

# 10 Sources of Energy

## Teacher Lesson Plan

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## Background Information

### What is Energy?

- Energy can be defined as the power to change things or the ability to do work.
- We experience energy in different ways. We can say...
  - Energy is light.
  - Energy is heat.
  - Energy makes things grow.
  - Energy makes things move.
  - Energy runs machines.
  - Energy doesn't disappear.
    - The Law of Conservation of Energy says that energy cannot be created or destroyed; it only changes forms. This is a topic for older grades, but the concept is important when discussing the forms of energy (heat, electrical energy, light sound) found in 3<sup>rd</sup> grade.
- Energy can change the states of matter.
- The United States uses a lot of energy. The average American consumes five times the world average per capita consumption of energy. This has a great impact on our economics, environment, politics and foreign relations.

### 10 Sources of Energy

- We use many different sources of energy to do work for us. They are classified into two groups:
  - Non-Renewable-Our supplies are limited and once they are used they are gone. These resources cannot be restored in a short period of time.
    - Coal, Natural Gas, Nuclear, Petroleum, Propane
  - Renewable-Our supplies are unlimited or can be restored within a short period of time.
    - Biomass, Geothermal, Hydropower, Solar, Wind
- There is no one perfect source of energy. Both groups have advantages and disadvantages.
  - Non-renewable Advantages
    - They are relatively inexpensive.
    - They are very energy dense or they produce large amounts of energy.
    - They provide our base load power, so we have access to energy 24/7/365.
    - They are highly reliable.
    - Our current infrastructure is set up for ease of use. (Example-there is a gas station on every corner.)

- Renewable Advantages
  - They produce energy without air pollution or other environmental impacts (exception-burning biomass.)
  - The source of energy is generally free (sun, wind, water).
  - They can provide energy where current infrastructure is not available.
- Non-Renewable Disadvantages
  - They produce greenhouse gases and air pollution contributing to climate change.
  - There are other environmental impacts from burning fossil fuels and storing spent nuclear fuel.
  - As the world's largest countries (China and India) develop more of a middle class, the world's need for energy will dramatically rise. Most of the energy development in these countries is through non-renewable sources causing faster use of these resources.
  - The increasing need for limited non-renewable resources impacts relationships between countries with and without these resources.
- Renewable Disadvantages
  - While the energy source is usually free, the technology to transform the energy sources into something useful is very expensive.
  - They are not reliable. The sun isn't always shining, and the wind isn't always blowing.
  - They are not energy dense. Example: One wind turbine produces roughly 4 megawatts of electricity. A medium sized coal burning power plant produces 1,600 megawatts of electricity.
- Electricity is called a secondary source of energy. One of the ten sources must be used to produce electricity. Electricity is an energy carrier because it is an efficient and safe way to move energy from one place to another.

## Content Standards

### Earth Science

- Earth's resources can be used for energy.
- Some of Earth's resources are limited.

### Physical Science

- All objects and substances in the natural world are composed of matter.

## Student Activities

### LESSON 1: What is Energy?

#### Procedure:

1. Define Energy & Matter discussing examples of each.
2. Students complete *Energy & Matter Worksheet*.
  - Answers to Student Worksheet:  
 Energy: Music, Electricity, Light, Motion, Heat, Wind  
 Matter: Tree, Water, Rock, Paper, Apple, Air

## LESSON 2: Introduction to 10 Sources of Energy

### Lesson Materials:

- 10 sources of energy cards and the pictures and definitions

### Procedure:

#### 1. Energy Sources Pictures and Definitions

- Introduce the 10 Sources of Energy using the colored cards with the Sources Pictures and Definitions. Students match the picture to the definition.
- Define and discuss renewable and non-renewable resources.
- Student Worksheet *“Energy Source Matching”*

#### 2. Energy Chants

- Reinforce the 10 Sources by introducing the Energy Chants and motions.
- For a video review of the chants, search YouTube for *“NEED Energy Chants”*.

#### 3. Energy Relay

*Helpful hints for the Energy Relay:*

- For safety, students must walk during the game.
- To help them with the clues, keep the 10 sources and definitions cards readily available so students can check their answers.

#### Relay Instructions:

- Separate the cards by color (energy source).
- Divide group into equal teams, up to 6 teams or less.
- Choose one energy source to start the game and distribute that card to each team by placing it face down in front of the team.
- When you give the signal, the teams turn over their card and determine which energy source is being described.
- When a team thinks they have the correct answer, one team member brings the card to you and quietly tells you the answer. Students must walk during the game.
- If the answer is correct, the walker gives you the card and receives the next card and returns to the team. If the answer is incorrect, the walker must return to the team with the card to try again.
- The first team to get all 10 cards correct and sitting down wins the game.

## LESSON 3: 10 Sources of Energy Highlighted

### Procedure:

Please refer to the 3<sup>rd</sup> Grade Overview – Classroom Activities and Demos handout, as well as NEED’s *Energy Stories and More*, for everything needed to show examples for many of the 10 sources of energy.