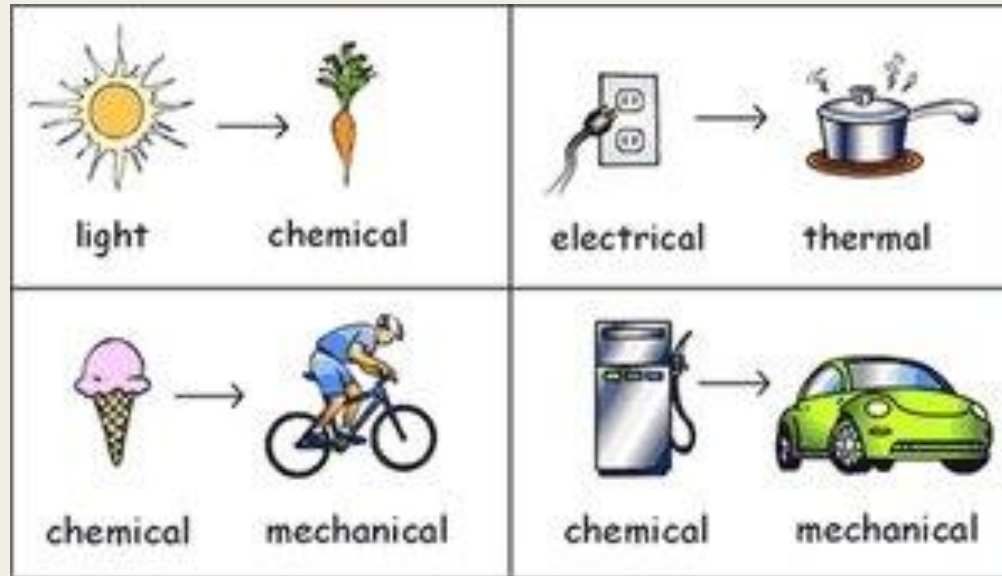


Energy Transformations



TEKS: 6.9 C demonstrate energy transformations such as energy in a flashlight battery changes from chemical energy to electrical energy to light energy

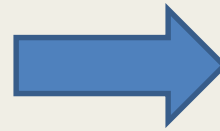
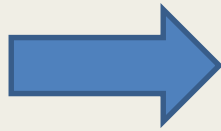
So if transform means to “change” ...

- Energy can be changed from **one type to another**. For example, as water falls over a waterfall, its gravitational potential energy is first transformed into kinetic energy



Law of Conservation of Energy

- The law states: **Energy cannot be created nor destroyed.**
- **What does this mean?** It means that energy can only change its form from one type to another. The energy of the world is a constant **because the total amount of the energy does not change.**
- For example: Let's look at a flashlight. It runs on batteries. The battery has chemical energy. When the flashlight is turned on, the chemical energy is first transformed into electrical energy and then into light energy.



Forms of Energy are:

Chemical

Electrical

Radiant

Mechanical

Thermal

Nuclear



Radiant Energy



Chemical Energy



Thermal Energy

electrical



mechanical



nuclear

Chemical Energy

- Energy **STORED** in matter because of its **CHEMICAL bonds**. It is released during a chemical reaction (change).
- Examples:
 - Battery
 - Digestion
 - Burning Wood/Fuel



Electrical Energy

- Energy in the form of electricity, that is caused by flowing electrons (negatively charged particles).



- Examples:
 - To light a bulb
 - Turn a motor
 - Run a hairdryer



Radiant or light Energy

- Type of energy **from the sun. Energy carried by ELECTROMAGNETIC RADIATION.**
- Radiant=LIGHT (but it Isn't always visible)
- Examples:
 - Visible Light/Sunlight (What you see)
 - X-Rays (invisible)
 - Microwaves (invisible)
 - UV Light (invisible)



Mechanical Energy

- Energy of matter caused by its POSITION or MOTION.
- Examples:
 - Moving Cars
 - Wind
 - Waterfalls
 - Running
 - Sound



Thermal Energy

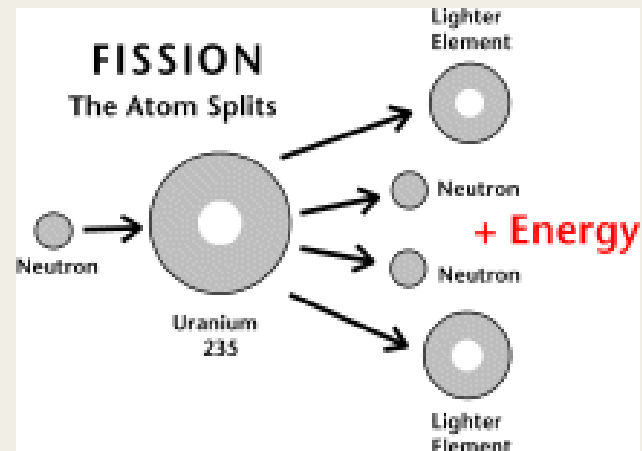
- The energy of heat, which **transfers from hotter objects to colder objects**. Energy comes from **the motion of atoms and molecules**. The *faster* the particles in an object move, the *more* thermal energy is produced.
- Examples:
 - Heating food
 - Drying clothes
 - Heat from a hairdryer











Nuclear Energy

- Energy that is released when the nuclei of atoms are split (fission) or combined (fusion).
- Huh? Ok, think of it like this: When two cars crash, it makes a lot of noise and parts flying everywhere. When you “smash” two atoms together, there are parts of the atom flying off as well as energy.

