Energy Types

Exercise 1: Find The 10 Basic Types of Energy

Group any types, sources, or associated words that seem to refer to the same type of energy. You can do this using colored pencils, or by making lists of each set of words that seem to be a given type of energy. Try to get all of the words into 10 categories, one for each basic type of energy.

For example, gasoline and charcoal are both examples of chemical energy.

nuclear

chemical

gasoline

electricity

batteries

fusion

oil

mechanical

pistons in a car engine

kinetic

potential

natural gas

steam

ball held above the ground

food

light

microwaves

hydro

fission

spring

thermal

sound

x-rays

heat

uranium

magnetic

wind

planetary poles

hot water

gun powder

wound up spring toy

static cling

ball in motion

heavy water

hydro

solar

ultraviolet rays

turning drill bit

lightning

wood

stretched bungee cord

star light

heat lamp

streetched rubber band

charcoal

heavy water

compass

Energy Types

In assignment 1, you tried to place the types, sources, and words associated with energy into 10 basic categories or types of energy. Since energy comes in so many forms and, as we will see, is also constantly changing from one form into another, selecting a perfect set of 10 basic types is not easy. Below are one possible set of 10 basic types of energy and the words from the list of assignment 1 that go with each type. You may have come up with your own perfectly reasonable set of 10 basic types that are somewhat different than the 10 listed below.

The 10 Types of Energy

<u>Kinetic energy</u> is energy of motion - the energy is contained in the movement of the object or movement inside of the object. <u>Potential energy</u> is stored energy, energy that can be kept for use at a later time.

Type of Energy Examples or Sources		KE= Kinetic PE= Potential	
Kinetic Energy	kinetic sound wind turning drill bit	KE	
Gravitational Energy	ball held above the ground hydro	PE	
Spring	spring stretched rubber band wound up spring toy stretched bungee cord	PE	
Electrical	electricity static cling lightning	KE	
Magnetic	magnetic planetary poles compass	PE	
<u>Mechanical</u>	mechanical pistons in a car engine	KE	
<u>Heat</u>	heat thermal	KE	

	hot water steam	
Nuclear	nuclear fission fusion heavy water uranium	PE
Light	light microwaves x-rays solar ultraviolet rays	KE
Chemical	chemical gasoline batteries oil natural gas food gunpowder wood charcoal	PE

Energy Changes

As we have said, energy is constantly changing from one type into another. This is happening all around us and throughout the universe.

Examples of Changes

Many of the most obvious examples of energy changing from one type into another occurs in our homes. A number of examples are illustrated below. In each example energy starts as one type (energy in) and changes into another type (energy out). In some cases the energy might actually change into more than one type before the final energy out. In those situations, ignore the energy changes in the middle. Try to identify when this is happening and check your guesses with the information given after the examples.

	Example Description	Energy In	Energy Out
Electric Wok		Electrical	Heat
	Flashlight Chemical (in the batteries)		Light
The state of the s	Guitar String (being plucked) Mechanical		KE (sound)
	Blinds (being opened) Mechan		Gravitational

Burning Candle	Chemical (wax)	Light
Sand Clock	Gravitational	Kinetic
Arrow Shot From Crossbow	Spring	Kinetic
Hand Scanner	Light	Electrical
A Toboggan Going Downhill	Gravitational	Kinetic
Gasoline Powered Lawnmower	Chemical	Mechanical
Microwave Oven	Light	Heat

Notes: The one example where there was an obvious energy change in the "middle" was the flashlight. Chemical energy from the chemicals inside the batteries first changed into electrical energy before finally being changed into light energy.

Energy Changes

You have seen a number of examples of energy changes. Let's see if you can identify some energy changes on your own.

Fill In Exercise

There are 10 examples of energy changes below. Type in or print and fill in what you think the energy in and energy out will be for each example. Then check your answers against the answers given below.

