# Chapter: 5
# Sources of Energy

Q.1 What is a good source of energy?
Ans.: A good source of energy is the one which has the following characteristics:

a) The source which would give a large amount of energy per unit mass.
b) The source should be cheap and easily available
c) It should be easy to store and for transportation
d) The source is safe to handle and use.
e) It should not cause environmental pollution.

Q.2 What is a good fuel?
Ans.: A good fuel is one which has the following characteristics:
a) It has a high calorific value
b) It has a proper ignition temperature
c) It burns without giving out any smoke or harmful gases
d) It burns smoothly and does not leave behind much ash after burning
e) It is cheap, easily available, easy to handle, safe to transport and convenient to store.

Q.3 If you could use any source of energy for heating your food, which one would you use and why?
Ans.: I would use LPG (liquefied petroleum gas) which is used as cooking gas for heating food because:
a) It has a high calorific value. It gives a lot of heat on burning.

b) It burns with a smokeless flame and hence does not cause any air pollution.
c) It does not produce any poisonous gases on burning
d) LPG does not leave behind any ash after burning

**In Text Questions-Pg-248**

Q.1 What are the disadvantages of fossil fuels?
Ans.: The fossil fuels has the following disadvantages:

(i) Fossil fuels are non-renewable sources of energy and once used they cannot be renewed again so early. Fossils take millions of years to be renewed.
(ii) The burning of fossil fuels causes a lot of air pollution. They release toxic gases such as Sulphur-dioxide ( ), carbon dioxide and nitrogen oxides which cause acid rain. The acid rain damages plant life as well as aquatic life on earth. causes greenhouse effect leading to excessive heating of the earth.
(iii) The burning of coal produces smoke which pollutes the air.

Q.2 Why are we looking at alternative sources of energy?
Ans.: We are looking at alternative sources of energy mainly due to two reasons:
a) Because the fossil fuels and nuclear fuels present in the earth are limited in nature and they cannot be renewed in an early time span.

b) Burning of fossil fuels and radioactive nuclear elements cause lot of pollution which is very toxic and unhealthy for mankind and other life forms on the earth.

Q.3 How has the traditional use of wind and water energy been modified for our convenience?
Ans.: The traditional use of wind energy has been modified for the welfare of mankind:

a) Generation of electricity through wind-powered generators.
b) Generation of electricity by fast flowing water (also called Hydroelectricty)

**In Text Questions-Pg-253**

Q.1 What kind of mirror-concave, convex or plane-would be best suited for use in a solar cooker? Why?
Ans.: A concave mirror reflector would be best suited for use in a solar cooker. This is because a concave mirror is a converging mirror which converges all the light falling on it. It converges a large amount of sun's heat rays onto the required area of cooking holder. A plane mirror does not converge all the light therefore, concave is used. And convex mirror reflector is a diverging mirror so it is also not used.

Q.2 What are the limitations of energy that can be obtained from the oceans?
Ans.: The energy from the oceans can be obtained mainly in three forms:

a) Tidal energy
b) Wave energy
c) Ocean thermal energy.

Some of the important limitations of these forms of energy are as below:

(i) Dams need to be built to harness tidal energy. Because the movement of tides in not constant in the ocean. Sometimes, there are high tides and sometimes low tides. Therefore, dams are necessary.

(ii) The wave energy can be harnessed in only at those places where the sea-waves are very strong. Moreover, setting up such systems is highly costly and require maintenance.

(iii) The efficiency of OTEC power plants which work by utilizing ocean thermal energy is very low. Moreover, it is very expensive to establish OTEC power plants.

Q.3 What is geothermal energy?

Ans,.: Geothermal energy is the heat energy from hot rocks present inside the earth. This energy can be used to produce electricity. This heat energy from the hot rocks present inside the rocks comes from the fission of radioactive materials which are naturally present in these rocks. Geothermal energy is available only at some places in the world.

Q.4 What are the advantages of nuclear energy?

Ans.: The following are the advantages of nuclear energy:

a) It produces a large amount of useful energy from a very small amount of a nuclear fuel. Ex- Uranium (235)

b) Once the nuclear fuel is loaded into the reactor, the nuclear power plantcan go on producing electricity for two three years at a stretch. There is no need for putting in nuclear fuel again and again.

c) It does not produce gases like carbon-dioxide which contribute to greenhouse effect or Sulphur-dioxide which causes acid rain.

