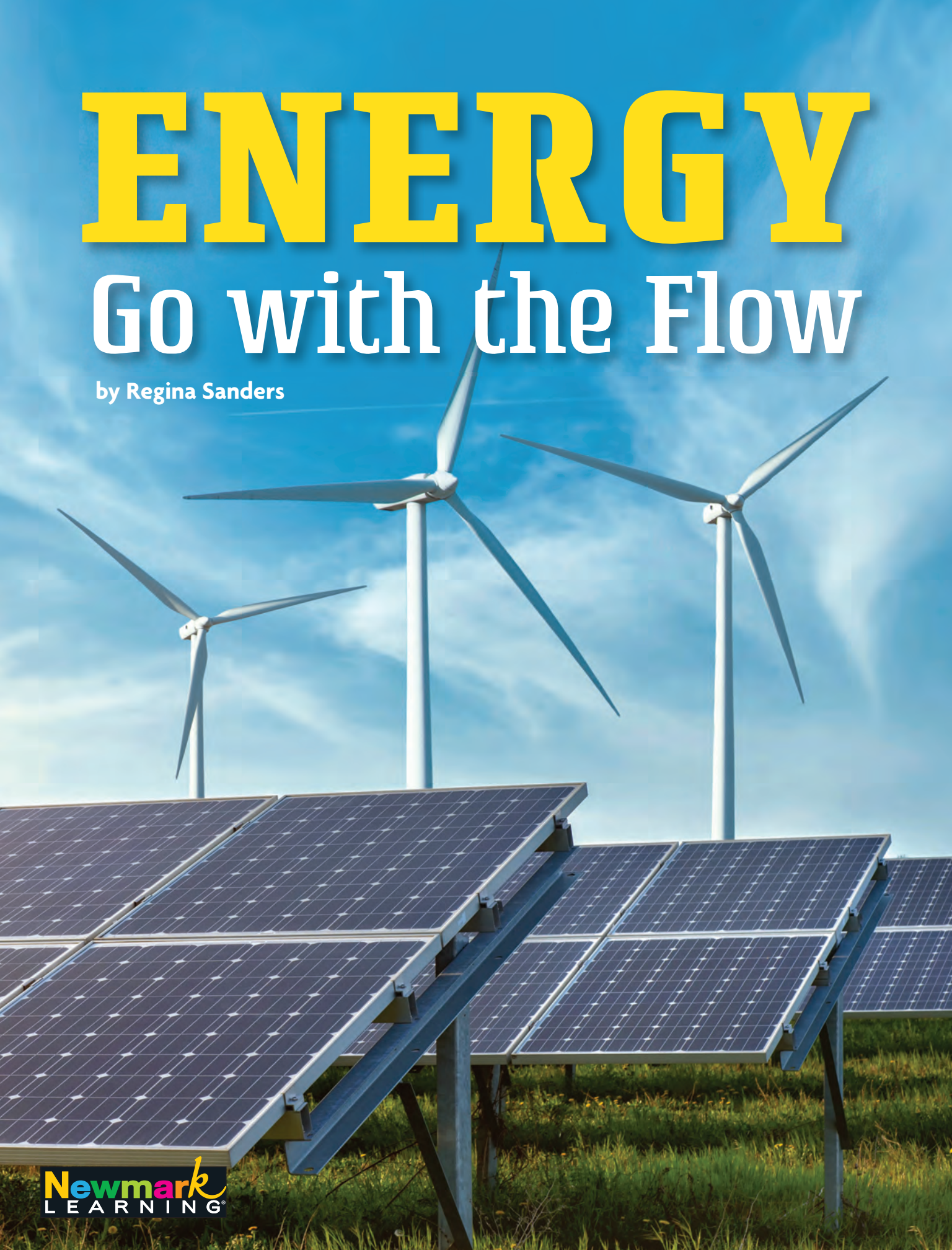
ENERGY

Go with the Flow

by Regina Sanders



Newmark LEARNING

Table of CONTENTS

Different Forms of Energy 4

New Energy on the Move 18

Glossary 23

Index 24

▲ The blackout of 2003 made headlines across the nation.

Different Forms of Energy

Blackout

On a hot afternoon in 2003, Joshua Seftel was drilling a nail into a wall. Suddenly, the drill stopped. Joshua went into the hall and saw that power was out in the building. Then he took the stairs down to the street. That's when Joshua discovered that the power was out in his whole neighborhood, in the whole city!

