

Renewable Energy Basics

« [Back to Renewable Energy](#)



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Renewable energy comes from sources that can be replenished on a human timescale, like biomass, hydropower, geothermal, wind, and solar power. Renewable energy technologies generally have fewer environmental and health impacts than non-renewables. Like all energy sources, each renewable energy technology has its own advantages and disadvantages.

Why does renewable energy matter?

Renewable energy sources account for around 11% of U.S. energy consumption and are a fast-growing source of low-carbon electricity.[1,2] While cost can be a barrier to the adoption of renewable energy sources, rapid advances in technologies, development of robust supply chains, and policy incentives have contributed to their considerable growth in the United States in recent years.[2,3] The spread of wind and solar technologies has also contributed to increasing demand for certain minerals such as rare earth elements.

How does geoscience help inform decisions about renewable energy development?

Geoscientists study the distribution of solar, wind, hydro, tidal, and geothermal energy resources, and help to identify suitable sites for their development. They assess the impacts of renewable energy development on climate, local ecosystems, and water resources. They also locate and extract the minerals used in many renewable energy technologies such as wind turbines and solar panels.

References

- 1 Renewable Energy Explained, EIA, www.eia.gov/energyexplained/index.cfm?page=renewable_home
- 2 Electricity in the United States, EIA, www.eia.gov/energyexplained/index.cfm?page=electricity_in_the_united_states
- 3 State Renewable Portfolio Standards and Goals, National Conference of State Legislatures, <http://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx>

Learn More

Introductory Resources

- What You Need to Know About Energy: Renewable Sources (Webpage), *The National Academies*
An in-depth overview of the current role of each energy source in the United States, the benefits and disadvantages of each energy source, and opportunities and challenges for using that energy source in the future. (Discusses geothermal, wind, solar, hydroelectric, biomass.)
- Renewable Energy Explained (Webpage), *Energy Information Administration*
A basic discussion of the five commonly used renewable energy sources (biomass, hydropower, geothermal, wind, and solar). Briefly overviews where each type of energy is found and how it is harnessed or utilized. Also provides a general overview of the role of renewable energy in the United States and barriers to renewable energy adoption.
- Learning About Renewable Energy (Webpage), *National Renewable Energy Laboratory*
Basic overview of renewable energy sources and technologies, including biomass, geothermal, hydrogen & fuel cells, hydropower, ocean, solar, and wind energy. Provides links to more information on research on these technologies.

Resources for Educators

- Education Resources Network, *AGI's Center for Geoscience & Society*
Search for renewable energy resources in: Professional Resources, Organizations, Curricula & Instruction, Teaching Media, Outreach Programs
- NGSS Performance Expectations, *Next Generation Science Standards*
K-ESS3-1, 4-ESS3-1, MS-ESS3-1, HS-ESS3-1, HS-ESS3-2
- NGSS Disciplinary Core Ideas, *Next Generation Science Standards*
ESS3.A

Frequently Asked Questions

What is renewable natural gas?

American Geosciences Institute

What are the advantages and disadvantages of offshore wind farms?

American Geosciences Institute

Why is geothermal energy a renewable resource? Can it be depleted?

What are the major sources and users of energy in the United States?

U.S. Energy Information Administration

How much U.S. electricity is generated from renewable energy?

U.S. Energy Information Administration

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Maps & Visualizations



Interactive map of geothermal resources in West Virginia

West Virginia Geological & Economic Survey

The West Virginia Geological and Economic Survey provides an interactive map of geothermal resources in the state. The map shows temperatures at specific depths underground, as well as the depth required to reach specific temperatures. In addition, a large amount of related information is also...

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