

5 More about energy

In this chapter, you will learn about:

- ◆ different forms of energy
- ◆ transformation of energy
- ◆ renewable sources of energy
- ◆ non-renewable sources of energy
- ◆ air pollution caused by fossil fuels
- ◆ various ways to reduce air pollution
- ◆ conservation of energy

Introduction

You have already learnt about energy in your earlier classes. You use energy to do work and make body movements. When you eat, your body transforms the chemical energy of the food into energy to do work. When you move or do some work, you 'burn' the energy in your body. Energy is needed for your body to grow and also for brain to function. Energy is required to do all types of work. The SI unit of energy is joule (J).

Key definition

Energy is defined as the ability or the capacity to do work.

Energy exists in various forms. In this chapter, you will learn about the different types of energy, transformation of energy and conservation of energy.

Different forms of energy

Energy has many forms. Let us discuss them in detail.

Mechanical energy

The energy possessed by a body by virtue of its position or due to its motion is called mechanical energy. There are two types of mechanical energy.

Potential energy: Energy possessed by the object by virtue of its position or change in

shape is called potential energy. For example, water in the lake on a mountain possesses energy because of its position and a stretched spring also possesses potential energy because of the change in its shape.

Let us consider a body of mass m kept at a height h above the Earth's surface. Now the potential energy possessed by this body can be given by the following formula.

$$\text{P.E.} = m \times g \times h$$

Here g is the acceleration due to gravity.

Kinetic energy: Energy possessed by an object by virtue of its motion is known as kinetic energy. For example, a moving bus, a ball rolling on the ground, flowing water, etc., are some examples of kinetic energy.

Let us consider a body of mass m moving with a velocity v . Now the kinetic energy of the body can be given by the following formula.

$$\text{K.E.} = \frac{1}{2}mv^2$$

Light energy

Light is a form of energy which produces the sensation of vision in your eyes. It cannot be seen but its effect can be felt. Light energy can be used to emit electrons from a metal surface and this effect is known as photoelectric effect.

Heat energy

Heat energy is the sum total of the kinetic energy due to random motion of the particles of a substance. Particles move faster at higher temperature, so they possess higher heat energy. Heat energy is the form of energy which can be transferred from one body to another due to the difference in temperature. It moves spontaneously

from a body at higher temperature to a body at lower temperature. Burning of fuels emits heat energy which is used to move vehicles.

Sound energy

Sound energy is the form of energy which produces the sensation of hearing in your ears. It is caused by the vibration of an object. When you stretch a guitar or a sitar string it vibrates to produce sound. Air molecules transmit this energy to your ears.

Chemical energy

The energy possessed by fuels and food is called chemical energy. This energy is product of chemical reactions. For example, the food you eat possesses chemical energy which is digested to give you energy to do work.

Magnetic energy

It is the energy possessed by the magnetic field around a magnet. The force of the magnets makes an object to move and some work is done. This work done gets stored as potential energy.

Electrical energy

Electric plug sockets and switches at your home allow you to use electrical energy. It is the energy possessed by the moving electrons (negatively charged particles of the atom) in the conductors. When you switch on a bulb, the electrons in the wires transmit this electric energy to the filament of the bulb.

Atomic energy

Energy stored in an atom is known as atomic energy. This is also known as nuclear energy because it exists in the nucleus of the atom. There is enormous amount of energy stored inside the atom. This energy can be used in nuclear reactors to produce large amount of energy.

Transformation of energy

Energy is interconvertible. It can be transformed from one form to another. Here are a few examples of such interconversions.

- When you switch on the bulb, the electrical energy converts into light energy.
- Chemical energy of the food that you eat is converted into mechanical energy by your body.
- Chemical energy of fuels is converted into kinetic energy by the car engine.
- Plants trap light energy and convert that into chemical energy by the process of photosynthesis.
- A cell or a battery converts chemical energy into electrical energy.
- The doorbell converts electrical energy into sound energy.

There are many examples of energy transformation in day to day life. Can you make a list of it?

Sun is the ultimate source of energy

For the Earth, the ultimate source of energy is the Sun. Earth traps solar energy and transforms it into various other forms. The Sun provides you heat and light. This energy is also known as **solar energy**. Plants absorb solar energy to perform photosynthesis which converts the solar energy into chemical energy and store it in the form of food. This chemical energy is taken by you in the form of food and converted into mechanical energy by your body. Wind energy is also associated with solar energy as solar energy

causes heating of the air which causes the flow of air. Coal and petroleum are made up from the fossils of plants and animals which existed long back on the Earth. Hence, fuel energy is also indirectly associated with solar energy. Rain is also caused by the vaporisation of water due to sunlight hence flowing water is also a consequence of solar energy. Thus, from the above discussion, you can conclude that the Sun is the ultimate source of energy on the Earth.

