatt hours of electricity generated in Oregon in 2022.[1]

58.8 Million

Megawatt hours of electricity consumed in Oregon in 2022.[3]

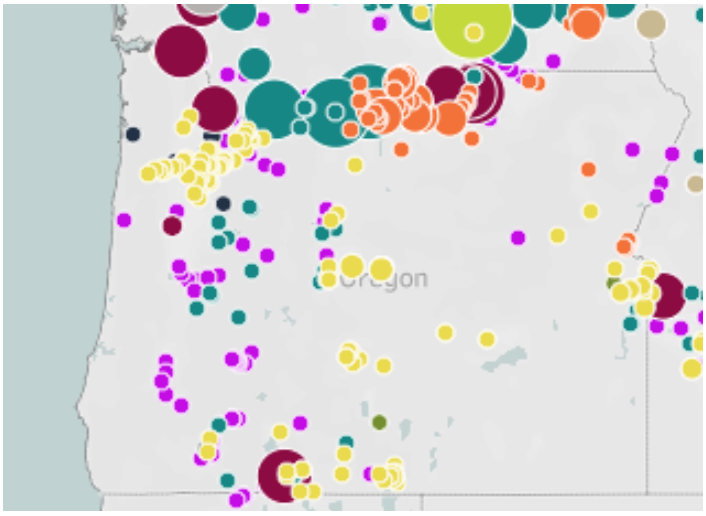
69%

Percentage of Oregon's electricity generation that comes from non-emitting resources.[3]

83%

Percentage of Oregon's electricity generation that is used in state.[3]

Electric Facilities

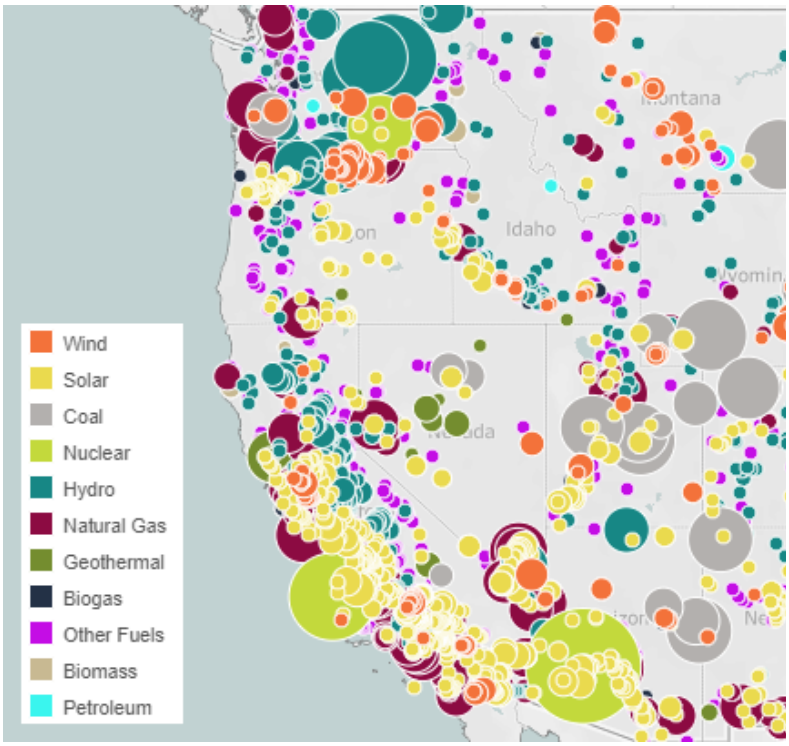


The map of Oregon at right shows where electricity generation sites are in the state. The map includes facilities owned by Oregon utilities as well as third-party owned facilities, with which utilities can contract to provide electricity to Oregon consumers. Third parties can also sell their electricity on the open energy market. Note that the color of the circles corresponds to the resource used to generate electricity (legend in map below), and the size of the circle is in relation to generation capacity or size of that facility.

Electricity used by Oregonians can come from facilities across the western United States. Oregon relies on hydroelectric power produced on rivers in the Columbia River watershed, nuclear power from the Columbia Generating Station in Washington, wind from turbines along the Columbia River Plateau, and electricity generated at coal-powered facilities located in several western states.[4]

The map below shows the various electricity generation sources in the Western Electricity Coordinating Council, a nonprofit organization that focuses on systemwide electricity reliability and security across a geographic region known as the Western Interconnection. This diverse region includes Oregon and most of the intermountain west and parts of Canada and Baja Mexico.[5]

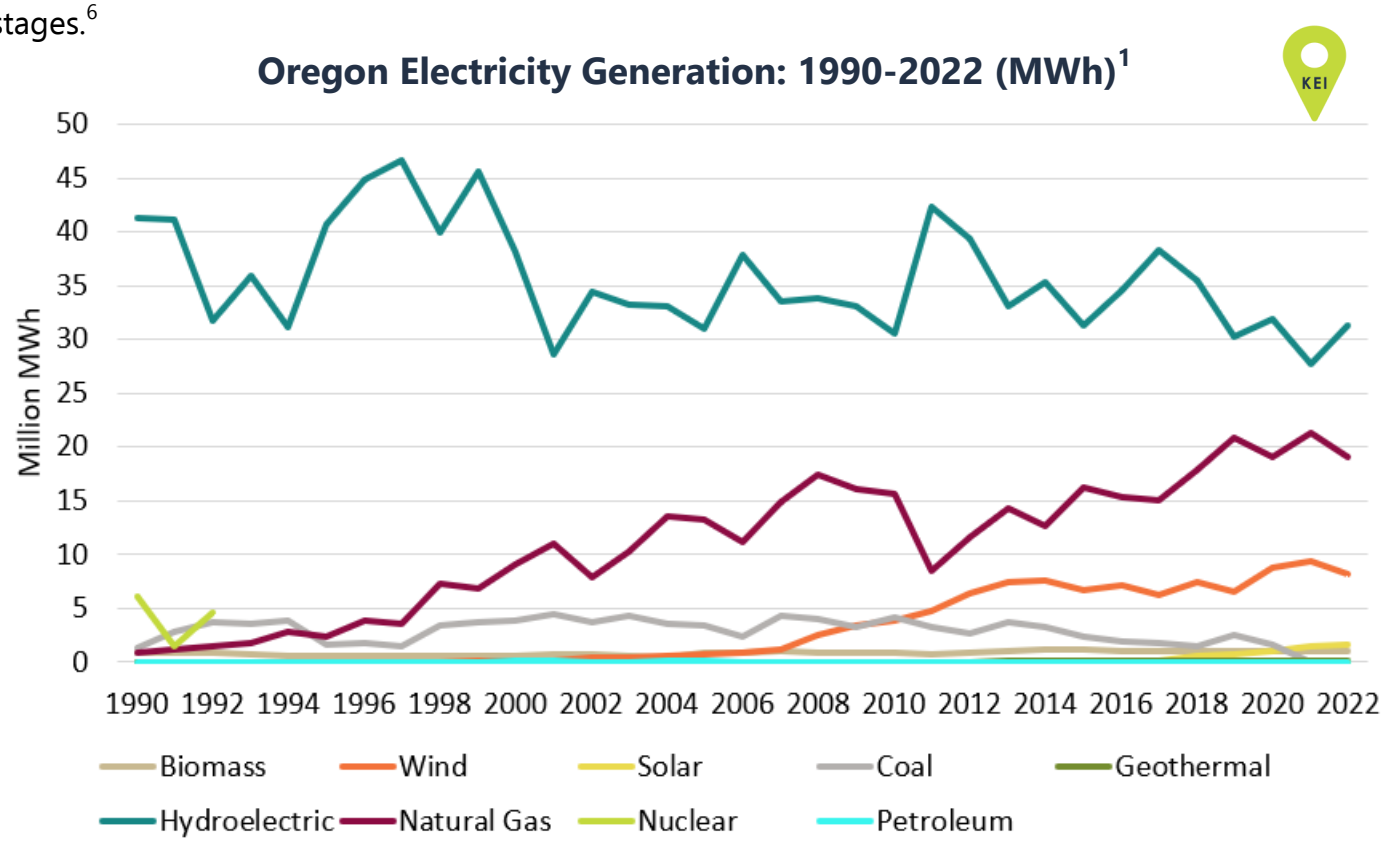
The maps of electricity generating resources use data from the U.S. Energy Information Administration and include facilities with a nameplate capacity of one megawatt or greater.[4]



According to the EIA, nameplate capacity is defined as the maximum rated output of a generator, prime mover, or other electric power production equipment under specific conditions designated by the manufacturer. Installed generator nameplate capacity is commonly expressed in megawatts and is usually indicated on a nameplate physically attached to the generator. Not all resources or facilities shown on the map contribute to Oregon's overall fuel mix, but many are used when Oregon utilities purchase electricity on the open market. Similarly, electricity generated in Oregon may be sold through the energy market to support electricity needs in other states.

Electricity Over Time

Oregon's electricity generation has changed over the years. Hydropower, which is Oregon's largest electricity resource, varies year-over-year based on precipitation. Oregon hydropower reached a generation high of 46.7 million MWh in 1997 as shown in the chart below. Wind and natural gas have both seen a gradual increase in generation over time. In 2022, natural gas was the second largest share of Oregon's electricity generation, at 19.0 million MWh. Coal generation no longer occurs in Oregon, with the last coal-powered plant closing in 2020. Solar has increased each year since 2011, and is expected to continue growing with several proposed large facilities in planning and review stages.[6]



Utility Scale Storage

Utilities in Oregon are investing in energy storage. There are several options for storing energy, including batteries and hydroelectric facilities. Many hydroelectric facilities store energy as water in reservoirs that can be released to flow through turbines when needed. When electricity demand is low, some of them can use their on-site electricity generation to pump water back upstream to be stored behind the reservoir until needed. Increasingly, utilities are also storing energy in batteries, which can be sited with variable renewable resources like solar and wind. This helps utilities get more out of these resources by storing energy when demand is low, and using them to supplement generation when demand is high.

Portland General Electric's Wheatridge Energy Facility includes battery storage.

Renewable Electricity

Renewable electricity generated in Oregon has grown due to customer demand, dramatic reductions in costs, and clean energy policies, like the Renewable Portfolio Standard and the 100 percent clean electricity by 2040 target set by HB 2021 (2021). Demand for clean energy in California also spurred prior wind development in Oregon – 45 percent of wind energy in 2022 was exported.[3]

Solar[7]

2012 Generation	2016 Generation	2020 Generation	2022 Generation
6,400 MWh	40,900 MWh	1,077,900 MWh	1,505,400 MWh

8.4% of Oregon's solar consumption was imported in 2022.[3]

Oregon has 4,809 MW of utility-scale solar facilities and 218 MW of net-metered solar installations on homes and businesses.

Wind[8]

2012 Generation	2016 Generation	2020 Generation	2022 Generation
6.3 Million MWh	7.2 Million MWh	8.8 Million MWh	8.2 Million MWh[ix]

45% of Oregon's wind generation was exported in 2022.[3]

Oregon has 3,981 MW of wind facilities in operation, with ODOE overseeing even more projects: 300 MW under construction, 360 MW approved but not yet built.[8]

Hydropower[8]

2012 Generation	2016 Generation	2020 Generation	2022 Generation
39.4 Million MWh	34.6 Million MWh	31.9 Million MWh	31.3 Million MWh

37% of Oregon's hydropower generation was exported in 2022.[3]

In some Oregon utility territories, hydropower provides over 90% of consumers' electricity.[4]

Oregon's hydropower fluctuates from year-to-year due to changing precipitation and water conditions.

[ix] Wind generation varies depending on the weather. Despite a steady increase to the total generating capacity in Oregon's wind facilities, 2022 was a low year for wind electricity production.

Direct Use Fuels

Natural gas is the most consumed direct use fuel in Oregon and almost all of it is imported. Biomass is the most produced direct use fuel but makes up only 21 percent of total consumption in the state as most direct use fuels — consumed by the residential, commercial, and industrial sectors — are imported. In 2022, Oregon used 267.5 trillion Btu of direct use fuels, representing about 30 percent of the total energy consumed in Oregon.[1] The majority of Oregon's primary energy production comes from energy sources like hydropower, wind, and solar used for electrical generation, but Oregon also produces some direct use fuels.

The table below shows the direct use fuels produced in Oregon in comparison to how much is consumed by the residential, commercial, and industrial sectors. If energy is produced in Oregon and not consumed in state, the Oregon Department of Energy determines that energy was exported to support neighboring states' energy systems (negative values in the chart). If more of an energy resource was consumed than produced, it is assumed that it was imported into the state for consumption.

100%

Percentage of Oregon geothermal energy consumption that is produced in state.[1]

23%

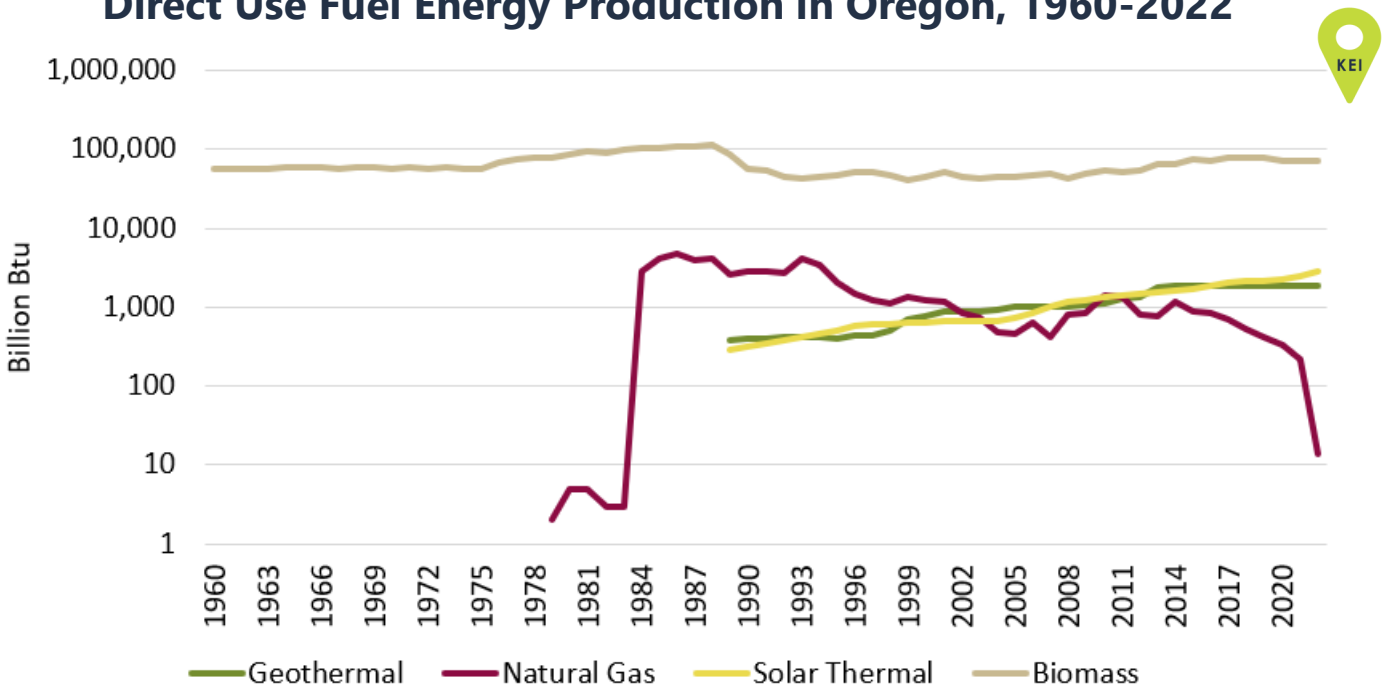
Percentage of Oregon overall direct use fuels consumption that is produced in state.[1]

In 2022, Oregon produced about 56.2 trillion Btu of direct use fuels energy from biomass.[1] Biomass is also used to produce transportation fuels in Oregon such as ethanol or biodiesel, but that is not included here. The U.S. Energy Information Administration collects and shares these high-level energy production and consumption estimates to inform Oregon's understanding of state and federal energy systems — but the data do not show where each Btu of energy is consumed.

Production & Consumption of Direct Use Fuels in 2022 (trillion Btu)[1]

Resource	Consumption in Oregon	Oregon Production	Imported	% of Consumption Produced in Oregon
Natural Gas	148.1	0.03	147.08	0%
Biomass	64	56.2	-11.8	87.8%
Other Petroleum	22	0	22	0%
Heating Oil	18.5	0	16.1	0%
Hydrocarbon Gas & Liquids/ Propane	9.8	0	9.8	0%
Solar Thermal	2.8	2.8	0	100%
Geothermal	1.2	1.8	-0.61	100%
Coal	1.1	0	1.1	0%
Totals	**267.5**	**60.8**	**194.9**	**23%**

Direct Use Fuel Energy Production in Oregon, 1960-2022[1]



The chart above uses a logarithmic scale to compare direct use energy produced in Oregon so that the natural gas, geothermal, and solar thermal resources can more easily be discerned. Although not an intended effect, this change in scale emphasizes changes in smaller resources like natural gas, solar thermal, and biomass, and deemphasizes changes in resources that constitute a larger proportion of the resources, like biomass.

Natural Gas. The Pacific Northwest's only natural gas production is located outside of Mist, northwest of Portland, and is owned and operated by NW Natural, one of three investor-owned natural gas companies serving Oregon. The Mist field produced about 13 million cubic feet of natural gas or 0.01 trillion Btu of energy in 2022.[1] The facility hit a production peak of 4.7 trillion Btu in 1986 and since then, production has steadily declined.[1]

The Mist facility is primarily used to store natural gas produced from outside of Oregon for use in electricity generation, as well as for customers within the natural gas distribution system. NW Natural pumps natural gas into the underground rock formations to store for later use during cold weather events, to help balance additions and withdrawals to its pipeline system, and minimize costs for customers by purchasing gas at favorable prices throughout the year.

Renewable Natural Gas. A biogas must be cleaned-up to be a substitute for fossil natural gas, and most often needs to meet stringent specifications required for injection into a natural gas distribution pipeline. Biogas is collected from landfills where it is produced from decaying municipal waste streams like food and garbage, from anaerobic digesters at wastewater treatment plants (waste and food), and at agricultural sites that process waste streams like manure.[9]

There are six RNG projects located in Oregon, and three are currently operational and able to inject RNG into natural gas pipelines.[10] [11] In 2018, the Oregon Department of Energy conducted an inventory of current and potential RNG facilities and estimated 4.5 percent of Oregon's total annual natural gas use could be replaced with RNG produced in the state. Production capacity could reach

as high as 17.5 percent of annual use with future technological advancements in collection and processing.[12] In November 2021, the Metropolitan Wastewater Management Commission in Lane County became the first public agency in Oregon to collect and inject RNG into NW Natural's gas line. The biogas is collected and processed from a regional wastewater treatment plant in Eugene.[13]

Solar Thermal. Solar thermal energy is a resource used directly to provide heat in Oregon homes and businesses. Solar thermal systems capture energy from the sun to provide water heating and space heating in buildings. Most solar thermal systems installed in Oregon are solar water heating systems that provide supplemental energy to residential water heaters, which can reduce water heating bills by 50 to 80 percent according to Energy.gov's Energy Saver.[14] In the last 10 years, residential solar water heating system installations have declined. In its place, more Oregonians are installing solar photovoltaic systems combined with energy efficient electric heat pump water heating systems as these combined systems have become more cost-effective.

Geothermal Energy. Direct use geothermal energy uses hot water or steam from reservoirs below the earth's surface piped to end users for water or space heating. Oregon produced 1.8 trillion Btu of geothermal energy in 2022, and 1.2 trillion Btu of it was consumed as a direct use fuel.[1] For decades, the city of Klamath Falls and the Oregon Institute of Technology's Klamath Falls Campus have used geothermal heat sources to heat buildings, residences, pools, and even sidewalks.[14,15] Schools and hospitals in Lakeview use a geothermal well system to heat some buildings.[16] The geothermal energy not used as a direct use fuel, is used to generate electricity.

Other examples of direct use of geothermal heat in the state include drying agricultural products, aquaculture (raising fish), heating greenhouses, and heating swimming pools. There are more than 2,000 thermal wells and springs delivering direct heat to buildings, communities, and other facilities in Oregon. The U.S. Department of Energy ranked Oregon as the state with the third highest geothermal potential, behind only Nevada and California.[2]

Biomass, Wood Pellets, and Charcoal Briquettes. Biomass energy is from plants and plant-derived materials, including wood, wood waste, wood pellets, and charcoal briquettes. Residual material or waste from forest harvest and mill operations is converted into useful retail products. Wood and wood waste biomass has been Oregon's largest direct fuel production source since 1960. In 1988, wood and wood waste production hit a high of 113 trillion Btu. Thirty-four years later, Oregon's production was 71 trillion Btu — a 37 percent decrease.[1] In Oregon, the industrial sector is the largest producer and consumer of biomass energy. Eleven woody biomass facilities use biomass to generate electricity used onsite and sold to other businesses in Oregon, primarily in the wood-products industry.[17] Wood is also produced and consumed as firewood to heat homes – after industrial, the residential sector is the second largest consumer of wood energy in Oregon.[1]

Wood pellets are manufactured from timber waste and used for residential and commercial heating. *Biomass Magazine* lists five wood pellet plants in Oregon, with an annual production capacity of 207,500 metric tons per year.[18] Charcoal briquettes and cooking pellets also use timber waste to create a fuel source for cooking; wood waste is burned in the manufacturing process as the products are heated up to remove moisture. Springfield, Oregon is home to one of Kingsford's five charcoal briquette manufacturing plants in the U.S. The facility has 90 local employees, is on a 40 acre site, and has been in operation for over 50 years.[24,25]

Transportation Fuels

Only 1.6 percent of the 318.4 trillion Btu of energy Oregonians consumed for transportation in 2022 was produced in state.[21] Oregon does not produce or refine any petroleum-based transportation fuels, but does produce 30 percent of the ethanol that is blended into gasoline and 12 percent of the biodiesel that is blended into petroleum diesel.[1] Though still a small fraction of the total transportation fuels, electricity use for transportation is growing in Oregon. The state consumed 0.8 trillion Btu of electricity in 2022 for transportation, or about 0.3 percent of total transportation fuel consumption.[1]

1.6%

Percentage of transportation fuel used in Oregon that is produced in state.

