

# 2022 Biennial Energy Report

House Committee on  
the Environment and Natural Resources  
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OREGON  
DEPARTMENT OF  
ENERGY



# 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

# 2022 BIENNIAL ENERGY REPORT

## Goal of the Report

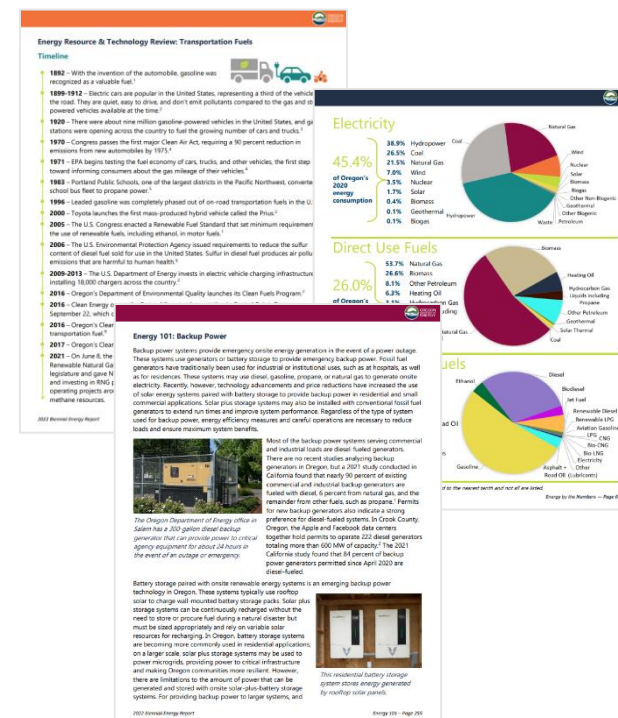
Pursuant to ORS 469.059, provide a comprehensive review of energy resources, policies, trends, and forecasts, and what they mean for Oregon.

## Scoping the Report

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

## Designing the Report

Themes cross sections – energy 101s, resource and technology reviews, policy briefs.



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## **Executive Summary & Introduction**

### **Energy By the Numbers**

- Oregon's Energy Story
- Energy Use in Oregon
- Energy Production
- Energy Costs & Economy
- Energy Efficiency
- Energy End Use Sectors

### **A Timeline of Oregon Energy History**

### **Energy Resource & Technology Reviews**

- Electricity Generation
- Transportation Fuels
- Clean & Efficient Vehicle Technologies
- Energy Efficient Building Technologies
- Electricity Storage
- Hydrogen

## **Energy 101**

- Oregon State Government Energy Landscape
- Consumer Energy Cost Drivers
- Oregon Fuel Action Plan
- Backup Power
- Radioactive Waste in Oregon
- Public Utility Regulatory Policies Act of 1978 (PURPA)
- Electric Sector Resource Planning and Acquisition
- Long-Duration Energy Storage
- Electrification Options in the Agricultural Sector
- Oregon State Climate Programs and Actions
- Infrastructure Investment and Jobs Act of 2021

## **Policy Briefs**

- Charting a Course for Oregon's Energy Future
- Oregon Clean Energy Opportunity Campaign Case Study
- Energy Efficiency Policy Opportunities in Existing Buildings
- Beyond Energy Savings – Co-Benefits of Energy Efficiency
- Local Energy Perspectives on Workforce and Supply Chain

## **Report Recommendations & Conclusion**

# Energy by the Numbers

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

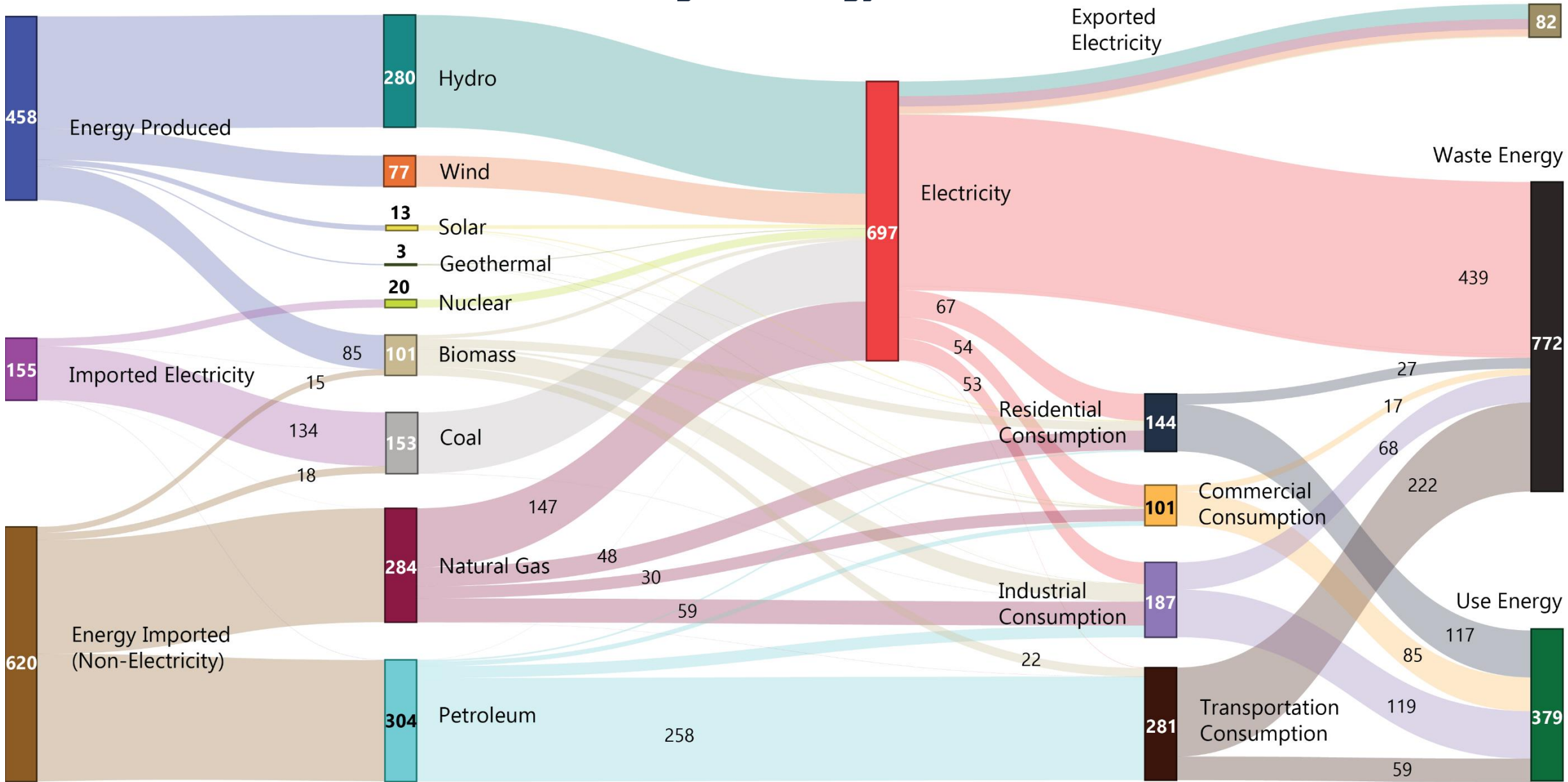
Data and metrics track how Oregon produces, purchases, and uses various types of energy.

