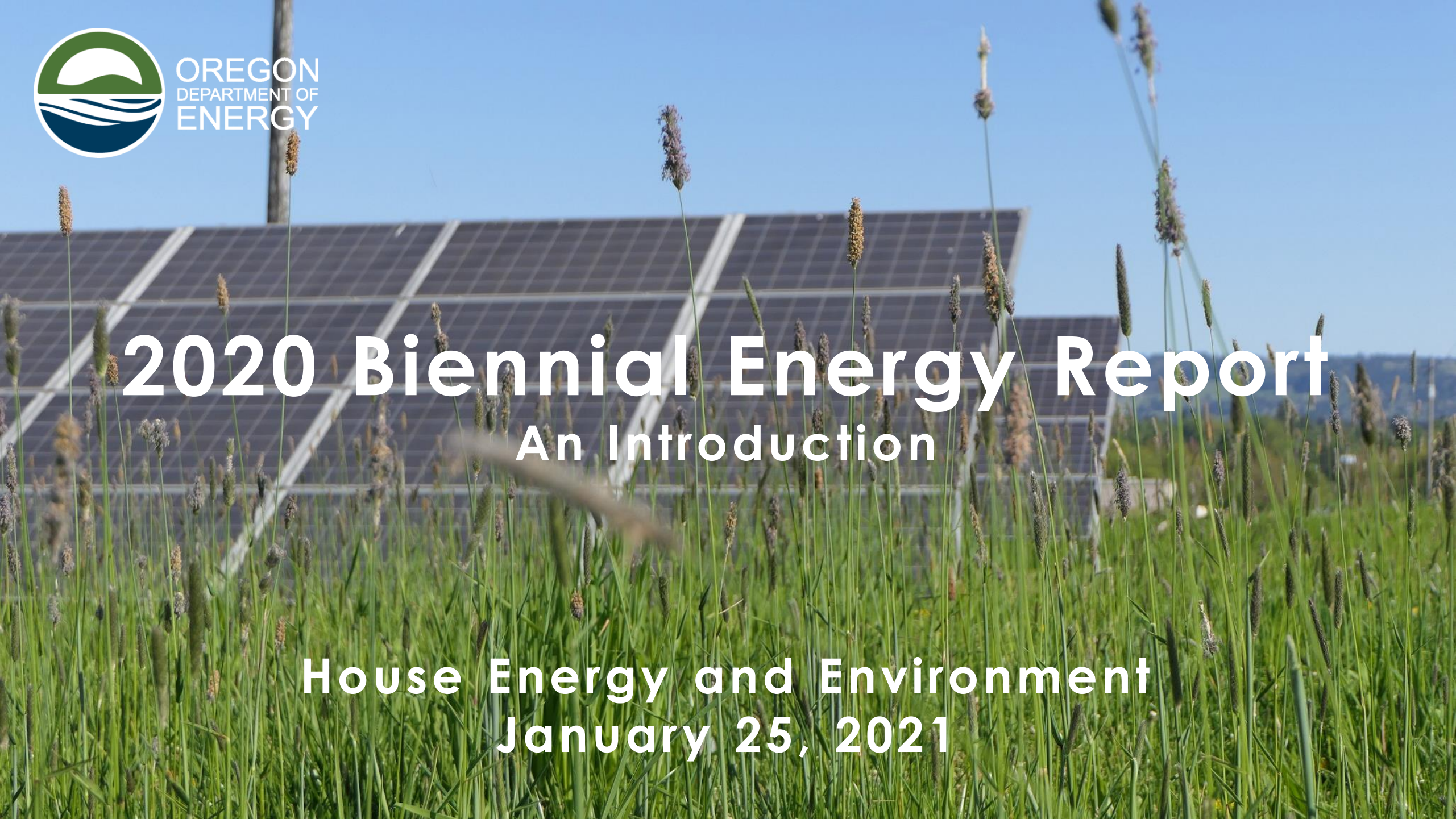


OREGON DEPARTMENT OF ENERGY

2020 Biennial Energy Report

An Introduction

House Energy and Environment

January 25, 2021

OREGON DEPARTMENT OF ENERGY

Leading Oregon to a safe, equitable, clean, and sustainable energy future.

Our Mission

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.

What We Do

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

2020 BIENNIAL ENERGY REPORT

Goal of the Report

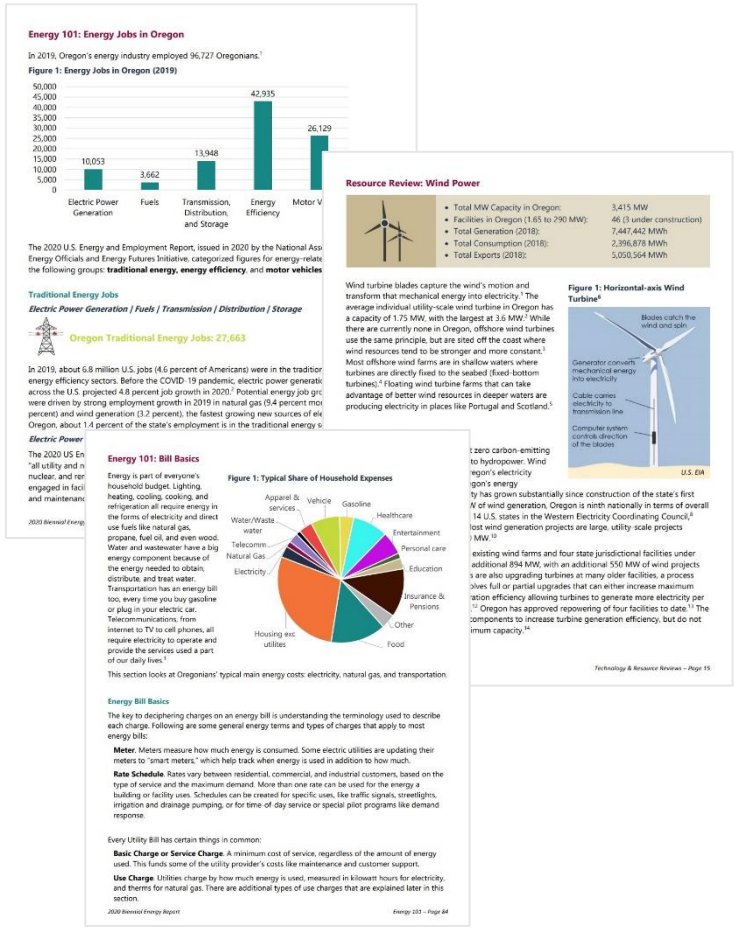
Pursuant to ORS 469.059, provide a comprehensive review of energy resources, policies, trends, and forecasts, and what they mean for Oregon.

Scoping the Report

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

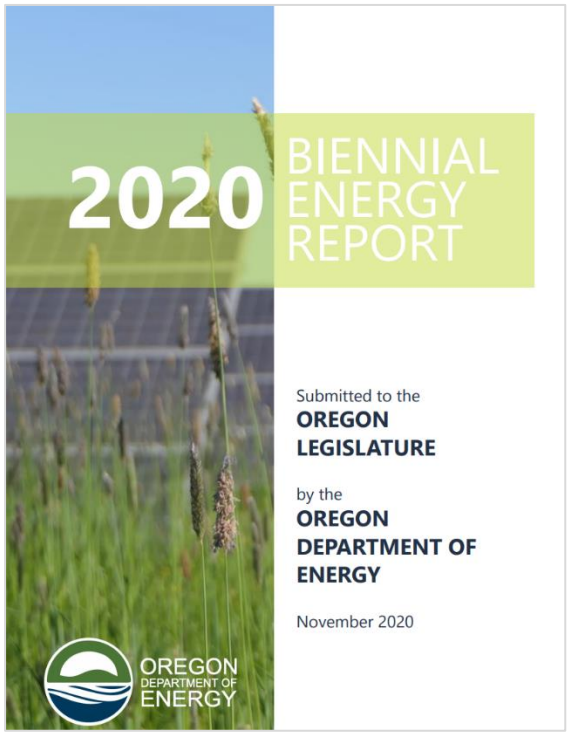
Designing the Report

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

OREGON DEPARTMENT OF ENERGY



energyinfo.oregon.gov/ber

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Energy by the Numbers

Oregon's overall and sector-based energy use, energy production and generation, and energy expenditures.

