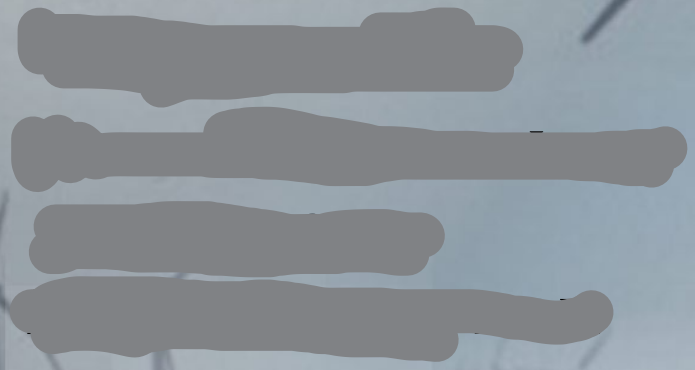
Basic Scheme and Application of Energy Conservation



ENERGY

- Energy can neither be created nor it can be destroyed. It can only be converted from one form to another.

- **For example :**

- In a room heater, electrical energy is converted to thermal energy.
- Turbine converts mechanical energy stored in steam to electrical energy.

TYPES OF ENERGY

➢ **Energy can be broadly divided into two categories-**

- Renewable energy

- Non-renewable energy

RENEWABLE ENERGY

- Renewable energy can be generated continuously practically without decay of source.
- **Example :**

- Solar
- Wind
- Geothermal
- Hydro
- Biomass
- Tidal

SOLAR ENERGY

- Solar Energy can be converted into electrical energy by using solar panels.
- Solar powered electrical generation depands on heat engines and photovoltaic's.

SOLAR CELLS

- **Examples :**
- Solar cooker
- Solar heater
- Solar cells

SOLAR HEATER

- **Advantages :**
- Solar energy doesn’t produce Carbon dioxide.
- It have minimal impact on environment.
- **Disadvantages :**
- It is not constant, it depends on weather conditions, time and location.

WIND ENERGY

- Wind energy generated by wind turbines is mainly used to generate electricity. India is world's fifth largest producer of electricity generation in this area.

- **Advantages :**

- Wind turbines (often called windmills) do not release emissions that pollute the air or water.

- **Disadvantages :**

- Installation and maintenance cost is very high.
- Only few places are there in world where wind blow continuously throughout the year.

GEOTHERMAL ENERGY

- Geothermal energy is heat from within the Earth. We can recover this heat as steam or hot water and use it to heat buildings or generate electricity.

- **Examples :**

- Hot springs
- Fumaroles (smoke)
- Geysers

- **Advantages :**

- Carbon dioxide emission levels are very low. They release less than 1% of the carbon dioxide.

- **Disadvantages :**

- Installation cost is very high.
- Release various kind of harmful gases.

HYDRO ENERGY

- Hydro energy is generally generated from running water using various mechanical methods.

- **Examples:**

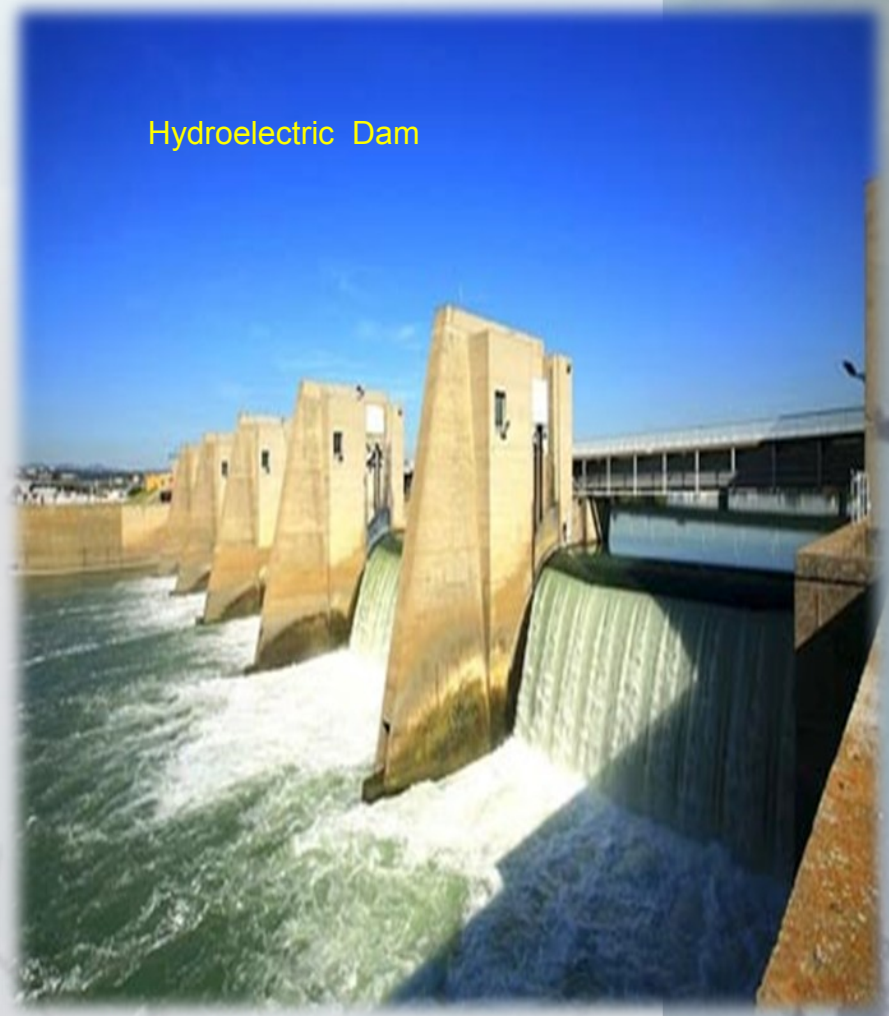
- Dams
- Tidal Barrages
- Ocean Thermal Energy Conversion (OTEC) system

