



ESSENTIAL QUESTION

How Do We Use Wind and Water for Energy?



Engage Your Brain

Find the answer to the following question in this lesson and record it here.

How do we use wind to provide us with energy?



ACTIVE READING

Lesson Vocabulary

List the terms. As you learn about each one, make notes in the Interactive Glossary.

Main Idea

The main idea of a paragraph is the most important idea. The main idea may be stated in the first sentence, or it may be stated elsewhere.

Active readers look for main ideas by asking themselves, What is this paragraph mostly about?

Water Energy

Have you ever stood in the ocean and been knocked down by a wave? Water can have a lot of energy!

ACTIVE READING As you read these two pages, draw a line under the main idea of each paragraph on the next page.

1

This illustration shows how a dam can be used to change the kinetic energy of falling water into electrical energy. Electricity made in this way is known as **hydroelectric energy**. *Hydro* means "water."

- 1 A river brings water to a dam. The dam holds the water behind it in an artificial lake called a reservoir [REZ•er•vwar].
- 2 Water is released through the dam. The water spins the blades of giant turbines.
- 3 Each turbine is connected to a generator. The turbine makes the generator spin to produce electricity.
- 4 The water then flows back into the river.



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People have long used water's energy to move people and things. Before boats had engines, ferries and rafts used the motion of rivers to carry people and goods from place to place.

Engineers and scientists have developed new ways to harness the energy of moving water. For example, tidal energy stations use the energy in the regular rise and fall of the ocean's tides to generate electricity.



Mills powered by water have been used for hundreds of years. Water flows over the wheel to turn it. The wheel turns an axle, or shaft, that turns a mill wheel or some other device.

Compare this water wheel to the hydroelectric dam. How are they alike? How are they different?

How are these people using the energy of moving water?

4

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Wind Energy

Flying a kite is a good way to experience energy. Sometimes the wind blows with so much force, you have to brace yourself!

ACTIVE READING As you read this page, circle two uses of wind energy.

Windmills, like water mills, have been used for hundreds of years. They use wind energy to move. **Wind energy** is energy produced by moving air. Older windmills were often used to grind grain. Today, windmills known as wind turbines are used in some places to produce electricity. The wind's kinetic energy causes the turbine's blades to move. A generator changes this energy of motion into electrical energy.

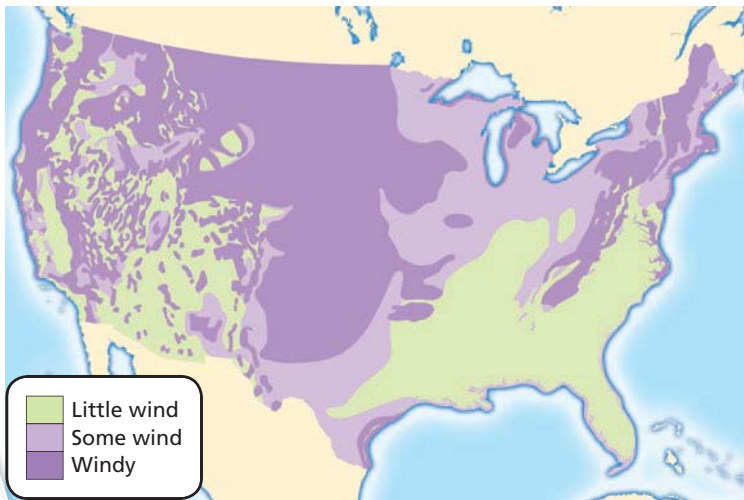
One wind turbine could make enough electricity to run your school. You could even have enough left over to sell to the local electric company! Wind, like water, is a clean energy source and does not hurt the environment. Both are renewable resources.

Floating windmills take advantage of stronger and steadier winds over the water. Undersea cables carry electricity to the shore.



Look at the map. Where in the United States could wind energy be used the most? What would you expect the land to look like in those areas?

Four horizontal lines for writing an answer.



Hang gliders and eagles use wind energy to fly.

Sailors must learn how to use sails to capture the wind.



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Renewable Energy Is Our Future



