

Using Natural Resources

Protecting Earth


..... Before You Read

What do you think? Read the two statements below and decide whether you agree or disagree with them. Place an A in the Before column if you agree with the statement or a D if you disagree. After you've read this lesson, reread the statements to see if you have changed your mind.		
Before	Statement	After
	5. Oil left over from frying potatoes can be used as automobile fuel.	
	6. Hybrid electric vehicles cannot travel far or go fast.	

..... Read to Learn

Monitoring Human Impact on Earth

As the human population increases, so does its impact on the planet. Scientists, governments, and concerned citizens around the world are working to identify environmental problems, educate people about them, and help find solutions.

Scientists collect data on environmental conditions by placing detectors on satellites, aircraft, high-altitude balloons, and ground-based monitoring stations. For example, the United States and the European Union have launched satellites into orbit around Earth. These satellites gather data on greenhouse gases, the ozone, ecosystem changes, melting glaciers and sea ice, climate patterns, and ocean health. The U.S. Environmental Protection Agency (EPA) is a government organization that watches the health of the environment and looks for ways to reduce the impact of humans. The EPA enforces environmental laws and supports research. It also identifies superfund sites—abandoned areas that have been contaminated by toxic wastes—and develops plans to clean them. 

Developing Technologies

Many technologies have been developed to protect Earth's resources. These advances often focus on saving energy and reducing pollution.

Key Concepts

- How can people monitor resource use?
- How can people conserve resources?

Mark the Text

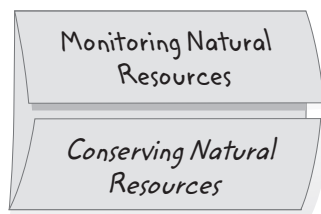
Building Vocabulary As you read, underline the words and phrases that you do not understand. When you finish reading, discuss these words and phrases with another student or your teacher.

Key Concept Check

1. State How can people monitor resource use?

FOLDABLES®

Make a small shutterfold book and use it to identify technology and methods that protect natural resources.



✓ Reading Check

2. Explain How does using CFLs help the environment?

✓ Visual Check

3. Summarize How do CFCs affect ozone molecules?

Water-Saving Technologies

It takes energy to clean water and to transport it to homes and businesses. So technologies that conserve water also save energy. Low-flow showerheads and toilets as well as drip irrigation systems help reduce water use.

Energy-Saving Technologies

Saving energy can make Earth's supply of fossil fuels last longer. Using renewable energy sources reduces fossil fuel use. Some of these sources are expensive, but designs are improving and costs are falling. Solar electricity might soon cost the same as electricity produced by burning fossil fuels. Burning fewer fossil fuels also creates less pollution.

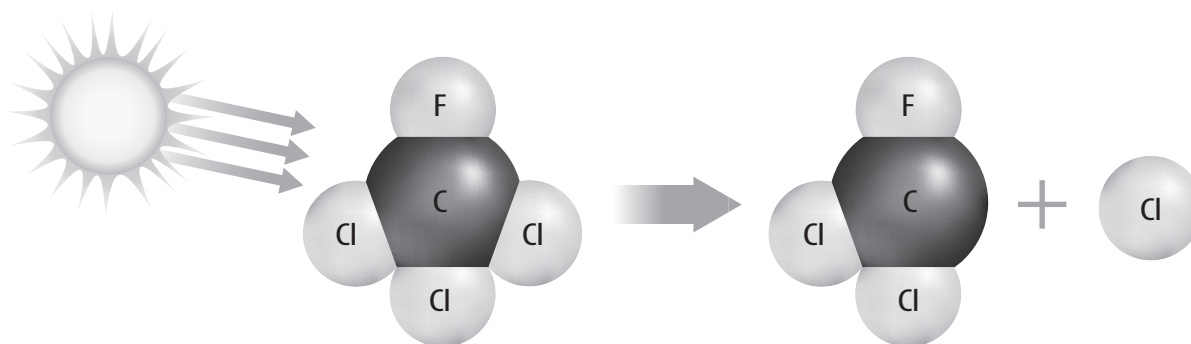
Other energy-saving advances include compact fluorescent lightbulbs (CFLs). They use about one-fourth the energy of incandescent bulbs and can last ten times longer. In 2007, Americans who switched to CFLs reduced greenhouse gas emissions by an amount equal to removing 2 million cars from the road. ✓

