

Energy Studies

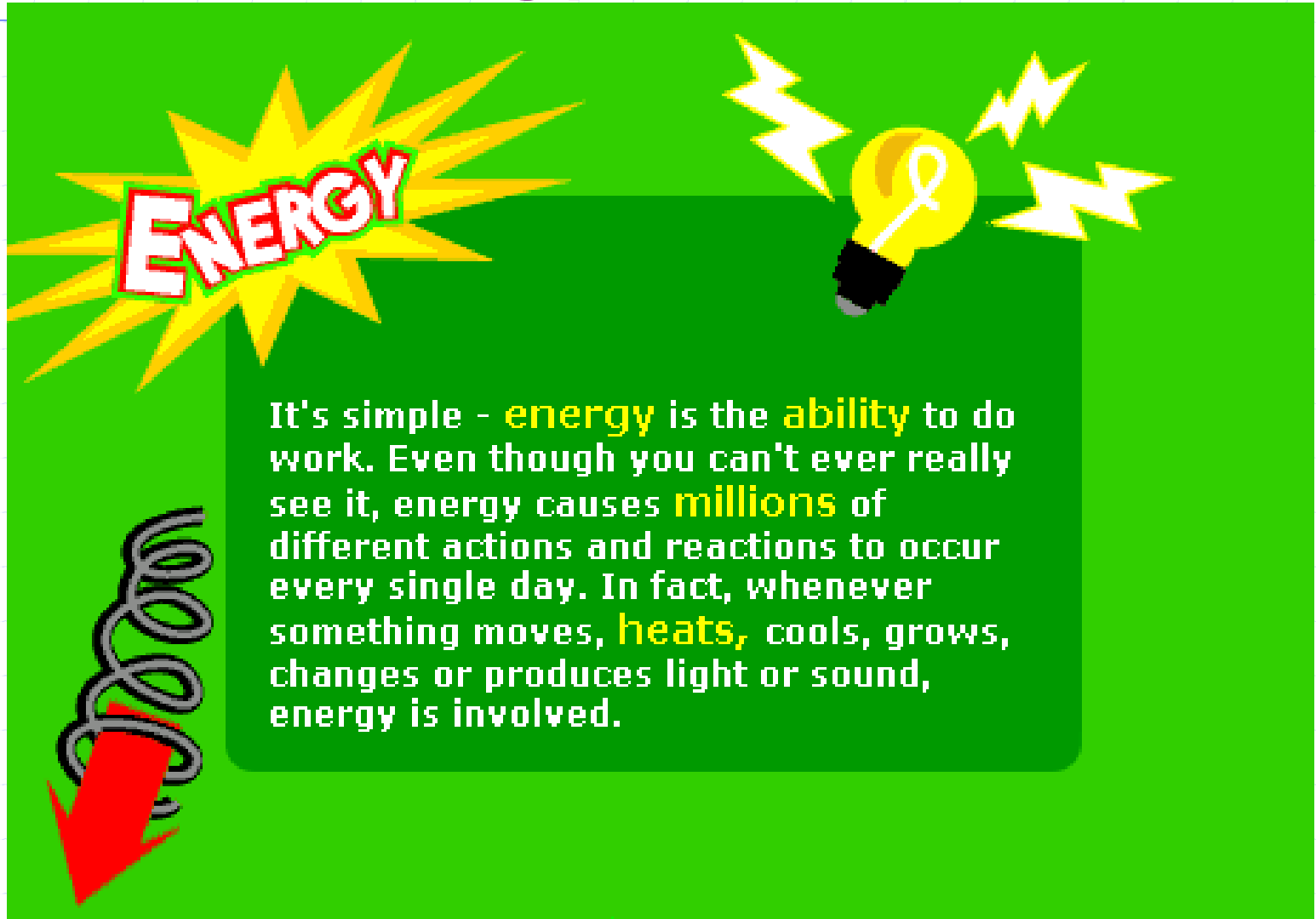
Darlene Devendorf OCM BOCES

Energy Studies Kit:

- Teacher Guide
 - Pages a-c (Overview and Standards)
 - Student Journal reference
 - BLMasters reference



What is Energy?



It's simple - **energy** is the **ability** to do work. Even though you can't ever really see it, energy causes **millions** of different actions and reactions to occur every single day. In fact, whenever something moves, **heats**, cools, grows, changes or produces light or sound, energy is involved.

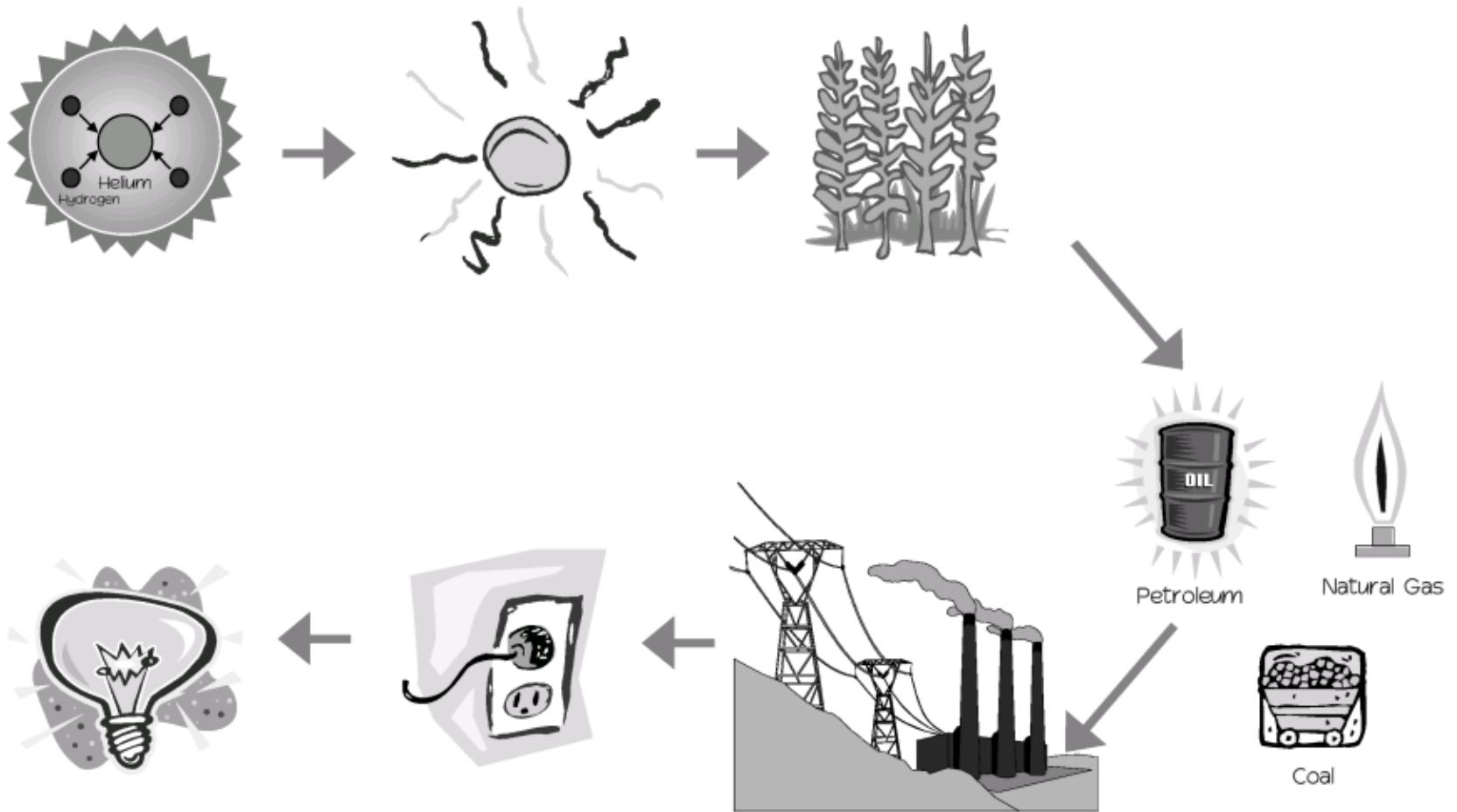
Energy is:

the capacity of a physical system to do work.

