2024 Oregon Envirothon Current Issue:

Renewable Energy for a Sustainable Future

Introduction

In our modern world, energy touches almost every aspect of our lives. It lights our homes, transports our food, cleans our water, and fuels our cars, powers life-saving medical equipment, and so much more. The production and use of energy are deeply entwined with the economy, social and political issues, and the environment. The environmental, economic, and social outcomes of the choices being made about energy now will shape the future of our planet. Governmental policies, industry, and public opinion are shifting to embrace a sustainable future that includes renewable energy.

Today, power generation from renewable energy sources accounts for approximately one third of the total global output.[1] Signatories to the United Nations Convention on Climate Change agreed to work towards the goal of nearly 80% of the global power demand to be met by renewable sources by 2050.[2]

In Oregon, the Renewable Portfolio Standard adopted in 2016 requires that 50% of the electricity Oregonians use come from renewable energy resources by the year 2040, with 25% by the year 2025. Oregon is making important progress toward that goal, but there's still a lot of room to grow. Oregon has seen a 23-fold increase in solar power generation since 2013, compared to a 12-fold increase nationally. Oregon currently ranks 18th in the country for growth in solar power generation since 2013, 21st in growth in wind power, 16th for growth of battery storage capacity, 16th for growth of sales of electric vehicles, and 44th in growth of energy savings, as compared to other states.[3]

Decisions about sustainable energy are not just made by politicians and corporations. Individuals can choose what energy practices to support and can advocate for the transition to renewables. Local, state and federal policies and incentives can help give renewable energy technologies a boost, including tax credits for renewable energy installations and electric vehicle purchases. New energy innovations are constantly transforming this emerging field, with technological developments in energy sources, production methods, and flexible delivery.

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[1] Source: IRENA (International Renewable Energy Agency) World Energy Transitions Outlook 2022.
[2] Source: IRENA (International Renewable Energy Agency) World Energy Transitions Outlook 2022.
[3] Source: Environment America 2023. Oregon is powered by more renewable energy than ever before, has room to grow (environmentamerica.org)

Key Topics

Key Topic #1: Introduction to Energy and Traditional Energy Infrastructure

Learning Objectives

1. Define energy and explain how energy is relevant in our everyday lives.
2. Describe the different levels at which energy decisions are made, and what factors affect energy decision-making.
3. Explain the setup and design of traditional energy infrastructure and distribution systems.
4. Explain how traditional non-renewable energy sources such as petroleum, coal, and natural gas are extracted and utilized to create energy.
5. Identify the environmental, social, and economic advantages and disadvantages of these traditional non-renewable energy sources, and evaluate their suitability for meeting the world's energy needs in the future.
6. Identify threats to the energy system for both traditional and renewable sources.

Resources

NCF-Envirothon Resources: See pages 4-52 in the 2024 Envirothon Current Issue Study Guide.

Oregon Resources:

Energy by the Numbers. Pages 1-72 of Oregon Department of Energy, 2022 Biennial Energy Report. This section provides Oregon-specific energy use data and infographics on electricity, transportation energy, and direct fuels. Find it using the clickable table of contents.

Electricity Mix in Oregon. Oregon Department of Energy. These data show the mix of energy sources for Oregon's electricity.

Find Your Utility. Oregon Department of Energy. Use this interactive map to find the electricity or natural gas utility serving your home or business.

Transportation. Oregon Department of Energy. Data on the transportation industry in Oregon.

Key Topic #2: Renewable Energy and Infrastructure

Learning Objectives

7. Describe the criteria for an energy source to be renewable, and identify examples.

8. Explain how Solar, Wind, and Hydroelectric systems generate electricity, and identify the technological advancements that have made this possible.

9. Identify the environmental, social, and economic advantages and disadvantages of Solar, Wind, and Hydroelectric power, and evaluate their suitability for meeting the world's energy needs in the future. (See also Key Topic #3)

10. Explain the setup and design of renewable energy infrastructure and distribution systems.

11. Describe how renewable energy can contribute to energy security.

Resources

NCF-Envirothon Resources: See pages 55-109 in the 2024 Envirothon Current Issue Study Guide.

