

# SOLAR ENERGY

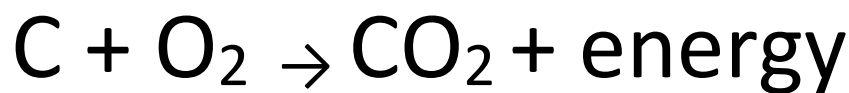
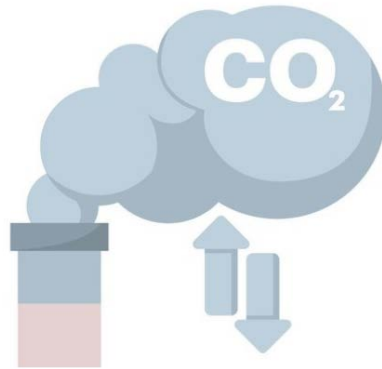


## DIRECT ENERGY FROM THE SUN

## INDIRECT FORMS OF ENERGY PRODUCED BY THE DIRECT INPUT

- ⚙️ **Wind:** wind blows because the sun unevenly heats different areas of our atmosphere due to the earth's rotation and difference in surface areas
- ⚙️ **Falling and flowing water:** hydropower is the result of rain and rain is the result of evaporation of water caused by the sun's energy
- ⚙️ **Biomass:** solar energy converted to chemical energy in trees and other plants

# BURNING OF CARBON-CONTAINING COMPOUNDS



When coal (which is mostly **carbon, or C**) burns completely, it combines with **oxygen gas (O<sub>2</sub>)** from the atmosphere to form the gaseous compound **carbon dioxide (CO<sub>2</sub>)**. In this case, energy is given off, making coal a useful fuel.

**BUT BURNING OF COAL AND  
CARBON-CONTAINING  
COMPOUNDS  
ADDS CARBON DIOXIDE GAS  
TO THE ATMOSPHERE**

COAL  
WOOD  
NATURAL GAS  
OIL  
PETROL / GASOLINE

**The higher the concentration of carbon dioxide in the atmosphere, the warmer the average temperature near the earth's surface.**

# THE LAW OF CONSERVATION OF MATTER



Materials are taken from the earth

Materials are carried to another part of the globe

Materials are processed into products

Products are used

and then

discarded

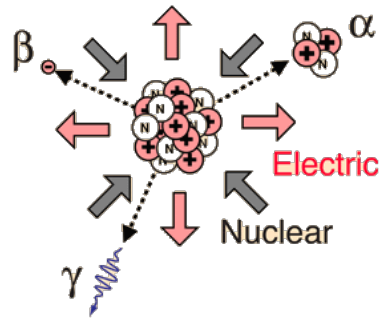
reused

recycled

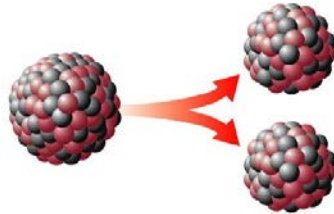
Everything we think we have thrown away is still here with us in one form or another. Input control can considerably reduce the amount of wastes we add to the environment.

# NUCLEAR CHANGE

## 1. Natural Radioactivity



## 2. Nuclear Fission: Splitting Nuclei



## 3. Nuclear Fusion: Forcing Nuclei to Combine



# FIRST AND SECOND LAWS OF THERMODYNAMICS



**1<sup>ST</sup> LAW:** energy can neither be created nor destroyed, only altered in form

*We can never get more energy out of an energy transformation process than we put in. Energy input always equals energy output. We can't get something for nothing; nor can we get nothing out of something in terms of energy quantity.*

**2<sup>ND</sup> LAW:** energy can be changed in only one direction – from usable to unusable, or from ordered to disordered

*In any conversion of energy from one form to another, some of the initial energy input is always degraded to lower-quality, less-useful energy, usually low-temperature heat that flows into the environment. We can never recycle or reuse high-quality energy to perform useful work.*

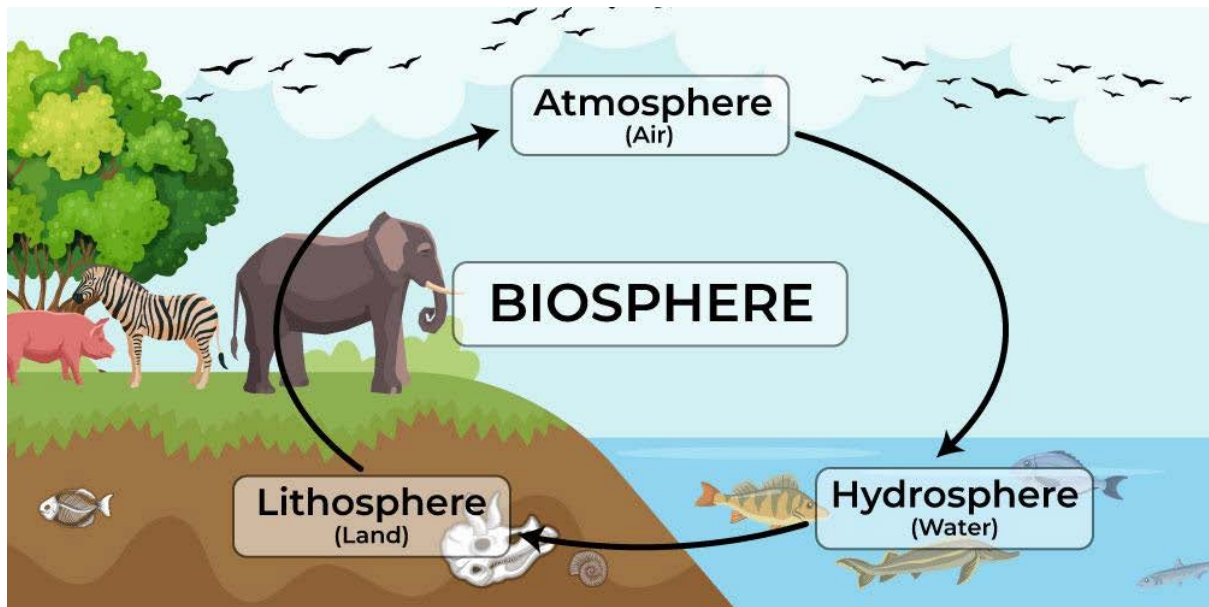
# ENERGY EFFICIENCY



We can **cut much of the energy waste** and **save money** by **increasing energy efficiency**. This is the percentage of total energy input that does useful work and is not converted to low quality, essentially useless heat in an energy conversion system.

**Example: Energy-efficient LED light bulbs are able to produce the same amount of light as incandescent light bulbs by using 75 to 80 percent less electricity.**

# BIOSPHERE & ECOSPHERE



**THE BIOSPHERE** - the living and dead organisms found near the earth's surface in parts of the atmosphere, hydrosphere, and lithosphere.

These living and dead organisms interacting with one another and their nonliving environment throughout the world is called **THE ECOSPHERE**.