Q.1 Can any source of energy be pollution free? Why or why not?

Ans.: In reality, no source of energy can be said to be pollution free. The use of each and every source of energy disturbs the environment in one way or the other. For example, though the use of a wind generator, solar cooker and solar cells for obtaining energy is pollution free but the processes involved in making the materials for these energy devices must have caused some pollution and damaged the environment in one way or the other.

Q.2 Hydrogen has been used as a rocket fuel. Would you consider it a cleaner fuel than CNG? Why or why not?

Ans.: Hydrogen is a cleaner fuel than CNG. This is because the burning of hydrogen produces only water, which is totally harmless. On the Other hand, burning of CNG produces carbon dioxide gas and heating of the environment in the long run.

Some of the environment consequence of the increasing demand for energy are the following:

a) The combustion of fossil is producing acid rain and damaging plants (crops), soil and aquatic life.
b) The burning of fossil is increasing the amount of greenhouse gas carbon dioxide in the atmosphere.
c) The cutting down of trees from the forest (deforestation) for obtaining fir-wood is causing soil erosion and destroying wild life.

d) The construction of the hydro-power plants is disturbing ecological balance.

e) Nuclear power plants are increasing radioactivity in the environment.

The various factors which we should keep in mind while choosing a sources of energy are :

a) The ease of extracting energy from that source

b) The cost of extracting energy from the sources

c) The efficiency of technology available to extract energy from that sources.

d) The damage to environment which will be caused by using that sources.

**In Text Questions-Pg-254**

Q.1 Name two energy sources that you would consider to be renewable. Give reasons for your choices

Ans.: Hydro-Energy and Biomass energy are the renewable sources of energy.

a) Hydro-Energy is the energy produced by fast flowing water. It is a renewable source of energy because it is supplied by the water cycle in nature and it will never get exhausted.

b) Biomass energy is the energy obtained from biofuels such as wood etc. Since wood is a renewable source of energy because if trees are cut from the forest for obtaining wood, then more trees will grow in the forest in due course of time.

Q.2 Give the names of two energy sources that you would consider to be exhaustible. Give reasons for your choices.

Ans.: Exhaustible sources of energy means non-renewable sources of energy i.e. the sources which are limited in nature or take millions of years to form. Example- Coal and Petroleum are the two exhaustible sources of energy. This is due to the following reasons: Coal and petroleum are fossil fuels which were formed in the earth very, very slowly. The coal and petroleum which are present in the earth today have taken millions of years to form and get accumulated. So, if all the coal and petroleum present in earth get exhausted, they cannot be produced quickly in nature. We will not get any coal or petroleum in the near future.

**Exercise-Pg-254**

Q.1 A solar water heater cannot be used to get hot water on:
A. a sunny day
B. a cloudy day
C. a hot day
D. a windy day
Ans.: The solar heater cannot be use on a cloudy day because sun rays are not sufficient. Option (b) is the correct answer.

Q.2 Which of the followings not an example of a bio-mass energy source?
A. wood
B. gobar-gas
C. nuclear energy
D. coal
Ans.: Nuclear energy is not a source of bio-mass energy. Thus option (c) is correct.

Q.3 Most of the sources of energy we use represent stored solar energy. Which of the following is not ultimately derived from the Sun's energy?

A. geothermal energy
B. wind energy
C. fossil fuels
D. biomass

Ans.: Geothermal energy is not derived from Solar energy. Thus, option (a) is correct.

Q.4 Compare and contrast fossil fuels and the sun as direct sources of energy.

Ans.: The following are the points that compare fossil fuels and the Sun:

a) The sun is a renewable source of energy but, fossil fuels are a non-renewable sources of energy.

b) The Sun's energy does not cause any pollution but burning of fossil fuels causes a lot of pollution.

c) The Sun's energy is available in a diffused from (scattered form) but fossils provide energy in concentrated form.

d) A solar cell or solar cooker is always needed to utilize sun's energy but this is not so in the case of fossil fuels.

e) The Sun's energy available only during the day time when the sun shines but energy of fossil fuels can be used all time.

Q.5 Compare and contrast bio-mass and hydroelectricity as sources of energy.

