

## Objective

The student will compare and contrast the percentages of different energy sources used by different states.

## Curriculum Focus

Social Studies  
Science  
Math

## Materials

- **Electrical Generation Poster**
- Paper plates and cups
- M&M candies, other colorful candy or various colors of pony beads

## Key Vocabulary

Nonrenewable resource  
Primary energy source  
Renewable resource  
Secondary energy source

## STEM Connection

Science

- Science as Inquiry
- Energy Sources, Forms and Transformations
- Science and Technology
- Personal and Social Perspectives

Technology

- Research Tools
- Problem-solving and Decision Making Tools

Engineering

- Historical Perspective

Math

- Numbers and Operations
- Measurement
- Data Analysis and Probability
- Connection to the Real World

# Discovering the State of Our Resources

## Introduction

Electricity is one of our most common sources of energy. It is important in our lives; most people use it everyday.

Electricity is a secondary energy source; that is, it is generated from a primary source—solar, oil, coal, natural gas, nuclear, water or wind. Electricity is unique in that it is energy in transit, kinetic energy, obtained when electric charges are set in motion by an electromotive force. This force begins the process of moving electrons from atom to atom. The electric current continues to flow as long as the electromotive force is applied.

Factors such as price, reliability of supply and environmental impact determine which sources are used in different locations. Most electricity in the United States comes from steam-powered generating plants that burn fossil fuels—coal, oil or natural gas—or use nuclear energy to heat water, thereby producing steam.

The steam spins a turbine, which turns a large magnet in a generator. The generator contains many coils of wire. When the magnet turns in the coils, an electric current is created, or induced, in the wire. In Canada, most electricity is generated by hydropower, which uses flowing water instead of steam to turn a turbine.

As we see our nonrenewable resources (coal, oil, natural gas, uranium) depleting, we are turning more to the development of green power or electricity generated from renewable resources such as solar, wind, geothermal, biomass and hydropower.

## Procedure

1. Discuss with the students the sources of energy illustrated on the **Electrical Generation Poster** and how they are used to produce electricity. You may want to block out the fuel mix percentages in the lower left corner.
2. Have students work in pairs or groups. Give each group a paper plate and a cup full of M&Ms or beads in a variety of colors. Assign each student group a state from those listed on the accompanying "Comparison of Resource Use by State."
3. Assign the following colors to each type of energy source: brown—coal, orange—natural gas, red—oil, yellow—nuclear, blue—hydro, green—other renewables.

4. Have students predict which energy types are used to produce electricity for their assigned state and assign a percentage of electrical generation to each resource. Each candy or bead represents five percent. Tell them that they will use 21 candies or beads (equaling 105 percent to allow for rounding up) in different colors to represent their predictions. For example, if they predict that 50 percent of the electricity is produced by nuclear power, 45 percent by coal, three percent by oil and two percent by renewable sources, they would have 10 yellow, 9 brown, one red and one green candy or bead on their plates.
5. Ask students to state their predictions for their assigned state and record them on a pie chart on their paper plates. If using pony beads, the beads could be strung on segments of pipe cleaner (one per color of bead) to create instant bar graphs.
6. Compare their predictions to the actual percentages on the following page. Whose estimations were closest to the actual numbers? Did any group match exactly?
7. Discuss the main energy sources used to generate electricity in your area and the reasons why. Consider price, availability, reliability and environmental impact. Why are fuel mix percentages in states so different? Do you think each country uses the same percentages of each fuel? Why or why not?

## To Know and Do More

Discuss the nonrenewable energy sources currently being used. At our current rate of consumption, how long is it predicted that our nonrenewable reserves will last? (Students can use the Internet for research). Make predictions about our future fuel mixes. What do the students believe the percentages will be in 20 years?

## Comparison of Resource Use by State For “Discovering the State of Our Resources”

State	Oil	Natural Gas	Coal	Nuclear	Hydro	Other Renewables
New York	2.8	35.7	2.7	34.2	18.2	5.8
Pennsylvania	0.3	22	37.2	36.2	1.0	3.0
Maryland	1.0	4.3	47	40.5	3.4	3.1
Georgia	0.4	39.3	27.5	27.3	2.6	3.5
New Jersey	1	40.8	4.9	50.6	0	2.0
Ohio	0.2	21.1	63.1	12.7	0.2	1.6
Michigan	0.1	14.4	43.6	31.5	1.5	7.4
Indiana	0.1	14.0	77.8	0	6.3	4.5
Illinois	0	4.5	41	48.1	0	5.9
Florida	0.5	62.9	16.9	15.0	0.1	2.5
Vermont	0	0.2	0	68.8	20.4	10.4
Utah	0	15.6	80.7	0	1.4	2.3
Idaho	0	24.9	0	0	56.8	17.7
Nevada	0.1	68	7.8	0	9.9	14.1

Numbers represent the percent of the electrical generation resource mix. Percentage of total energy use will be different. Numbers may not add up to 100 percent due to rounding.

(Source: [www.eia.gov](http://www.eia.gov), Energy Information Administration, accessed April 20, 2015)