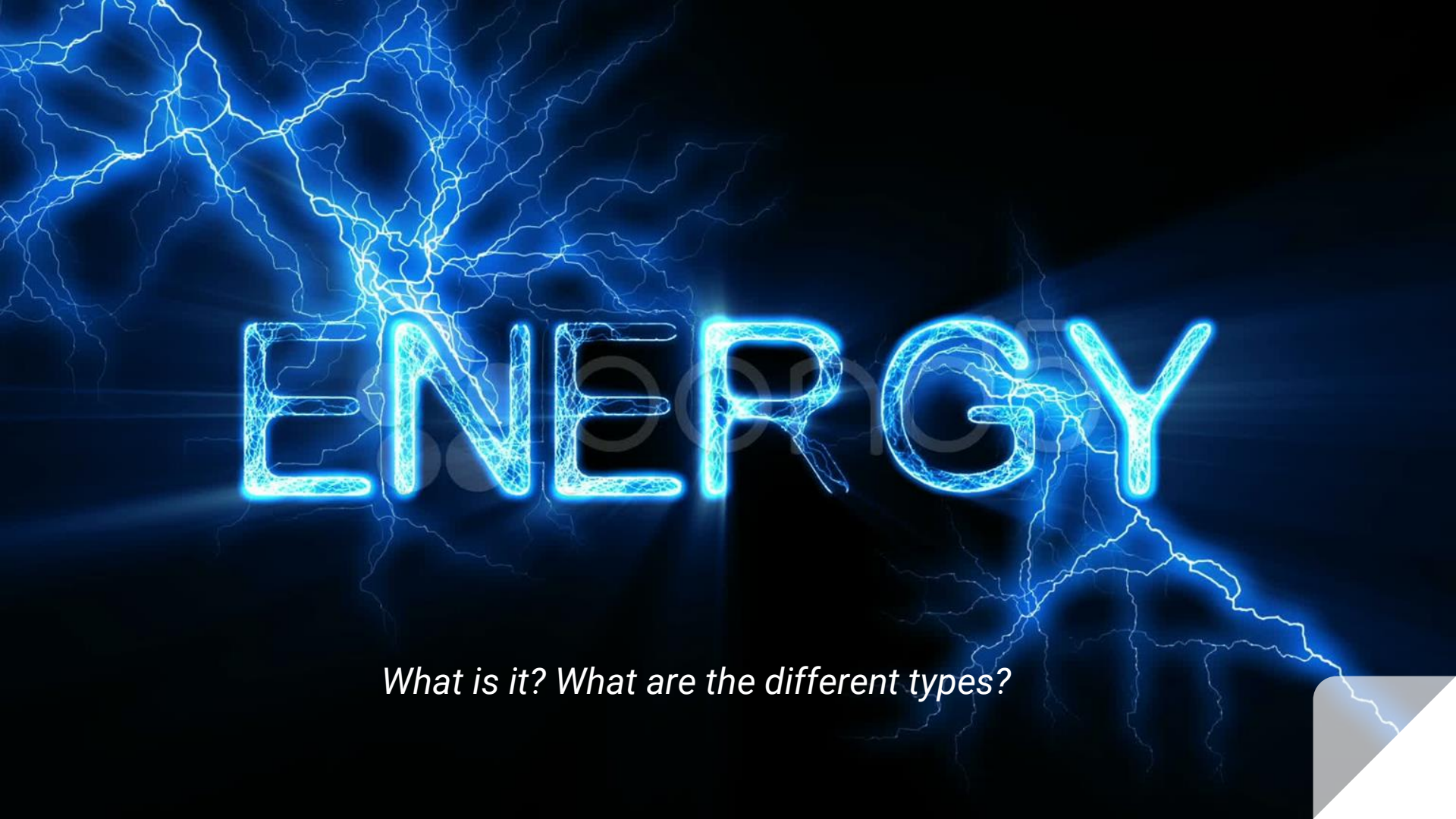


What is it? What are the different types?

Energy is a challenging concept to understand and explain

- Energy is an abstract concept that has slightly different definitions depending on what branch of science we are dealing with.
- One definition used to describe energy is the ability of a **system to do work.**
- ***'Work'*** is done when a force acts on an object to cause it to move, change shape, displace, or do something physical.