New York City, a city of 8.4 million people, was in the middle of a blackout. According to CBS News, the Northeast blackout of 2003 was the biggest power outage in U.S. history. More than 500 million people lost electricity for days.

The blackout stopped trains, phones, and water pumps. People sat in the hot, dark rooms asking hard questions about energy.

What Is Energy?

Energy is the power to do work. Electricity is one type of energy. The very first energy came from the sun in the form of heat and light. Then humans learned to use fire for heat, light, and cooking. Thousands of years later, people used wind to move boats. Moving water turned waterwheels that could do work. Electricity was still more than 3,000 years in the future.

The types of energy have changed many times throughout history. Now, as the world faces new challenges, energy sources are changing again.

THE JOURNEY OF ELECTRICITY

1. A power plant burns coal to make electricity.

2. Electricity travels on power lines across the country.

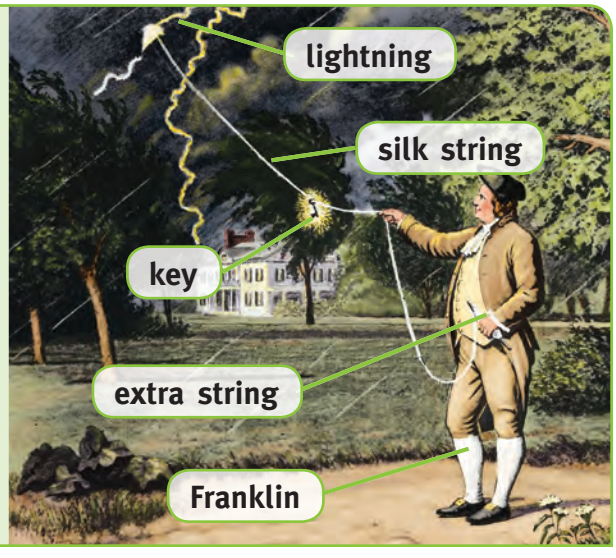
3. Electricity arrives at a substation.

4. Local power lines send electricity to houses.

5. Lights switch on; plugs power appliances.

The Kite Experiment

In 1752, Benjamin Franklin ran an experiment. At one end of a silk rope, he tied a kite. At the other, he tied a key. Then he went outside in a thunderstorm and flew his kite into the clouds. Later, when he moved his hand near the key, he got an electrical shock. Franklin was lucky to survive this dangerous experiment, but he proved that electricity could be transferred from place to place.

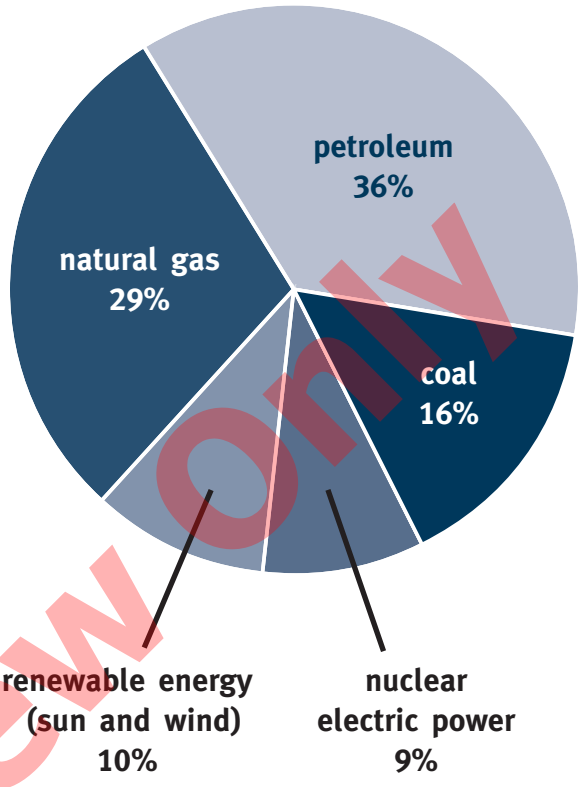


Fossil Fuels

All energy comes from a source. Today, fossil fuels are the main source. Fossil fuels, such as coal, oil, and natural gas, are forms of organic matter burned to create energy. These nonrenewable resources cannot be replaced. They took millions of years to form from ancient plants and animals.

Fossil fuels are popular because it doesn't take much of them to produce great amounts of energy. They are easy to find, easy to burn, easy to store, and easy to transport.