- **the units of energy are joules or ergs**
- **"energy can take a wide variety of forms"**

Work is energy in transition.

Forms of Energy



Energy is not created or destroyed, it changes form.

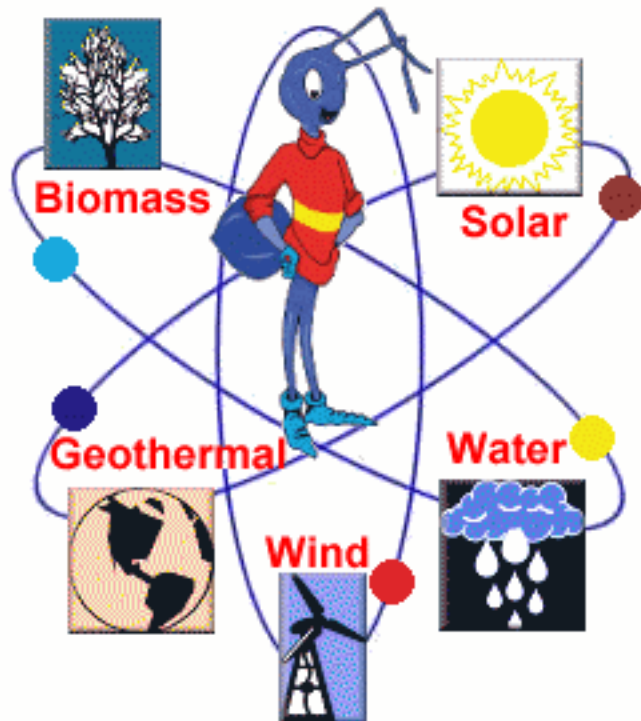
Sources of Energy

There are many different **energy** sources, which include **hydropower**, **nuclear energy** ⚡, **oil**, **coal**, **natural gas**, solar, biomass, geothermal, and wind. When a snowboarder glides through the trees, an egg **sizzles** in a pan, a puddle **freezes**, your little neighbour **grows** taller, a chameleon **changes colour**, a flashlight guides you using the light **powered** by its batteries

