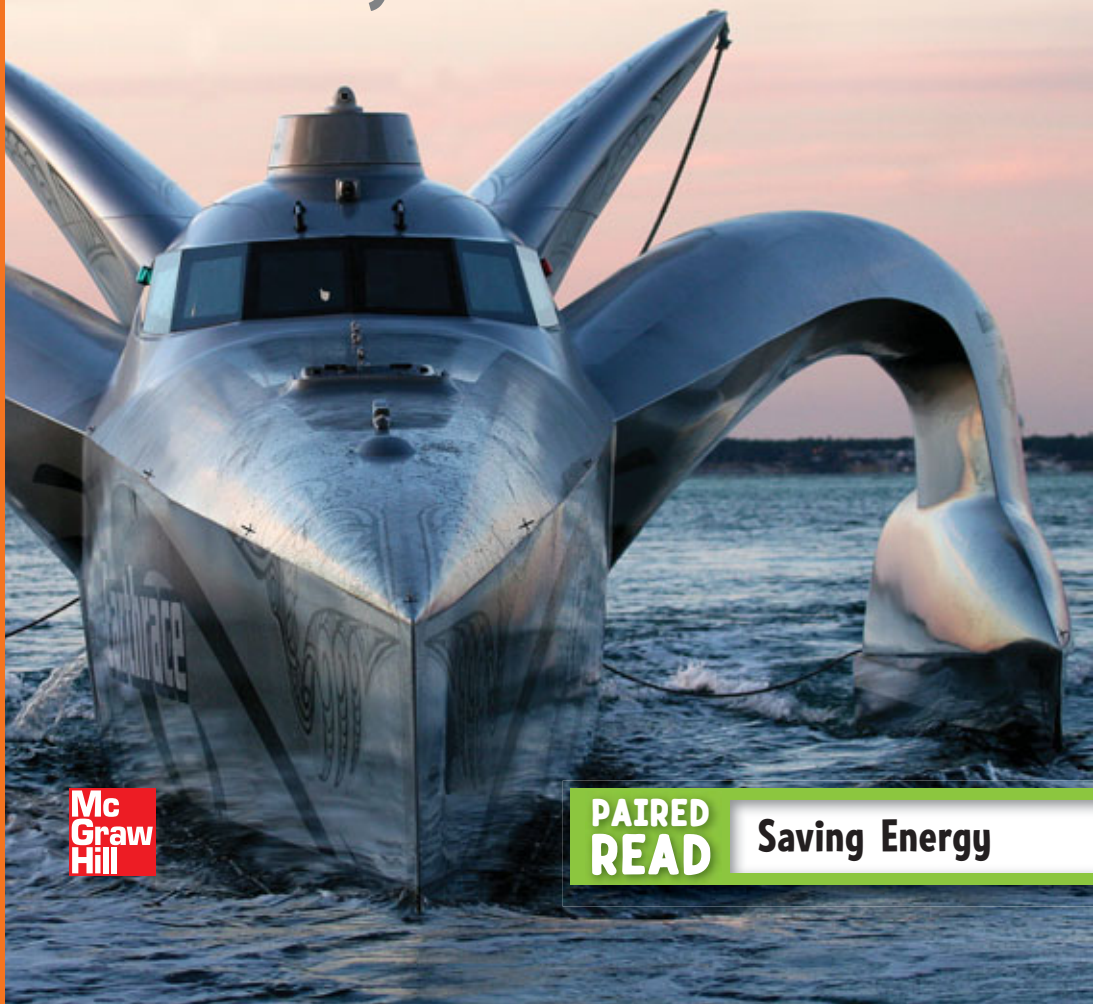
Expository Text

The Fuel of the Future

by Vanessa York



PAIRED READ

Saving Energy

STRATEGIES & SKILLS

Comprehension

Strategy: Ask and Answer Questions

Skill: Cause and Effect

Vocabulary

energy, natural, pollution, produce, renewable, replace, sources, traditional

Vocabulary Strategy

Homophones

Content Standards

Science

Earth and Space Science

Word count: 800**

Photography Credit: Cover Earthrace Conservation.

**The total word count is based on words in the running text and headings only. Numerals and words in captions, labels, diagrams, charts, and sidebars are not included.

CCSS **Genre** Expository Text

Essential Question

What are different kinds of energy?

