Sources of Energy

FOCUS QUESTION

Why have people used energy from different sources?

NOTICE AND WONDER

Look at the titles and images of the three texts you will read in this lesson. What do you notice? What do you wonder? Discuss your ideas with a partner.

TALK ABOUT WORDS

Circle the terms below that you know. Pick one term and tell a partner what you know about it.

energy	renewable resources
fuel	nonrenewable resources
waste	fossil fuels

I think the word ___ means ___ because ___.

One example of ___ is ___.

First Came Fire: A Story of Energy and Fuel

by Jessica Miller

What Makes It Go?

by Stephanie Peters

Cool Solutions: Trash to Gas

by Danielle Jansen

SESSION 1 READ

First Came Fire

A Story of Energy and Fuel

by Jessica Miller

source = where something comes from

dung = animal waste

1 People have used fire for thousands of years to cook food, stay warm, and light up the dark. Fire is a powerful **source** of energy. But to make fire and use its energy, you need a fuel. So, for as long as people have been using fire, they have been looking for fuel.

Stop & Discuss

Why did people look for fuels?

Underline details that tell why people looked for fuels. Discuss the details with your partner.

2 People found that certain types of materials, such as wood, oil, and cow **dung**, could be burned as fuel for a fire. For a long time, wood was the main source of fuel for many people. But as more and more trees were cut down, people searched for other fuels and, finally, found something deep underground: coal.

FUEL USE

More than 400,000 years ago

People begin to control fire and use it for heat, light, and cooking. People use fuel such as wood and dried dung, or animal poop.

More than 3,000 years ago

Coal is first used in China.

1500s

Coal replaces wood as fuel in parts of Europe. As time goes on, coal is used by more and more people.

1821–1859

First successful natural gas well is dug (1821) and first oil well is drilled (1859) in the United States.

3 Coal is a fuel that looks like hard black lumps of rock. It formed over millions of years from dead plants that got buried under layers of dirt and rock. Pound for pound, coal gives off more energy when it is burned than wood does, and it burns longer, too. Coal continues to be used to heat homes, as well as to power engines and generate, or make, electricity.

4 Natural gas and petroleum are other fuels that formed over millions of years from living things that died. In the 1850s, people in the United States started using petroleum, also called oil. Gasoline, which powers many cars and trucks, is made from oil.

5 Over time, scientists have learned that fuels such as coal and oil have **disadvantages**. Burning them pollutes the air, and they can't be replaced once they're used up. So, more and more people are turning to different sources of energy to power their homes, vehicles, and machines.

disadvantages = problems; things that cause difficulty

Stop & Discuss

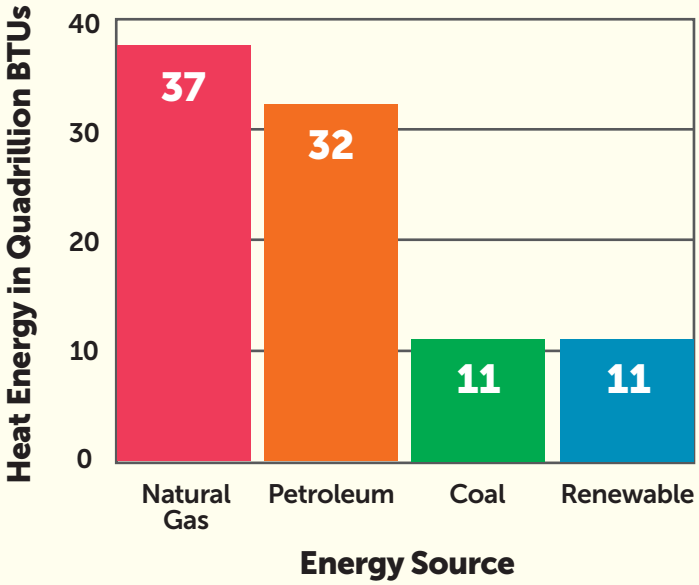
How is coal helpful? How is it harmful?

Underline one way coal is helpful and one way it is harmful.

1880s

First electricity plants are built. The plants are fueled by coal. Electricity is used for lighting and for powering trains and other vehicles.

TOP ENERGY SOURCES IN THE U.S. IN 2019



SESSION 2 PRACTICE

Interpret Visual Information

- **Visuals** such as time lines and bar graphs can help show information and explain ideas in a text.
- A **time line** shows the dates of important events in the order they happened. A **bar graph** shows amounts or numbers of items in different categories.

Reread/Think

How have wood, coal, and oil been used as fuel over time? Reread "First Came Fire: A Story of Energy and Fuel" and complete the chart with information from both the visuals and the text.

Fuel	Information from the Text	Information from the Visuals
wood		
coal		
petroleum (oil)		

Talk

How have wood, coal, and oil been used as fuel over time?

- Talk about what you have learned using information from both the text and the visuals.
- Explain how the visuals helped you better understand the topic.

The text says ___.
The time line explains ___.
The bar graph shows ___.

Long ago, ___.
Now ___.

Write

How has coal been used over time? Use information from the text and the visuals to support your response.