Data and metrics track how Oregon produces, purchases, and uses various types of energy.

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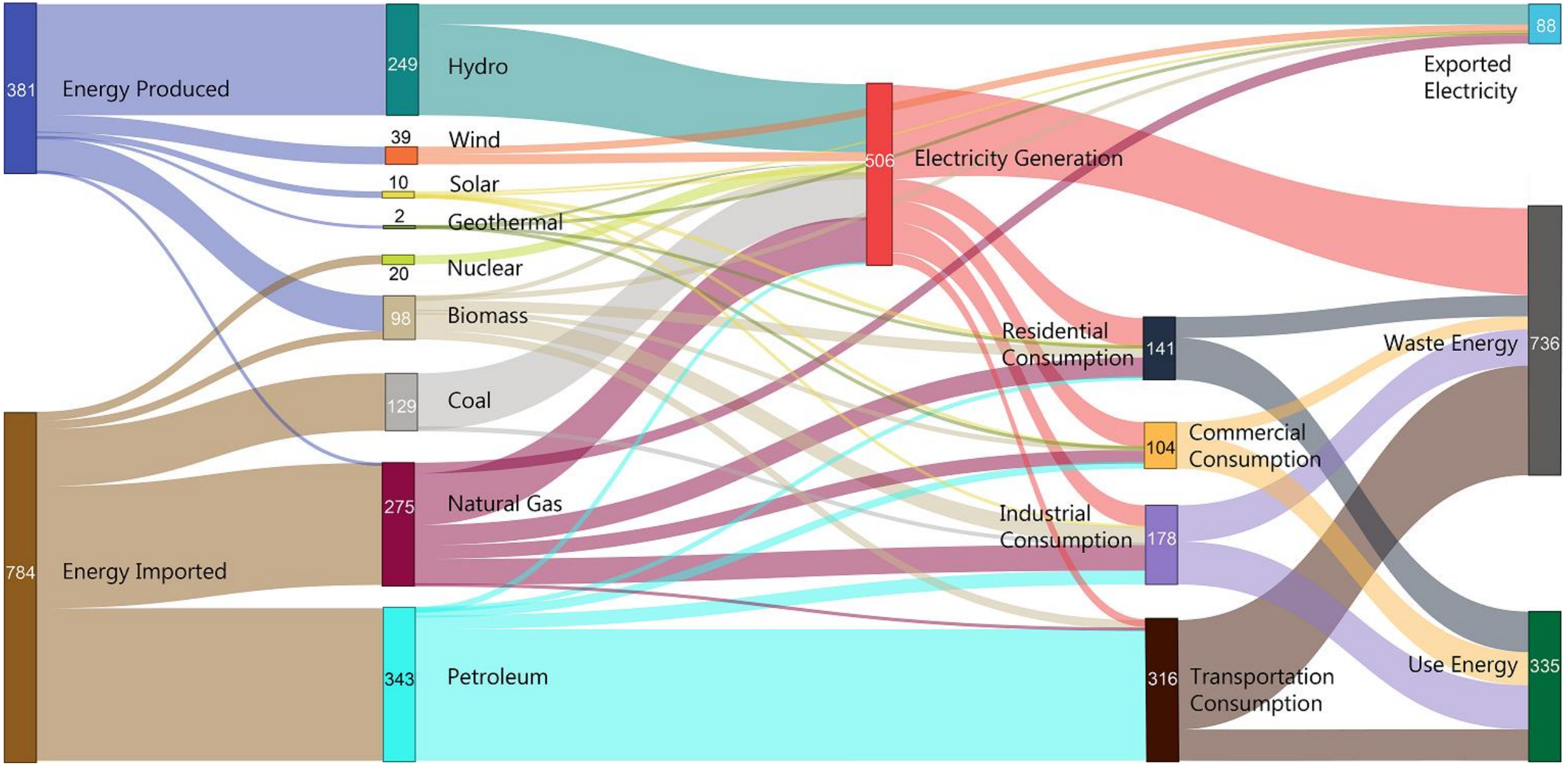
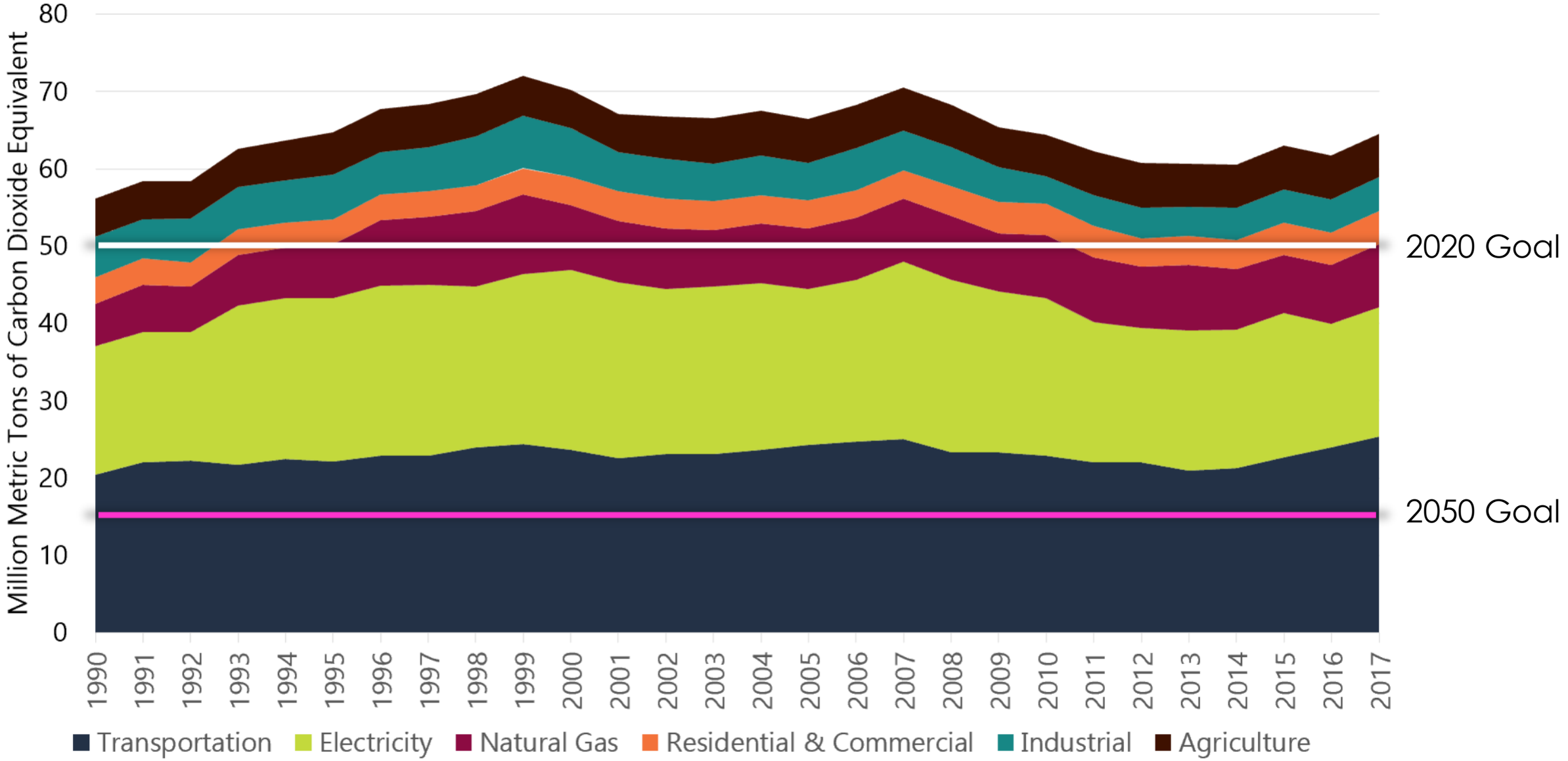
Oregon's Energy Flow



