



Teaching Guide
and Classroom
Poster
GRADE 4



The United States of Energy

Our world is powered by energy.
Learn where America's energy comes
from, how it is used, and what part it
plays in our lives.



- Inside You'll Find:
- Lesson Plans
 - Reproducible Worksheets
 - National Standards



AMERICAN COAL FOUNDATION

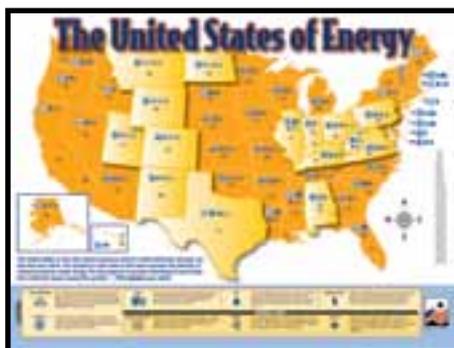
Welcome Teacher,

Many natural resources create the energy that turns on our lights, warms our homes, and powers our vehicles. “**The United States of Energy**,” brought to you by the American Coal Foundation (www.teachcoal.org), teaches about the variety of energy sources that are being used across the United States to power homes and businesses. The lesson plans, student worksheets, and classroom poster in this program align with national standards in **technology, geography, language arts, and science**.

We think you’ll find the enclosed **Family Resource Sheet** to be useful in your students’ homes as well. We hope that you and your students enjoy this energizing program!



Unfold for a map to hang in your classroom!



Alignment with National Standards for Grade 4				
TECHNOLOGY	Lesson 1	Lesson 2	Lesson 3	Poster
Understands the nature and uses of different forms of technology				
Knows that different types of energy (e.g., solar, fossil fuels) have different advantages and disadvantages and that regardless of the source of energy, the technological design should attempt to maximize the use of it	•	•		
GEOGRAPHY				
Understands the characteristics and uses of maps, globes, and other geographic tools and technologies				
Knows the basic elements of maps and globes (e.g., title, legend, cardinal and intermediate directions, scale, grid, principal parallels, meridians, projection)		•		•
LANGUAGE ARTS				
Gathers and uses information for research purposes				
Uses electronic media to gather information	•	•		
Uses strategies to gather and record information for research topics	•	•		
SCIENCE				
Understands the structure and properties of matter				
Knows that matter has different states	•		•	

LESSON INSTRUCTIONS

LESSON 1

Our Energy

Goals: Language Arts—gather and use information for research; Physical Science—understand the structure and properties of matter

Materials: *Worksheet 1: “Our Energy”* (see next page), pen/pencil, Internet and library access

Time Required: One 40-minute class period, plus research and homework time

Lesson Steps:

1. Explain that in the United States electricity is generated using a variety of energy sources. These sources include coal, natural gas, nuclear, oil, solar power, water, and wind. Energy sources are found in different amounts in each of the U.S. states, and are collected in different ways. For example, some energy sources are dug out of the ground, while others are collected from the movement of air or water. (You may want to share the map with students at this point, and show them the different sources across the United States.)
2. Divide the class into teams and assign each team an energy source. Distribute copies of *Worksheet 1*. As homework, instruct students to use library resources and/or the Internet to research their topic. Instruct students to visit the government Web site at <http://tonto.eia.doe.gov/state/>. This Web site, which is from the U.S. Department of Energy, has information for every state’s energy sources.
3. Inform students to use the questions on *Worksheet 1* to guide their research. The questions will help them focus on the important information surrounding their topic. Students should collect notes and use them to create a written report.
4. Each team member should present a specific part of the report. Encourage students to be creative in their presentation. Visual aids can include posters with photos or illustrations, drawings on the chalkboard, graphs and tables, scale models, or even puppets. Teams can make a short video in the form of a newscast or documentary. Teams could also write a short skit in the form of a talk show about the topic and perform it for the class.