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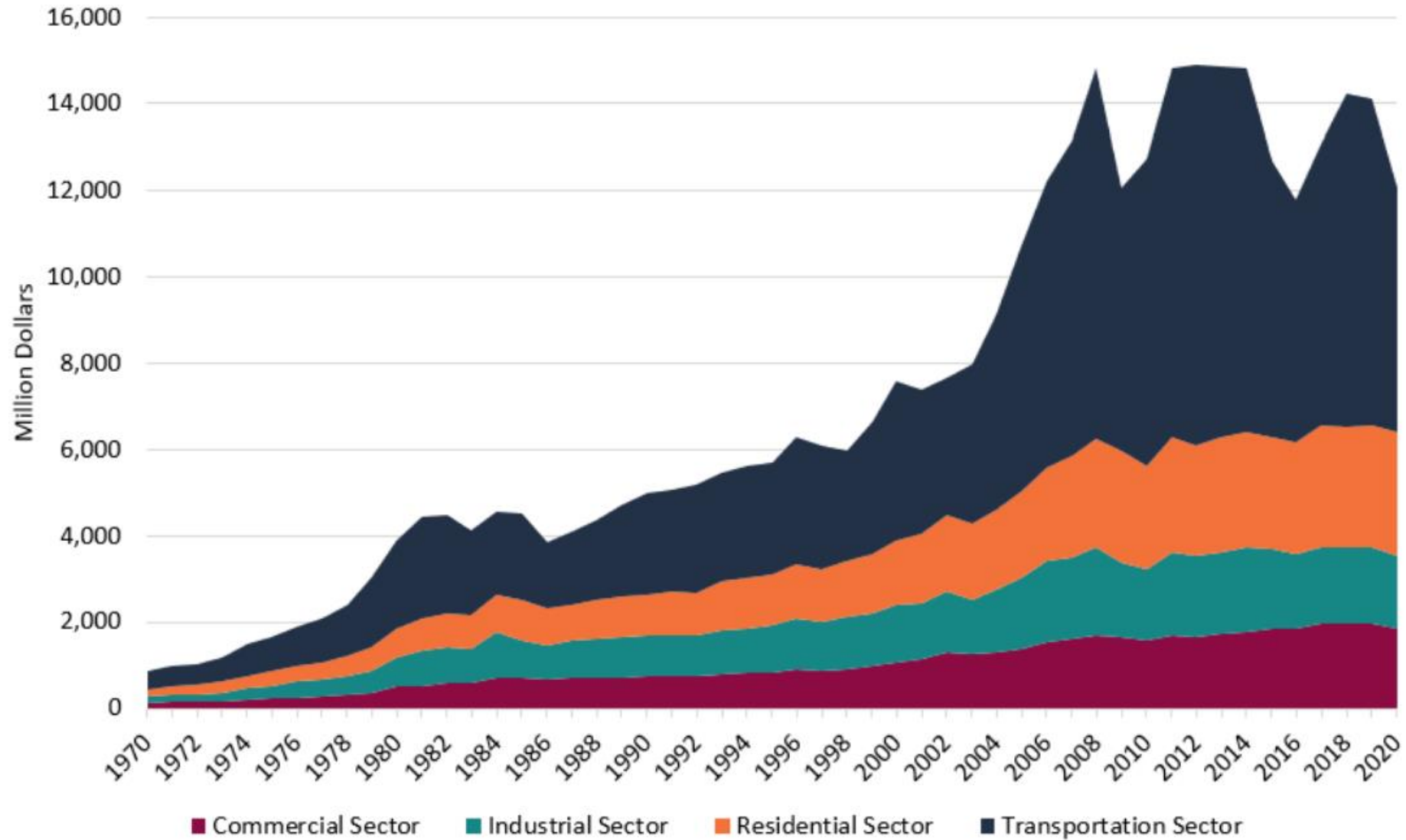
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# Oregon's Energy Flow



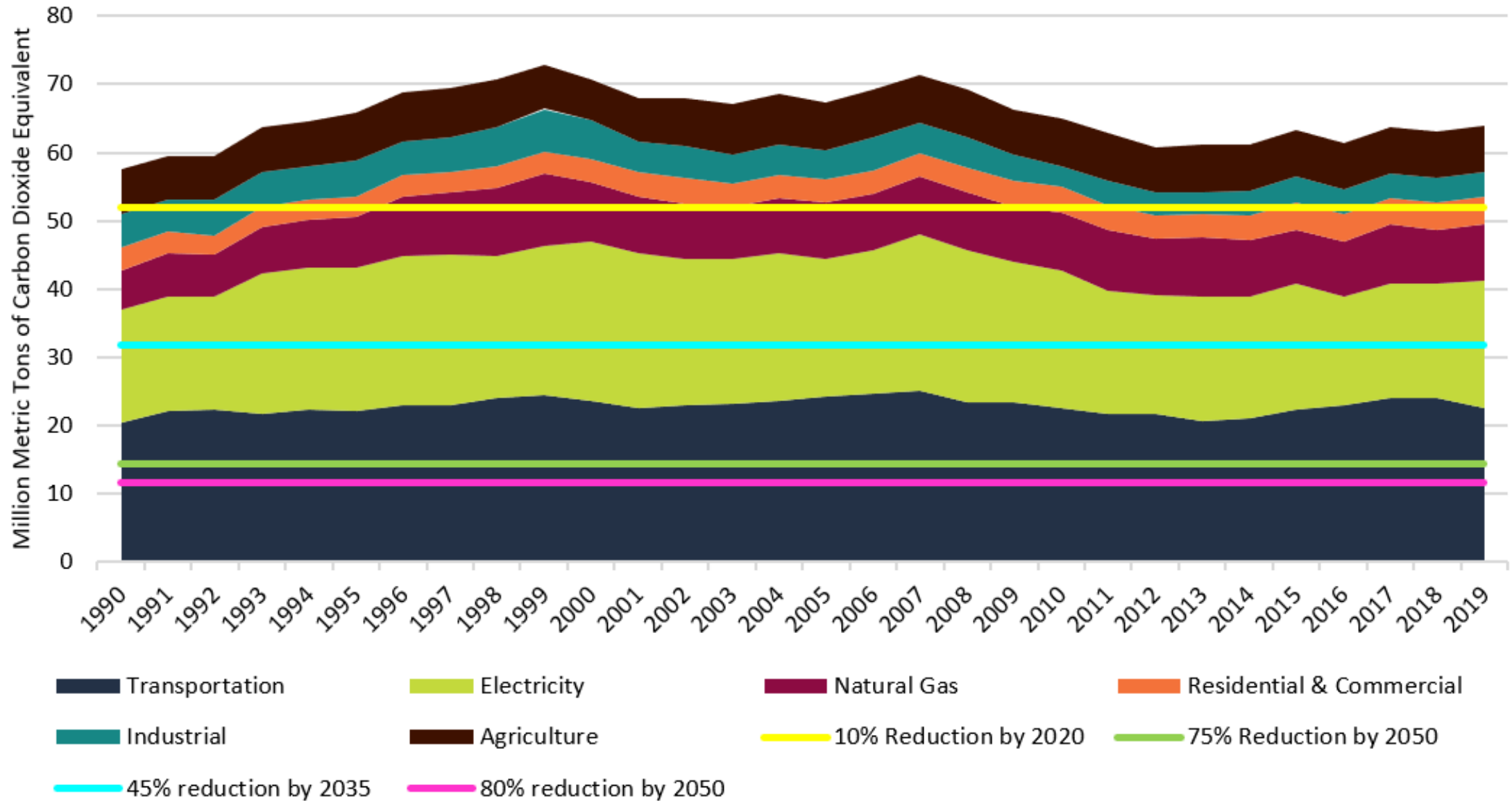
Numbers are in trillions of British thermal units (Btus) 6