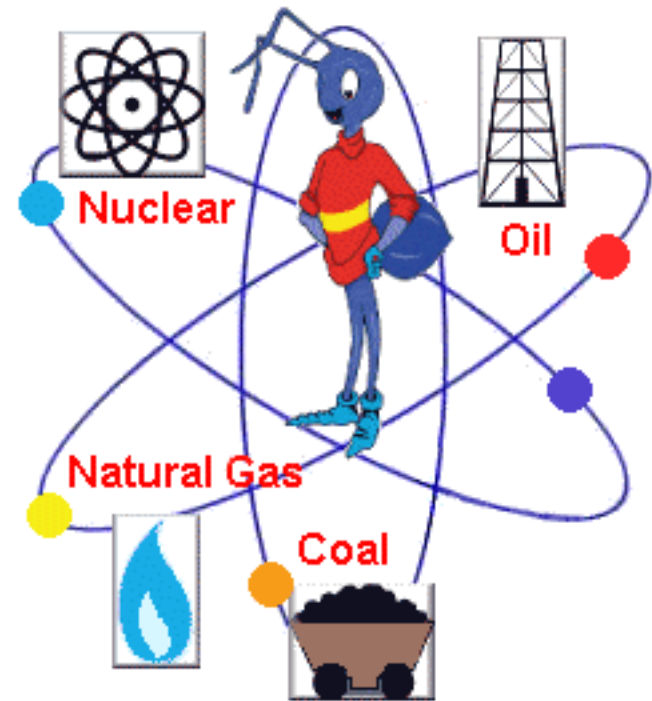


↓
Energy is transformed

Sources of Energy

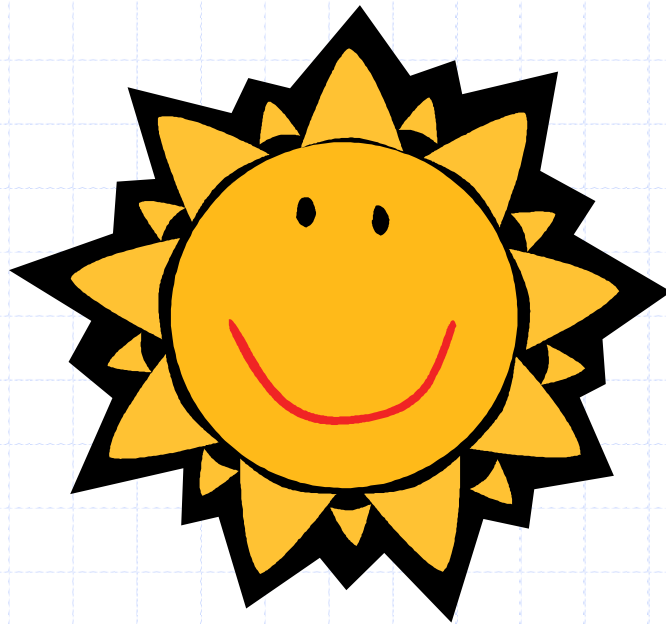


Renewable

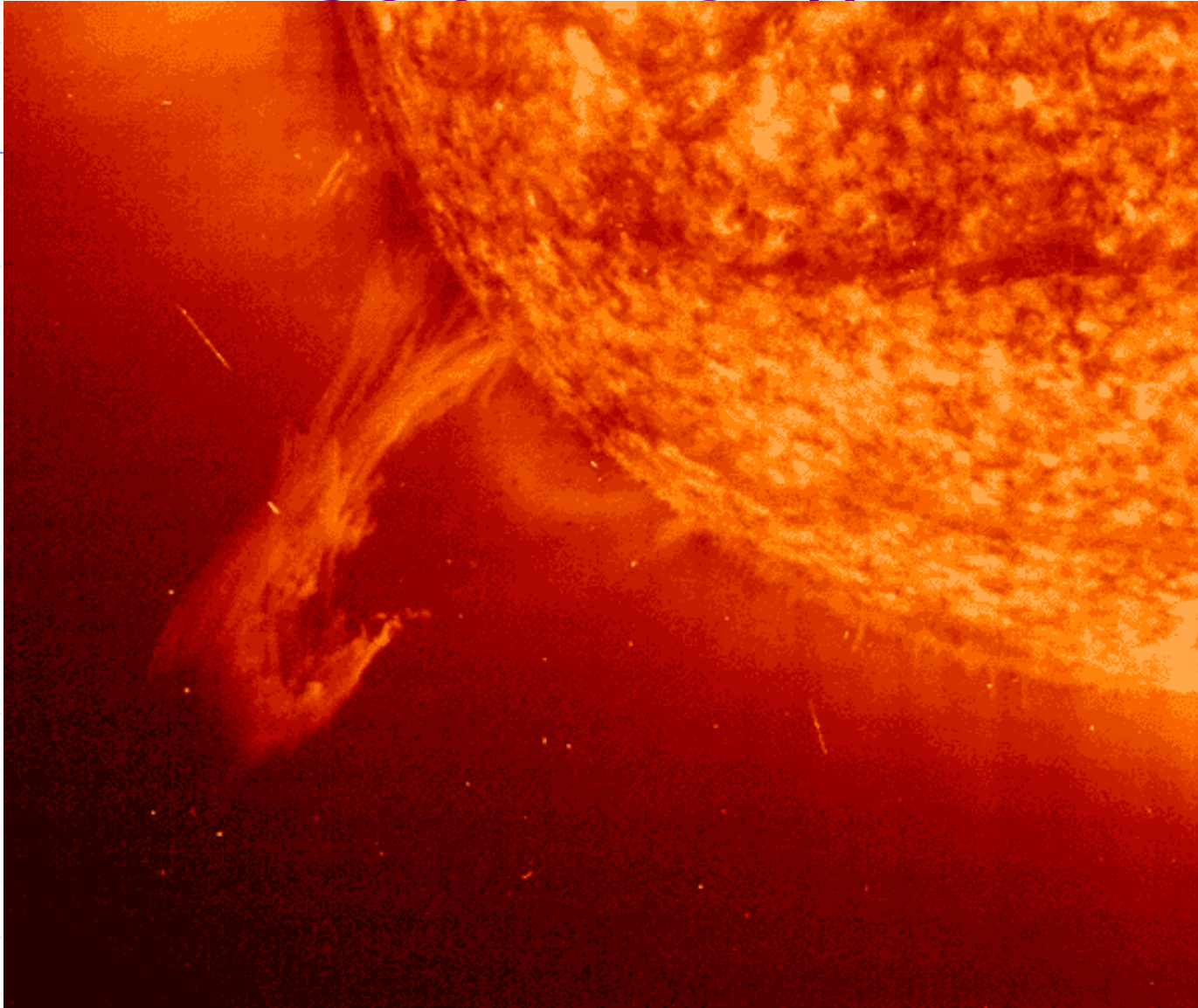


Non-renewable

THE SOURCE of Energy



Solar Energy



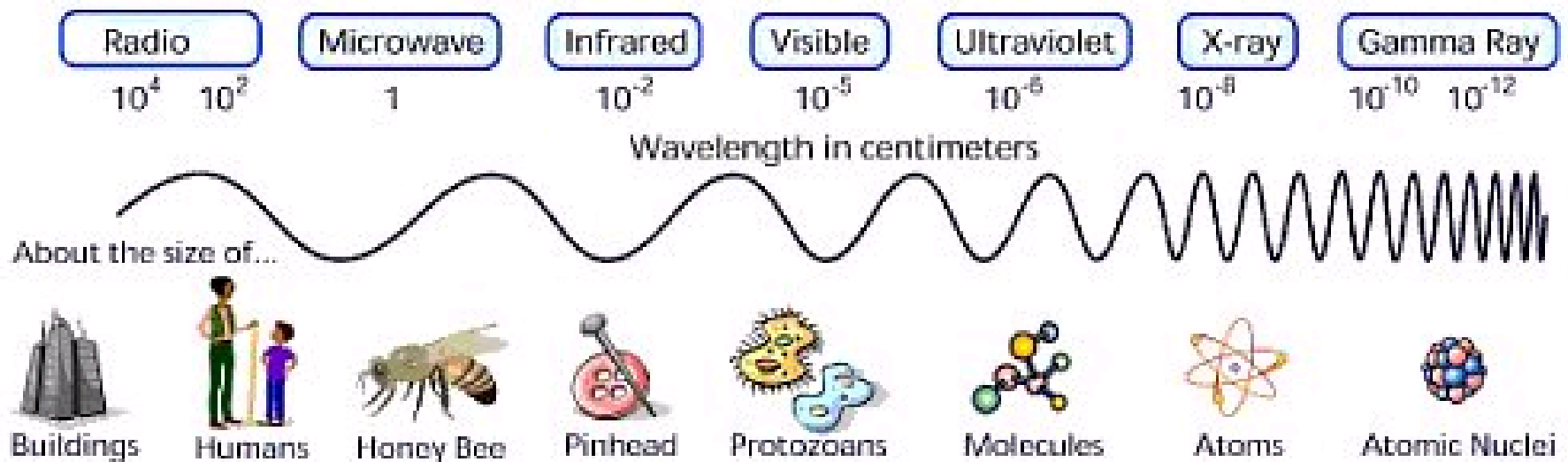
What forms of energy do we get from the Sun?

Electromagnetic spectrum

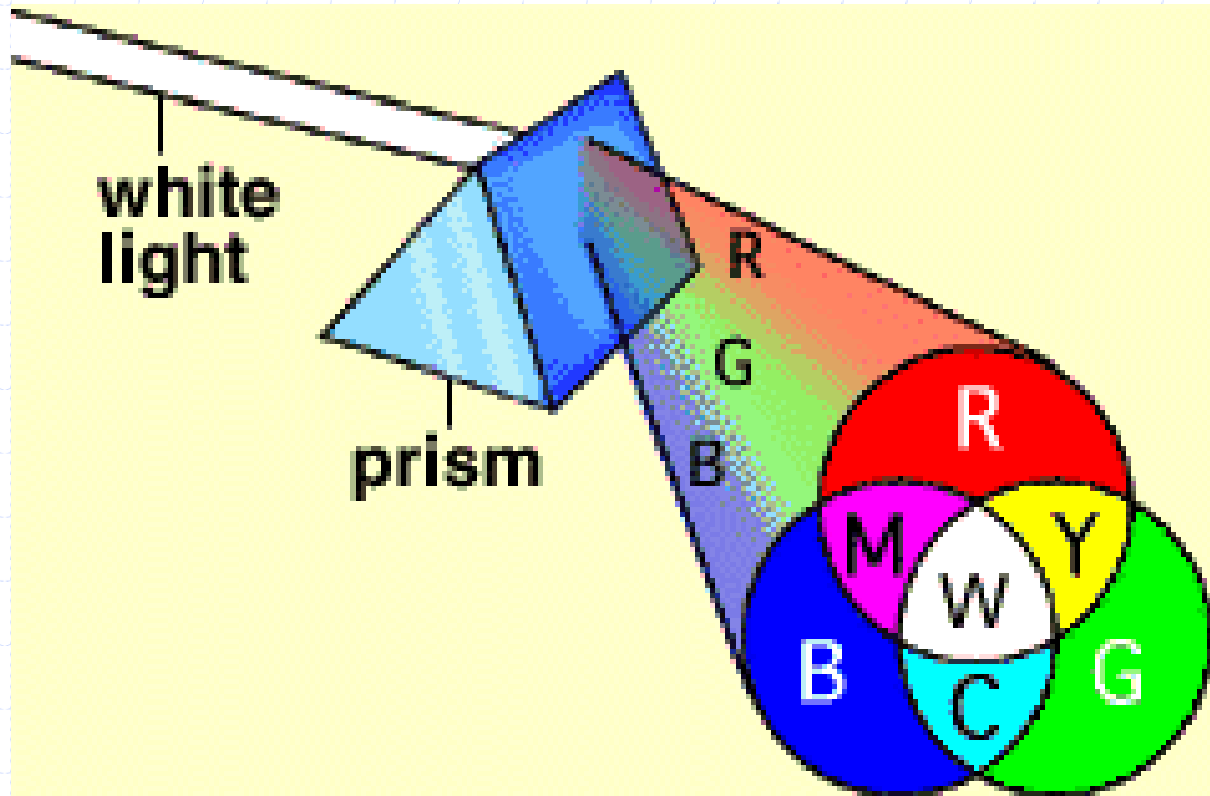
Solar Energy = radiant energy

Radiant energy:

It travels in waves, the best-known form is light energy. Other forms are radio and TV waves, X-rays and gamma waves.