- **Advantages :**

- Produces very less amount of carbon dioxide.
- It is also being used to control flood and for irrigation purposes.

- **Disadvantages:**

- Natural environment is destroyed.



BIOMASS ENERGY

- Biomass is organic material made from plants and animals waste. (microorganisms).
- When it is burned, the chemical energy in biomass is released as heat .
- **Examples :**

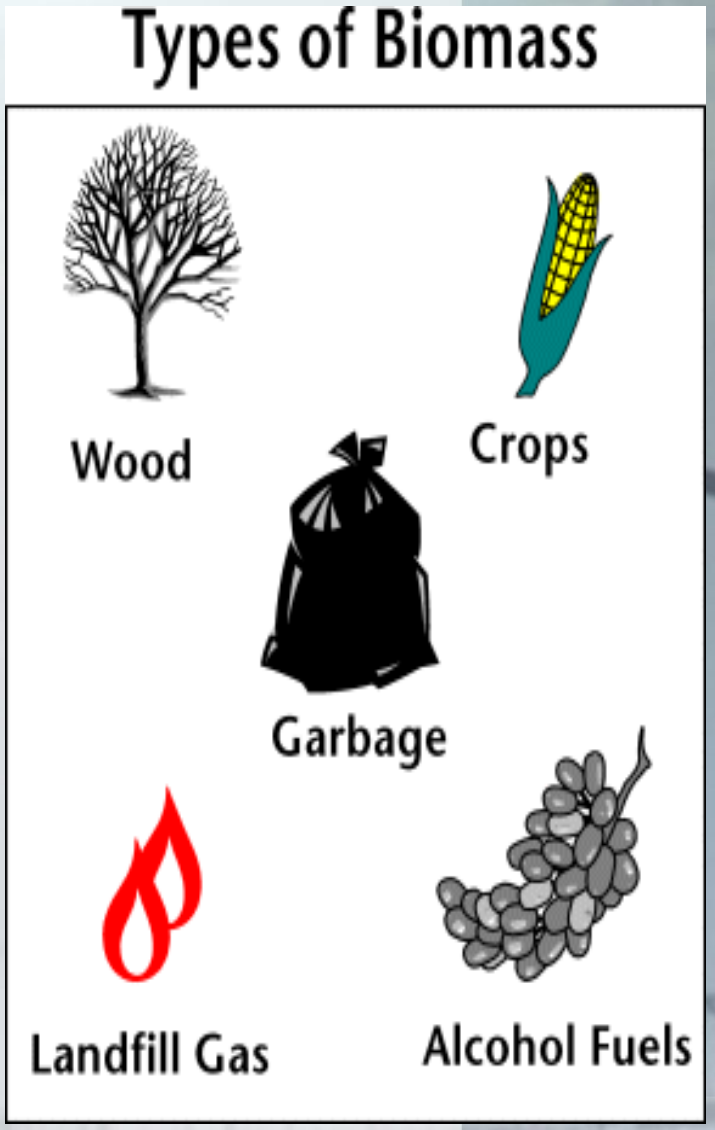
- Methanol (from animal waste)
- Ethanol
- Biodiesel(liquid biomass)

- **Advantages :**

- Equipment (biogas plant) installation cost is less.
- Helps in garbage reduction.

- **Disadvantages :**

- Releases high amount of *sulphurous* gases.



TIDAL ENERGY

- The energy contained in ocean waves can potentially provide an unlimited source of renewable energy.
- Ocean waves are created by the interaction of wind with the surface of the sea.