# Oregon's Total Energy Expenditures by Sector Over Time



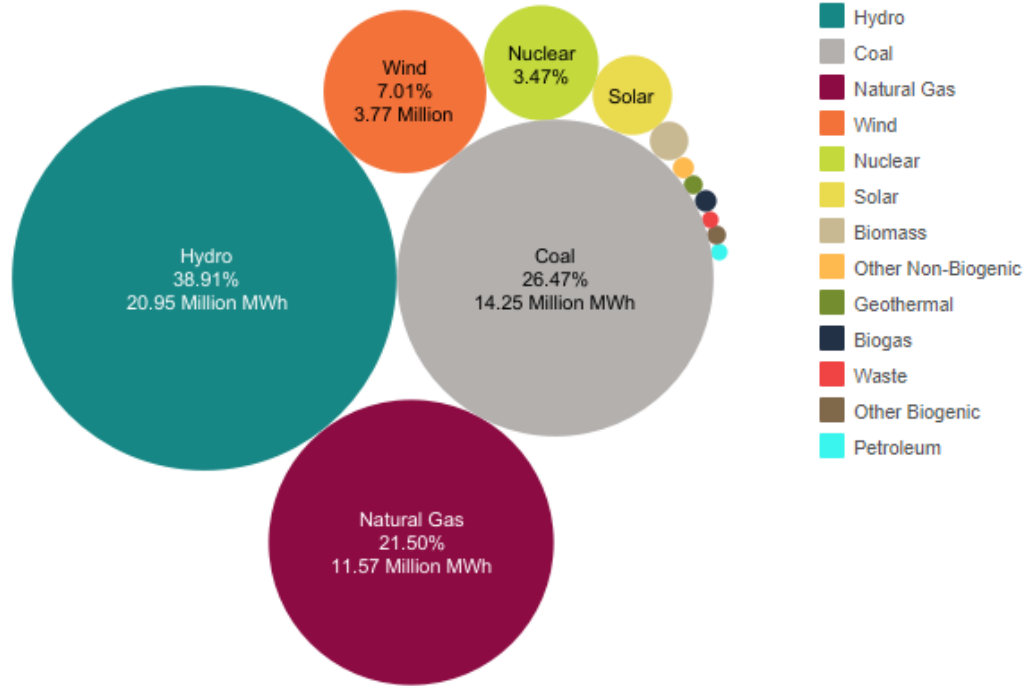
*U.S. EIA reports prices in current dollars per million Btu. Chart is not adjusted for inflation.*

