



## Oregon's Electricity Resource Mix Dashboard

### Frequently-Asked Questions

<https://www.oregon.gov/energy/energy-oregon/Pages/Electricity-Mix-in-Oregon.aspx> ↗

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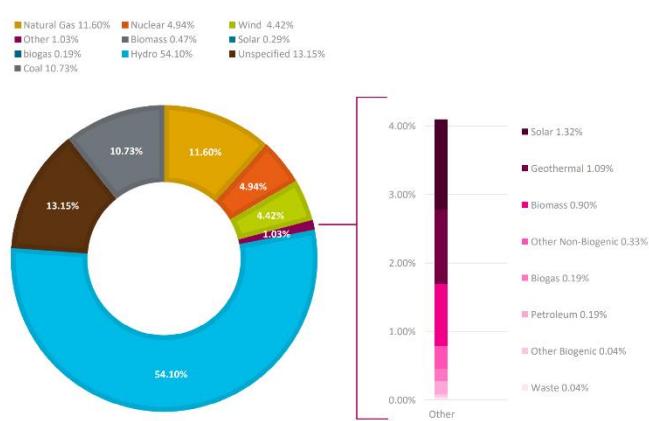
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#### **Q: How does Oregon's Electricity Resource Mix compare nationally or to other states?**

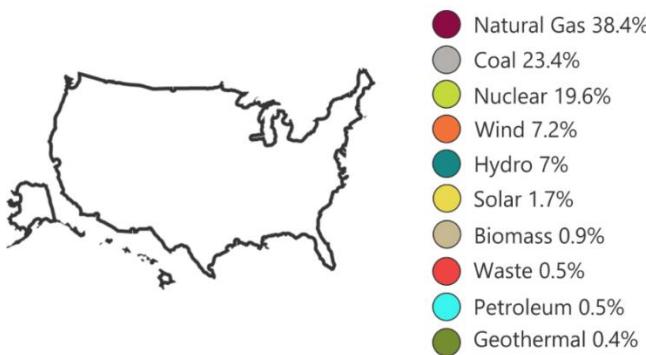
A: Oregon's Electricity Resource Mix is similar to our neighbor to the north, Washington. Both electricity mixes contain a significant amount of hydroelectric power. While contributions from wind and solar continue to grow, coal and natural gas still comprise most of the mix. To learn more about hydropower, coal, natural gas, and other resources used to deliver electricity to Oregonians please visit [Technology Reviews — Energy Info \(oregon.gov\)](#). Meanwhile, the national electricity mix contains much less hydroelectric power than Oregon's, with greater reliance on electricity generation from natural gas, coal, and nuclear power. The electricity mixes of different states and regions is determined by many factors including access to resources, policy choices, and demand for electricity in those areas. To better understand Oregon's electricity generation and policy implications, please consider visiting the policy briefs section of ODOE's 2020 Energy Report [Policy Briefs — Energy Info \(oregon.gov\)](#).

- WA ERM [2019 Fuel Mix Disclosure - Washington State Department of Commerce](#)
  - National ERM [How electricity is generated - U.S. Energy Information Administration \(EIA\)](#)
  - [Oregon ERM](#)

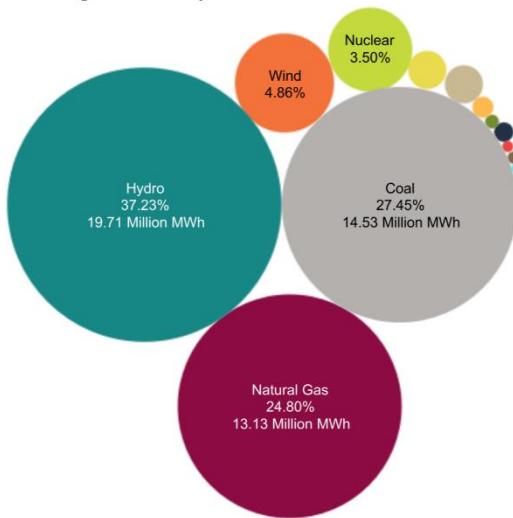
Figure 1: Washington State Electric Utilities Aggregate 2019 Fuel Mix (Percent)



National Electricity Resource Mix for 2019



## Oregon Electricity Use: Resource Mix Over Time



**Q: What is the average greenhouse gas emissions per capita of all fuels consumed to generate electricity in Oregon?**

A: Using Oregon DEQ-provided total estimated GHG emissions from 2019 and the 2019 Oregon population, we calculate that Oregon produced 4.4 metric tons of carbon dioxide equivalent (MT CO<sub>2</sub>e) per person in 2019. In comparison, Washington State produced an estimated 2.2 metric tons of carbon

dioxide equivalent (MT CO<sub>2</sub>e) per person in 2018. In 2019, the United States produced 1.6 billion metric tons of carbon dioxide equivalent (MT CO<sub>2</sub>e) from the electricity sector. With a population of 328 million people, the United States produces just under 5 metric tons of carbon dioxide equivalent (MT CO<sub>2</sub>e) per person.