Renewable sources of energy

All forms of energies are obtained from different sources. These sources can be mainly divided into two kinds: renewable sources and non-renewable sources.

Key definition

Renewable energy is the energy obtained from natural sources which can be replenished continuously and will never run out.

For example solar energy, wind energy, biomass energy, tidal energy, etc., are renewable sources of energy.

Solar energy

Most of the energy you use comes from the Sun, but only a very little is used directly from the Sun. On a cold but sunny morning, you might sit in the sunshine to warm your body. Your house might be designed to collect warmth from the Sun's rays, perhaps by having larger windows on the sunny side. However, most of the energy you use comes indirectly from the Sun. It can also be used directly to cook food, heat water or to generate electricity. Solar energy is very economical source of energy and it is also available in abundant.

Solar cooker: It is a device which uses solar energy to cook food. It consists of a double walled rectangular metallic box which is painted black from inside. The space between double walls is filled with heat insulator to avoid loss of heat. A plain mirror is attached to the upper side of the box which helps to reflect sunlight on the box. Outer side of the utensils are painted black as black can absorb maximum heat radiations. Nowadays, solar cookers are more often used. Figure 5.1 shows a plane mirror solar cooker.

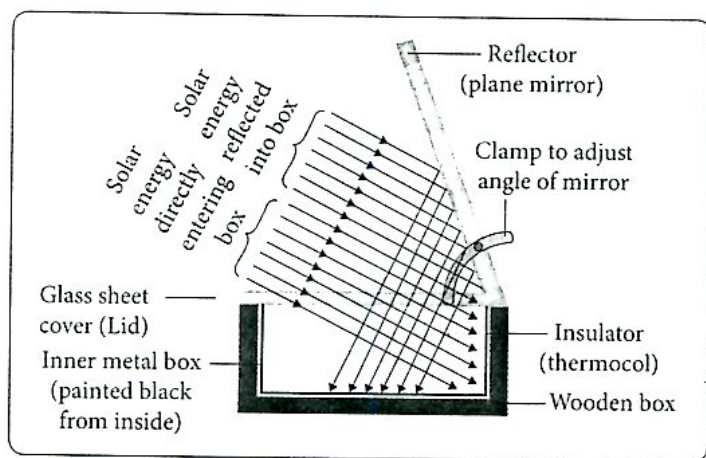


Figure 5.1 Solar cooker

Solar water heater: It is a device used to heat water by using solar energy. Water in these devices is heated by the circulation of water through pipes placed in front of the Sun's rays. It consists of a rectangular, insulated metallic box painted black from both the sides. This box consists of a coil of copper tubes painted black from outside. The free ends of copper pipes are joined to an insulated storage tank provided with inlet for fresh water and outlet for hot water, respectively. Metal box is provided with plane glass lid to provide greenhouse effect.

When sunlight enters the box through glass lid it is absorbed by the copper pipes which contains cold water. After sometime water gets heated and expand. Due to this thermal

expansion water pushes itself in the insulated storage tank. Now the cold water comes into the copper pipe to take the place of hot water. Hence, this cycle continues and you get heated water. Figure 5.2 shows solar water heater.

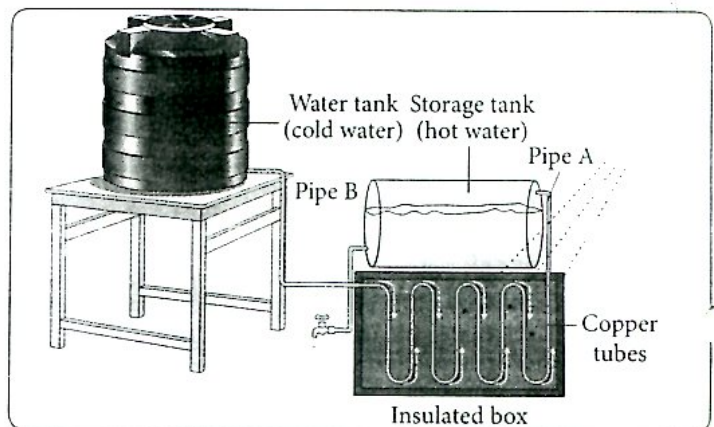


Figure 5.2 Solar water heater

Solar cells: They are also known as photovoltaic cells. These cells directly convert solar energy into electrical energy. Solar cells are used to power many kinds of equipments, including satellites, calculators, remote radiotelephones, etc. The Sun's rays are incident on thin layers of photoelectric substances like silicon or gallium. These substances convert solar energy into electrical energy. For large production of electricity solar panels are used. A solar panel is made up of large number of solar cells (Figure 5.3). Solar panels are used in satellites and devices in space.