CFC Replacements

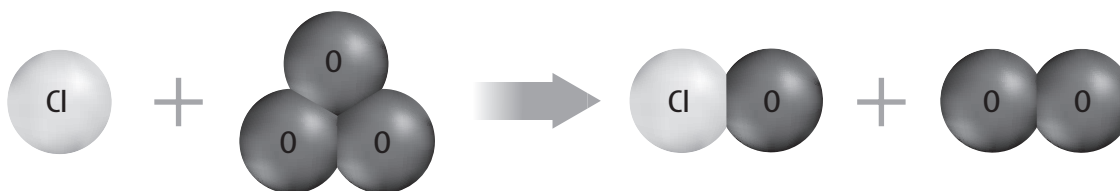
CFCs thin the ozone layer because the chlorine atoms in CFC molecules react with sunlight to destroy ozone, as shown in the figure below. All CFCs soon will be phased out and replaced with chemicals that do not contain chlorine. Replacements include hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs). Even after CFCs are no longer in use, it will take decades for the ozone layer to recover.

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CFCs



Sunlight reacts with a CFC molecule, causing a chlorine atom to break away.



The chlorine atom reacts with and breaks apart an ozone molecule.

Alternative Fuels

Gasohol and biodiesel are alternative fuels that help reduce humans' use of fossil fuels. These alternative fuels also help reduce air pollution. ✓

Gasohol Gasohol is a mixture of 90 percent gasoline and 10 percent ethanol. Ethanol is alcohol made from corn, sugarcane, or other plants. Using gasohol in gasoline engines helps reduce emissions of carbon monoxide. Carbon monoxide is an air pollutant that contributes to smog.

The carbon in ethanol comes from plants instead of fossil fuels. So using gasohol can help reduce emissions that contribute to global warming.

Biodiesel Biodiesel is an alternative fuel that is made from renewable resources, primarily vegetable oils and animal fats. Biodiesel can even be made from oil that is left over from frying foods in restaurants!

Biodiesel can be burned in diesel engines in farm and industrial machinery, trucks, and cars. It produces fewer pollutants than regular diesel fuel, and it reduces CO₂ emissions by 78 percent.

Automobile Technologies

If you were buying a car, you would want to know how many miles it can travel per gallon of fuel. This measurement is called miles per gallon (mpg).

The higher a car's mpg rating, the less pollution it will add to the environment. A car with a high mpg rating also will use up fewer fossil-fuel resources.

HEVs Many people have decided to purchase a hybrid electric vehicle (HEV). HEVs combine a small gasoline engine with an electric motor powered by batteries.

HEVs run on battery power as much as possible. They get a boost from the gasoline engine for longer trips, higher speeds, and steep hills. The gasoline engine also charges the vehicle's batteries.

HEVs usually get excellent gas mileage. They can get up to twice the mileage of a regular car. Some recent models of HEVs get close to 50 mpg.

✓ Reading Check

4. Name two alternative fuels that help reduce humans' use of fossil fuels.

SCIENCE USE V. COMMON USE

hybrid

Science Use an offspring of two animals or plants of different breeds or species

Common Use something that has two different components performing essentially the same task