You can find the [Greenhouse Gas Sector-Based Inventory Data](#) for this calculation on DEQ's website.

#### **Q: Why are the electricity generation and ERM by utility tabs not filterable by year?**

A: The Oregon Department of Energy is interested in displaying electricity generation over time to show the growth and change of electricity generating facilities in Oregon, and we plan to make this addition to the ERM visualization in 2023. Providing electricity resource mixes by utility over time is a greater challenge, the visualization software we currently use don't allow us to dynamically sort by utility and year on our website. To request utility electricity data over time, please [visit our customer portal](#) and send us a request.

#### **Q: How is the ERM different or similar to DEQ's GHG reporting program? Are the resources in the ERM treated the same or differently in those programs and if so, how are they different?**

A: The ERM has a different purpose than DEQ's GHG reporting program. DEQ's program counts and reports economy-wide greenhouse gas emissions (GHGE), while the ERM labels the electricity resource mix for electric utilities. DEQ calculates and counts, for each utility serving Oregon, actual annual GHGE from generation to meet its customer's consumption of electricity. ODOE creates an annual electricity resource mix by type of resource which is reported on the ERM website (as a percentage of that year's total sales by type of resource and the associated MWhs) and is used to develop individual utility power content labels.

The Oregon Department of Energy partners with the [Oregon Department of Environmental Quality's Greenhouse Gas Reporting Program](#) to collect data on electricity generation, contracted sales, and unspecified market purchase sales that supply electricity for Oregon's use. In addition, ODOE refers to the U.S. Energy Information Administration's electricity generation data while collecting and verifying data. When ODOE and DEQ request electricity service supplier sales data, the agencies ask that the data include what type of generating resource (wind, solar, coal, etc.) produced the electricity and the facility it came from, so we can assign a label for that type of generation. These resources are considered *specified* resources because they can be verified and labeled. Resources labeled as *unspecified* purchases include electricity purchased on the open market where the generating source is unknown. Renewable resources for which its renewable energy credits (RECs) are sold separately are also considered *unspecified* resources for labeling purposes (which is consistent in the way Washington, California, and USEPA treats these resources).

#### **Q: How is the ERM different or similar to DEQ's Climate Protection Program?**

A: [DEQ's Climate Protection Program](#) sets a declining annual limit, or cap, on greenhouse gas emissions from fossil fuels used throughout Oregon — including diesel, gasoline, natural gas, kerosene, and propane — that are used in transportation, residential, commercial, and industrial settings. The program also regulates site-specific greenhouse gas emissions at large facilities ( $\geq 25,000$  MTCO<sub>2</sub>e per year), such as emissions from industrial processes, using a best available emissions reductions approach. The

program does not regulate emissions from the electricity sector, but HB 2021 (100% clean electricity standard enacted in 2021) requires PGE and PacifiCorp to eliminate carbon emissions by 2040. While the Climate Protection Program regulates greenhouse gas emissions, ODOE's Electricity Resource Mix is an educational tool to help inform Oregonians through labeling the resources used to generate electricity to meet their demand.

**Q: How does the ERM relate to the PUC oversight of resource planning and acquisition to meet the requirements of Oregon's Renewable Portfolio Standard and the new 100% clean electricity standard (from HB 2021)?**

A: Only the three investor-owned electric utilities that serve Oregonians (PGE, PacifiCorp, and Idaho Power) are regulated by the PUC. One of the core aspects of that regulation involves the PUC's review—taking into account policy requirements such as the RPS and HB 2021's clean energy standards—of whether utility resource procurement decisions are just and reasonable. As these utilities procure resources to comply with these policy requirements consistent with PUC regulation and oversight, the mix of electricity resource types that they use to serve their customers will change over time. The ERM tool will report these changes after the fact, after new generating resources have been identified by utility planning processes, procured subject to PUC oversight, and become operational.

