Where are you joining us from today?

- Oregon Coast
- Willamette Valley
- Columbia Gorge
- Central Oregon
- Southern Oregon
- Eastern Oregon
- Northeast Oregon
- Southeast Oregon
- Out of State
- Tribal Land Acknowledgement
- Meet ODOE
- About the 2020 Biennial Energy Report
- Energy by the Numbers
- Climate Change in Oregon
- Clean & Renewable Energy
- Oregon Energy Consumers
- Your Thoughts
TRIBAL LAND ACKNOWLEDGEMENT

The Oregon Department of Energy and its staff would like to express our respect to the Native Americans of Oregon, who have had a relationship with this land from time immemorial that continues to this day. It is impossible to understand today’s energy landscape without acknowledgement and understanding the rich culture and contributions of these people and communities.
The Oregon Department of Energy helps Oregonians make informed decisions and maintain a resilient and affordable energy system. We advance solutions to shape an equitable clean energy transition, protect the environment and public health, and responsibly balance energy needs and impacts for current and future generations.

On behalf of Oregonians across the state, the Oregon Department of Energy achieves its mission by providing:

- A Central Repository of Energy Data, Information, and Analysis
- A Venue for Problem-Solving Oregon's Energy Challenges
- Energy Education and Technical Assistance
- Regulation and Oversight
- Energy Programs and Activities
Goal of the Report

Pursuant to ORS 469.059, provide a comprehensive review of energy resources, policies, trends, and forecasts, and what they mean for Oregon.

Scoping the Report

Shaped by a data-driven process, equity considerations, and input from stakeholders and the public.

Designing the Report

Shorter briefs on a wider variety of energy topics, tear-away style. Themes cross sections for general 101 or technology reviews and deeper-dive policy briefs.

https://energyinfo.oregon.gov/ber
How does Oregon produce, purchase, and use various types of energy?
Oregon’s Energy Flow

Numbers are in trillions of British thermal units (Btus)
Resources Used to Generate Oregon’s Electricity
Based on 2019 data, this chart shows the energy resources used to generate the electricity that is sold to Oregon’s utility customers.

Oregon Electricity Mix Over Time

Energy by the Numbers | Pages 9-10
Report includes 2018 data; ODOE now has 2019 data available
Oregon Greenhouse Gas Emissions by Source Over Time

Million Metric Tons of Carbon Dioxide Equivalent

2020 Goal

2050 Goal

Transportation  Electricity  Natural Gas  Residential & Commercial  Industrial  Agriculture
What is your **biggest concern** about Oregon’s energy sector?

- Access to energy after an emergency (resilience)
- Affordable equipment, like solar panels or efficient appliances
- Energy costs
- Greenhouse gas emissions/climate change
- Having enough energy to meet demand (resource adequacy)
- Reliable energy (supply)
- Not sure
- Something else – feel free to add your answer in the chat
The energy we use affects and is affected by climate change.
**Climate Change + Energy**

**What's at Stake?**

**Electricity Demand**
- Warmer temperatures and more frequent heat waves could create a new summer peak electricity demand to meet additional cooling needs in homes and workplaces. This would put stress on our current energy systems and create challenges for utility managers to meet demand.

**Energy Reliability**
- Longer wildfire seasons, more frequent wildfires, and greater area burned could lead to more Oregonians experiencing fire-related infrastructure outages or proactive power shut-offs to reduce risk. Increased frequency and intensity of extreme weather can affect energy facilities and transmission lines, threatening the reliability of the energy services Oregonians need.

**Transportation Fuels**
- Flooding and landslides can potentially inundate and block roads and rails, and damage pipeline pumping stations and storage facilities. Increased frequency and intensity of extreme weather events, flooding, and power outages can disrupt fuel distribution outlets and gas stations.