WRITING CHECKLIST

- ☐ I explained how coal has been used over time.
- ☐ I included information from the text, time line, and bar graph.
- ☐ I used complete sentences.
- ☐ I used correct spelling, punctuation, and capitalization.

SESSION 3 READ

WHAT MAKES IT GO?

by Stephanie Peters

1 True or false: The energy you used to get dressed and go to school this morning came from the sun.

2 It's . . . TRUE! Let's think more about this idea.

3 Suppose you had orange juice and cereal for breakfast. The fruit in your juice and the grains in your cereal come from plants. The plants grew with energy from the sun. When you eat plants or food made from plants, your body turns that food into energy it can use to do things like get dressed.

role = job that something does

4 But your body is not the only thing that uses energy from the sun. The bus or car you rode to get to school also runs on energy from the sun. So do trains, ships, and airplanes. Do these vehicles use sunbeams for fuel? Not at all. Rainbows? Cool idea, but nope. To understand the sun's **role** in making the fuels of today, we need to know what was happening on Earth about 300 million years ago.

Stop & Discuss

What uses energy from the sun?

Underline two examples of things that use energy from the sun.

5 Back then, before dinosaurs lived, plants grew all over Earth. These plants used energy from the sun to make food for themselves, which helped them grow. But once the plants and other living things died, sand and clay covered them, slowly turning to rock. Over time, more and more layers of rock formed over the dead things. The crushing weight of all this rock squeezed the dead material. Then, over millions of years, heat and the pressure from all that rock turned the dead material into fossil fuels.

6 Fossil fuels come in three forms: a black rock called coal, a black or brownish liquid called petroleum (oil), and a clear gas called natural gas. (If fossil fuels are rocks, liquid, and gas, why are they called *fossil* fuels? Well, just like fossils, they come from things that lived long ago.)

7 Some power plants use fossil fuels to make electricity, and people still burn fossil fuels to heat their homes. Gasoline, which is made from oil, powers most of the cars, buses, trains, and airplanes we use to travel. All these fossil fuels we burn come from plants that grew millions of years ago using energy from the sun.

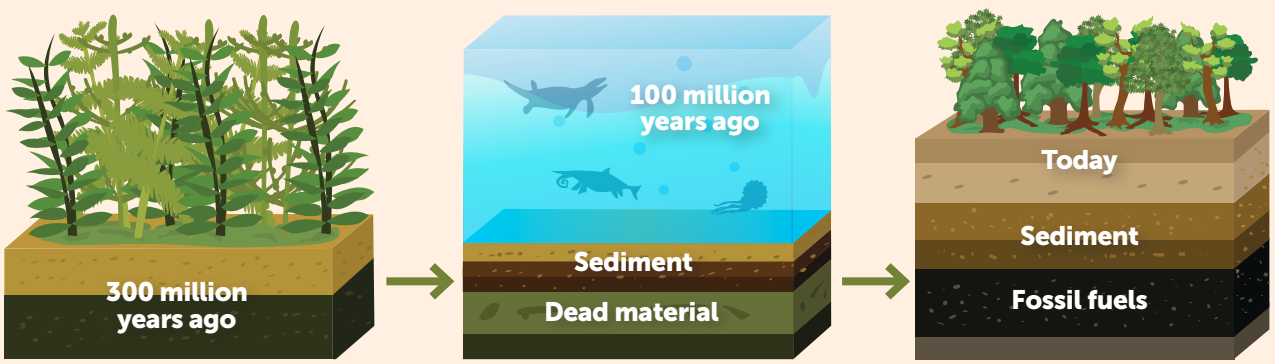
Stop & Discuss

Which statement would the author agree with?

- ☐ Fossil fuels form slowly, but people use them a lot.
- ☐ Fossil fuels form quickly, and people use them a little.

Explain your choice to a partner.

HOW FOSSIL FUELS WERE FORMED



Plants used energy from the sun to grow.

Over millions of years, water and layers of sediment buried dead materials.

Heat and pressure turned the dead materials into fossil fuels such as coal.

alternative = different

solar energy = energy from the sun

8 Today, more than 80% of the world's energy still comes from fossil fuels. But petroleum, coal, and natural gas will not last forever, and they take millions of years to be replaced. They are nonrenewable resources. They also create pollution, which harms human health and the environment. So, people must find **alternative** sources of energy.

9 Renewable resources are one option. Renewable energy sources, such as **solar energy**, wind energy, and hydropower (water power), create less pollution and will not run out. When it is cloudy or calm, we don't have to wait long for more sun and wind. At least not as long as the millions of years it would take for dead animals or plants to turn into oil or coal!

10 People have explored different ways to use energy from natural resources for centuries. And every new discovery has had a huge effect on the way people live. What will the energy of the future be?

RENEWABLE RESOURCES

ENERGY SOURCE	DESCRIPTION
 Solar	• Energy from sunlight • Can be turned into electricity or heat • Heats buildings, warms water, powers vehicles and tools
 Wind	• Energy from moving air (wind) • Can be used to generate electricity • Wind turns the blades of a turbine. The turbine spins a generator, which generates electricity.
 Hydropower	• Energy from moving water • Can be used to produce electricity • Flowing water turns a turbine to spin a generator, which generates electricity.