Numbers are in trillions of British thermal units (Btus)

Oregon Greenhouse Gas Emissions by Source Over Time



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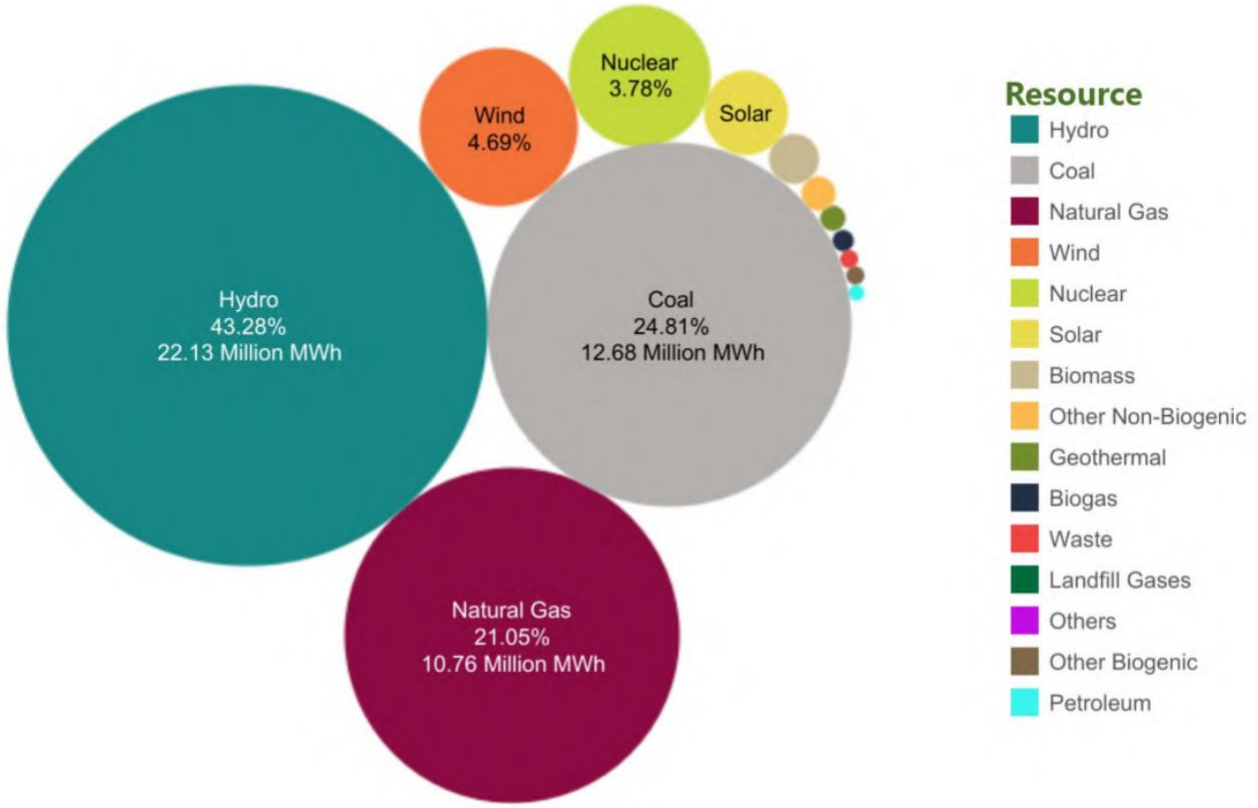
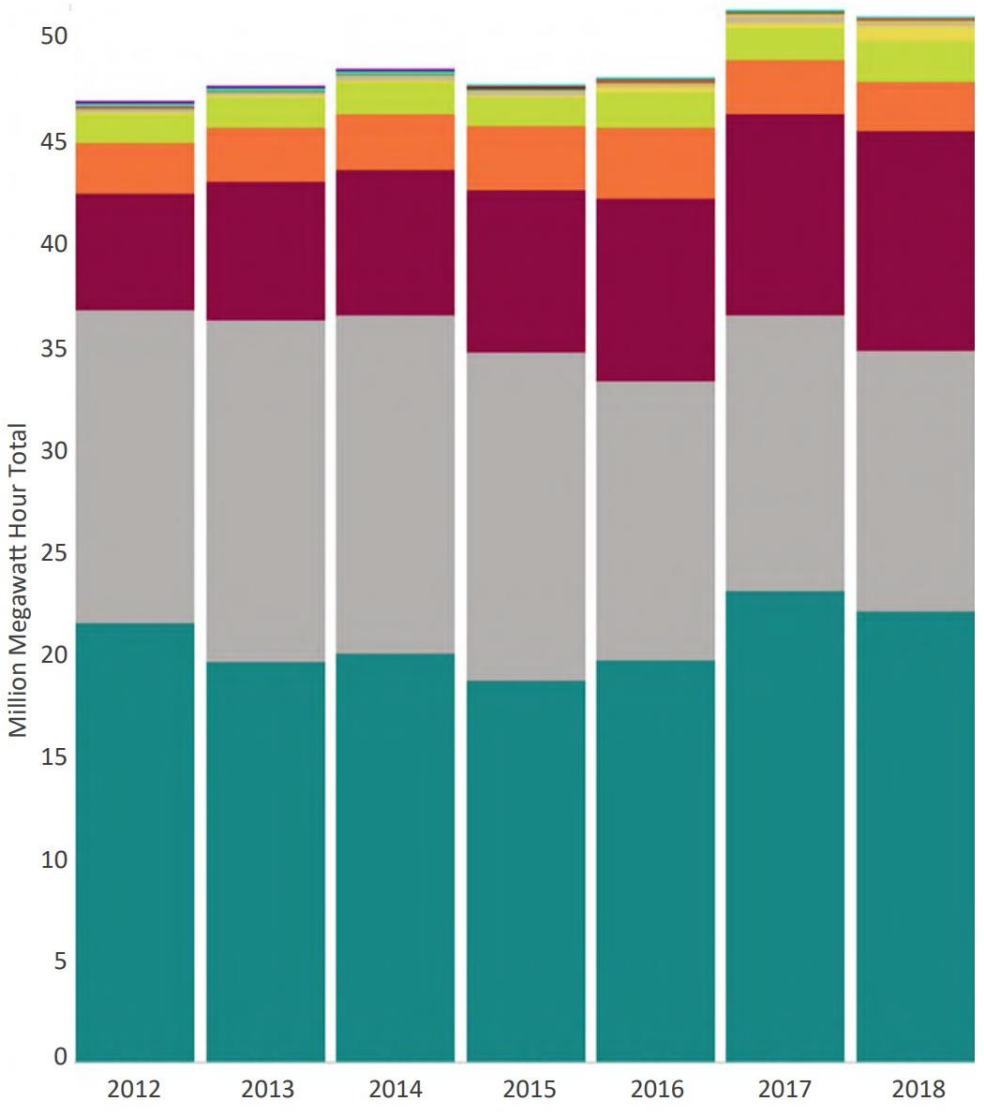
Resources Used to Generate Oregon's Electricity

Based on 2018 data, this chart shows the energy resources used to generate the electricity that is sold to Oregon's utility customers.



