

# LESSON PLAN



Grades 4 & 6

## Energy Sources



### SUMMARY

This research-based lesson will help students demonstrate an understanding of renewable and non-renewable resources. The students will conduct research to develop a deeper understanding of the properties of energy. This entire lesson can be completed virtually.



### LESSON OBJECTIVES

Upon completing this lesson the students will:

- Define energy and the major sources of energy currently in use.
- Explain the difference between energy efficiency and energy conservation.
- Describe renewable energy sources and the advantages and disadvantages of each.
- Describe nonrenewable energy sources and the advantages and disadvantages of each.
- Evaluate energy sources for their contribution to sustainability and energy independence for the country.



### ESSENTIAL QUESTIONS

1. How do people make use of resources to power their everyday energy needs?
2. How does the use of these resources impact the environment?
3. What are steps we can take to lessen the impact of energy production and use on the planet?



### DURATION

The activity requires one or two class periods.



### MATERIALS

- Computer with Internet Access



## COLLEGE & CAREER-READY SCIENCE STANDARDS 2021

### GRADE 4

### GRADE 6

#### STANDARD

**4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.**

#### STANDARD

**6-PS3-4. Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.**

#### DISCIPLINARY CORE IDEA (DCI)

#### PS3.B: Conservation of Energy and Energy Transfer

Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced.

Light also transfers energy from place to place.

Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light.

#### DISCIPLINARY CORE IDEA (DCI)

#### PS3.B: Conservation of Energy and Energy Transfer

The amount of energy transfer needed to change the temperature of a matter sample by a given amount depends on the nature of the matter, the size of the sample, and the environment.

#### CROSS-CUTTING CONCEPTS (CCC)

#### Energy and Matter

Energy can be transferred in various ways and between objects.

#### CROSS-CUTTING CONCEPTS (CCC)

**Scale, Proportion, and Quantity** Proportional relationships (e.g. speed as the ratio of distance traveled to time taken) among different types of quantities provide information about the magnitude of properties and processes.



## ENGAGE

Have the students watch a short video describing renewable energy. Visit <https://youtu.be/T4xKThjcKaE>.

SOURCE: **Renewable Energy 101** from the Student Energy website – [www.studentenergy.org](http://www.studentenergy.org).



## EXPLORE

- Using the information at [www.eia.gov/kids/energy-sources/renewable/](http://www.eia.gov/kids/energy-sources/renewable/), explore renewable energy sources. Have the students list five forms of renewable energy.
- As a class, discuss the advantages of renewable energy sources. Using the information at [www.eia.gov/kids/energy-sources/nonrenewable.php](http://www.eia.gov/kids/energy-sources/nonrenewable.php), have the students list the four forms of nonrenewable energy. (Hint: They are written in blue!)



## EXPLAIN

Have the students research different types of energy sources. Each should choose four energy sources to research. The students can create their own way to present the information learned. They could present the information in a written essay, create a prezzi, a Google Doc, a slide presentation, or another teacher-approved way to show the information learned.

Have the students use the **Energy Sources Student Worksheet** to choose energy sources and begin their research.



## ELABORATE

The students will continue their research on energy uses and conserving energy. Visit [www.eia.gov/kids/energy.cfm?page=us\\_energy\\_use-basics](http://www.eia.gov/kids/energy.cfm?page=us_energy_use-basics).

- Have the students explain the four areas where energy is used in the United States and in South Carolina. Instruct students to construct an explanation of the information using the chart **Total U.S. Energy Consumption by End-Use Sectors**. South Carolina specific information is available at [www.eia.gov/state/?sid=SC](http://www.eia.gov/state/?sid=SC). Click on CONSUMPTION BY SECTOR and find the chart "South Carolina Energy Use Consumption by Sector." Have students answer the following questions:
  - Where was the most energy consumed in the United States? Why? In South Carolina? Why?**
  - Where was the least energy consumed in the United States? Why? In South Carolina? Why?**
- Have the students list the five ways in which energy is used in our homes. Use the residential consumption information and data at [www.eia.gov/consumption/residential/](http://www.eia.gov/consumption/residential/).
  - What is the most used type of energy in the home?**
  - Construct an explanation for why that is the most used type of energy.**
- Have the students describe the difference between energy efficiency and energy conservation.
- Have the students identify three different ways in which we can conserve energy.



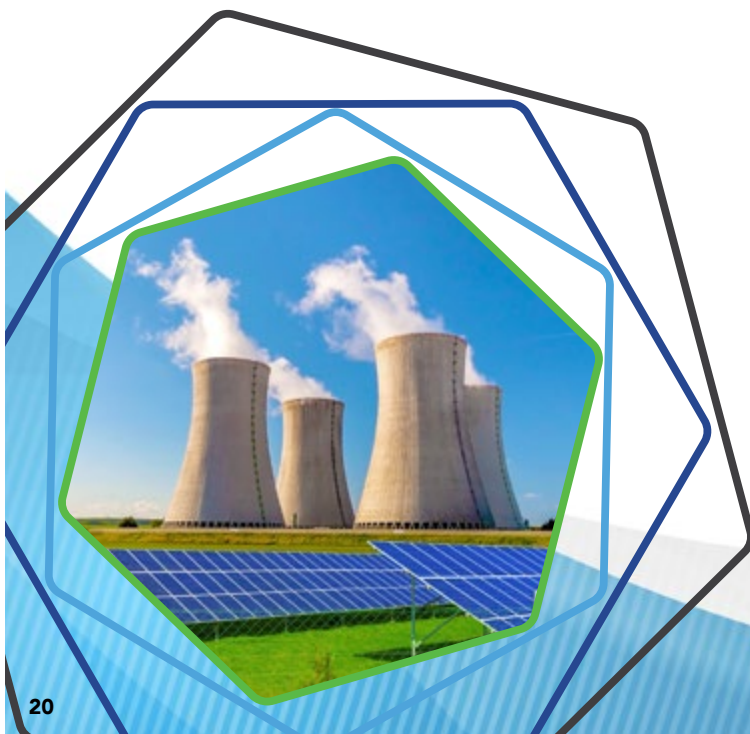
## EVALUATE

Have the students take this online quiz to measure their learning from the activity – [www.eia.gov/kids/games-and-activities/quiz/](http://www.eia.gov/kids/games-and-activities/quiz/).



