NCERT Solutions for Class -10

Science

Chapter 14 – Source of Energy

Intext Exercise 1

1. What is a good source of energy?

Ans: A good energy source is one that can:

- Produce a lot of heat per unit mass.
- Has the ability to perform a substantial amount of work per unit of mass.
- Has the potential to be easily accessible.
- It's simple to transport and store.
- Is cost-effective.
- Emits a small amount of smoke.

2. What is a good fuel?

Ans: A good fuel is one that generates a lot of heat when burned, creates little smoke, and is readily available.

3. If you could use any source of energy for heating your food, which one would you use and why?

Ans: Natural gas has the following properties that make it suitable for heating and preparing food:

- It is a renewable energy source.
- When burned, it does not emit a lot of smoke.
- Despite being very combustible, it is simple to use and transport.
- It also produces a lot of heat when it's burning.

Intext Exercise 2

1. What are the disadvantages of fossil fuels?

Ans: The following are some of the downsides of fossil fuels:

- Coal and petroleum combustion produce a lot of pollutants, which pollute the air.
- Fossil fuels emit carbon, nitrogen, sulphur, and other oxides that generate acid rain, which has an impact on soil fertility and potable water.
- The combustion of fossil fuels emits gases such as carbon dioxide, which contribute to global warming.

2. Why are we looking at alternate sources of energy?

Ans: Non-renewable energy sources include fossil fuels, which have long been used by humans as a source of energy. These energy sources are finite and cannot be replenished individually. They're being devoured at breakneck speed. If current consumption trends continue, the Earth's fossil fuel reserves will be depleted.

As a result, we must conserve energy sources. As a result, we must seek out alternative energy sources.

3. How has the traditional use of wind and water energy been modified for our convenience?

Ans: Waterfalls were formerly employed as a source of potential energy that was transformed into power using turbines. Due to the scarcity of waterfalls, a large number of water dams have been built. Hydro-dams are now commonly employed to harness the potential energy of stored water. Water flows from a height on the turbine, which generates energy, in water dams. Windmills were once used to capture wind energy and use it to perform mechanical tasks such as lifting/drawing water from a well. Windmills, on the other hand, are now utilised to generate electricity. The kinetic energy of the wind is harnessed and turned into electricity in windmills. The turbine of the electric generator is turned by the rotatory action of the blades.

Intext Exercise 3

1. What kind of mirror − concave, convex or plain − would be best suited for use in a solar cooker? Why?

Ans: A solar cooker cooks and heats food by utilising the heat of the sun. A mirror is used in a solar cooker to reflect and focus sunlight at a specific point. In a solar cooker, a concave mirror is commonly employed for this purpose. Because the mirror concentrates all of the incident sunlight at one area, the temperature at that point rises, cooking and heating the food placed there.

2. What are the limitations of the energy that can be obtained from the oceans?

Ans: Tidal energy, wave energy, and ocean thermal energy are some of the numerous types of energy that can be obtained from the water. There are various constraints that must be overcome in order to harness these energy.

(i) Tidal energy is dependent on the Earth's, moons, and Sun's relative positions.

(ii) To transform tidal energy into power, high dams must be built.

(iii) Using wave energy to generate power.

Extremely powerful waves are required.

(iv) To effectively harness ocean thermal energy, the temperature difference between surface water (hot) and deep water (cold) must be at least 20°C.

3. What is geothermal energy?

Ans: Geothermal energy is the earth's heat energy. Geothermal power plants use the Earth's heat to generate electricity. The molten materials existing in the earth's core are forced to the earth's crust as geological processes occur. This causes hotspots to form. When underground water comes into touch with these hot sites, steam is produced, resulting in the formation of hot springs. In geothermal power plants, this trapped steam is used to generate energy.

4. What are the advantages of nuclear energy?

Ans: The following are some of the benefits of nuclear energy:

(a) There is a tremendous quantity of energy created per unit mass.

(b) It produces no smoke and is a non-polluting energy source.

(c) The energy released by fissioning one atom of uranium is 10 million times that generated by burning one atom of carbon.