**Energy Supply**
- With higher temperatures, Oregon will likely see more rain instead of snow in the winter, which would shift decades-long patterns of when hydropower is available across the region — this could lead to increases in energy costs and new infrastructure needs. Lower water availability and warmer air and water temperatures make energy generation, transmission, and distribution systems less efficient.
Mitigation

Adaptation/Resilience

Efficiency is the second-largest electricity resource in Oregon (behind hydropower). Maximizing energy efficiency and smart-grid technologies in our homes, schools, offices, farms, and industries can lower energy use and costs while reducing greenhouse gas emissions.

Oregon is working to build an energy system that includes distributed energy generation, renewables, microgrids, and batteries and other storage to strengthen the system’s resilience to the effects of climate change and natural disasters.

Supporting infrastructure for using clean fuels (including electricity, renewable natural gas, and hydrogen) and alternative transportation modes (including walking, biking, carpool, and public transportation) leads to more choices for consumers.

Accelerating the adoption of low- or zero-emission vehicles also encourages use of locally-produced fuel (Oregon imports nearly all of its transportation fuels).

Transitioning to locally-generated, low-carbon resources (like wind, solar, hydro, renewable natural gas, and geothermal), would diversify our energy mix and reduce our reliance on volatile global energy markets.
Transitioning to cleaner energy resources and technologies provides more reliable energy, increased energy independence, new living-wage jobs, sustainable transportation options, and reduced operating and maintenance costs.

https://showyourstripes.info/
What should be Oregon’s **top priority** for addressing climate change in the energy sector?

- Address transportation emissions
- Adopt clean electricity requirements (such as higher RPS or 100% clean policy)
- Make clean energy options more affordable
- Focus on adaptation to climate change, like preparing infrastructure for increased drought, flooding, or wildfires
- Further research in emerging renewable energy resources for Oregon, like renewable natural gas, offshore wind, and geothermal
- Reduce the amount of energy Oregonians use through energy efficiency and conservation
- Not sure
- Something else – feel free to add your answer in the chat
Clean and renewable energy policies and programs can reduce greenhouse gas emissions and make Oregon more energy-independent.
Market-based policies requiring retail electricity suppliers to procure a minimum amount of energy they sell from eligible resources.
A renewable portfolio standard establishes a target percentage of a jurisdiction’s electricity that must come from eligible renewable resources. Oregon established its RPS in 2007, which required the state’s largest utilities to provide 25 percent of retail sales of electricity from eligible renewable sources by 2025. In 2016, the Oregon Clean Electricity and Coal Transition Plan increased the RPS requirement to 50 percent by 2040.
A clean electricity standard a target percentage of a jurisdiction’s electricity that must come from eligible “clean” zero- or low-carbon emitting resources. The purpose of a CES is to decarbonize electricity generation by increasing the use of carbon-free or low-carbon resources.

May Add:

- RPS Eligible Resources
- Potential Clean Electricity Standard Eligible Resources
Since Oregon updated the RPS in 2016, there has been a trend toward strengthening clean and renewable targets, with several states adopting 100% clean or 100% renewable targets.

Learn More!
Energy 101: Clean & Renewable Standards
Policy Brief: Renewable & Zero Emission Standards
Technology Reviews: Storage, Solar, Wind, Etc.
Technology for a Clean Energy Transition:

Which three resource or technology reviews are you most interested in hearing about today? (POLL)

- Solar
- Hydropower
- Wind
- Small Modular Reactors (Nuclear)
- Geothermal
- Marine Hydrokinetic (Wave)
- Energy Storage (Batteries)
- Carbon Capture and Sequestration
Oregon solar grew over five-fold between 2015 and 2019, with installed capacity growing from 91 MW to 592 MW, and generation increasing from 116,000 MWh to 776,000 MWh.

Energy Jobs:
Solar provided about 5,700 jobs for Oregonians in 2019. The median annual wage of a solar installation technician is $44,890.
**Hydropower**

- Total Capacity in Oregon (2019): 8,303 MW
- Facilities in Oregon (0.03 to 2,160 MW): 94*
- Total Generation (2018): 35,442,773 MWh
- Total Consumption (2018): 22,125,769 MWh
- Total Exports (2018): 13,317,004 MWh

*Seven hydropower facilities cross state borders.