5%

Biodiesel blend is used in most heavy-duty vehicles on and off the highway.[22]

10%

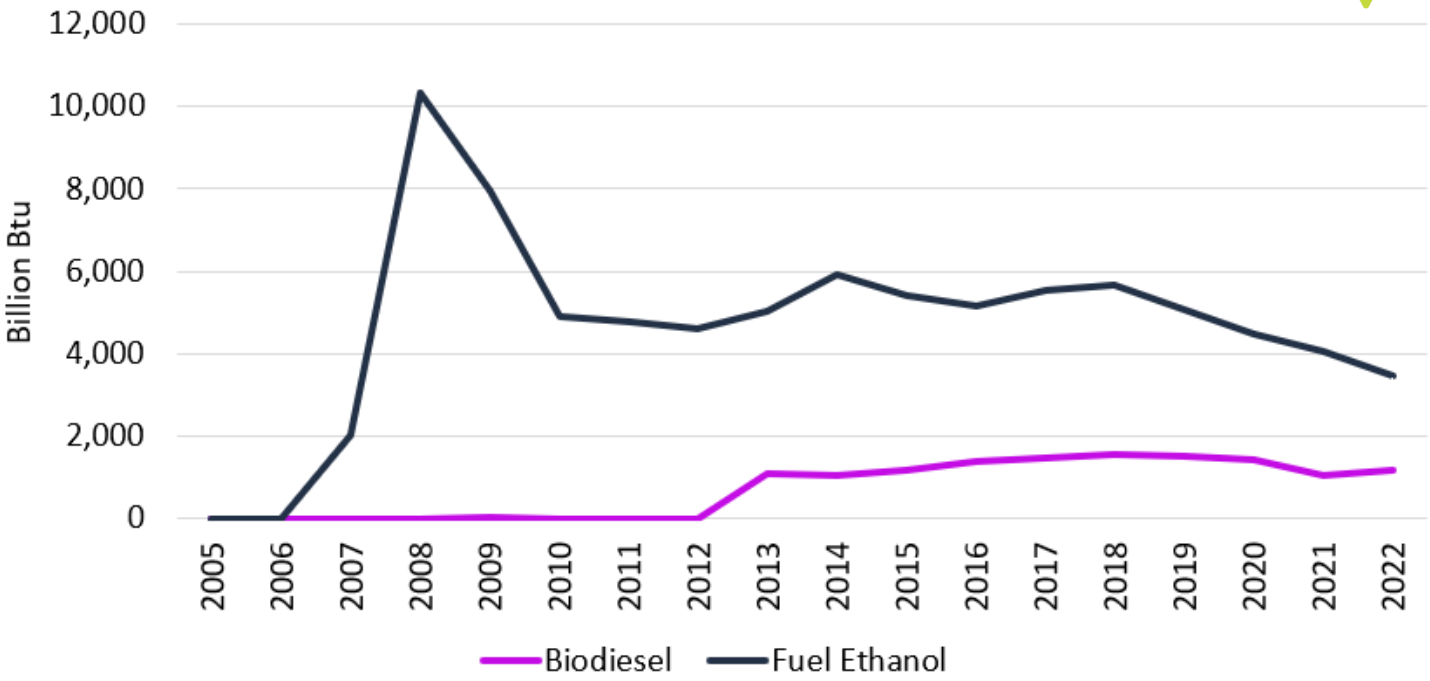
Ethanol blend fuel is used in a majority of light-duty vehicles in Oregon.[22]

Production & Consumption of Transportation Fuels in 2022 (trillion Btu)[3]

Resource	Consumption in Oregon	Oregon Production	Imported	% of Consumption Produced in Oregon
Gasoline	157.79	0	157.79	0%
Diesel	96.33	0	96.33	0%
Jet Fuel	23.13	0	23.13	0%
Fuel Ethanol	11.56	3.48	8.08	30%
Asphalt & Road Oil	10.65	0	10.65	0%
Biodiesel	9.71	1.18	8.52	12%
Renewable Diesel	5.78	0	5.78	0%
Lubricants	1.54	0	1.54	0%
Electricity* (gge)	0.80	0.54	0.25	68%
Bio-CNG	0.47	0	0.47	0%
Aviation Gasoline	0.32	0	0.32	0%
LPG/Propane	0.22	0	0.22	0%
Renewable Propane	0.06	0	0.06	0%
Compressed Natural Gas	0.03	0	0.03	0%
Hydrogen	<0.01%	0	<0.01%	0%
Totals	**318.38**	**5.21**	**313.16**	**1.6%**

**Specific electricity production is not known at the transportation level. The percentage used here is based on the ratio of electricity produced to electricity imported for 2022.*

Transportation Energy Production in Oregon, 2005-2022[3]



Ethanol. Oregon began producing fuel ethanol in 2007 and had its largest production year in 2008 with 10.3 trillion Btu of energy created. In 2022, Oregon produced 3.5 trillion Btu of ethanol.[1] Oregon has one commercial ethanol producer — Alto Ingredients' Columbia Dry Mill and Distillery in Boardman (previously known as Pacific Ethanol). Carbon dioxide emissions from the plant are captured and used by the food and beverage industry, turning emissions into a beverage-grade liquid used to carbonate soft drinks and make dry ice.[23]

Biodiesel. The U.S. Energy Information Administration began tracking Oregon biodiesel production in 2013. In 2022, Oregon produced 1.2 trillion Btu of biodiesel. In January 2024, SeQuential Pacific Biodiesel (the second largest Oregon producer of renewable fuel) was acquired by Neste Corporation and has been merged with Mahoney Environmental. They are expected to continue to collect and provide used cooking oils as a feedstock for renewable fuels, however it is uncertain if production at the biodiesel facility in Salem will continue, as Neste is a partner in a joint venture producing renewable diesel in Martinez, California.[24]

A biodiesel truck fills up in Salem, OR.

Renewable Natural Gas. This emerging biofuel that captures methane from waste streams has potential to displace some fossil transportation fuels in Oregon. For more details, see the Renewable Natural Gas paragraph in the Direct Use Fuels section.

Energy Facility Siting in Oregon

Oregon's Energy Facility Siting Council is a governor-appointed body that oversees the siting of energy facilities in the state, and is staffed by the Oregon Department of Energy. The types and sizes of energy projects subject to EFSC jurisdiction have changed over time. While the bulk of applications have been for electric generation projects, EFSC has also reviewed site certificate applications for electrical energy transmission, pipelines, nuclear research reactors, ethanol production, liquefied natural gas storage, and many others. More recently, EFSC has reviewed battery storage as part of other energy projects, even though battery storage is not by itself in state jurisdiction. EFSC also has ongoing responsibility for approved sites, including monitoring projects going into construction and operation, and reviewing site certificate amendment requests.

62

Total number of site certificates issued by EFSC.

24.5 Gigawatts

Total capacity of electricity-generating facilities approved by EFSC. Nearly 10.3 GW is renewable.

11 Gigawatts

Total capacity of renewable electricity generation under review, approved to begin construction, under construction, or operating.

Site Certificate — under ORS 469.300(26) — means the binding agreement between the State of Oregon and the applicant, authorizing the applicant to construct and operate a facility on an approved site, incorporating all conditions imposed by EFSC on the applicant.

EFSC Jurisdiction Renewable Electricity Projects (Megawatts)[1 2]

Status	Wind	Solar	Geothermal	Hydro	Battery	Total MW
Active						
Operational	2,719	212	-	-	56	2,987
In Construction	300	200	-	-	-	500
Approved	361	1,542	-	-	1,133	3,036
Under Review	201	4,444	-	-	4,606	9,251
Subtotal	**3,581**	**6,398**	**-**	**-**	**5,795**	**15,774**
Inactive						
Approval Expired	1,214	75	35	-	-	1,324
Decommissioned	-	-	-	-	-	-
Denied	-	-	-	80	-	80
Withdrawn	2,445	1,250	180	200	1,600	5,675
Subtotal	**3,659**	**1,325**	**215**	**280**	**1,600**	**7,079**
TOTAL MW	**7,240**	**7,723**	**215**	**280**	**7,395**	**22,853**

EFSC Jurisdiction Non-Renewable Electricity Projects (Megawatts)[1 2]

Status	Coal	Nuclear	Natural Gas	Other	Total MW
Active					
Operational	-	-	3,237	51	3,288
In Construction	-	-	-	-	-
Approved	-	-	-	-	-
Under Review	-	-	-	-	-
Subtotal	**-**	**-**	**3,237**	**51**	**3,288**
Inactive					
Approval Expired	109	5,040	3,636	38	8,823
Decommissioned	550*	1,130	415	-	2,095
Denied	-	-	-	-	-
Withdrawn	431	-	5,147	109	5,687
Subtotal	**1,090**	**6,170**	**9,198**	**147**	**16,605**
TOTAL MW	**1,090**	**6,170**	**12,435**	**198**	**19,893**

*The Boardman Coal Plant has ceased operation and is closed, but not yet fully decommissioned.

EFSC Jurisdiction Non-Electricity Generation Projects (Number) — Part 1[1 2]

Status	Research Reactors & ISFSI*	Electric Transmission Line	Natural Gas Storage	Liquefied NG Storage	Total Projects
Active					
Operational	3	1	1	-	5
Approved	-	1	-	-	1
Under Review	-	1**	-	-	1
Subtotal	**3**	**3**	**1**	**-**	**7**
Inactive					
Withdrawn	-	1	-	2	3
Subtotal	**-**	**1**	**-**	**2**	**3**
Total MW	**3**	**4**	**1**	**2**	**10**

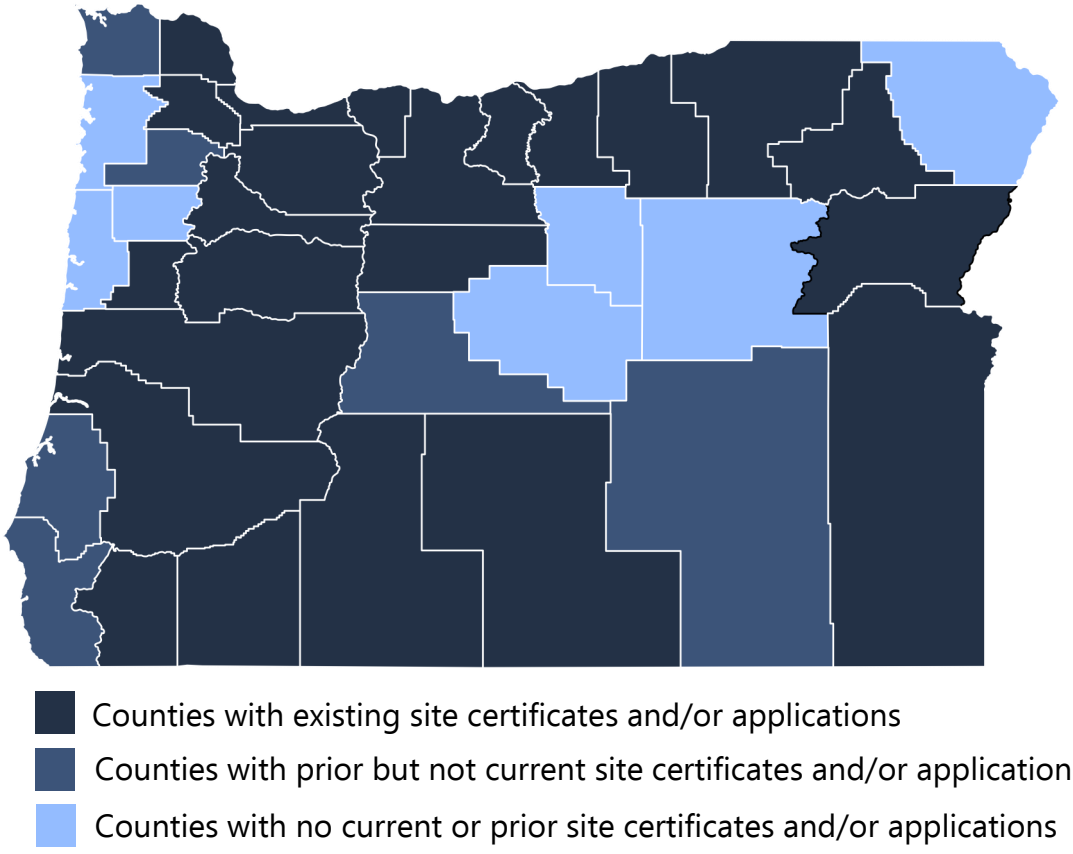
*Portland General Electric's Independent Spent Fuel Storage Installation Facility at decommissioned Trojan Power Plant.
**This is an amendment to the existing in-service Eugene to Medford 500 kV transmission line.

EFSC Jurisdiction Non-Electricity Generation Projects (Number) — Part 2[1 2]

Status	Natural Gas Pipeline	Ethanol Production	Total Projects
Active			
Operational	2	1	3
Approved	-	-	-
Under Review	-	-	-
Subtotal	**2**	**1**	**3**
Inactive			
Withdrawn	-	1	1
Subtotal	**-**	**1**	**1**
Total MW	**2**	**2**	**4**

Total Projects (Parts 1 and 2)	**14**

Oregon Counties with State Jurisdictional Energy Projects



Counties with existing site certificates and/or applications

Counties with prior but not current site certificates and/or applications

Counties with no current or prior site certificates and/or applications

More information on Oregon's state-jurisdictional energy projects is available online:

tinyurl.com/EFSC-projects

Energy Costs & Economy

What We Spend

In 2022, Oregon spent $19.5 billion on energy, an increase from the recent low of $12.1 billion in 2020.[1] This includes electricity and fuel for homes and businesses, industrial energy uses, and petroleum used in the transportation sector. Transportation accounts for about half of our state's energy expenditures and sees the largest swings in price. The variability in what we spend on energy is driven primarily by transportation fuel costs. In 2022, Oregonians sent about $11.2 billion in transportation dollars – nearly double the amount in 2020 – to other states and countries where extraction, processing, and refining of transportation fuels occurs.[1]

$19.5 billion

Oregonians spent on energy in 2022, a more than 60% increase from 2020.[1]

12.4 cents

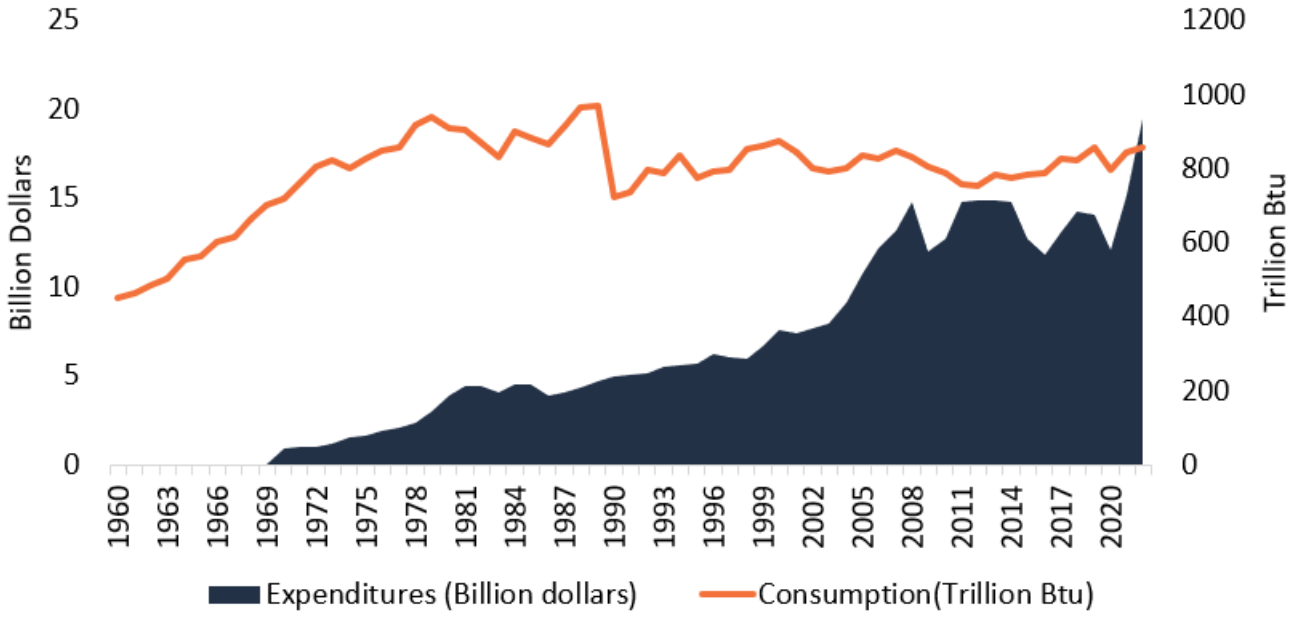
Oregon's average residential retail price per kilowatt hour of electricity for 2022.[2]

6.55%

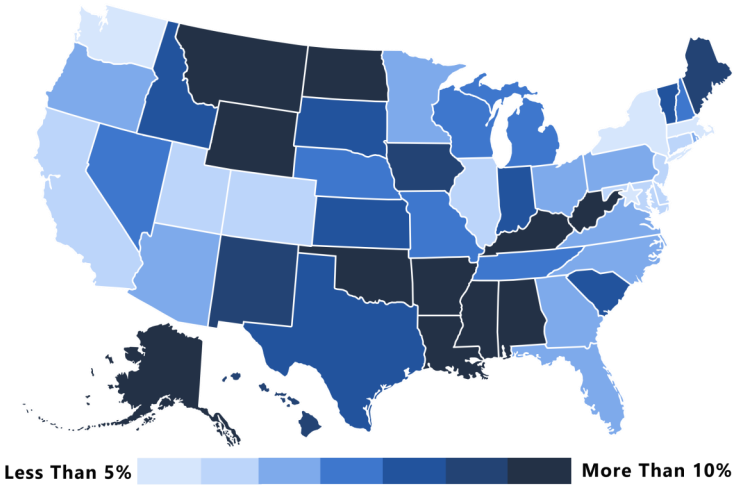
Percentage of Oregon's GDP spent on energy in 2022.[1]

KEI

Oregon's Total Energy Expenditures vs. Total Energy Consumption[1]



Note: Figure shows expenditures in nominal dollars, which are not adjusted for inflation.



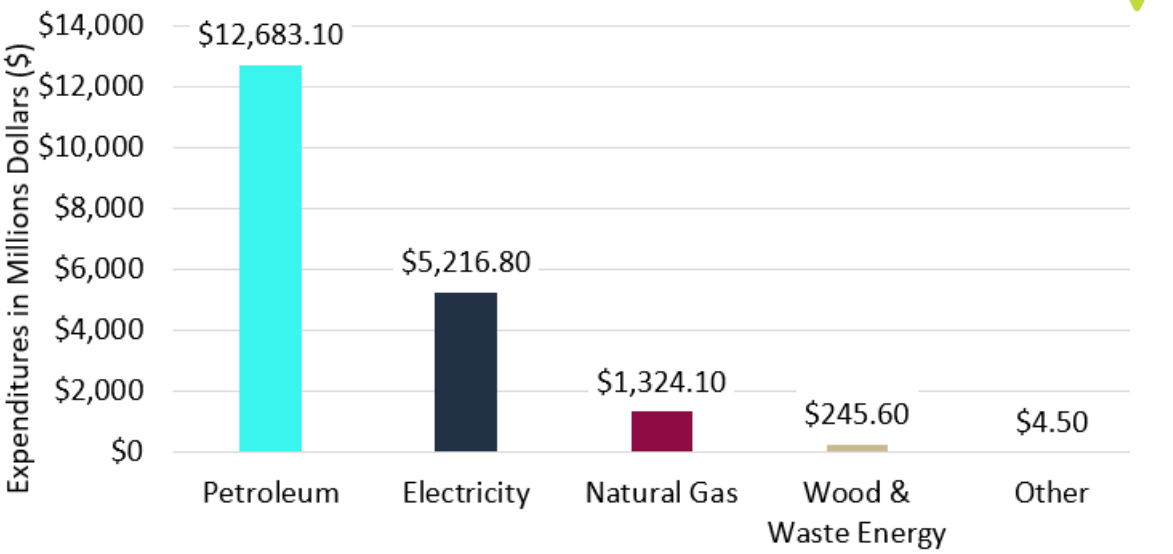
State Total Energy Expenditures as a Percentage of State Gross Domestic Product (2022)[1]

Oregon's energy expenditures as a percentage of the state's gross domestic product was 6.55 percent in 2022, which is just below the national average of 6.68 percent.[1]

Oregon Energy Expenditures by Source

Oregon's industrial, commercial, residential, and transportation sectors spent over $19.5 billion on energy from petroleum, electricity, natural gas, wood, waste, and some coal (other) in 2022.[1]

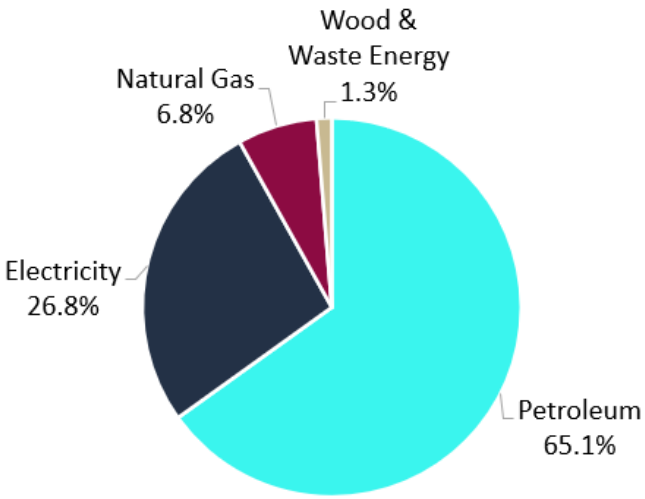
2022 Oregon Energy Expenditures by Source[1]



The petroleum category is dominated by transportation fuels. The transportation sector accounts for $11.2 billion in expenditures, mainly on petroleum products though it also includes some natural gas and electricity expenditures subject to regulation by the Oregon Public Utility Commission. Petroleum product prices are unregulated and experience a high level of price volatility due to global market effects. A sharp increase in price per unit of energy in petroleum products in 2021 and 2022 nearly doubled the amount of money Oregonians spent on transportation fuels compared to 2020.[1]

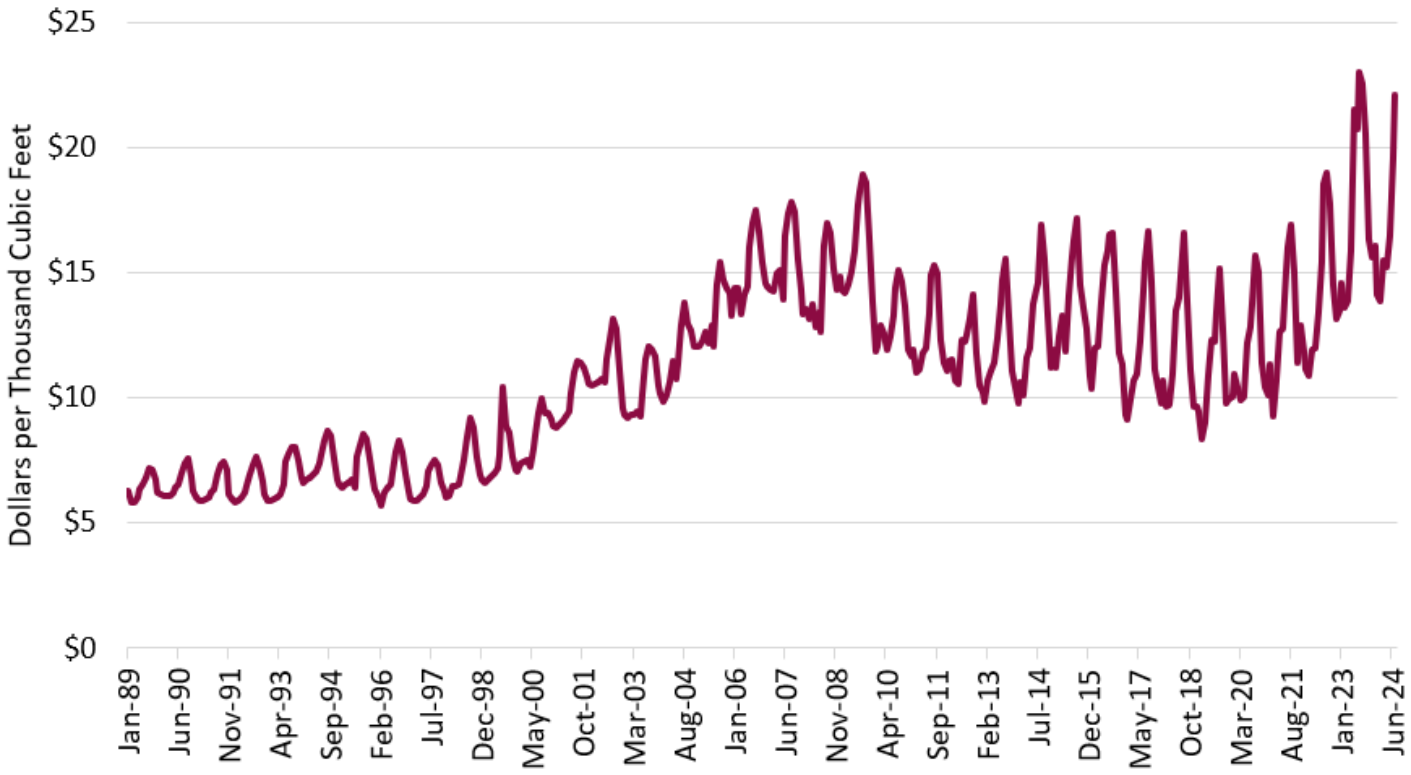
The average price of electricity has increased slowly from 2020 through 2022, but regulation of retail rates by the OPUC and local governing boards of Consumer-Owned Utilities has kept retail electricity prices from being as volatile as transportation fuel costs. Since 2022, many electric utility customers have seen rate increases, with the highest increases for investor-owned utility customers. Additional rate increases are under consideration at the OPUC and at some local COU governing boards.

Share of Energy Expenditures by Source in Oregon (2022)[1]



Natural gas expenditures constitute a smaller portion of total consumer energy expenditures in Oregon, primarily because not all people and businesses use natural gas. Natural gas retail prices are also regulated by the OPUC, and like electricity prices, have increased since 2020. Customers have faced higher retail prices due to a variety of factors, including higher natural gas supply costs in 2021 and 2022.[3] Investments in energy efficiency, low carbon alternative fuels, and other options to decarbonize Oregon's existing natural gas system will likely increase the cost of doing business for utilities and contribute to future retail rate increases.[4] [5]

Oregon Price of Natural Gas Delivered to Residential Consumers Over Time[6]



Get Involved

The Oregon Public Utility Commission offers trainings to help Oregonians better understand its processes and encourage participation. The agency provides recorded online trainings on its website, including support for those new to OPUC processes, information on climate change and utility investment, wildfire and public safety, and information on what to expect for hearings, public meetings, and rulemaking opportunities, among other trainings.