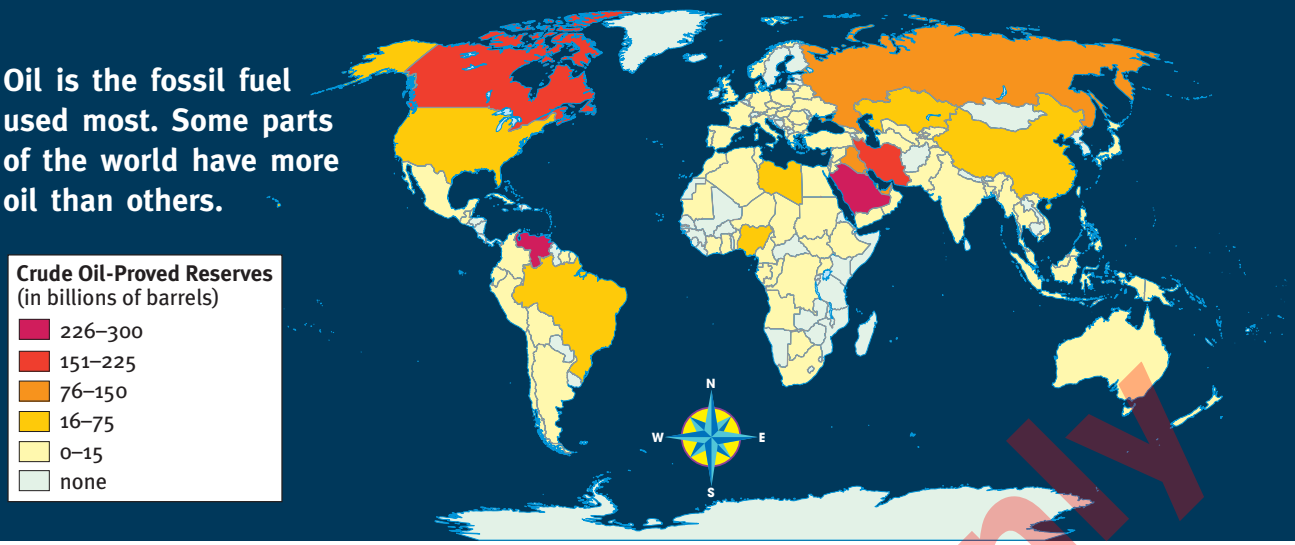
U.S. ENERGY CONSUMPTION BY ENERGY SOURCE, 2015



FOSSIL FUELS: Most of the U.S.'s energy comes from these three fossil fuels.

Fossil Fuel	State of Matter	Location on Earth	Uses
 Natural Gas	gas	usually found near oil source; channeled into pipelines and sent to storage facilities	used in gas stoves, ovens, gas heaters, and water heaters
 Oil	liquid	pumped from the ground and seafloor by oil rigs	purified and processed for different purposes: gasoline, jet fuel, kerosene, asphalt, plastic
 Coal	solid	chunks of black rock mined from deep underground	burned for electricity; used to make steel and cement

Oil is the fossil fuel used most. Some parts of the world have more oil than others.



Fossil Fuels: A Huge Problem

Fossil fuels are nonrenewable, and they are running out. As supplies go down, prices go up. Even more problems may develop as different parts of the world fight for the remaining resources.

Conservation, the careful use of resources to prevent them from running out, may help the situation. But running out of available resources is not the only problem with fossil fuels.


Oil spills can harm the environment.

Fossil fuels harm the environment. Collecting and transporting them result in oil spills, habitat damage, and pollution. Fossil fuels come from organic matter, material that was once living. All organic matter contains carbon.

When fossil fuels burn, they release carbon dioxide. Too much carbon dioxide means trouble for the environment. Carbon dioxide causes global warming, or the increase of temperatures on Earth. Global warming makes ice caps melt and sea levels rise. As a result, floods, droughts, dangerous storms, and other forms of extreme weather occur.

Fossil fuels are a problem. But what can replace them?