(d) The fusion of four hydrogen atoms generates a substantial quantity of energy, roughly equal to 27 MeV.

Intext Exercise 4

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

Ans: No, no energy source can be pollution-free. Solar cells are believed to be pollution-free. However, even creating them has a negative impact on the environment. In the case of nuclear energy, there is no waste generated following the fusion reaction. However, it is not fully pollution-free. The fusion reaction requires a temperature of around 107 K, which is provided by the fission reactions. The byproducts produced by fission processes are extremely hazardous. As a result, no energy source is pollution-free.

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

Ans: Hydrogen gas is less polluting than compressed natural gas (CNG). Hydrocarbons are used to make CNG. As a result, it contains carbon. A form of CNG pollutant is carbon. Hydrogen, on the other hand, produces no waste. There is no waste produced by hydrogen fusion. As a result, hydrogen is more environmentally friendly than CNG.

Intext Exercise 5

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

Ans: The following are two renewable energy sources:

- Sun: Solar energy is the energy derived from the Sun. Fusion of hydrogen into helium, helium into other heavy elements, and other processes provide solar energy. The Sun has a considerable amount of hydrogen and helium.

  As a result, solar energy may be regenerated on its own. The Sun will continue to burn for another 5 billion years. As a result, solar energy is a renewable energy source.

- Wind: Wind energy is obtained from the movement of high-speed air. Windmills are used to generate electricity from wind energy. Because of the

Earth's unequal heating, air blows. Wind energy will be available indefinitely as the Earth's heating continues.

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

Ans: The following are two renewable energy sources:

(a) Sun: Solar energy is the energy derived from the Sun. Solar energy is a renewable resource.

The following are two non-renewable energy sources:

(a) Coal is made up of the lifeless remnants of plants and animals that have been buried for millions of years beneath the earth's crust. Coal takes millions of years to produce.

The demand for coal has increased as a result of industrialization. Coal, on the other hand, does not replenish itself quickly. As a result, coal is a nonrenewable or finite energy source.

(a) Wood: Wood comes from forests. Deforestation has resulted in a rapid reduction in the number of trees on the planet. A forest's growth necessitates

NCERT Exercise

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: (b) A solar water heater uses sun energy to heat water. To function correctly, it requires bright and intense sunshine. On a cloudy day, sunlight is reflected back into the sky by the clouds, preventing it from reaching the ground. As a result, solar energy is not available for the solar heater to function correctly. As a result, on a cloudy day, the solar water heater will not work.

2. Which of the following is not an example of a bio-mass energy source?

(a) wood

(b) gobar gas

(c) nuclear energy

(d) coal

Ans: (c) Biomass is a renewable energy source derived from plant and animal waste. During nuclear fission and fusion, nuclear energy is released. The uranium atom is attacked with low-energy neutrons during nuclear fission. As a result, the uranium atom splits into two lighter nuclei. This reaction produces a tremendous amount of energy. Lighter nuclei are fused together to generate a comparably heavier nucleus in a nuclear fusion event. This reaction generates a huge quantity of energy. As a result, nuclear energy does not qualify as a bio-mass energy source. Gobar gas is created from animal faeces, while coal is a fossil fuel obtained from the buried rema.

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) Nuclear energy

(d) Bio-mass

Ans: (c) Nuclear energy is produced by nuclear fission and fusion reactions. The uranium atom is attacked with low-energy neutrons in nuclear fission. As a result, the uranium atom splits into two lighter nuclei. This reaction produces a significant quantity of energy. In terms of nuclear power, Lighter nuclei are fused together to generate a comparably heavier nucleus in the fusion event. Fission reactions gives you the amount of energy required to fuse the lighter nuclei this is the outcome. Generates a huge amount of energy these reactions can be carried out in a laboratory setting. Sunlight is either absent or present. These responses are unaffected by sunshine. Therefore Nuclear energy is not derived entirely from the Sun's energy. Solar energy is the source of geothermal energy, wind energy, and biomass energy. Geothermal energy is stored as heat energy deep within the earth's crust. The absorption of atmospheric and oceanic heat causes the heating. The atmosphere and oceans are heated by sunshine. Wind energy is captured when the wind blows. Wind is caused by the sun's uneven heating of the earth's surface. Dead plants and animal wastes are used to create bio-mass. In the presence of water and sunlight, chemical reactions occur in the dead plants and animal wastes. As a result, biomass is linked to sunlight in an indirect way.

