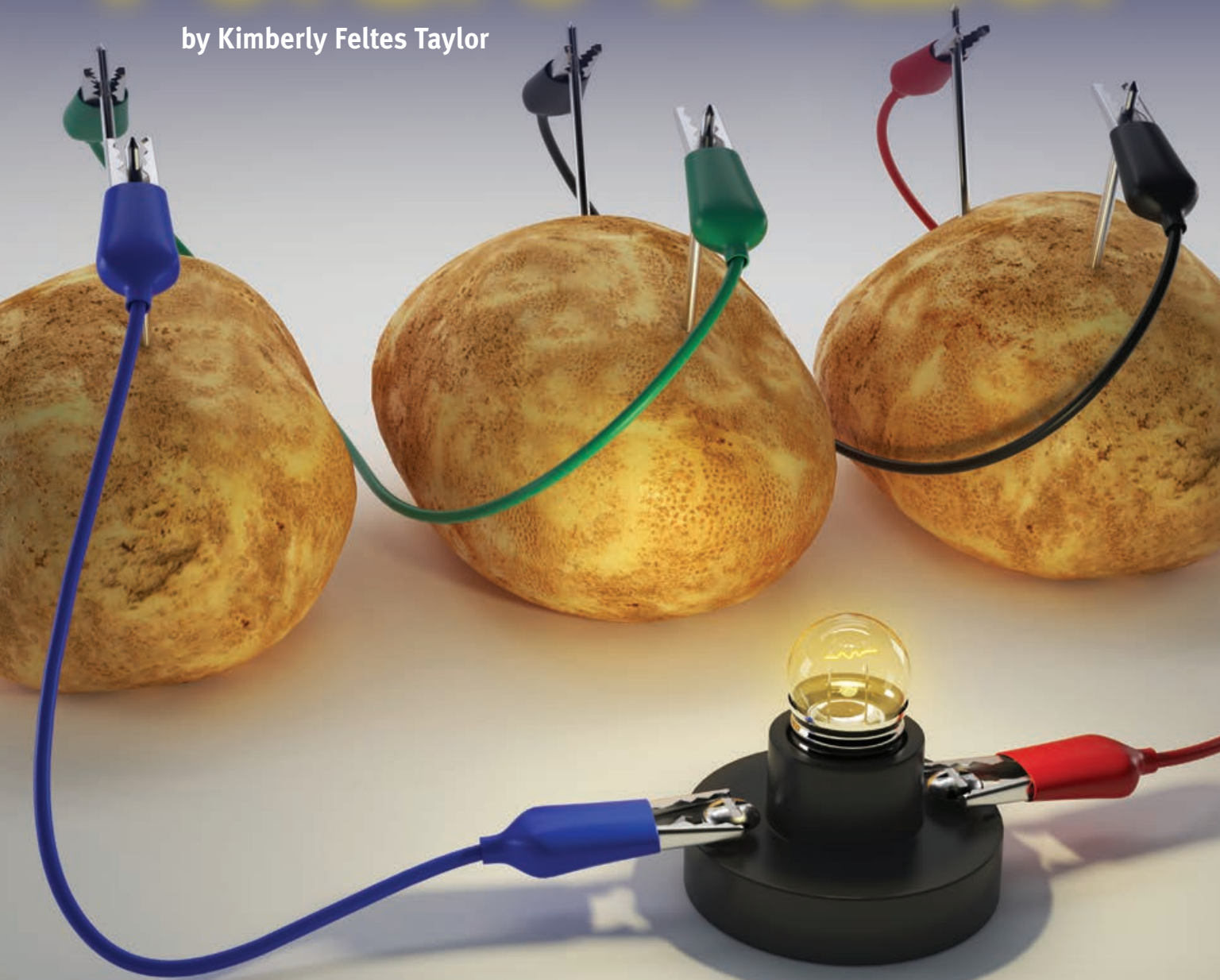


# Potato Power

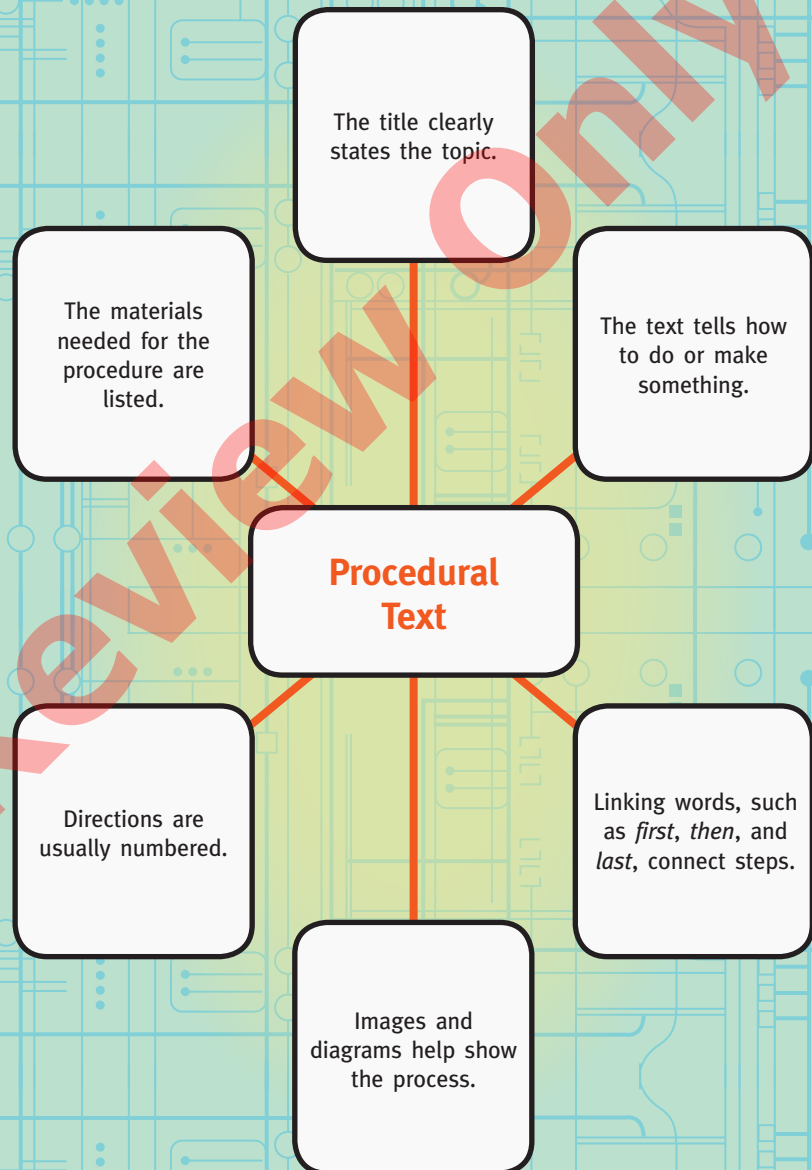
by Kimberly Feltes Taylor



**How can a potato  
power a light bulb?**

## Procedural Text

Look for the genre features noted below as you read this book. Use the features to help you understand the text.



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# Power Up!

**P**eople eat potatoes all over the world. In fact, they are the fourth most-produced crop in the world. People eat potatoes with breakfast, lunch, and dinner. People boil them and mash them. People bake them and fry them. People even use them as batteries.

Wait! What? Use them as batteries? Yes, a potato can be turned into a battery.



▲ People cook and eat potatoes in many different ways.





▲ A potato battery provides the electricity to power this digital clock.

Okay, so most people don't use potatoes as batteries. But potatoes *can* be used to make a battery. How is that possible? Potatoes contain chemicals that react with certain metals to generate electricity.

In this book, you will learn how to make a potato battery. You will power a small light bulb with your potato battery. You will also learn how batteries work. And you will learn about electricity and other forms of energy.

# What Is Energy?

**E**nergy is the ability to do work. Energy exists in many different forms. These include light, heat, and sound, as well as mechanical, chemical, and electrical energy. Energy can change, or transform, from one form to another.

Energy can move, or transfer, from place to place. It can also exert **force** to move objects from one place to another.

Imagine a baseball bat in midswing about to hit a ball. When the bat does hit the ball, the energy in the motion of the swinging bat is transferred to the ball, and this energy causes the ball to move through the air. In other words, the energy does the work of moving the ball from one place to another place.

▼ The force of energy transfers from the bat to the ball, moving it forward.



