SOURSES OF ENERGY

Energy does not exist naturally in the form which we can use. They are primary as well as secondary source of energy. Energy that earth's receives from the sun, in the form of heat & light, is the ultimate source of almost all our sources of energy.

Source of energy:- any system from where energy can be trapped is called a source of energy.

CONVENTIONAL/ NON-RENEWABLE SOURSE: - energy source which are used traditionally for many years and are deplete over a period of time are called conventional/ non-renewable sources.

e.g. - coal, petroleum, natural gas etc.

NON-CONVENTIONAL/ RENEWABLE SOURSE:- energy sources which do not deplete and are scarcely used by population are called non- conventional or renewable sources of energy.

e.g. - solar energy, Wind energy etc.

CHARECTERSTICS OF GOOD SOURCES OF ENERGY:-

1. Should be capable of providing adequate amount of energy.
2. Should be convenient to use & easy to store , handle & transport.
3. Should be capable of giving desired quantity at required rate steadily over a long period.
4. Should be easily accessible.
5. Should be economical.
6. Should release energy in mostly all forms in which the day-to-day requirement exists.

FORMS OF ENERGY:

1. Muscular energy
2. Heat energy
3. Light energy
4. Chemical energy
5. Nuclear energy
6. Solar energy
7. Wind energy
8. Tidal energy
9. Geothermal energy
10. Ocean energy.

❖ Energy can neither be created nor destroyed, but can be transformed from one form to another.

FOSSIL FUEL: - the fuels which are obtained from the remains of plants & animals are called fossil fuel.

e.g. - coal, petroleum & natural gas.

The remains of plants and animals which got buried inside the earth million of years ago, changed into coal, petroleum & natural gas due to excess of heat & high pressure inside the earth.

These conditions don't exist anymore, so new reserves of these fuels are not being formed now.

Disadvantages of using fossil fuel:-

1. Burning of coal and petroleum lead to air pollution.

2. They cause acid rain by forming oxide of carbon, nitrogen & sulphur.
3. They cause global warming.

THERMAL POWER PLANT:- In thermal power plants large quantity of fossil fuels like coal is burnt to produce heat energy. This produces steam. This is used to rotate turbines to produce electricity.

HYDROELECTRICITY/ HYDRO-POWER PLANT:- the energy of water flowing through rivers or stored in dam is used to rotate the turbine and thus produce electricity.

Disadvantages:-

1. The construction of dams may lead to ecological imbalance.
2. A vast variety of animals, plants get submerged.
3. It decreases fertility of soil in down-stream area and affects crops.
4. Creates problem of satisfactory rehabilitation
5. Rotten, submerged vegetation produces greenhouse gas.

BIOMASS: - The material contained in the bodies of plants and animals is called biomass.

- ❖ The residue of sugarcane after extracting juice from them is used as fuel in industries.

BIOGAS:-is a mixture of gasses like Methane (75%), carbon dioxide, hydrogen, hydrogen sulphide etc. produced during decay of biomass in the absence of oxygen.

There are two designs of commonly used biogas plants-

1. Fixed dome type.
2. Floating doam type.

Advantages of biogas:-

1. Biogas is excellent fuel because it contains 75% of methane. It is used as fuel for domestic purposes, to run engines and as illuminant in villages.
2. It burns without smoke, therefore causes no pollution.
3. It does not involve storage problems because biogas is supplied through pipes.
4. It is used for production of electricity.
5. The slurry left behind in digester is a good manure because it is rich in plant nutrients i.e. nitrogenous and phosphorous compound.

SOLAR ENERGY: - Is energy from sun.

Nuclear fusion reaction of the deuterium is said to power the sun.

Solar Constant: - The amount of solar energy received per square meter per second on the surface of earth is called solar constant.

It is approximately equal to 1.4 kg/m2s (1.4kgm-2s-1)

Advantages of solar energy:-

1. Drying clothes is made easier by Infrared radiation of sun.
2. To obtain salt from seawater by evaporation.
3. To get rid of moisture content in food grains.
4. To prevent preserve fruits, vegetable, sea foods by sun drying.

