



Sources of Energy and Natural Resources

Energy is the capacity to do work. Without energy we cannot perform any activities. In our day to day life, we use energy from various sources for doing work.

There are mainly two categories of sources of energy:

- (1) Non-Renewable sources of energy
- (2) Renewable source of energy

Non-renewable Sources of Energy

Are those sources of energy which cannot be quickly replaced when exhausted For example, fossil fuels, petroleum, etc.

Fossil Fuel

It consists of mainly coal, petroleum and natural gas. It is a non-renewable source of energy. It takes millions of years for the formation of fossil fuels. It is formed deep under the earth from the remains of plants and animals. That's why fossil fuel should be wisely and carefully used. Fossil fuels have some disadvantages as well. It causes pollution to disturb the ecological balance of earth.

Nuclear Energy

The energy released during a nuclear reaction is called nuclear energy. This energy can be obtained during nuclear fission and fusion. During nuclear fission, the nucleus of a heavy atom such as uranium, plutonium or thorium is bombarded with low-energy neutrons. The nucleus can be split apart into lighter nuclei. In this process, a large amount of energy is released. During fusion, the two nuclei of light elements such as hydrogen combine to form a heavy nucleus such as helium. In this process a large amount of energy is produced. The nuclear energy can be used to produce electricity on a large scale. If this energy is used carefully and wisely then it can fulfil the requirement of energy needs. This energy has limitations as well. The major hazard of nuclear power generation is the storage and disposal of spent or used radioactive substances. The nuclear hazard can cause destruction on a large scale. It cannot only cause environmental contamination but also huge loss of life and property.

Renewable Sources of Energy

Are those which are inexhaustible and being produced continuously in nature. These sources of energy are also known as non-conventional sources of energy. For example, wind, tides, sun, etc.

Wind Energy

The air in the atmosphere that is in motion is called wind. The wind possesses kinetic energy. Wind turbines convert the kinetic energy in the wind into mechanical energy. Wind is caused by uneven heating of the atmosphere by the sun, variations in the earth's surface and rotation of earth. Wind turbines produce electricity by rotating propeller-like blades around a rotor.

Biomass

Biomass is a major source of energy. It is produced from the dung of animals, firewood, agricultural residues such as bagasse and crop stalks. The dead parts of plants, trees and the waste material of animals are called biomass.

The following are the various applications of biomass that are widely in use:

- ❖ Power generation
- ❖ Biomass gasification for thermal heating and power generation.
- ❖ Biogas generation for cooking

Solar Energy

Solar energy is one of the most important sources of energy. The continuous nuclear fusion reaction taking place inside the sun keep on liberating enormous amounts of heat and light energy.

Applications of solar energy

- ❖ Solar cooker is used for cooking food without producing any smoke.
- ❖ Solar cells are used for providing electricity in artificial satellites and space probes.
- ❖ Solar cells are used for the transmission of radio and television programs in remote areas.

Tidal Energy

Tidal energy is a renewable source of energy. The tidal activity takes place in the sea due to gravitational pull of the moon. The tidal forces produced by the moon and the sun, in combination with earth's rotation, are responsible for the generation of the tides. This energy is used to produce electricity. The movement of water during tides turns the turbines and thus produces electricity. There is a limitation of tidal energy. Only few parts of the sea experience the tide that can produce the energy.

Wave Energy

The wind that blows over the ocean causes waves. The incessant blowing of wind over the surface of the sea causes waves on a large scale. These waves consist of tremendous energy. This energy is extracted by wave power devices directly from the surface motion of ocean waves or from pressure fluctuations below the surface.

There is a limitation of wave energy. It is not found uniformly all over the world. Only some parts of the world have the potential to harness the energy from waves because high waves are found in these parts.

Geothermal Energy

The geological changes push the molten rocks upward. The rocks that are pushed upward get trapped somewhere in between. Underground water comes in contact with these molten rocks. When the molten rocks and underground water meet, they produce steam. Sometimes hot water from that region comes out on the surface of the earth and forms a hot spring. The steam trapped in rocks is taken out through a pipe to a turbine. Thus it helps in rotating the turbine and produces electricity.

Forest and Wild Life

Forest is one of the most important natural resources. It conserves soil, gives us oxygen, prevents flood, attracts rain, provides raw materials to industries and many valuable medicines to us. The most important thing is that it is the dwelling place of many animals as well as humans. Forest is one of the key factors that helps in maintaining the balance in ecological system. It is the good source of fodder for animals. Many animals that live in the forest help to maintain the food web and food chain and thus maintain the balance of life. Rapid industrialization and urbanization cause enough harm to the forests. There is a need to exploit this resource in a controlled way so that a sustainable development can be ensured.

Sustainable Forest Management

Sustainable forest management means ensuring that forests should be used to fulfill our present needs at the same time it should be available to fulfil the needs of future generations. In other words, we can say that forest management includes the administrative, legal, technical, economic, social and environmental aspects of the conservation and use of forests so that its loss can be prevented. It must ensure the safeguarding and-maintaining the forests to maintain the ecological balances.

Water for All

Water is the basic necessity for all forms of life. This resource is found in abundance on the earth. It is the renewable resource, but human intervention has changed the availability of water in various regions. The careless and unwise use of water has caused scarcity of this valuable resource. Many steps have been taken to ensure the water availability in various regions. Dam and water harvesting are such few steps in this regard.

Dams

Dams are the store house of water. They are useful to us in many ways. They ensure the storage of adequate water not only for the irrigation of crops but also for generating electricity. Water stored in dams can be supplied to distant places through canal systems. For example, the Indira Gandhi Canal that supplies water in the desert region of Rajasthan has brought greenery to many areas in this part.

Water harvesting

Rain Water Harvesting is the latest way of saving the valuable resources of water. During rain, water is stored on the ground or under the ground. The stored water is kept for future use. This method is very helpful to replenish the

underground water and prevents water scarcity. It is followed in both urban and rural areas. But it is not done on a large scale yet. A lot of work needs to be done in this regard.

Environmental Consequences

Environmental consequence of harnessing energy is a matter of great concern for all of us. Exploiting any source of energy disturbs the environment directly or indirectly. For example, extraction of energy, its processing, uses, etc. cause harm to the environment. Now a days CNG is widely used in the cities. We consider this fuel as a clean fuel. But excessive use of this fuel causes harm to the environment. So we can only say that a particular fuel is cleaner than other fuel not more than this. Fossil fuels cause air pollution.

Natural resources are our real treasure. They are available in abundance to fulfil our needs but not our greed. The careless and unwise use of natural resources has compelled us to think about the management of natural resources. The natural resources have been decreasing day by day. The loss of natural resources leads to environmental problem. The governments of various countries have made laws to protect the natural resources. But in reality these laws are ineffective.

The management of natural resources is required because resources are not unlimited. The increasing population, industrialization and urbanization put strain on these resources. Therefore, we need to use our resources carefully. Resources should be exploited in such a way so that it must not cause harm to the environment. The policy of sustainable development should be followed.