

NON-CONVENTIONAL SOURCES OF ENERGY

Those sources which have been developed in the recent past as an alternative to conventional sources of energy. These renewable, inexhaustible, non-polluting, less expensive and easy to maintain.

Ex: - Solar Energy, Wind Energy, Tidal Energy.



SOLAR ENERGY:

India is lucky to receive high amount of solar energy due to location on Tropic's. The per hour unit solar per km² solar energy is 5 to 7 kW.

GENERATION OF SOLAR ENERGY

i) **Solar Cells** - Photovoltaic cells are made of semiconductors they can convert solar energy into electricity. It is used in calculators, watches, street light, water pumps.



ii) **Solar Cooker** - It is a device that absorbs solar energy and cooks raw food.



iii) **Solar Water Heater** - A device which heats water and store it for use.



ADVANTAGES:

- i) It is renewable source of energy,
- ii) It can be put to many use such as produce electricity,



distill water, power the satellites.

iii) It is easy to maintain.

iv) It saves fossil fuels, reduces e bill and pollution.

WIND ENERGY:

Difference in heating causes differences in pressure which in turns results in wind. Movement of air from H.P. to LP is Wind.

GENERATION OF WIND ENERGY

The wind energy is obtained by making use of wind mills. The blades of windmill move by force of wind. These moving blades drives a of machines like number water pumps, flour mills and electric generators.

A number of windmills installed in a definite pattern in cluster is called **wind farm**. Largest wind farm in India - Nagarcoil to Madurai in Tamil Nadu.

ADVANTAGES:

i) It is renewable source of energy.

ii) It is cleanest source of energy.

iii) It reduces our dependence on fossil fuels.

iv) Provide additional source of income.

TIDAL ENERGY

The term 'tide' is used for the periodic rise and fall of waters of the ocean and produced by the attraction of the Moon and the Sun. This rise and fall of water produces a large amount of energy called tidal energy.



GENERATION OF TIDAL ENERGY

The tidal energy can be harnessed by constructing a tidal barrage. During high tide, the sea-water flows into the reservoir of the barrage and turns the turbine, which in turn produces electricity by rotating the generators. The reverse process takes place during the low tide, when the sea level is low, the sea water stored in the barrage reservoir flows out in the sea. During the process, the flowing water turns the turbines. There are only a few sites in the world where tidal energy can be suitably harnessed. In India, the prospective sites for exploitation of tidal energy are Gulf of Kutch, Cambay and Sunderbans. Other suitable sites are near Lakshadweep Islands and Andaman and Nicobar Islands.

ADVANTAGES

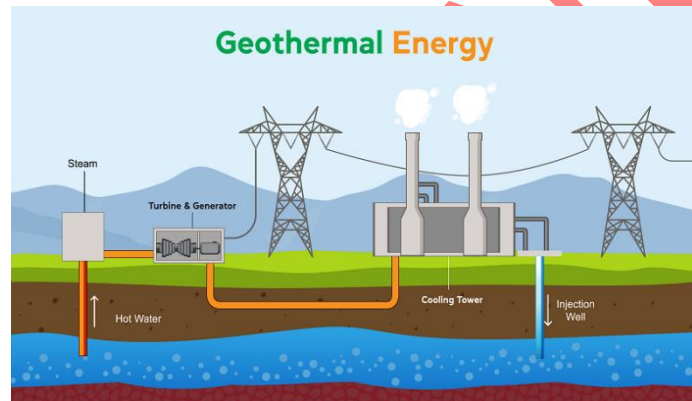
- (i) Massive amounts of water in the oceans move in extremely predictable patterns. This makes it easy to harness the tidal energy.
- (ii) Tides are controlled by the gravitational pull between the earth, sun, and moon. This means that as long as the earth is being orbited by the moon, the tides will continue to be there producing energy and tidal energy is an inexhaustible source of energy.
- (iii) After the initial construction costs, there are very few additional costs to keep the tidal energy plant running. They require little maintenance and minimal personnel as well.

(iv) Tidal energy can be produced even if the water moves at low speed.