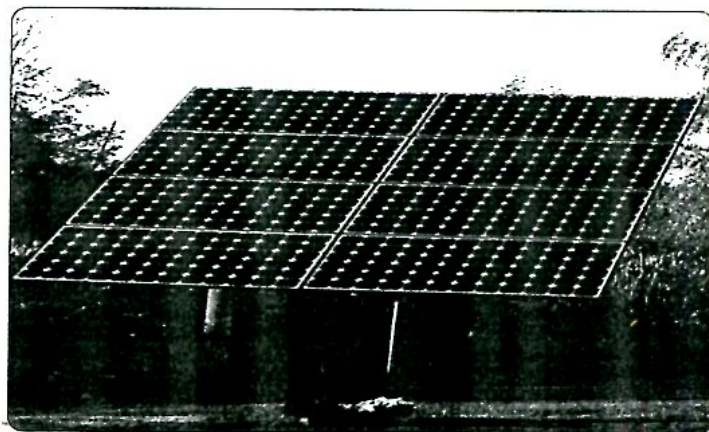


Figure 5.3 Solar panel

Advantages of solar energy:

- Use of solar energy saves fuels.
- It does not cause any kind of pollution.
- Food cooked in solar cooker is more nutrient as all the nutrients are preserved because of slow heating.
- Water heaters and photovoltaic panels can be used in hospitals, offices and homes to save electricity.

Disadvantages of solar energy:

- Solar energy is not available at night and cloudy days.
- Solar cooker cannot cook food in a short span of time. Similarly, the water heaters will not provide hot water immediately.
- Solar energy is not available in large amount in all countries especially in extremely cold countries.

Hydroelectric power

The name comes from 'hydro', the Greek word for water. Hydroelectric power is the electricity generated using the energy stored in moving water. Hydroenergy can be trapped by use of many different methods. The most common method of using energy from water is by using a **hydroelectric power plant**. Water is allowed to flow in a controlled manner in a dam, which will then move the turbines and thus, drive the generators to produce electricity. Hydroelectric power is a renewable source of energy that produces maximum amount of electricity used all over the world. Figure 5.4 shows the working of hydroelectric power plant.

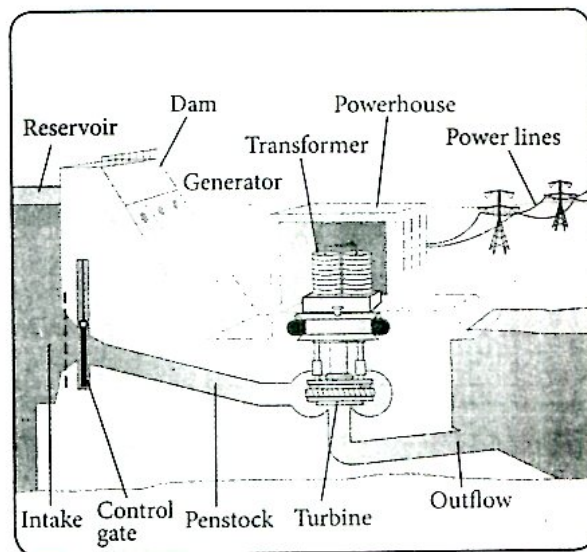


Figure 5.4 Hydroelectric power plant

Advantages of hydroelectricity:

- Hydroelectric power stations do not cause any kind of pollution.
- Hydroelectric power stations are the most economical way to generate electricity.
- Hydroelectric power is more reliable than solar energy, as this source of energy is available throughout the year.

Disadvantages of hydroelectricity:

- Dams are expensive to build.
- Dams block rivers, and affect fish and other water creatures.
- Dam changes the habitat and landscape upstream, as much more land will be submerged. The land below the dam is also affected as the flow of water is reduced.
- Silt can build up in the dam as when the water slows down, it does not have enough energy to carry the sand and silt with it.

Wind energy

Wind energy is mainly used to generate electricity. Wind is a renewable energy source because it is freely available and will always be available as long

as the Sun keeps shining. Using wind to create electricity has been known for a long time. When the wind turns the blades of a windmill, it spins a turbine inside a small generator to produce electricity. To make enough electricity, to serve lots of people, power companies build 'wind farms' with dozens of huge wind turbines. Wind farms are built in flat, open areas where the wind blows at a speed of at least 15 km/h. Figure 5.5 shows wind electric generator.

