

An Energy Expedition:

Teacher's Guide

Seeking Out Our Energy Sources

Suggested Grade Level:

- Grades 6-8

Subject Focus:

- Science
- Energy
- Environment
- Climate Change
- Technology

Materials &

Preparations:

- Computer lab access
- Powerpoint program (or poster, paper, and writing utensils)
- Other electronic or library resources (newspapers, magazines, encyclopedia)

Time:

- One class period

Summary of Lesson:

Students will engage in a comprehensive learning expedition to explore and investigate energy; how it is made, where it comes from and how modern society uses it today and tomorrow. This will allow an easy connection with the Change Our 2morrow (CO2) Schools' Challenge.

Objectives:

Students will:

1. Be able to understand and discuss the connection between energy use and global climate change topics.
2. Be able to learn about 13 different energy sources and how they are used.
3. Be able to learn about energy consumption and production.
4. Be able to understand the impact of energy on society and the environment.
5. Use the computer lab to explore the internet.
6. Use technology to create an interactive powerpoint presentation to teach other students about energy sources.
7. Learn to work in small groups and practice public speaking in front of peers.
8. Use critical analysis to grade and evaluate their peers using a rubric.

Introduction & Background:

The Energy Expedition Question: What types of energy do we consume and how do we produce it for our energy use?

We all need energy to power our daily lives. Just think about today's society—we use electricity to power our computer, the television and the lights in our rooms. We use fossil fuels riding the bus to school, and getting to soccer or tennis practice. We all use energy—but where does all that energy come from and how does it get to where it needs to be? These are central questions to learning about your carbon impact and energy sources.

Since everyone uses energy, everyone can help reduce the negative impacts on the environment by being energy efficient and using different types of energy. Depending on where you live, your power can be produced by a number of different sources. You might get energy from nonrenewable sources like coal, natural gas, or nuclear power plants. Or maybe your energy comes from renewable sources like hydropower, solar panels or wind turbines. If you think about the things you do each day that use energy and add it all up, it equals an astonishing amount!

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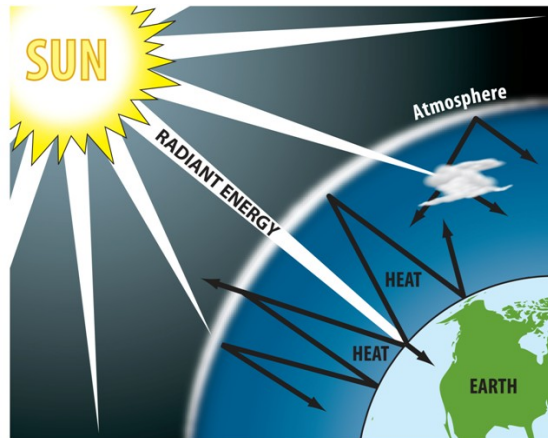
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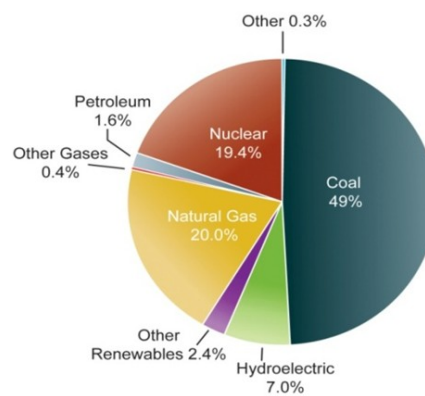
The Greenhouse Effect



Over the past several decades scientists have made connections between energy use and something else – greenhouse gas emissions like CO₂, that are linked to climate change. Scientists agree that the burning of fossil fuels releases greenhouse gases that cause climate change.

Today, scientists can see the climate impacts on land and agriculture, ecosystems and forests, the water cycle, urban cities, coastal and marine environments, and in industry. Fortunately, some natural processes reduce the greenhouse gas CO₂. For example, plants and trees withdraw CO₂ from the atmosphere by taking it up in photosynthesis and CO₂ is soluble in seawater.

To help reduce these impacts and cut down on greenhouse gas emissions, it is important to diversify how we get energy and how well we use it. Learning about renewable types of energy sources, and making sure you are acting efficiently when it comes to your energy use will help curb your own carbon footprint and create a more positive impact on the planet.



EIA²⁰¹³

Coal, natural gas, and nuclear power plants together account for about 90 percent of current U.S. electricity production.

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Procedures:

1. Assign students an energy source from the list below. This “energy expedition” can be done individually or in small groups, depending on size of class and time allotted for the activity.