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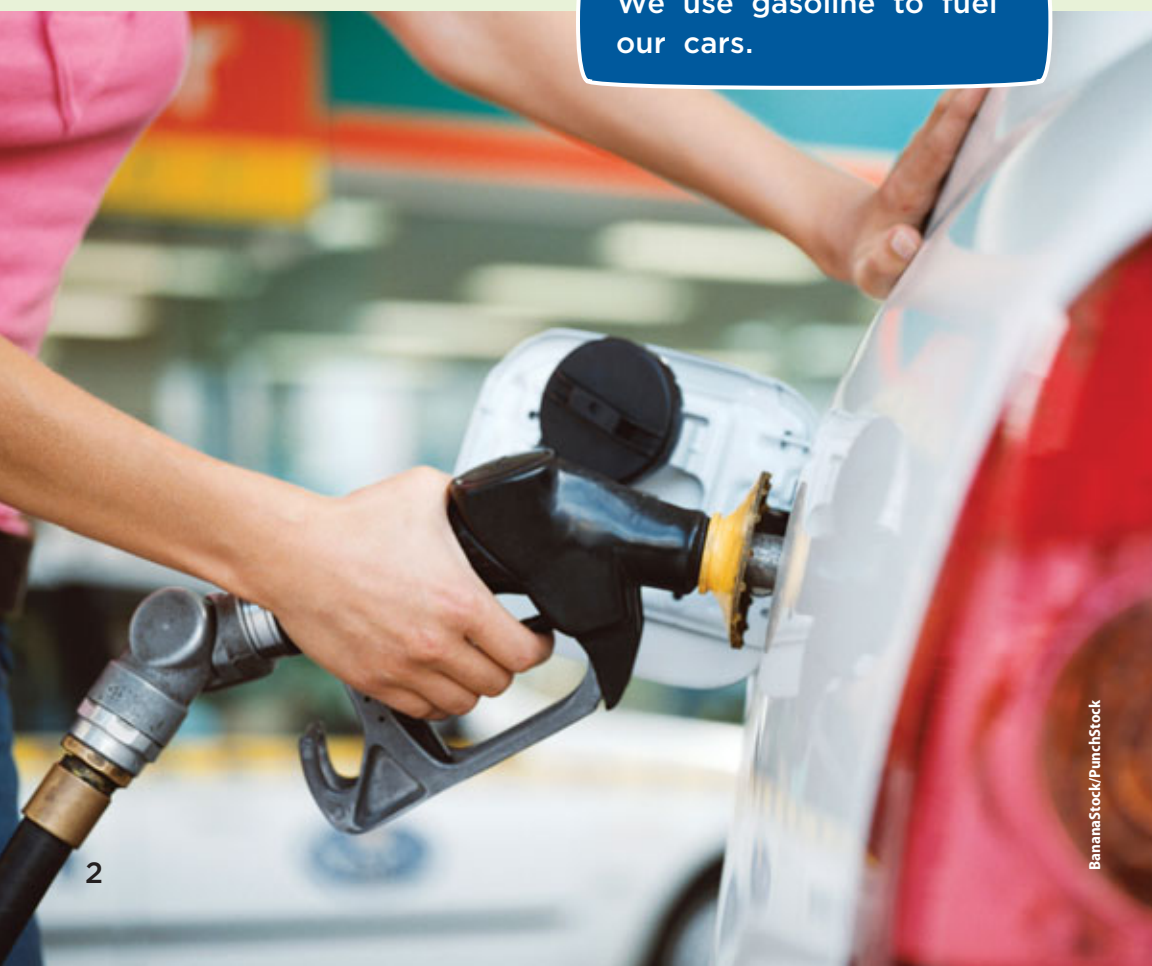
Introduction

Fuel is any material that stores energy that can be **extracted** and then used. We use fuel to run cars, trucks, and machines. We also use fuel to make electricity.



We use gasoline to fuel our cars.

BananaStock/PunchStock

Many trucks run on diesel fuel.

People have used **fossil fuels**, such as coal, natural gas, and oil, for a long time. We find these fuels in the ground. But there are problems with fossil fuels. Fossil fuels cause pollution. They also produce **greenhouse gases**. Some scientists think that greenhouse gases may cause **global warming**. We are also running out of fossil fuels. Scientists are looking for the fuels of the future.

