

Chapter 14 - Sources of Energy

❖ Characteristics of a good fuel:

- (i) High calorific value
- (ii) Less smoke
- (iii) Less residue after burning
- (iv) Easy availability
- (v) Inexpensive
- (vi) Easy to store and transport

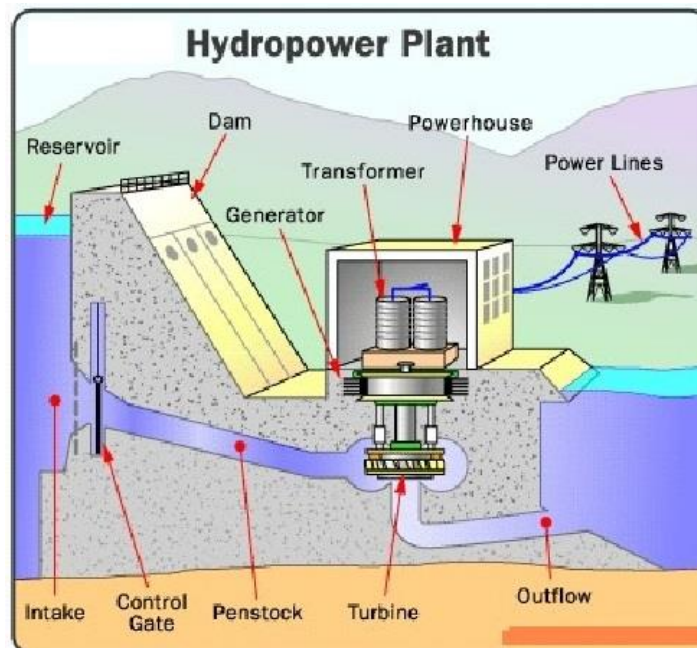
❖ Fossil fuels:

Were formed millions of years ago, when plants and animal remains got buried under the earth and were subjected to high temperature and pressure conditions. E.g.: Coal, Petroleum, etc. These fossil fuels are non-renewable sources of energy and cause environmental problems due to pollution.

❖ Thermal power plants:

- (i) Use coal, petroleum and natural gas to produce thermal electricity.
- (ii) Electricity transmission is very efficient.
- (iii) The steam produced by burning the fossil fuels runs the turbine to produce electricity

❖ Hydro power plant:



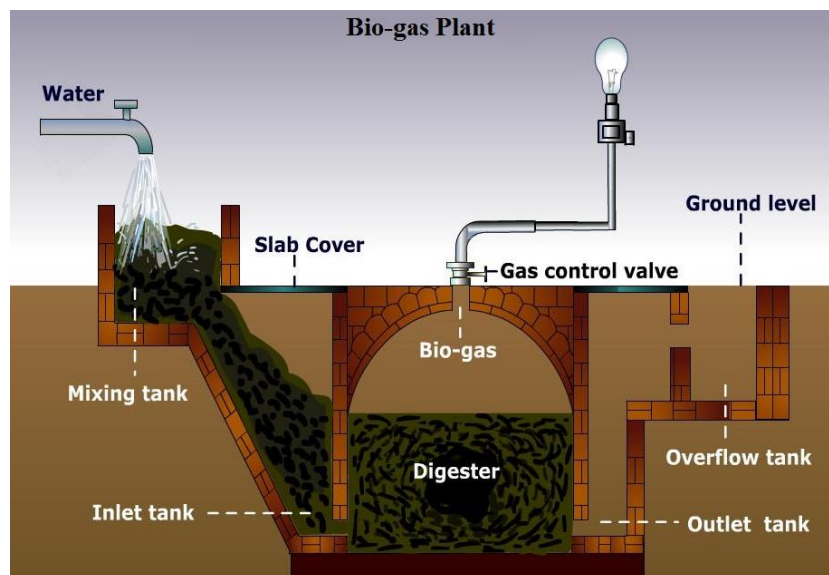
- (i) It is the most conventional renewable energy source obtained from water falling from a great height.
- (ii) It is clean & nonpolluting source of energy.
- (iii) Dams are constructed to collect water flowing in high altitude rivers. The stored water has a lot of potential energy.
- (iv) When water is allowed to fall from a height, potential energy to kinetic energy, which rotates the turbines to produce electricity.

❖ Disadvantages of Hydro power plant:

- (i) Highly expensive to construct.
- (ii) Dams cannot be constructed on all river sites.
- (iii) Large areas of human habitation and agricultural fields get submerged.
- (iv) People face social and environmental problems.