# Oregon Greenhouse Gas Emissions Over Time

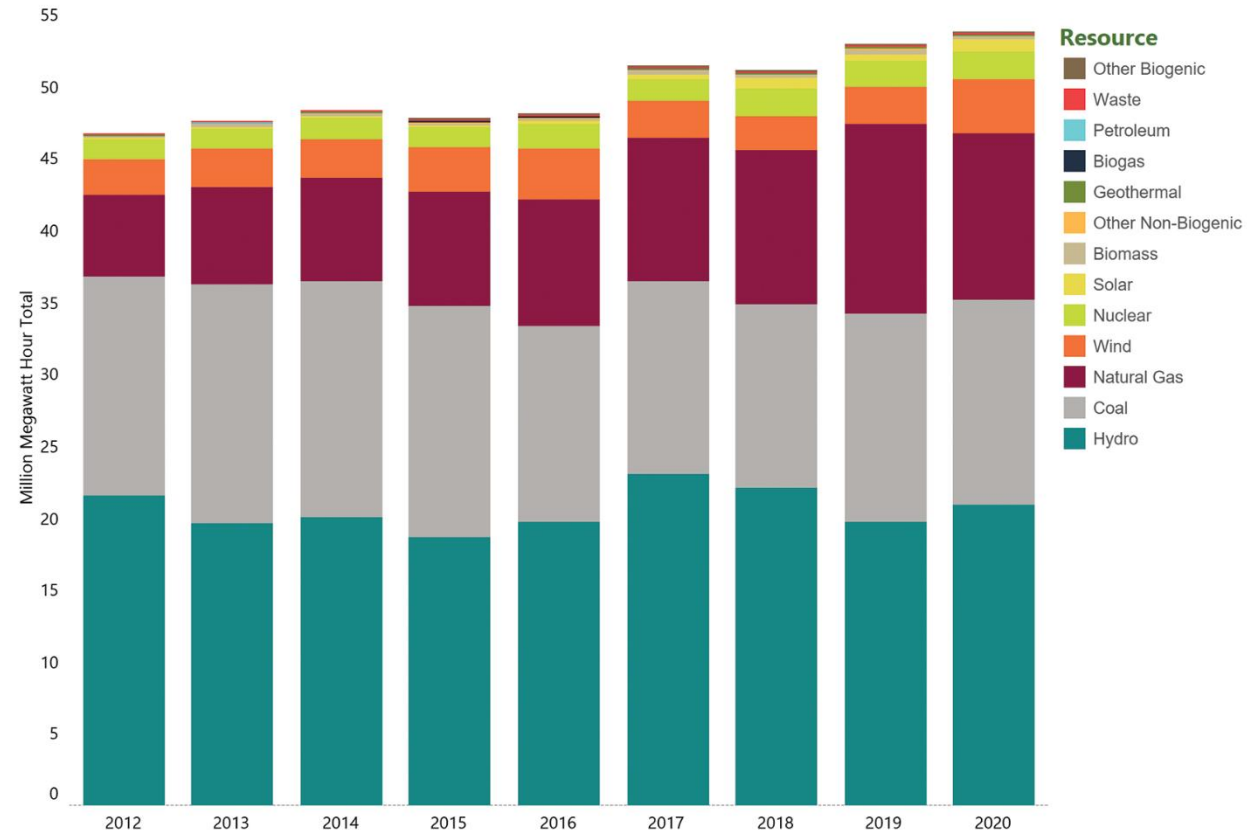




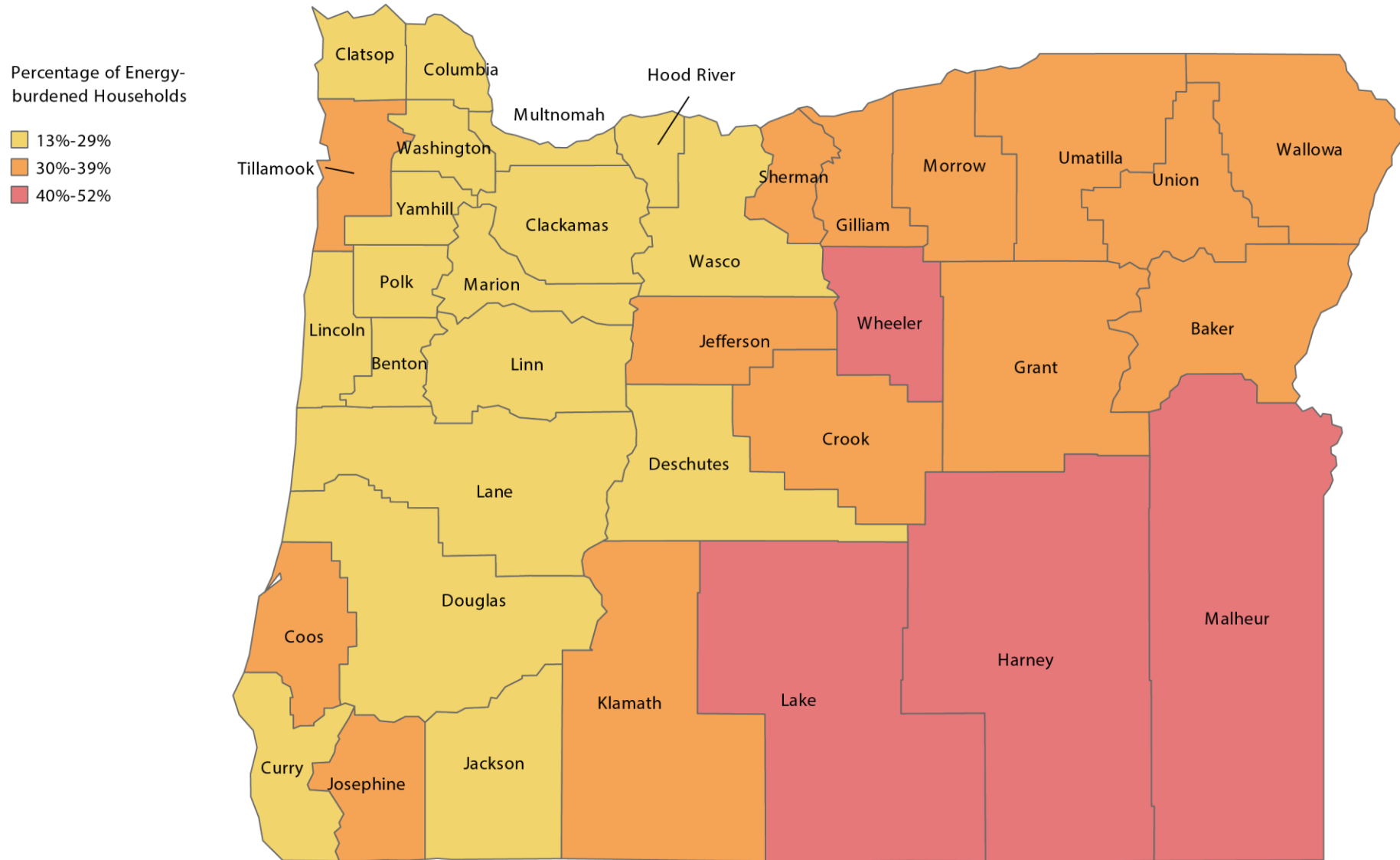
## Resources Used to Generate Oregon's Electricity (2020)



## Resources Used to Generate Oregon's Electricity Over Time



# Percentage of Oregon Households Considered Energy Burdened and Earning 200 Percent or Below Federal Poverty Level by County (2020)



# History Timeline

The online, interactive 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.



<https://energyinfo.oregon.gov/timeline>

OREGON STATE COLLEGE  
May 1941

Image courtesy of OSU...

EVENT

First Aluminum Smelter in the Northwest  
1940



Left image- Alcoa Aluminum Co. poster during World War II, courtesy National Archives.

More →

3d

EVENT

Woody Guthrie & the "Columbia River Songbook"  
1941



Check out the Audio link to listen Guthrie's songs from the "Columbia River Songbook"!

More →

EVENT

BPA's Motion Picture Information division starts the motion picture "The..."  
1941



Watch

EVENT

Grand Coulee Dam begins Operation and Flooding of Kettle Falls  
1941



Images (1) Audio (3)

1941

✕



"Roll On Columbia"



## WOODY GUTHRIE & THE "COLUMBIA RIVER SONGBOOK"

Check out the Audio link to listen Guthrie's songs from the "Columbia River Songbook"!

Woody Guthrie starts work at BPA. He was hired to write songs and produced 26 songs in the 30 days of his employment which later were collected into the "Columbia River Songbook." The most famous of these songs is "Roll On, Columbia," the state folk song of Washington.

# 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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# Consumer Energy Cost Drivers

**Transportation fuel costs** influenced by global crude oil prices

- *Global commodity prices subject to volatility and vulnerable to market disruption (e.g., war, pandemic)*

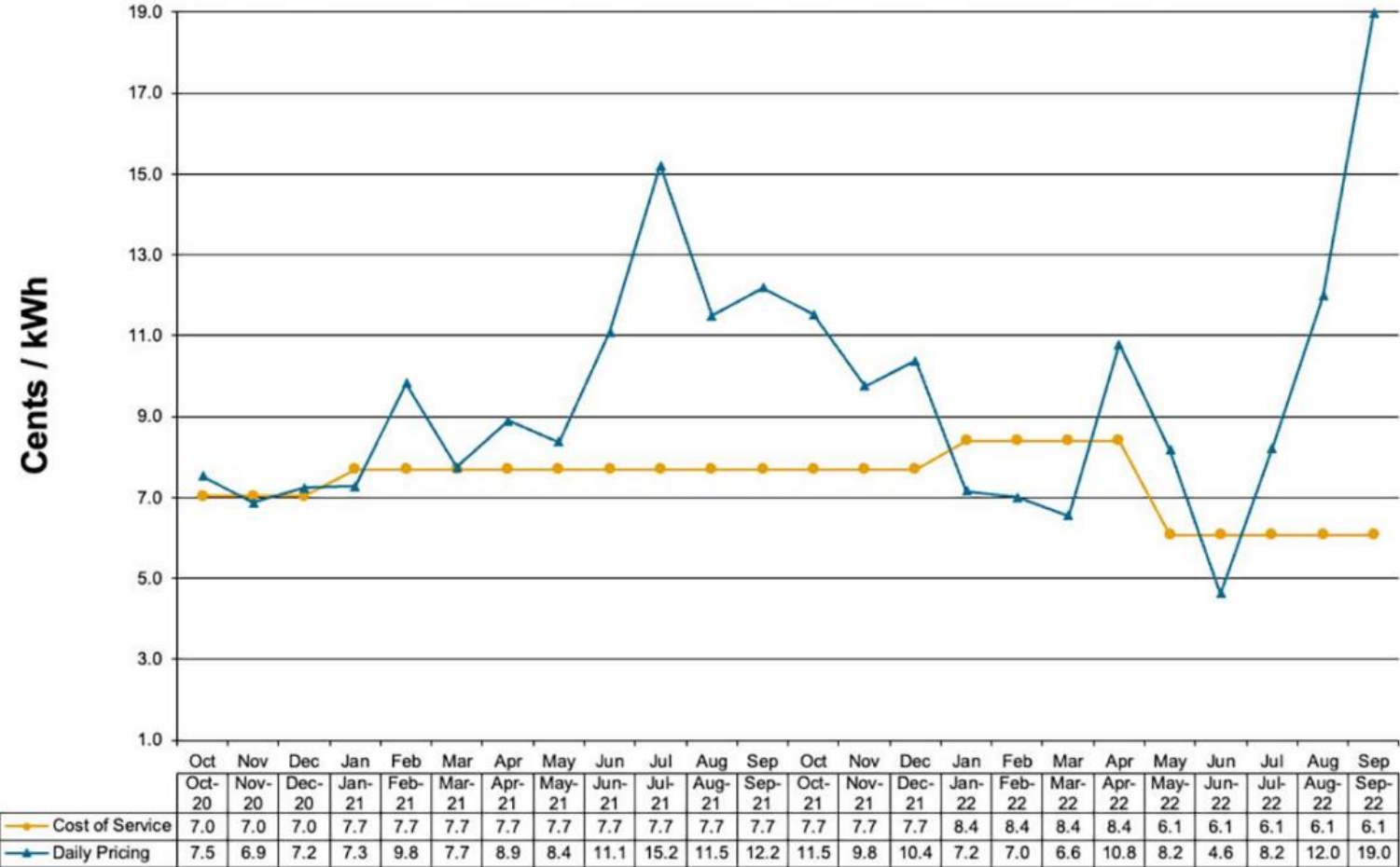
**Wholesale electricity and natural gas costs** driven by market supply and demand