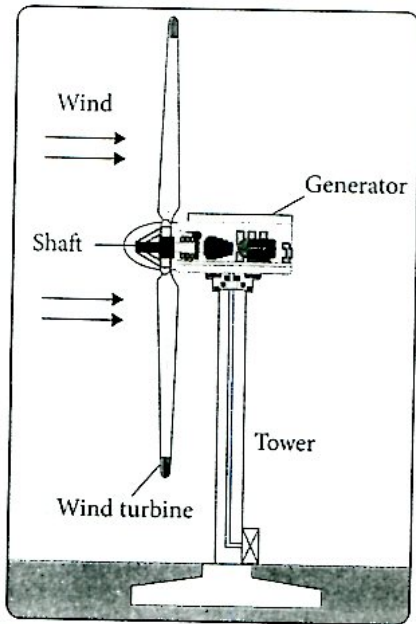


Figure 5.5 Wind electric generator

Advantages of wind energy:

- Wind energy is also absolutely renewable, as it takes no other fuel or resources that can be exhausted.
- Wind farms do not produce excessive noise, and they have not shown any affect on farms or other livestock.
- Wind energy does not cause any pollution.

Disadvantages of wind energy:

- The speed of wind is not constant and therefore there is no definite supply of electricity from a wind turbine.
- Large numbers of wind turbines are needed to generate power even for small towns.

Geothermal energy

The words *geo* and *thermal* are Greek words which mean Earth and heat, respectively. Geothermal energy means heat energy obtained from the Earth. Geothermal energy is generated in the Earth's core. The double layered core is made up of very hot magma and a solid iron centre. A large amount of heat is produced due to slow decay of radioactive elements. Molten rocks called **magma** are pushed upwards and get collected near the Earth's crust. These regions are known as **hot spots**. These usually occur in volcanic regions. Magma heats the nearby water. This water can be used directly or after converting it into steam. Geothermal energy can be used to keep your homes warm or to generate electricity.

Geothermal energy was used by ancient people for heating and bathing. Even today, hot springs are used worldwide for bathing and many people believe hot mineral waters have natural healing powers. North western Himalayas and the western coast are some geothermal areas in India.

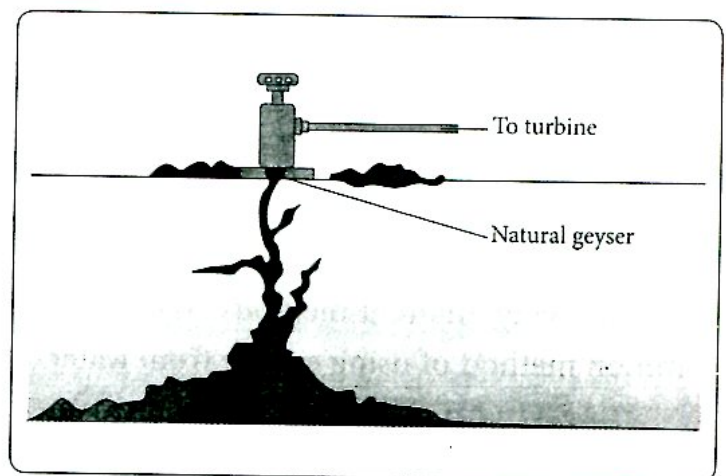


Figure 5.6 Geothermal energy

Advantages of geothermal energy:

- The cost to build a geothermal plant is less. As geothermal plants take up very less space, so you don't need to purchase a large area of land.

- Geothermal energy is clean and does not produce any harmful gases nor leaves any toxic residue behind.
- No fuel is required to run the plant.

Disadvantages of geothermal energy:

- To set up geothermal plants, hot spots need to be recognised. They are usually scattered and not easy to find.
- Sites are usually near active volcano region and to set up a plant near a volcano is very risky.
- A site may be extracting steam and turning it into power for many years but can suddenly stop producing steam. This can happen and last for around 10 years in some cases.

Biomass energy

Biomass is an organic material made from plants and animals. Biomass contains stored chemical energy prepared by plants using the Sun's energy by the process of photosynthesis.

When biomass is burnt, it releases heat. For example, wood logs used in rural areas.

There are lot of examples of usage of biomass energy, like the burning of:

- Leftover wood from sawmills.
- Leftover paper and wood waste from paper mills
- Agricultural waste from farms

Biogas is an efficient fuel generated from biomass. Biogas can provide a clean, easily controlled source of renewable energy from organic waste materials which will replace

firewood or fossil fuels (which are becoming more expensive). The major fuel constituent of biogas is methane, an organic compound along with carbon dioxide.

Biogas plant: The plant where biogas is produced is called a biogas plant. The design of the plant is tailored to use cattle dung as raw material. Cattle dung and water is mixed in the ratio of 1:1 and the resultant slurry containing 9% total solids is fed into the biogas plant by gravity. This slurry is retained in the digester for a period of 35–50 days. During this retention period, 35–40 litres of biogas is recovered per kg of dung fed. Figure 5.7 shows a biogas plant and its working.