CHAPTER 1

Biofuels

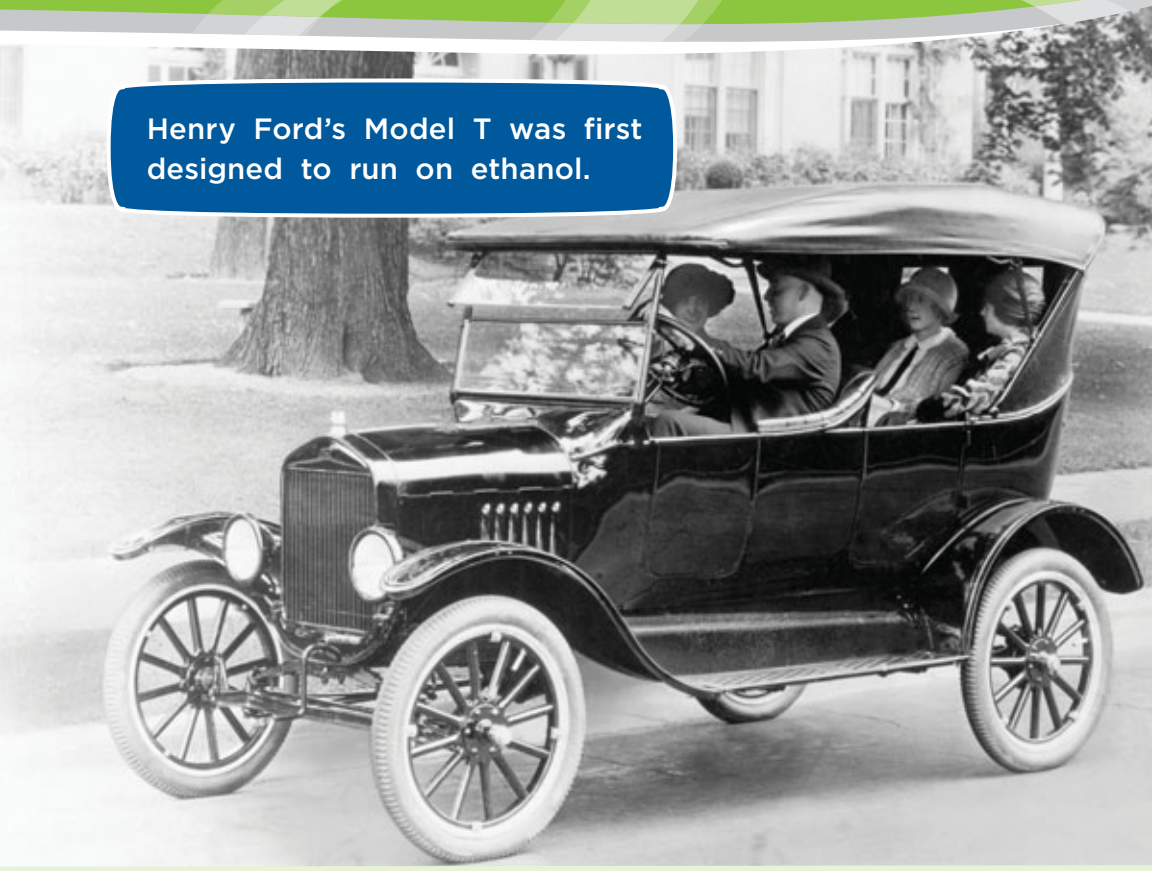
Biofuel is a renewable fuel. It is made from plants. Biofuel can also be made from natural waste products such as vegetable oil. It produces less pollution than traditional fuels.

Plant Sugars and Ethanol

Plants are full of sugar. The sugar can be extracted to make a biofuel called ethanol.

Science Photo Library/Getty Images

A biofuel called ethanol is made from corn at this plant in Iowa.



Henry Ford's Model T was first designed to run on ethanol.

Biofuel is not a new idea. Rudolf Diesel invented the diesel engine. He knew that his engine would run on vegetable oil. Henry Ford also expected his Model T car to run on ethanol, which is made from corn. At that time, nobody knew that everyone would use gasoline for cars.

Bettmann/CORBIS

Some buses run on biofuel.

The most common type of biofuel is ethanol. Ethanol is made from plants such as wheat and sugar beet. It can also be made from seaweed.

Ethanol is mostly used to run cars. In Brazil, about one out of five cars runs on ethanol.

Wu Kaixiang/Xinhua Press/CORBIS

Ethanol Fuel Production in 2010

United States	13,230 million gallons
Brazil	6,922 million gallons
European Union	1,177 million gallons
China	542 million gallons
Canada	357 million gallons

Not everyone thinks biofuel is good for the environment. Ethanol does not pollute the environment as much as gasoline. But it takes seven acres of corn to produce enough ethanol to run one car for one year. That's a lot of corn. It's also a lot of land that could be used to produce food. In some places, rain forest has been cut down to make room for biofuel crops.