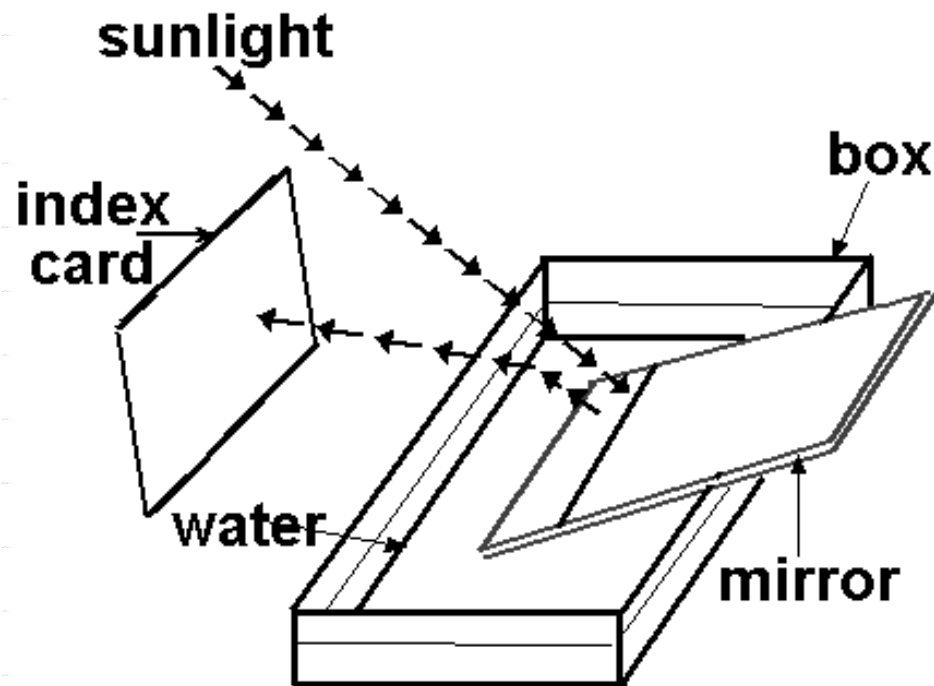


Waves of Visible Light

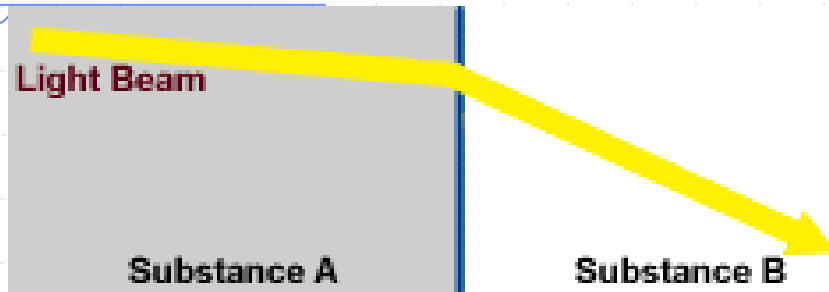


We see reflected colors of light.

Waves of Visible Light Activity



White light to Color spectrum



Refraction of light



Each color from the original beam of light has its own particular wavelength (or color) and each wavelength is slowed differently by the glass.

Rainbows

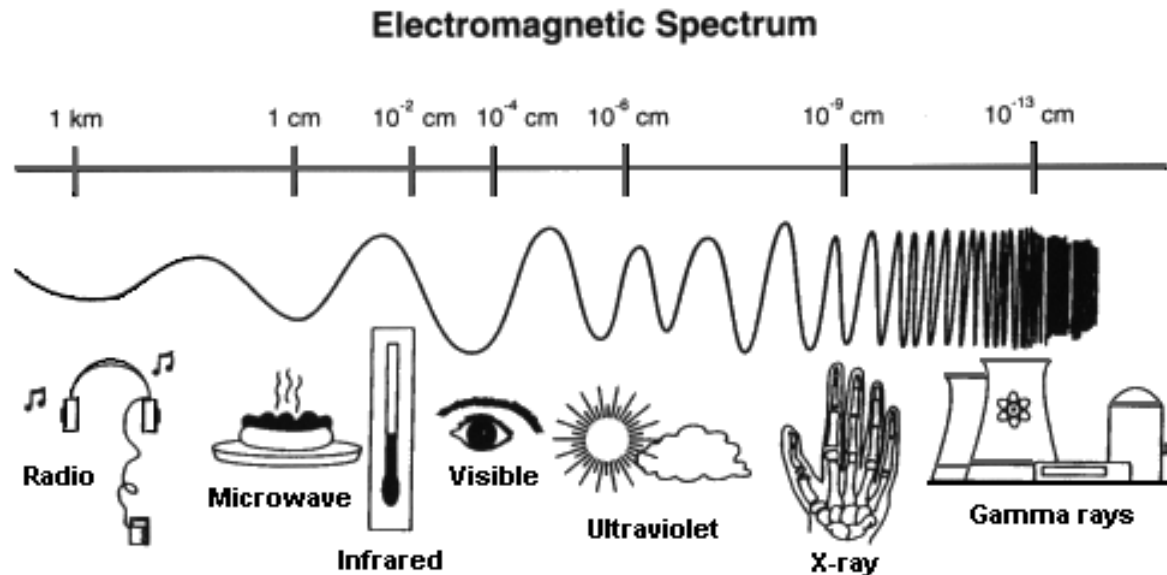


How do rainbows form?

Refraction of light



Solar Energy = radiant energy



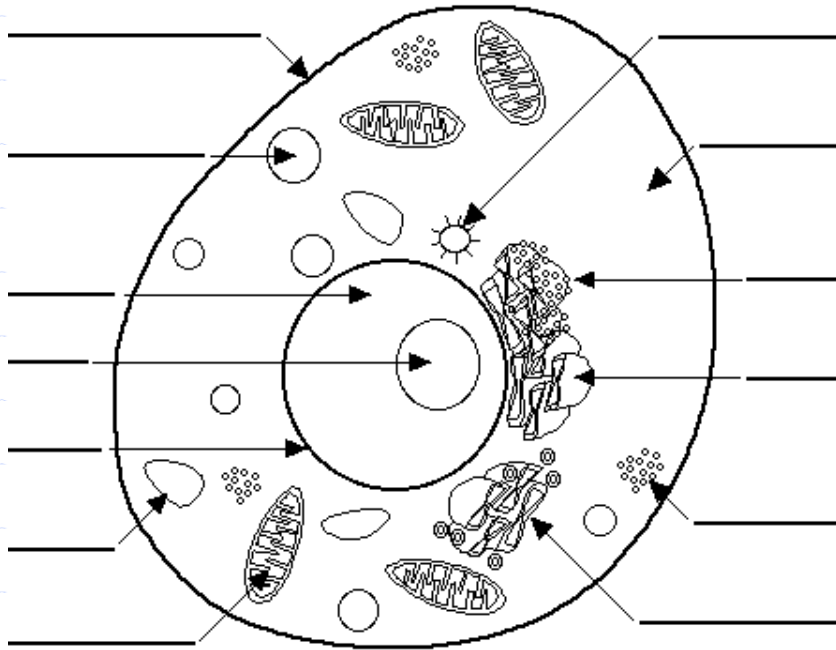
Focus:

Visible Light
UV radiation
Infrared

Electromagnetic spectrum

Stored Energy in Plants

Cross-Section of an Animal Cell

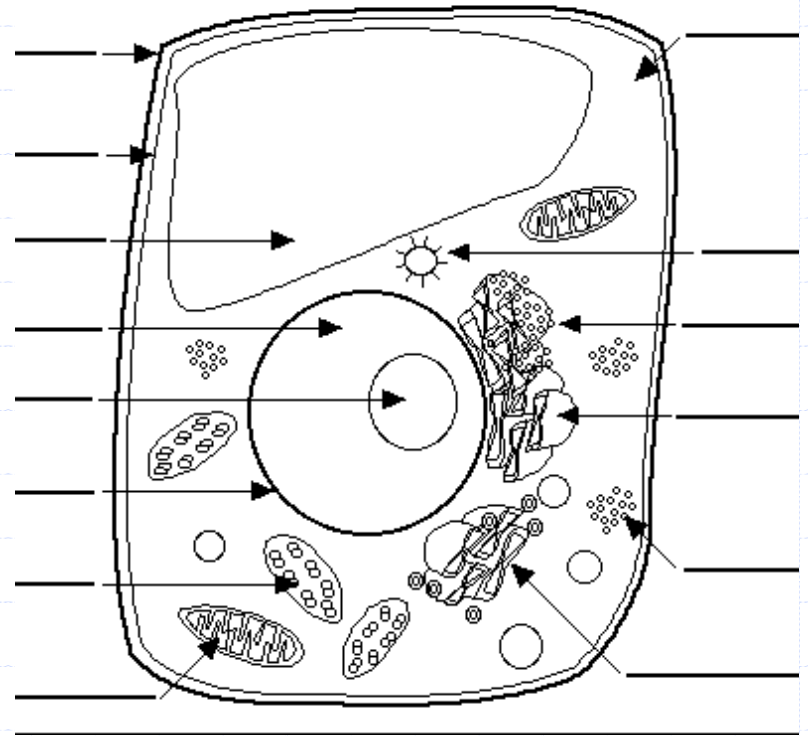


Compare – Contrast

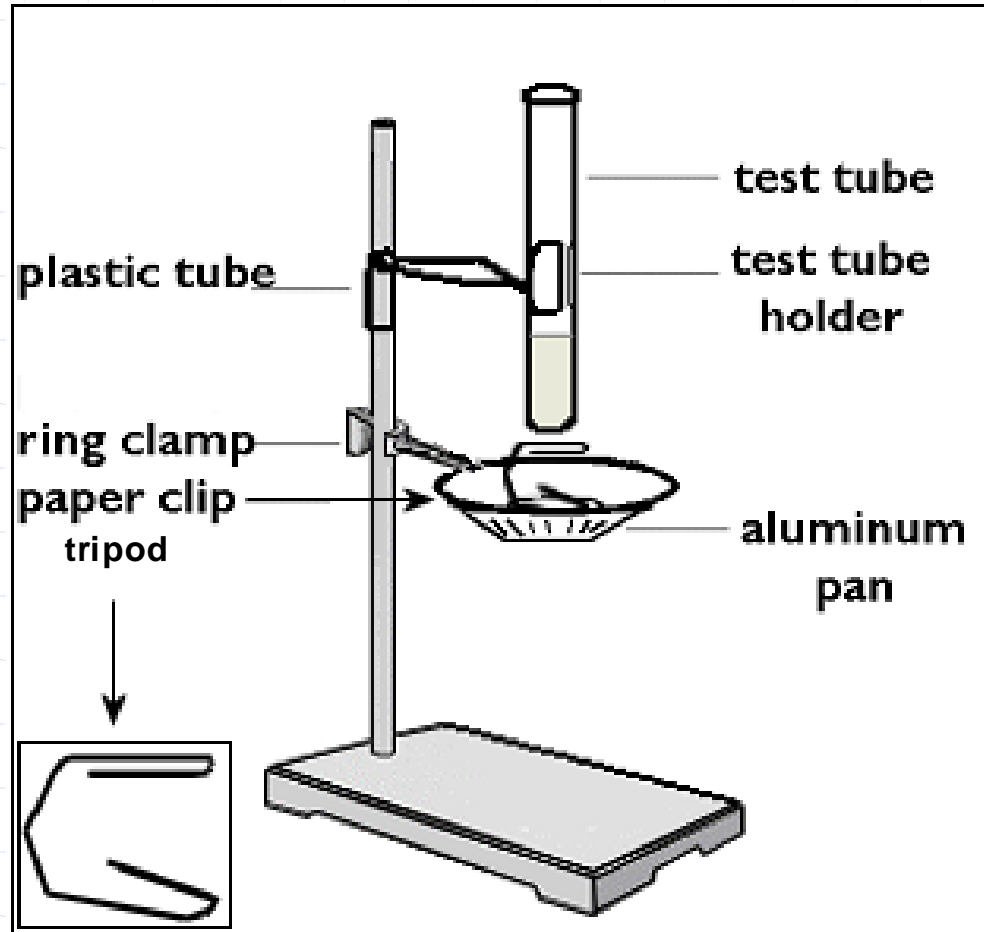
Photosynthesis

Chemical compound: Sugar

Cross-Section of a Plant Cell



Energy From Plants (heat value)



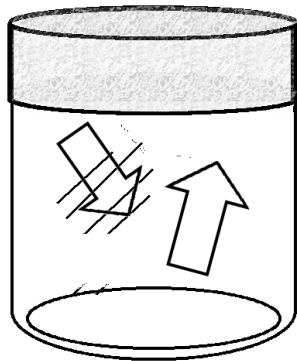
Heat Value and Density of Wood



Biomass as an energy source. From burning peanuts to burning wood.

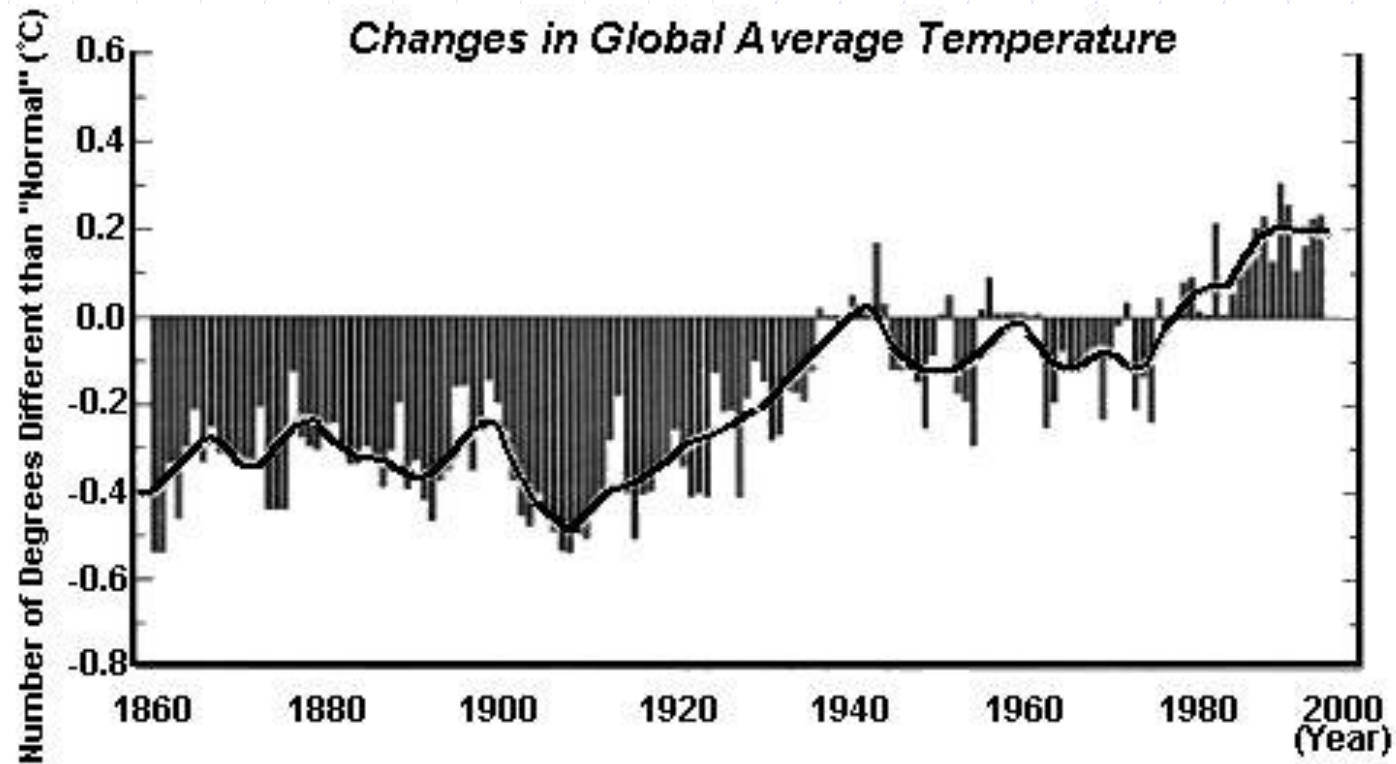
Heat Energy

We use it. We produce it. Energy is almost always one of the products of energy transfer.