**Conduit Hydropower**

- Total Capacity in Oregon: 35 MW (estimate)
- Facilities in Oregon (10 kW - 5 MW): 25-30 (estimate)
- Generation and Consumption Data: Not Available

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**Figure 2: Oregon Annual and Monthly Average Hydropower Generation by Year**

![Hydropower Generation Chart]

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

- Annual Generation
- Monthly Generation
Most existing and planned utility-scale wind generation lies on the Columbia River Plateau in Wasco, Sherman, Gilliam, Morrow, and Umatilla counties, with a few developments in Eastern Oregon.

**Energy Jobs:**
Wind provided about 1,000 jobs to Oregonians in 2019. The average annual wage of a wind technician is $52,910.
Small Modular Reactors

While there are small, traditional nuclear reactors operating in the world, there are no new-generation SMRs yet in operation. The International Atomic Energy Agency reports that of the 50 or more designs being pursued, there are “four SMRs in advanced stages of construction in Argentina, China and Russia, and several existing and newcomer nuclear energy countries are conducting SMR research and development.”

Oregon has statutory barriers to siting nuclear power plants in the state. One barrier: Oregon voters would have to approve any nuclear facility.
Geothermal energy is a renewable resource from heat generated continuously within the earth. Geothermal energy can fuel electricity generation, as well as provide heating and cooling for buildings or industrial processes at small or large scales.

Energy Jobs:
Geothermal energy currently employs about 27 people in Oregon.
A 2011 study from Electric Power Research Institute estimated the potential of wave energy in the U.S. at 143 terawatt hours, and a recent National Renewable Energy Laboratory study identified Oregon as the highest-ranking region for long-term wave energy development in the United States.

Learn more about PacWave: http://pacwaveenergy.org/
### Residential Storage

- Peak Power Capacity in Oregon: 670 kW
- Facilities in Oregon: 291
- Maximum Stored Energy in Oregon: 1,440 kWh
- Range of Sizes: 2.4 to 46 kWh

### Utility-Scale Storage

- Peak Power Capacity in Oregon (2019): 5 MW
- Facilities in Oregon (2019): 1 (5 MW)
- Total Capacity of Storage Under Construction: 430 MW
- Maximum Stored Energy in Oregon (2019): 1.25 MWh
- Total Energy Discharged (2018): 545 MWh

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**Figure 1: Range of Residential Battery Sizes in Oregon (2018-2020)**

- Bar graph showing the number of systems by energy storage capacity (kWh) ranging from 2-6 to >30 kWh.

**Figure 1: Storage Cumulative Installations and Costs per kWh**

- Line graph showing the cumulative installed capacity (MW) and lithium-ion battery cost ($/kWh) from 2010 to 2018.
Carbon capture and storage (CCS)—also known as carbon capture and sequestration—is the process of:
1. Capturing or separating carbon dioxide from energy-related and industrial emission sources;
2. Transporting the removed CO2; and
3. Storing the removed CO2 in geological formations for long-term isolation from the atmosphere.

There are currently no large-scale projects (capturing more than one metric ton of carbon dioxide per year) in Oregon.

There are currently six operating and five planned projects in the United States. Worldwide, there are another 13 operating projects and two planned projects.

Adding carbon capture and storage to natural gas plants can reduce emissions by up to 95 percent.
What should be Oregon’s top priority for encouraging a cleaner energy sector?

