

Expository
Text

The Fuel of the *Future*

by Vanessa York



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PAIRED
READ

Saving Energy

VOCABULARY & SKILLS

Comprehension Skill

Cause and Effect

Vocabulary

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

Expand Vocabulary

combine, common,
extracted, generate,
reaction, released, upset

Content Standards

Science

Earth and Space Science

Word Count: 712**

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.

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Essential Question

What are different kinds of energy?

The Fuel of the *Future*

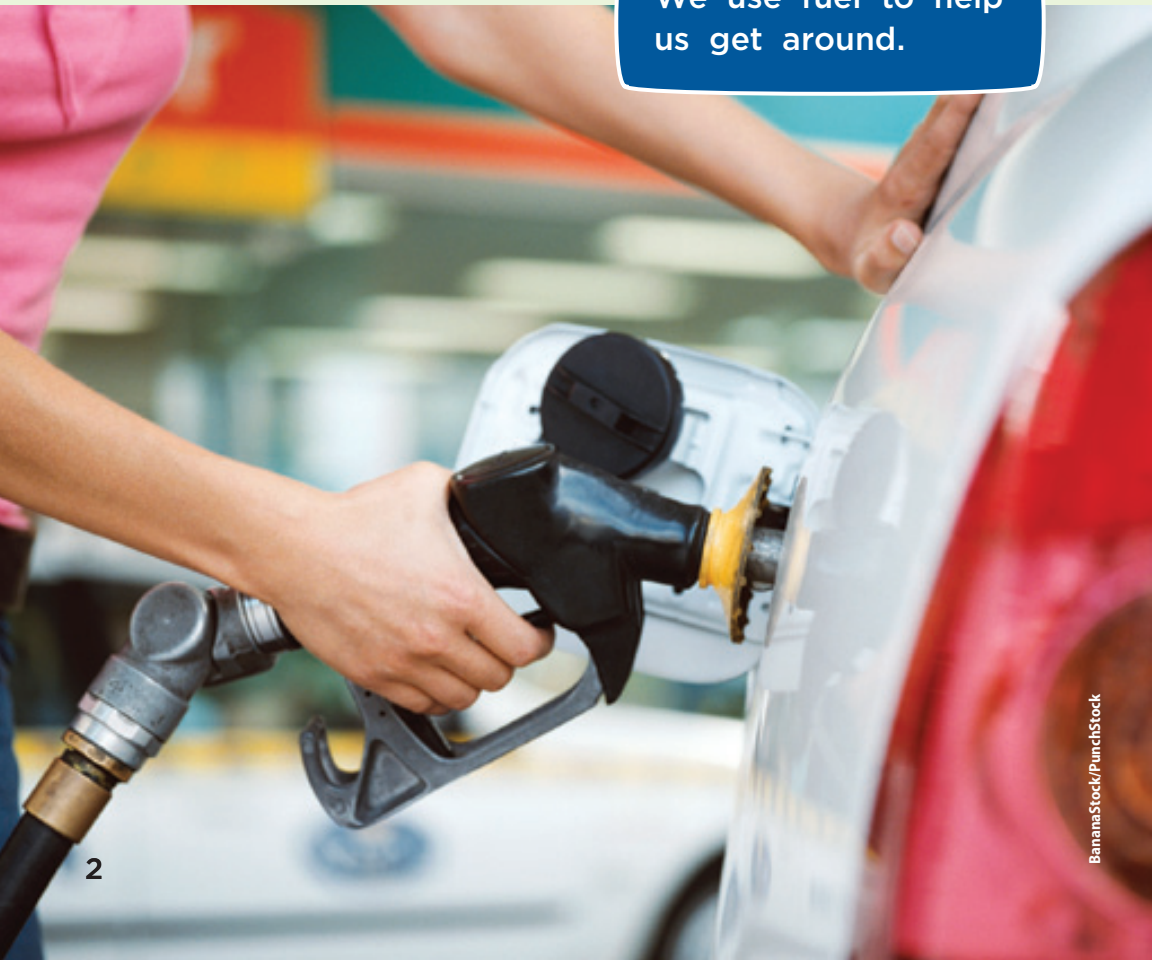
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Introduction

Fuel is any material that has **energy** that can be **extracted** and then used. We use fuel to run machines. We use fuel to make electricity.

We use fuel to help us get around.





Many trucks run on diesel fuel.

Fuels such as coal and oil are called **fossil fuels**. They come from the ground. But these fuels cause **pollution**. They also give off **greenhouse gases**. Some scientists think that greenhouse gases cause **global warming**.

Fossil fuels are running out. Scientists are looking for other fuels that people can use.

Biofuels

Biofuel is a **renewable** fuel. It is made from the sugar in plants. Biofuel is also made from **natural** products, such as vegetable oil, that have already been used.

Biofuel produces less pollution than **traditional** fuels like coal or gas.

This factory in Iowa makes a biofuel called ethanol. Machines extract the sugar found in corn.





The Model T car was built to run on ethanol.

Biofuel is not new. Rudolf Diesel invented the diesel engine in 1898. His engine ran on vegetable oil. Henry Ford's first car, the Model T, used ethanol.



Some buses run on biofuel.

Ethanol is the most **common** biofuel. Ethanol is made from plants. It can be made from corn, sugar beets, wheat, or seaweed.

Ethanol is mostly used to run cars. The United States and Brazil make and use the most ethanol.

STOP AND CHECK

What is ethanol?

Some people don't think that biofuels are good for the environment. Ethanol does not pollute as much as gasoline. But it takes seven acres of corn to **produce** enough ethanol to run one car for one year. That land could be used to produce food. Some rain forests have been cut down to grow biofuel crops.

Some corn is grown to make biofuels.