Example: Nuclear Power Plant



Examples of energy transformations and their uses:

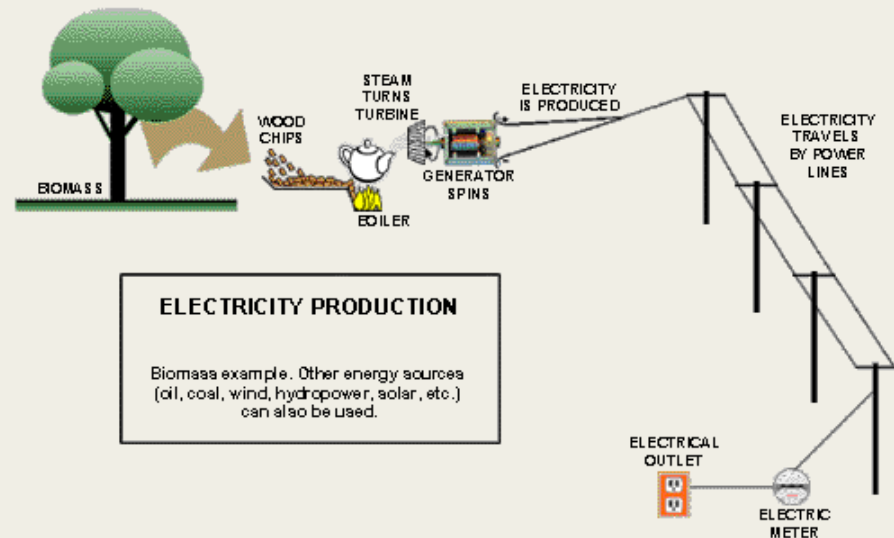
	A television changes electrical energy into sound and light energy.
	A toaster changes electrical energy into thermal energy and light.
	A car changes chemical energy from fuel into thermal energy and mechanical energy.
	A flashlight changes chemical energy from batteries into light energy.
	When you speak into your telephone, sound energy from your voice is changed into electrical energy. The electrical energy is then converted back into sound energy on another phone, allowing someone to hear you.
	Light energy is converted into electrical energy using solar panels.
	Campfires convert chemical energy stored in wood into thermal energy, which is useful for cooking food and staying warm.
	Nuclear energy generates a tremendous amount of thermal energy, which can be converted into electrical energy in a nuclear power plant.

Natural Energy Transformations

Sunlight (radiant) converts to chemical energy in plants through the process of photosynthesis

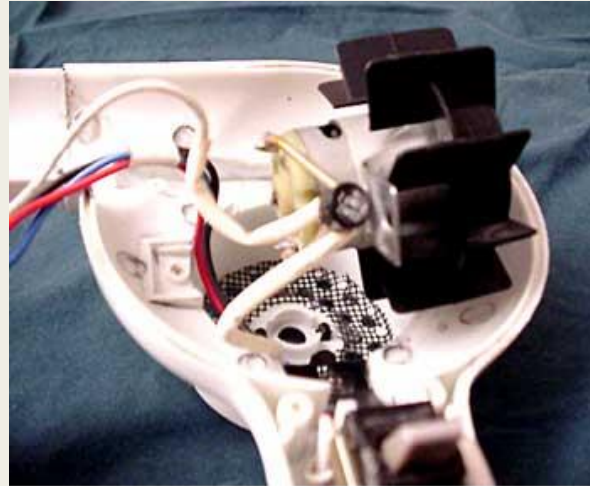


Trees then use this chemical energy to grow. And we can use this energy as biomass!!



Energy transformations can be multi-stepped (called energy chains):

- A hairdryer: electrical → mechanical → thermal



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- A flashlight: chemical → electrical → radiant

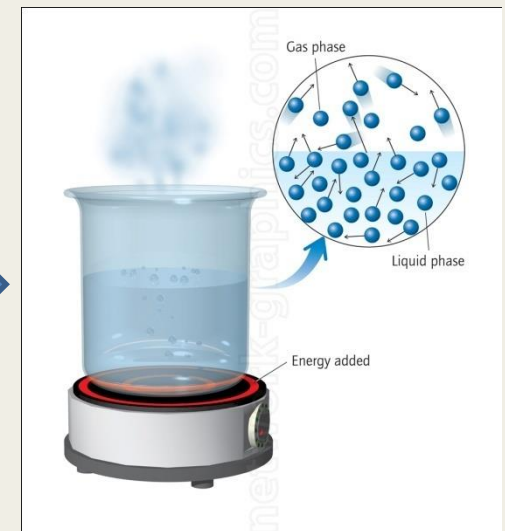
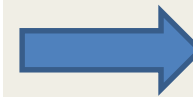
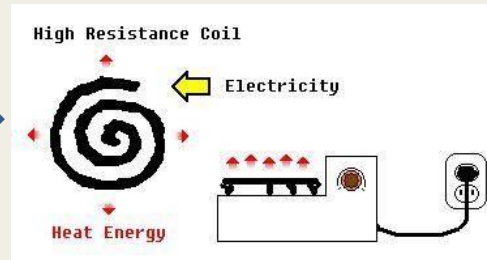
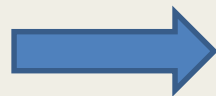