Energy: Kinetic vs. Potential

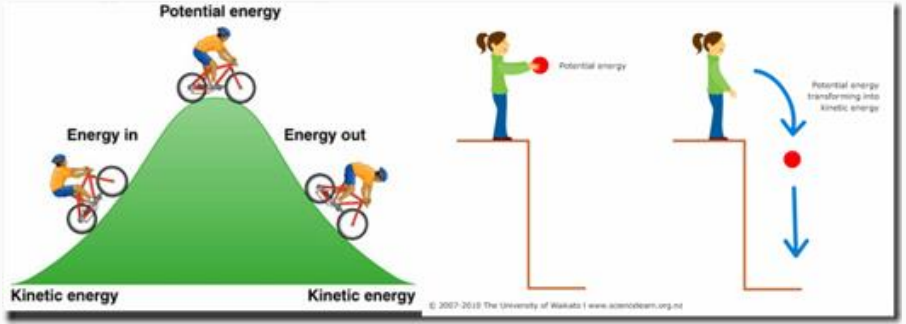
Energy is usually classified into **two** broader categories:

Kinetic - the energy an object has as a result of its motion.

Potential - the energy stored in a system because of its position or state

Another way to look at this is, **kinetic energy** is a way of understanding how matter ***is*** moving, while **potential energy** is a way of understanding how matter ***could*** move.

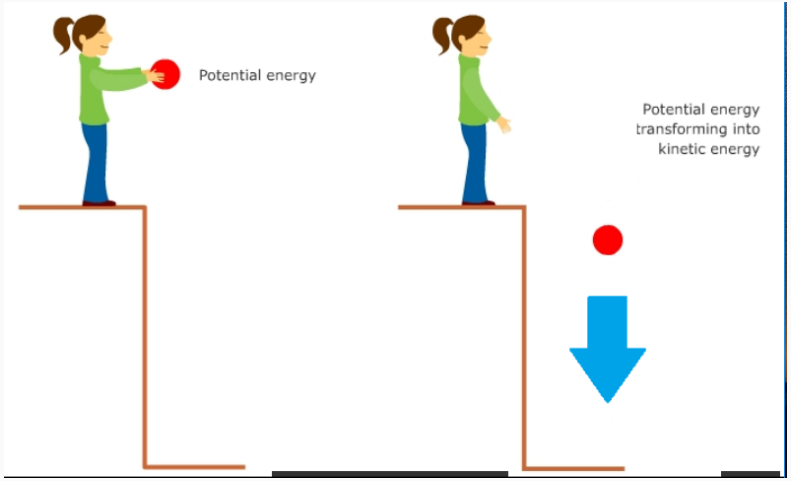
Roller Coaster Energy



What Really is Gravitation Potential Energy?

Is the **ENERGY** an object has due to its position above Earth.

This energy is affected by the objects **MASS (Kg)** and **HEIGHT (m)**.



Form of Energy #1: Mechanical Energy Summary (this is where you can start your notes)

What is it?

Mechanical energy is the sum of kinetic and potential energy in an object.

Where does it come from?