## E-LEARNING ACTIVITIES

- The **Energy Sources** lesson can be completed virtually.
- For Grade 6, visit [www.eia.gov/consumption/residential/data/2015/c&e/pdf/ce3.4.pdf](http://www.eia.gov/consumption/residential/data/2015/c&e/pdf/ce3.4.pdf) to create a consumption pie chart for the South Atlantic.
- See **Renewable Energy Activities: Choices for Tomorrow**, RENEW-A-BEAN, page 19, [www.energy.gov/sites/prod/files/2014/06/f16/lesson297.pdf](http://www.energy.gov/sites/prod/files/2014/06/f16/lesson297.pdf).
- See **U.S. Energy Consumption by Sector**, [flowcharts.inl.gov](http://flowcharts.inl.gov).



# ENERGY SOURCES

Have students use the information at the websites provided to answer the list of questions for each source of energy.

## BIOMASS

[www.eia.gov/kids/energy-sources/biomass/](http://www.eia.gov/kids/energy-sources/biomass/)

What does Biomass mean and what does it contain? \_\_\_\_\_

Name five things that are biomass materials. \_\_\_\_\_

What is the most common biomass material? \_\_\_\_\_

How can biomass energy impact the environment? \_\_\_\_\_

## COAL

[www.eia.gov/kids/energy-sources/coal/](http://www.eia.gov/kids/energy-sources/coal/)

Describe the physical properties of coal. \_\_\_\_\_

How does coal form? \_\_\_\_\_

What country has the largest known coal reserves in the world? \_\_\_\_\_

How many states mine coal? \_\_\_\_\_

List six uses of coal in the everyday world. \_\_\_\_\_

## GEOHERMAL

[www.eia.gov/kids/energy-sources/geothermal/](http://www.eia.gov/kids/energy-sources/geothermal/)

What does the word "geothermal" mean? \_\_\_\_\_

What is geothermal energy? \_\_\_\_\_

Where is geothermal energy found? \_\_\_\_\_

Name two ways people have used direct geothermal energy? \_\_\_\_\_

How has Iceland used geothermal energy? \_\_\_\_\_

## HYDRO

[www.eia.gov/kids/energy-sources/hydropower/](http://www.eia.gov/kids/energy-sources/hydropower/)

Hydroelectric power generates what type of energy? \_\_\_\_\_

Explain how the hydroelectricity affects the environment. \_\_\_\_\_

What 3 states hold over one-half of the total U.S. hydroelectric capacity for electricity? \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_

Most dams in the United States were not built to provide electricity, but for \_\_\_\_\_ and \_\_\_\_\_.

## NATURAL GAS

[www.eia.gov/kids/energy-sources/natural-gas/](http://www.eia.gov/kids/energy-sources/natural-gas/)

How is natural gas formed? \_\_\_\_\_

Describe the physical properties of natural gas. \_\_\_\_\_

List six ways we use natural gas everyday in the United States. \_\_\_\_\_

Compared to other energy sources, is natural gas considered to have a positive or negative effect on the environment? \_\_\_\_\_

## OIL (PETROLEUM)

[www.eia.gov/kids/energy-sources/oil/](http://www.eia.gov/kids/energy-sources/oil/)

How is oil formed? \_\_\_\_\_

What does the word "petroleum" mean? \_\_\_\_\_

Describe crude oil and where it is found. \_\_\_\_\_

List six products that crude oil is used to make that are used everyday in the United States. \_\_\_\_\_

What is the leading cause of petroleum sources in North American waters? \_\_\_\_\_

## SOLAR

[www.eia.gov/kids/energy-sources/solar/](http://www.eia.gov/kids/energy-sources/solar/)

What is solar energy? \_\_\_\_\_

Solar energy is converted into what energy? \_\_\_\_\_

Give two examples of how solar energy is used. \_\_\_\_\_

What do solar cells do? \_\_\_\_\_

What do solar power plants do? \_\_\_\_\_

What are the two main disadvantages to solar energy? \_\_\_\_\_

Explain how solar energy is beneficial for the environment. \_\_\_\_\_

## URANIUM (NUCLEAR ENERGY)

[www.eia.gov/kids/energy-sources/uranium/](http://www.eia.gov/kids/energy-sources/uranium/)

What is nuclear energy? \_\_\_\_\_

What percentage of nuclear electricity is generated in the United States? \_\_\_\_\_

How many nuclear power plants are in the United States today? \_\_\_\_\_

What do nuclear power plants generate? \_\_\_\_\_

Describe the effects nuclear power has on the environment. \_\_\_\_\_

## WIND

[www.eia.gov/kids/energy-sources/wind/](http://www.eia.gov/kids/energy-sources/wind/)

What is wind and how is it caused? \_\_\_\_\_

What did American colonists use windmills for? \_\_\_\_\_

What do wind turbines produce? \_\_\_\_\_

Describe a wind power plant. \_\_\_\_\_

Describe the effects of wind turbines on the environment. \_\_\_\_\_