

KidWind / Know Energy

# IVa. Energy Terms and Concepts

# Items Needed for this Lesson

- Hand-held flashlight
- NEED “Forms of Energy” handout
- NEED “Energy Flow” worksheet

# Energy Terms

There are two main forms of energy:  
Kinetic and Potential

# Kinetic Energy

- Energy of motion
- Forms of kinetic energy:
  - sound,
  - thermal,
  - electrical,
  - radiant,
  - moving objects

# Potential Energy

- Stored energy
- Forms of potential energy:
  - chemical energy,
  - stored mechanical energy (like a coiled spring),
  - nuclear energy,
  - energy of position (due to the force of gravity)

# FORMS OF ENERGY

All forms of energy fall under two categories

## POTENTIAL

Potential energy is stored energy and the energy of position (gravitational).

### CHEMICAL ENERGY

Chemical energy is the energy stored in the bonds of atoms and molecules. Biomass, petroleum, natural gas, propane and coal are examples of stored chemical energy.

### NUCLEAR ENERGY

Nuclear energy is the energy stored in the nucleus of an atom. It is the energy that holds the nucleus together. The nucleus of a uranium atom is an example of nuclear energy.

### STORED MECHANICAL ENERGY

Stored mechanical energy is energy stored in objects or substances by the application of a force. Compressed metal springs and stretched rubber bands are examples of stored mechanical energy.

### GRAVITATIONAL ENERGY

Gravitational energy is the energy of place or position. Water held in a reservoir behind a hydropower dam is an example of potential gravitational energy. When the water in the reservoir is released to spin the turbines, it becomes motion energy.

## KINETIC

Kinetic energy is motion. It is the motion of waves, electrons, atoms, molecules and substances.

### RADIANT ENERGY

Radiant energy is electromagnetic energy that travels in transverse waves. Radiant energy includes visible light, x-rays, gamma rays and radio waves. Solar energy is an example of radiant energy.

### THERMAL ENERGY

Thermal energy (or heat) is the internal energy in substances. It is the vibration and movement of atoms and molecules within substances. Geothermal energy is an example of thermal energy.

### MOTION

The movement of objects or substances from one place to another is motion. Wind is an example of motion energy.

### SOUND

Sound is the movement of energy through objects or substances in longitudinal (compression/rarefaction) waves.

### ELECTRICAL ENERGY

Electrical energy is the movement of electrons. Lightning and electricity are examples of electrical energy.

# Sources of Energy

There are two broad groups of energy:  
Renewable and Non-renewable

# Renewable Energy Sources

Renewable energy sources are those that can be replenished in a relatively short period.

- Solar
- Wind
- Hydropower
- Biomass
- Geothermal



# Non-Renewable Energy Sources

Energy sources that cannot be replaced in a short time.

- Coal
- Petroleum
- Natural Gas
- Uranium
- Propane

# Energy Conversions

Energy can be converted from one form to another.

For example stored chemical energy in a battery can be converted to light in a flashlight.

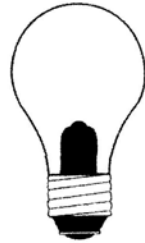
Or falling water can be used to turn a turbine, which motion can be used to make electricity

The following activity comes from  
**THE NEED PROJECT**

Follow the directions to complete the  
“Energy Flow” work sheet

# Energy Flow

Below are seven forms of energy involved in an energy flow. Your job is to unscramble the energy flow so that the forms of energy are in the proper order. Number the pictures from one to seven on the lines to the right of the pictures, with number one as the beginning of the flow.



Radiant Energy

4



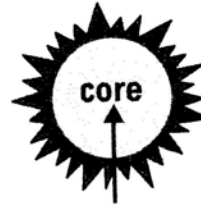
Motion

5



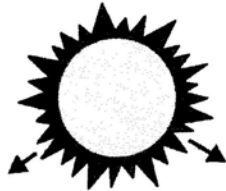
Chemical Energy

3



Nuclear Energy

1



Radiant Energy

2



Electrical Energy

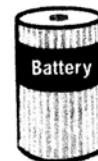
6

8



Chemical Energy

1

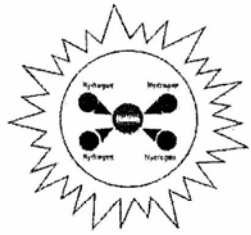


Chemical Energy

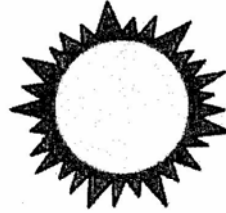
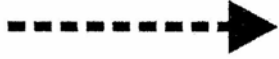
7

# ENERGY TRANSFORMATIONS

## Hand Generated Flashlight



Nuclear Energy



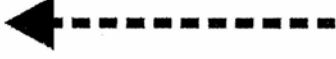
Radiant Energy



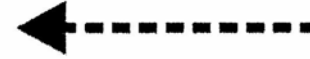
Chemical Energy



Electrical Energy



Motion



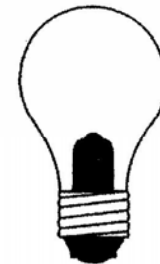
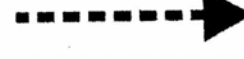
Chemical Energy



Stored Chemical Energy



Electrical Energy



Radiant (light) Energy

# Energy Inefficiencies

Some energy is lost every time one form of energy is converted to another form.

Most losses occur in the form of heat.

# Climate Change

Using non-renewable forms of energy creates two problems:

1. It uses up limited amounts of energy
2. Most non-renewable energy forms (fossil fuels in particular) are burned. The burning of these fuels produces greenhouse gases which gases have been linked to rises in global temperatures.

The end of part IVa.