

RESOURCE LIBRARY
ACTIVITY : 50 MINS

Researching Fossil Fuels

Through a team reading activity, students become experts on one of the three main types of fossil fuels (petroleum, coal, and natural gas) by investigating where they come from, how they are extracted, and the benefits and consequences of using each one. Each team member uses a classification chart to document their individual findings, then teaches their peers about their assigned fossil fuel, in order to complete the chart as a team. This activity will help the class further their initial understanding about where the energy in fossil fuels comes from and where it goes.

GRADES

6 - 8

SUBJECTS

Earth Science

CONTENTS

2 Images, 2 PDFs, 4 Resources, 1 Link

OVERVIEW

Through a team reading activity, students become experts on one of the three main types of fossil fuels (petroleum, coal, and natural gas) by investigating where they come from, how they are extracted, and the benefits and consequences of using each one. Each team member uses a classification chart to document their individual findings, then teaches their peers about their assigned fossil fuel, in order to complete the chart as a team. This activity will help the class further their initial understanding about where the energy in fossil fuels comes from and where it goes.

For the complete activity with media resources, visit:

<http://www.nationalgeographic.org/activity/researching-fossil-fuels/>

In collaboration with



DIRECTIONS

This activity is part of the [Carbon Trackers](#) unit.

1. Introduce the three types of fossil fuels.

- Remind students of the lesson driving question and their work in the [Putting the “Fossil” in Fossil Fuels](#) activity. Explain that in this activity they will conduct research on the different types of fossil fuels to better understand fossil fuels as a source of carbon and energy, and to answer their questions from the class *Know & Need to Know* chart.
 - If students identified oil and/or gas as fossil fuels in the *Putting the “Fossil” in Fossil Fuel* activity, reference their ideas and confirm that those and the other main types of fossil fuels will be explored in this activity.
- Distribute the [Fossil Fuels Classification Table](#) and explain that there are three main types of fossil fuels: petroleum (oil), coal, and natural gas.
- Go over the *Fossil Fuels Classification Table* with the class to be sure the students are clear on what each column is asking so they know what to look for in their reading.

2. Break students into teams and distribute materials for the jigsaw reading activity.

- Split the class into teams of three and have each team assign each member to a different type of fossil fuel. Each student is responsible for completing the table for their fossil fuel and then teaching the other two team members what they need to know to complete the table.
- Instruct all students to read the [Nonrenewable Resources](#) encyclopedic entry and add their initial ideas to the *Fossil Fuels Classification Table*.
- After this reading, direct each team member to read one of the following more in-depth encyclopedic entries about each type of fossil fuel and complete as much of their chart as possible from the readings:
 - [Coal](#)

- Natural Gas
 - Petroleum
- Next, ask students to get into expert groups based on their assigned fossil fuel (one group for coal, one for natural gas, and one for petroleum).
 - Guide expert groups to work together to complete their section of the *Fossil Fuels Classification Table* before returning to their original group to share the information.

3. Direct student teams to share information from their individual readings to ensure that all team members can complete the *Fossil Fuels Classification Table*.

- Each student has five to seven minutes to share about their particular fossil fuel type with the other team members, helping their team to complete the *Fossil Fuels Classification Table*.
- Emphasize that while each student expert is sharing they are assuming the role of teacher and should explain thoroughly so that their team members have a solid understanding of each fossil fuel type. Encourage the rest of the team to not only take notes while the expert is sharing, but to also ask questions.

4. Lead a class discussion to review students' findings and revisit the class *Know & Need to Know* chart.

- Ask each team to contribute one to three major findings from their reading/research. If time permits, have each expert provide one piece of information about their fossil fuel to the whole class. If students hear anything they didn't capture on their chart, encourage them to do it now.
- Revisit the class *Know & Need to Know* chart. With the new ideas from this activity, students may be able to move some items from the "Need to Know" to the "Know" column. They also may have new questions to add about how to connect what they learned to the unit project. Update the chart accordingly.
- Have students discuss in their groups what could be changed on the *Know & Need to Know* chart and then make suggestions. Circulate to press students to explain ideas, quote the readings, and justify their suggestions. Students' major findings from today are likely to answer questions on the chart.

5. To quickly assess their basic understanding of fossil fuels, have students complete the [Basics of Fossil Fuels Kahoot!](#) quiz.

Modification

Step 2: If each student does not have access to a computer to read the encyclopedic entries, you may want to print them before class and provide paper copies.