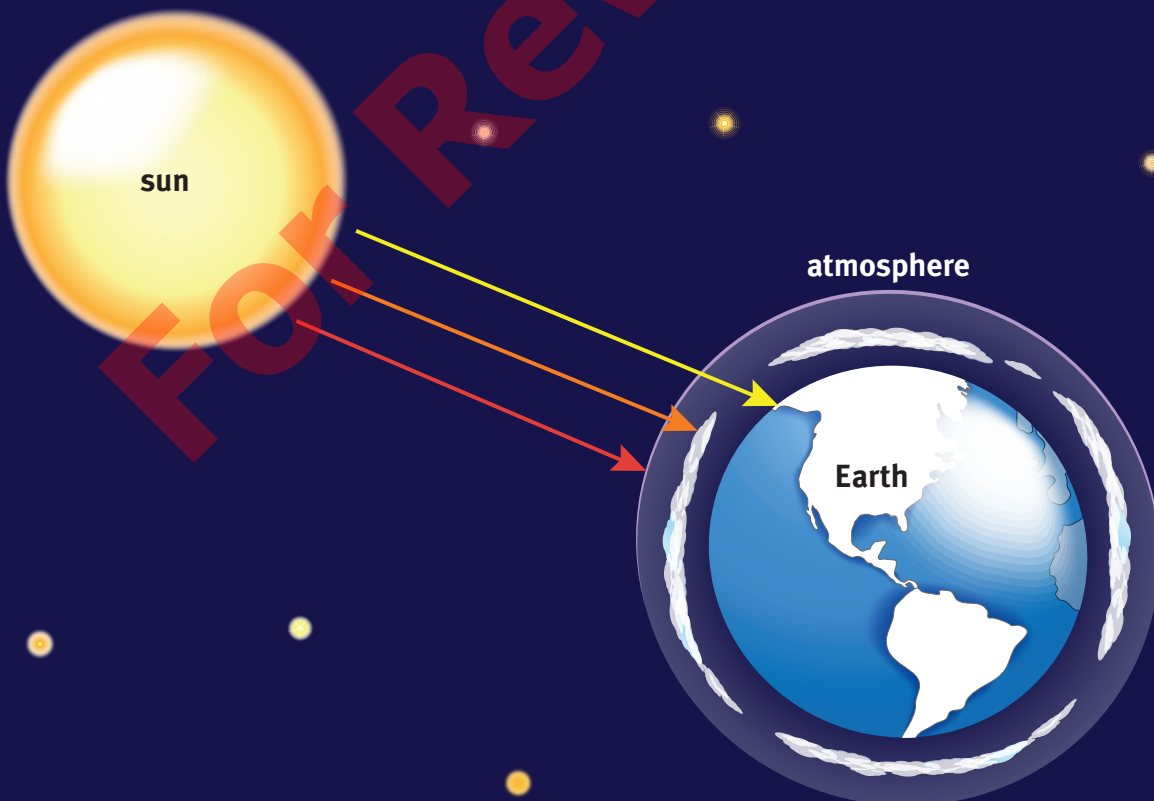
# Potential and Kinetic Energy

All energy on Earth originates from the sun. The sun's light travels in waves through space. When the waves reach Earth, light enters Earth's atmosphere.

Plants convert the light energy they absorb into chemical energy through **photosynthesis**. This process allows the plant to make the food it needs to live and grow. The rest is stored in the plant. This stored chemical energy is an example of **potential energy**.

Light waves enter Earth's atmosphere and transfer into heat energy. This heat energy warms Earth's air and water, causing moving currents of wind and water. The energy in moving water and wind are both examples of **kinetic energy**.

▼ The sun is the source of all energy on Earth.