		Example Description	Energy In	Energy Out
1	20	Blender		
2		Solar Panel Powered Communications Satellite		
3		Gas Powered Grill		
4		Water Dispenser		
5	ž O	Electric Pencil Sharpener		

6	2	Game Controller		
7		Microphone		
8		Sail Boat		
9		Bike		
10		Pistol		
		ANSWERS	-	

Energy Changes

Not only can energy change from one type into another, energy can even change into several other types at the same time. Sometimes it may seem that energy is being changed from one form into another, but the first energy is only causing another source of energy to be turned on. This can cause some confusion when energy changes types over and over again in what we might call energy "chains."

Energy Chains

Below there are several examples. The first few illustrate how energy might change into two types of energy. The second illustrates an energy chain or a continuous changing of energy. And the third illustrates an energy chain that is broken, the energy does not continue to change but causes another energy to be turned on. Make sure you understand these examples before continuing.

Energy Changing into Several Types					
	Example Description	Energy In	Energies Out		
*	Cruise Missile Gaining Altitude	Chemical	Gravitational + Kinetic		
	Lightning	Electrical Heat + Light + Sound			
		Energy Chains			
	Wind Up Alarm Clock Ringing	Spring	Mechanical Kinetic (Sound)		

Note: Sometimes it is hard to tell whether the energy is changing into two forms simultaneously or sequentially. In this case the spring is making the parts of the bell move which then hit to make the sound.



A Hammer Hitting a Nail

Kinetic

Kinetic



Heat

Note: In this example the moving hammer drives the nail into the wood giving it initially kinetic energy. But after the nail is driven into the wood, the nail stops. Where did the kinetic energy go? The kinetic energy goes into heat. Many energy changes are accompanied by part of the original energy turning into heat, and when the energy seems to disappear, it often has gone into heat energy. This "loss" of energy into heat will be important later when we see how the "lives" of energy are used up.

Broken Energy Chain



A Person Pulls a Cord of a Guillotine (to chop a cabbage)

Chemical Mechanical Mechanical Gravitational Kinetic







Note: The person's chemical energy (from food) allowed the movement of a hand, or mechanical energy, to move the cord, mechanical energy. This is the end of the chain. The cord pull allowed the energy already stored in the guillotine blade, or gravitational energy, to turn into kinetic energy. The gravitational energy was already stored and did not come from the mechanical energy of the moving cord.

Energy Generation

To generate energy, we must have some source to generate energy from. While energy is everywhere, only certain sources can be efficiently used.

Energy Sources

Following is a table of the most common sources of energy that are available to us today. These sources have been categorized into the 10 types of energy.

Chemical	Wood Coal Oil Natural Gas Hydrogen (Fuel Cells)	Occasionally Used Extensively Used Extensively Used Extensively Used Being Developed	Power Plant Power Plant Home Heating	PE
Gravitational	Hydro	Extensively Used	Power Plant	PE
Nuclear	Uranium (Fission) Heavy Water (Fusion)	Extensively Used Being Developed	Power Plant	PE
Kinetic	Wind	Alternative	Power Plant	KE
Light	Solar	Alternative	Power Plant	KE
Heat	Geothermal	Alternative		KE

As you can see, useful sources have not been found for all 10 types of energy. Some sources are used a lot in our modern world, while others are still being developed.

Fuel cells and fusion are being researched for future use, while wind, solar, and geothermal have been around for years but have not been cheap enough to be used extensively. These available but not yet competitive sources (like solar) are often called alternative energy sources.

Note that the potential energy sources can be stored for future use. Oil from your home storage tank can sit for years until it is needed. The kinetic energy sources must be used as they are available since they cannot be stored. Once the sunshine or solar energy hits the ground, it no longer can be collected by a solar panel.

Also, some of these sources tend to be used to produce energy (or power - more on this later) in large power plants that produce electrical energy. While electrical energy is kinetic and cannot be stored, it can be easily distributed long distances to where it is needed, to industrial plants or to your home.