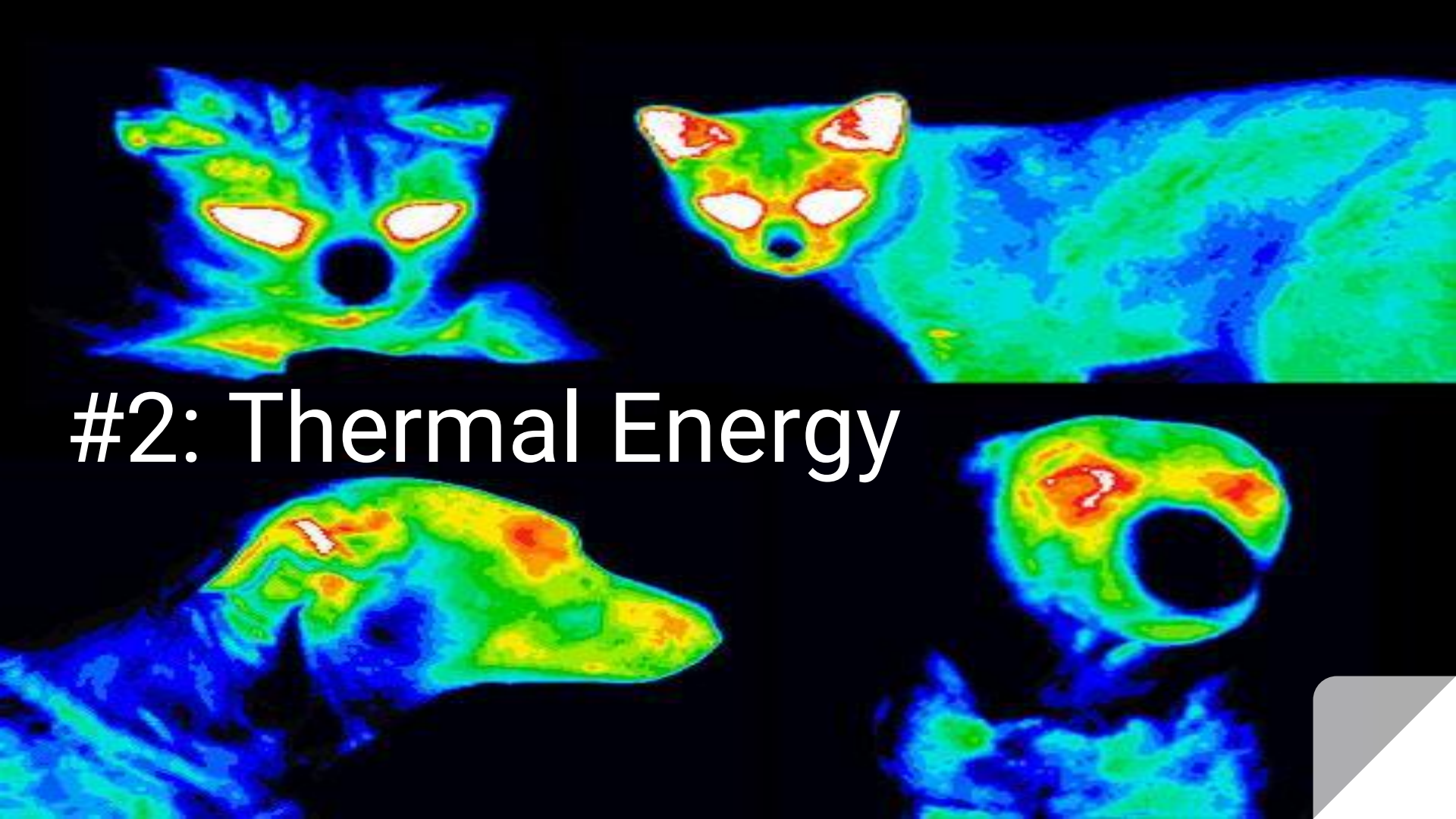
Objects have mechanical energy if they are in motion and/or if they are at some position relative to a zero potential energy position.

Where is it used?

Everywhere! Here are some examples:

A car possesses mechanical energy due to its motion (kinetic energy).

A moving baseball possesses mechanical energy due to its high speed (kinetic energy) and it's position above the ground (gravitational potential energy)



#2: Thermal Energy

Review: Kinetic Molecular Theory

- Particles that make up matter are constantly moving
- Higher amount of movement = higher amount of energy

https://interactives.ck12.org/simulations/chemistry/states-of-matter/app/index.html

Thermal energy, Temperature, and Heat… oh my!

- In everyday life these terms are used interchangeably but in science each has very different meanings

Thermal Energy: TOTAL energy of all the particles

Temperature: a measure of the **AVERAGE** kinetic energy of the individual particles of a substance

Heat: thermal energy moving from a warmer object to a cooler object.

Form of Energy #2: Thermal Energy Summary

What is it?

Thermal energy is the sum of the kinetic energy of all the molecules within an object.

Where does it come from?

The amount of thermal energy is related to temperature (average kinetic energy of the individual particles in a substance).

Where is it used?

- The Sun warming the Earth
- Baking a cake
- Powering automobiles

Watch the following video:

https://www.youtube.com/watch?v=hNGJ0WHXMyE

Stop at 1:52 to answer the following question

Do you think the cake or the tin will be hotter? Why?

#3: Nuclear Energy

Form of Energy #3: Nuclear Energy Summary

What is it?