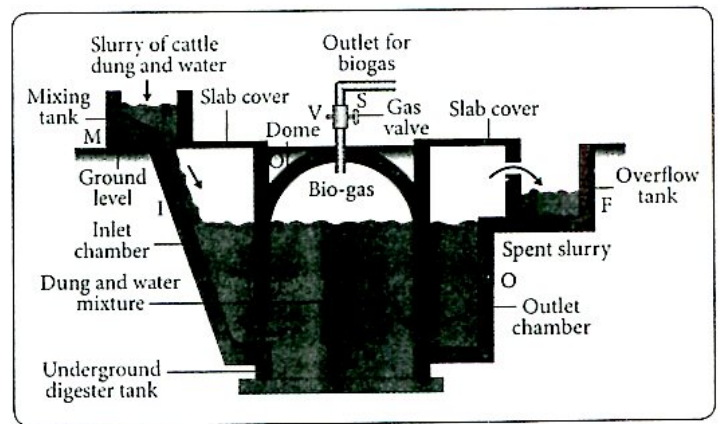


Figure 5.7 Biogas plant

Along with cattle dung, plant remains and agricultural waste can also be used in the biogas plant. Biogas can be used for cooking and lighting in rural areas.

Key point

Biomass energy is not environment-friendly as on burning, they generate carbon dioxide which causes air pollution.

Tidal energy

The power of rise and fall of the sea level or tidal power can be harnessed to generate electricity.

When tides come onto the shore, they can be trapped in reservoirs, behind the dams built along the shoreline. When the tide recedes, the water behind the dam can be let out in a controlled manner just like in a regular hydroelectric power plant. The tide flow is allowed to pass through turbines to generate electricity. Figure 5.8 shows working of tidal energy plant.

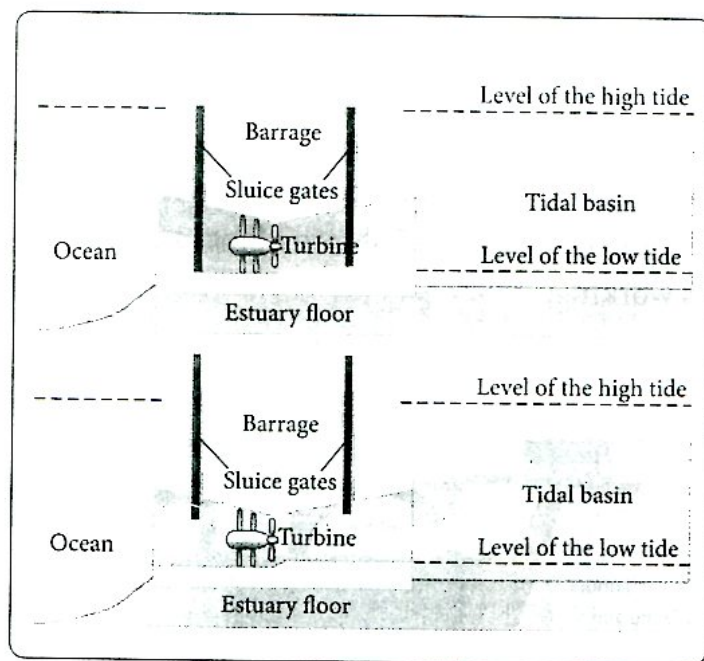


Figure 5.8 Tidal energy plant

Advantages of tidal energy:

- Tidal energy can also be used to reduce dependence upon fossil fuels to some extent.
- Tidal energy generation and consumption is eco-friendly as it creates no liquid or solid pollution.

Disadvantages of tidal energy:

- It does not produce lot of electricity. Hence, cannot be used as an effective source of electricity.

Nuclear energy

Nuclear energy is the energy stored in the nucleus of an atom. You might have learnt that

atoms are tiny particles that make up every object in the universe. There is an enormous amount of energy in the nucleus of an atom.

Nuclear energy can be used to make electricity. But first the energy must be released. It can be released by the atoms in two ways: nuclear fusion and nuclear fission.

In **nuclear fission**, energy is released when atoms are split apart to form smaller atoms. Nuclear power plants use this energy which is mainly released as heat energy to produce electricity via generation of steam in boilers using this heat. Figure 5.9 shows process of nuclear fission.