Ans.: Bio-mass and hydroelectricity as sources of energy. The following points compare them:

a) Both Bio-mass and Hydro-Electricity are renewable sources of energy.

b) The use of bio-mass by burning causes air pollution but the use of hydroelectricity do not.

c) Bio-mass gives heat energy which can be used for cooking and heating whereas hydroelectricity can be used for running all types of electrical appliances.

d) Bio-mass energy can be obtained without using any special devices but hydroelectricity can be produced only by establishing hydro-power plants.

Q.6 What are the limitations of extracting energy from:
(a) wind ?
(b) waves?
(c) tides?
Ans. : (i) Limitations of extracting energy from wind:

a) Wind generators to produce electricity can be established only at those places where wind blows for most of the year.
b) The wind speed should be higher than 15 km/h to meet the requirement for the appropriate speed of wind turbines for generating electricity.
c) There should be some back-up facilities like storage cells to take care of energy needs during the period there is no wind.
d) A large area of land is required for establishing wind energy farm.
e) The initial cost of establishing wind energy farms is quite high.

(ii) Limitations of extracting energy from waves (or sea-waves):

a) The wave energy can be harnessed at only those places where the sea-waves are very strong.

b) The efficiency of power plants based on wave energy is very low.

c) The power plants built in oceans or at sea-shores have high cost of installation, corrode easily and net a lot of maintenance.

(iii) Limitations of extracting energy from tides:

a) There are very few sites around the world which are suitable for building tidal dams.

b) The rise and fall of sea-water during high and low tides is not enough to generate electricity on a large scale.

Q.7 On what basis would you classify energy sources as:
(a) Renewable and Non-Renewable ?
(b) Inexhaustible and Exhaustible ?
Are the options given in (a) and (b) the same?
Ans.: The options given in (a) and (b) are the same. The Renewable sources of energy are also known as inexhaustible sources of energy and Non-renewable sources of energy are also called exhaustible sources of energy.

(i) Renewable sources of energy /Inexhaustible sources: Those sources of energy which are abundant in nature and can be used again and again. These sources never get exhausted. For example, wood, water etc.

(ii) Renewable sources of energy/Exhaustible sources: Those sources of energy which have accumulated in millions of years and cannot be produced in very less time span. For example, coal. If all the coal gets used up completely, it cannot be produced quickly in nature.

Q.8 What are the qualities of an ideal source of energy ?
Ans.: An ideal source of energy has the following qualities:

(i) It gives a large amount of energy per unit mass.
(ii) It does not cause any pollution.
(iii) It is easy to store and safe for transportation.
(iv) It is safe to handle and easy to use.

(v) It is cheap and available easily.

Q.9 (a) What are the advantages and disadvantages of using a solar cooker? (b) Are there any places where solar cookers would have limited utility?

Ans.: (a) The advantages of using solar cooker:

(i) It is an efficient and green cooking method.

(ii) Solar cooker is cheap since it use sun energy which is free.

(iii) It require zero fossil fuel.

(b) The disadvantages of using solar cooker:

(i) Cooking in solar cooker can be a time consuming process.

(ii) Solar cooking is possible only if it's a sunny day. It does not work on rainy day.

(iii) The solar cookers have limited utility at those places which usually remain cloudy and have long winters. An example of such places are hilly areas, poles etc.

Q.10 (a) What are the environmental consequences of the increasing demand for energy?

(b) What steps would you suggest to reduce energy consumption ?

**Ans.:** (a) Some of the environmental consequences of the increasing demand for energy are the following:

(i) The combustion of fossil fuels produces gases which cause acid rain which damages the crops and aquatic life.

(ii) The burning of fossil fuels produces gases that cause the greenhouse gas effect and eventually leading to global warming.

(iii) Wood is used as a fuel which is obtained by cutting forests. Deforestation disturbs the nature cycle.

(iv) The construction of hydropower plants is disturbing ecological balance.
(v) Nuclear power plants cause radioactive reactions which is toxic in nature.

(b) Some of the steps which can be taken to reduce energy consumption are as follows:
(i) We must save electricity by switching off lights, fans and other such electrical appliances.
(ii) Use energy efficient electrical appliances such as compact fluorescent lamps.
(iii) Pressure cookers should be used for cooking food instead of cooking in open wares. This will save fuel.
(v) Solar water heaters should be used for heating water as well as cooking.
(vi) Bicycles should for travelling short distances.