**Q: Can the ERM be used to see whether the state is meeting its obligations for policies such as RPS and 100% clean electricity standard over time? Are the assumptions in the ERM the same as the compliance obligations for those policies?**

A: ODOE does not regulate the compliance of Oregon utilities with the RPS or Clean Electricity standard, and the ERM is not a regulatory compliance tool. That said, a utility's ERM is expected to change over time as they comply with the policy requirements and standards. For more information on utility compliance with the RPS ([link](#)) and HB 2021's clean electricity standard, we recommend contacting Oregon Public Utility Commission.

**Q: Will Oregon's electricity mix be completely clean by 2040? Will we no longer see coal or natural gas in our ERM after 2040?**

A: HB 2021 requires PGE, PacifiCorp, and other regulated electric service providers to submit Clean Energy Plans to the PUC to reduce greenhouse gas emissions by 80% by 2030, 90% by 2035, and completely eliminate emissions by 2040. For those utilities the ERM should show a declining amount of fossil fuels in their resource mix as they comply with the law's targets, and no fossil fuels after 2040. This law does not apply to utilities not regulated by the PUC (i.e., consumer-owned utilities). HB 2021 also prohibits the Energy Facility Siting Council from issuing site certificates for new natural gas-fired electricity plants. To learn more about clean energy policy, please visit ODOE's [Policy Brief on Emerging Trends in Renewable and Zero-Emissions Electricity](#) in the 2020 Biennial Energy Report.

**Q: What is the difference between biogenic and non-biogenic waste?**

A: Resource definitions are provided in the "Data Info" button at the bottom of the "Oregon ERM" tab of the ERM webpage. Biomass or biogenic sources of energy come from the burning or breaking down of

energy from plant and animal products such as wood or waste products like paper, cotton, or agricultural products. Non-biogenic electricity is produced by the combustion of non-biogenetic materials, such as plastics and tire-derived fuels.

**Q: Why is coal such a large part of the mix? Didn't the Boardman plant close?**

A: Oregon eliminated coal burning electricity generation within the state with the retirement of the Boardman coal plant in October 2020. Oregon's Electricity Resource Mix, however, reflects the electricity consumed in Oregon, which includes imports of electricity from other states through contracted purchases and by unspecified market purchases. Some of that imported electricity is generated by coal plants. This, too, however is required to be largely eliminated from contracted purchases of imported electricity in Oregon's resource mix by 2030 pursuant to SB 1547 (2016). To learn more, please visit ODOE's [Coal Technology Review](#) in the 2020 Energy Report.

**Q: Wind consumption in Oregon appears to be decreasing over time but more wind turbines appear to be going up around the state. Does Oregon use all the wind energy produced?**

A: Energy production from most types of renewable resources is variable throughout the year and from year to year. For example, hydropower output can vary widely based on annual precipitation patterns, resulting in significant changes in how much hydropower is available to serve Oregon demand from one year to the next. Similarly, wind and solar output is also variable. At times, this type of variability results in a surplus of clean energy output that can either be exported to neighboring states or otherwise must be curtailed (turned off). So, while the installed capacity of wind and solar increases year over year, the contribution of those resources to Oregon's electricity resource mix may fluctuate, depending on what is happening with hydropower generation and how much wind is being exported to neighboring states. To learn more about Oregon's electricity production, visit the [Energy Production section of Energy By the Numbers](#) in the 2022 Energy Report.

**Q: How can I use this emissions factor information to figure out my personal GHG emissions from electricity?**

A: First select the emission factor associated with your electric utility within the ERM "GHG emissions by utility" tab, then review your utility bill(s) to determine your electricity use in kWh. You can sum up your monthly use to get the total for the time period you want to calculate, such as annual electricity use to calculate annual emissions. Then multiply total kWh of electricity use by the emission factor in pounds of CO<sub>2</sub>e per kWh to get how many pounds of CO<sub>2</sub>e your household emits from electricity use. Note, however, that currently the ERM reports annualized data. While looking at your electricity consumption over an annual basis can give you some indication of your personal GHG emissions footprint, it is worth noting that the resource mix, and therefore the carbon intensity, changes throughout the year and even throughout the day as utilities use different generating resources at different times. Since the ERM only reports annualized data from the previous year it can only give you an approximation of your GHG emissions footprint over the current year, and therefore cannot provide a more granular view of the resource mix at different times within the year.