- *Impacted by fuel price volatility and weather conditions*

**Retail electricity and natural gas costs** determined through utility cost-of-service ratemaking processes

- *Regulatory oversight provides consumer cost stability and mitigates impacts from wholesale price volatility*

**Comparison of Wholesale and Retail Electricity Rates**



## 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.

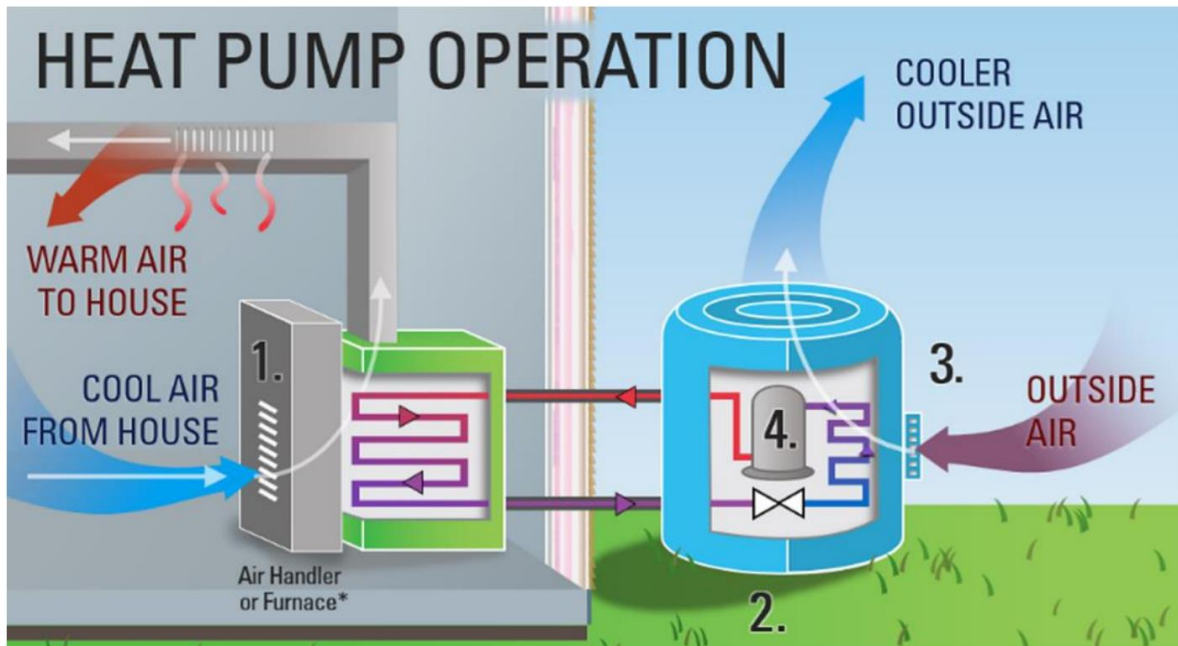
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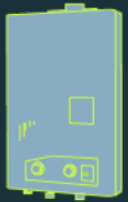
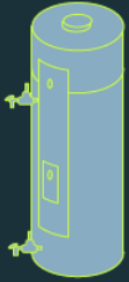
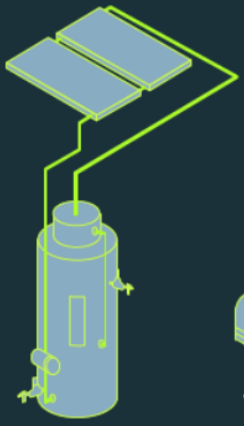

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## Energy Efficient Building Tech

Energy efficiency saves Pacific Northwest ratepayers over **\$4 billion** and reduces GHG emissions by over 22 million MTCO2 each year.



## TYPES OF WATER HEATERS

| STORAGE   | TANKLESS  | HEAT PUMP   | SOLAR   | TANKLESS COIL & INDIRECT  |
|---|---|---|---|---|
|  |  |  |  |  |
| <b>COST</b>   | <b>COST</b>   | <b>COST</b>   | <b>COST</b>   | <b>COST</b>   |
| \$  | \$\$  | \$\$  | \$\$\$  | \$\$  |
| <b>LIFE EXPECTANCY</b>  | <b>LIFE EXPECTANCY</b>  | <b>LIFE EXPECTANCY</b>  | <b>LIFE EXPECTANCY</b>  | <b>LIFE EXPECTANCY</b>  |
| 10-15 years   | 20+ years   | 10-15 years   | About 20 years  | 10-11 years   |

Advances in energy efficiency have helped utilities manage regional demand and reliability for energy, **reduce energy burden** for many Oregonians, and contribute to progress toward state and local climate goals.

There remains significant energy efficiency potential to continue to provide these benefits.