Stop & Discuss

What is the difference between renewable and nonrenewable resources?

Use details and examples from the text and chart to support your answer.

Renewable resources are different because ___.

Interpret Visual Information

- A **diagram** is a drawing or picture that explains what something looks like or how it works. A diagram can help explain a complicated idea.
- A **chart** organizes information in a way that makes it easier to find and understand.

Reread/Think

How is the sun connected to the fossil fuels we use today? Reread "What Makes It Go?" Complete the chart with information from the text and the diagram on page 373 that will help you answer the question.

Information from the Text	Information from the Diagram

SESSION 4 PRACTICE

Talk

How did the diagram help you understand more about how fossil fuels were formed? Share the information from your chart with a partner. Listen to your partner's information.

The diagram shows ___.

The diagram helps me picture ___.

First, ___. Next, ___. Finally, ___.

Write

How were fossil fuels formed? Use information from the text and diagram to support your response.

WRITING CHECKLIST

- ☐ I explained how fossil fuels formed.
- ☐ I included information from the text and the diagram.
- ☐ I used complete sentences.
- ☐ I used correct spelling, punctuation, and capitalization.

COOL SOLUTIONS: TRASH TO GAS

by Danielle Jansen

1 Lunch is almost over. You crunch into the last morsel of your apple. Then you toss your apple core into the trash bin. In a week or two, this trash will be dumped in a landfill, where the trash will remain.

2 In the United States, people throw away tons and tons of waste every year, and most of it goes to landfills. Can you guess the most common type of waste at landfills? It's not plastic, and it's not paper—it's food!

3 Food is a kind of organic waste. Organic waste is plant or animal material that breaks down over time. This waste takes up a lot of space in landfills, but imagine if it could be turned into something useful, instead of sitting in a landfill, left there to rot.

4 Sweden has thought of one solution. In 2005, the country **banned** organic waste in landfills. What does Sweden do with all this organic waste, then?

banned = stopped allowing

HOW BIOGAS IS MADE

Organic waste is collected and prepared.

The organic waste goes in a big tank where bacteria break it down.

As bacteria break down the organic waste, biogas is produced.

Biogas is turned into fuel that powers vehicles.

5 The waste is taken to a plant, a place where something is produced. At the plant, waste is broken down by tiny living things called bacteria. When bacteria break down the waste, they produce biogas. Biogas can be used as a fuel to power cars, buses, and other vehicles. In fact, this biogas powers more than 200 city buses in Sweden!

6 But people don't stop at recycling food waste. Some have also developed plants that reuse animal manure from farms or human waste (poop) that gets flushed down the toilet. Why *poop*? Well, when poop breaks down, it can also create biogas!

7 Here's how it works: The waste that people flush down the toilet travels to a treatment plant. There, the waste is separated from water. Machines take this waste, remove and clean the water, and then release the water into the sea. What's left is lots of thick muddy stuff called sludge. As the sludge breaks down, it makes biogas. The treatment plant uses biogas to make fuel for vehicles.

8 People are still looking for new ways to use waste, and maybe one day, all our trash will skip the landfill and become fuel.

Respond to Text

Reread/Think

Reread "Cool Solutions: Trash to Gas." Choose the best response to each question.

1. Which information from the text is also in the diagram on page 378?

A. Organic waste takes up a lot of space in landfills.

B. Machines separate human waste from water.

C. Biogas can be used as a fuel to power cars, buses, and other vehicles.

D. The waste people flush down the toilet travels to a treatment plant.

2. What does the word *common* mean as it is used in paragraph 2?

A. belonging to all

B. appearing a lot

C. simple

D. general

3. Write an **X** in the box next to each detail to show whether it describes information in the text, information in the diagram, or information in both the text and the diagram.

	Text	Both	Diagram
The waste is taken to a power plant.			
The organic waste goes in a big tank.			
Biogas is turned into fuel for vehicles.			

SESSION 5 PRACTICE

Reread/Think

4. How does the diagram on page 378 help the reader understand paragraph 5?

A. It shows the steps organic waste goes through to become fuel.

B. It shows the amount of organic waste needed to make biogas.

C. It shows how long it takes to make biogas with organic waste.

D. It shows how often the big tank is filled with organic waste.

Write

How do details from both the text and the diagram explain how waste is turned into fuel? Use at least **one** example from the text and **one** from the diagram to support your response.

WRITING CHECKLIST

- ☐ I answered the question.
- ☐ I used at least one example from the text and one from the diagram.
- ☐ I used correct spelling, punctuation, and capitalization.

Respond to the Focus Question

Why have people used energy from different sources?

Reread/Think

Choose one text from the lesson to reread with a partner.

TEXT: _____

What is one source of energy that people use, and how have they used it? Why have people used energy from that source?

1. _____

_____

_____

2. _____

_____

_____

Talk

Share what you learned from the text you reread. Use the sentence frames to get started.

People have used energy from ___ to ___.

People have used ___ as a source of energy because ___.

Write

Why have people used energy from different sources? Use information from at least two texts in your response.