Oregon's Electricity Mix Over Time



Energy by the Numbers | Pages 9-10

Oregon County Energy Profiles

	WASHINGTON	JACKSON
 **County Info & Demographics**	**Population:** 583,595 **Regional Typical Income:** $60,286	**Population:** 213,765 **Regional Typical Income:** $44,028
 **Poverty & Energy Burden**	**Energy Burdened Households:** 16% **Annual Energy Burden Gap:** $497	**Energy Burdened Households:** 27% **Annual Energy Burden Gap:** $557
 **Homes**	**Homes Built Before 1990:** 53% **Owner-occupied Homes:** 60%	**Homes Built Before 1990:** 61% **Owner-occupied Homes:** 62%
 **Energy**	**Average Annual Electricity Cost:** $1,177 **Average Annual Natural Gas Cost:** $627	**Average Annual Electricity Cost:** $1,236 **Average Annual Natural Gas Cost:** $634
 **Home Primary Heating**	**Electricity:** 44% **Natural Gas**: 52%	**Electricity:** 54% **Natural Gas**: 36%
 **Travel**	**Annual Vehicle Miles Traveled:** 19,897 **VMT Cost:** $3,192	**Annual Vehicle Miles Traveled:** 20,867 **VMT Cost:** $3,346

Web-based Report| https://energyinfo.oregon.gov/counties-2020

History Timeline

The timeline of Oregon's energy history is meant to serve as a useful reference for readers as they review sections of the Energy Report, especially for energy data over time.

Portland during the early morning hours of pumping when gas was limited to five gallons per car on a first-come, first served basis, courtesy of David Falconer/EPA/US National Archives. (1973)

OREGON DEPARTMENT OF ENERGY

Clean Energy Timeline

1941 – Grand Coulee Dam, the largest concrete structure ever built at the time, begins operation - but inundates an important, historic fishing ground at Kettle Falls under Lake Roosevelt in Washington state.

1983 – EFSC approves its first renewable energy project.

2001 – The Stateline Wind Project in Umatilla County becomes first utility-scale wind energy facility built in Oregon.

2007 – Oregon legislature passes a renewable portfolio standard requiring the state's largest utilities to provide 25 percent of retail sales from eligible renewable sources by 2025 (SB 838).

2016 – Oregon adopts a 50 percent renewable portfolio standard and becomes the first state to legislatively mandate an end to coal in the state's electricity mix by 2030 (SB 1547).

2017 – Oregon's first utility-scale solar PV project larger than 50 MW, the Gala Solar project Crook County, begins operation.

2020 – Construction underway on multiple large utility-scale wind and solar energy projects, including the Wheatridge Renewable Energy Facilities in Morrow County, the Montague Wind and Solar Projects in Gilliam County, and the Golden Hills Wind Facility in Sherman County.

Energy 101

This section is intended to help the reader understand the first part of the energy story: how energy is produced, used, and transformed.

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OREGON DEPARTMENT OF ENERGY

Codes & Standards

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.

Figure 1: Status of State Energy Code Adoption for Residential Buildings[10]

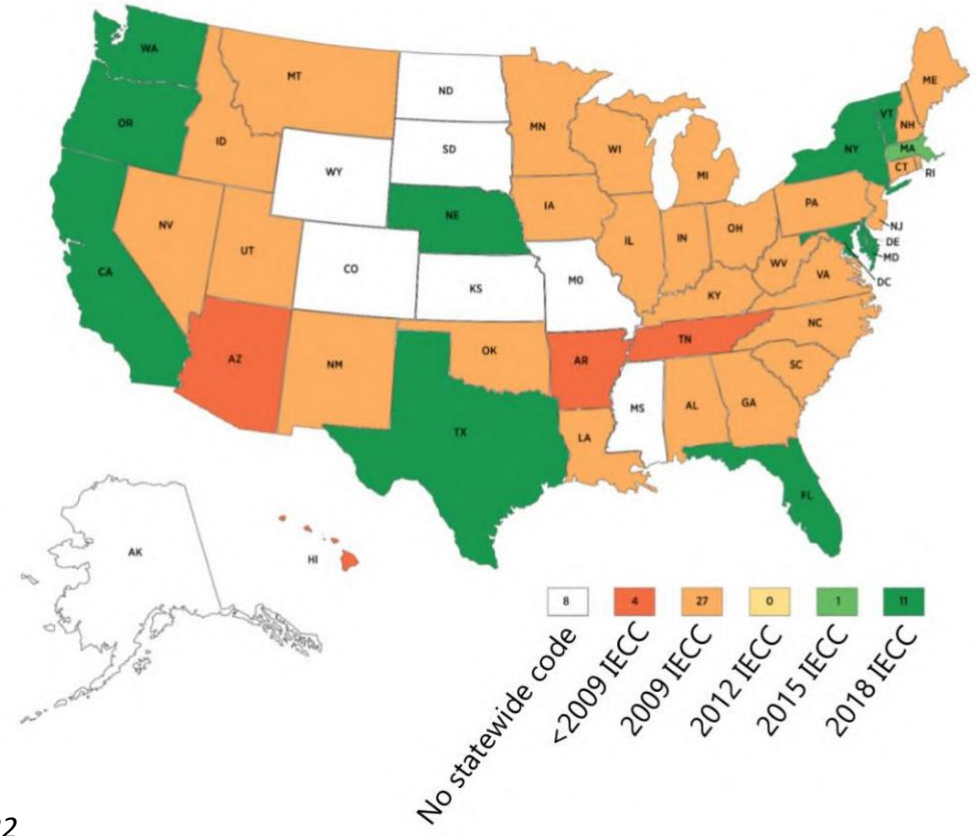
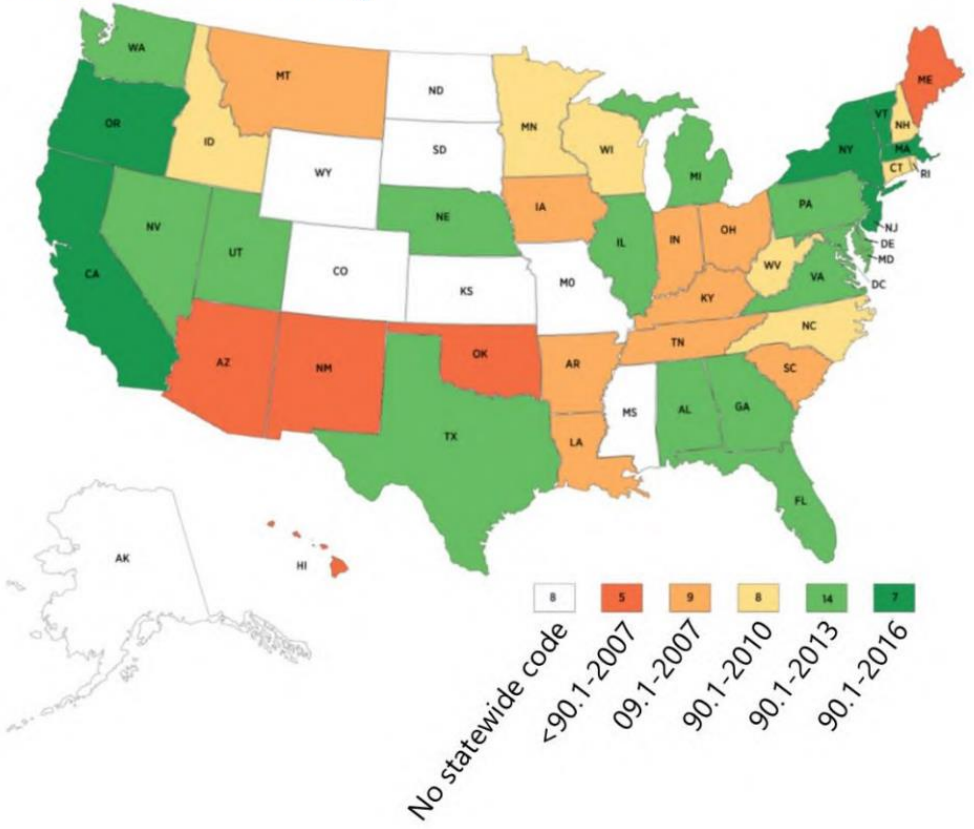


Figure 2: Status of State Energy Code Adoption for Commercial Buildings[10]



Resource & Technology Reviews

The reviews in this section cover the spectrum of traditional to innovative – and demonstrate the breadth of technology that is integral to the production and management of our energy system.