## Policy Briefs

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

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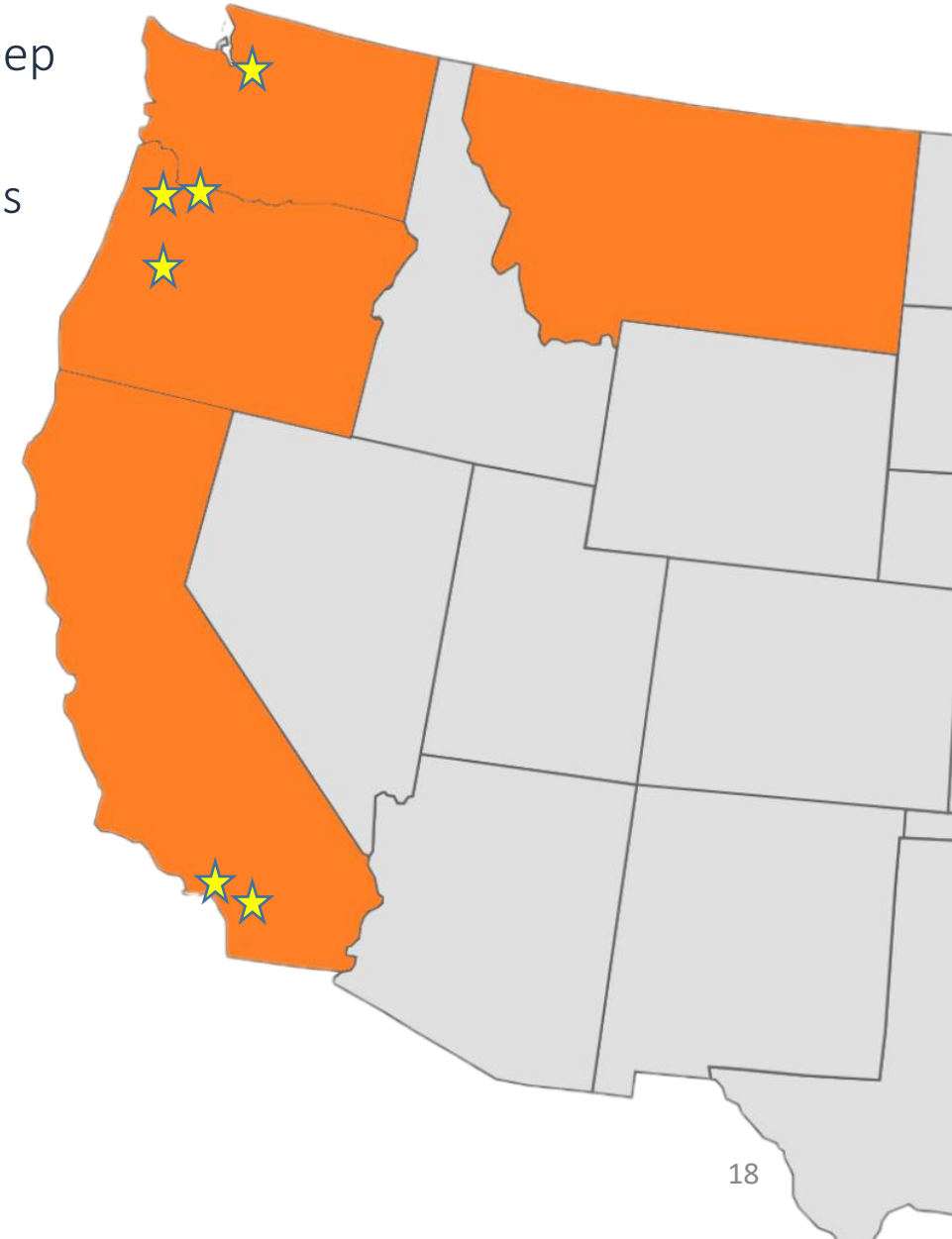
**Charting a  
Course for  
Oregon's  
Energy Future**

## Part I: Introduction

- What will it take to achieve economywide deep decarbonization and 100% clean energy?
- We reviewed 20 technical studies from across the country (mostly the west)

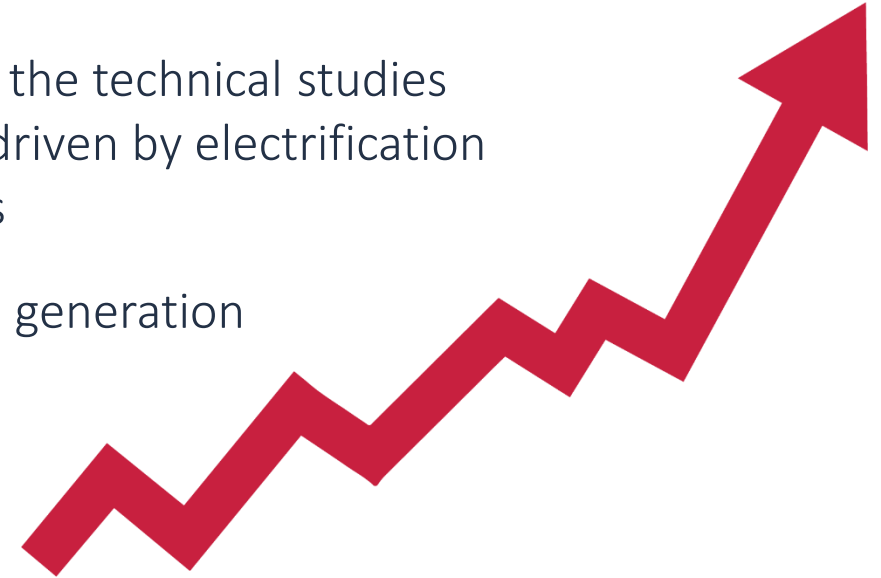
### Key Findings:

- Achieving these policies is possible!
- Four pillars of decarbonization identified:
  - energy efficiency,
  - electrification of end uses,
  - cleaner electricity, and
  - develop low-carbon fuels
- There are multiple pathways to achieve policies by mid-century, each with its own tradeoffs



## Part II: Electric Sector

- Growing the electric sector: Consensus in the technical studies that demand for electricity will increase, driven by electrification of vehicles and some natural gas end uses
- Cleaning the electric sector: Existing fossil generation will also need to be replaced



### Key Findings:

- Energy efficiency continues to play an important role
- Significant amount of new renewable generation required (likely in the tens of gigawatts in Oregon)
- Need to balance tradeoffs involved with clean energy choices—land use impacts, fish and wildlife concerns, total costs, and more

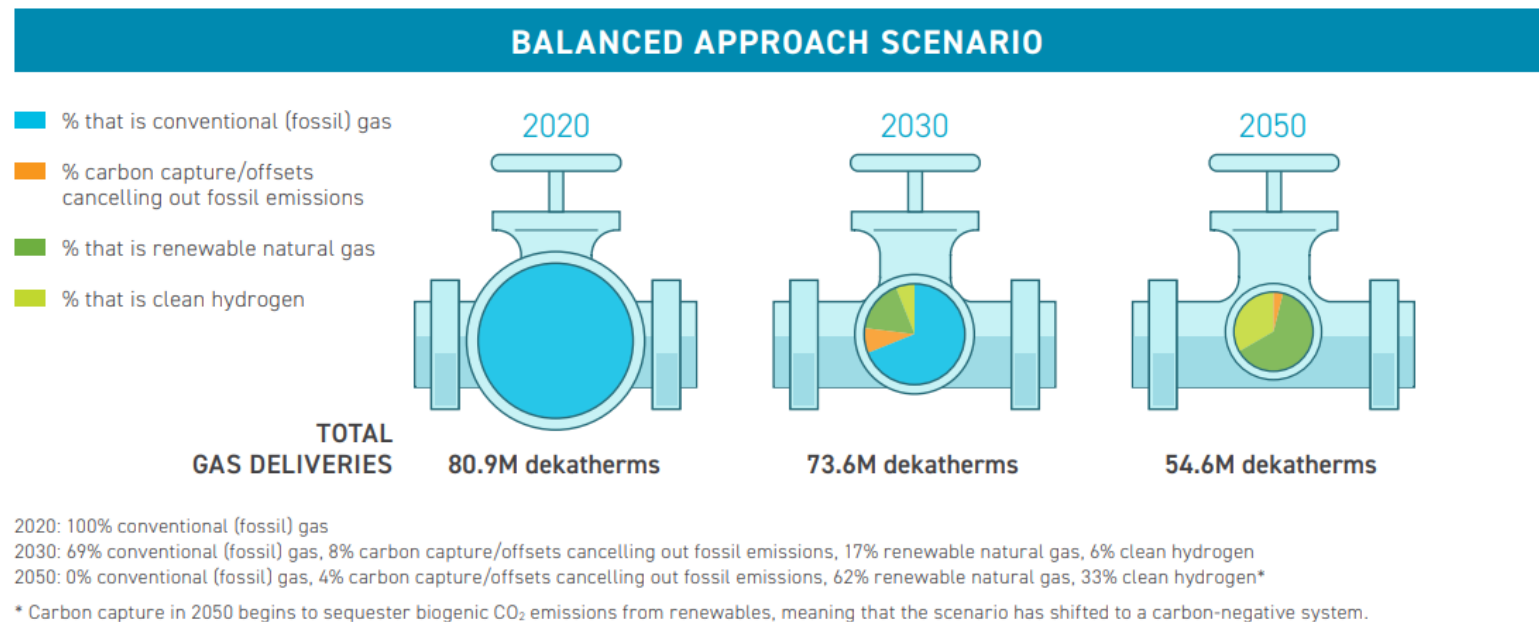
Charting a Course for Oregon's Energy Future