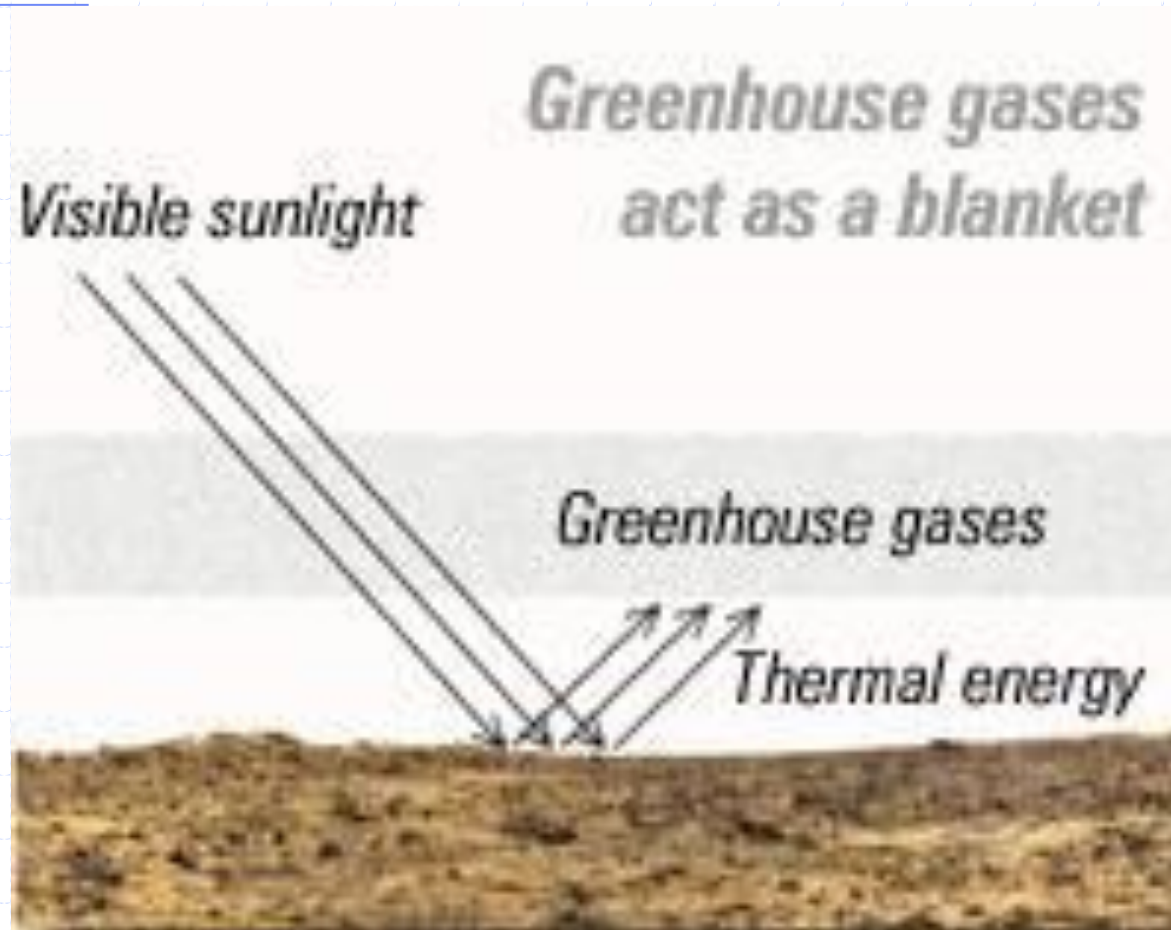


Heat energy keeps the Earth warm.

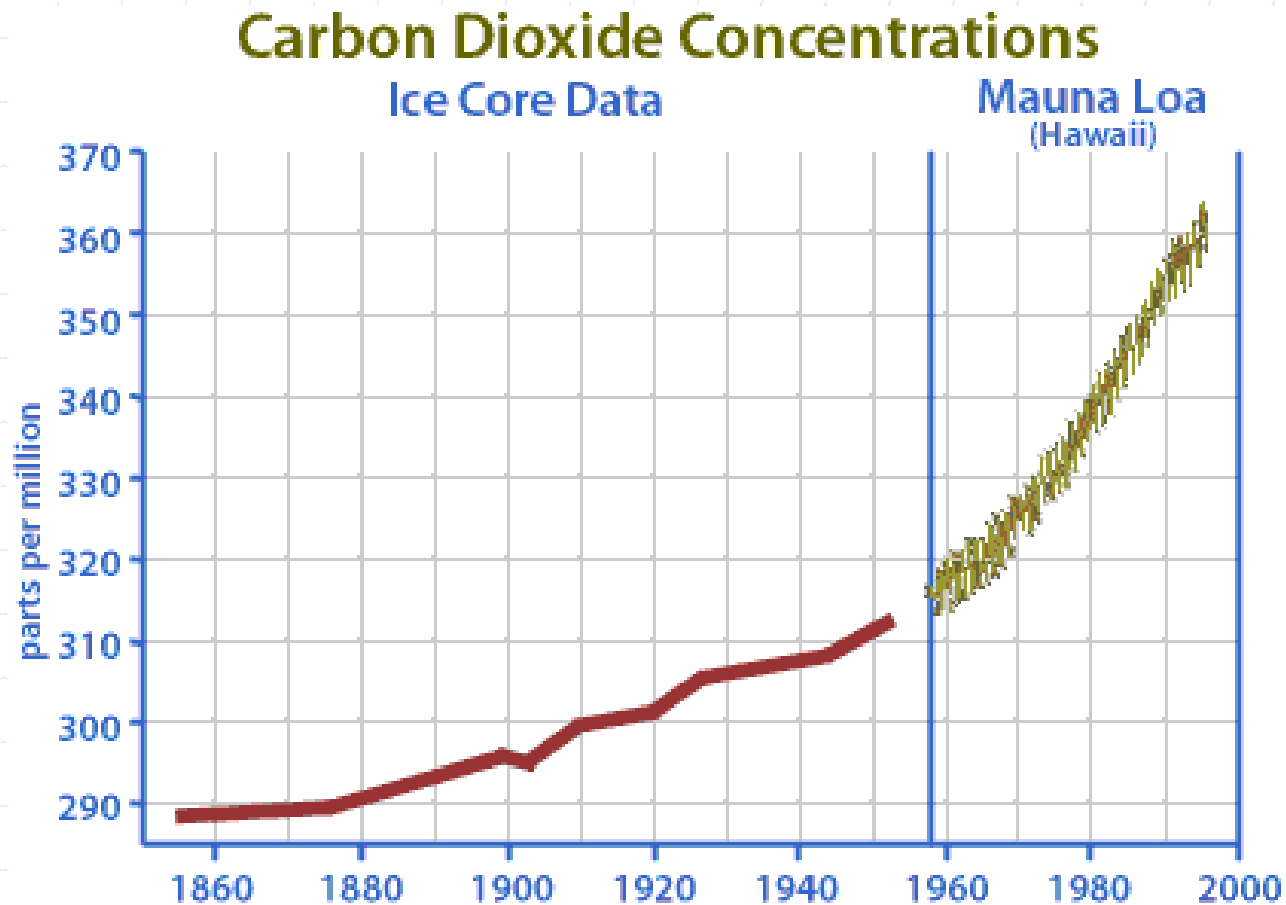
Global Warming?