❖ Non-conventional sources:

(1) Bio Mass:



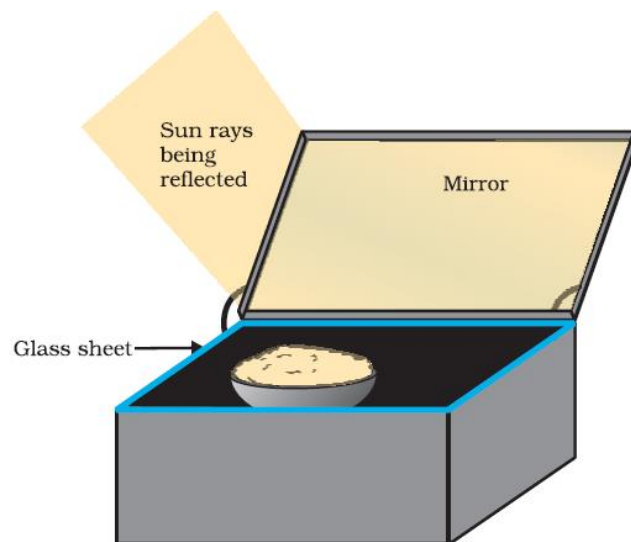
- It is the source of the conventionally used fuels that are used in our country. E.g.: Cow dung cakes, fire-wood, coal, charcoal
- Bio gas: It is a mixture of gases produced during decomposition of bio mass in the absence of Oxygen. (Anaerobic Respiration). Methane is the major component of bio gas.
- Bio gas plants: Animal dung, sewage, crop residues, vegetable wastes, poultry droppings, etc. are used to produce Bio gas in Bio gas plants.

(2) Wind Energy:



- It can be converted into mechanical and electrical energy.
- Kinetic energy of the wind is used in running of wind mills, which are used to lift water, grind grains, etc.
- Advantages:
 - (i) Eco friendly
 - (ii) Renewable
- Disadvantages:
 - (i) Wind speed not uniform always.
 - (ii) Needs a large area to erect series of wind mills.
 - (iii) Big amount of investment is needed.
 - (iv) Output is less as compared to investment

(3) Solar Energy:



- Solar radiations can be converted electricity through solar cells (photovoltaic cells).
- Photovoltaic cells convert solar radiations directly into electricity through silicon solar cells.
- Solar cells arrange on a large flat sheets form a solar panel.
- Solar cookers are painted black from outside and a large glass plate to trap solar radiations by green house effect.
- Advantage of Solar cookers:
 - (i) Eco friendly
 - (ii) Renewable
 - (iii) Used in rural areas.
 - (iv) Retains all the nutrients in food due to slow cooking.
- Disadvantages of solar cooker:
 - (i) Silicon cells are expensive.
 - (ii) Solar radiations are not uniform over earth's surface.
 - (iii) Cannot be used at night or on cloudy days.
 - (iv) Cannot be used to make chapattis for frying as these require a temperature of 140°C or more.
(Maximum temperature of 100°C only can be achieved in a solar cooker)
- Other solar devices- Solar water heater, Solar furnace

(4) Geo Thermal Energy:

- (i) Energy harnessed from the heat of the sun is called Geo thermal energy.
- (ii) Magma is formed when this heat melts the rocks. The molten rocks and hot gases are called magma
- (iii) The magma gets collected at some depths below the earth's surfaces. These places are called "Hot spots"
- (iv) When underground water comes in contact these hot spots, it changes into steam, which can be used to generate electricity.
 - Advantages of Geo thermal energy:
 - (i) Renewable
 - (ii) Inexpensive
 - Disadvantages of Geo thermal energy:
 - (i) Only few sites available for harnessing energy.
 - (ii) Expensive

(5) Nuclear Energy:

- (i) Energy released when some changes take place in the nucleus of the atom of a substance, is called Nuclear energy.
- (ii) It is used for heat generation, fuel for marine vessels.

- **Advantages of Nuclear Energy:**
 - (i) Alternative source of energy due to depletion of fossil fuels.
 - (ii) From a small amount of fuel, a large amount of energy is released.
- **Disadvantages of Nuclear Energy:**
 - (i) Risk of nuclear waste leakage
 - (ii) High cost of setting up of nuclear plant
 - (iii) Pollution of environment.

(6) Energy from the sea-

- Tidal Energy: Locations in India – Gulf of Kutch, Gujrat & W. Bengal
 - (i) Depends upon harnessing the rise and fall of sea level due to tidal action.
 - (ii) Dams are constructed across a narrow part of sea and turbine converts tidal energy into electrical energy.
- Disadvantages: Uniform tidal action is not seen
- Wave Energy:
 - (i) Kinetic energy of the waves of sea are used to rotate turbines.
 - (ii) These turbines generate electrical energy