## Part III: Natural Gas Sector

- Electrification: Most studies find that it is more cost-effective to achieve decarbonization policies by electrifying a lot of current uses of natural gas—such as for electric generation and for many heating applications
- Strategic use of gas: In other instances, the continued use of gas resources may prove the most cost-effective path to achieving clean energy policies

### Key Findings:

- Many studies identify a continued need for some dispatchable gas resources
- To achieve policy targets, the gas will need to become cleaner over time by using RNG, carbon capture, or renewable H2

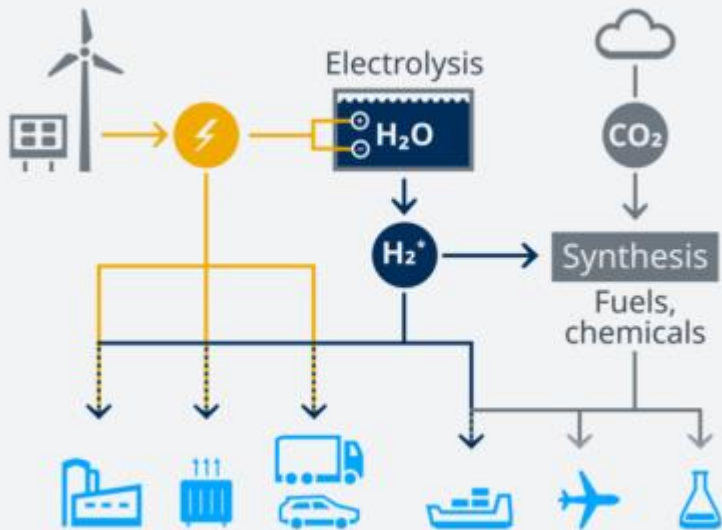


## Charting a Course for Oregon's Energy Future

### Part IV: Transportation Sector

- Electrification: Electrifying road vehicles – passenger vehicles, trucks, and buses – is a key element of most deep decarbonization studies. Many studies indicate that sales of new passenger vehicles will need to be all electric by 2035 to achieve significant decarbonization by 2050.

#### Power-to-x: carbon-neutral fuels



Source: DW | \*H<sub>2</sub> = hydrogen

©DW

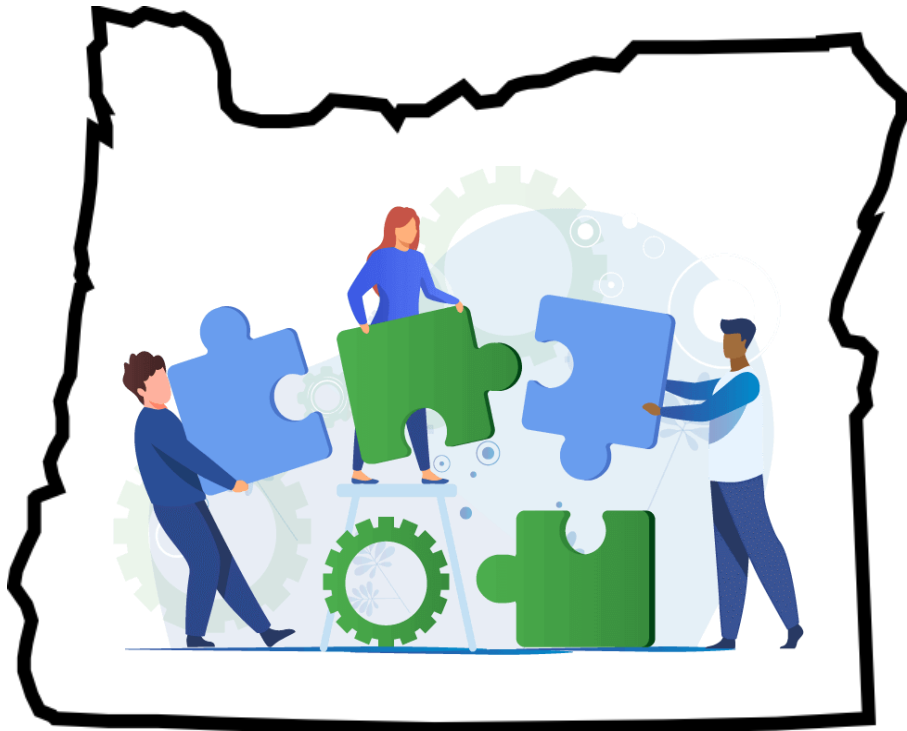
- Equity: A transition to clean transportation requires thoughtful deliberation and robust engagement with industry, communities, drivers, and governments. There is an opportunity to build a more equitable transportation system from the ground up.

#### Key Findings:

- Electrify as many vehicles as possible as soon as possible.
- Use lower-carbon liquid fuel alternatives, such as renewable diesel, for vehicles that cannot be electrified in the near-term.
- Plan for zero-carbon liquid fuel alternatives to decarbonize vehicles that cannot be electrified.