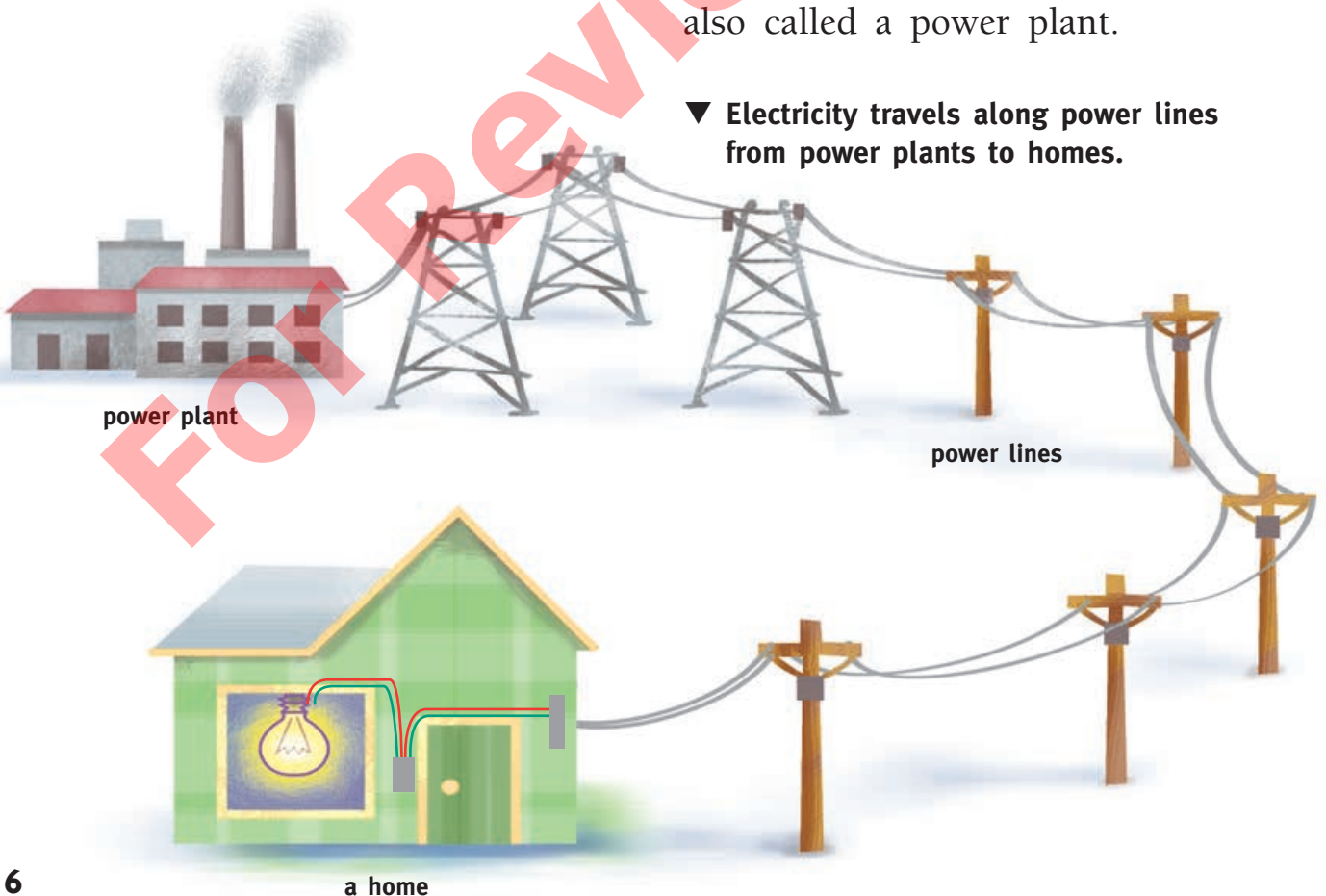
# Electricity: From Power Plant to Light Bulb

**E**lectrical energy flows through certain types of matter. When people flick a switch to turn on a light, they use their own body's energy to do the work of moving the switch from "off" to "on." But that is *not* the energy that turns on the light.

The switch in the "on" position connects a **circuit**. This pathway allows electricity to flow to the light bulb. When the electrical energy reaches the light bulb, it is transformed into light energy. The light waves are released into the room, illuminating what is dark. Some energy is also released as heat. That is why a light bulb may feel warm after it is turned on.

Where does this electrical energy come from? Most often, electricity enters a home through a network of wires. These wires are connected to a power station, also called a power plant.

▼ Electricity travels along power lines from power plants to homes.





▲ These wind turbines convert the wind's kinetic energy into electricity.

Power plants convert different forms of energy into electrical energy. There are different types of power plants. Traditional power plants burn **fossil fuel**, such as coal. The chemical energy in the coal is converted to heat that boils water, turning the water to steam. The steam turns a turbine. The turbine activates a machine called a generator, which generates an electrical **current**. Nuclear power plants use the heat from nuclear reactions to turn water into steam, which turns turbines and generates electricity.



▲ This power plant burns fossil fuel to generate electricity.