Energy Type	Energy Sources
Nonrenewable Energy	Gasoline, Diesel Fuel, Propane, Natural Gas, Coal, Nuclear
Renewable Energy	Hydropower, Biomass, Ethanol, Biodiesel, Wind, Geothermal, Solar

2. Students will conduct internet research on their assigned energy source. They should concentrate on the following points:
 - description of the energy source;
 - where the energy source is found and how it is recovered; how energy is stored in the source and how the energy is released;
 - how the energy source is used today;
 - advantages and disadvantages of the energy source;
 - environmental impacts of the energy;
 - future of the energy source.
3. Encourage students to use the websites provided in the “Useful Web Resources and Tools” section below while also exploring other linked websites. Support student dialogue about the definitions for these vocabulary words: energy consumption; energy production; climate change; global warming; nonrenewable; renewable; energy efficiency.
4. Students will create a short (2-5 minute) powerpoint presentation that includes a title slide and slides addressing each bullet point question listed above.
5. Students will present their findings to the class and each student will have an opportunity to practice public speaking.
6. Following the presentations, students will complete peer evaluations based on the grading rubric outlined under Evaluations.

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Evaluations:

Students will do peer evaluations of each other (by group and/or presentation topic) using a 1-to-5 rubric to assess a) group knowledge of the energy source, b) content specific material, c) participation in research and oral presentation, and d) design and creativity of the presentation.

Conclusions:

Guide the class to discuss why energy diversity is important, noting the advantages and disadvantages of competing energies, and how it is needed for everyday use. Discuss why it is essential for society to understand how to use energy today and in the future. Introduce the idea that what we do makes an impact and can change the future. Lead students through the CO₂ Schools' Challenge pledge list and carbon calculator, answering any questions. Challenge students to go home and complete the pledge list on their own and work with their families to complete the calculator.

Extensions – Possible Essay Questions:

1. Why is learning about energy sources important when acting on energy efficiency?
2. Define and explain the greenhouse effect and how it links to your energy use.
3. Many human activities release CO₂ and other greenhouse gases.
 - What human activities and processes are involved?
 - What kinds of impacts will increasing CO₂ concentrations and other greenhouse gases have on the environment and society?
 - Will these future impacts on the earth be positive or negative?

Useful Web Resources & Tools:

Energy 101: Electricity Generation. Energy NOW. (Video length 5 minutes 18 seconds.)

<http://www.youtube.com/watch?v=20Vb6hLQsg>

Climate Hot Map: Global Warming Effects Around the World

<http://www.climatehotmap.org/global-warming-solutions/index.html>

Environmental Literacy Council: All About Energy

<http://www.enviroliteracy.org/category.php/4.html>

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Environmental Protection Agency: A Student's Guide to Global Climate Change

<http://epa.gov/climatechange/kids/solutions/technologies/index.html>

Institute for Energy Research: Energy Categories

<http://www.instituteforenergyresearch.org/energy/>

National Energy Education Development Project (NEED)
Energy Infobooks

<http://cms.need.org/Energy-Infobooks>

National Geographic Education: Energy Collection

http://education.nationalgeographic.com/education/topics/energy/?ar_a=4

National Renewable Energy Laboratory: Learning About Renewable Energy

http://www.nrel.gov/learning/re_basics.html

U.S. Energy Information Administration – Energy Kids
Energy Sources

<http://www.eia.gov/kids/energy.cfm?page=2>

Using & Saving Energy

<http://www.eia.gov/kids/energy.cfm?page=3>

Union of Concerned Scientists: Our Energy Choices

http://www.ucsusa.org/clean_energy/our-energy-choices/

America's Natural Gas Alliance

<http://www.anga.us/why-natural-gas>

American Coal Foundation

<http://teachcoal.org/faqs-about-coal>

Geothermal Energy Association

<http://geo-energy.org/Basics.aspx>

Kid Wind Project: Learn About Wind

<http://learn.kidwind.org/learn>

National Hydropower Association

<http://hydro.org/why-hydro/>

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Curriculum Guidelines:

This lesson and activity has been aligned with National Science Education Content Standards for grades 6 through 8. Below are the specific content standards this activity targets. For further State or Regional information please refer to the Teacher Resources.

- Content Standard A - Science as Inquiry
- Content Standard B - Physical Science
- Content Standard E - Science and Technology
- Content Standard F - Science in Personal and Social Perspectives

Nuclear Energy Institute

<http://www.nei.org/>

Propane Education and Research Council

<http://www.propanecouncil.org/council/what-is-propane/>

Solar Energy Industries Association

<http://www.seia.org/about/solar-energy/solar-faq>

<http://www.seia.org/about/solar-energy>

Sources:

The original idea of this lesson and activity comes from: Doris Tomas, NEED Lead Teacher, Jackson Elementary School, Rosenberg, TX.

Energy Literacy: Essential Principles & Fundamental Concepts for Energy Education. Sponsored by the Department of Energy and the American Association for the Advancement of Science (2010).

<http://library.globalchange.gov/energy-literacy-essential-principles-fundamental-concepts-for-energy-education>

Frequently Asked Questions About Global Warming And Climate Change: Back to Basics. By the Environmental Protection Agency (2009).

http://www.globalchange.gov/images/documents/toolkit/Climate_Change_FAQ/Climate_Basics_8pager_508_v4.pdf

Make an Impact

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