SCAN OR CLICK

Energy Burden

Home energy burden is commonly used to refer to the percent of household income spent on home energy bills, including electricity, natural gas, and other home heating fuels. To calculate a household's energy burden, the total electricity and/or heating costs are compared to the total gross income of the people in that household. The U.S. Department of Energy and other consumer-focused agencies regard a household spending 6 percent or more of its income on home energy costs as experiencing high energy burden, while households spending 10 percent or more are considered severely energy burdened.[7] However, percentages are not able to capture all the unique and differing ways that a household may experience energy burden. The energy affordability gap is the difference between a household's actual energy costs and what may be considered an "affordable" energy burden level. Many low-income Oregonians — those making 200 percent of the federal poverty level or less — face high or severe energy burden.

Oregon's energy affordability gap is estimated to be about $277 million per year, or eight times the federal funding Oregon receives for energy assistance.[8]

4x

In Oregon, low-income households spend over four times more on energy costs compared to the average spending of non-low-income households on energy.[8]

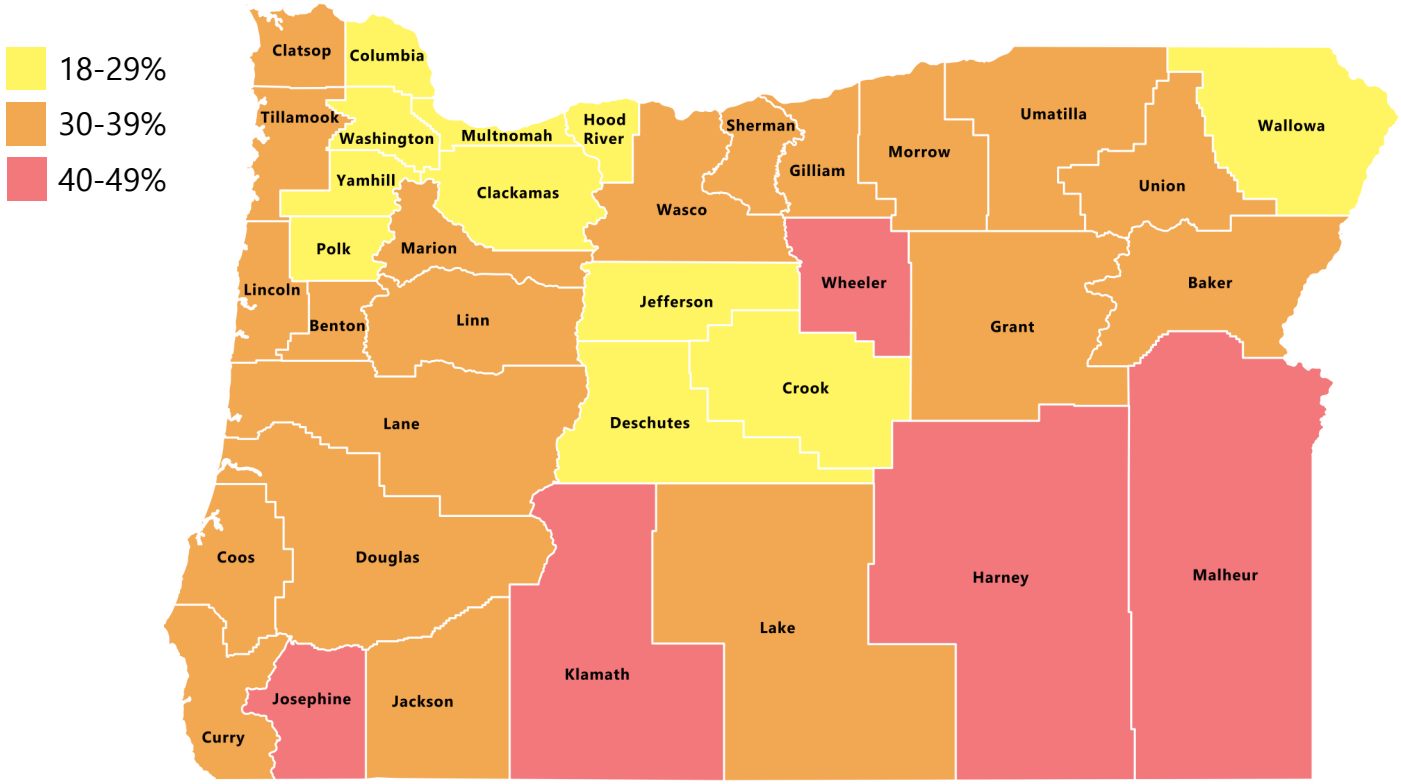
477,540

Number of Oregon households that were energy burdened in 2022, an increase of more than 100,000 households in 2020.[8]

28.4%

Percentage of all Oregon households that were energy burdened in 2022,[5] a 2% increase from 2020.

Percentage of Oregon Households Experiencing High or Severe Energy Burden and Earning 200 Percent or Below Federal Poverty Level by County[8]



The Oregon energy burden map shows how each county compares in energy burden among very low-income Oregonians. The prevalence of higher energy burden in places outside metropolitan areas shows that many rural Oregonians spend a high percentage of their income on energy. This is in part because there is an increased cost for providing energy services and commodities for consumers in more remote parts of the state, including the costs to deliver fuels to rural areas or to maintain infrastructure such as electricity distribution lines over longer distances.

Transportation burden represents the total annual transportation costs of households in comparison to income of the household.[9] Similar to electricity and heating costs, rural Oregonians have a higher degree of transportation burden than more urban and suburban areas of the state, in part because they have to travel farther distances.

Home and transportation energy burdens are combined to discuss the whole energy burden of a household — and both are important indicators of affordability for Oregonians.

The Housing + Transportation Affordability Index was last updated in 2022 and provides more information on transportation energy burden by town: htaindex.cnt.org/map/

The Oregon Department of Transportation is supporting solutions to increase the affordability for Oregon communities through public transportation and other transportation options. Learn more about ODOT's innovative solutions in its Oregon Public Transportation Plan: tinyurl.com/ODOT-OPTP

Energy Costs for Oregonians

Price swings for petroleum products and rate increases for some electric utilities have contributed to a rapidly changing economic situation that is challenging for all Oregonians — but especially for low-income households.

The 2022 BER discussed challenges for Oregonians posed by worldwide events. As the state worked to recover from the COVID-19 Pandemic, heatwaves, and effects from the wars abroad over the last two years, the price of energy and goods has continued to increase. Previously there were downward trends in the percent of Oregon households experiencing energy burden, but those trends have shifted, and more families are now experiencing energy burden than at the peak of the pandemic.[8]

Recent filings at the Oregon PUC indicate that electric utility disconnections in 2024 are on the rise. Utility disconnections are an indicator of energy affordability.[10]

Learn more about what drives electricity rates in the Energy 101 section of this report.

Oregon County Profiles

Oregon county profiles are a compilation of demographic, economic, and geographical datasets representing Oregon's 36 counties. The profiles aim to highlight aspects of each county's economic status and provide a focused perspective on the diverse communities in the state.

The profiles have been updated with data from 2022[X] and include the following categories:

County Characteristics[13]

Many characteristics can influence county-level energy consumption, including county area (total acreage), location, population, number of households, median household income, and the county's diversity index.

Poverty & Energy Burden[14] [15]

The county profiles assess the economic impact, home energy burden, and annual energy burden gap of county residents. Home energy burden is the percentage of household income dedicated to home energy bills. If a household spends more than 6 percent of their total income on energy costs, it is considered burdened. The energy affordability gap is the difference between a household's actual energy costs and an "affordable" energy burden equal to 6 percent of the household's income.[13]

Homes[13]

The residential sector contains new, existing, and vintage constructions, with home energy use varying significantly depending on the type and size of the home.[14] Accounting for factors such as the age of residences, type and size of residences, and type of ownership aids in understanding the energy needs of Oregonians.

Energy[16] [17]

Energy use represents the direct use of energy resources within each county. These data demonstrate the amount of energy consumed by county residents and include the average annual residential electricity use and cost, average annual residential natural gas use and cost, and the average cost of these as a percent of a typical income for that county.

Home Primary Heating[13]

Home heating evaluates the primary heating resources used by residents within the county. Heating systems vary depending on the energy source and the device that produces the heat. Heating systems can vary depending on current needs and the energy resources available; however, most heating systems are categorized as natural gas, electricity, propane, wood, and fuel oil.

Travel[17]

The transportation and travel section accounts for the transportation burden of county residents. Information in this section includes average vehicle miles traveled per household; the fuel, maintenance, and repair costs associated with that VMT; VMT costs as a percent of typical income; and VMT as a percentage of 200 percent the federal poverty level income.[15]

[X] This is the most recent available data; profiles do not reflect recent changes in energy rates and their effect on customers.

Profiles

Included here are three county profiles that provide diverse examples of the energy, demographic, economic, and geographic factors of Oregon communities. Profiles of all 36 counties are available online.

Multnomah County

County Seat: Portland

Area (Total Land Acres)	275,941
Total Population (2022)	787,437
Diversity Index[xi]	54%
Number of Households	343,370
Median Household Income (2022)	$83,668

Poverty and Energy Burden

Energy Burdened Households	93,395
Federal Poverty Level (Family of 3)	$23,030
200% Federal Poverty Level	$46,060
Annual Energy Burden Gap	$493

Homes

Homes Built Before 1990	70%
Owner-Occupied Homes	55%
Renter-Occupied Homes	46%

Energy

Average Annual Residential Electricity (kWh)	9,991
Average Annual Electricity Cost	$1,363
Average Annual Residential Natural Gas Therms	663
Average Annual Natural Gas Cost	$777
Electricity and Natural Gas Average Costs (Percent of Typical Income)	3%

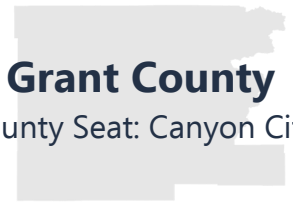
Primary Home Heating

Electricity	48%
Natural Gas	47%
Propane	1%
Wood	1%
Fuel Oil	2%

Travel

Average Annual Vehicle Miles Traveled (VMT) Per Household	13,609
Annual VMT Cost (Fuel, Maintenance, Repairs)	$2,102
VMT Cost as Percent of Regional Typical Income	3%
VMT as Percent of 200% Federal Poverty Level Income	5%

[xi] The diversity index is a measurement that describes how diverse a population is by calculating the probability that two people chosen at random will be from different race and ethnicity groups. This metric considers all of the race and ethnicity data selection options collected in the U.S. Census and is updated every 10 years.



Grant County

County Seat: Canyon City

Area (Total Land Acres)	2,897,783
Total Population (2022)	7,034
Diversity Index	21%
Number of Households	3,368
Median Household Income (2022)	$56,045

Poverty and Energy Burden

Energy Burdened Households	1,084
Federal Poverty Level (Family of 3)	$23,030
200% Federal Poverty Level	$46,060
Annual Energy Burden Gap	$1,180

Homes

Homes Built Before 1990	76%
Owner-Occupied Homes	78%
Renter-Occupied Homes	22%

Energy

Average Annual Residential Electricity (kWh)	12,536
Average Annual Electricity Cost	$1,261
Average Annual Residential Natural Gas Therms	N/A[xii]
Average Annual Natural Gas Cost	N/A[xii]
Electricity and Natural Gas Average Costs (Percent of Typical Income)	2%

Primary Home Heating

Electricity	30%
Natural Gas	1%
Propane	5%
Wood	43%
Fuel Oil	20%

Travel

Average Annual Vehicle Miles Traveled (VMT) Per Household	22,882
Annual VMT Cost (Fuel, Maintenance, Repairs)	$3,532
VMT Cost as Percent of Regional Typical Income	6%
VMT as Percent of 200% Federal Poverty Level Income	8%

[xii] A data discrepancy exists for these data points. The U.S. Census Bureau data indicate 0.7 percent of Grant County residents use natural gas, but Oregon Public Utility Commission data indicate no costs for natural gas in Grant County.

Klamath County

County Seat: Klamath Falls

Area (Total Land Acres)	3,807,981
Total Population (2022)	68,319
Diversity Index	42%
Number of Households	28,186
Median Household Income (2022)	$57,219

Poverty and Energy Burden

Energy Burdened Households	11,855
Federal Poverty Level (Family of 3)	$23,030
200% Federal Poverty Level	$46,060
Annual Energy Burden Gap	$787

Homes

Homes Built Before 1990	69%
Owner-Occupied Homes	67%
Renter-Occupied Homes	33%

Energy

Average Annual Residential Electricity (kWh)	11,434
Average Annual Electricity Cost	$1,227
Average Annual Residential Natural Gas Therms	567
Average Annual Natural Gas Cost	$860
Electricity and Natural Gas Average Costs (Percent of Typical Income)	4%

Primary Home Heating

Electricity	34%
Natural Gas	42%
Propane	3%
Wood	13%
Fuel Oil	4%

Travel

Average Annual Vehicle Miles Traveled (VMT) Per Household	18,663
Annual VMT Cost (Fuel, Maintenance, Repairs)	$2,881
VMT Cost as Percent of Regional Typical Income	5%
VMT as Percent of 200% Federal Poverty Level Income	6%

2023 Oregon Cooling Needs Study

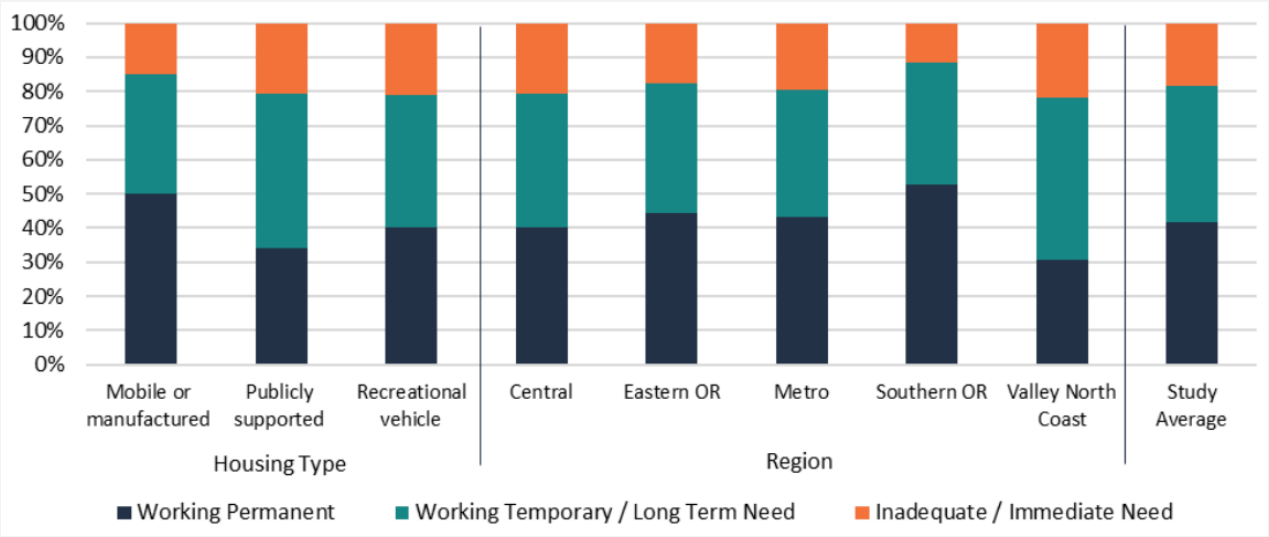
SB 1536 directed the Oregon Department of Energy to conduct a cooling needs study, which the agency published in December 2023.

Following the 2021 heat dome event, during which at least 100 Oregonians died of heat-related illnesses – often in their own homes – the Oregon Legislature directed the Oregon Department of Energy to report on the cooling needs of Oregon households that live in the housing types most vulnerable to heat. The study focused on publicly supported housing, manufactured and mobile homes, RVs being used as housing, and employer-provided agricultural workforce housing.

The study found that:

- Many Oregonians do not have adequate cooling equipment, including 58 percent of residents living in the housing types surveyed.
- The estimated total cost to provide the health and safety baseline level of cooling equipment to avoid the worst effects of extreme heat events is $604,400,000.
- The estimated total cost to provide comprehensive cooling (permanently installed equipment to properly cool the full living space in each housing unit) is $1,082,700,000.
- The average county heat vulnerability index is 57 (out of 100). The counties with the highest heat vulnerability are Morrow (68), Multnomah (68), Malheur (67), Marion (64), Umatilla (62), and Wheeler (61).
- The study also identified social and economic barriers residents face in accessing existing resources and found that only 22 percent of surveyed individuals have used existing cooling, weatherization, or utility bill assistance programs.
- The figure below illustrates the immediate and long-term cooling needs as projected by housing type and region. It does not include ag housing.

Cooling Needs by Housing Type and Region in Oregon



Energy Jobs

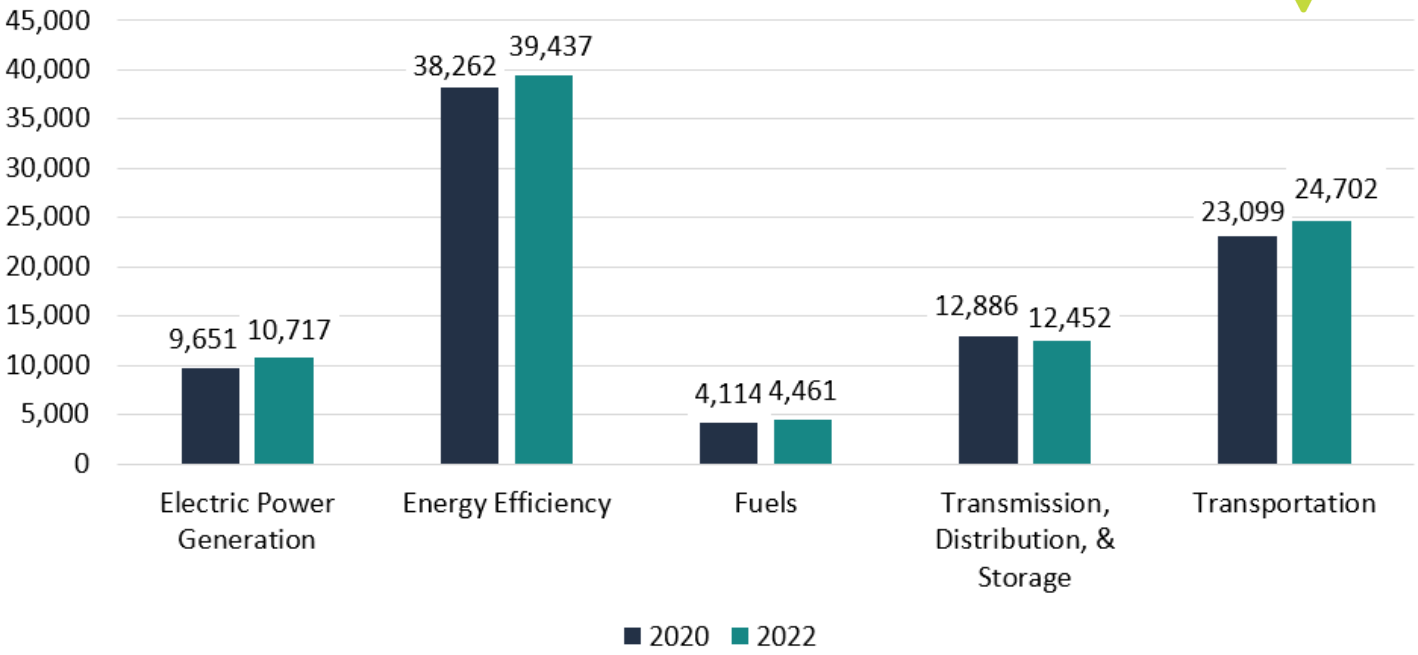
91,769

Number of Oregonians employed in the energy industry in 2022.[11]

Oregonians hold many different types of jobs in the energy industry — from energy utility workers to wind turbine technicians to heating, ventilation, and air conditioning (HVAC) installers.

Energy employment is often sorted into energy efficiency, traditional energy, and motor vehicles jobs. In Oregon, most energy industry employees work in energy efficiency, including high-efficiency and traditional HVAC and renewable heating and cooling firms, in addition to other specialized areas. Traditional energy jobs include energy extraction, as well as power generation, transmission, distribution, and storage. Motor vehicles jobs include both the manufacture and distribution of parts and plug in hybrid, battery electric and hydrogen fuel cell vehicles for all industries, from large-scale industrial vehicles to small recreational vehicles such as golf carts.

Number of Energy Jobs in Oregon by Type (2020, 2022)[11]



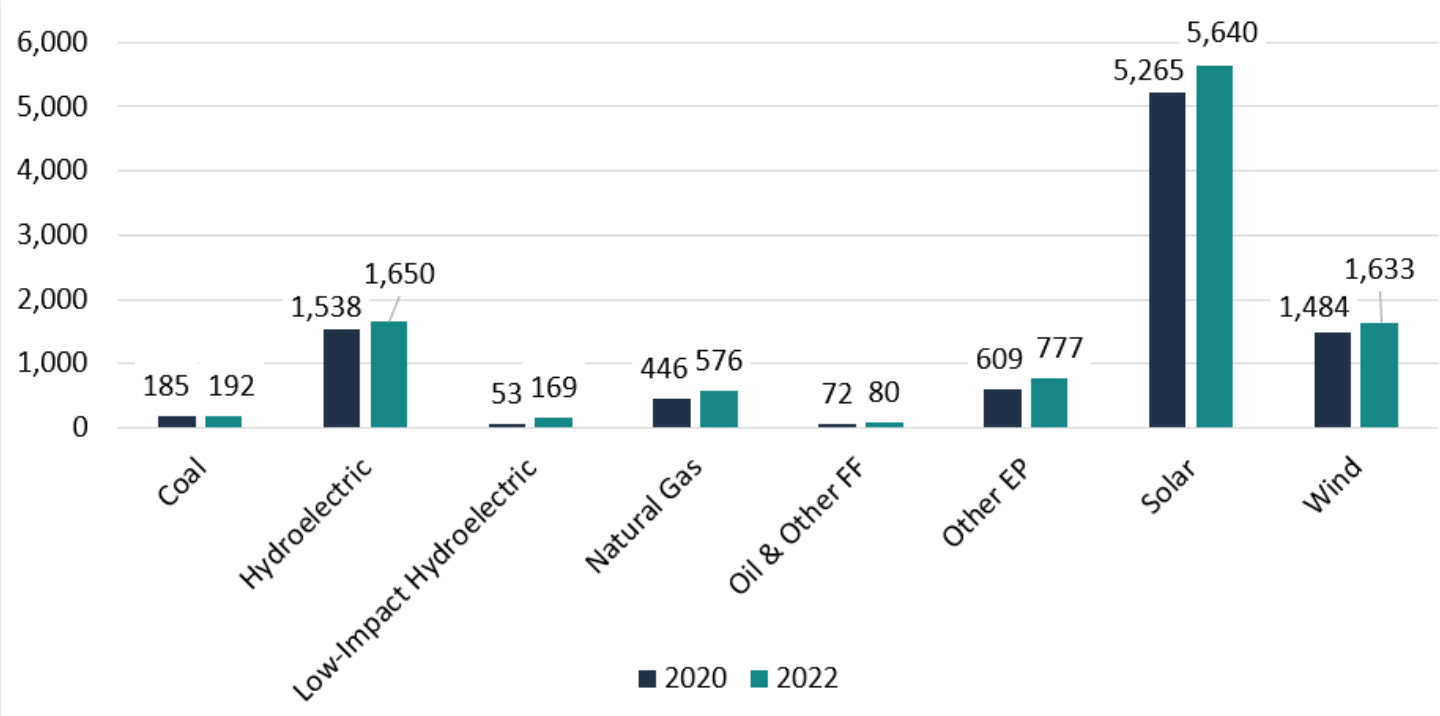
Building Oregon's Energy Workforce

With unprecedented federal funding from the 2021 Infrastructure Investments & Jobs Act and 2022 Inflation Reduction Act comes support for building a clean energy workforce. As programs supporting energy efficiency and renewable energy projects come online in Oregon — such as the Solar for All program and Home Energy Rebates — the state will need the workforce to complete these projects. The Oregon Department of Energy and our partners will be rolling out programs to support workforce development and training, including for disadvantaged communities as defined by Justice40.