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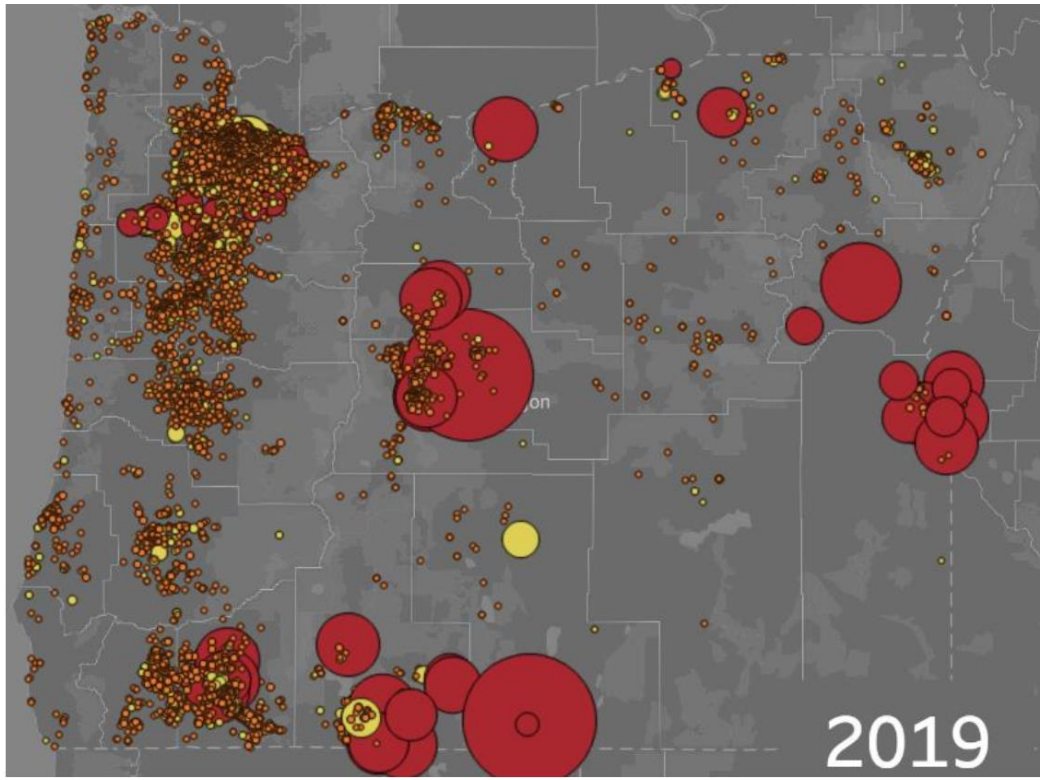
Solar

• Total Capacity in Oregon (2019):[i]	592 MW
• Facilities in Oregon (2019): (1 kW to 56 MW)	18,000+ Residential/Commercial and 77 Utility-Scale
• Total Generation (2018):	776,000 MWh
• In-State Consumption (2018):	680,499 MWh
• Total Exports: (2018):	95,501 MWh

Oregon Solar Dashboard



www.tinyurl.com/OregonSolarDashboard

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.

Technology & Resource Reviews | Pages 25-26

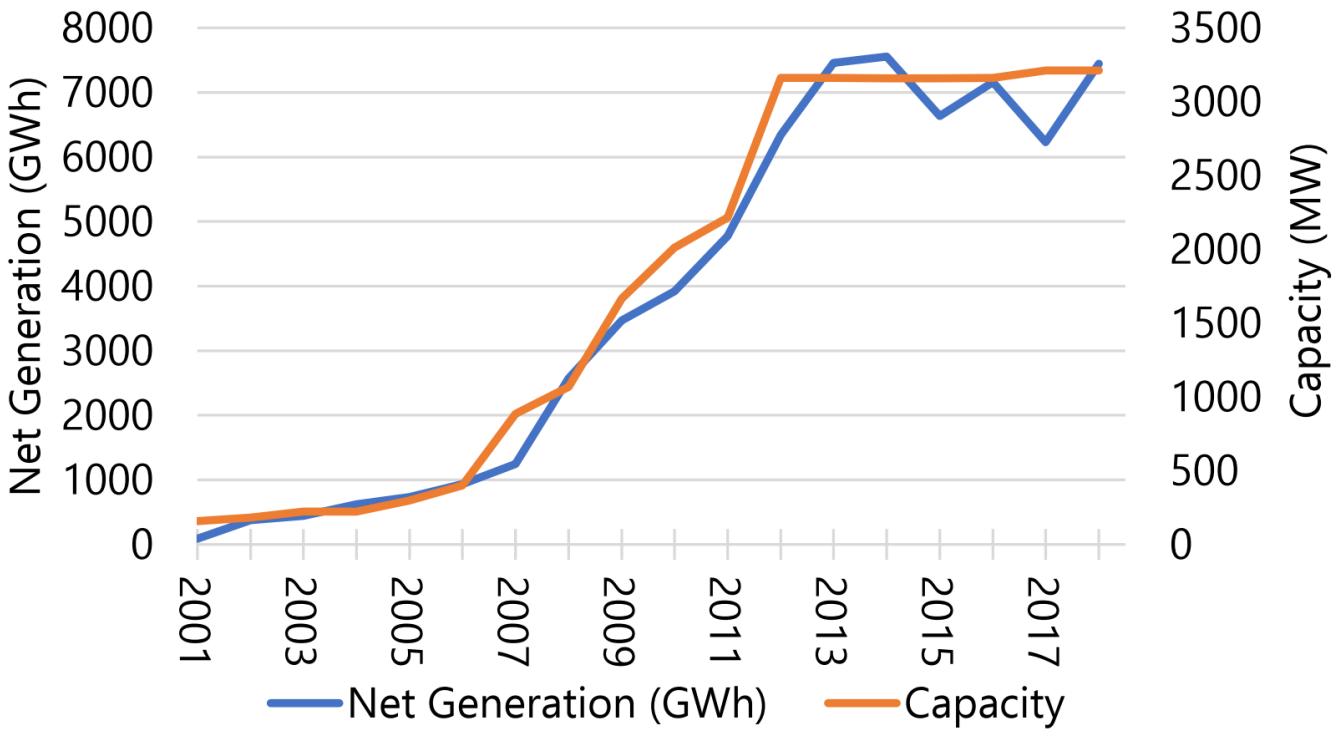
Wind

- Total MW Capacity in Oregon: 3,415 MW
- Facilities in Oregon (1.65 to 290 MW): 46 (3 under construction)
- Total Generation (2018): 7,447,442 MWh
- Total Consumption (2018): 2,396,878 MWh
- Total Exports (2018): 5,050,564 MWh

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.