The energy stored in the nucleus of an atom.

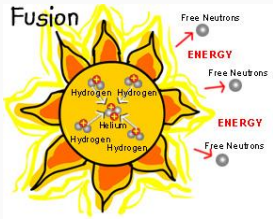
Where does it come from?

Nuclear energy is the force that holds the nucleus together in an atom - it is the energy found within the attraction between protons and neutrons. Nuclear energy can be released through fission, fusion or radioactivity.

Where is it used?

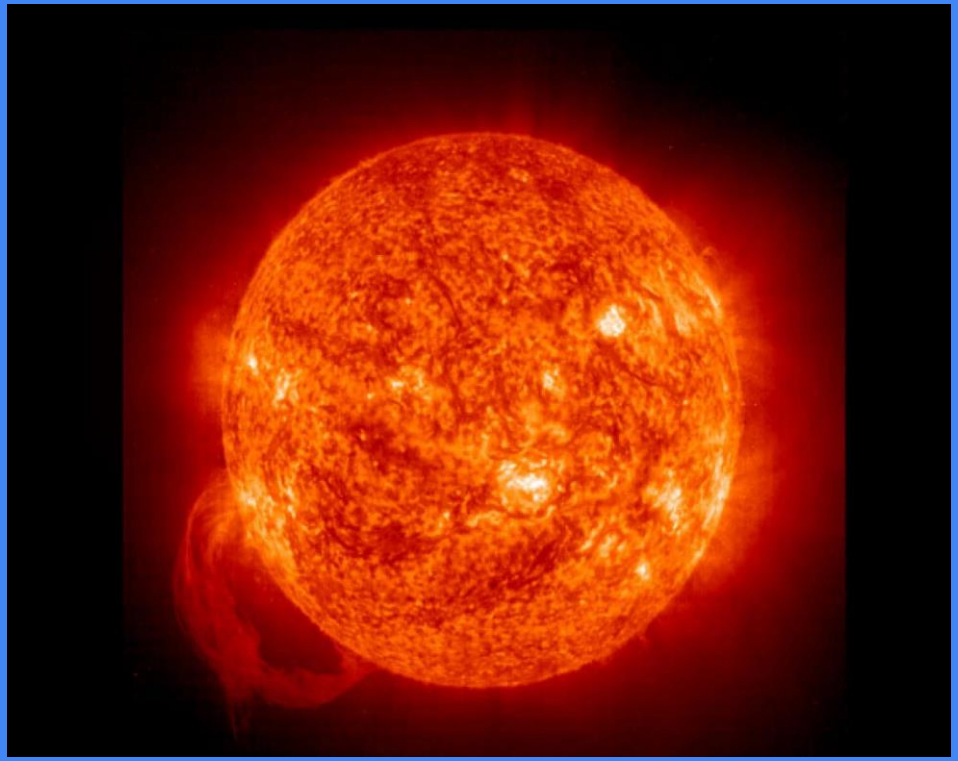
Nuclear power plants use fission to generate heat which in turn generates electricity.

The energy from the sun is produced through fusion of hydrogen atoms.



Atomic bombs

#4: Solar Energy

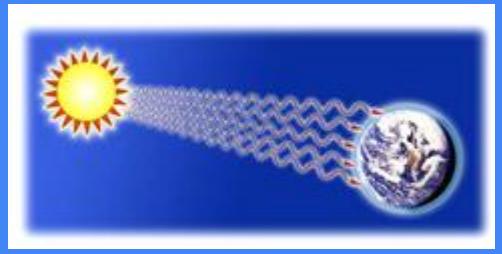


Where does the Sun get it’s energy?

Watch….

https://www.youtube.com/watch?v=Ux33-5k8cjg

Solar Energy



In general, the terms "solar energy" and "solar radiation" simply refer to energy from the Sun.

The range of electromagnetic energy emitted by the sun is known as the Solar spectrum, and lies mainly in three regions: ultraviolet (UV), visible light, and infrared. (There is a small amount of high-energy radiation like x-rays in the sun's energy but these do not penetrate below the topmost layer of the atmosphere.

The majority of solar energy comes in the form of "light" and "heat" in the visible and infrared regions of the electromagnetic spectrum.

Form of Energy #4: Solar Energy Summary

What is it?