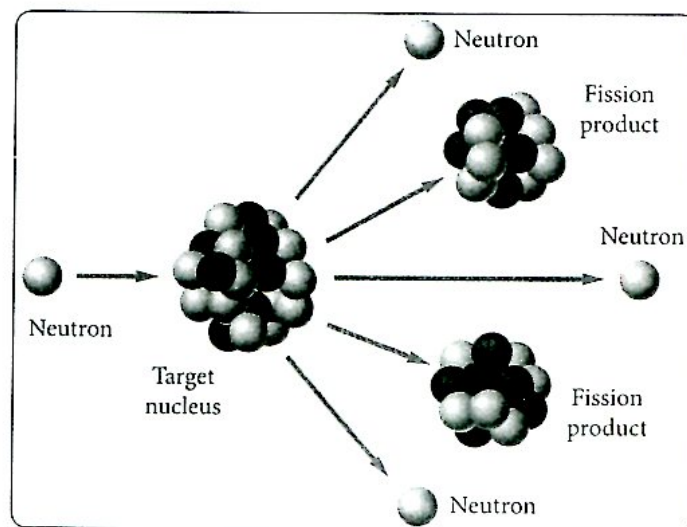


Figure 5.9 Nuclear fission

In **nuclear fusion**, energy is released when atoms are combined or fused together to form a larger atom. This is how the Sun produces energy.

Advantages of nuclear energy:

- It is a non-exhaustible source of energy. A single fusion or fission can generate tremendous amount of energy.
- Produces very less amount of waste products.

Disadvantages of nuclear energy:

- Radioactive waste produced by it causes radioactive pollution which may prove to be very dangerous.
- Radiation leakage from the nuclear plants can be very harmful.

- Nuclear reactors are very expensive and need a lot of capital to install a nuclear plant.
- Nuclear plants require good maintenance.



Presently, there are about 19 nuclear power plants in India.

A Give one word for the following.

- 1 An efficient fuel generated by biomass.
- 2 The power of the rise and fall of the sea level.
- 3 The most readily available source of non-conventional energy.
- 4 The enormous amount of energy stored in the bonds that holds atoms together.
- 5 Energy of moving air.

Non-renewable sources of energy

Non-renewable sources of energy are those which once used will not be replenished within a reasonable span of time. For example, petrol, diesel, coal, etc., are non-renewable sources. Mineral oil, natural gas and coal are the main sources of energy for the modern world. All of these fuels are classified as **fossil fuels**. They are referred to as fossil fuels because they are formed by the decay of plant and animal remains that have been preserved in the Earth's crust for millions of years and due to pressure, bacterial processes and heat. It took millions of years for these organisms to chemically change into fossil fuels. Liquid fossil fuels, like mineral oil, is found in areas which were once covered by oceans or seas. These fuels are supposed to have been formed when dead plants and animals sank to the bottom of the ocean and got covered by sediments. Over long periods of time, pressure, bacterial processes and heat transformed these

sediments into sedimentary rocks, and the plant and the animal remains into oil. The rate of production of these fuels is very low as compared to the rate of consumption, in formation of these fossil fuels takes millions of years. Once these are used up, they are gone forever. Other than fossil fuels there are many other non-renewable sources of energy, like Uranium, these fuels will also get exhausted after sometime. Therefore, these fuels should be used economically.

Air pollution caused by fossil fuels

One of the major causes of air pollution is burning of fossil fuels in industries and vehicles. The exhaust produced by burning of fuels is very harmful for the environment.

Vehicles and industries burn different types of fossil fuels and therefore produce several types of air pollutants. Among the most harmful air pollutants are hydrocarbons and nitrogen oxides, which combine to form smog;

particulate matter, which is harmful for lungs; and carbon monoxide, which is formed due to incomplete combustion of fuels. Carbon dioxide is known to block oxygen circulation in the body, a particular risk for the very young and the very old ones. In the atmosphere, substances like carbon dioxide, produced by the burning of petrol in a car's engine, contribute greatly to the greenhouse effect and debilitating climate change. Large quantity of carbon dioxide present in the air leads to global warming. Today, it is becoming a matter of great concern for the world.

Relative advantage of using CNG over fossil fuels

Natural gas carries high potential as a fuel for vehicles. It is relatively cheap and clean, and easily meets the standards of present and future emission limits. Natural gas can be used as a fuel in both conventional engines as well as vehicles designed specially for this purpose.

The technology for using natural gas as a fuel is fully developed and has been tested over a number of years. At present there are more than three million vehicles powered by natural gas in 60 countries worldwide.

In addition to the existing vehicles, petrol or diesel vehicles are also being converted to use natural gas. An increasing number of carmakers are offering vehicles designed specifically for the use of this new fuel.

Compared to crude oil, deposits of natural gas are larger and more evenly located throughout the world, a fact that is important for the future utilisation of natural gas in the field of transportation.

How to reduce air pollution?