Figure 2: Wind Net Generation and Capacity in Oregon by Year



Technology & Resource Reviews | Pages 15-17

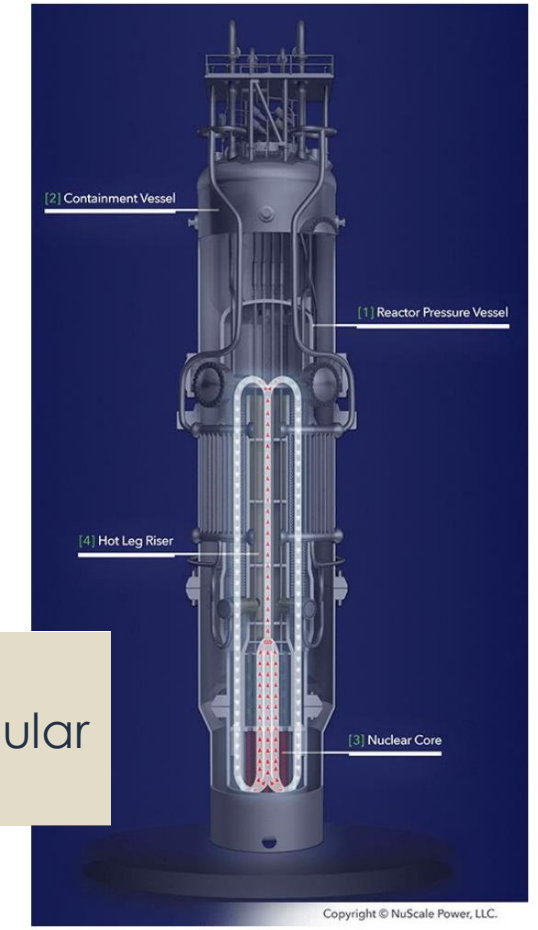
Small Modular Reactors

- Total Capacity and Facilities in Oregon: 0
- Range of Potential Sizes: 60 – 250 MW per module

Oregon-based NuScale developed the first modular reactor to receive design approval by the U.S. Nuclear Regulatory Commission.

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.



Design Illustration of NuScale Power Modular Reactor

Technology & Resource Reviews | Pages 54-56

Power-to-Gas

- Established technology in Europe; emerging in the U.S.
- NW Natural and Eugene Water & Electric Board are evaluating an 8.5 MW project opportunity in Oregon.
- Douglas County PUD in Washington is planning a 5 MW facility
- Utah's ACES project expects to have 10 GWh of H2 storage capacity

Figure 2: Green, Blue, and Grey Hydrogen Explained[9]

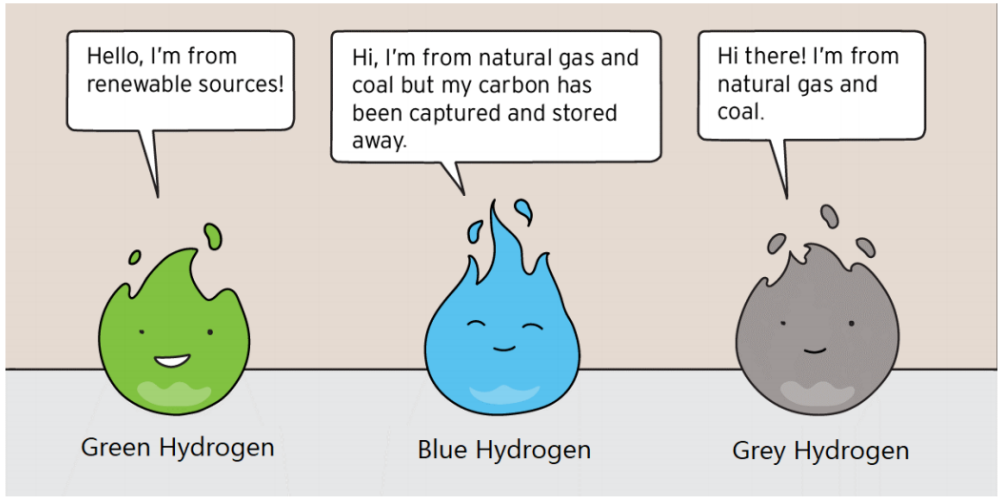
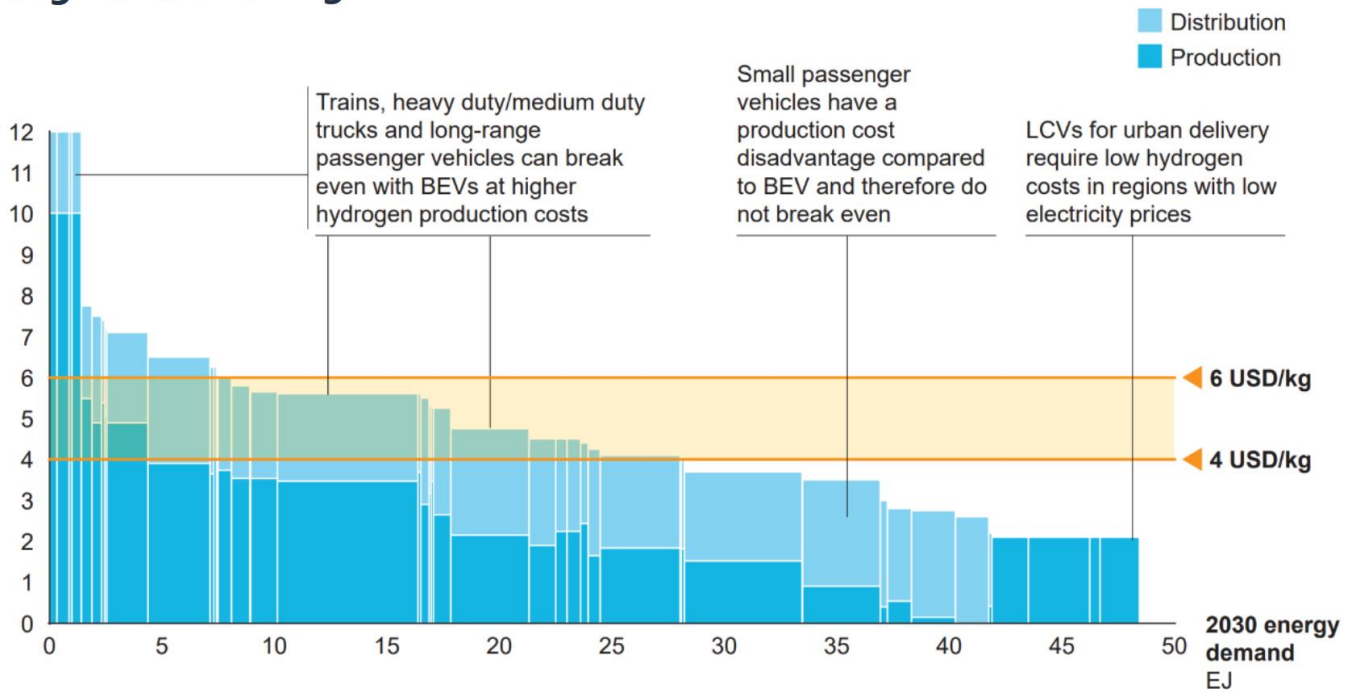


Figure 3: Cost Curve for Hydrogen for Transportation Sector Across Segments and Regions[21]



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Policy Briefs

This section provides deeper-dive insights on emerging energy trends, opportunities, and barriers in the energy sector.