The energy that comes from the sun.

Where does it come from?

Solar energy comes from the sun (obviously!) but is produced through the fusion reactions that occur in the Sun's core.

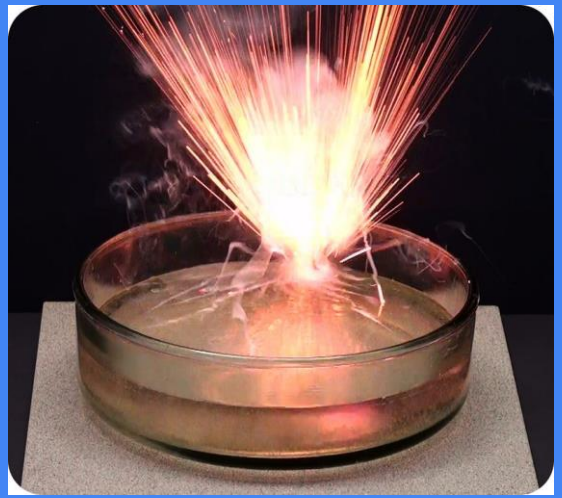
Where is it used?

To sustain life on Earth!

Solar technology to produce electricity.

#5: CHEMICAL ENERGY

THE BREAKING OF BONDS AND THEY ENERGY THEY PRODUCE



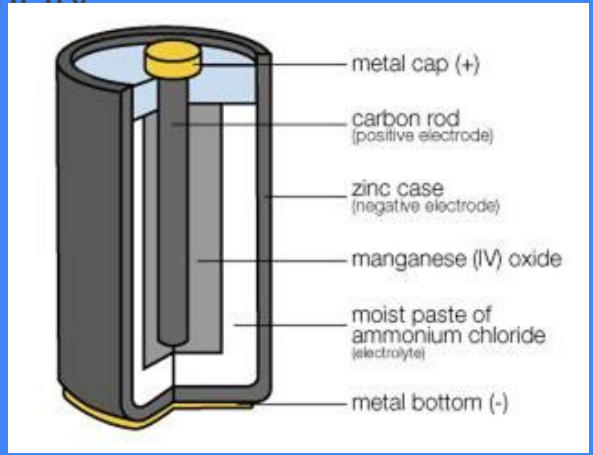
CHEMICAL POTENTIAL ENERGY COMES FROM CHEMICAL REACTIONS…

- Chemical reactions:
  - Atoms are rearranged
  - Bonds are broken/formed
  - The number and type of atoms at the beginning of the reaction are the same at the end

WHERE MIGHT WE USE CHEMICAL ENERGY TO STORE ELECTRICAL ENERGY?

Batteries!

A battery is a device that is able to store electrical energy in the form of chemical energy, and convert that energy into electricity.



Form of Energy #5: Chemical Energy Summary

What is it?

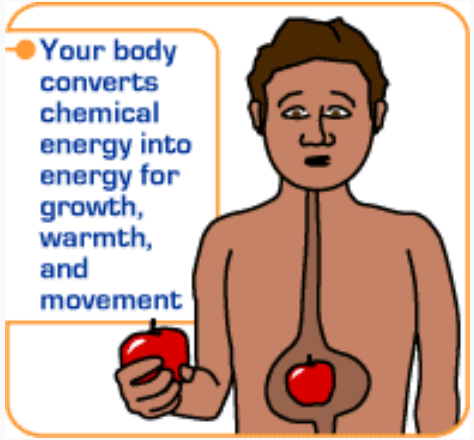
The energy that comes from chemical reactions.

Where does it come from?

Chemical energy is a type of potential energy that is released when bonds form or when bonds break in a chemical reaction.

Where is it used?

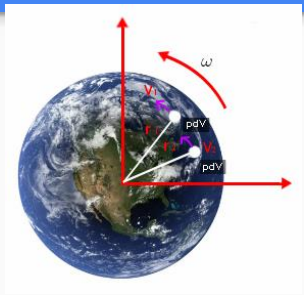
Batteries
Photosynthesis
Digesting Food



…..some other types of energy

Sound energy

Electrical energy



Rotational energy

Choose one of these types of energy (or another type) and do a bit of research to fill in the last section of your notes.

Magnetic energy

Elastic energy