- Electrostatic precipitator is a device that can collect particulate matter from air. This device should be used in steel plants, thermal power plants and cement plants to minimise the ash and smoke in the environment.
- Instead of fossil fuels, CNG should be used, as it is an economical and environment-friendly fuel.
- Efficient internal combustion engines should be used in vehicles to burn the fuels completely. This prevents the production of carbon monoxide which is produced due to the incomplete combustion of fuels in the absence of sufficient amount of oxygen.
- Improved form of *chulha* should be used to reduce the production of smoke and toxic gases. Wood, coal and cow dung should be avoided as fuels since they produce a large amount of smoke. For cooking purpose, LPG gas cylinders can be used as they produce very less amount of smoke.
- Sulphur dioxide and nitrogen dioxide can be removed by passing the poisonous gas through water before letting them out in the atmosphere as these gases are soluble in water.
- More trees must be grown as trees absorb the harmful gases from the environment.

Conservation of energy

Whenever you save energy, you not only save money, you also reduce the demand for fossil fuels, such as coal, oil and natural gas. Reduced use of fossil fuels also means lower emissions of

carbon dioxide which is the primary contributor to global warming.

Following are some methods with which you can reduce the consumption of energy.

- Turn your refrigerator thermostat to a higher temperature. Make sure that its energy saver switch is turned on. Also, check the gaskets around your refrigerator or freezer doors to make sure they are clean and sealed tightly.
- Turn down your water heater thermostat. Thermostats are often set at 60 °C when 50 °C is usually good enough.
- Select the most energy-efficient models when you replace your old appliances with new ones. Look for the energy star rating label.
- Be careful not to overheat or overcool your rooms. In winters, set your thermostat of blowers or heaters at 20 °C during daytime. In the summer, keep the thermostat of your AC at 25 °C.
- Clean or replace AC air filters and when recommended. More energy is lost when air conditioners have to work harder to draw air through dirty filters. Cleaning a dirty air conditioner filter can save up to 5% of the energy used. That could reduce 79.4 kg of CO₂ production per year.
- Buy energy-efficient compact fluorescent bulbs for your most-used lights. Although they cost more initially, but they save money in long run by using only one-fourth energy as compared to an ordinary incandescent bulb and lasts 8–12 times longer. They provide an equivalent amount of bright and attractive light. Only 10% of the energy consumed by a normal light bulb is used to generate light, the rest just makes the bulb hot.
- Use less hot water in bathrooms.
- Try to install as many as possible solar gadgets at home.
- Whenever possible, walk, cycle, indulge in car pool or use mass transit.
- Next time when you buy a car, choose the one that gives a good mileage.
- Reduce the amount of waste you produce by buying minimally packaged goods, choosing reusable products over disposable ones and recycling. Making products with recycled materials, instead of from scratch with raw materials, uses 30 to 55% less of paper products, 33% less of glass and 90% less of aluminium.
- Insulate your walls and ceilings. This can save 20 to 30% of home cooling and heating bills, and reduce CO₂ emissions.
- Switch off any electrical appliance when not in use.
- Plant shady trees and paint your houses in light colours if you live in a warm climate region, or a darker colour if you live in a cold climate region. Reduction in energy use resulting from shade trees and appropriate painting can save up to a lot of CO₂ emissions per year. (Each tree also directly absorbs about 25% of CO₂ from the air annually.)

Checkpoint

- A Give one word for the following
- 1 Fuels formed from animals and plants remain
 - 2 The major ingredient of natural gas
 - 3 Another name for crude oil
 - 4 An automobile fuel obtained from petroleum
 - 5 Oil from the Earth

Key ideas

- ◆ Energy is defined as the ability or the capacity to do work.
- ◆ The energy possessed by a body by virtue of its position or due to its motion is called mechanical energy.
- ◆ Energy possessed by an object by virtue of its position or change in shape is called potential energy.
- ◆ Energy possessed by an object by virtue of its motion is known as kinetic energy.
- ◆ Light is a form of energy which produces the sensation of vision in your eyes.
- ◆ Heat energy is the sum total of the kinetic energy due to random motion of the particles of a substance.
- ◆ Sound energy is a form of energy which produces the sensation of hearing in your ears. It is caused by the vibration of an object.
- ◆ The energy possessed by fuel and food is called chemical energy. This energy is a product of chemical reactions.
- ◆ The energy possessed by the moving electrons (negatively charged particles of the atom) in the conductors is known as electrical energy.
- ◆ Energy stored in an atom is known as atomic energy.
- ◆ Energy is interconvertible. It can be transformed from one form to another.
- ◆ For the Earth, the ultimate source of energy is the Sun.
- ◆ A renewable energy is the energy obtained by natural sources which can be replenished continuously and will never run out.
- ◆ Hydroelectric power is the electricity generated using the energy stored in moving water.
- ◆ Wind energy is mainly used to generate electricity.
- ◆ Geothermal energy means heat energy obtained from the Earth.
- ◆ Biomass is the organic material made from plants and animals.