SCAN OR CLICK

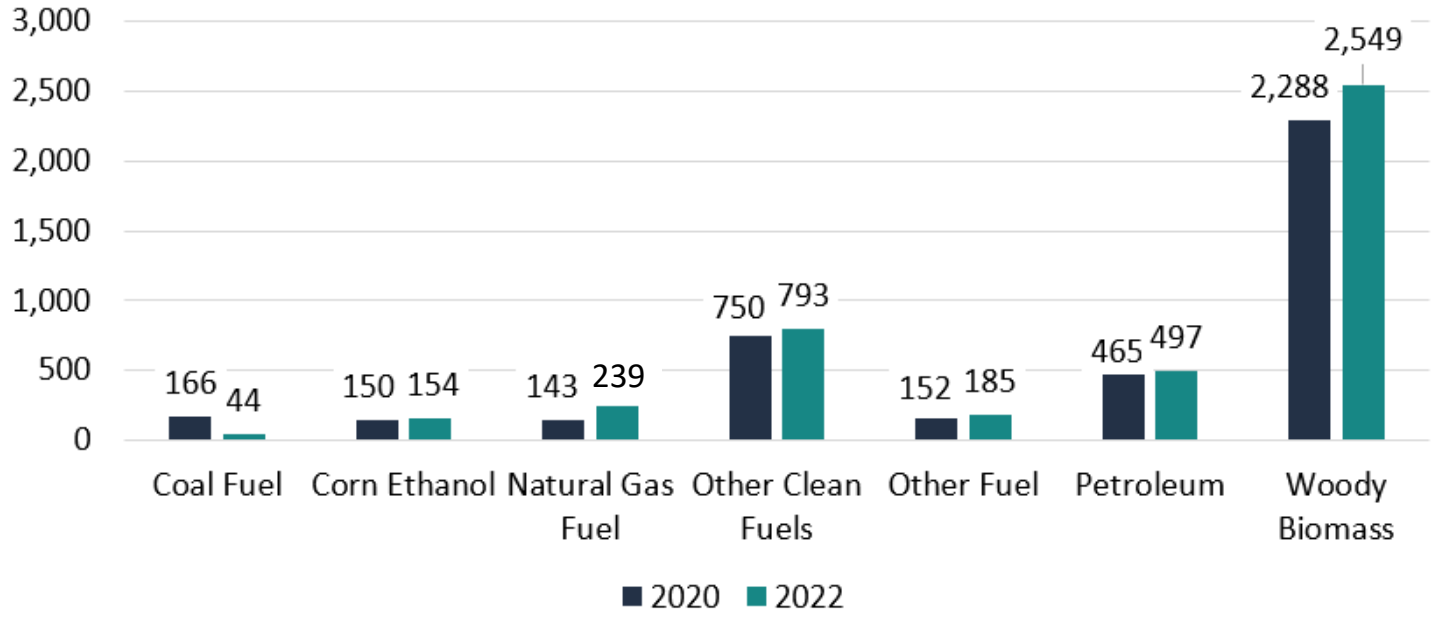
The electric power generation sector in Oregon employed 10,717 workers in 2022, an increase of 1,066 jobs from 2020.[11] In 2022, there were 5,640 solar jobs in Oregon – 375 more than 2020. The solar industry has rapidly expanded since the early 2000s due to many factors, including solar potential, incentive programs, and clean energy policies in the state. In 2022, hydroelectric generation and wind energy provided 1,650 and 1,633 jobs, representing gains of 112 and 149 jobs from 2020.

Electric Power Generation Jobs in Oregon by Technology (2020 and 2022)[11]



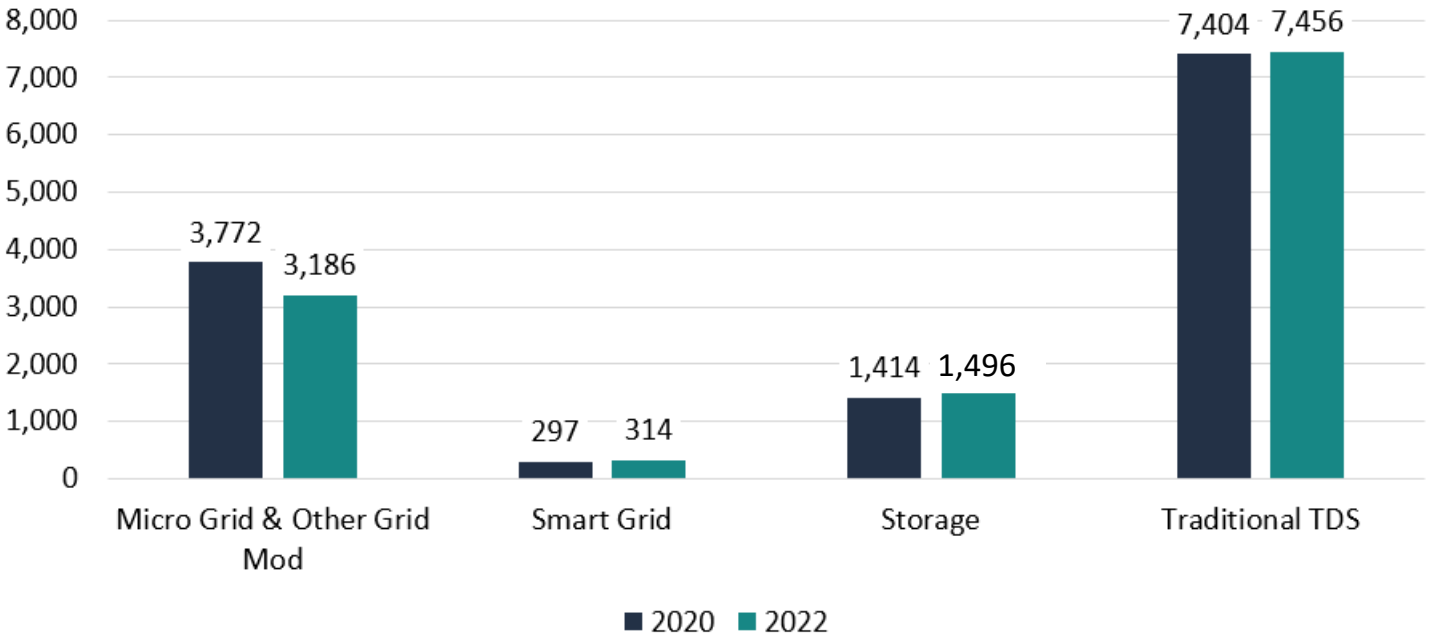
The fuels sector in Oregon employed 4,461 workers in 2022, 347 more than 2020.[11] More than half, or 2,549, of those fuel jobs are related to woody biomass.

Fuels Jobs in Oregon by Resource (2020 and 2022)[11]



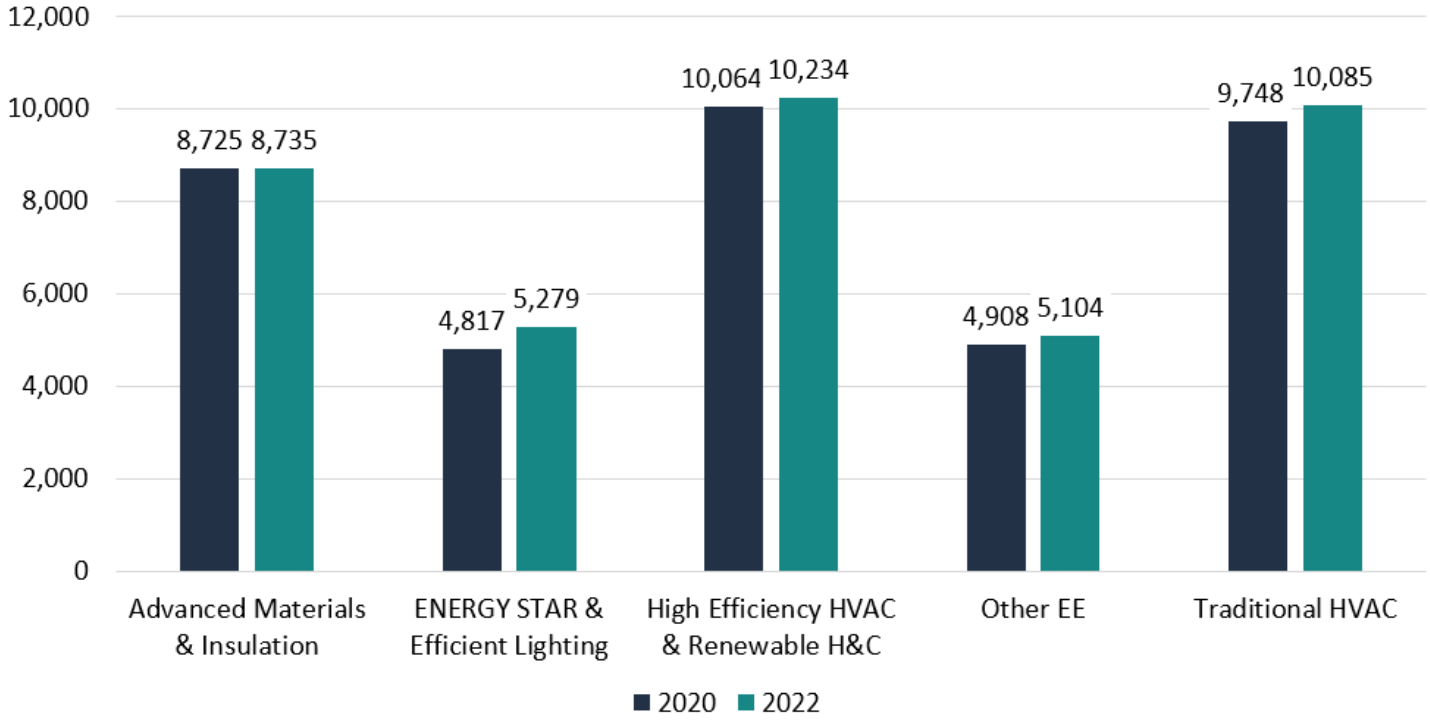
The transmission, distribution, and storage sector in Oregon employed 12,452 workers in 2022, a decrease of 434 jobs from 2020.[11]

Transmission, Distribution, and Storage Jobs in Oregon (2020 and 2022)[11]



The energy efficiency sector in Oregon employed 39,437 workers in 2022, up 1,175 jobs from 2020.[11]

Energy Efficiency Jobs in Oregon by Technology (2020 and 2022)[11]



Energy Efficiency Workforce Statistics

Oregon's energy future will need more people trained in energy efficiency jobs. Traditionally, many of the energy jobs that have been an area of focus have been lineworkers, power plant workers, workers in the renewable energy sector, and solar installers. A healthy workforce of trained HVAC installers/maintenance workers, electricians, plumbers, and building envelope professionals is needed to meet energy efficiency standards for state and federal building codes. They also will support consumer efforts to reduce energy consumption and their climate footprint through energy efficient upgrades in homes and businesses. Energy efficiency standards help Oregon address the 34 percent of greenhouse gas emissions that are produced by the built environment.

Meeting this growing demand means Oregon needs a construction workforce trained in the installation of energy efficient technologies. According to data from the Oregon Employment Department, construction jobs are projected to increase 15.1 percent by 2032, while an expected 85 percent of the current workforce will retire. More support is needed for training programs to fill the approximately 113,936 construction jobs that will be vacant by 2032.[12]

Employment in the categories of *High Efficiency & Renewable Heating & Cooling* and *Traditional HVAC* both grew from 2020 and account for more than half of the energy efficiency sector jobs in Oregon in 2022. *Traditional HVAC* companies are companies where more than 50 percent of installations are not considered high efficiency. *High Efficiency & Renewable Heating & Cooling* indicates businesses where more than 50 percent of installations performed are considered high efficiency, such as heat pumps.

Energy Efficiency

Oregon's Second Largest Resource

11th

Oregon's 2022 rank among U.S. states for energy efficiency by the American Council for an Energy Efficient Economy.[2]

Energy efficiency, the use of less energy to perform the same task or produce the same result, plays a critical role in Oregon.[1] It remains the second largest resource in the state after hydropower, and Oregon has consistently met increased demand for electricity by implementing energy efficiency strategies. The Northwest Power & Conservation Council reports that since 1978, the Pacific Northwest has provided about 7,678 average megawatts of savings through efficiency programs and improvements.[1] That's more electricity than the whole state of Oregon uses in a year.

In 2010, Oregon's per capita energy use was 204.9 million Btu. By 2022 it dropped to 202.4 million Btu, despite the state's population growing by a half million people to 4.3 million (up from 3.8 million in 2010). One reason for the drop is energy efficiency. Oregon's gains in energy efficiency have been helped by federal appliance standards, state policies and programs, natural gas and electric utility programs, Energy Trust of Oregon, Bonneville Power Administration, and other non-governmental organizations. Of the region's cumulative savings, 59 percent comes from utility and Bonneville Power Administration programs.[1] Energy efficiency gains are cumulative and continue paying dividends for the region over time.

While Oregon has long remained in the American Council for an Energy Efficient Economy's (ACEEE) top ten ranking, the state fell to eleventh place in 2022. This was largely due to other states building momentum in the efficiency space, lower relative costs of renewable energy technologies, and fewer investments in energy efficiency programs.

New Home Energy Rebates Coming to Oregon Homes

In October 2024, The Oregon Department of Energy was awarded over $113 million from the U.S. Department of Energy for two new home energy rebate programs that will provide financial incentives to single-family and multifamily households for eligible high-efficiency home improvements, appliances, and equipment.

The Home Efficiency Rebate Program (also known as HOMES) will provide performance-based rebates for energy efficiency retrofits in single-family and multifamily 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 will be issued for projects that can provide at least 20 percent estimated energy savings, with higher incentives available for projects that could save 35 percent or more. The Home Electrification and Appliance Rebate Program (also known as HEAR) will provide 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.

ODOE is working on the programs' design and start procuring and developing the program guidance, technology systems, coordinating agreements, and other materials necessary to launch two effective and well-run programs. ODOE expects that rebates will be available in late 2025 or early 2026.

Oregon Electricity Savings

7,678

Average megawatts of regional electricity savings from energy efficiency (1978-2022).[1]

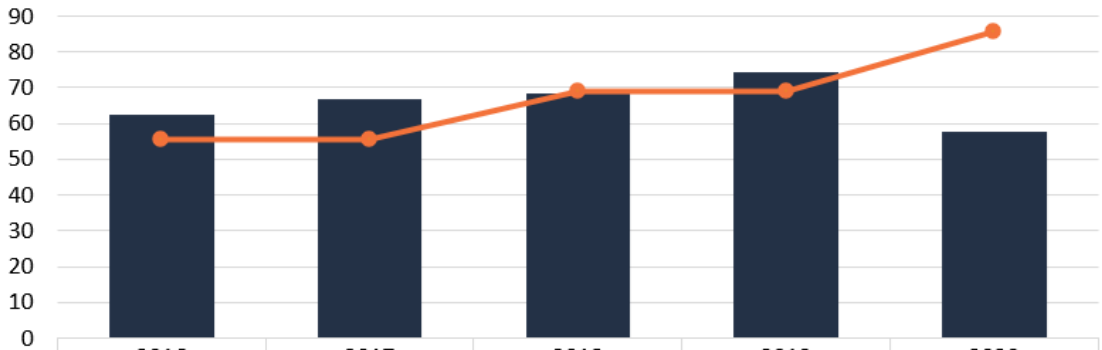
2,303

Average megawatts of Oregon electricity savings from energy efficiency (1978-2022).[3]

The Northwest Power & Conservation Council's 2021 Northwest Power Plan, published in March 2022, concluded that cost-effective energy efficiency could meet a large amount of new load growth in the region – enabling Oregon's economy to grow while reducing the need for new electricity resources. The plan called on the region to develop new energy efficiency programs equivalent to acquiring 2,400 average megawatts of power by the end of 2041.[3] Integrated Resource Plans from Oregon's large electric utilities also include energy efficiency as a key strategy to manage demand over their planning horizons. More recent analysis indicates that the rate of load growth is increasing. The 2024 update to the Pacific Northwest Utilities Conference Committee's Northwest Regional Forecast projects "electricity consumption could increase from about 23,700 aMW in 2024 to about 31,100 aMW in 2033 (an increase of 7,400 aMW). This is an over 30 percent in electricity demand over the next 10 years."[4]

The Regional Conservation Progress Report to the Northwest Power and Conservation Council in October 2023 affirmed the targets set in the 2021 Plan, and noted that the region exceeded the savings achievement target for 2021.[1] Program expenditures have been flat to declining over the last seven years, and the cost of savings has been increasing from $2 per aMW in 2016 to $2.75 per aMW in 2020.[3] The price to achieve energy savings is increasing for utilities as the lower cost, higher savings measures (such as lighting upgrades) hit saturation in the existing building stock, and the remaining measures cost more to achieve the same amount of savings.

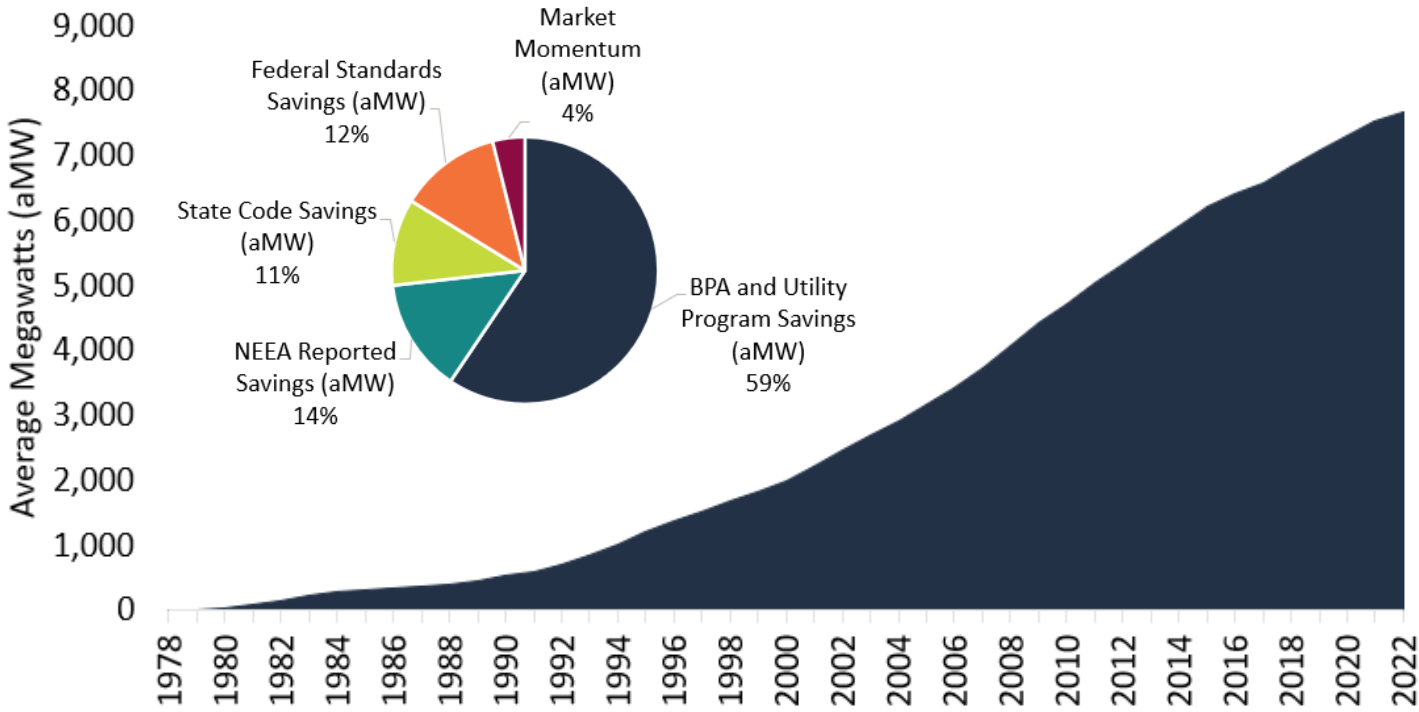
Oregon Electricity Savings & Estimated Share of Seventh Power Plan Goal (aMW)[3]



	2016	2017	2018	2019	2020
Energy Trust of Oregon	58.4	62.2	50.0	51.8	39.9
BPA	9.3	5.7	8.1	8.9	3.9
COU Utility Self-Funded	1.1	0.6	2.6	3.3	0.3
NEEA	9.0	7.9	12.4	16.8	15.0
Codes and Standards	0.0	0.5	1.9	2.4	3.4
Momentum	3.2	8.2	0.0	0.0	0.0
Market Adjustment	-18.7	-18.2	-6.6	-9.0	-4.6
Total Oregon Savings	62.37	66.85	68.38	74.24	57.81
Estimated Oregon Share of Goal	56	56	69	69	86

The regional savings achievements reported by the NWPCC can be split into state goals and achievements. The split is based on the Oregon percentage of the regional market and is not exact since each state does not set independent efficiency goals — rather, the region and each utility set goals. The previous chart shows how Oregon energy efficiency achievement has varied over the last 7 years. The annual goals are shown in the orange line. After two years of the region not meeting its goals – due to several factors, including increasing cost of energy efficiency measures without increasing investments – the 2022 goal was lowered, and the region was able to exceed it. The table included with the chart indicate the amount of energy savings attributed to specific programs or mechanisms.

NWPCC Cumulative Regional Energy Efficiency Savings (Chart) and Share of Cumulative Savings (Pie) by Mechanism[5]



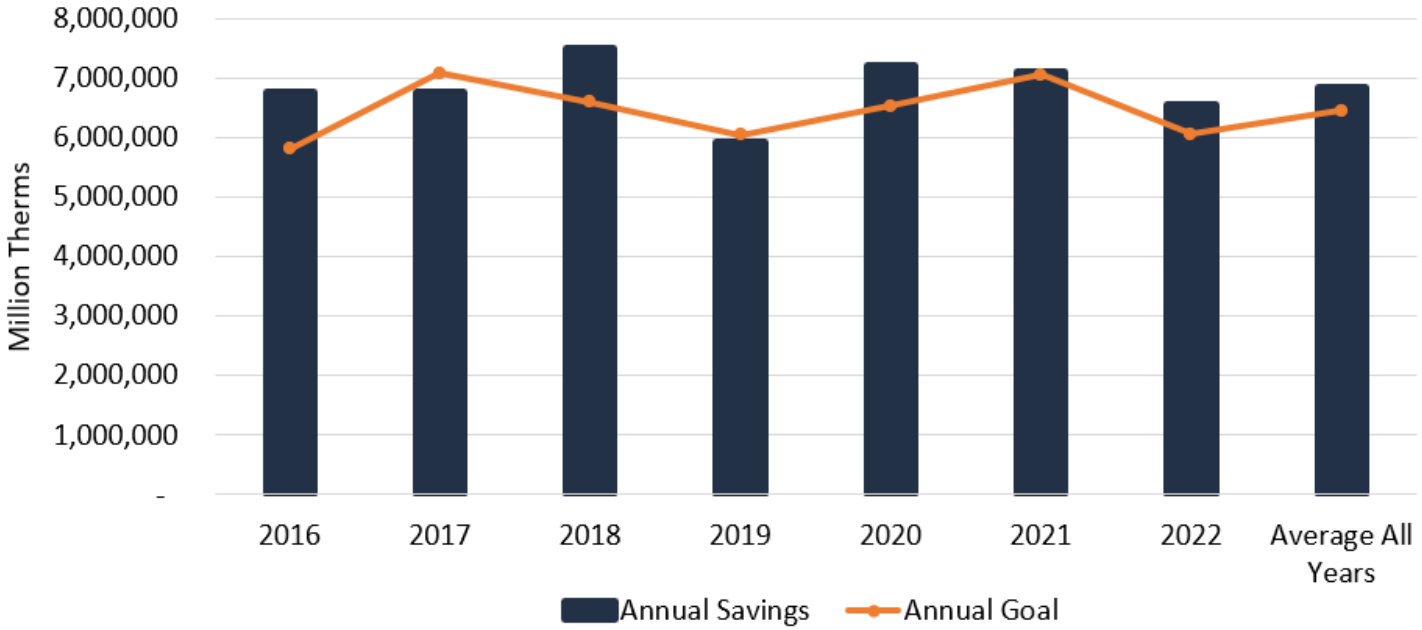
The figure above shows cumulative regional energy efficiency savings since 1978. Savings are shown cumulatively because each measure continues to provide efficiency savings over the life of the equipment. The pie chart indicates how each program or mechanism contributed to the savings over the entire time frame from 1978 through 2022. Federal standards include federal appliance and equipment efficiency standard programs such as Energy Star. States in the region set building codes, efficiency codes, and may set additional standards for appliances and equipment that are not included in the Federal standards. The Northwest Energy Efficiency Alliance supports building code and energy efficiency standard work in the region and implements market transformation programs that seek to remove market barriers to energy efficiency and drive permanent change through the supply chain. Market momentum is an estimate of additional energy savings attributed to the changing market. The largest slice of energy saving contributions is the utility programs shown in dark blue; this is inclusive of all local utility programs and the regional Bonneville Power Administration programs in which some local utilities participate.