Hot plate



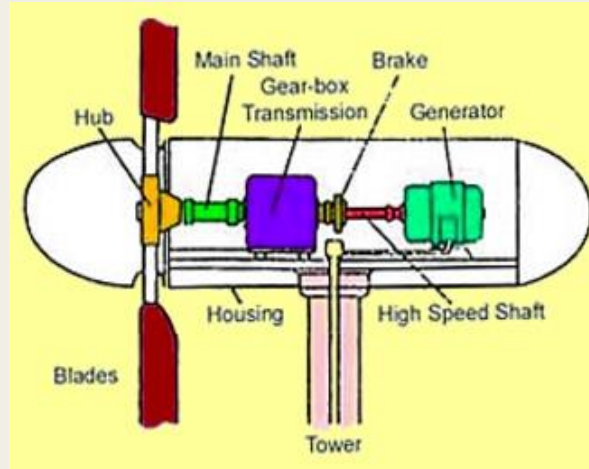
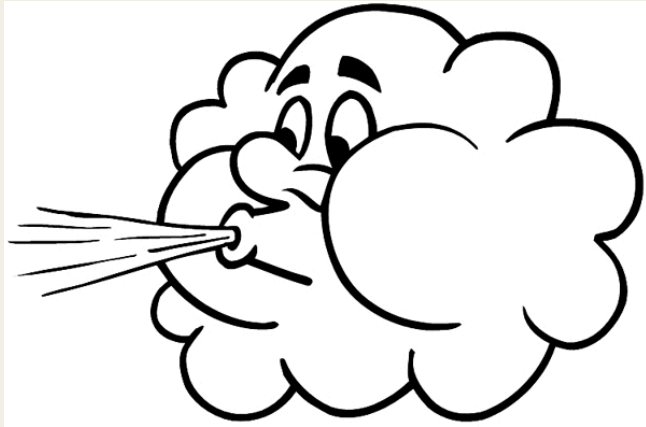
A hot plate transforms electrical energy into heat (thermal energy). This energy is then transferred to the object on it (a beaker usually) by conduction.

The energy transformation is:



Wind Turbine (with light bulb)

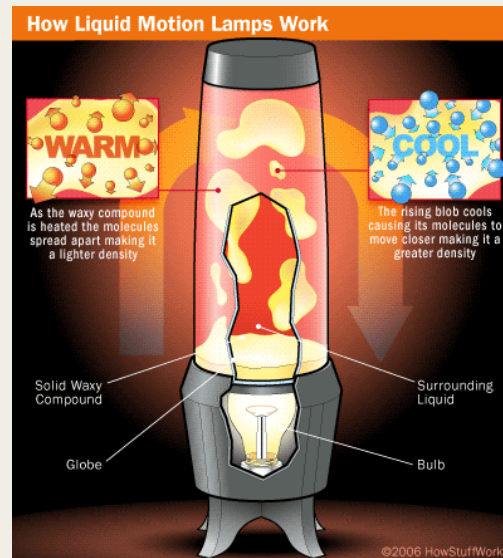
- Energy transformation is:



Wind(mechanical) → turbine spins(mechanical)
→ electrical → radiant

Lava lamp

- Lava lamps are made of two liquids, colored wax in colored water. The light bulb heats up and the liquids change densities as they warm up. As heated liquid cools, it falls back down. It is re-heated by the bulb and the cycle continues.



- electrical → radiant and thermal → convection

Can you light a light bulb?







Here is your group's challenge!

There are various supplies for each group. Use these to light the light bulb – the more creative, the better!

Once you have a CREATIVE and successful design, sketch it at the bottom of your notes.

Transfer of Energy sort

- Each group gets a set of energy cards, match as best you can and then we will check them.

Electrical to heat and light (thermal/radiant)	Electrical to thermal	Chemical to thermal/ radiant		Mechanical to chemical	Chemical to mechanical	Nuclear to radiant and thermal
Energy from a lightning bolt 	Energy to iron your clothes 	Energy that melts a candle 		Energy you get from eating food 	Energy gasoline provides the car 	Energy from atoms combining in the sun 
Electrical to thermal	Mechanical to thermal	Chemical or electrical to thermal		Mechanical to mechanical	Chemical to mechanical	Chemical to mechanical