

NH Envirothon 2024 Current Issue:

Renewable Energy for a Sustainable Future

Introduction

Energy is one of the most important components of the global climate challenge facing society. The combustion of fossil fuels to generate electricity, power transportation, heat and cool buildings, and fuel industry leads to a significant increase in greenhouse gases that blanket the Earth and trap the sun's heat. To avoid the worst impacts of climate change, emissions from the burning of fossil fuels must be reduced by nearly 50% by 2030, and to *Net Zero* by 2050 (United Nations, 2023). The only way to achieve these goals is to increase the development and use of renewable energy sources such as wind, solar, and hydroelectric in combination with using less energy through efficiency and conservation.

To address the challenges associated with fossil fuel combustion such as air pollution and climate change, the United States has substantially increased the use of renewable energy sources to generate electricity. For example, over the past 10 years electricity produced from small-scale solar has increased by more than 350% and electricity produced from wind power has increased by over 200% (EIA, 2023).

New Hampshire is working to increase the amount of renewable energy that powers our state. Currently the state's demand for electricity is met by the nuclear power plant at Seabrook, natural gas-fired plants, and renewable energy (hydroelectric, solar, and biomass). Renewable energy sources only account for about 15% of the State's demand (NH-DOE, 2023a). To encourage renewable energy use and increase efficiency, there are several federal, state, and utility incentives. Additionally, New Hampshire has explored the benefits and impacts related to the potential development of offshore wind in the Gulf of Maine (NH-DOE, 2023b)

The Challenge

During this year's Envirothon competition your team will first explore renewable energy and identify the advantages and disadvantages of different sources. Next you will investigate the current energy portfolio and plan for your community. Lastly, your team will research and develop a plan to achieve a *Net Zero Community*.

Outcomes to Guide Your Solution to the Challenge

- 1) Describe the criteria for an energy source to be renewable and identify examples.
- 2) Describe how Solar, Wind, and Hydroelectric systems generate electricity.
- 3) 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.
- 4) Describe some ways that increasing energy efficiency in certain areas can both reduce our use of fossil fuel energy sources and increase our use of renewable energy sources.
- 5) Identify promising technologies and techniques for dealing with intermittent energy resources such as wind and solar.
- 6) Name and quantify the current mix of energy sources- fossil fuels, renewable fuels, and energy efficiency across the a) transportation, b) residential, c) commercial, and d) industrial/agricultural sectors in **your community**. If community-level data is not available, use New Hampshire-level data.
- 7) Define “Community Net Zero” and develop a vision of what a Net Zero Community looks like.
- 8) Describe what efforts your community has already made towards becoming Net Zero: How does your community compare with other communities in New Hampshire and elsewhere?
- 9) Develop a Net Zero plan for your community, including the mix of energy resources across the four sectors listed above. Incorporate goals of energy reliability, reasonable cost, and reduced environmental impacts into the plan. Your plan should include an innovative solution to some of the challenges associated with your community reaching Net Zero.
- 10) Explain how the goals of diversity, equity and inclusion are incorporated into the plan. For example, is your plan fair to all income classes? Is it fair to both renters and building owners?

Current Issue Team

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References

EIA, 2023. *Today in Energy*, U.S. Energy Information Administration, accessed November, 2030 [U.S. Energy Information Administration - EIA - Independent Statistics and Analysis](#)

NH-DOE, 2023a. *Energy in New Hampshire*, accessed November 2023, [Energy in New Hampshire | NH Department of Energy](#)

NH-DOE, 2023b. [Potential Environmental, Economic, and Energy Impacts in New Hampshire from Development of Offshore Wind in the Gulf of Maine \(nh.gov\)](#)

NH Saves, 2023. Energy Savings Tips, accessed November 2023, [Your Source for Energy Efficiency in New Hampshire | NHSaves](#)

United Nations, 2023. *Climate Action*, accessed November, 2023 [Renewable energy – powering a safer future | United Nations](#)

Resources

North American Envirothon
[2024-Current-Issue-Part-A.pdf \(envirothon.org\)](https://www.envirothon.org/2024-Current-Issue-Part-A.pdf)

EIA is good for energy data:
<https://www.eia.gov/state/?sid=NH>

These national energy flow charts are excellent visualizations of energy flows:
<https://flowcharts.llnl.gov/>

Energy consumption by sector
<https://www.eia.gov/consumption/>

Net zero and critical thinking
<https://www.treehugger.com/does-net-zero-energy-building-really-right-target-4850383>

FEMP's net zero energy, water and waste building handbooks
<https://www.energy.gov/femp/net-zero-energy-water-and-waste-handbooks>
&
<https://www.energy.gov/eere/buildings/articles/common-definition-zero-energy-buildings>

Net Zero Energy Community Definition (2009)
<https://www.nrel.gov/docs/fy10osti/46065.pdf>

Net Zero World Initiative
<https://www.nrel.gov/international/net-zero-world.html>

Zero Energy Districts / Communities Planning
<https://betterbuildingssolutioncenter.energy.gov/accelerators/zero-energy-district>

Net Zero and Disadvantaged Communities
<https://energycoalition.org/case-study/scaling-up-net-zero-electricity-in-disadvantaged-communities-2/>

Net Zero Community Library / Modeling
<https://www.colorado.edu/lab/sbs/nzec-library>

Economics of Zero Energy Homes, 2019
<https://rmi.org/insight/economics-of-zero-energy-homes/>

Monadnock Sustainability Hub
<https://monadnocksustainabilityhub.org/>

Clean Energy NH- Take Action, Local Government
<https://www.cleanenergynh.org/act-localgovt>

Community Power Coalition of NH- Benefits
<https://www.cpcnh.org/benefits>

Sierra Club "Ready for 100" Activist Toolkit
<https://www.sierraclub.org/clean-energy-toolkit>

ICLEI USA- Local Governments for Sustainability- Resource Library
<https://icleiusa.org/resources/>

Presentation Guidelines

1. All five team members must participate in the presentation.
2. Each team will have exactly 15 minutes to make their presentation, followed by 5 minutes of questions by the judges.
3. Any videos in the presentation must be produced solely by the NH Envirothon team making the presentation. The total amount of video in the presentation cannot exceed 2 minutes.
4. All resources should be properly cited at the end of your presentation.

Evaluation of Presentations

1. Grading Rubric available on NH Envirothon website.
2. Panel of 3-4 judges will hear the presentation and then ask questions.
3. Before answering questions, huddle and come to a consensus.