Oregon Natural Gas Savings

Natural gas efficiency goals are developed in each natural gas utility's Integrated Resource Plan submitted to the Oregon Public Utility Commission. The utilities' savings exceeded goals from 2016 and 2018 with a slight decline in 2019, then continued to exceed goals in 2020 through 2022.[6] Energy Trust of Oregon implements energy efficiency programs for the state's natural gas utilities. Programs are funded by customer rates, and cost effectiveness tests of natural gas measures ensure that efficiency investments cost less than building new natural gas infrastructure.

For more about cost-effectiveness, see ODOE's 2022 Policy Brief on Co-Benefits of Energy Efficiency.

Oregon Natural Gas Savings Compared to Goals (Million Therms)[6] [xiii]



Integrated Resource Planning

From the Oregon Public Utility Commission's website:

Oregon was one of the first states to require utilities to file integrated resource plans (IRPs). The IRP presents a utility's current plan to meet the future energy and capacity needs of its customers through a "least-cost, least-risk" combination of energy generation and demand reduction. The plan includes estimates of those future energy needs, analysis of the resources available to meet those needs, and the activities required to secure those resources. What began thirty years ago as a simple report by each utility has grown into a large, stakeholder-driven process that results in a comprehensive and strategic document that drives utility investments, programs, and activities.

Learn more: **www.oregon.gov/puc/utilities/Pages/Energy-Planning.aspx**

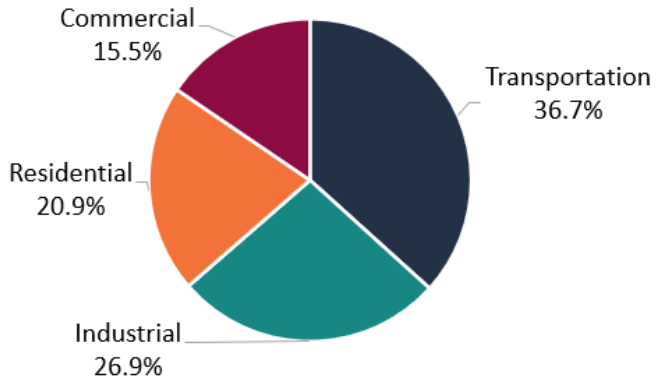
[xiii] A therm is a unit of measurement describing the amount of heat, or energy content, in a unit of natural gas.

Energy End Use Sectors

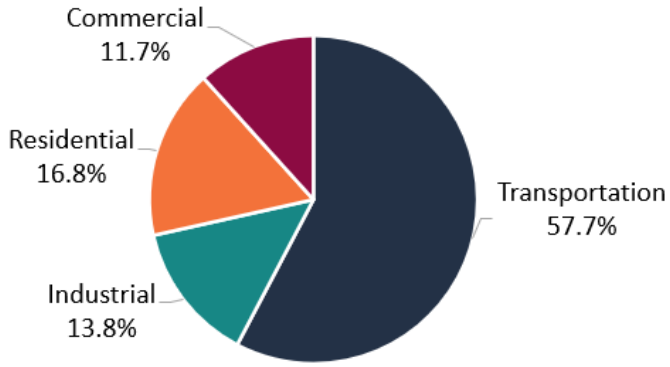
Consumption

As noted earlier in this section, energy metrics are commonly divided into four end-use sectors: residential, commercial, industrial, and transportation. Consumption and cost of energy vary across the sectors. In 2022, transportation accounted for 36.7 percent of energy consumption and 57.7 percent of expenditures due to the higher per-unit cost of transportation fuels. The industrial sector used 26.9 percent of the total energy but accounted for only 13.8 percent of expenditures due to lower per-unit costs relative to the other sectors.[1] Industrial users can buy some types of energy in bulk or are large users and in some cases have different (lower) rates.

Oregon Consumption by End-Use Sector (2022)[1] [2]

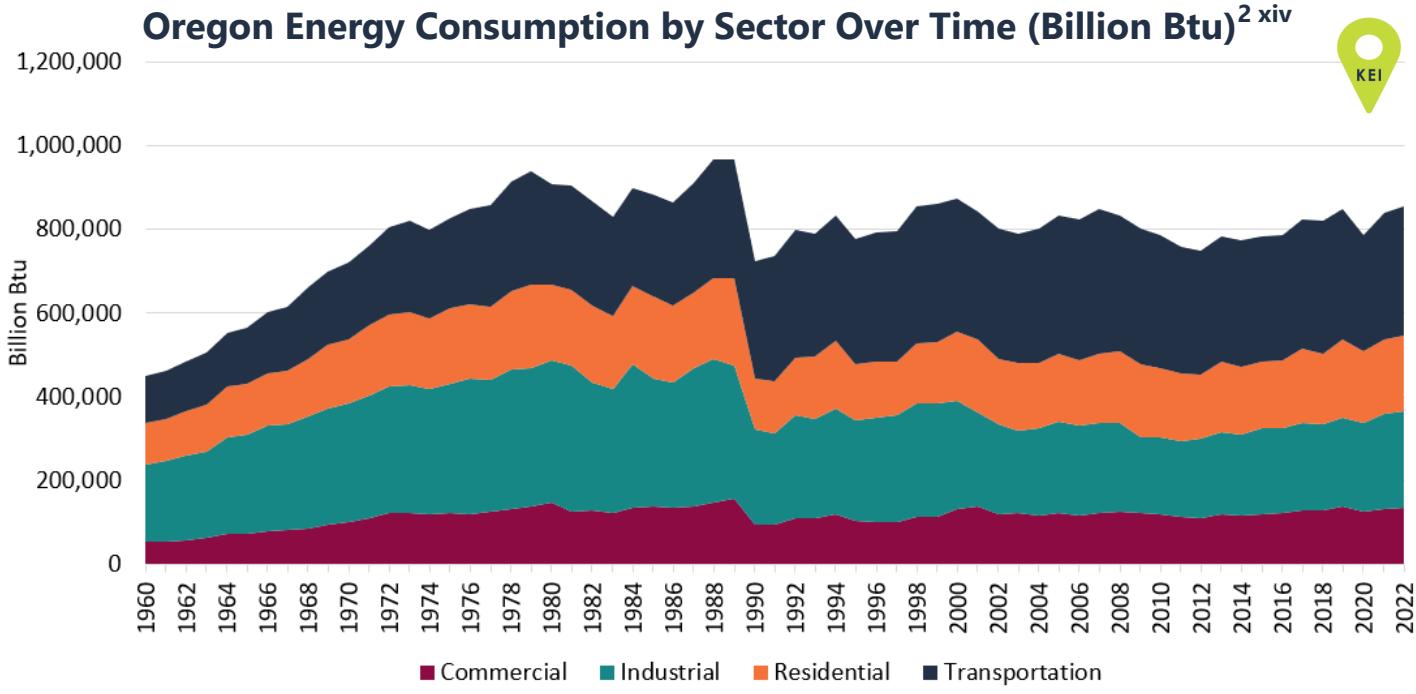


Oregon Expenditures by End-Use Sector (2022)[2] [3]



Energy consumption across all sectors has remained relatively steady over the last two decades. Increased population, GDP, and recently increased vehicle miles traveled — which all increase energy use — have been offset by efficiency gains and a shift toward less energy-intensive industries, demonstrated in the relatively flat energy use shown in the figure below since the early 2000s.

Oregon Energy Consumption by Sector Over Time (Billion Btu)[2] [xiv]



[xiv]The EIA methodology change affects how primary energy is calculated for renewables. See the About the Data section for more.

Expenditures

$4,594

Oregon per capita energy expenditures in 2022. The amount has increased by 61% since 2020.[3]

40th

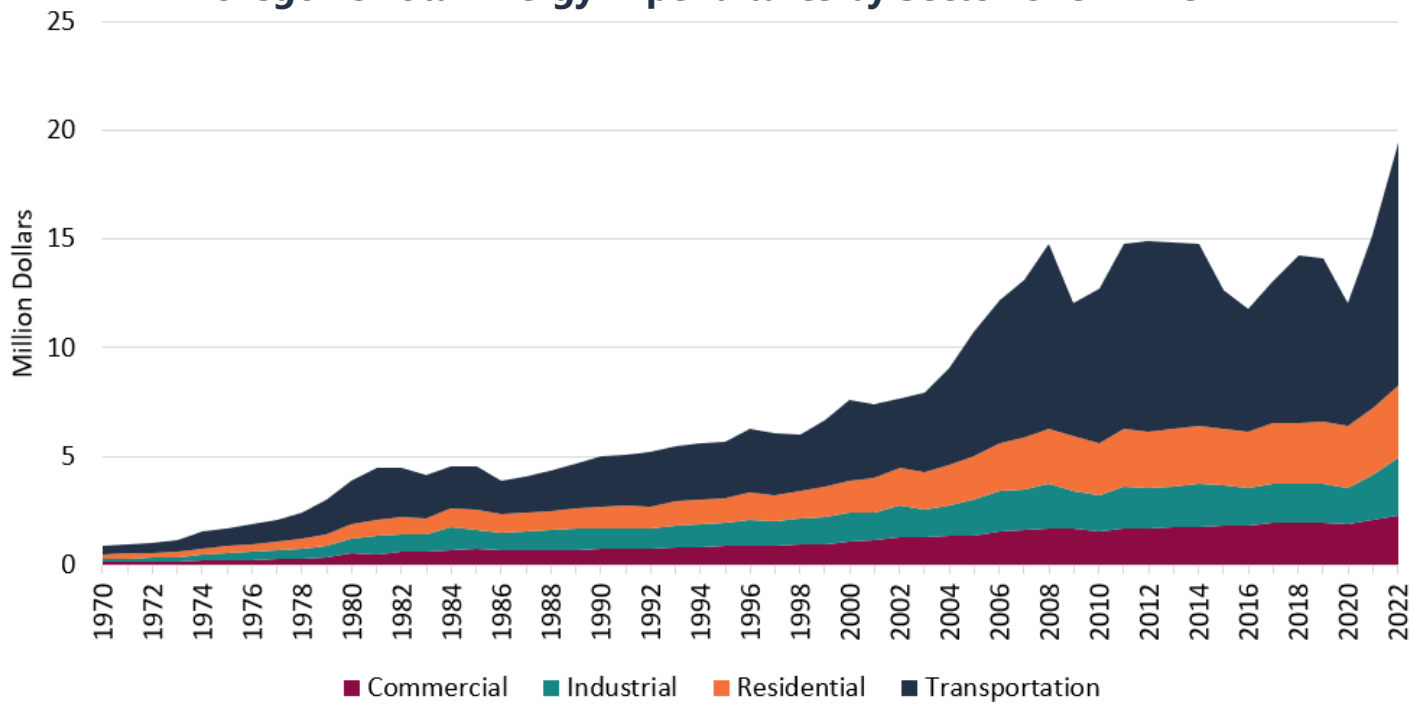
Oregon's national rank for per capita energy expenditures. 39 states spend more per capita.[3]

Oregonians' 2022 energy expenditures can be separated by sector. The transportation sector accounts for more than half of expenditures,[1] and because nearly all Oregon's transportation fuels are imported, most of this money goes to other states and countries.[3] While the residential, commercial, and industrial sectors have experienced gradual increases in spending through 2022, transportation sector expenditures reflect both increasing consumption and price volatility.

The variability in what Oregonians spend on energy is driven primarily by transportation fuel costs. The data show a drop in expenditures across all sectors for 2019 and 2020 — a sharp drop in transportation and slight decreases in each of the other sectors. This coincides with the start of the COVID-19 pandemic, which likely affected energy use and prices as individuals were not driving as much but transportation of goods increased.[1] In 2021 and 2022, expenditures increased from rising costs of energy in all sectors — with the sharpest increase in transportation.

Transportation sector expenditures are increasing due to more driving and higher prices on petroleum fuels since the pandemic low in 2020. Total vehicle miles traveled in Oregon have increased by 13.6 percent between 2020 and 2022.[4] At the same time, crude oil prices[xv] — the primary driver of the price of gasoline and diesel[5] — increased from an average closing price of $41.96 per barrel in 2020 to an average of $82.38 in the first three quarters of 2024.[6] This, coupled with smaller increases in electricity and natural gas costs, are driving overall higher energy costs in Oregon.

Oregon's Total Energy Expenditures by Sector Over Time[2]



The U.S. EIA reports prices in current dollars per million Btu and expenditures in current dollars — the chart is not adjusted for inflation. Learn more: https://www.eia.gov/state/seds/

[xv]Based on Brent crude oil prices, which are reflective of global crude oil prices

Greenhouse Gas Emissions

Most of Oregon's greenhouse gas emissions come from the energy we use every day. These GHG emissions contribute to climate change.

The Oregon Department of Environmental Quality annually collects and publishes data on GHG emissions in Oregon and creates a sector-based GHG emissions inventory. To illustrate recent emissions trends, this section includes preliminary 2022 inventory data from DEQ.[7]

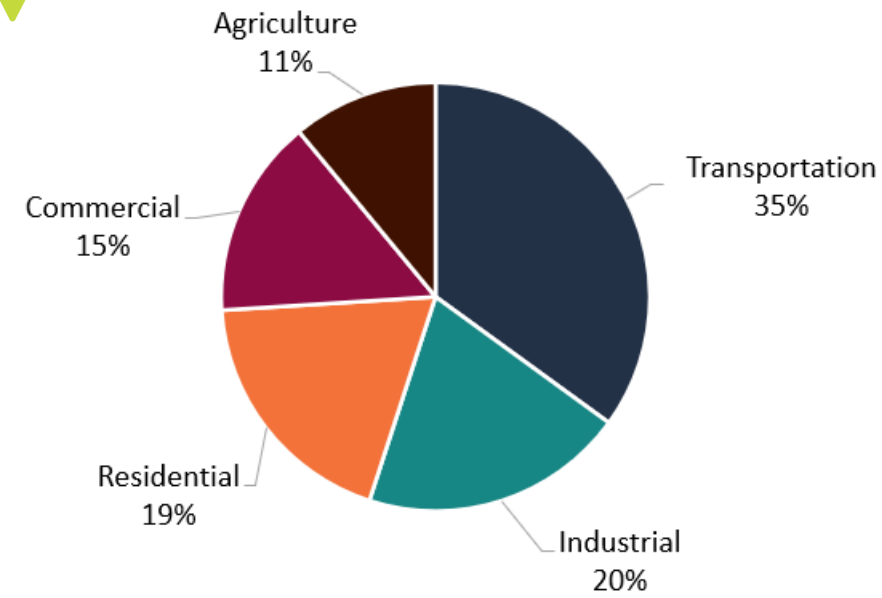
GHG emissions can be categorized in multiple ways: by the productive use — for example, industrial heating — that creates emissions, by end-use within a sector, and by the source of the emissions. DEQ provides a mixture of these data categories. As a result, when analyzing the data, various methods of categorization can reveal new insights. In this section, the data are first presented based on end-use sector, then by source, and then by a combination of sector and source.

GHG Emissions by Sector

Most of Oregon's greenhouse gas emissions come from the production or use of energy. The state categorizes and reports GHG emissions for five end-use sectors — transportation, residential, commercial, industrial, and agriculture. (Note that in other sections of this report, agriculture is included in the industrial sector.) Oregon's sector-based GHG inventory reports annual emissions from each of these sectors.[7] Except where noted, the results presented here are based on preliminary 2022 inventory data from DEQ.

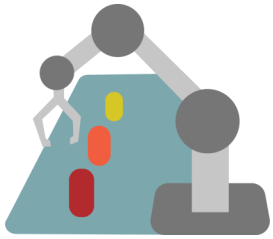
The chart at right summarizes sector emissions for 2022. Transportation is the largest source of sector emissions, contributing over a third of Oregon's total GHG emissions. The residential and industrial sectors each contribute about 20 percent of state emissions, and the commercial sector contributes 15 percent. Together, energy consumption makes up nearly 90 percent of Oregon's greenhouse gas emissions.

Greenhouse Gas Emissions by Sector (2022)[7]

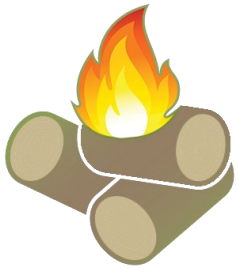


Transportation GHGs. Transportation is the state's largest source of sector-based GHG emissions. Transportation emissions primarily result from the direct combustion of petroleum products in on- and non-road vehicles (such as construction equipment, agricultural vehicles, and off-road recreational vehicles). About 55 percent of Oregon's transportation emissions are from gasoline combustion in passenger cars and other gas-powered vehicles, and about 33 percent are from medium- and heavy-duty diesel vehicles.[3]

Commercial & Residential GHGs. The largest sources of GHG emissions from the residential and commercial sectors include electricity generation, natural gas direct use, municipal landfills, commercial petroleum combustion, and wastewater treatment.



Industrial GHGs. The largest sources of industrial GHG emissions in Oregon are semiconductor manufacturing, natural gas distribution and production, and cement manufacturing.[7] The sector-based inventory includes industrial emissions from electricity generation, natural gas direct use, and petroleum combustion, in addition to GHG emissions from industrial processes unrelated to energy use.



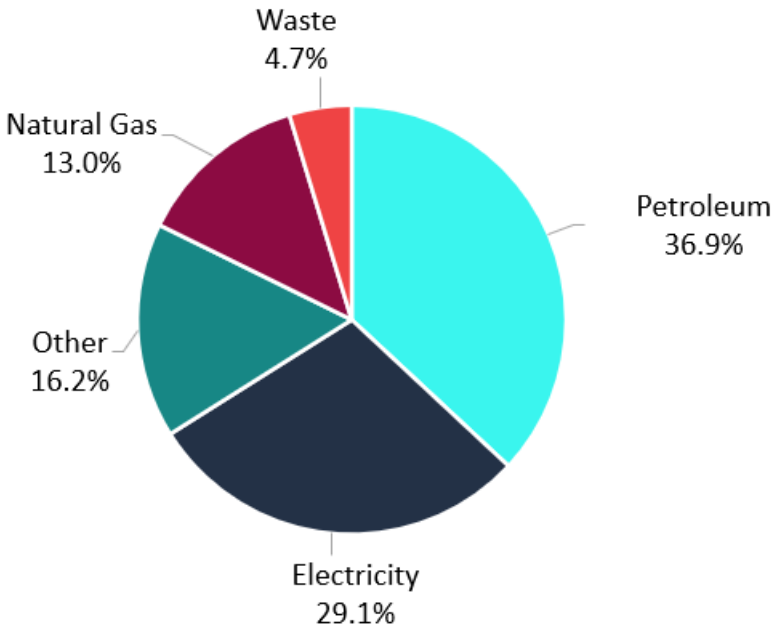
Agricultural GHGs. Oregon's sector-based GHG inventory tracks emissions from certain agricultural processes and waste products, including manure and other organic wastes, fertilizer application and soil management, and agricultural residue burning. The sector-based inventory exclusively tracks anthropogenic (*i.e.,* human-caused) emissions for the agricultural sector, which are primarily methane and nitrous oxide emissions from agricultural processes. Energy consumption, such as electricity and fuels used in this sector, are included in the transportation and industrial sectors.[7]

GHGs by Source

GHG emissions data can also be categorized by the direct source of emissions, which correlates with energy production and consumption processes that directly emit greenhouse gases. This includes petroleum combustion, electricity generation, and natural gas combustion, as well as emissions from waste production and treatment.

Source emissions data for GHG emissions was not available for 2022 at the time of publication, so the data presented here are through 2021. The combustion of petroleum products is the largest source of emissions at nearly 37 percent. Emissions resulting from generating electricity are the second largest source at 29 percent. Natural gas combustion, excluding natural gas used to generate electricity, accounts for 13 percent of source emissions.

Greenhouse Gas Emissions by Source (2021)[7]



Petroleum. Petroleum-derived fuels, including diesel, gasoline, and jet fuel, are primarily consumed by the transportation sector. Emissions from petroleum-fueled equipment used by the residential, commercial, and industrial sectors are also included in petroleum emissions.

Electricity. This accounts for electricity used in all sectors, which includes emissions from the generation of electricity used in the state, regardless of where it is generated. Emissions from electricity generated in Oregon but used out of state are not included.

Natural Gas. This includes direct use of natural gas in all sectors, plus fugitive emissions from distribution. It does not include emissions associated with natural gas-fired power plants.

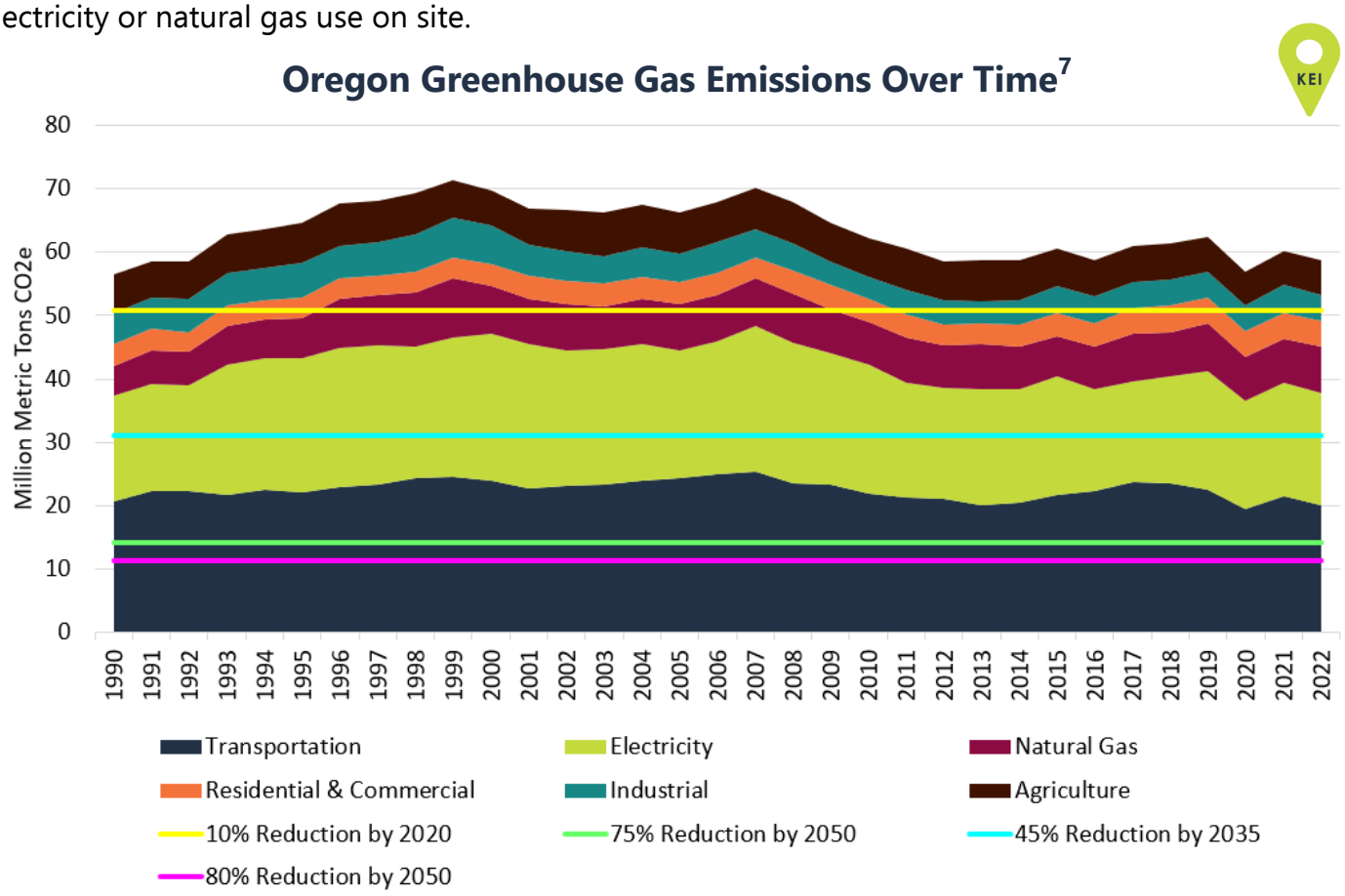
Other. This category includes uses specific to a sector's activity, such as fertilizer, cement and soda ash production and consumption, semiconductor manufacturing, use of refrigerants and solvents, and others.