LESSON 2

Mapping Electricity

Goals: Geography—understand the characteristics and uses of maps, globes, and other geographic tools and technologies; Language Arts—gather and use information for research purposes

Materials: *Map “The United States of Energy,” Worksheet 2: “Mapping Electricity”* (see removable cover of separate booklet “Part 2 of 2”)

Time Required: One 40-minute class period

Lesson Steps:

1. Explain to students that different states use different sources of energy to create electricity.
2. Invite students to study the map on the poster “The United States of Energy.”
3. Working in teams (these could be the same teams as assigned in Lesson 1), guide students to study the map and choose five states to research. Tell them to write down the top sources of energy that each state uses to generate electricity. Encourage each group to focus on a different region of the nation.
4. Once they are finished, ask each group to share the top energy sources for their key states. Keep a running list on the board, if possible, with the region and state’s top source with the region. Discuss which source seems most common and why they think that source is used more often than others.
5. Distribute copies of *Worksheet 2* and guide students in completing the questions. Allow students to use the map on the poster and remind them to use their map-reading skills. Point out the map legend and its list of symbols. (*Worksheet 2* Answers: 1. coal. 2. AL, CO, IL, IN, KY, MT, ND, NM, OH, PA, TX, UT, VA, WV, WY. 3. Answers will vary. 4. Mojave Desert, CA. 5. dam. 6. Answers will vary.)

LESSON 3

Powered Up About Electricity!

Goals: Technology—understand the nature and uses of different forms of technology; Physical Science—understand the structure and properties of matter

Materials: *Worksheet 3: “Powered Up About Electricity!”* (see removable cover of separate booklet “Part 2 of 2”), pen/pencil

Time Required: One 40-minute class period

Lesson Steps:

1. Explain that different energy sources are turned into electricity in different ways. In the case of fossil fuels such as coal and natural gas, the fuels are used in power plants. These fuels release large amounts of heat, and the heat is converted into electricity.
2. Walk students through the basic steps of coal production and how it is used to generate electricity.
 - First, miners uncover coal in surface or underground mines. They use massive equipment, much of which is computerized.
 - Second, trains or barges carry hundreds of millions of tons of coal to power plants.
 - Third, coal is combusted in a power plant. The heat turns water into steam in a large box called a boiler.
 - Fourth, pressure from the steam turns the propeller blades of a turbine. The pressure pushes the blades and makes the turbine spin.
 - Fifth, the turbine is connected to a generator by a spinning rod. This rod turns magnets inside coils of wire in the generator. This process creates electricity inside of the wires.
3. The last step in the production of electricity is delivering it to users. The electricity is carried through enormous power lines to cities and towns. Every home, business, factory, and any other place that uses electricity is connected to the power plant. In some places, the power behind the light switch is coming from a power plant hundreds of miles away.
4. Distribute copies of *Worksheet 3* and guide students in completing the activity. (Possible answers: 1. Trains or barges carry mined coal to power plants. 2. Coal is combusted to create steam that makes the turbine move. 3. Propeller blades, turbine, generator, spinning rods, magnets, wire coils. 4. Steam or pressure. 5. Electricity is delivered to homes through wires.)

Bonus Worksheet: Have students solve the math word problems on the worksheet “America’s Power: It All Adds Up!” (See removable cover of separate booklet “Part 2 of 2”). Answers to Bonus Worksheet: 1: 10,000 tons; 2: 218 miles; 3: 162 more surface mines; 270 total coal mines; Bonus question: Answers will vary.

Name: _____

Our Energy

The questions below will help you organize the research about your topic. Use additional paper as needed.

1 What source of energy are you researching? _____

2 How long has this kind of energy been used? _____

3 How is this energy collected from nature? _____

4 What kind of equipment is used to collect this energy? _____

5 In what states is this energy found? _____

6 What are the benefits of this kind of energy? _____

Keep Track of Your Sources

Keeping track of your sources is an important part of research. As you do your research, list the titles of the books, Web sites, magazine articles, or newspaper articles that you used. Use additional paper as needed to organize your sources.

Books: _____ _____ _____	Magazine articles: _____ _____ _____
Web sites: _____ _____ _____	Newspaper articles: _____ _____ _____