

12. Sources of Energy

- Energy is the ability to do work. It exists in different forms.
- Some of the energy sources can be replenished in a short period of time such sources are called “renewable sources” of energy.
- The sources of energy that can not be regenerated in a short period of time are called “non-renewable sources” of energy.
- Fossil fuels like coal, petroleum and natural gas are the examples of non-renewable sources of energy and Sun, windmill, hydroelectric generator, etc. are the example of renewable sources of energy.
- Energy can be obtained from atom (nuclear energy) and biomass as well.
- In addition to the renewability, there are other reasons why we should look to switching over to such sources, such as:
 - (a) To reduce pollutants, green house gases and toxins that are byproducts of non-renewable sources of energy.
 - (b) The use of alternative energy sources can help preserve the delicate ecological balance of the earth, and help conserve the non-renewable energy sources like fossil fuels; and
 - (c) Renewable sources are inexhaustible.
- All plants and animals get their energy from the Sun.
- Some of the advantages of using solar energy are:
 - (a) Use of solar energy causes no environmental pollution, because no chemical waste or toxic gases get released while using solar energy.
 - (b) solar energy can be used for practical purpose such as heating and lighting.
 - (c) The sun is an ever lasting source of energy which is freely available, and can be converted into electrical energy and put to many uses.
- Using the Sun as a source of energy has certain limitations. Solar power plants can not produce energy if the sun is not shining. During night time and cloudy days it is not possible to produce energy from Sun. Establishment of solar power stations is very expensive. Solar panels need to be regularly maintained and cleaned to continue generating electricity.
- Nuclear energy is non-renewable as the fuels are consumed in the fission reaction and hence are not replenishable. But it has many uses such as:
 - (i) Energy produced in a nuclear reactor can be harnessed to produce electricity.
 - (ii) Nuclear energy is also being used to power submarines and ship. Vessels driven by nuclear energy can sail for long periods without having to refuel.
 - (iii) Radio isotopes obtained as by products in nuclear reactions are used in medicine, agriculture and research.
- Geothermal energy is used for heating homes and for generating electricity without producing any harmful emissions. It has following advantages:
 - (i) Unlike most power stations, a geothermal power plant does not create any pollution. Harnessed correctly, it leads to no harmful byproducts.

- (ii) Geothermal power plants have very low running costs. Because they require energy to run a water pump. There is also no cost for purchasing, transporting, or cleaning up of fuels.
- (iii) Geothermal power plants are an excellent source of clean and inexpensive renewable energy.
- (iv) Geothermal energy can be used to produce electricity 24 hours a day.
- (v) Geothermal power plants are generally small and have little effect on the natural landscape, or the near environment.

Build your Understanding

- Classify the following as renewable and non-renewable sources of energy. Sun, ocean, wind, coal, natural gas, wood.

Sun, ocean and wind are the renewable sources of energy.

Coal, natural gas and wood are the non-renewable source of energy.

- Sun is the ultimate source of energy. Justify.

Every energy source gets energy from Sun directly or indirectly. Therefore, Sun is the ultimate source of energy.

- Where should a wind mill be establish? What are advantages of wind energy?

Wind mill should be established at a place where flow of wind is very strong like coastal areas.

- (i) Wind energy is free of cost and reliable.
- (ii) Wind energy is clean and produces no environmental pollution.
- (iii) In wind power generation no harmful by-products are left over.

- (iv) Farming and grazing can still take place on land occupied by wind which can help in the production of bio-fuels.

- Hydroelectric energy is clean energy. Write some disadvantage of it.

Few disadvantage of hydroelectricity are:

- (i) The hydroelectric power plants can not be sited at a place of our choice. There must be a strong current or considerable height to make the production worthwhile, as the capital cost of setting up production is relatively quite high.
- (ii) Dams can be very expensive to build.

- How will you use tidal power of ocean to generate energy?

The tidal energy of ocean can be harnessed by trapping water at high tide and then capturing its energy as it rushes out and drops to low tide. When tides come into the shore, they can be trapped in reservoirs behind dams. And when the tide drops, the water behind the dam can be let out just like in a regular hydroelectric power plant.

✓ Maximise Your Marks

- There are different types of energy sources. The sources of energy which can be used again and again are called renewable sources and those which can not be used again are called non-renewable source of energy.
- Any one form of energy can be converted into another form of energy.
- The energy sources which do not pollute the environment are called clean energy sources.
- Some common source of energy are:
 - (i) Coal,
 - (ii) Natural gas,
 - (iii) Nuclear energy,
 - (iv) Solar energy,
 - (v) Wind
 - (v) Hydroelectric,
 - (vii) Geothermal,
 - (viii) Ocean,
 - (ix) Biomass.
- For future we should make use of renewable source of energy as much as possible. We should not depend upon the non-renewable source of energy.

★ Stretch Yourself

1. The coal based power plants first burns the coal in large furnaces creating tremendous amounts of heat. The heat is used to boil water in boilers so as to convert it into steam. The steam expands, causing pressure to increase in boiler. A steam turbine is placed at the exit of the boiler so that the moving steam rotates the turbine to produce electricity.
2. The particles formed on burning of fossil fuels are very dangerous. These small particles can exist in air for indefinite periods of time, upto several weeks and can travel two miles. The particle, sometime smaller than 10 microns in diameter, can reach deep within the lungs. The

particles smaller than this can enter the blood stream, irritating the lungs and carry with them toxic substances such as heavy metals pollutants. Those affected by these particles could become affected with fatal asthma and other serious pulmonary diseases.

3. If the nuclear chain reaction is uncontrolled, all the nuclei in the piece of uranium split in a fraction of a second and this may cause a devastating explosion – such as those of the atom bombs.
4. The pressure and temperature increase as one move closer to the centre of earth. As one moves outwards from the inner core, he/she encounters the outer core and then mantle followed by the crust. The mantle is a layer that is below the crest of the earth. This is said to go down 2900 km, its temperature is about 870°C. The outer core has a very high temperature which ranges from 4400°C to 6100°C. The outer core begins where the mantle ends and it extends further down to the centre 2250 km. The inner core is about 6400 km below the earth surface. The temperature of the inner core of the earth is at high of about 7000°C.

? Test Yourself

1. Write the advantages of renewable source of energy over non-renewable source of energy.
2. Write the disadvantages of renewable source of energy over non-renewable source of energy.
3. Mention the limitation of (i) Wind energy, (ii) solar energy, and (iii) biomass energy.
4. How best use of solar energy can be made?
5. Explain the formation of electrical energy from coal energy.
6. Explain a conventional source of energy.
7. Reason out the energy crisis in our country.
8. Explain few methods of mitigating energy crisis.