Waste. This includes treatment of waste products from the various sectors, including landfill waste and agricultural waste. Some of these emissions result from the combustion of waste.

GHGs by Sector and Source

Whether something is classified as a sector or a source can sometimes be blurred in GHG emissions data. For example, electricity can sometimes be considered a sector or source depending on who is doing the categorization. The sector and source distinction is not as important as the stories the presentation of the data can tell, particularly over time.

The chart below mirrors the sector-based inventory graphic DEQ provides. It includes six emissions categories, including one for each of the sectors outlined earlier (residential and commercial are combined here), as well as ones for electricity and natural gas. Electricity and natural gas reflect source emissions, while the remaining categories are sector specific. As a result, the residential and commercial and the industrial source emissions in this chart do not include emissions associated with electricity or natural gas use on site.



The Oregon Climate Action Commission[xvi] and others use DEQ's inventory to track progress toward the state's greenhouse gas reduction goals, including goals established in legislation and by executive order. The different goals are indicated by horizontal lines on the chart. Oregon did not achieve its goal of 10 percent below 1990 levels by 2020 (top yellow line).

In 2020, Executive Order 20-04 established updated goals to reduce GHG emissions to at least 45 percent below 1990 levels (light blue line) by 2050 and at least 80 percent below 1990 levels (pink line) by 2050. [8] The recent TIGHGER analysis done by ODOE for the Oregon Climate Action Commission found the state has the policies in place to achieve the 2035 goal if all adopted climate policies and programs are fully implemented.[9]

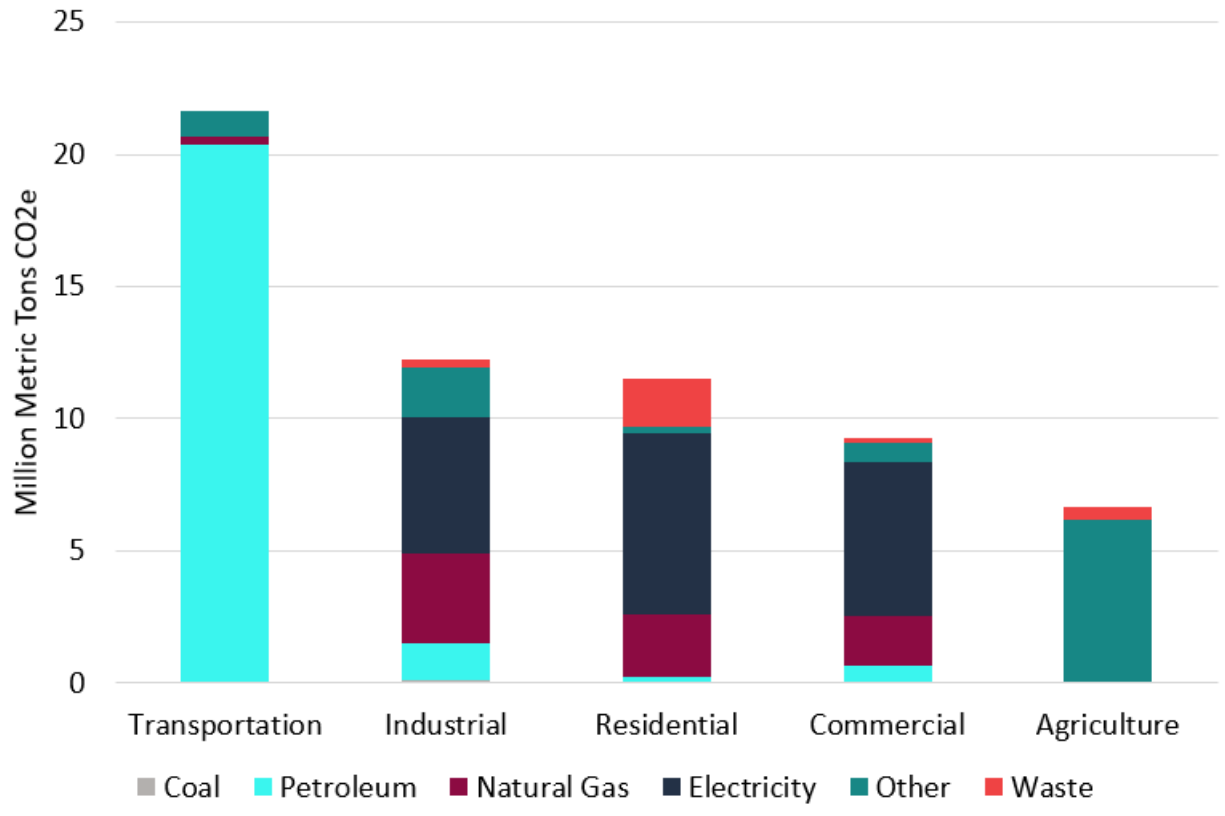
[xvi] Formerly known as the Oregon Global Warming Commission.

The Oregon Climate Roadmap to 2030

The Oregon Climate Action Commission's Transformational Integrated Greenhouse Gas Emissions Reduction (TIGHGER) analysis evaluated the emissions reductions anticipated from existing policies and identified additional actions to further reduce emissions while continuing to grow Oregon's economy. The TIGHGER analysis provided the foundation for the Commission's **Climate Roadmap to 2030**, which presented a list of actions and recommendations to inform state climate action and put Oregon on track to meet its GHG reduction goals. Learn more at **climate.oregon.gov/tighger**.

Using DEQ's Greenhouse Gas Inventory data, the chart below shows Oregon's 2021 emissions from the five GHG sectors, broken out into emissions by source within each sector. The light blue, dark blue, and dark red shades in the bar chart reflect energy-related emissions. Transportation emissions are largely driven (pun intended) by petroleum combustion shown in bright blue, while the residential, commercial, and industrial sector emissions largely come from electricity generation, followed by natural gas use. There is a small amount of coal still used in the industrial sector, shown in light gray at the bottom of its bar. The chart shows that energy use is the primary source of GHG emissions in Oregon.

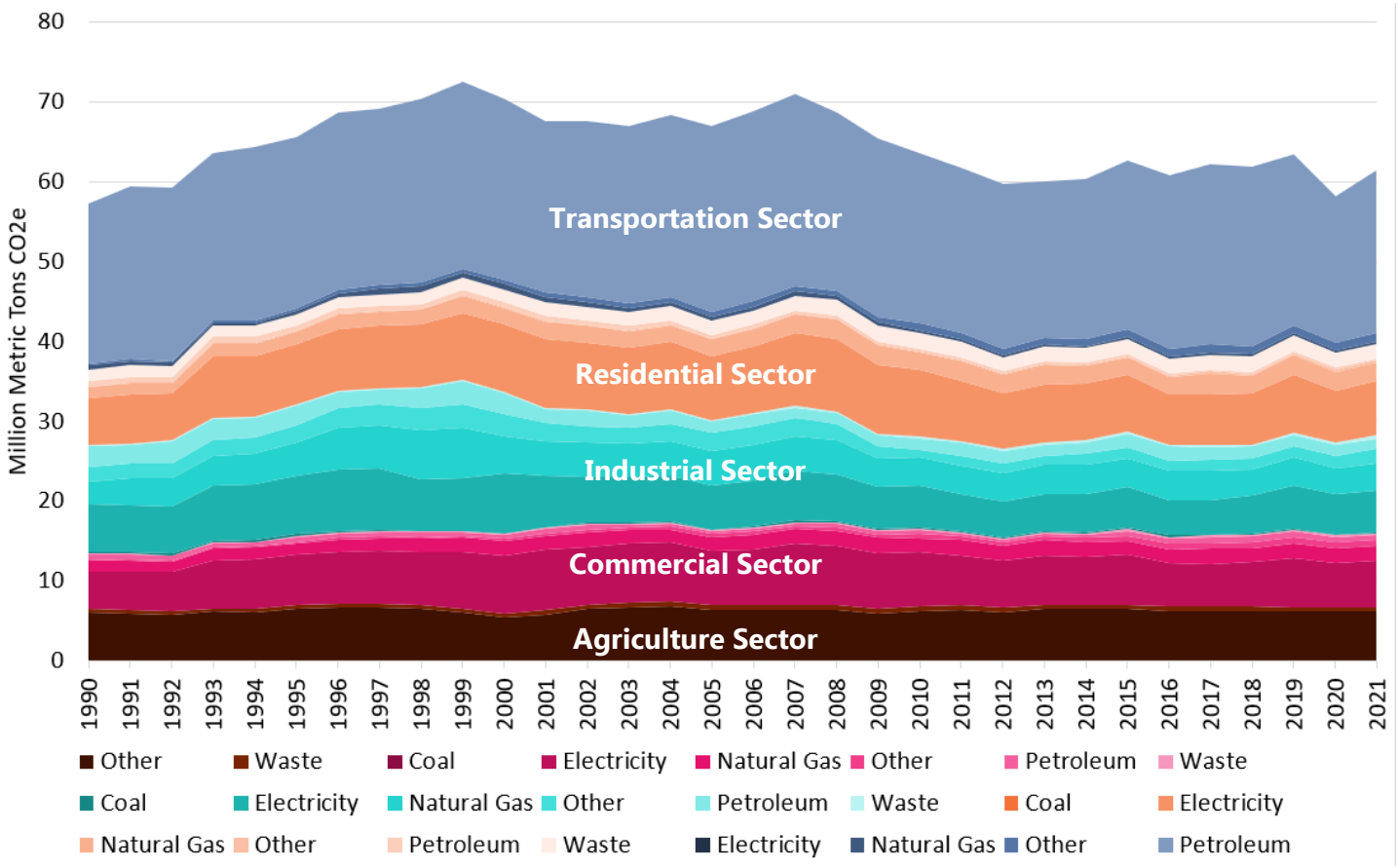
Oregon Greenhouse Gas Emissions by Sector and Source (2021)[7]



Viewing these data over time shows the variety of emissions sources in Oregon and emissions trends from these sources over time. This level of analysis informs policy makers about what policies will most effectively reduce emissions and meet state goals.

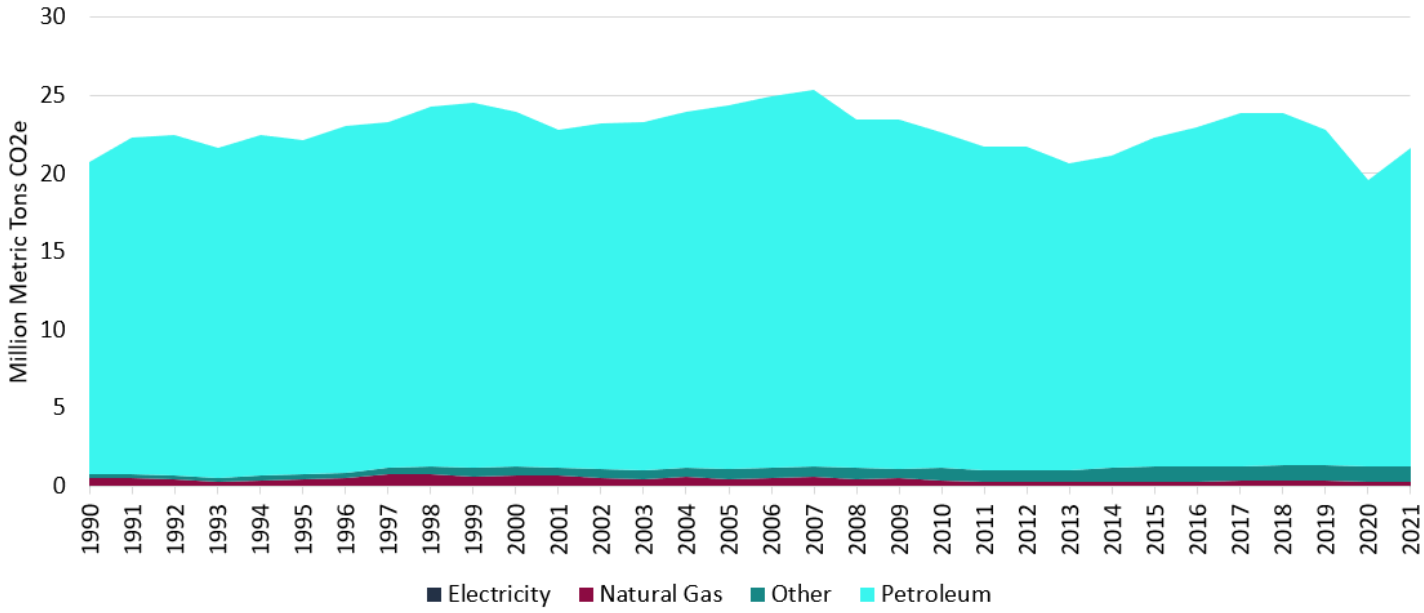
The following chart groups emissions by sector, with emissions by source illustrated using similar color shades within each sector. Following the chart are additional charts showing each sector broken out to provide additional clarity.

Oregon Greenhouse Gas Emissions by Sector and Resource Over Time[7]



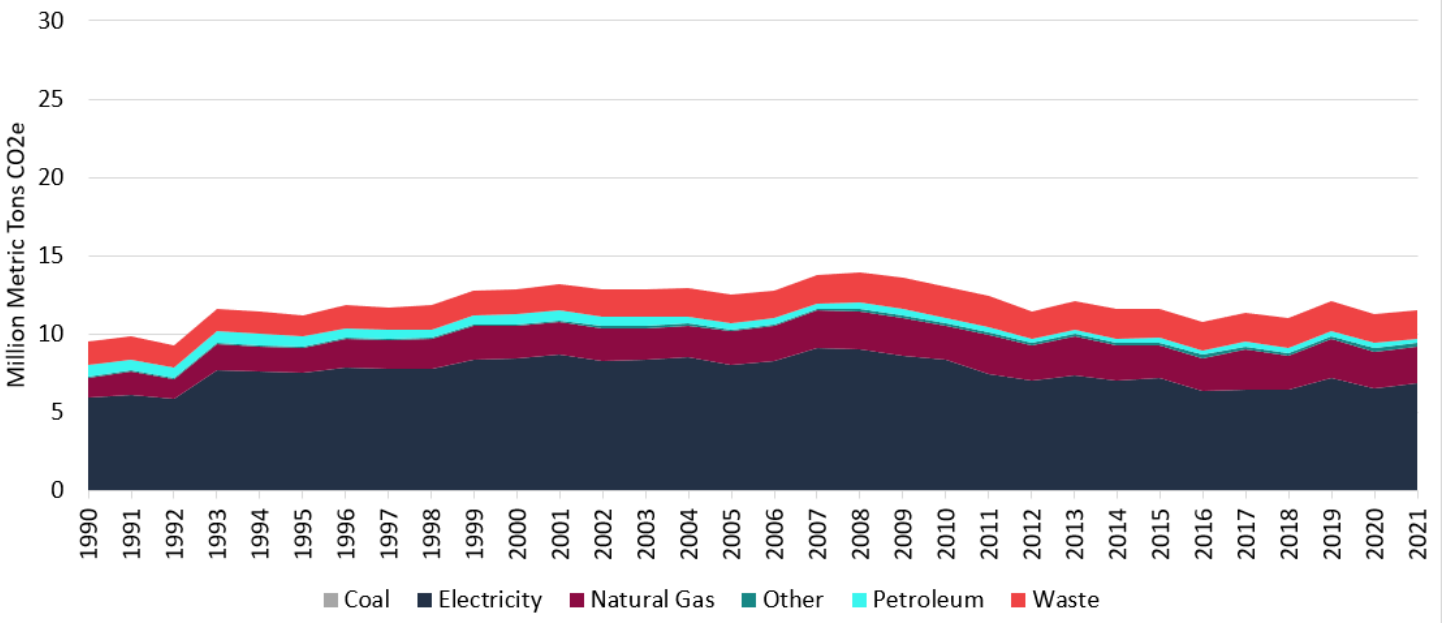
Almost all emissions in the transportation sector come from petroleum use. State greenhouse gas policies, such as the DEQ's Climate Protection Program, Clean Fuels Program, Advanced Clean Cars II rule, and Advanced Clean Trucks rule, drive electrification of vehicles, which, in conjunction with de-carbonization of the electricity sector, will be able to address much of the emissions in this sector.

Oregon Transportation Sector GHG Emissions by Source 1990-2021[7]

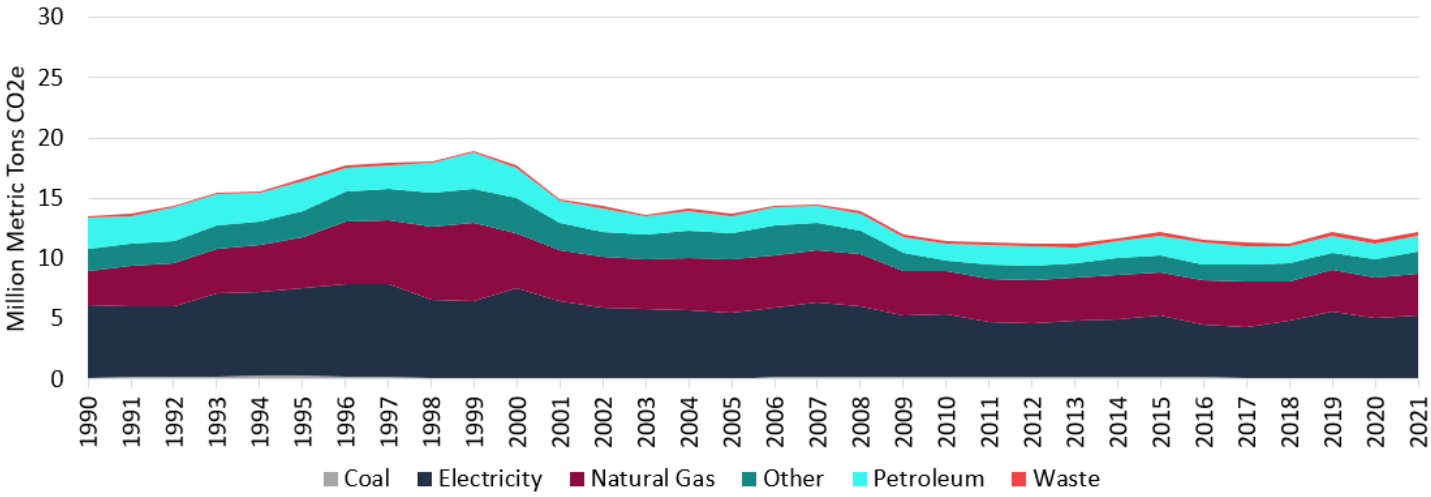


The following individual sector charts show that electricity consumption, shown in dark blue, is the largest source of emissions in the commercial, residential, and industrial sectors. This means policies like HB 2021, which will culminate in a 100 percent reduction in emissions from electricity sold to investor-owned electric utility customers by 2040, will have the greatest effect on emissions across these sectors.

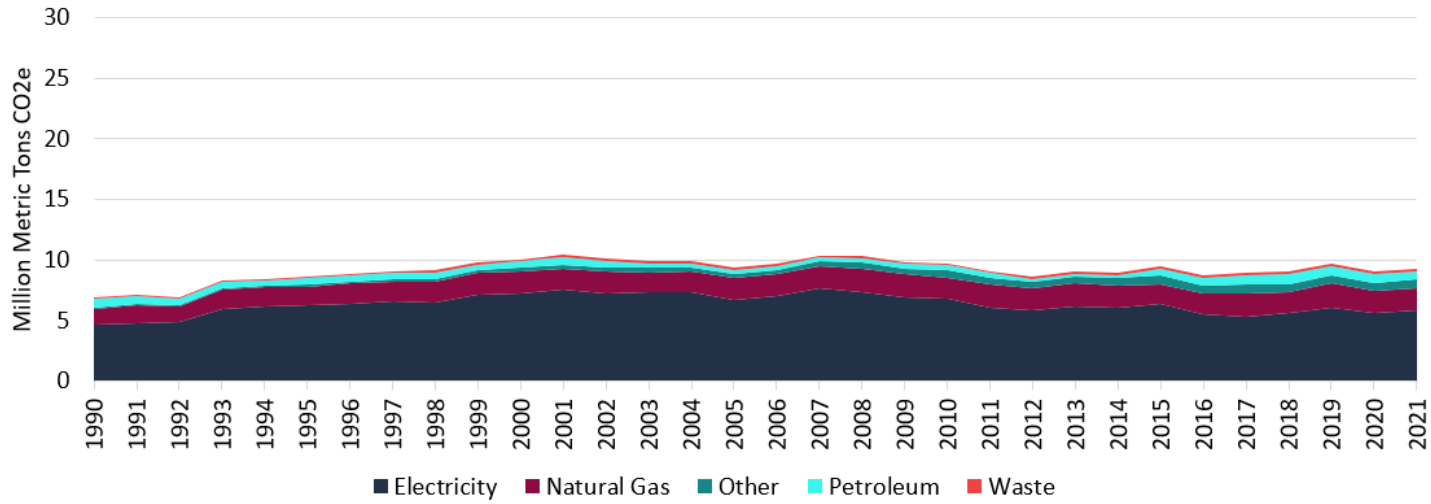
Oregon Residential Sector GHG Emissions by Source 1990-2021[7]



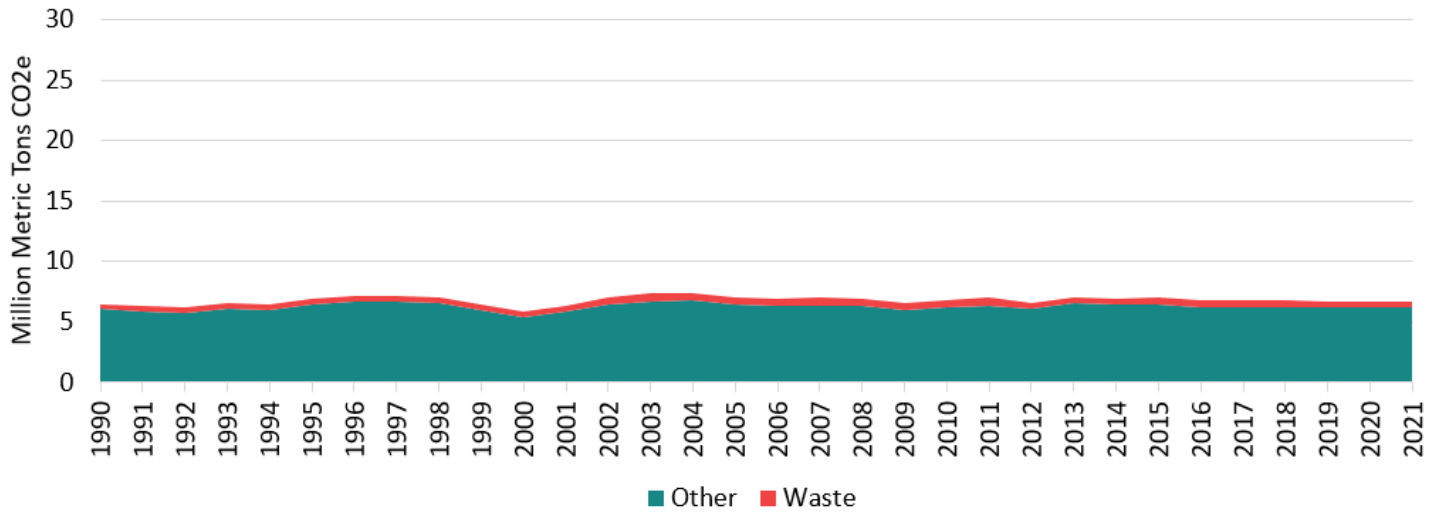
Oregon Industrial Sector GHG Emissions by Source 1990-2021[7]



Oregon Commercial Sector GHG Emissions by Source 1990-2021[7]



Oregon Agriculture Sector GHG Emissions by Source 1990-2021[7]



Sector Profiles

Residential

The residential sector consists of both single- and multi-family occupancies. Common uses of energy associated with this sector include space heating, water heating, air conditioning, lighting, refrigeration, cooking, and appliances. Residential energy use is closely tied to weather, housing size and vintage (the decade a home is built), and type of housing.