(v) There are no carbon emissions from tidal energy plant, making it an energy source that does not negatively affect the global environment.

GEOTHERMAL ENERGY

Geothermal energy is the heat energy contained in the rock and fluid that fills the fractures and pores within the rock in the earth's crust. It is clean and sustainable.



GENERATION OF GEOTHERMAL ENERGY

Resources of geothermal energy range from the shallow ground to steam, hot water and hot rock accessed by drilling wells up to thousands of feet beneath the earth's surface. The extremely high temperatures in the deeper geothermal reservoirs. are used for the generation of electricity. The high-pressure steam spins a turbine that rotates a generator and produces electricity,

Hot water is pumped from deep underground through a well under high pressure. When the water reaches the surface, the pressure is dropped, which causes the water to turn into steam. The steam spins a turbine, which is connected to a generator that produces electricity. The steam cools off in a cooling tower and condenses back to water. The cooled water is pumped back into the Earth to begin the process again.

ADVANTAGES

The general characteristics of geothermal energy that make it of significant importance for both electricity production and direct use include:

- It is easily accessible because of its extensive distribution.
- It is environment-friendly in nature; has low emission of sulphur, carbon dioxide and other Greenhouse Gases.
- It is independent of external supply and demand effects and fluctuations in exchange rates.
- It is independent of weather and season.

DISTRIBUTION

India has about 12,000 MW of geothermal power potential that can be harnessed for various purposes. In India, geothermal plants are located in Manikaran in Himachal Pradesh and Puga Valley in Ladakh.

The surface temperature of the hot springs ranges from 35°C to as much as 98°C. These hot springs have been grouped together and termed as different geothermal provinces. Different regions are - Himalayan geothermal province, Naga-Lushai geothermal province, Andaman-Nicobar Islands geothermal province and Cambay graben, Son-Narmada-Tapti graben, West coast, Damodar valley, Mahanadi valley, Godavari valley.

NUCLEAR POWER

Nuclear power is obtained from energy stored in the nuclei of atoms of naturally occurring radioactive elements like Uranium, Thorium and Plutonium.



GENERATION OF NUCLEAR ENERGY:

When atoms of these radioactive substances react, they split apart. This process of splitting of atoms is called nuclear fission.

DISTRIBUTION:

Nuclear power is the fourth-largest source of electricity in India after thermal. Uranium and Thorium, which are available in Jharkhand and the Aravali ranges of Rajasthan are used for generating atomic or nuclear power. The Monazite sands of Kerala is also rich in Thorium.

Advantages:

- 1) Nuclear energy reduces the amount of energy generated from fossil fuels and reduces the use of fossil fuels and lowers Greenhouse Gas emissions.
- 2) It saves on raw materials but also in transport, handling and extraction of nuclear fuel.
- 3) It reduces the price volatility of other fuels such as petrol.

Disadvantages:

- 1) Remains of Nuclear is highly polluting.
- 2) Leakage of Nuclear material, it will lead to disaster.

BIOGAS:

Biogas is composed of methane, carbon dioxide, hydrogen and hydrogen sulphide. It is produced by anaerobic degradation of animal and plant wastes in the presence of water. The residue left behind in the tank is rich in nutrients and can be used as manure. The plants which use cattle dung are called 'Gobar Gas Plants'. They provide twin benefits to the farmers in the form of



energy and good quality manure. The gas is used for cooking, lighting and pumping water from wells.

GENERATION OF BIOGAS

A digester tank is placed underground. The digester tank receives the dung-water mixture through inlet pipe while the other side discharges the spent slurry through outlet pipe. In the digester tank, there is a gas outlet which is controlled by a pipe. Waste Recycling and Resources Recovery Programmes (WRRSE) are now being used from the organic plant waste and night soil. This helps in improving the sanitary conditions in our cities and villages. The plants generate enriched organic manure useful for supplementing chemical fertilisers.

Advantages:

- 1) Biogas is a clean, non-polluting and cheap.
- 2) There is direct supply of gas from the plant. Therefore, there is no storage problem.
- 3) The sludge left behind is a rich fertiliser containing bacterial biomass.