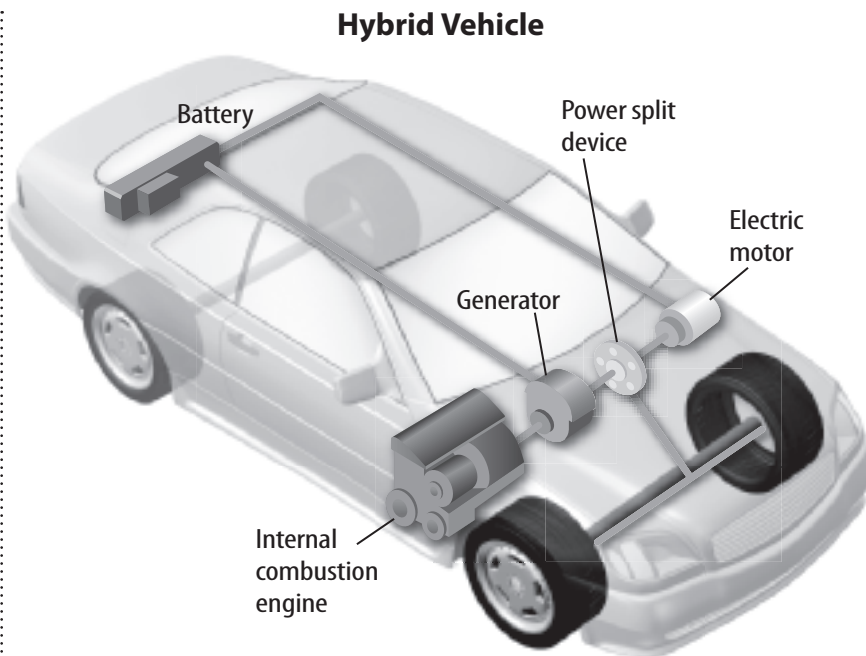


Think it Over

5. Analyze Which do you think would probably be cheaper to own: a car that gets 30 mpg or one that gets 20 mpg? Why?

Visual Check

6. Draw a circle around the power sources in the hybrid vehicle.



The figure above is a diagram of a typical hybrid electric vehicle. The battery powers the electric motor. The small gasoline engine can provide additional power.

FCVs In the future, another automobile alternative might be a fuel-cell vehicle (FCV). Inside a fuel cell, oxygen from the air chemically combines with hydrogen to produce electricity. The primary waste product is water. Tailpipe emissions from FCVs are nearly pollution-free. However, obtaining hydrogen fuel requires using methane or other fossil fuels. Researchers are looking for alternatives. ✓

Making a Difference

Do you turn off the lights when you leave a room and recycle bottles and cans? If so, you are helping reduce your impact on the environment. You can help protect Earth's resources in other ways as well. Possibilities include cleaning up a stream, educating others about environmental issues, and analyzing the choices you make as a consumer.

Sustainability

When people talk about environmental issues, they often use the word *sustainability*. **Sustainability** means meeting human needs in ways that ensure future generations also will be able to meet their needs. When you turn off the lights as you leave a room, you are saving energy—and you are also helping to ensure a sustainable future. Other actions that promote a sustainable future include planting trees, composting, and picking up litter. ✓

Reading Check

7. Compare HEVs and FCVs.

Reading Check

8. Define What is sustainability?

Restore and Rethink

Restoring damaged habitats and ecosystems to their original state is one way to make a difference. For example, picking up trash can restore water habitats.

You also can rethink the way you perform everyday activities. Instead of riding in a vehicle to nearby places, you could ride your bike or walk. ✓

Reduce and Reuse

You can reduce the amount of waste you create by reducing the amount of material you use. For example, you might avoid buying products with too much packaging.

Another way to reduce the amount of waste you create is to bring your own bags when you go shopping. Carrying your purchases in reusable bags, rather than using the plastic or paper bags the store offers, can help save energy and reduce waste.

Reusing items also helps reduce waste. Instead of buying new, reuse something that will work just as well. You also can donate used items to charities or sell them.

Recycle

If an item cannot be reused, you might be able to recycle it instead of throwing it away. **Recycling** is *manufacturing new products out of used products*. The recycling process reduces waste and extends our supply of natural resources. ✓

Computers and Electronics Computers and other electronics are examples of items that can be recycled. For example, these products contain valuable metals that can be used again. They also contain toxic materials that can contribute to pollution. So recycling also helps ensure that toxins are properly disposed of.