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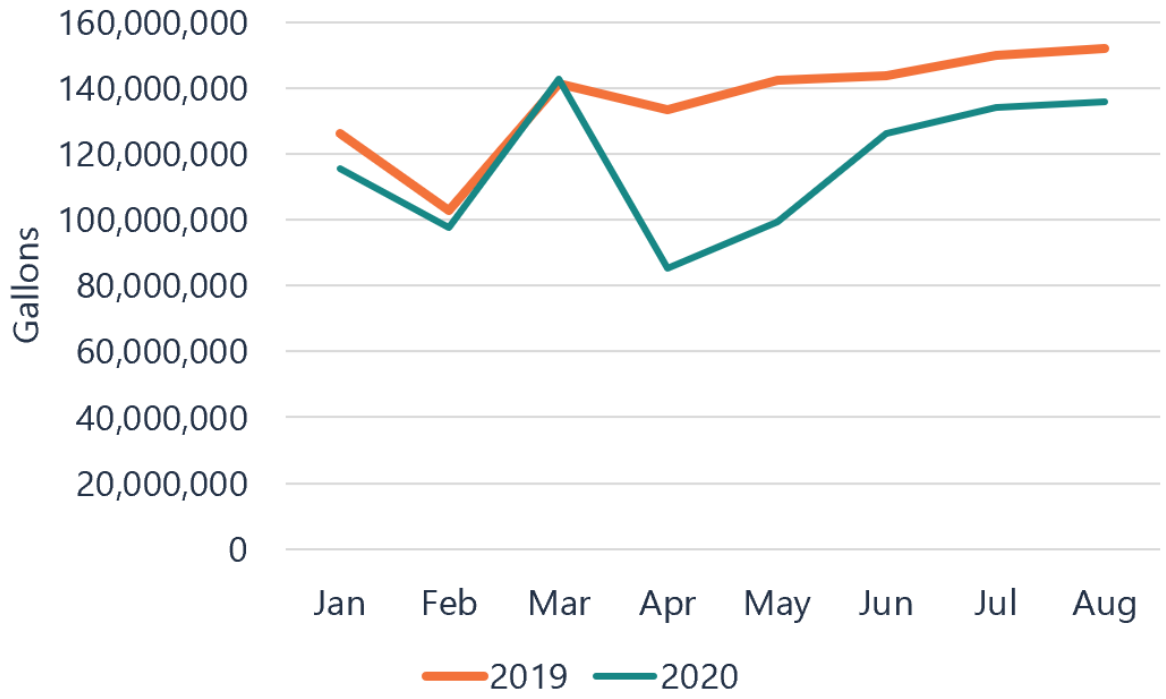
Policy Briefs

OREGON DEPARTMENT OF ENERGY

COVID-19 and Energy

The COVID-19 pandemic has affected the energy sector in many ways, both around the world and in Oregon. Because of COVID-19 we saw energy consumption behavior change quickly. For example, the U.S. Energy Information Administration (EIA) reported that total national energy consumption in April 2020 was 14 percent lower than in April 2019, the lowest monthly energy consumption since 1989 and the largest year-over-year decrease since EIA began tracking this data in 1973.

Figure 2: Oregon Gasoline Consumption (2019 Compared to 2020 January – August)[14]



Some Oregon utilities took action in the wake of the COVID-19 outbreak:

- Waiving fees for disconnections and reconnections.
- Waiving the accrual and collection of late payment fees, interest, and penalties.
- Increasing the duration and flexibility for payment arrangements to pay off past due balances.
- Creating new relief funds offering bill credits to customers who lost income due to the pandemic.
- Assisting business customers in applying for federal aid.
- Relaxing eligibility conditions for equal payment plans.
- Refunding security deposits or applying them to utility bills.
- Easing paperwork requirements to qualify for energy assistance programs and medical certification.

Policy Briefs | Page 208, 215

Agriculture and Energy

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

Top 5 Uses of Electricity	Top 3 Uses of Natural Gas	Top 3 Uses of Propane
Irrigation	Greenhouses	Forklifts
Seed Cleaning	Dryers (hops, onions)	Greenhouses
Greenhouses	Shop/Farm	Shop/Farm
Shop/Farm		
Cold Storage		

For several rural consumer-owned utilities, farms are the primary customer base – and the seasonal dynamics of supplying energy to farms drives utility operations.

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Equity & Renewable Energy

Oregon has been a leader in development of renewable energy for many years. Customer-owned or on-site renewables can provide individual financial benefits, societal benefits associated with clean energy production, and economic development associated with jobs to install systems. However, access and benefits of on-site renewable energy systems have not been enjoyed by all Oregonians.

Figure 1: Annual Count and Average Cost of PV installations in the Residential Energy Tax Credit Program

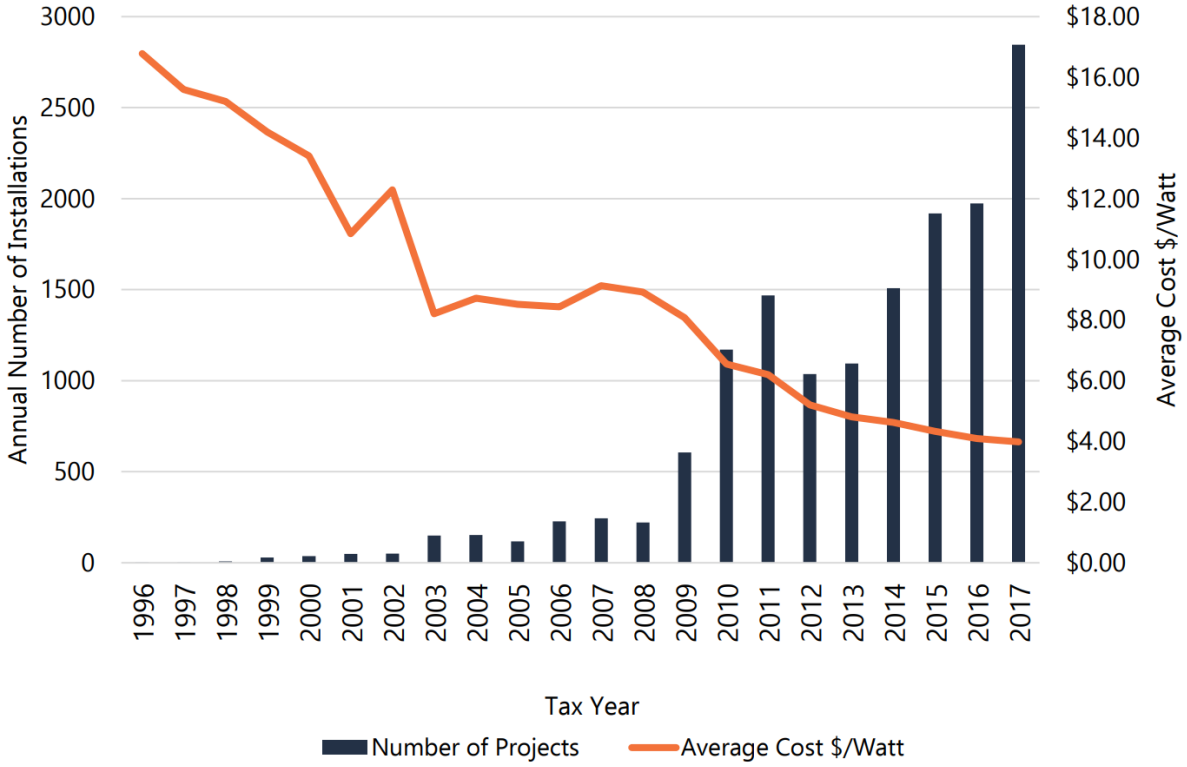

Table 2: Race Distribution of 2010 RETC Census Blocks

	2010 Oregon Population Race Distribution	2010 RETC Block Group Race Distribution
White	78.46%	84.76%
Hispanic	11.75%	6.40%
Asian	3.64%	3.29%
Two or More Races	2.87%	2.76%
Black	1.70%	1.61%
American Indian and Alaska Native	1.14%	0.81%
Hawaiian / Other Pacific Islander	0.33%	0.22%
Other	0.14%	0.16%

