

Board – CBSE

Class – 10th

Topic – Source of Energy

1 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

2 Fossil fuels:

Fossil fuels were formed millions of years ago when plants and animal remains were buried under the earth and 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.

3 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

4 Hydropower plant:

- (i) It is the most conventional renewable energy source obtained from water falling from a great height.
- (ii) It is a clean & non-polluting 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 changes to kinetic energy, which rotates the turbines to produce electricity.

5 Disadvantages of Hydropower 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.

6 Non-conventional sources:

(A) Biomass:

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

(B) Wind energy:

- It can be converted into mechanical and electrical energy.
- The wind's kinetic energy is used in running windmills, which lift water, grind grains, etc.
- Windmill

Advantages:

- (i) Eco friendly
- (ii) Renewable

Disadvantages:

- (i) Wind speed is not uniform always.
- (ii) Needs a large area to erect a series of windmills.
- (iii) Big amount of investment is needed.
- (iv) Output is less as compared to investment

(C) 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 large flat sheets form a solar panel.
- Solar cookers are painted black from the outside and a large glass plate to trap solar radiation by the greenhouse effect.

Advantages of Solar cookers:

- (i) Eco friendly
- (ii) Renewable
- (ii) Used in rural areas.
- (iv) Retains all the nutrients in food due to slow cooking.

Disadvantages of solar cookers:

- (i) Silicon cells are expensive.
- (ii) Solar radiations are not uniform over the earth's surface.
- (ii) Cannot be used at night or on cloudy days.
- (iv) Cannot be used to make chapattis for frying as these require a temperature of 1400°C or more.

(Maximum temperature of 1000°C only can be achieved in a solar cooker)

- Other solar devices- Solar water heater, Solar furnace.

(D) Geothermal energy:

- Energy harnessed from the heat of the sun is called Geothermal energy.
- Magma is formed when this heat melts the rocks. The molten rocks and hot gases are called magma
- The magma gets collected at some depths below the earth's surface. These places are called Hot spots
- When underground water comes in contact with these hot spots, it changes into steam, which can generate electricity.

Advantages of Geothermal energy:

- (i) Renewable
- (ii) Inexpensive

Disadvantages of Geothermal energy:

- (i) Only a few sites are available for harnessing energy.
- (ii) Expensive

(E) Nuclear energy:

- The energy released when some changes occur in the nucleus of the atom of a substance is called Nuclear energy.
- It is used for heat generation, fuel for marine vessels.

Advantages of Nuclear energy:

- (i) An alternative source of energy due to the 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
- (ii) Pollution of environment.

(F) Energy from the sea:

- (a) Tidal energy: Locations in India - Gulf of Kutch, Gujarat & 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 the sea, and turbine converts tidal energy into electrical energy.

Disadvantages: Uniform tidal action is not seen

- (b) Wave energy:
 - (i) The kinetic energy of the waves of the sea is used to rotate turbines.
 - (ii) These turbines generate electrical energy.