Compost Leaves, grass clippings, and vegetable scraps can be recycled by composting. In a compost pile, these materials decay into nutrient-rich soil that can be put back into the garden.

Buy Recycled Separating recyclables from the rest of the trash is just one step. To keep the cycle going, people need to buy and use recycled products. You can find shoes, clothing, paper, and carpets made from recycled materials. ✓

✓ Reading Check

9. Consider How does using your bike for transportation benefit the environment?

✓ Reading Check

10. State How does recycling help the environment?

✓ Key Concept Check

11. Explain How can you conserve resources?

Mini Glossary

recycling: manufacturing new products out of used products

sustainability: meeting human needs in ways that ensure future generations also will be able to meet their needs

1. Review the terms and their definitions in the Mini Glossary. Write a sentence explaining how recycling contributes to sustainability.

2. Write the correct letter in each box within the graphic organizer to compare and contrast gasohol and biodiesel.

a. made from vegetable oils

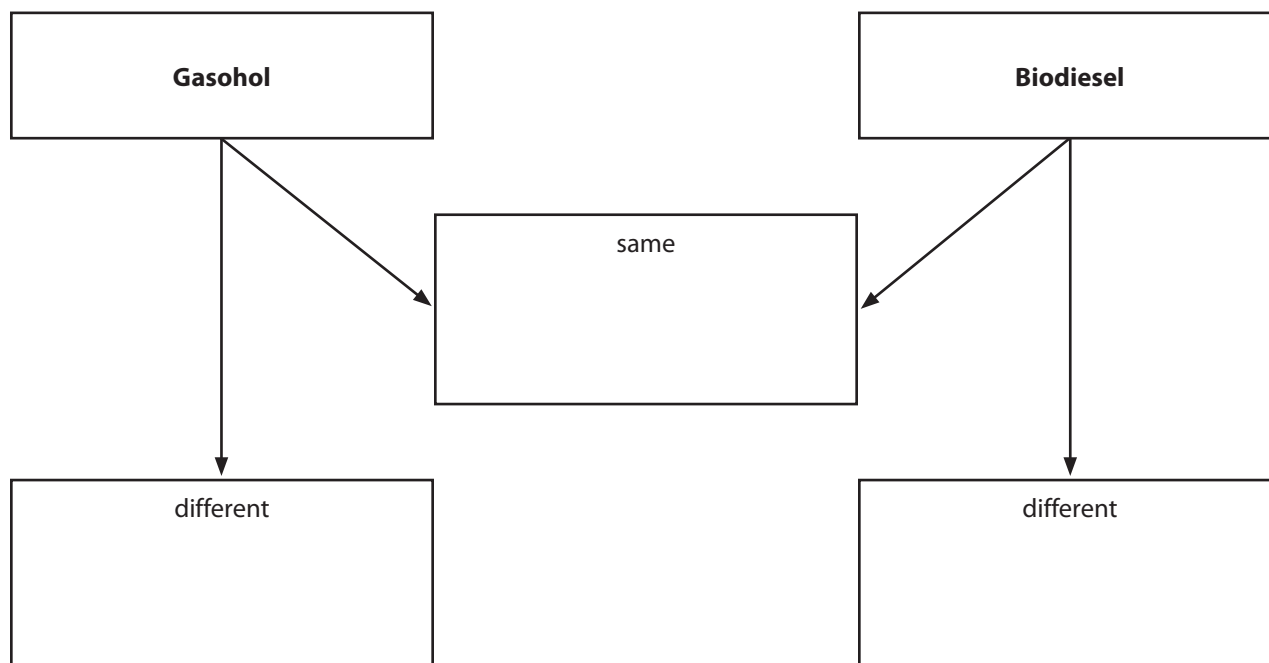
b. burned in gasoline engines

c. made from gasoline and ethanol

d. burned in diesel engines

e. reduces harmful pollutants

f. alternative fuel



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What do you think **NOW?**

Reread the statements at the beginning of the lesson. Fill in the After column with an A if you agree with the statement or a D if you disagree. Did you change your mind?



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END OF LESSON