Advantages :

- It doesn't produce greenhouse gases and its life is very long.
- It's efficiency is around 80%.It doesn't require any kind of fuel to run.

Disadvantages :

- Cost of construction of tidal power plant is high.

Sea-Gen tidal turbine, installed in Strangford Lough, County Down, Northern Ireland, (image courtesy of Marine Current Turbines (MCT))

NON-RENEWABLE ENERGY

- Non renewable energy can’t be generated again and again form the same source.

- **Examples:**

- Petroleum products (kerosene, petrol, diesel, etc)
- Coal
- Uranium

COAL

- Coal is a combustible black or brownish-black sedimentary rock composed mostly of carbon and hydrocarbons.
- For millions of years, a layer of dead plants at the bottom of the swamps was covered by layers of water and dirt, trapping the energy of the dead plants.
- The heat and pressure from the top layers helped the plant remains turn into what we today call coal .

- **Disadvantages :**

- Responsible for 57% of carbon dioxide in the air.

URANIUM

- Nuclear energy is energy in the nucleus (core) of an uranium-235 atom. Atoms are tiny particles that make up every object in the universe.
- It can be released from atoms in two ways: nuclear fusion and nuclear fission.

Advantages :

- Even a small amount can release enough energy to light-up thousand of energy for months. (1 kg uranium-235 corresponds to 2.7 million kg coal equivalent.)

Disadvantages :

- After using it in nuclear reactor then also it radioactive substances is very dangerous for human . Eg : carbonyl accident and fukushima plant accident.

DIFFERENCE BETWEEN RENEWABLE AND NON-RENEWABLE SOURCE OF ENERGY

➢RENEWABLE SOURCE

- Definition : Renewable energy can be generated continuously practically without decay of source.
- Responsible for 3-4% of carbon dioxide in environment.
- Not a reason behind "global warming".

➢NON-RENEWABLE SOURCE

- Definition : Non-renewable can't be generated continuously without decay of source.
- Responsible for 91-94% of carbon dioxide in environment.
- Main reason behind "global warming".

ENERGY CONSERVATION

- Energy conservation refers to efforts made to reduce energy consumption.
- Energy conservation can be achieved through increased efficient energy use or reduced consumption from non-renewable energy sources.
- Energy conservation is often the most economical solution to energy shortages.

WHY TO CONSERVE ?

- We have limited fuels available on earth.
- Our demand for energy is increasing day-by-day.
- It is possible that someday, most of fuels will be exhausted , and we will have to switch to alternate energy.

ENERGY CONSERVATION IN 'INDIA'

- In India , government has passed " energy conservation bill, 2001 " for better utilization of energy and conservation of the same.
- By this act, it is mandatory for energy intensive sectors to get their "energy audit " conducted by energy auditor.
- Bureau of energy efficiency : this body keeps watch on energy consumption patterns, develops norm for appliances etc.
- Star ratings : BEE has also initiated "star rating system" for electrical appliances e.g. - CFL'S , geysers, refrigerator, etc.

DATA RELATED TO ENERGY CONSUMPTION IN 'INDIA'

- About 70% of India's energy generation capacity is from fossil fuels, with coal accounting for 40% of India's total energy consumption followed by crude oil and natural gas at 24% and 6% respectively.

- By 2030, India's dependence on energy imports is expected to exceed 53% of the country's total energy consumption. In 2009-10, the country imported 159.26 million tonnes of crude oil which amount to 80% of its domestic crude oil consumption .

- In India 31% of the country's total imports are oil imports.

What we can do ?

- Always switch off light and fans while going out of room.
- We should not open fridge frequently.
- While going to purchase new products eg. Geysers, television, CFL, etc. insist for ratings ranging from 4-5 .
- Increase everyone's understanding of the benefits of energy efficiency.

What we can do ?

- **RECYCLE** waste materials into new products to prevent waste of potentially useful materials.

- **REPLACE** old light bulbs with energy saving fluorescent bulbs. They may cost more, but will save you much more in the long run.

❑RECYCLING IS AN EXCELLENT WAY OF SAVING ENERGY AND CONSERVING THE ENVIRONMENT.

Do you know that:

- 1 recycled tin would save enough energy to power a television for 3 hours.
- 1 recycled glass bottle would save enough energy to power a computer for 25 minutes.
- 1 recycled plastic bottle would save enough energy to power a 60-watt light bulb for 3 hours.
- 70% less energy is required to recycle paper compared with making it from raw materials.


RECYCLE
REDUCE
REUSE

THREE R's

- The slogan *reduce, reuse, recycle* is widely used to raise awareness against the use of non-renewable source of energy.

- Reduce consumption
- Reuse manufactured products
- Recycle raw materials

SAVE ENERGY, SAVE EARTH