• Educating consumers, policymakers, and decision-makers
• Incentives like rebates, grants, or tax credits for clean energy development
• Market transformation – making clean energy options more affordable and accessible
• More regulations or guidance for the sector
• Research and development of technologies and resources
• Not sure
• Something else – feel free to add your answer in the chat
Every Oregonian uses energy – at home, on the road, at school, and at work. What should Oregon energy consumers know?
Codes and standards deliver energy efficiency at low cost. In 2019, 30 percent of the cumulative energy savings in the Pacific Northwest came from codes and standards. Additionally, from 2000-2018, 11 percent of regional savings came from market transformation efforts by the Northwest Energy Efficiency Alliance (NEEA) – work that directly leads to updates of codes and standards.
The term Grid-interactive Efficient Buildings has emerged from the application of cross-cutting strategies and advancement of interactive technologies in the built environment. While still evolving, the Grid-interactive Efficient Buildings concept envisions “energy efficient building(s) with smart technologies characterized by the active use of distributed energy resources to optimize energy use for grid services, occupant needs and preferences, and cost reductions in a continuous and integrated way.”
Oregon is well-known for its agricultural diversity – and this diversity of crops, livestock, soils, climates, and production methods is reflected in how Oregon farms use energy. Oregon farmers and ranchers use energy for many purposes: to power tractors and other farm equipment in the field, to chill milk and freshly-picked produce, to provide heat and light for greenhouses, to mechanically control weeds, to pump water, and to run equipment like hop dryers, seed cleaners, and mint oil distilleries.

Table 1: Oregon Farm Bureau Survey

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<thead>
<tr>
<th>Top 5 Uses of Electricity</th>
<th>Top 3 Uses of Natural Gas</th>
<th>Top 3 Uses of Propane</th>
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<tbody>
<tr>
<td>Irrigation</td>
<td>Greenhouses</td>
<td>Forklifts</td>
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<tr>
<td>Seed Cleaning</td>
<td>Dryers (hops, onions)</td>
<td>Greenhouses</td>
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<td>Greenhouses</td>
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<td>Cold Storage</td>
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For several rural consumer-owned utilities, farms are the primary customer base – and the seasonal dynamics of supplying energy to farms drives utility operations.
Oregon County Energy Profiles

WASHINGTON

County Info & Demographics
- Population: 583,595
- Regional Typical Income: $60,286

Poverty & Energy Burden
- Energy Burdened Households: 16%
- Annual Energy Burden Gap: $497

Homes
- Homes Built Before 1990: 53%
- Owner-occupied Homes: 60%

Energy
- Average Annual Electricity Cost: $1,177
- Average Annual Natural Gas Cost: $627

Home Primary Heating
- Electricity: 44%
- Natural Gas: 52%

Travel
- Annual Vehicle Miles Traveled: 19,897
- VMT Cost: $3,192

JACKSON

County Info & Demographics
- Population: 213,765
- Regional Typical Income: $44,028

Poverty & Energy Burden
- Energy Burdened Households: 27%
- Annual Energy Burden Gap: $557

Homes
- Homes Built Before 1990: 61%
- Owner-occupied Homes: 62%

Energy
- Average Annual Electricity Cost: $1,236
- Average Annual Natural Gas Cost: $634

Home Primary Heating
- Electricity: 54%
- Natural Gas: 36%

Travel
- Annual Vehicle Miles Traveled: 20,867
- VMT Cost: $3,346

Electric Vehicles in Oregon

Oregon Electric Vehicle Dashboard

Average Annual Energy Use for a Household

https://goelectric.oregon.gov
If you could choose one primary energy area to focus more public dollars, which would you choose?

- Energy bill assistance and low-income weatherization
- Incentives like rebates or grants for renewable energy projects for homes and businesses
- Incentives like rebates or grants to help pay for energy efficient appliances and equipment for homes and businesses
- Investing in clean transportation fuel infrastructure, like free public EV charging
- More support for energy efficient school buildings
- Not sure
- Something else – feel free to add your answer in the chat
What future webinar topic(s) would you be interested in attending?

What resources do you need from your Department of Energy?

What questions do you have about energy or your choices in energy?

Does your organization or an organization you’re interested in have events or venues where ODOE should participate or present? What is the organization, and which topics would be of interest?
Thank you!

Energy Report online: energyinfo.oregon.gov/ber
Comment Portal: https://tinyurl.com/BERComment