A photograph of a cornfield with a green sign that says "Grown for Biofuel". The sign is rectangular with a yellow border and is mounted on a black post. The corn is golden yellow, indicating it is ready for harvest. The sky is blue with some light clouds.

Grown
for
Biofuel



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

Biobutanol is another biofuel. It is made from plants. Scientists have found that some bacteria make biobutanol. These bacteria cause **upset** stomachs!

Biobutanol costs a lot to make. Scientists are looking for better ways to make it. They want to make it a renewable fuel to **replace** fossil fuels.

Biodiesel is made from oils or fats, like soy and palm oil.

Biodiesel looks like ordinary, or regular, diesel. Ordinary diesel can harm the environment. Some people think biodiesel is better than diesel. Biodiesel is **non-toxic**. It is also **biodegradable**.

Pand X Pictures/PunchStock



Many large machines run on diesel.

Biodiesel is easily available. It is sold at many gas stations. It causes less pollution than ordinary diesel. However, it still produces pollution. Biodiesel also costs a lot to make. Scientists are looking at ways to improve this fuel.

The powerboat *Earthrace* ran on biodiesel. In 2008, *Earthrace* broke a world speed record.



Earthrace Conservation

STOP AND CHECK

What are some of the problems with biodiesel?

Hydrogen Fuel

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

Hydrogen is also found in hydrocarbons. Hydrocarbons are in many fuels, like gasoline and natural gas.



Stocktrek/age fotostock

NASA uses hydrogen fuel to launch rockets.

It costs a lot to make hydrogen fuel. It takes a lot of energy.

Hydrogen fuel is mostly used in fuel cells. Fuel cells **combine**, or bring together, hydrogen and oxygen. This causes a chemical **reaction**, or change. Fuel cells **generate** electricity. Clean water is **released**.



Hydrogen power helps provide electricity to Venice, Italy.

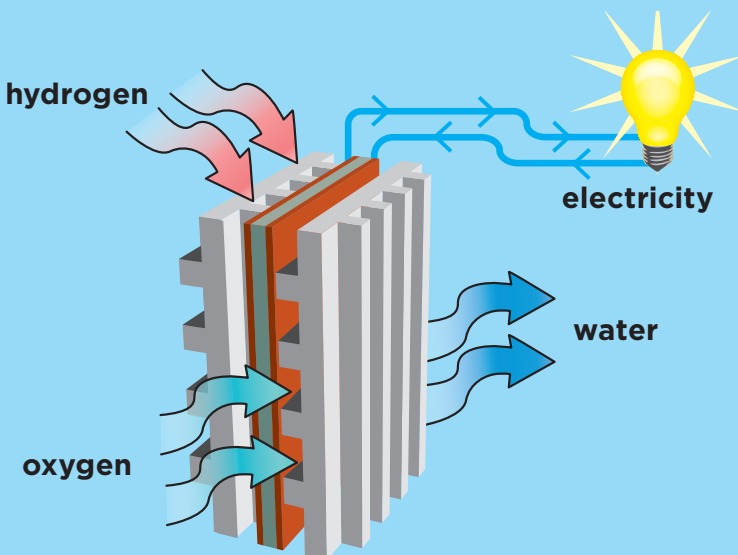
Hydrogen fuel may be the fuel of the future. It does not cause pollution. One day, cars and airplanes may run on hydrogen fuel.

STOP AND CHECK

Why is hydrogen good for the environment?

A Hydrogen Fuel Cell

Hydrogen and oxygen are combined in a hydrogen fuel cell. Electricity and water are produced.



Conclusion

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

Hydrogen fuel powers this racing car.



Car Culture/CORBIS

Respond to Reading

Summarize

Summarize what you have learned about fuels of the future. Use details from the text. Your chart may help you.

Cause	→	Effect
First	→	
Next	→	
Then	→	
Now	→	

Text Evidence

1. Reread page 3. How does using fossil fuels affect Earth? **CAUSE AND EFFECT**
2. Find the word *available* on page 10. What does it mean? What clues help you figure it out? **VOCABULARY**
3. Write a paragraph about the effects hydrogen would have if it became a popular fuel. **WRITE ABOUT READING**

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 and computers.

There are many ways to save energy. Keeping doors and windows closed when it is cold saves energy. Keeping doors and windows open when it is hot cools the air without using energy.

Wasting water also wastes energy. Don't keep the water running while brushing your teeth or washing the dishes.

Wasting electricity also wastes energy. Use lightbulbs that save energy. Turn off televisions and computers when you are not using them.



Don't forget to turn off the light when you leave a room.

TOP TIPS TO SAVE ENERGY

- 1. Turn it off!** Turn off the lights, televisions, and computers when you have finished using them.
- 2. Keep it closed!** The refrigerator and the oven both work better when the door is closed. Close the doors inside the house to keep the 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-saving lightbulb uses little electricity.



Make Connections

What is the main idea in *Saving Energy*?

ESSENTIAL QUESTION

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

Glossary

biodegradable (*BY-oh-di-GRAY-duh-buhl*) able to decay naturally (*page 9*)

fossil fuels (*FOS-uhl FEW-uhlz*) coal, oil, natural gas, and other fuels that are found in the ground (*page 3*)

global warming (*GLOH-buhl WAWRM-ing*) the increase in Earth's surface temperature due to the greenhouse effect (*page 3*)

greenhouse gases (*GREEN-hows GAS-uhz*) gases, such as carbon dioxide, that get trapped in Earth's atmosphere, making it hotter (*page 3*)

non-toxic (*non-TOK-sik*) safe, harmless to the environment (*page 9*)

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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?

Nonfiction

Thinkmark

The Topic

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

Vocabulary

What new words did you learn?

Author's Purpose

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

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*?

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