Oregon Resources:

Energy Resource and Technology Reviews. Pages 75-196 of 2022 Biennial Energy Report. Oregon Department of Energy. This section provides Oregon-specific data and infographics on electricity generation, clean and efficient vehicle and building technologies and other relevant topics. Find it using the clickable table of contents.

Oregon Solar Dashboard. Oregon Department of Energy. Interactive map showing solar installations in Oregon.

Oregon's Clean Energy Industry: Economic Impacts and Benefits. Renewable Northwest. A fact sheet on Oregon's Clean Energy Industry

Organization: Renewable Northwest

Curriculum: Lesson Plans**.** Hands-on lesson plans on energy topics. Oregon State University.

Other Resources:

Curriculum: "Exploration Energy!" *Explore Your Environment*. Project Learning Tree.

Key Topic #3: Renewable Energy and Natural Resources

Learning Objectives

12. Describe the impact renewable energy projects have on natural resources and the environment on both local and global scales.

13. Identify actions or innovative approaches to address negative impacts from renewable energy on natural resources and the environment.

14. Explain the benefits and limitations of concurrent use of renewable energy projects on agricultural lands.

Resources

NCF-Envirothon Resources: See pages 111-137 in the 2024 Envirothon Current Issue Study Guide.

Oregon Resources:

State of Oregon: Energy in Oregon - Renewable Portfolio Standard – This standard requires that 50 percent of the electricity Oregonians use come from renewable resources by 2040. (Does not include hydropower, which was mostly online before the standard was instituted).

Energy 101. Pages 206-369 of Oregon Department of Energy, 2022 Biennial Energy Report. This section provides Oregon-specific data and infographics on consumer energy cost drivers, energy storage, and other relevant topics. Find it using the clickable table of contents.

Oregon Renewable Energy Siting Assessment. Oregon Department of Energy. Data and a mapping tool about the opportunities and constraints of renewable energy development in Oregon.

Key Topic #4: Global Perspectives on Renewable Energy

Learning Objectives

15. Describe the landscape of renewable energy across various regions of the world, including strengths and challenges.

16. Explain the barriers to transitioning to renewable energy and identify solutions to these barriers.

17. Evaluate the effectiveness of different approaches to renewable energy given varying environmental, social, and economic conditions.

18. Explain the roles of economic and political policy, public perception, community advocacy, and scientific advancements in a successful transition to renewable energy.

Resources

NCF-Envirothon Resources: See pages 139-174 in the 2024 Envirothon Current Issue Study Guide.

Oregon Resources:

Policy Brief: Charting a Course for Oregon's Energy Future. Pages 377-501 in of 2022 Biennial Energy Report. Oregon Department of Energy. This section provides Oregon-specific challenges and recommendations for meeting renewable energy goals.

Recent Federal Investments in Energy and Climate. Oregon Department of Energy. Describes opportunities for greater investments in renewable energy and climate mitigation projects.

Addressing Climate Change. State of Oregon. An overview of what Oregon is doing to reduce greenhouse gas emissions and mitigate the effects of climate change.

Other Resources:

Curriculum: "Exploration Energy!" *Explore Your Environment*. Project Learning Tree.

Key Topic #5: Local Action and Energy Equity

Learning Objectives

19. Identify actions that can be taken on the individual and local level to support renewable energy.

20. Define Energy Justice, and describe its connection to environmental justice and climate justice.

21. Explain the components of Energy Justice and how these interact with the transition to renewable energy.

Resources

NCF-Envirothon Resources: See pages 176-204 in the 2024 Envirothon Current Issue Study Guide.

Oregon Resources:

Energy Efficient Devices. Oregon Department of Energy. Describes actions for reducing energy consumption at home.

Organization: Energy Trust of Oregon

Other Resources:

- Iain Sterry presentation on Energy Justice for educators in New Jersey. https://docs.google.com/presentation/d/1-qbZ7vwefJsg_Bft0mqervqM0E2hwbZmZeg5jcOgU84/edit#slide=id.g25a3fcd1d8c_0_132