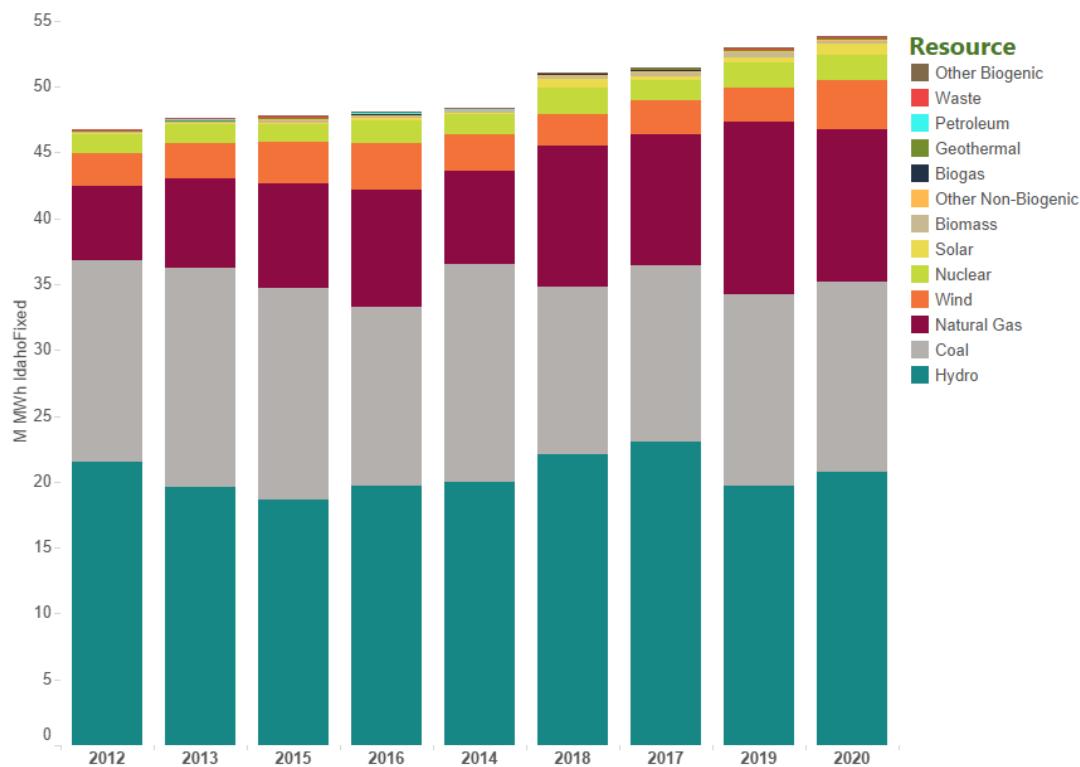
## **Q: Why does the electricity resource mix fluctuate from year-to-year?**

A: The ERM represents the proportion that each resource (such as solar, wind, and hydropower) contributes to the total amount of electricity that Oregonians consume each year. Figure 1 (below) presents the ERM from 2012 to 2020 and shows two notable trends: First, total annual consumption of electricity has increased from 47 million MWh to 53 million MWh from 2012 to 2020, driven by factors such as economic and population growth and increased customer demand. Second, the percentage that each resource contributes to total electricity for Oregon consumption changes from year-to-year. For example, between 2012 and 2020, coal's share of total electricity consumed in Oregon steadily declined from 32% to 26%, while the share of natural gas increased from 12% to 25%. In the same period, hydropower's share went up and down according to annual precipitation patterns, with a high of 46% in 2012 and a low of 37% in 2019. So, 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.

**Figure 1: Oregon's Electricity Mix Over Time**

Hydropower is a key example of how resource availability drives year-to-year fluctuations in the ERM.

