iScience
Readers

Matter and Energy:
Finding the Power

by Emily Sohn and Nina Tsang

Science Objective

Children will discover that all matter exists in a physical state—solid, liquid, or gas—and that many types of matter can change from one state to another and back again. Matter has mass and it takes up space. Matter has stored energy, and can undergo chemical changes. Energy cannot be created or destroyed, but it can be changed from one form to another. Some forms of energy include heat, motion, and electricity.

iScience Puzzle: Energy for Lunch

In this science puzzle, children learn that heat is a form of energy and that energy can change matter. They must consider where they can get the energy to cook a pizza. The three choices introduce the concept that energy comes from the Sun and from deep inside Earth. Children also learn that their bodies have energy and they use it to perform lots of activities.

Objectives ➤ Children will:

- learn that the Sun is the main source of energy on Earth.
- understand that matter takes up space and can be in the form of a solid, a liquid, or a gas.
- explore the definition of energy and recognize that it is contained in all matter.
- understand that energy can be converted from one form into another, such as chemical energy into light energy in a flashlight.

Lesson Plan

Before Reading

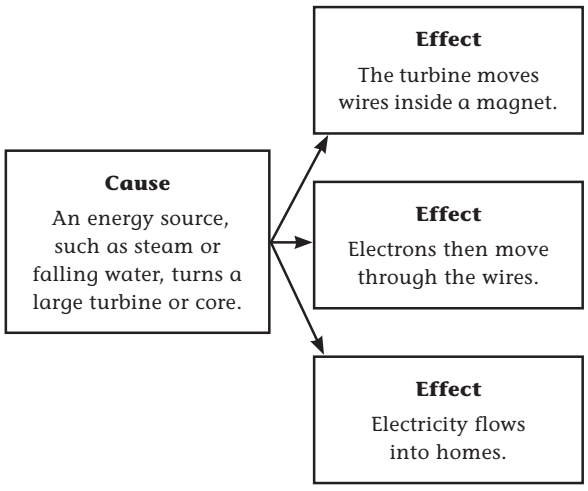
Investigation	Science Concepts
Have children rub their hands together. Explain that they have used energy to make their hands warmer.	Energy is the ability to make things happen. All changes in matter require energy.
Hold up classroom objects, such as a book, a pencil, and a piece of chalk. Explain that these are examples of solid matter. Ask: *How much space does this object take up? What would happen if we heated the object?*	Matter is made of moving particles. The speed at which the particles move and the distance they are from one another determine whether the matter is in the form of a solid, a liquid, or a gas.

Explain that children will learn about matter, which can be in the form of a solid, a liquid, or a gas. It can change from one form to another. Children will also learn about energy. Energy is the ability to make things happen. All matter contains stored energy. When matter changes somehow, it uses energy. The Sun is the source of all energy on Earth.

During Reading

Investigation	Science Concepts
p. 6: Ask: *What happens when you exercise? How does your body feel? Does it get hot?* Tell children that Earth, the Sun, and their bodies contain thermal energy, or heat.	All matter has energy.
pp. 7–8: Ask: *If you put a black T-shirt and a white T-shirt in sunlight, which one would feel warmer after a few minutes? Why?* Explain the terms absorb and reflect in terms of how colors are affected by light.	Colors reflect and absorb different amounts of light energy.
pp. 9–10: Help children understand that everything is made of matter. Explain that matter can be a solid, a liquid, or a gas.	All matter takes up space even if we can't see it.
p. 11: Pour an equal amount of water into two glasses that are the same size. Then pour water from one glass into another container of a different size and shape. Ask: *Does this container have more water than the glass?* If children say yes, help them understand that the volume, or amount, of water did not change even though its shape did change in the new container.	Liquids do not have a shape of their own. Instead, they take on the shape of the container they are in.

During Reading (continued)

Investigation	Science Concepts
p. 12: Refer back to the Discover Activity. Ask: *Does air in a bottle take up space? How do you know?*	Like all matter, gas has volume. That is, it takes up space. A gas can expand or compress to suit the available space.
pp. 13–14: Explain that a human body in motion is using energy, and some of that energy is converted to heat. Energy is stored in the body until it is needed.	Energy is the ability to make things happen.
pp. 15–16: Ask: *Can you think of any types of matter that normally begin as a liquid and turn into a solid?* (Some examples are butter, ice cream, paint, glue.)	Many types of matter can change from a solid to a liquid or a gas. Matter can also change in the other direction, from a gas to a liquid to a solid.
pp. 17–19: Write the terms *energy of motion, electrical energy,* and *chemical energy* on the board. Ask children to name examples of each type. Write their responses under each heading.	Stored energy can be released by a chemical reaction. Energy can be carried through electric current or moving objects.
pp. 20–22: Explain that energy can be stored for use at a later time. Chemical reactions release energy stored in batteries and in plants and animals. They release stored energy when children catch a ball. To help children answer the question on page 22, ask: *Can you use energy again after it has been released?*	Matter contains stored energy that can be converted into other types of energy. The Sun is the main source of all energy on Earth.
pp. 23–25: Ask: *Can you think of other energy transfers besides the ones discussed on these pages?*	Energy can be transferred from one object to another, or from one type of matter to another. People can capture it, store it, and put it to use at a later time.
p. 26: Draw a cause-and-effect chart on the board.  	Moving wires near a magnet can produce an electric current. Energy can move from one place to another as an electric current.
pp. 27–29: Have children think about pizza dough and cheese topping. Ask: *How does solar energy change the matter in a pizza?*	Some solids change texture when heat is applied. Some solids melt when heat is applied.

After Reading

Restate the key ideas in this book. All matter is made of moving atoms. Matter has volume and mass. It can exist in different states (solid, liquid, and gas) and can change from one state to another. Matter contains stored energy that can be converted into different forms of energy. Most energy comes from the Sun; plants use sunlight to grow; animals and humans eat plants or other animals to grow.

Investigation	**Understanding Science**
Have children identify different kinds of energy they use at home, such as light energy from a flashlight, a lamp, and a candle; thermal energy from an oven and a furnace; energy to move or think or breathe. Then ask them to tell how the energy was used or converted.	Different kinds of energy from different sources are converted into different other kinds of energy.