Corn is grown for biofuel, as well as food.

Dave Reede/All Canada Photos/CORBIS

This scientist is studying plant bacteria that may be used to make biofuel.

Biobutanol is made from plants. Scientists have found that biobutanol can be made by bacteria such as e.coli. E.coli is a bacteria that causes upset stomachs!

Biobutanol costs a lot of money to make. Scientists are trying to find easier ways to make biobutanol. That would make it a renewable fuel that could replace fossil fuels.

Biodiesel is made from oils, or fats such as soybean and palm oil. Scientists have even made biodiesel from coffee grounds!

Biodiesel looks like ordinary diesel. Diesel is a fuel made from oil. But ordinary diesel is harmful to the Earth. Biodiesel is **non-toxic** and **biodegradable**.

Diesel is used to run heavy machinery, as well as many cars and trucks.

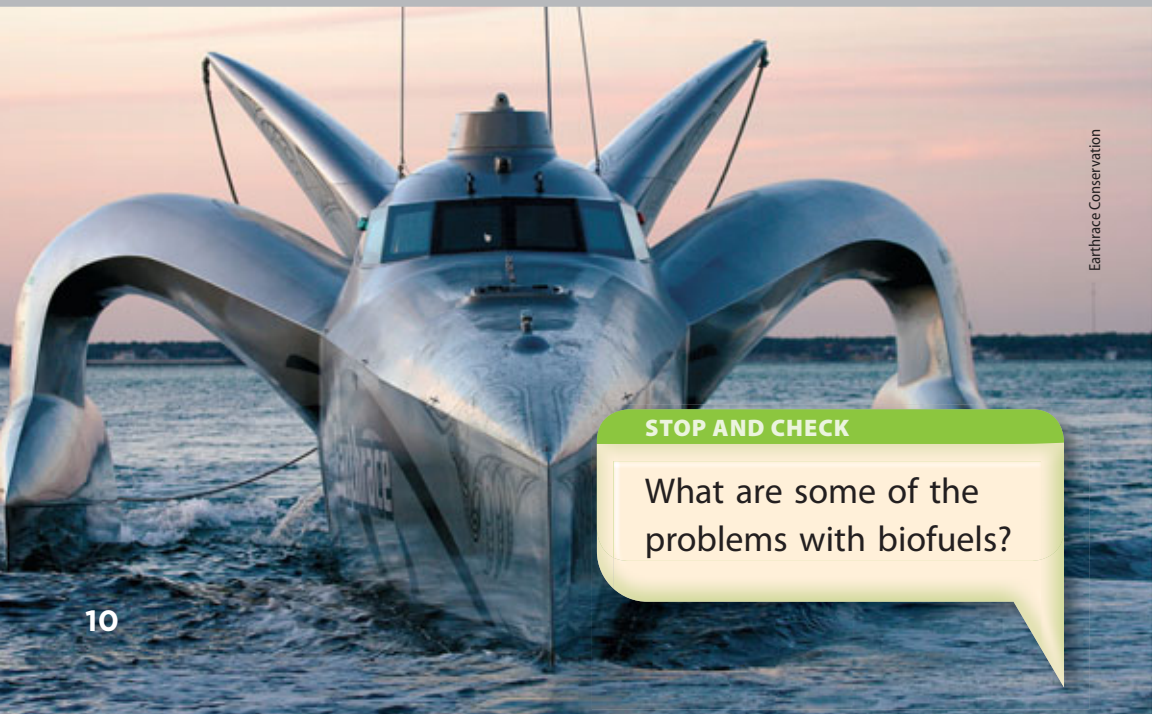
Brand X Pictures/PunchStock

People can buy biodiesel at gas stations. There are problems with biodiesel, however. It causes less pollution than ordinary diesel. But biodiesel still produces pollution. Biodiesel costs a lot to make. Scientists are looking at ways to improve this fuel.

Earthrace

Around the World

In 2008, *Earthrace*, a cool-looking powerboat that ran entirely on biodiesel, broke the world speed record for going around the globe.



Earthrace Conservation

STOP AND CHECK

What are some of the problems with biofuels?

CHAPTER 2

Hydrogen Fuel

In the future, cars may run on water. Hydrogen is a gas with no color. It has no smell. Hydrogen can be burned as a fuel. It produces almost no pollution.