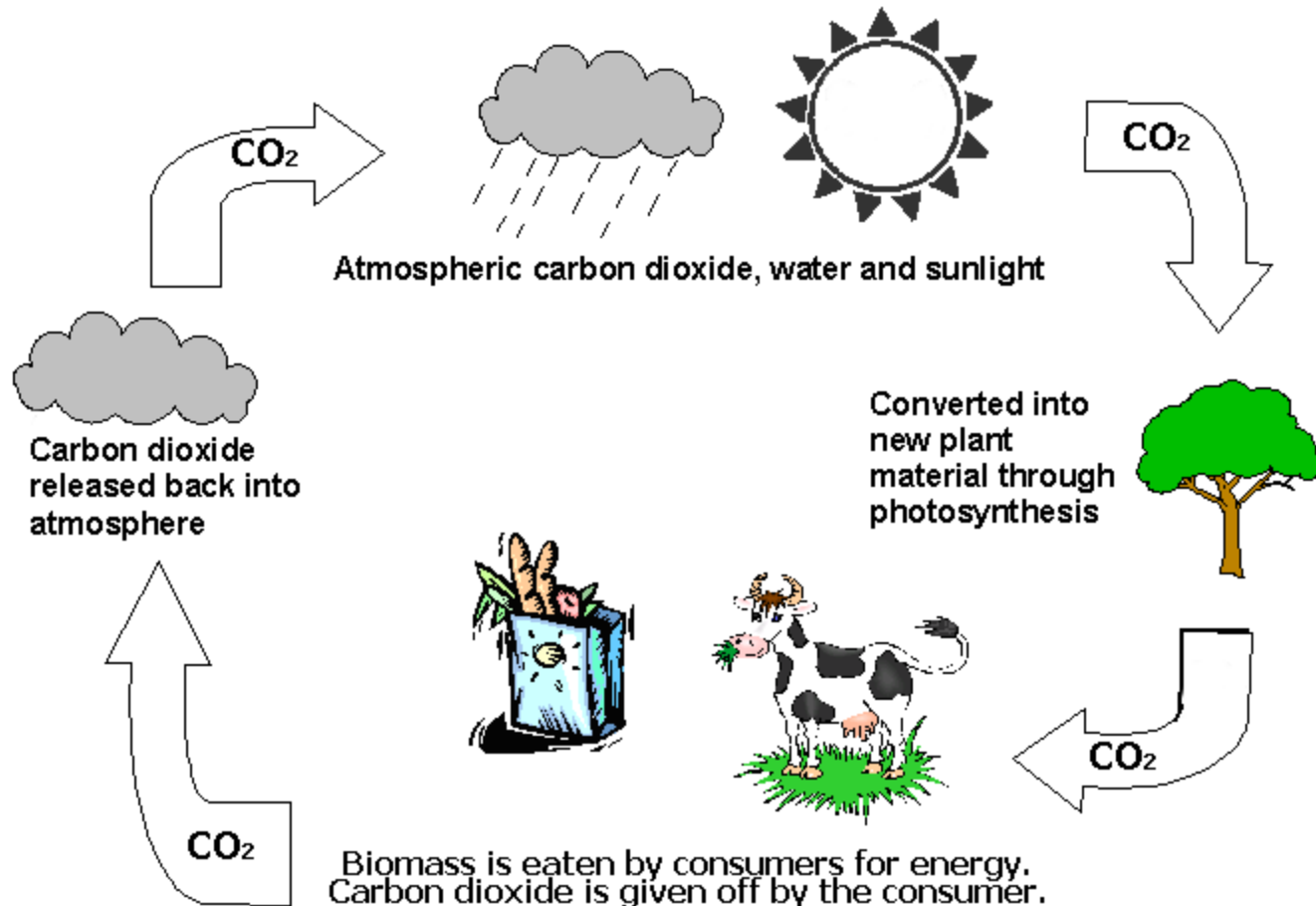
Greenhouse Effect



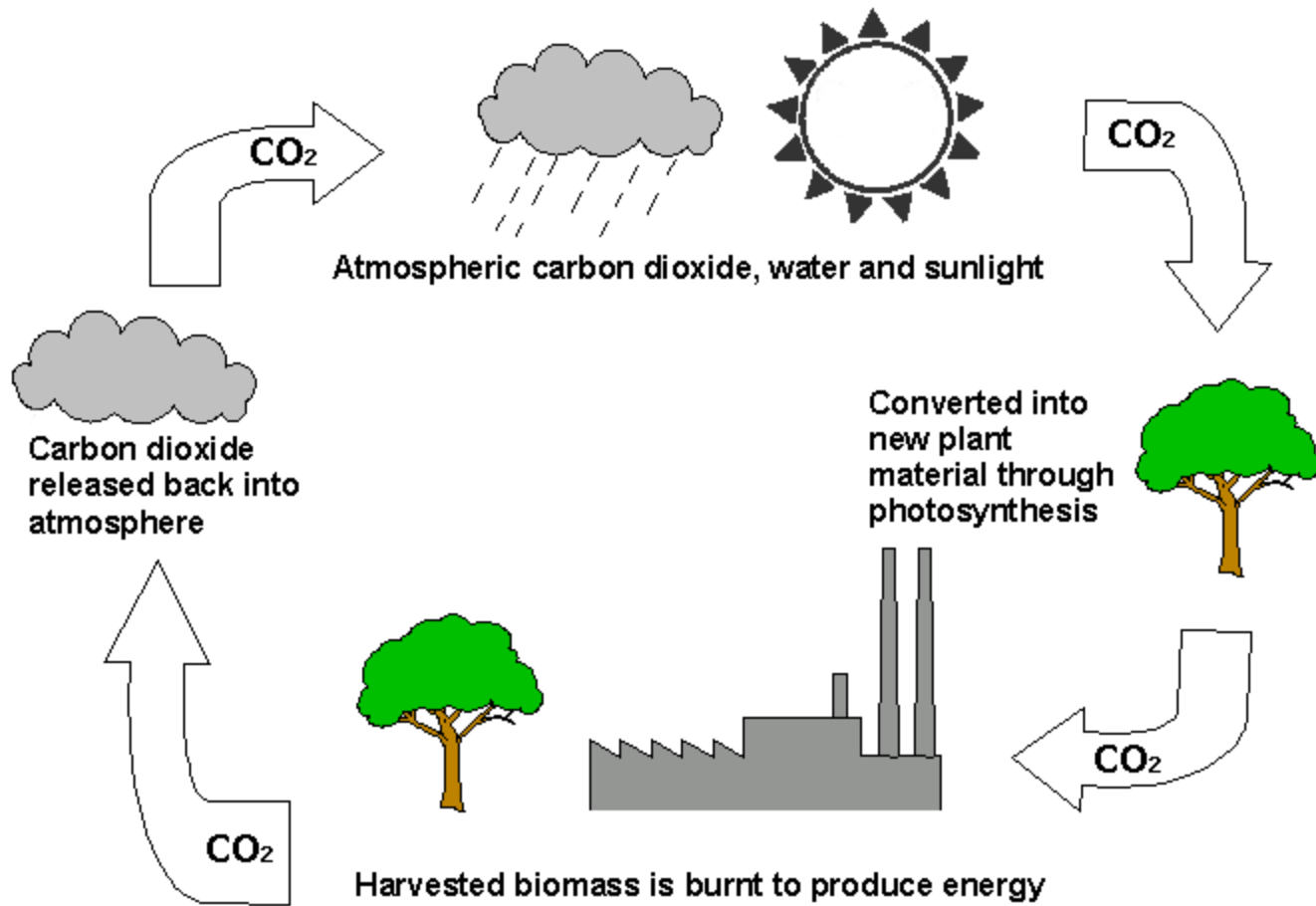
Greenhouse Gases



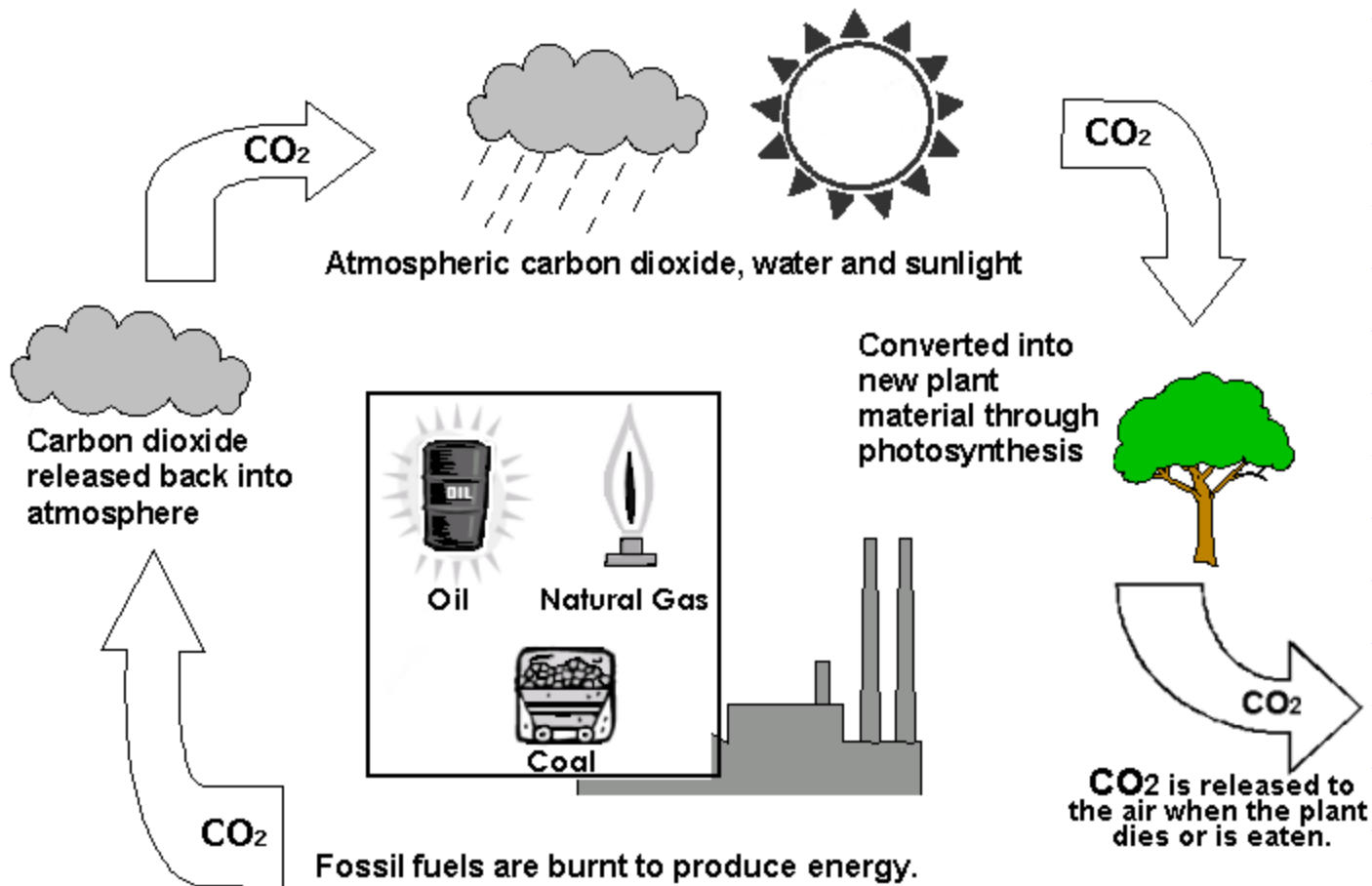
Carbon Dioxide Cycle



Biomass as a Energy Source