Solar Power

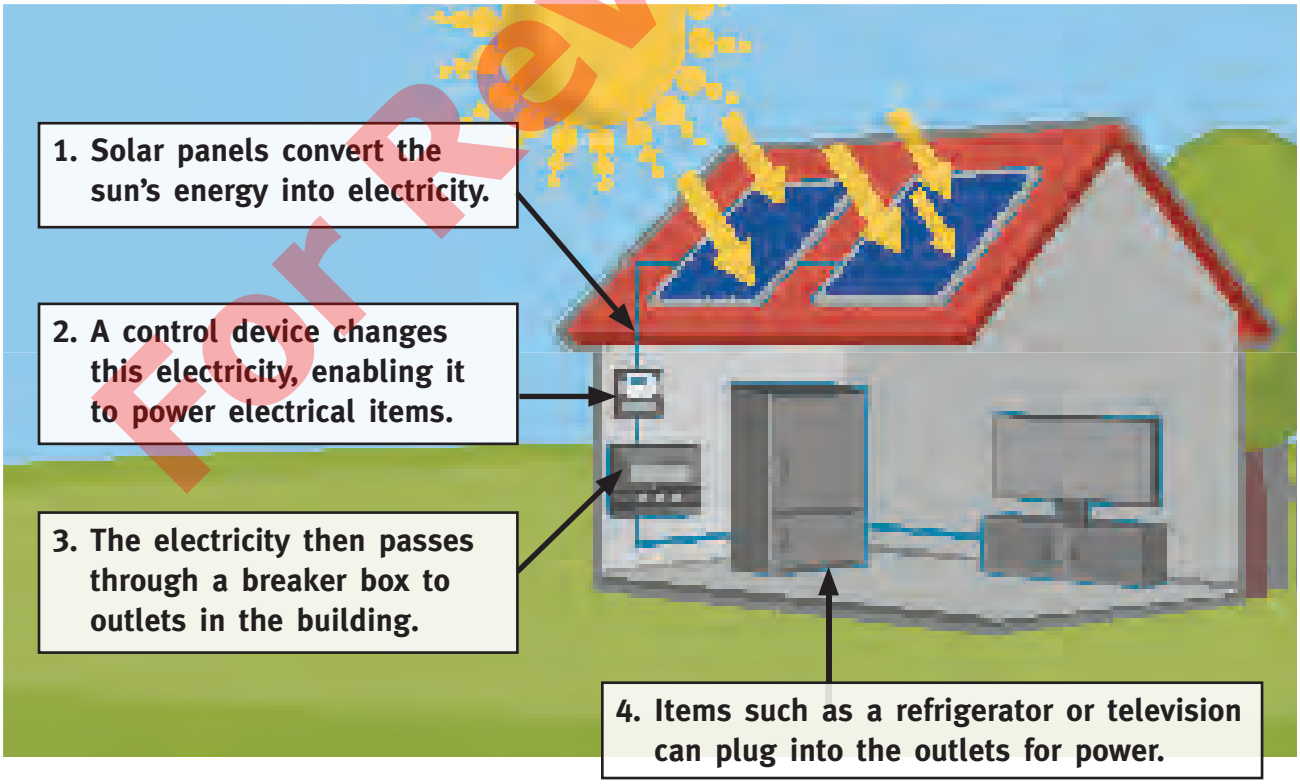
The sun was Earth's first energy source. Now solar power—energy from the sun—is replacing fossil fuels. Every minute, enough solar energy arrives on Earth to meet human needs for a whole year.

More and more people are putting solar panels on their houses. Solar farms are places where large amounts of solar energy can be collected.

Solar farms like this collect the energy to power thousands of homes.

Solar panels are made of solar cells that change light energy into electricity. They work because of atoms. When light from the sun hits an atom, it knocks an electron free. The free electrons become electricity.

Solar panels on a roof are designed to collect enough energy from the sun to power a home all year long. ▼



The Pros and Cons of Solar Power

Compared with fossil fuels, solar power is better for many reasons. First, solar power is renewable, meaning it is always available or can be quickly replaced through natural means. Second, it does not pollute the air or water. It does not create carbon dioxide or other dangerous gases. Third, energy from the sun is free. Of course, it costs money to install solar panels. However, solar systems rarely need repair.

Like fossil fuels, solar energy has a few problems. The amount of solar energy is not constant. The amount of energy from the sun depends on the time of day, time of year, location, and weather. Fortunately, companies have developed special batteries to store solar energy for use at night, in power outages, and on rainy days.

Also, the sun does not offer that much energy to one spot. The best way to collect it is at solar farms. These farms convert solar energy to electricity, and the energy is transmitted over power lines to electric and energy companies. Solar farms take up a lot of space and may disturb the plants and animals around them.

Solar panels often go on the roofs of houses and other buildings. ▼

CAREER IN SOLAR ENERGY

Solar Designer

Solar designers plan solar panel electric systems for homes and businesses. Because all buildings are unique, solar designers must carefully assess a building's roof space from satellite views. They also try to avoid shade obstructions, like trees, chimneys, and other buildings, to help the panels make as much electric energy from the sun as possible. Solar designers help people produce their own clean energy and reduce their electric costs.