Stocktrek/age fotostock

Hydrogen is found in water. Hydrogen is also found in hydrocarbons. Hydrocarbons are in many fuels, such as natural gas.

NASA uses hydrogen fuel for rockets and other spacecraft.

Making hydrogen fuel takes a lot of energy. It also costs a lot of money. Scientists hope that their research will make hydrogen fuel easily available.

Today, hydrogen fuel is mostly used in fuel cells. Fuel cells bring together hydrogen and oxygen. This causes a chemical reaction. Fuel cells produce electricity.

Hydrogen Power

Italy has a hydrogen power plant giving power to 20,000 homes. It prevents thousands of tons of greenhouse gases each year.

Michelangelo Gratton/DigitalVision/Getty Images

Hydrogen power helps provide electricity to the city of Venice, Italy.

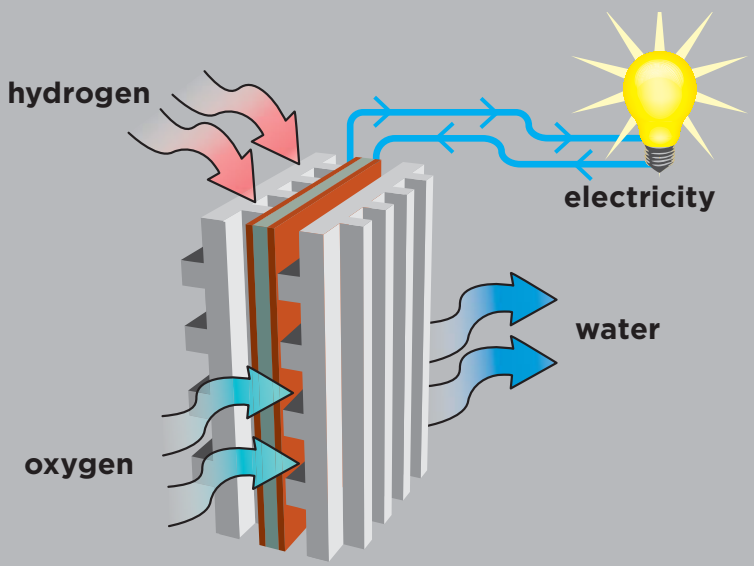
Hydrogen fuel may be the fuel of the future. Biofuels cause some pollution, but hydrogen fuel does not. One day, cars and airplanes may run on hydrogen fuel.

STOP AND CHECK

What is one benefit of hydrogen as a fuel?

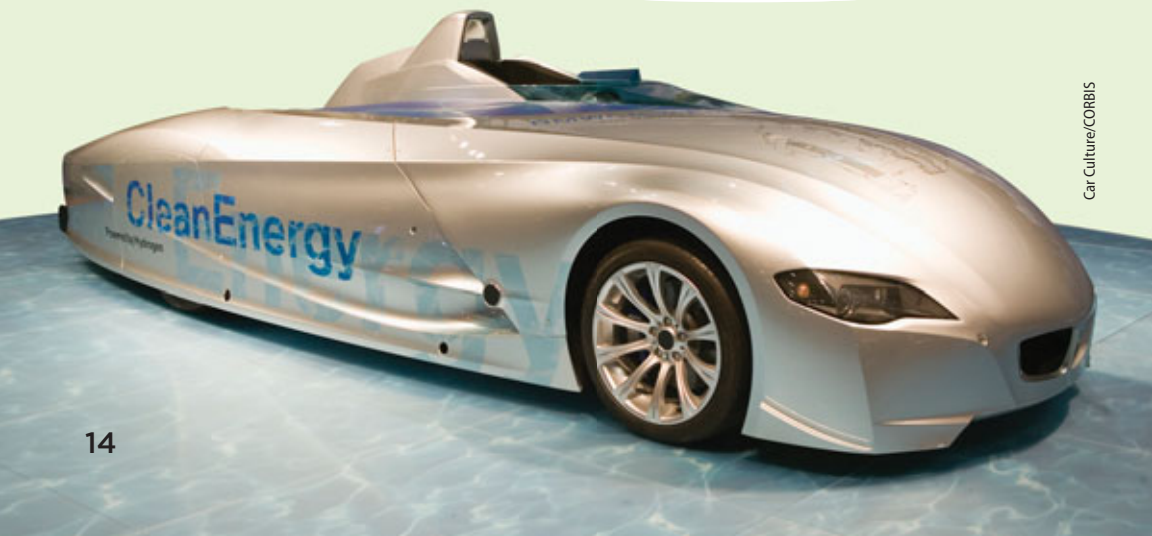
A Hydrogen Fuel Cell

Hydrogen and oxygen are combined in a fuel cell. Electricity is generated. Clean water is also released.