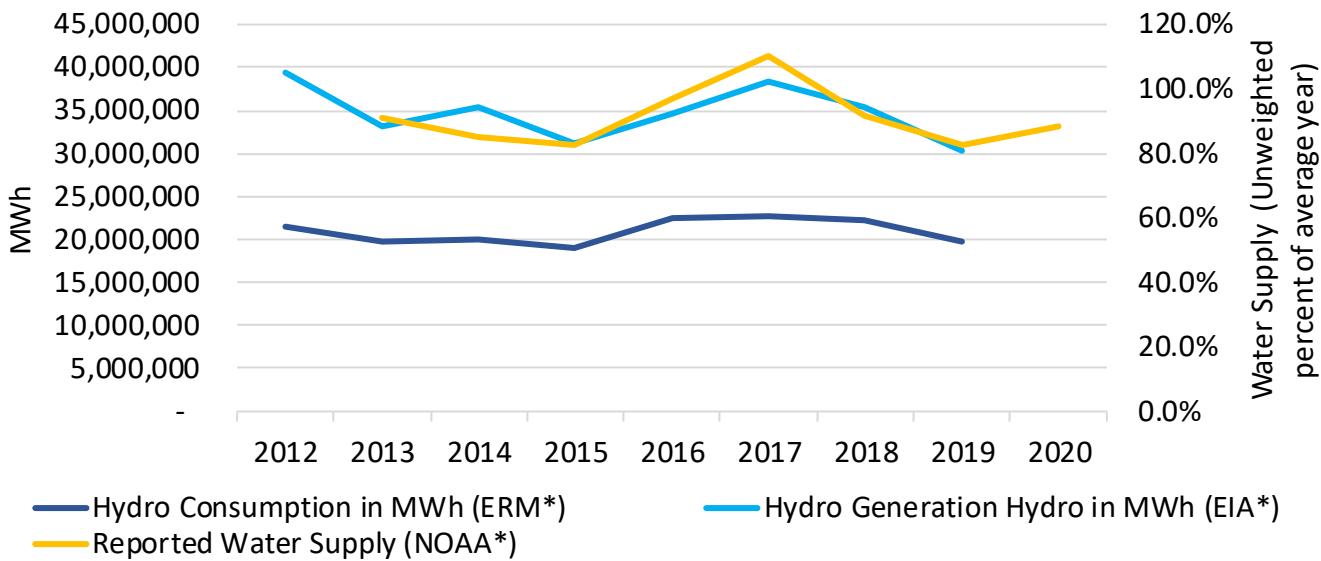
Oregon and the Pacific Northwest are rich in hydropower, which is consistently a low-cost resource.



In energy markets, electricity providers typically prioritize using the lowest cost generating resources, allowing them to meet customer demand at least cost. This often results in prioritization of hydropower, wind, and solar, which have low or zero marginal costs. These types of resources are used first, and then, if there is unmet customer demand, energy providers will look to other types of units, 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—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. For example, Figure 2 shows how hydropower generation is closely related to annual water supply.

**Figure 2: Water Supply vs. Electricity Generation and Consumption in Oregon 2012-2020**



\*Electricity Resource Mix (ERM) is an Oregon Department of Energy produced data set available on our website (<https://www.oregon.gov/energy/energy-oregon/Pages/Electricity-Mix-in-Oregon.aspx>)

\*Energy Information Administration (EIA) provides official energy statistics from the U.S. Government. (<https://www.eia.gov/electricity/>)

\*National Oceanic and Atmospheric Administration (NOAA) gathers data on climate, weather, oceans and coasts to understand and predict changes. This data comes from the Northwest River Forecast Center (<https://www.nwrfc.noaa.gov/rfc/>)

To learn more about electricity production and distribution, please visit [Energy 101](#) or the [Resource Adequacy Policy Brief](#) within ODOE's 2020 Biennial Energy Report.

**Q: Why is the mix of resources Oregon uses different from the mix of resources Oregon generates?**

Annual variation in Oregon's electricity resource mix results from an evolving fleet of generation resources driven by policy and technological advancements, year-to-year fluctuations in output from renewables and shifts in the mix of market imports from across the region. Oregonians consume the electricity provided by their utilities, which may be generated in state, purchased through contracts, or purchased from the open electricity market. Electricity generated in state may be used by Oregonians or may be sold or exported to be used out of state. This is a high-level description of the factors influencing variation in consumption by resource in Oregon. The issues involved are more complex and nuanced than can be fully described here. To see a high-level view of how energy flows in Oregon, please visit the [Energy by the Numbers chapter of ODOE's Energy Report](#).

## Learn More

To learn more about electricity generation, consumption, and their relationship to Oregon's energy system, please visit the following resources.

- Bonneville Power Administration
  - [Fact Sheets \(bpa.gov\)](#)
  - [Historical Streamflow Data \(bpa.gov\)](#)
- ODOE 2020 Biennial Energy Report [Introduction — Energy Info \(oregon.gov\)](#)
  - Energy 101
    - Electricity Transmission
    - Resource Adequacy
  - Resource and Technology Reviews
    - Hydropower
    - Natural Gas
    - Wind
    - Coal
    - Solar
    - Biomass
    - Geothermal
    - Utility-Scale Energy Storage
  - Policy Briefs
    - Resource Adequacy
    - Evolving Wholesale Electricity Markets
- 2021 Northwest Power Plan [The 2021 Northwest Power Plan | Northwest Power and Conservation Council \(nwcouncil.org\)](#)