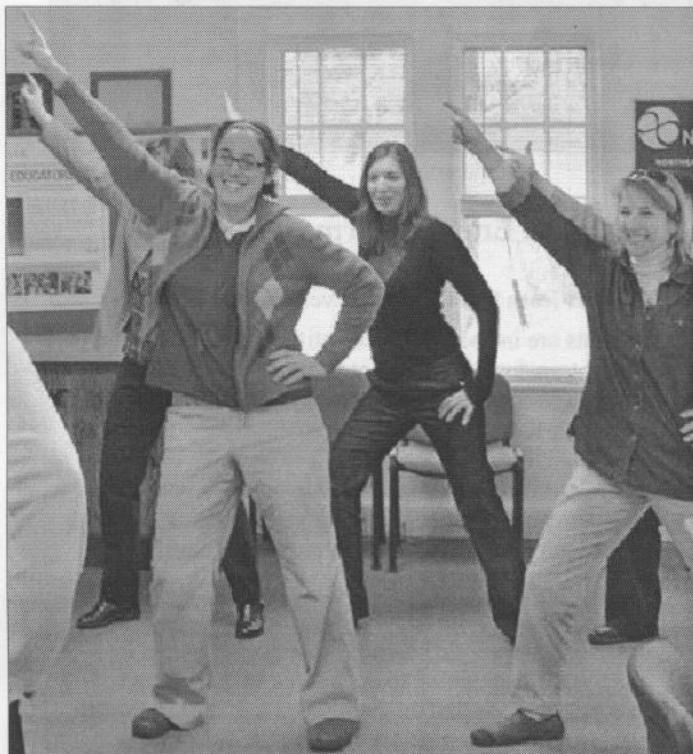


# Acting Out Energy Forms

*A pantomime activity for teaching about different forms of energy*



by Arianna Aleksandra Grindrod

**L**IGHTING HOMES, heating water, warming spaces, running machines, driving cars and flying planes — everything we do requires energy. In a most basic sense, energy is a force capable of performing work or of organizing or changing matter. But how do we teach about it this invisible force? “Acting Out Energy Forms” is an engaging pantomime activity that helps provide a context for teaching scientific principles related to energy transformations, chemical transformations, electricity and light, which are central to many clean energy technologies. Using pantomime is a fun and effective way to teach if you are comfortable having your students out of their chairs and getting a bit riled up. Active learning helps students comprehend complex ideas. They may not remember the term “kinetic energy,” but once they have acted it out, they will remember that energy can be in motion.

For younger students you may decide to introduce energy as a basic concept and pick only a few energy forms to pantomime. For older students you may decide to use this activity as a template to teach the concepts and then have your students create or construct representations of various energy forms as artistic expression pieces or physical science displays.

In addition to introducing students to energy forms, this activity can be used as a stepping stone to larger, interdis-

ciplinary topics such as human impacts on energy supply and demand, climate change, current and future lifestyles, sustainability practices, distributed power generation and innovative energy technologies.

## Background: Energy forms and sources

Energy occurs in many forms and is classified as either kinetic energy (in motion) or potential energy (stored) and can be converted from one form to another.

### Kinetic energy

**Electrical energy** is the movement of electric charges. Electricity, which is the movement of electrons through a wire or other conductor, is an example of electrical energy. Lightning is another example.

**Mechanical energy** is the movement of objects or matter. Throwing a ball, lifting a weight, pulling a wagon and pedaling a bike are all examples of mechanical energy. Wind and moving water are also examples of mechanical energy. Sound, which is the movement of molecules in a wave, is another example of mechanical energy.

**Radiant or light energy** travels in electromagnetic waves. It includes visible light, which our eyes can see, and also gamma rays, x-rays, ultraviolet radiation, infrared (heat)



radiation, microwaves and radio waves. Sunlight is an example of radiant energy.

**Thermal (heat) energy** is the vibration and movement of atoms and molecules within a substance. The hotter a material is, the faster the atoms and molecules that make up that material are moving.

### Potential energy

**Chemical energy** is energy stored in the bonds that hold molecules together. Food, batteries, fossil fuels and biomass (plants) are examples of items that have stored chemical energy.

**Stored mechanical energy or elastic energy** is energy stored in objects that are either compressed or stretched. Stretched rubber bands or compressed springs are examples of stored mechanical energy.

**Magnetic energy** is energy produced by the magnetic field that causes magnets to attract or repel.

**Nuclear energy** is the energy that holds the nucleus of an atom together. This energy is released when nuclei are split apart (called fission) or combined (called fusion). Nuclear power plants split atoms to release energy. The sun releases energy when it combines hydrogen atoms to form a helium atom.

**Potential energy or gravitational energy** is the energy of position. An object has potential energy when it is in a position to be acted upon by gravity. Water stored behind a dam is an example of potential energy. A book teetering on a bookshelf is another example.

### Energy resources

Energy resources are natural resources that can be extracted or captured for the energy they contain. Crude oil, coal, sunlight and wind are all examples of energy sources. Renewable energy sources, such as wind, sunlight, plants and moving water, are those that are naturally and continually replenished. Compared to non-renewable energy sources, such as fossil fuels, renewable energy sources are more sustainable and less damaging to the health of organisms and to the environment on which life depends. "Green energy" is energy obtained from renewable resources that produce little or no pollution and that replenish themselves faster than humans consume them.

## Acting out Energy Forms

### Objectives:

- Students learn that there are several forms of energy.
- Students are introduced to scientific principles related to energy transformations, electricity and light.