Conclusion

Scientists are working hard to find the fuels of the future. They want to find better ways to make biofuels and hydrogen fuels. They also want the fuels of the future to come from different sources. We must make good use of Earth's resources because not all resources are renewable.



This racing car is powered by hydrogen fuel.

Car Culture/CORBIS

Respond to Reading

Summarize

Summarize what you have learned about fuels of the future. Use the chart to help you.

Cause →	Effect
First →	
Next →	
Then →	
Finally →	

Text Evidence

1. *The Fuel of the Future* is an expository text. Expository text gives information about a topic. Find two pieces of information about biofuels in the text. **GENRE**

2. How does using fossil fuels affect the environment? **CAUSE AND EFFECT**

3. Homophones are words that sound the same, but have different meanings. Find the homophones on page 5. **HOMOPHONES**

4. Write a paragraph describing the author's attitude toward biofuels or hydrogen fuel. **WRITE ABOUT READING**

CCSS **Genre** Expository Text

Compare Texts

Read about ways you and your family can save energy.

Saving Energy

We use energy in our homes. We use it to heat our houses. We use it to run our televisions, computers, and appliances.

There are many simple ways we can save energy. Using less energy saves money. It is also good for the environment.

In the cold weather, keep doors and windows tightly closed to save energy in heating. In warmer weather, open doors and windows to cool the air without using energy.

Wasting water also wastes energy. It takes a lot of electricity to supply water and take away wastewater. Turn off the water while brushing your teeth or washing the dishes.

Wasting electricity also wastes energy. Turn off the lights if you are leaving a room. Use energy saving lightbulbs. Turn off televisions and computers when you aren't using them.

Don't forget to switch off the lights.

JGI/Jamie Grill/Blend Images/CORBIS

TOP TIPS TO SAVE ENERGY

1. **Turn it off!** If you've finished with the lights, the television, or the stereo, turn them off.

2. **Keep it closed!** The fridge and the oven all work better when the door is closed. Closing doors inside the house helps keep heat in.

3. **Look for the label!** Washing machines, refrigerators, and dryers that use less energy have a special "energy star" label. You can also get lightbulbs that save energy.

Mike Kemp/Rubberball/Getty Images

An energy-efficient lightbulb uses 75% less energy.

Make Connections

What do you think was the main idea in *Saving Energy*? **ESSENTIAL QUESTION**

What theme does *The Fuel of the Future* share with *Saving Energy*? **TEXT TO TEXT**

Glossary

biodegradable *(BI-oh-dee-GRAYD-ible)* able to decompose naturally ***(page 9)***

extracted *(EX-trakt-id)* taken out of something or from somewhere ***(page 2)***

fossil fuels *(FOH-suhl FEW-ills)* fuels such as coal, oil, and natural gas that are found in the ground ***(page 3)***

global warming *(GLOW-buhl WAR-ming)* the increase in Earth's surface temperature due to the greenhouse effect ***(page 3)***

greenhouse gases *(green-HOWZ gassiz)* gases, such as carbon dioxide, that get trapped in Earth's atmosphere, making it hotter ***(page 3)***

non-toxic *(nuhn-TUHX-ik)* safe, harmless to the environment ***(page 9)***

Index

Focus on Science

Purpose To find out how a gas (carbon dioxide) rises from liquid.

What You Need

- a bottle of soda
- a balloon
- a watch or clock

What To Do

Step 1 Open a bottle of soda.

Step 2 Put the end of the balloon over the neck of the bottle. Make sure it fits tightly.

Step 3 Check the balloon every ten minutes for changes.

Step 4 Record what you see.

Conclusion What happened to the balloon?

Literature Circles

Nonfiction

Thinkmark

The Topic

What is *The Fuel of the Future* mostly about?

Vocabulary

Find three key words in the text that relate to the topic.
What new words did you learn?

Author's Purpose

What is the author's purpose in writing *The Fuel of the Future* and *Saving Energy*?

Conclusions

What is the most important thing you learned in *The Fuel of the Future*?
What is the most important thing you learned in *Saving Energy*?