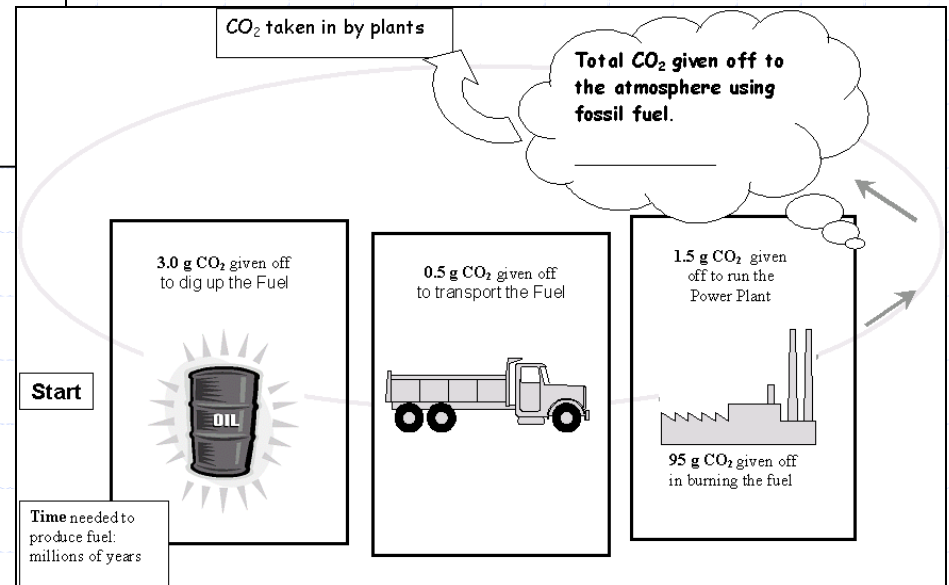
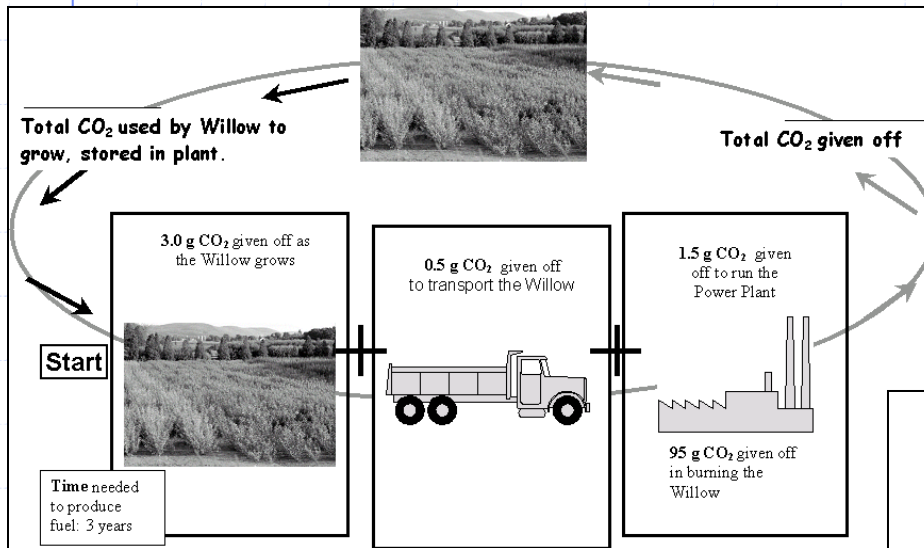


Fossil Fuels as an Energy Source



Winning Ways of Willow

Paper lab activity:



ESF Biomass Project: Willow

www.esf.edu/willow