Charting a  
Course for  
Oregon's  
Energy Future

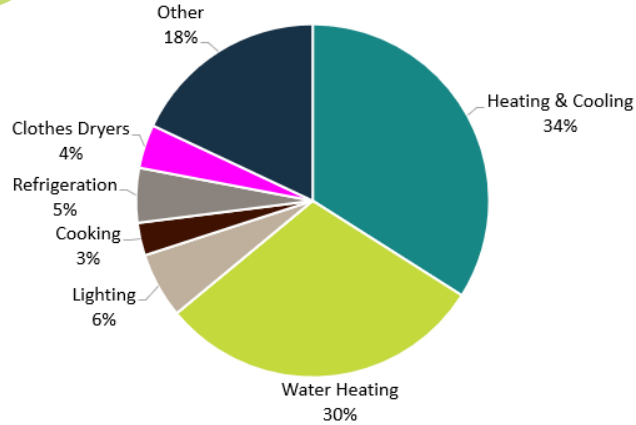
## Part V: Pathway Tradeoffs



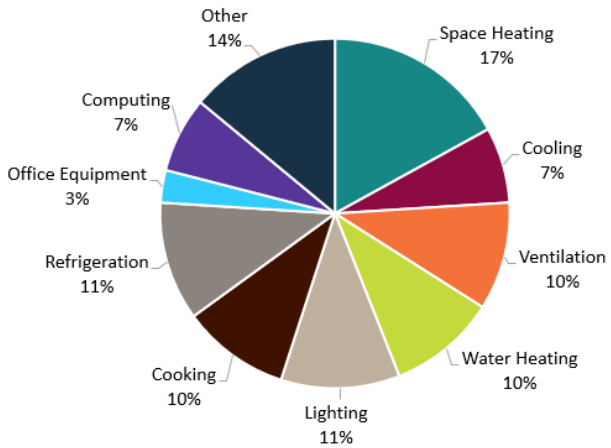
- The costs of failing to achieve mid-century clean energy and climate policy goals fall inequitably across Oregonians
- Technical analysis shows us that there are multiple technology pathways to achieve mid-century policy goals
- Significant choices remain, and the tradeoffs of those choices must be carefully considered
- Can Oregonians work together to chart an intentional course for the state's energy future that balances these tradeoffs?

**Energy Efficiency Policy Opportunities in Existing Buildings**

**Residential Energy End-Uses**



**Commercial Energy End-Uses**



- Energy consumption in buildings is responsible for about 22.4 million metric tons, or nearly 35% of annual Oregon greenhouse gas emissions.
- Existing buildings hold the greatest potential for reducing energy consumption and associated greenhouse gas emissions in the building sector.
- Successful existing voluntary energy efficiency programs have made Oregon a leader in energy efficiency and GHG reductions, but more is required to access the large pool of potential energy efficiency and GHG reductions in the existing building stock.
- There are multiple strategies and programs that can support higher adoption of energy efficiency technologies for existing buildings.
- Policy design should be informed by robust data and new programs should establish specific targets and goals to ensure programs are efficient and effective.

## Local Energy Perspectives on Workforce and Supply Chain



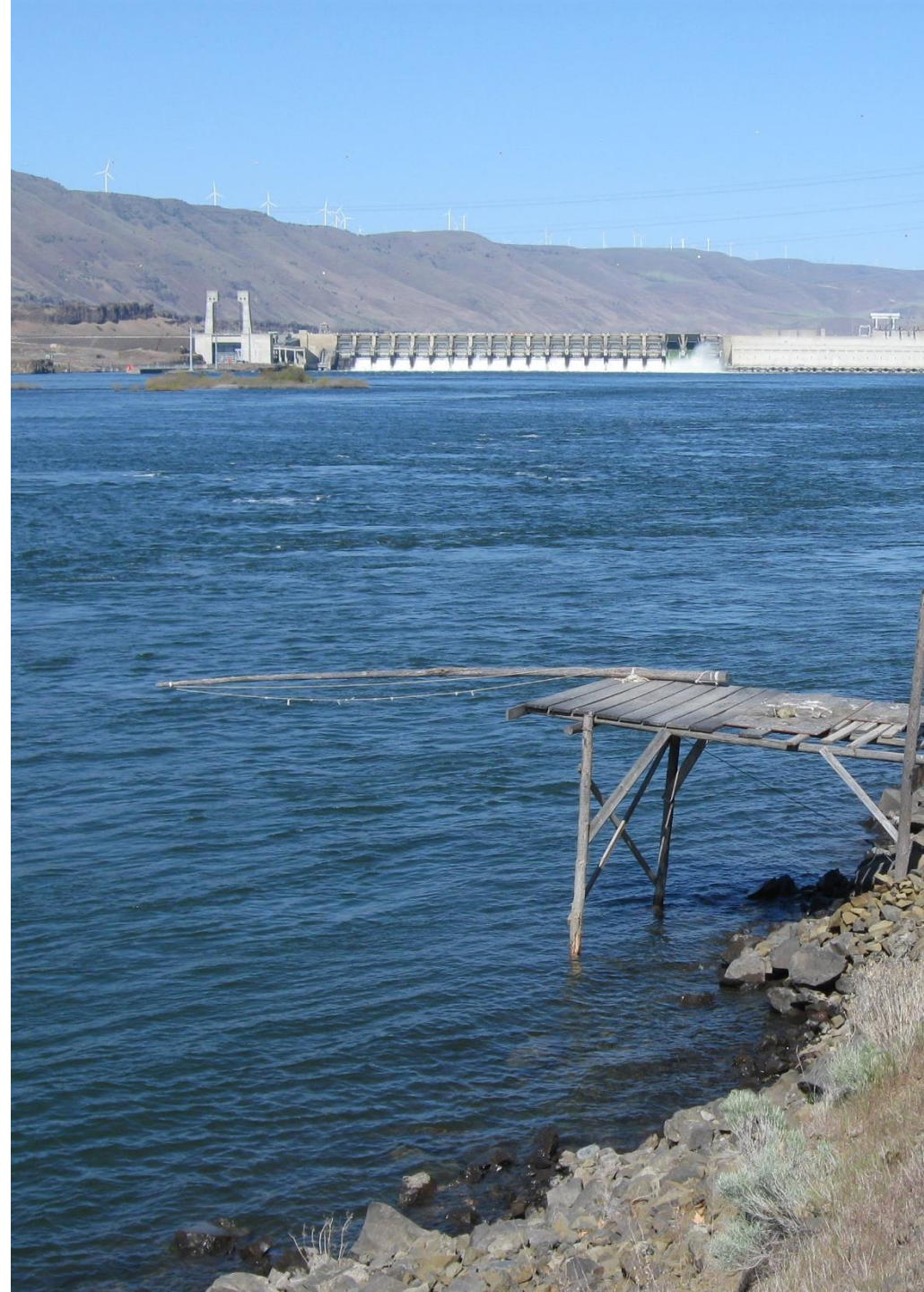
Building Energy Controls Apprenticeship Program at Lane Community College

- While labor market disruptions due to the pandemic have largely resolved, long-term workforce issues have re-emerged: generational turnover, shortages of workers with critical skills, and challenges with caretaker needs and affordable housing.
- The clean energy transition presents challenges for training and recruitment of workers with needed skills but also positions the energy industry as an attractive employer at the forefront of meaningful societal change.
- Pandemic-driven supply chain disruptions have pushed energy project developers to plan further ahead to procure materials and equipment and have created pressures to increase domestic manufacturing.



# 2022 Report Recommendation

The state would benefit from an **energy strategy** to align policy development, regulation, financial investment, and technical assistance in support of an intentional transition to a clean energy economy. This strategy could identify specific pathways to meet the state's policy goals that maintain affordability and reliability, strengthen the economy, and prioritize equity while balancing tradeoffs to maximize benefits and minimize harms. Ultimately, this strategy could be used to **make informed decisions and motivate action.**





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# Questions/Comments?

## RESOURCES:

Report online: [energyinfo.oregon.gov/ber](https://energyinfo.oregon.gov/ber)

ODOE's website: [www.oregon.gov/energy](https://www.oregon.gov/energy)