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

Ans: Fossil fuels are energy sources derived from beneath the Earth's crust, such as coal and petroleum. Humans have direct access to them and can use them. As a result, fossil fuels are the only source of direct energy. There are only a few of these available. These are non-renewable energy sources since they cannot be regenerated in nature. The creation of fossil fuels takes millions of years. If the Earth's current fossil fuels run out, it will take several years for new ones to emerge. Fossil fuels are also prohibitively expensive.

Solar energy, on the other hand, is a renewable and direct source of energy. The Sun has been shining for years and will continue to do so for another five billion years. Solar.

5. Compare and contrast bio-mass and hydro-electricity as sources of energy.

Ans: Biomass and hydroelectricity are both renewable energy sources. Dead plants and animal wastes are used to create bio-mass. As a result, it is replenished organically. It's a result of natural occurrences. Wood, gobar gas, and other bio-mass examples are only a few. Hydro-electricity, on the other hand, is derived from the potential energy contained in water at a height. It can be used to generate energy again and over again. It is obtained using mechanical methods and is derived from water.

6. What are the limitations of extracting energy from –

(a) The wind?

Ans: Windmills are machines that use the wind to generate electricity. A windmill requires a wind speed of over 15 km/h to create power, which is one of the limits of harvesting energy from wind. In addition, a vast number of windmills covering a large region are necessary.

(b) Waves?

Ans: Extremely powerful ocean waves are necessary to harvest energy from waves.

(c) Tides?

Ans: To collect energy from tides, extremely high tides are required. Tides are also affected by the relative locations of the Sun, Moon, and Earth.

7. On what basis would you classify energy sources as

(a) Renewable and non-renewable?

Ans: Renewable energy is defined as a source of energy that refills itself in nature. Sun, wind, moving water, bio-mass, and other renewable energy sources are only a few examples. Non-renewable energy is defined as a source of energy that does not

regenerate itself in nature. Non renewable energy sources include coal, petroleum, natural gas, and other fossil fuels.

(b) Exhaustible and inexhaustible?

Ans: Exhaustible energy sources are those that will deplete and exhaust within a few hundred years. Coal, petroleum, and other nonrenewable energy sources are all finite. Energy resources that are inexhaustible are ones that will not run out in the future. These options are limitless. One of the limitless sources of energy is bio-mass**.**

(c) Are the options given in (a) and (b) the same?

Ans: Yes. (a) and (b) both have the same options.

8. What are the qualities of an ideal source of energy?

Ans: An ideal source of energy must be:

- cost-effective,
- easily accessible,
- smoke- and pollution-free,
- simple to store and transport,
- Capable of producing massive amounts of heat and energy when burned.

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

Ans: The Sun's energy is used to heat and prepare meals in a solar cooker. It is an endless and environmentally friendly renewable energy source. It is available to everyone for free and in an unlimited quantity. As a result, running a solar oven is inexpensive.

The cost of a solar cooker is a significant disadvantage. It is unable to function in the absence of sunlight. As a result, on a cloudy day, it is rendered ineffectual.

Solar cookers have limited utility in regions where the days are very short or where there is cloud cover all year.

10. What are the environmental consequences of the increasing demand for energy? What steps would you suggest to reduce energy consumption?

Ans: The need for energy rises as a result of industrialization. Fossil fuels are readily available energy sources that can supply this requirement. The increased usage of fossil fuels has a significant negative impact on the environment. Excessive use of fossil fuels raises the amount of greenhouse gases in the atmosphere, resulting in global warming and a rise in sea level. The use of fossil fuels cannot be completely eliminated. However, some actions can be taken, such as not wasting electricity and using electrical appliances. Water should not be used unnecessarily. A large-scale implementation of a public transportation system including mass transit is required. These small steps can help you cut down on your consumption.