**Grade level:** K-8

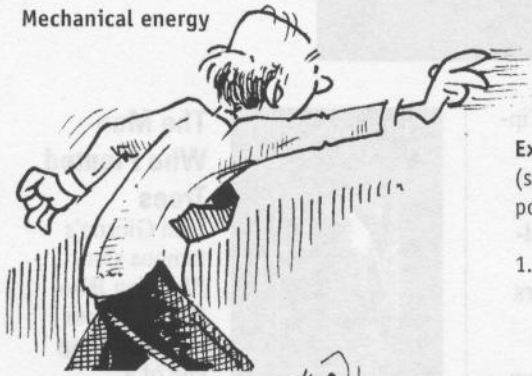
### Procedure:

1. Discuss the topic of energy with your students, referring to the background information provided above.
2. Choose an open area large enough to facilitate moving about. Introduce the activity by telling students, "In order to learn a little bit about how energy works in our lives, we are going to act out the various forms of energy." Explain that they will need to listen and watch, because this is a repeat-after-me, do-as-I-do game.
3. Using the "Acting Out Energy Forms" activity reference sheet (see page 40), have students mimic you as you act out energy forms. After many chuckles, inquire what knowledge your students retained. Challenge them to state or act out each energy form's definition.
4. For classes that keep science journals, have students write the definition, as they remember it, of each energy form and draw a representational image the definition.

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The **Northeast Sustainable Energy Association (NESEA)** focuses on promoting the understanding, development and adoption of energy conservation and non-polluting, renewable energy technologies. The NESEA K-12 Education Department offers professional development opportunities and resources for teachers, non-formal educators, and community mentors, and curriculum and programs on energy efficiency and energy conservation, and on forms and applications of renewable energy. Visit [www.nesea.org](http://www.nesea.org) or call (413) 774-6051.

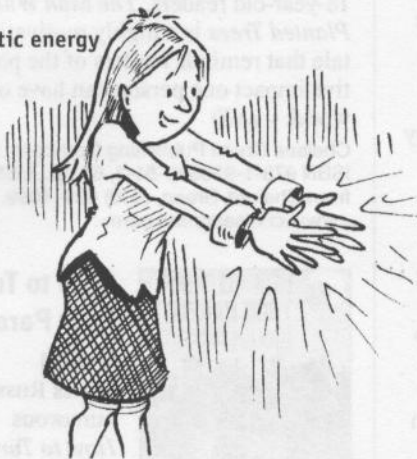
Mechanical energy



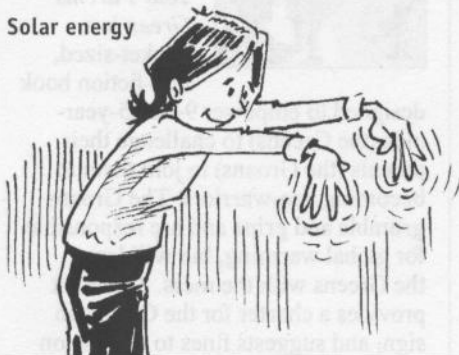
Electrical energy



Magnetic energy



Solar energy



## Acting Out Energy Forms

### Leader's Reference Sheet

**Example:** The leader says, "Kinetic energy" (students repeat) "is energy" (students repeat) "in motion" (students repeat). The leader pretends to power walk, and the students mimic the action.

1. **Kinetic energy** is energy in motion (*pretend to power walk*).

**Mechanical energy** is energy that is a moving object (*pretend to throw a ball*).

**Electrical energy** is energy that is electrons moving through wires (*put hands at sides and shuffle fast a few paces, turn and continue to shuffle, as if you are moving inside a wire*). Electrical energy is also lightning! (*Pose with your hand raised at a diagonal, finger pointed up to the sky and then point down across your body to the ground. Repeat a few times. Think disco dancing.*)

**Radiant energy** is the energy of electromagnetic waves, or light, traveling from the sun (*splay fingers, pointing slightly down and move your arms in a downward wave motion, mimicking sunrays traveling to Earth*).

**Thermal energy** is energy that is vibrating due to heat (*jiggle up and down slightly*). The hotter the matter gets, the faster it moves (*jiggle body up and down faster*).

2. **Potential energy** is energy that is waiting (*tap your foot and look at your wrist*).

**Chemical energy** is energy stored in food (*pretend to pick up a treat and smack your lips*), in batteries (*pretend to hold a battery up examining it*), in fossil fuels (*squat into a ball like a lump of coal*), and in plants (*feet and legs together, arms out like leaves, head arced to sunlight*).

**Elastic energy** is energy stored in an object that is either compressed (*tighten up your body*) or stretched (*stretch your body out like a rubber band*).

**Magnetic energy** is energy created by a magnetic field (*pretend your hands are magnets attracting and repelling*).

**Nuclear energy** is energy that holds the nucleus of an atom together (*pretend to hold something small in your hands*). Energy is released when nuclei are split apart (*pretend to pull something apart between your hands*) or forced together (*clap your hands once*).

**Gravitational energy** is energy in a position to be acted upon by gravity (*look down and teeter on your feet, as if you are about to fall — be dramatic with hands waving, body bobbing*).

3. **Renewable Energy** is energy from sources that are naturally and continually replenished.

**Solar energy** is energy that comes from the sun (*splay fingers, pointing slightly down and move your arms in a downward wave motion, mimicking sunrays traveling to Earth*). The sun's rays touch the solar panel and the energy inside gets excited (*dance in place*) and makes electricity (*diagonally hand dance up and down*).

**Wind energy** is energy that comes from wind turning big metal turbine blades in the sky (*wave your arms in big slow circles and make a low and constant "whoosh" sound*).

**Water power** is energy that comes from moving water (*move hands in wave-like motion*) falling down on turbine blades and turning them (*bend over sideways as if falling and spinning your arms*).