20.9%

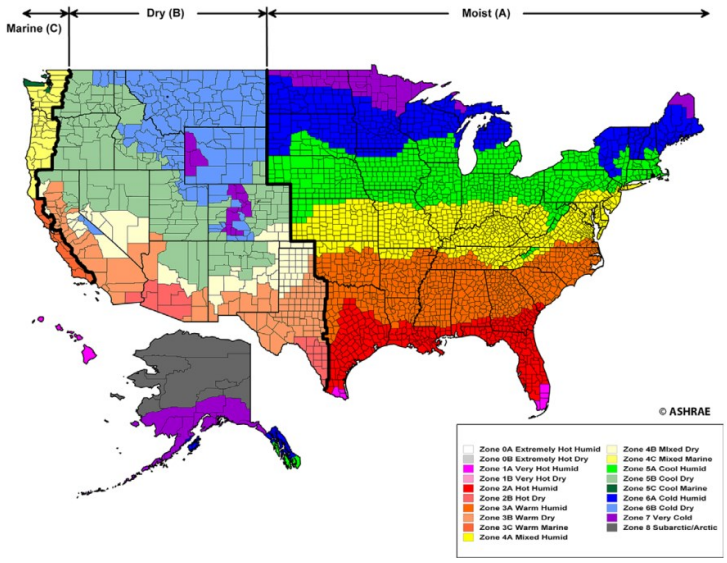
Residential sector's share of Oregon's energy use in 2022.[1]

1.7 Million

Number of occupied housing units in Oregon in 2022.[2]

Weather

Oregon is divided into two climate zones with different energy needs and weather patterns. The map to the right demonstrates the climate zones in the U.S.[3] In Oregon, west of the Cascade mountain range is a temperate mixed marine – or more humid – climate zone in yellow. East of the Cascade Mountain range shown in green, is a cool, dry climate with more heating and cooling days that require more energy use. Buildings in Eastern Oregon have a higher average energy use index, meaning they typically use more energy per square foot.

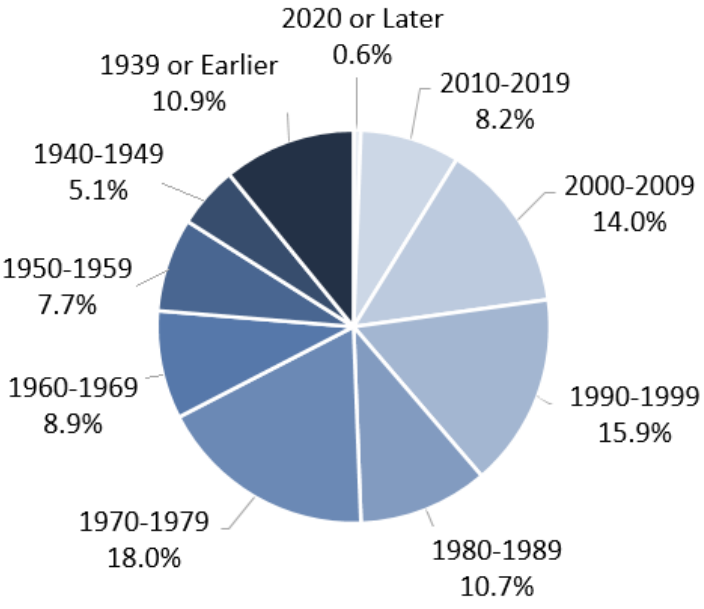


Vintage

The residential sector includes newer and older buildings — and energy use can be very different between them, especially when comparing a newly built home to a decades-old home. Oregon's residential energy code has made significant performance increases since Oregon's first energy code in 1974.

Older homes with less insulation and older equipment use more energy for heating and cooling than newer, more efficient homes. Home vintage can indicate opportunities for updating heating and cooling equipment, water heating, insulation, windows, and house weatherization. About 63 percent of all homes in Oregon were built before 1990.[2]

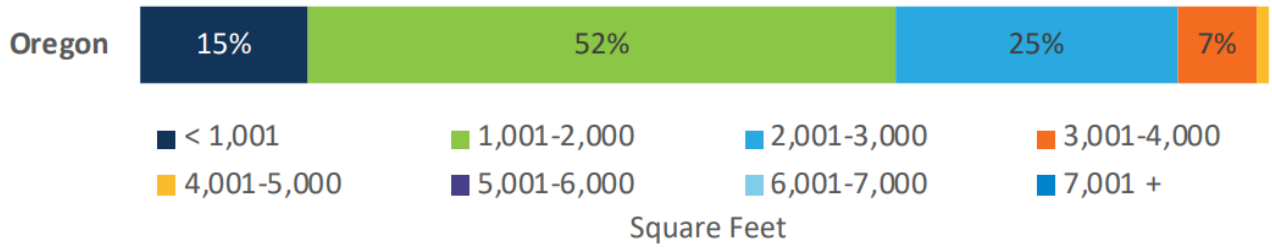
Oregon Homes by Vintage[2]



Size of Housing

The size of a home affects energy use. Typically, larger homes use more energy, since there is a greater volume of air to heat or condition. Census data indicate that the size of single-family homes in the United States is again on the rise after declining between 2016 and 2020 during a period where the construction industry focused on building smaller starter homes. Contributing factors to recent increases to home size include increased use and roles of homes – for work and study – in the post COVID-19 environment.[4]

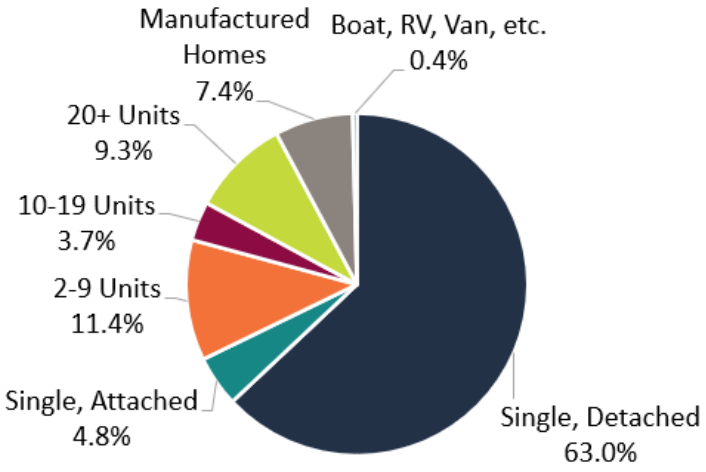
Oregon Homes by Size[5]



Type of Housing

Most housing in Oregon (63 percent) is detached, single-family. Multifamily complexes with 20 or more units represent 9.3 percent of all housing, followed by mobile/manufactured homes at 7.4 percent. Other multifamily units (like those with fewer than 20 units) comprise the remainder.[2]

Oregon Housing Types[5]



Ownership and Vintage

Another way to look at housing stock in Oregon is by ownership and home vintage across the region. Northwest Oregon has the most housing units, as well as the highest percentage of rental units.

Oregon Housing Characteristics by Region[2]

Region	Total Occupied Housing Units	Share of Units That Are Rental Properties	Share of Units That Are Pre-1980 Homes
East Oregon	213,677	32%	54%
NW Oregon	1,222,517	36%	53%
SW Oregon	211,344	30%	52%
All of Oregon	1,642,579	34%	52%

Residential Energy Efficiency

Oregon's energy efficiency programs and policies save residential customers energy and money while increasing household comfort. In its 2021 Power Plan, the Northwest Power and Conservation Council estimated the total technical energy efficiency potential of the residential sector in the Pacific Northwest would meet about 27 percent of the projected load in 2041.

The Northwest Power and Conservation Council's 2021 Annual Regional Conservation Progress Report outlines several opportunities for increased efficiency in residential buildings:

Lighting. Lighting has historically been a significant energy efficiency opportunity, and the region has made great progress. Installations of energy-efficient LED bulbs have increased from less than 1 percent of all installed bulbs eight years ago to nearly 70 percent.[4]

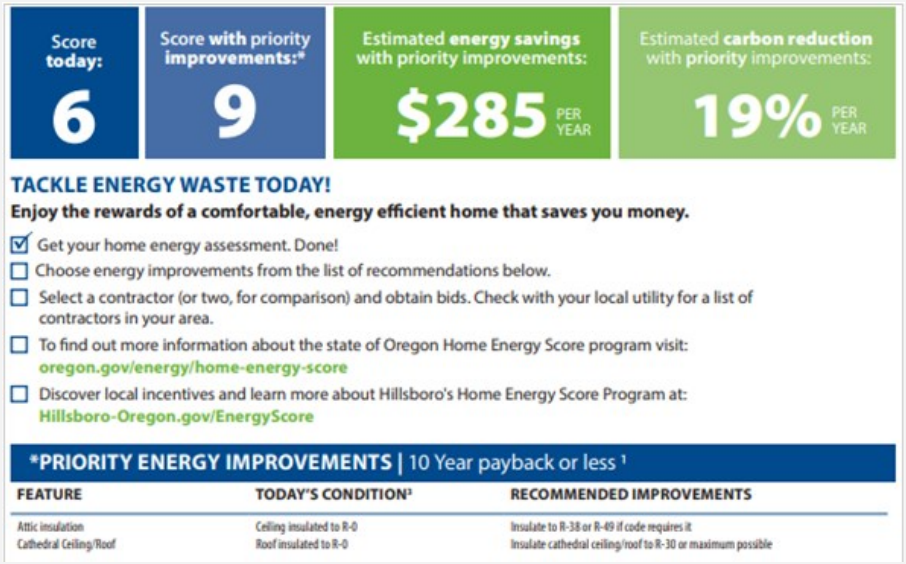
Heating, Ventilation and Air Conditioning. Upgrading an electric furnace to a heat pump can cut heating electricity use in half.[8]

Electronics. Homes have a lot of electronic devices, and most of them are plugged in all the time. Simple controls that turn off equipment when nobody is in the room can significantly reduce energy use.

Water Heating. Just 2 percent of homes in the region have upgraded to a heat pump water heater, which can reduce the electricity used to heat water by half or better.[5]

Home Energy Scores

Home Energy Score™ was developed by the U.S. Department of Energy and its partner national laboratories to provide homeowners, buyers, and renters comparable and credible information about a home's energy use. Using a 1 to 10 scale (10 is high performance), the score estimates a home's energy consumption and recommends ways to reduce its use, cut costs, and improve comfort. The score also relays greenhouse gas information related to that energy use. At right is part of a Home Energy Score scorecard example.



Learn more about home energy scoring in Oregon in the Energy 101 section of this report.

Residential Heating and Cooling

More than half of Oregon homes heat with electricity.[2] [8] Cooling types vary among Oregon homes, and the percentage of homes using air conditioning increased from 57 to 66 percent between 2017 and 2022.[9]

Average electricity use in Oregon has increased slightly from 10,827 kWh in 2018 to 11,323 in 2022.[10] [11] Average residential electricity use in consumer-owned utility territory is typically higher than in investor-owned territory. In 2022, the average annual COU customer use was 13,404 kWh, while for IOUs it was 10,606 kWh.[11] This may be partially due to higher prevalence of electric resistance heating – which is less efficient than natural gas – in more rural COU territories, and more homes that use natural gas as a heat source in urban IOU areas.

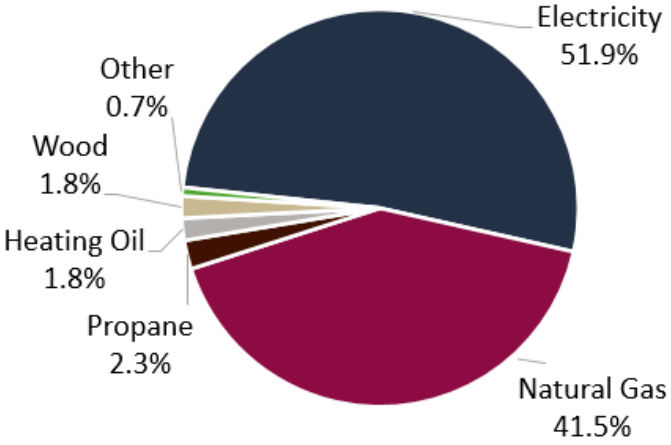
11,323 kWh

Average annual residential electricity use in Oregon in 2022.[11]

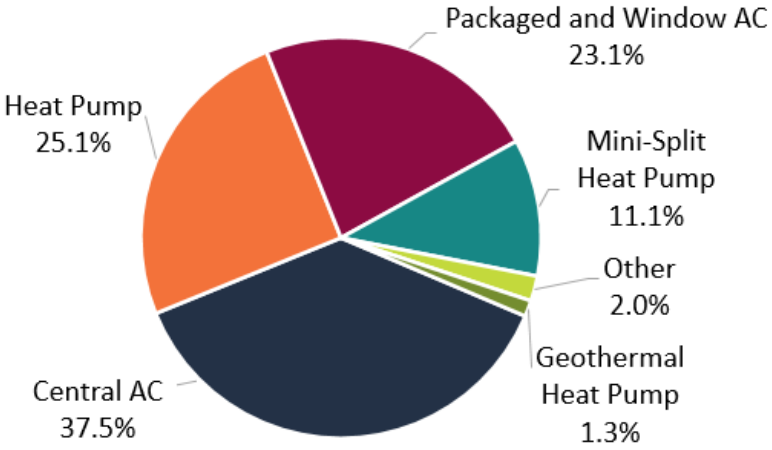
660 therms

Average annual residential natural gas use in Oregon in 2022.[11]

Average Heating Types Across Oregon Homes[12]



Average Cooling Types Across Oregon Homes[8]



Many Oregon homes lack cooling equipment. Historically, weather patterns have kept much of the state's population in a moderate climate. Recent extended high heat weather events have motivated many households to install or purchase new cooling equipment, and state programs have incentivized heat pump installations to provide cooling.

Oregon County Profiles

As shared earlier in this section, the Oregon Department of Energy has updated its Oregon County Profiles. The profiles are a compilation of demographic, economic, and geographical datasets representing Oregon's 36 counties. The profiles aim to highlight aspects of each county's economic status and provide a focused perspective on the diverse communities in the state. Find them online: **energyinfo.oregon.gov/ber**

Commercial

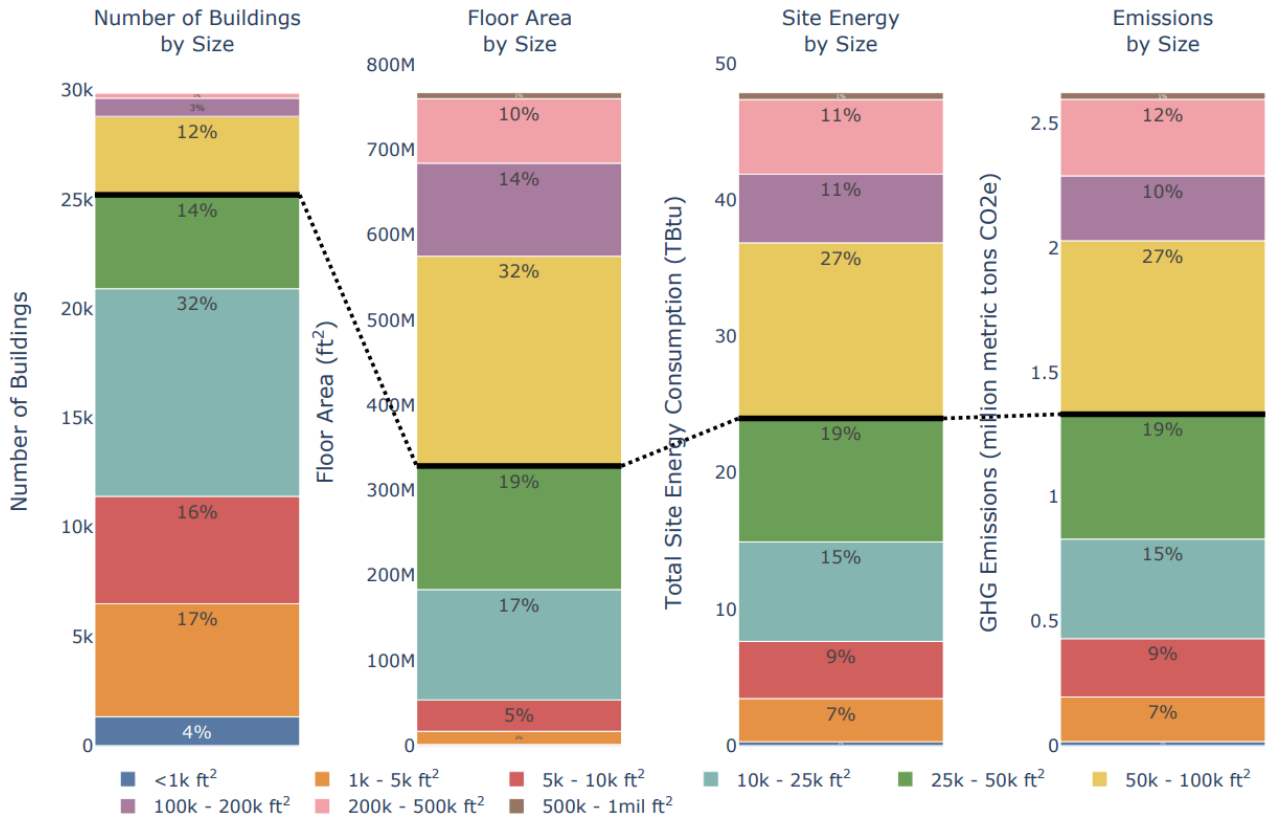
15.5%

Commercial sector's share of Oregon's energy use in 2022.[1]

The commercial sector is diverse and includes buildings with various purposes, such as offices and businesses; government, schools, and other public buildings; hospitals and care facilities; hotels; malls; warehouses; restaurants; and places of worship and public assembly. This sector is comprised of buildings that span sizes ranging from a few hundred to millions of square feet. In 2022, the commercial sector represented approximately 16 percent of total energy consumption in Oregon. Oregon's total commercial sector energy consumption has fluctuated annually in the past due to combinations of economic, societal, and other factors; however, total sector usage in 2022 was approximately the same as in 2000.[1]

The chart below illustrates the distribution of commercial buildings in the Portland, Salem, and Medford metro areas. According to an analysis by U.S. Department of Energy in 2023, buildings less than 50,000 square feet make up 84 percent of all commercial and multi-family buildings, but only 43 percent of area, 50 percent of building energy consumption, and 51 percent of emissions. Buildings over 50,000 square feet represent just 16 percent of buildings, but 50 percent of energy use and 49 percent of emissions. Thus, policies that target large buildings can address most emissions while affecting fewer buildings.[12] Similar trends exist in other parts of Oregon, and more information and similar analysis may be found in US DOE's Building Segmentation Analysis program reports.[13]

Building Stock Segmentation For Portland, Salem, and Medford Metro Areas[12]



Note: *The black line indicates buildings greater than 50,000 square feet*

Energy Performance

Many factors influence a building's energy consumption and performance, such as design, construction materials, size, equipment efficiency, activities, operation profile, and location. Commercial building energy performance is often measured by comparing a building's annual energy use to its size. This metric combines all energy consumption (like electricity and natural gas) into common units that are normalized to building area — commonly units of kBtu (1,000 Btu) per square foot per year. This is often referred to as a building's EUI, or Energy Use Intensity.

Financial incentives, improved building code and appliance standards, and energy efficiency programs are helping commercial buildings improve energy performance. In 2023, the Oregon Legislature passed House Bill 3409, establishing an Energy Performance Standard policy for commercial buildings, often referred to as a Building Performance Standard.

This BPS program will set standards for many large commercial buildings to enhance energy management practices, including requiring energy audits and energy efficiency measures to meet EUI targets based on the average energy use for that type of building. Oregon's BPS will be modeled after the ANSI/ASHRAE/IES Standard 100-2024, Energy and Emissions Building Performance Standard for Existing Buildings.[14]

For the purposes of the BPS program, large commercial building compliance will be phased in based on building size. Additionally, commercial buildings are divided into tiers based on building type:

Tier 1

A building in which the sum of gross floor area for hotel, motel, and nonresidential use equals or exceeds 35,000 square feet, excluding any parking garage.

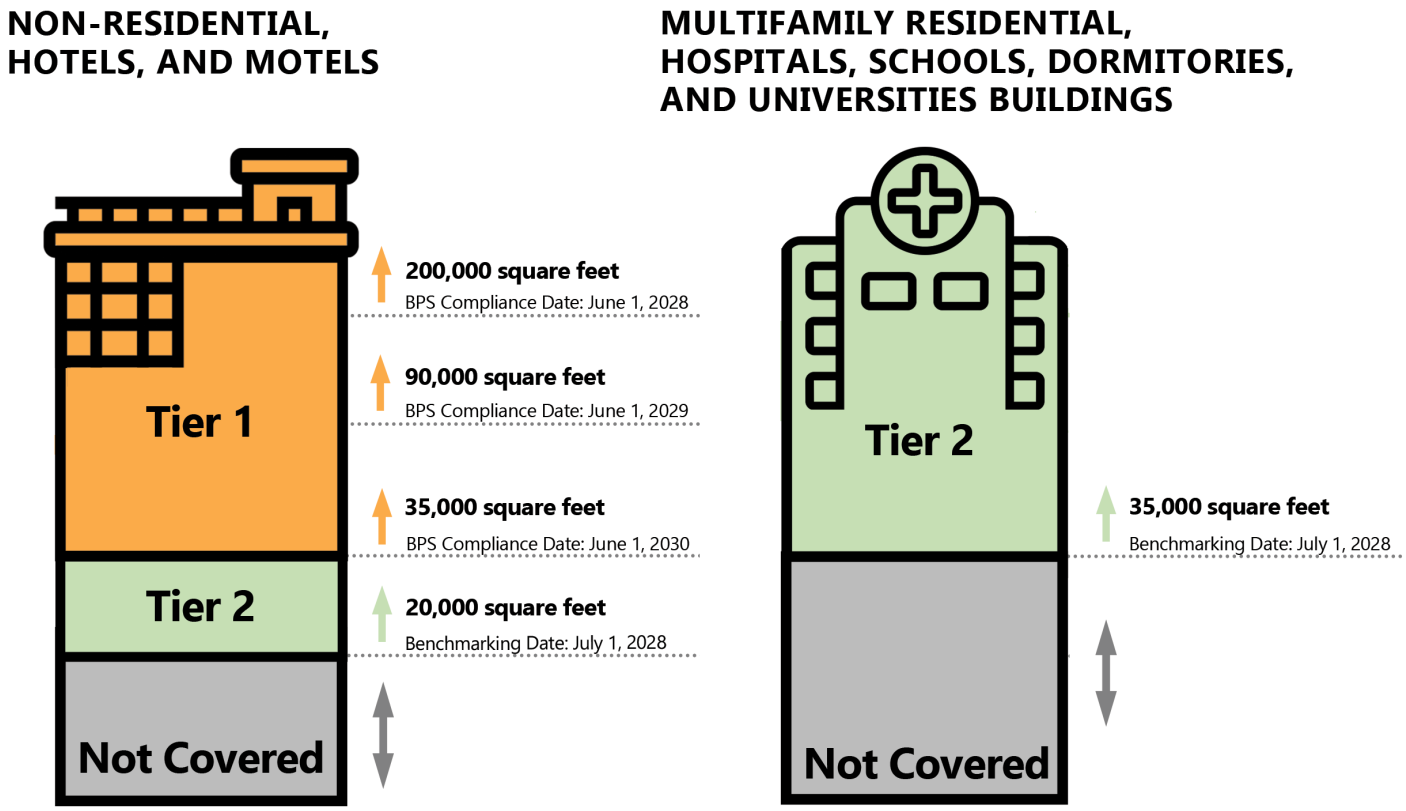
Tier 2

A building with gross floor area, excluding any parking garage, that equals or exceeds 35,000 square feet and that is used as a multifamily residential building, a hospital, a school, a dormitory or university building; or

A building in which the sum of gross floor area for hotel, motel, and nonresidential use exceeds 20,000 square feet but does not exceed 35,000 square feet, excluding any parking garage.

The BPS program first requires benchmarking to assess the building's overall comparison to the standard, followed by a requirement for compliance with program standards. Large commercial building benchmarking and compliance will be phased in based on building size, as shown in the chart below.