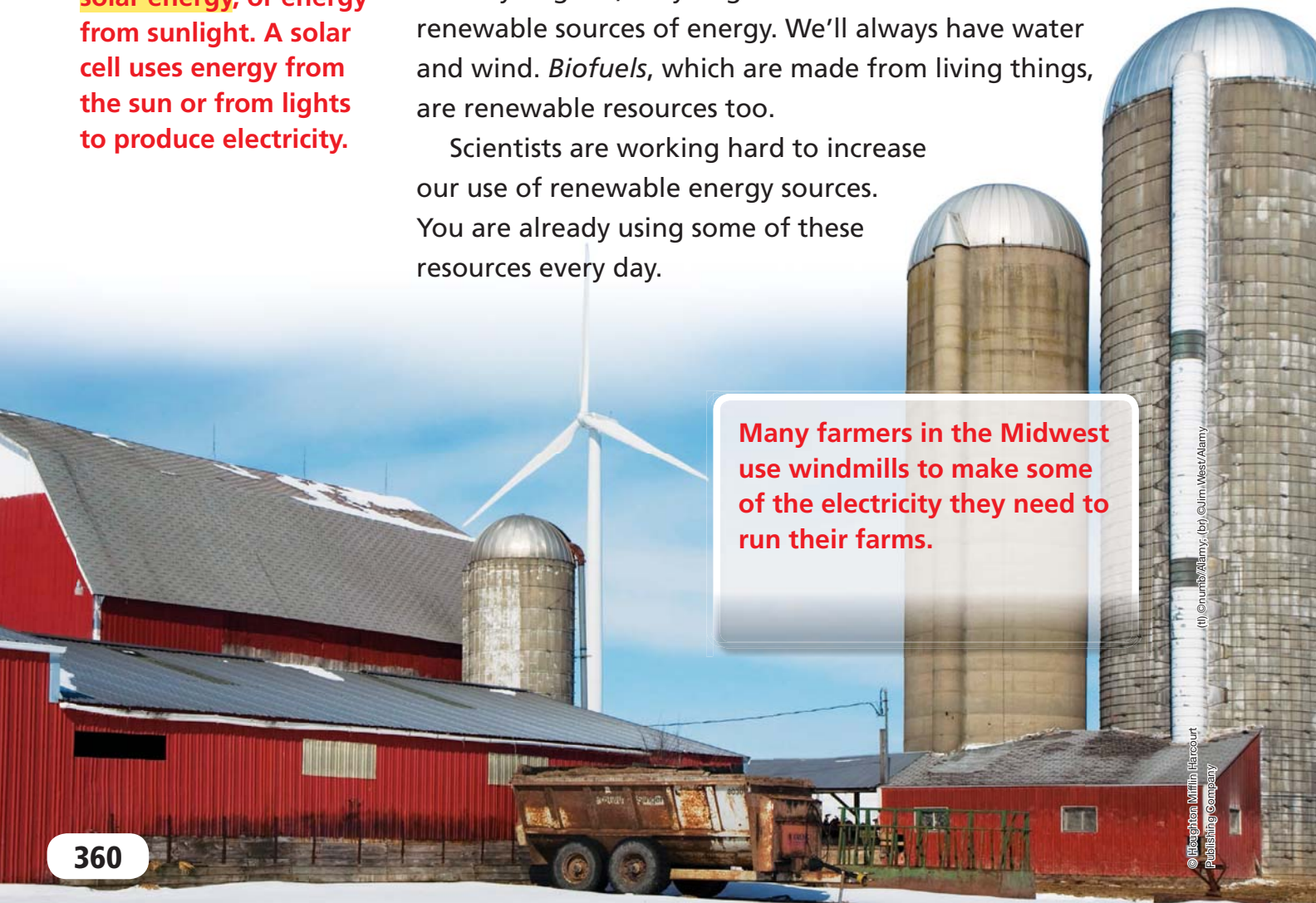
Many calculators use **solar energy**, or energy from sunlight. A solar cell uses energy from the sun or from lights to produce electricity.

We may someday run out of fossil fuels like coal, petroleum, and natural gas. If we want to use electricity in the future, we'll have to find ways to use other sources of energy.

Fossil fuels are nonrenewable sources of energy. Once they're gone, they're gone. Water and wind are renewable sources of energy. We'll always have water and wind. *Biofuels*, which are made from living things, are renewable resources too.

Scientists are working hard to increase our use of renewable energy sources. You are already using some of these resources every day.

Many farmers in the Midwest use windmills to make some of the electricity they need to run their farms.





This bus has a tank filled with hydrogen instead of gasoline. The hydrogen goes to a fuel cell, where hydrogen and oxygen produce electricity. The electricity drives the bus's motor. The bus's fuel cell is similar to the one shown here from a hydrogen car.



DO THE MATH

Solve Real-World Problems

This house just had solar panels added to its roof. Before the solar panels, the homeowners' monthly electric bill was about \$250. With the solar panels, their bill dropped to about \$175 per month. How much money are the solar panels saving them each month? _____



Sum It Up »

Use information in the summary to complete the graphic organizer.

Wind and water are two important sources of renewable energy. Humans have long used water's energy to move people and things. Windmills were often used to grind grain. Today, we use wind energy and water energy to drive generators. The generators change mechanical energy to electrical energy. Scientists are working hard to increase our use of renewable energy sources.

Main Idea: Wind and water are two important sources of renewable energy.

Detail: Humans have long used water's energy to move people and things.

1

Detail: _____



2

Detail: _____

Apply Concepts

2 In the space below, draw a picture to show one way that water moves an object.

3 Circle the activities that use a clean energy source.



4 Describe why the activities you circled involve a clean energy source.

5 Make a list of six ways you use renewable energy at home or at school.

6 Tell how a dam is used to make electricity.

7 Which of these is a renewable resource? How do you know?

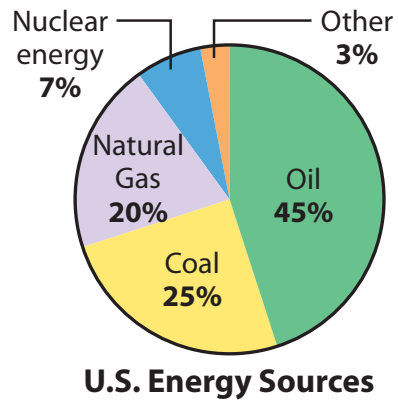


8 What energy source do you think people will use most in the future?
Explain your answer.

9 Which of these is a nonrenewable resource? Circle it.



10 Wind and water energy account for less than 3% of the energy used in the United States each year. Use the circle graph to explain in a letter to a lawmaker why using renewable energy sources is important.



Take It Home!

Share what you have learned about wind and water uses with your family. With a family member, name uses of water in places in your home and yard.