If your students need additional support with reading comprehension and/or note-taking strategies, consider reading the encyclopedic entries aloud with them, modeling the way you would take notes, highlight, and add to the *Fossil Fuels Classification Table* as or after you read.

Tip

Step 3: To help students more efficiently share about their particular fossil fuel, consider setting a timer with a limit of four to five minutes per person.

Provide sentence stems on the board or at the table that show the kinds of questions students might ask. For example: “Which part of the reading did you find that in?” or “Can you explain that in a different way?”

Informal Assessment

Collect students' *Fossil Fuels Classification Table* at the end of class and use their responses to check their understanding as a group. The *Fossil Fuels Classification Table Answer Key* is provided.

Students' responses to the [Basics of Fossil Fuels Kahoot!](#) quiz can also be used as a formative assessment of their understanding of fossil fuels.

OBJECTIVES

Subjects & Disciplines

Earth Science

Learning Objectives

Students will:

- Understand that there are three main types of fossil fuels: petroleum (oil), coal, and natural gas.
- Evaluate the sources, extraction methods, types of human uses, environmental impacts, and benefits of each fossil fuel resource.
- Model how carbon moves from living things into fossil fuel sources and finally into the atmosphere as a result of human's extracting and burning fossil fuels for energy.
- Describe the value of fossil fuels to human societies.
- Practice skills in reading comprehension, effective note-taking, and communicating information gleaned from readings with others.

Teaching Approach

- Project-based learning

Teaching Methods

- Cooperative learning
- Reading
- Research

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
 - Information, Media, and Technology Skills
 - Information Literacy

- Media Literacy
- 21st Century Themes
 - Environmental Literacy
 - Global Awareness
- Critical Thinking Skills
 - Remembering
 - Understanding
- Science and Engineering Practices
 - Obtaining, evaluating, and communicating information

National Standards, Principles, and Practices

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

- **CCSS.ELA-LITERACY.RST.6-8.2:**

Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

- **CCSS.ELA-LITERACY.SL.7.2:**

Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.

NEXT GENERATION SCIENCE STANDARDS

- **Crosscutting Concept 5:**

Energy and matter: Flows, cycles, and conservation

- **ESS2.A: Earth Materials and Systems:**

All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms. The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future.

- **ESS3.C: Human Impacts on Earth Systems:**

Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things.

- **MS-ESS2-2:**

Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

- **Science and Engineering Practice 8:**

Obtaining, evaluating, and communicating information.

Preparation

What You'll Need

REQUIRED TECHNOLOGY

- Internet Access: Required
- Tech Setup: 1 computer per learner, Projector

PHYSICAL SPACE

- Classroom

GROUPING

- Jigsaw grouping
- Small-group learning
- Small-group work

BACKGROUND & VOCABULARY

Background Information

Fossil fuels are formed over millions of years from buried organic materials altered by heat and pressure. The energy in fossil fuels ultimately came from the sun, was moved into organic matter via photosynthesis and then finally into fossil fuels. The carbon in fossil fuels originated in the atmosphere, moved into plant matter via photosynthesis, and then finally into fossil fuels. Because fossil fuels form over such long periods and are irreplaceable over a human's lifetime, they are considered nonrenewable resources.

When fossil fuels are burned, they release usable energy. The costs of obtaining them compared to their caloric value have made them critically important to the global energy economy. However, fossil fuel combustion also releases toxic gases and carbon dioxide into the atmosphere. As the concentration of carbon dioxide and other greenhouse gases in the atmosphere increases, the average temperature of the Earth rises and this impacts global climate in different ways.

In addition to the environmental impacts of fossil fuel combustion, the extraction and processing of fossil fuels into usable energy can have negative impacts on people and the environment.

Prior Knowledge

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Recommended Prior Activities

- [Putting the "Fossil" in Fossil Fuels](#)

Vocabulary

Term	Part of Speech	Definition
coal	<i>noun</i>	dark, solid fossil fuel mined from the earth.
extraction	<i>noun</i>	process by which natural resources are extracted and removed from the earth.
natural gas	<i>noun</i>	type of fossil fuel made up mostly of the gas methane.
nonrenewable resource	<i>noun</i>	natural resource that exists in a limited supply.
petroleum	<i>noun</i>	fossil fuel formed from the remains of ancient organisms. Also called crude oil.

For Further Exploration

Articles & Profiles

- [Union of Concerned Scientists: The Hidden Costs of Fossil Fuels](#)
- [Science News for Students: Where Fossil Fuels Come From](#)
- [National Geographic: Fossil Fuels](#)



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