Buildings Covered by Oregon's Building Performance Standard Program



ODOE initially estimates that there could be approximately 5,000 Tier 1 buildings and another 5,000 to 10,000 Tier 2 buildings in Oregon. The BPS program will adjust targets over time, leading to progressive improvements in energy efficiency, which will support greenhouse gas reductions from the building sector. These efficiencies will also reduce energy costs for building owners and tenants and help moderate effects on utility ratepayer costs by reducing the need for more energy resources to serve this growth.

Industrial

26.9%

Industrial sector's share of Oregon's energy use in 2022.[1]

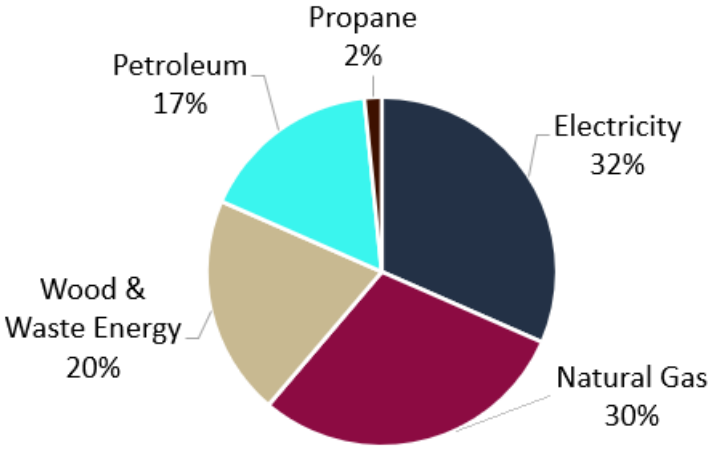
The industrial sector includes all facilities and equipment used for producing, processing, or assembling goods. The U.S. Energy Information Administration defines the industrial sector to include manufacturing, agriculture (including fishing and forestry), construction, and mining (which includes oil and natural gas extraction).[16]

Nationally, manufacturing was 76 percent of industrial energy consumption in 2022, by far the largest share of any of the industrial subsectors. The largest industrial energy consumer of the manufacturing segment is the bulk chemical industry (followed by petroleum refining and paper production). Collectively, these represented a combined 70 percent of industrial energy use in 2018, the latest year for which data are available.[17] Oregon's industrial manufacturing subsector includes paper and food processing, wood products, and computers and electronics.

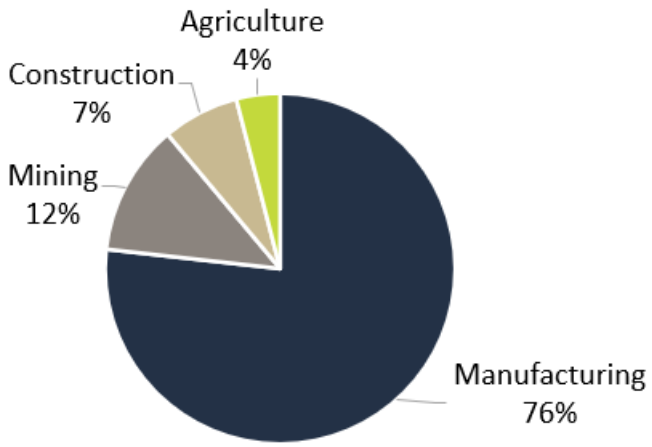
The industrial sector uses electricity to operate machine drives (motors), lights, computers and office equipment, and equipment for facility heating, cooling, and ventilation. Machine drives are the largest use of electricity by U.S. manufacturers.[18] Industry uses fossil fuels and renewable energy sources for heat in industrial processes and space heating in buildings, boiler fuel to generate steam or hot water for process heating and generating electricity, and feedstocks (raw materials) to make products like plastics and chemicals.[17]

According to the U.S. EIA, most of Oregon's Gross Domestic Product comes from "non-energy-intensive service-providing businesses" — though the energy-intensive subsectors of agriculture, food processing, and forest products manufacturing are important to the state. Computers and electronic products (not including data centers, which are included in the commercial sector) accounted for about 40 percent of Oregon's manufacturing GDP. Relative to other states, Oregon's industrial sector per capita energy use is lower than 60 percent of other states.[19] Computer and electronic manufacturing overall have low energy intensity relative to their high dollar value contribution to GDP.[19] Many forest products and paper operations in Oregon offset natural gas for heat and electricity from the grid by using residual woody biomass and black liquor, respectively, for cogeneration of electricity and steam for process heat.

2022 Oregon Industrial Energy Consumption by Fuel[1]



2022 U.S. Industrial Sector Energy Use Subsector Shares[17]



Transportation

The transportation sector covers the movement of goods, services, and people—including passenger and commercial vehicles, trains, aircraft, boats, barges, and ships. Fuel, mostly in the form of petroleum products, is used directly for vehicles and to fuel equipment.[21]

Transportation fuel costs tend to be higher in Oregon because of the region's distance from fuel supplies and refineries. The largest portion of the transportation sector's energy use comes from passenger vehicles — and in Oregon, passenger vehicles are older than the national average.[22] SUVs and pickup trucks make up 61.4 percent (44.2 and 17.2 percent respectively) of passenger vehicles registered in Oregon.[21]

Of the transportation fuels used in Oregon, gasoline creates the largest amount of greenhouse gas emissions — over 16.6 million metric tons of carbon dioxide equivalent[xvii] in 2022. Diesel is the second largest contributor of emissions at almost 11.2 MMTCO2e.[23] Increased consumption of lower-emitting and renewable fuel sources such as electricity, biodiesel, renewable natural gas, and renewable diesel help reduce emissions from the transportation sector.

36.7%

Transportation sector's share of Oregon's energy use in 2022.[1]

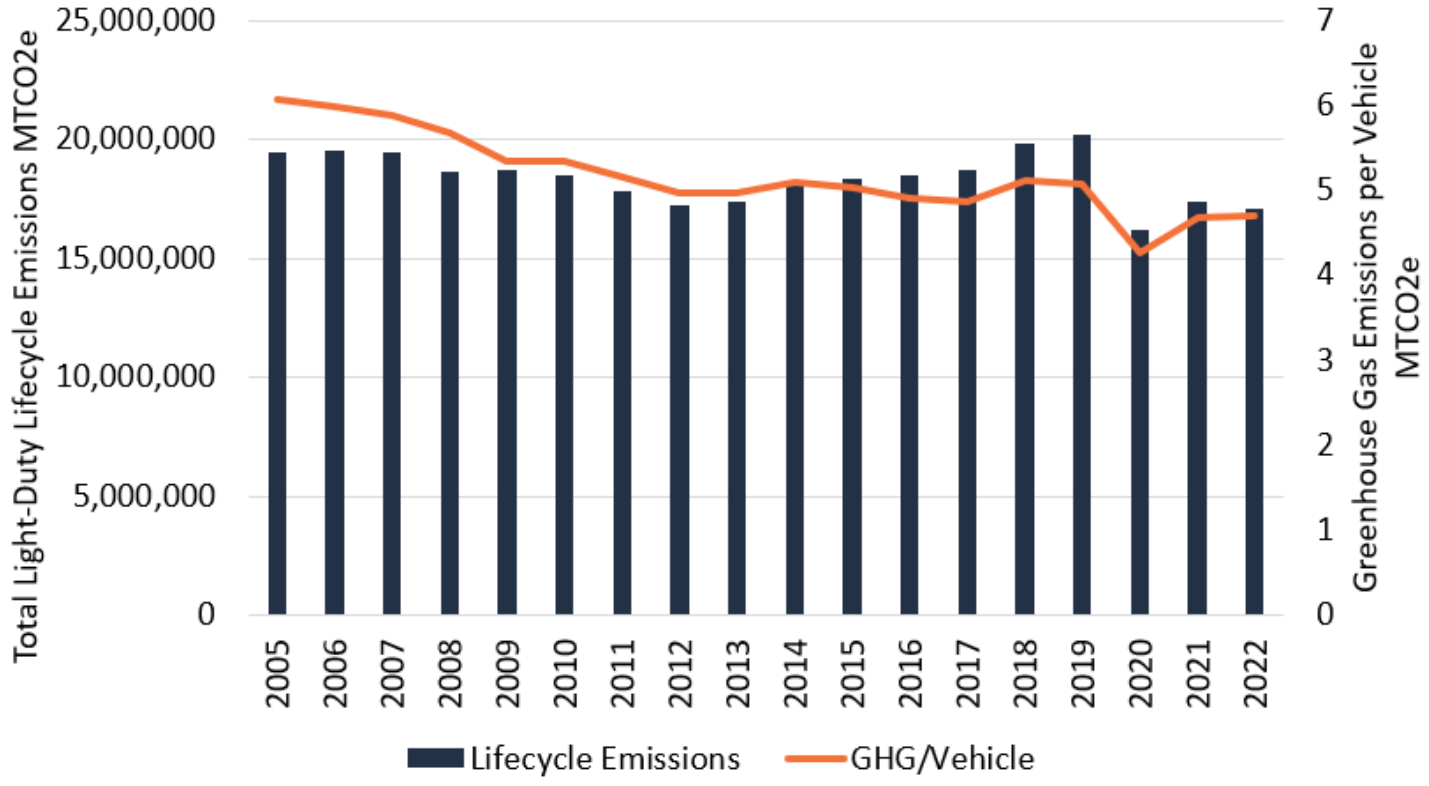
493 Gallons

Annual amount of fuel used by a 2005 typical model vehicle. It also emits about 6.08 metric tons of CO2 equivalent per year.[1]

402 Gallons

Annual mount of fuel used by a 2022 typical model vehicle. It also emits about 4.69 metric tons of CO2 equivalent per year.[1]

Metric Tons of CO2e produced by all Light-Duty Vehicles and Metric Tons of CO2e per Vehicle[23]



[xvii] Carbon dioxide equivalent, or CO2e, is a unit of measurement that enables a standardized comparison of different greenhouse gases. A unit of CO2e is equivalent to the global warming potential of carbon dioxide alone.

Greenhouse gas emissions per light-duty passenger vehicle decreased in the early parts of the century primarily thanks to federal fuel efficiency standards.[24] Emissions per vehicle have held steady since 2012 but dipped in 2020 because although the total number of vehicles remained the same, gas consumption dropped. As gasoline consumption increased, emissions per vehicle rebounded in 2021 and 2022, but not to pre-COVID levels.

Transportation Fast Facts

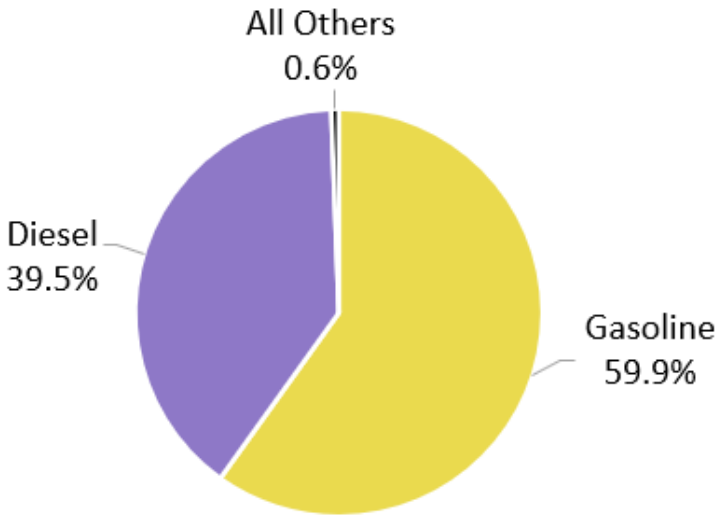
In 2022, nearly 1.36 billion gallons of gasoline powered vehicles on Oregon roads.[23]

That's over 318 gallons per Oregonian.

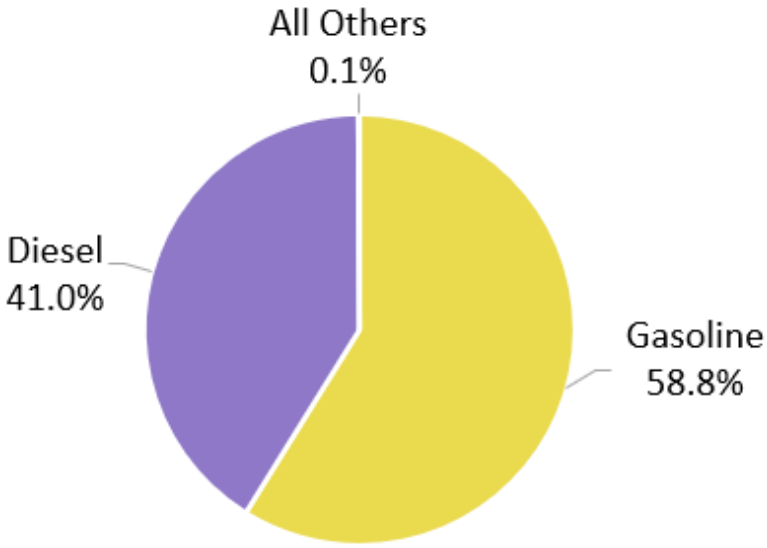
The typical Oregon household has at least two cars.[25]

For electric vehicle drivers, no matter where a car is fueled in Oregon, drivers reduce their greenhouse gas emissions by 50 to 95 percent by fueling with electricity.[26]

Percent of On-Highway Consumption in Oregon (2022)[22]



Percent of On-Highway GHG Emissions Among Fuel Types (2022)[22]



Learn more about electric vehicles in ODOE's 2023 Biennial Zero Emission Vehicle Report.

Electric Vehicles

January 2011: **672 registered EVs**

May 2022: **52,033 registered EVs**

July 2024: **100,360 registered EVs**[27]

More than 45,000 EVs added in two years!

Oregon's Zero Emission Vehicle Targets (Senate Bill 1044 and Advanced Clean Vehicles II Rules)[28] [29]

- 250,000 registered ZEVs on Oregon roads by 2025
- At least 25 percent of registered vehicles and at least half of the new vehicles sold annually are ZEVs by 2030
- 100 percent of new vehicles sold are ZEVs by 2035.

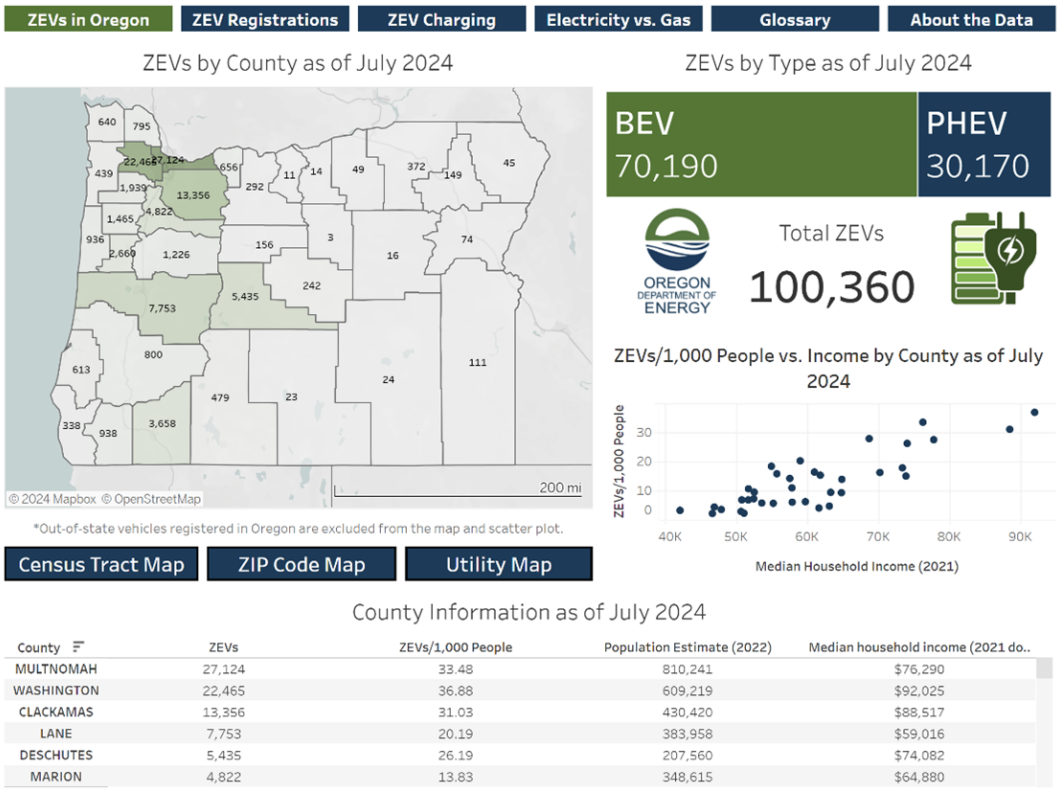
Oregon EVs by the Number

3,675,246 registered passenger vehicles[30]
100,360 registered electric vehicles
2.73% of registered vehicles are EVs
70,190 are battery EVs
30,170 are plug-in hybrid EVs
(data through July 2024)

Oregon's EV Charging

24 charging networks[31]
3,193 public EV chargers
1,259 charging locations
(data through July 2024)

Oregon Electric Vehicle Dashboard



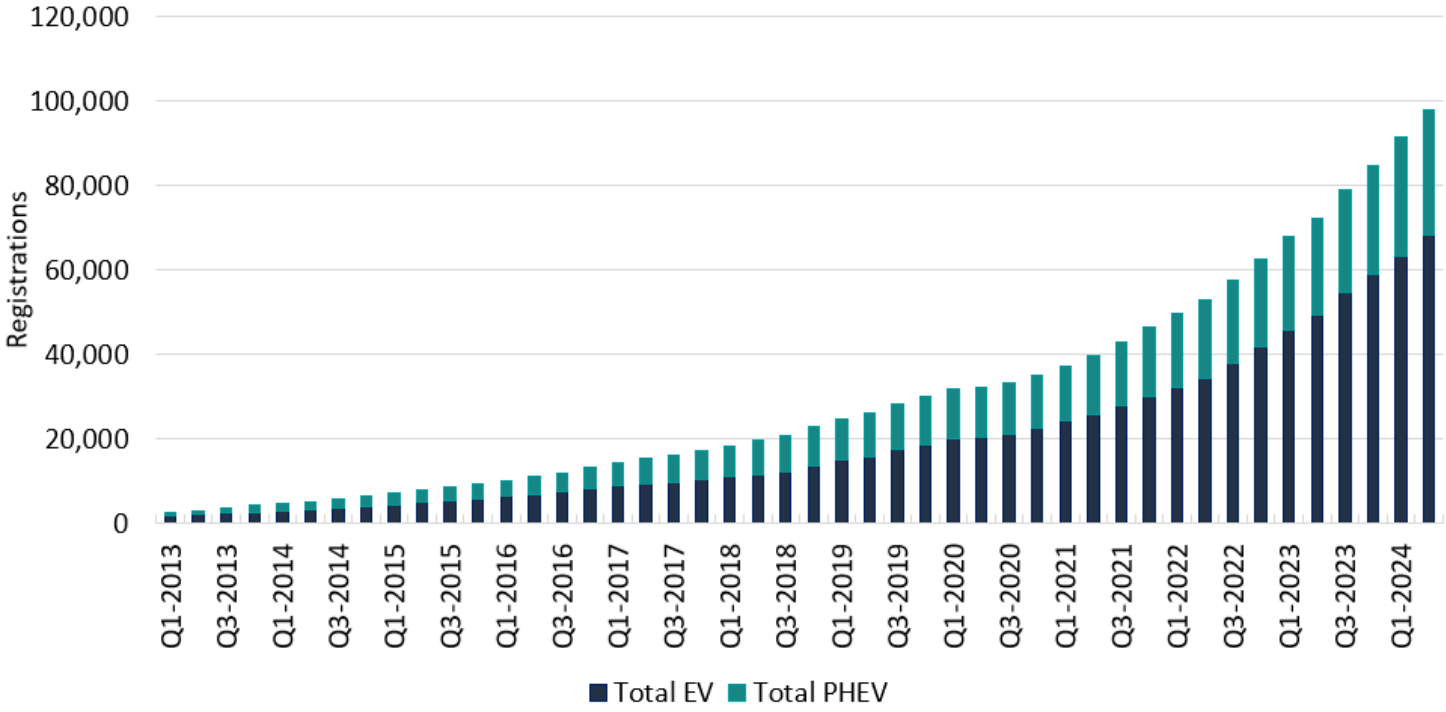
County Information as of July 2024

County	ZEVs	ZEVs/1,000 People	Population Estimate (2022)	Median household income (2021 do..
MULTNOMAH	27,124	33.48	810,241	$76,290
WASHINGTON	22,465	36.88	609,219	$92,025
CLACKAMAS	13,356	31.03	430,420	$88,517
LANE	7,753	20.19	383,958	$59,016
DESCHUTES	5,435	26.19	207,560	$74,082
MARION	4,822	13.83	348,615	$64,880

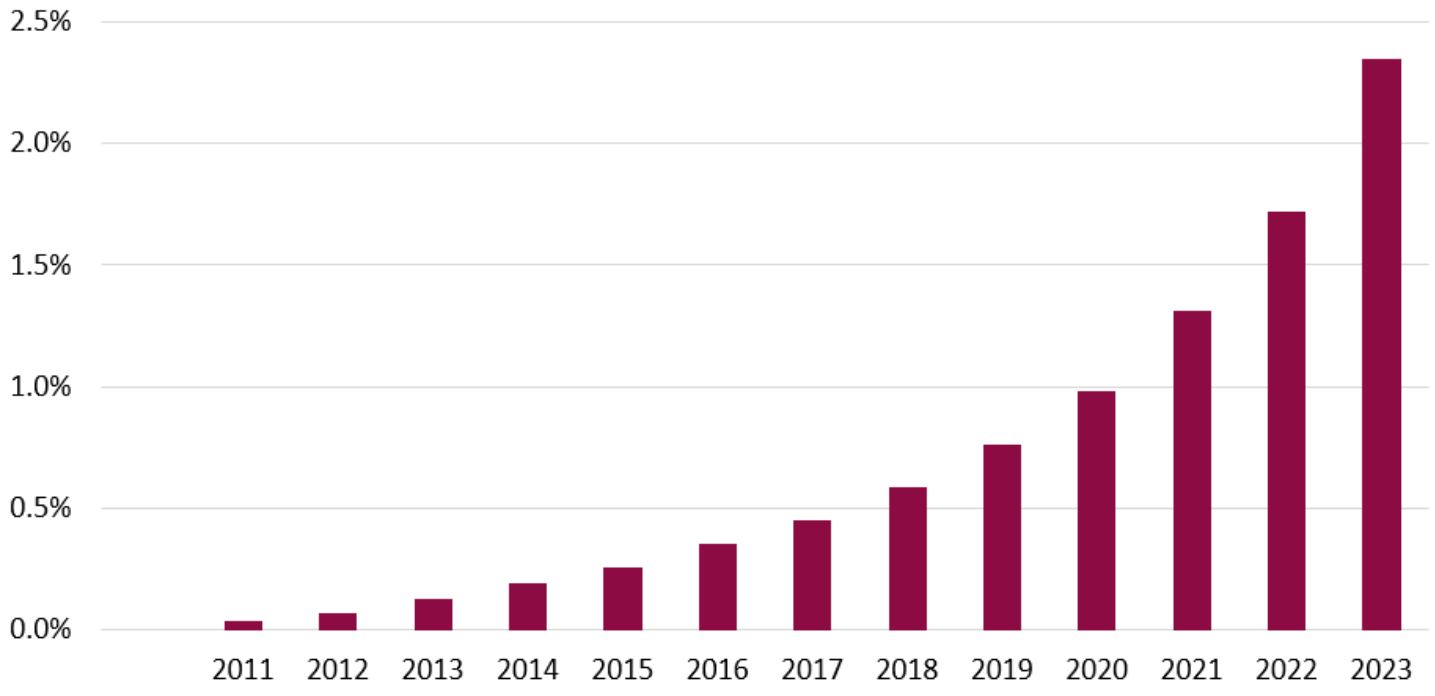
The Oregon Department of Energy developed an interactive Electric Vehicle Dashboard, which shows county-by-county EV adoption information, popular EV models, and other data. The dashboard also includes a calculator to show Oregonians estimated savings by making the switch to an EV.

www.tinyurl.com/OregonEVDashboard

Cumulative Oregon Electric Vehicle (and Plug-in Hybrid EV) Registrations by Quarter Year (2013 Q1 — 2024 Q2)[26]



EVs and PHEVs as a Percent of Total Fleet by Year[26]



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