Limitation:-

1. Energy reach in the surface is very much diffused and so the direct utility is limited.
2. It is not available uniformly all the times and at all the places.
3. It is not available in night.
4. Cloud formation may obstruct the reflection

- Solar energy can be used directly using solar cooker, electricity production using solar cell or indirectly i.e. biomass production, wind, tidal or hydro energy which are due to the difference in temperature at different levels.

Solar Cooker: - A solar cooker is a device which is used to cook food using solar energy.

Solar cell: - It is a device which converts solar energy i.e. light energy directly into electricity. They are made up of Silicon, Germanium, Selenium, Gallium (semi conductor).

Wind Energy: - The blowing wind has energy which is called wind energy. Wind is associated with K.E.

Wind is caused due to uneven heating of equatorial region and polar region of earth, Rotation of earth and local conditions.

- Denmark is known as country of winds.

Energy from ocean:-

Tidal energy: - The rise of ocean water due to attraction of moon is called high tides whereas fall of ocean water is called low tides. The tidal wave rise and fall twice a day. The enormous movement of water between high tides and low tides provides a very large source of energy in the coastal areas of the world Tidal energy can be harnessed by constructing tidal barrage or tidal dam. The sea water arisen during high tide trapped by the barrage is allowed to fall down on water turbines due to which they start rotating. The rotating water turbines drive generators which produce electricity.

SEA WAVES ENERGY: - Energy from oceans is also available in form of sea waves. Due to blowing of winds on the surface of ocean, very fast sea wave moves on its surface. It has lot of K.E. due to high speed. It can be used to produce electricity. Some specially designed devices are set up in the sea which moves as the sea-waves pass them. Their movement can be used to drive dynamos which generate electricity.

OCEAN THERMAL ENERGY: - There is always a temperature difference between water at the surface and at deeper level (at the depth of 2 km) up to 20 degree Centigrade.

The warm surface water is used to boil a volatile liquid like ammonia. The vapors of the liquid are then used to run the turbine of generator. The cold water from the depth of the ocean is pumped up and condense vapors again to liquid.

The energy potential from the sea is quite large, but efficient commercial exploitation is difficult.

GEOTHERMAL ENERGY:-

Due to geological changes, molten rocks formed in the deeper hot regions of earth's crust are pushed upward and trapped in certain regions called **hot spots**.

When underground water comes in contact with the hot spots stem is generated i.e. underground water gets converted into steam and remains trapped between rocks at high pressure. The steam taken out at high pressure can run turbine to generate electricity.

- In some places without any drilling, hot water with steam comes out. They are called a **hot springs**.
- Hot spots are seen at three places in India Madhya Pradesh, At Sohna Gurgaon and at Manikaran, kullu; but none of these are used to us on commercial basis.
- New Zealand & USA are two major areas where commercial use of geothermal energy is done.

NUCLEAR ENERGY:-

Nuclear energy is produced due to nuclear reaction in which nucleus of an atom undergoes a change due to which a new element is formed with release of tremendous amount of energy.

The nuclear reaction is not affected by temperature and pressure. It is of two types.

1. Nuclear fission reaction: -Discovered by Otto Hahn & Fritz Strassman. The nuclear reaction in which the heavy nucleus splits into lighter nuclei of smaller atomic number is called Nuclear fission

   $_{92}U^{235} + {}_{0}n^{1} \longrightarrow {}_{56}Ba^{141} + {}_{36}Kr^{92} + 3\ {}_{0}n^{1}$

2. Nuclear fusion reaction:- The nuclear reaction in which two or more lighter nuclei fuse come together to form a single heavier nucleus Is called nuclear fusion.

   H + H ----------> He + n + Energy

NUCLEAR REACTOR:- Nuclear reactor are designed for electric power generation based on controlled Nuclear fission reaction, during which a lot of energy is generated which can be used to produce steam and further generate electricity.

HAZARDS OF NUCLEAR POWER GENERATION:-

1. Nuclear wastes causes more harm than the pollution caused by fossil fuels due to continuous release of harmful radiations.
2. Nuclear accidents due to possible leakage are very much devastating.
3. Installation of a nuclear power plant is very costly.
4. Availability of uranium is limited.