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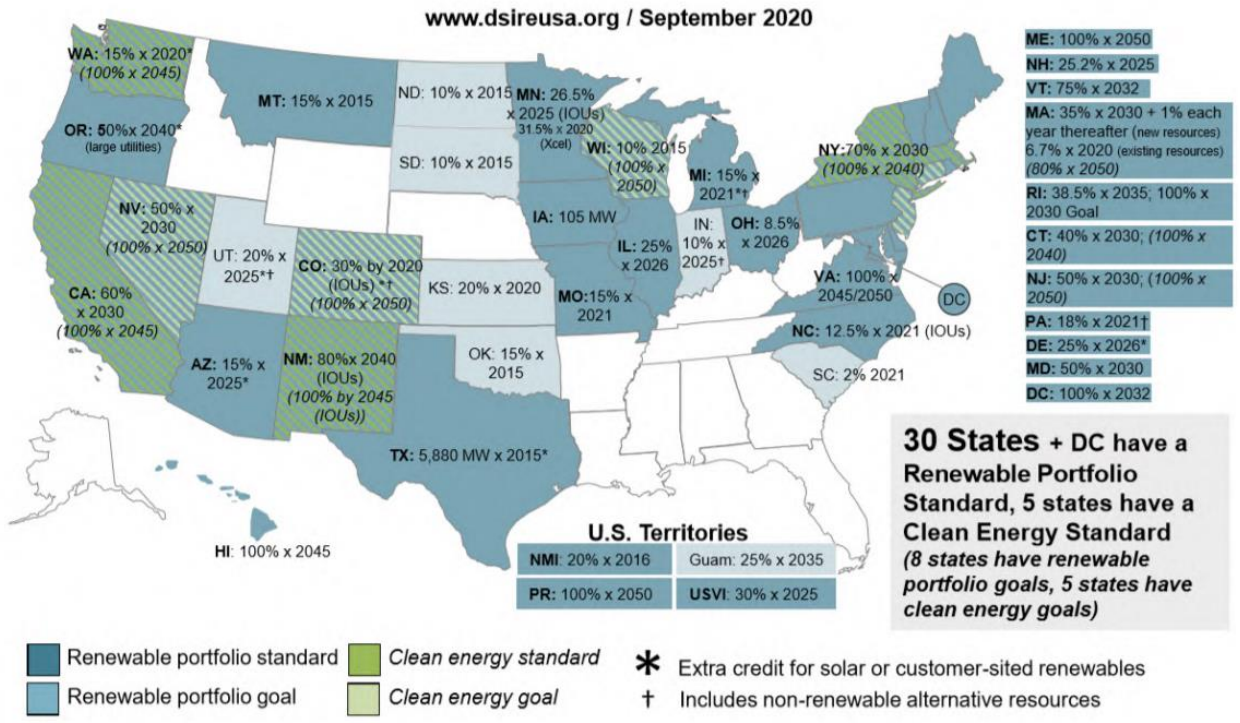
CROSS-SECTIONAL TOPICS

Resource Adequacy & Clean Energy Standards

Resource adequacy ensures there are sufficient resources available to meet electricity needs. As more coal plants head toward retirement and renewable energy facilities come online, addressing resource adequacy will become even more important.

- Energy 101: Clean & Renewable Standards
- Policy Brief: Renewable & Zero Emission Standards
- Technology Reviews: Storage, Solar, Wind, Etc.
- Energy 101: Resource Adequacy
- Policy Brief: Resource Adequacy

Figure 1: Renewable and Clean Energy Standards in the United States



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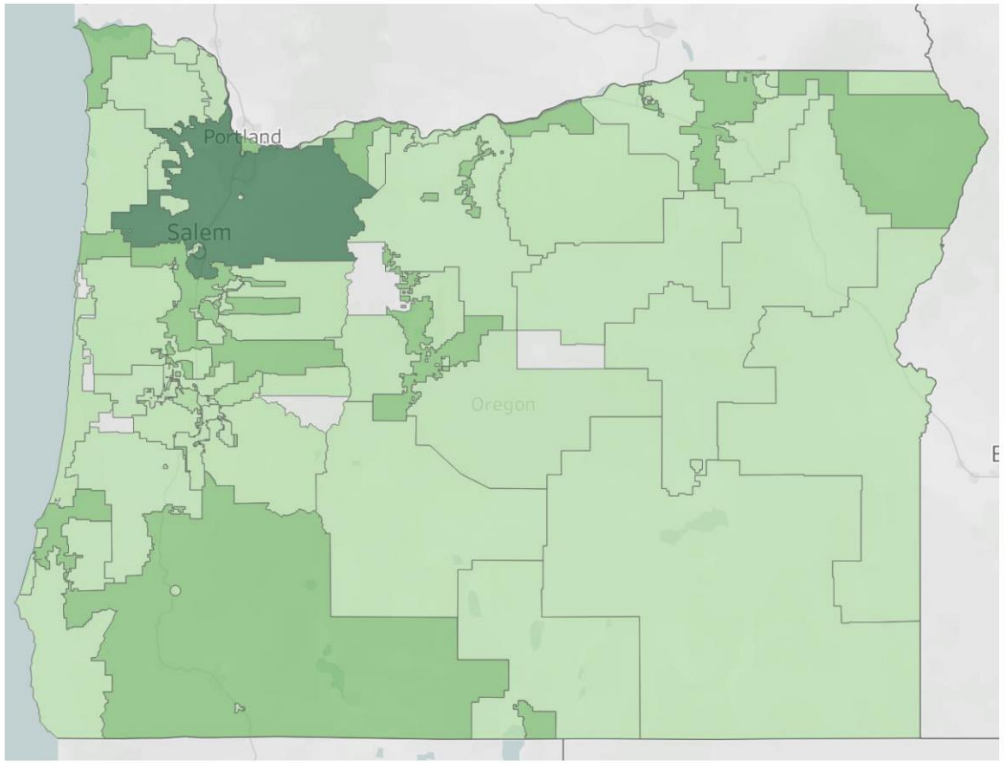
Key Considerations for a Clean Energy Standard

- How should equity be centered?
- How can the policy be designed to maximize cost effectiveness?
- What should be the final target date?
- Which electricity generation resources should be eligible?
- How can the policy ensure enough electricity to meet demand at all times?
- Which entities should be subject to a standard?

CROSS-SECTIONAL TOPICS

Figure 2: Registered EVs by Oregon Utility Service Territory[4]



Darker shades of green = more registered EVs

Alternative Fuels and Electric Vehicles

Transportation is the largest contributor of greenhouse gas emissions in Oregon, so increasing low- and zero-emission vehicle options can help address climate change. Sections discuss the technologies, how increased adoption can affect utilities and the electric grid, and more.

- Energy by the Numbers: Transportation Fuel Production, Consumption, Expenditures, and Emissions
- Energy 101: Where Transportation Fuels Come From
- Technology Reviews: Electric Vehicles, Charging, & Hydrogen Cars
- Policy Brief: Assessing & Managing Effects of EVs on the Grid
- Policy Brief: Using Truck Efficiency to Reduce Fuel Consumption and Emissions
- Policy Brief: Alternative Fuels Assessment for Medium- & Heavy-Duty Fleets

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Questions/Comments?

Email christy.splitt@oregon.gov

RESOURCES:

Energy Report online: energyinfo.oregon.gov/ber

ODOE's website: www.oregon.gov/energy