- ◆ The power of the rise and fall of the sea level or tidal power can be harnessed to generate electricity.
- ◆ Nuclear energy is the energy stored in the nucleus of an atom.
- ◆ Oil, petrol, natural gases are known as fossil fuels because they are formed by the decay of plants and animals that have been preserved in the Earth's crust for millions of years. Fossil fuels are formed due to pressure, bacterial processes and heat.
- ◆ The exhaust produced by burning of fuels is very harmful for the environment.

Key words

Conventional energy energy that was used traditionally

Fossil fuel fuels formed by the decay plant and animal material over millions of years

Metamorphosis stage by stage changes that takes place for a thing

Methane a compound of carbon which is the constituent of natural gas

Nuclear fission splitting of atoms to form smaller atoms with a simultaneous release of heat energy

Nuclear fusion when atoms are combined or fused together to form a larger atom with a simultaneous release of heat energy

Biogas an efficient fuel generated from biomass

CNG an alternative fuel for engines, less polluting in nature

Energy conservation making judicious use of energy



Exercise

A Fill in the blanks.

- 1 Bended bow possesses _____ energy.
- 2 Solar cooker uses _____ energy to cook food.
- 3 In nuclear _____, heavy nucleus splits to form two or more lighter nuclei and release tremendous amount of energy.
- 4 _____ radiation can damage or destroy the cells of living things.
- 5 Oil, coal and gas are _____ fuels.

B Match the following.

- | | |
|------------------------|------------------------------------|
| 1 Solar energy | a not a constant source |
| 2 Nuclear energy | b hot spots |
| 3 Hydroelectric energy | c water stored in dams at a height |
| 4 Geothermal energy | d ineffective in monsoon |
| 5 Wind energy | e nuclear waste |

C State whether the following statements are True or False.

- 1 Biogas is an environment-friendly fuel.
- 2 Water stored at height possesses a lot of potential energy.
- 3 Fossil fuels are made from remains of plants and animals.
- 4 Hydroelectric power stations do not affect the surrounding habitats.
- 5 The process in which energy is released from fusion of two nuclei is called nuclear fission.


D Choose the correct option.

- 1 Which of the following gives rise to coal?
a Rocks
b Plant matter
c Animal matter
d Both b and d
- 2 Which is the main ingredient of natural gas?
a Carbon dioxide
b Methane
c Nitrogen
d Hydrogen
- 3 Which of the following processes release nuclear energy?
a Nuclear fission
b Nuclear fusion
c Nuclear fission and fusion
d Chemical reactions
- 4 Which of the following is applicable for wind energy?
a Inexhaustible energy
b Exhaustible energy
c Fossil energy
d Non-renewable energy
- 5 Which of the following is a non-conventional energy?
a Natural gas
b Coal
c Crude oil
d Biogas

E Distinguish between the following.

- 1 CNG and petrol
- 2 Natural gas and biogas
- 3 Hydropower and tidal power
- 4 Thermal energy and geothermal energy
- 5 Fossil fuels and non-renewable fuels

F Answer the following questions in short.

- 1 Name any three materials that can be used locally to generate biogas.
- 2 Which are the four major conventional sources of energy?
-  3 How is coal formed?
- 4 Explain the formation of natural gas.
- 5 Which automobile fuels are obtained by processing of crude oil?
- 6 How is the energy from the tides harnessed?
- 7 What are wind farms?
- 8 How is nuclear fission different from nuclear fusion?

G Give scientific reasons for the following.

- 1 Conventional energy sources should be supplemented with non-conventional energy.
- 2 Tidal energy is eco-friendly.
- 3 Fossil fuels are non-renewable energy sources.
- 4 Firewood is not an eco-friendly energy source.
- 5 CNG is a better fuel than petrol or diesel in vehicles.



Brain teaser

Make a chart of energy transformation taking place in hydroelectric power plant.



Project idea

What will the world be like 20 years from now? What kind of fuels will be used then? Prepare a presentation about what will be the world after 20 years from now if we do not conserve energy and also a comparable presentation about the world after 20 years from now if we conserve energy.



Know your scientist

Jean Baptiste Joseph Fourier was a French mathematician and physicist best known for initiating the investigation of Fourier series and their application to problems of heat flow. Fourier is also generally credited with the discovery of the greenhouse effect as in 1824 he was the first to describe that the gases in the atmosphere might increase the surface temperature of the Earth.



Jean Baptiste
Joseph Fourier
(1768–1830)