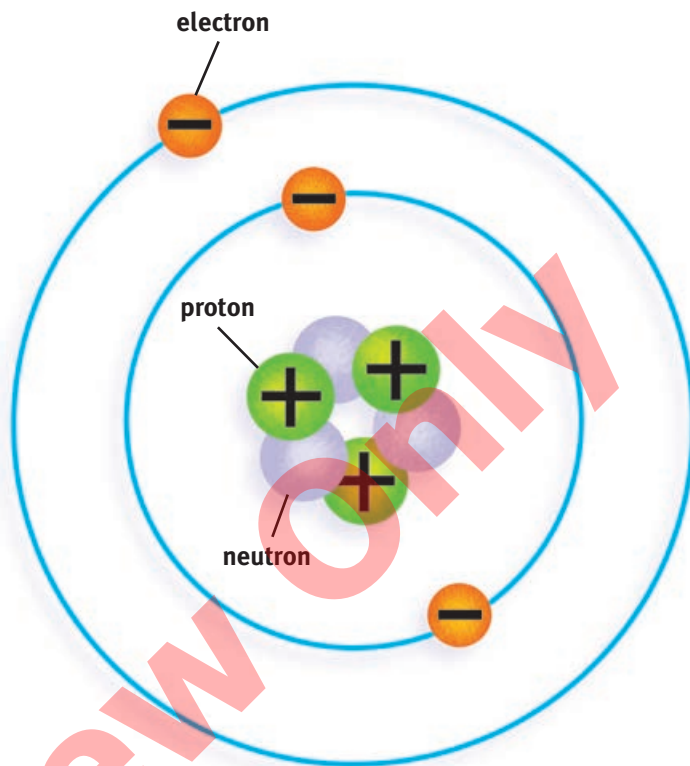
Wind and water power plants use the energy from moving water or moving wind to generate electricity. Solar power plants use light and heat energy from the sun to generate electricity.

Power lines carry the electricity from power plants to schools, businesses, and homes. This electricity powers light bulbs. It also powers ovens, computers, and anything else that requires electricity to run.

# What Is Electricity?

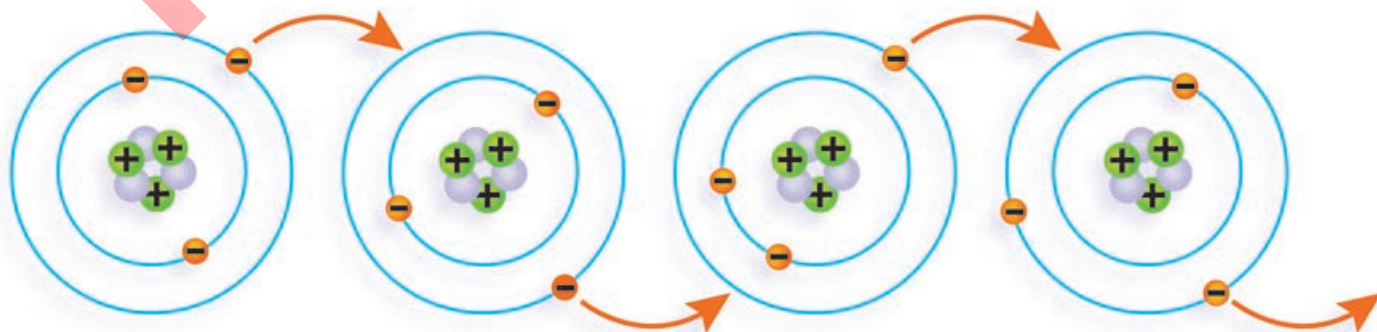
To better understand electricity, it is helpful to know about atoms. Atoms are the building blocks of all matter. Atoms are made from varying numbers of three basic particles: a **neutron**, a **proton**, and an **electron**. The nucleus of the atom contains one or more neutrons and protons. Then one or more electrons move around the atom's nucleus.

Atoms can lose electrons. When this happens, the lost electron can move to another atom. The flow of electrons traveling in the same direction—from one atom to the next, over and over—is electrical energy, also called electricity.



▲ Every atom has tiny particles called neutrons, protons, and electrons.

▼ When an electron is attracted or repelled, it moves from one atom to the next atom, pushing another electron out. This chain reaction generates a flow of electricity.



Much of the electricity used in everyday life flows through power lines from power plants. But there are also a lot of everyday things that rely on electricity from batteries. Batteries contain stored energy (potential energy) in the form of chemical energy. When a battery is used, the chemical energy is transformed into electricity. Batteries are commonly used in flashlights, certain radios, toys, and more.

## Rechargeable Batteries

Most typical batteries store a limited amount of potential energy. When this potential energy has been entirely transformed into electricity, the battery can no longer be used. Rechargeable batteries are different.

When a rechargeable battery “runs out” of energy, it can be recharged. To recharge, this type of battery is typically placed into a special recharging station and then plugged into an electrical source. This

electrical energy is converted into potential energy stored in the battery. Some rechargeable batteries can even be recharged through solar power.



▼ Different batteries can store different amounts of energy.

