9. Energy Resources

Can you tell? Observe the pictures and answer the questions.

Figure 9.1 : Studying in the Light of a Lantern

Figure 9.2 : Use of Mineral Oil

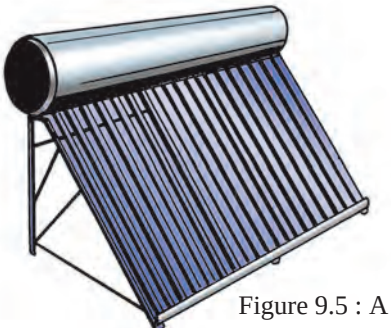

Figure 9.5 : A Solar Energy Panel

Figure 9.3 : A Pinwheel, Winnowing

Figure 9.4 : Using Natural Gas as Fuel

- Which energy resource is used in figure 9.1 to obtain light?
- Where did this resource come from?
- Figure 9.2 shows fuel being filled in a motorcar. From where was this energy resource brought to the pump?
- Figure 9.3 shows Malati with her pinwheel and her father winnowing grain. Who is helping both of them?
- Which energy resource is used for lighting a lamp, running a rickshaw and heating oil as shown in figure 9.4?
- What are the various purposes for which man can use sunlight?
- For which of the above energy resources do we have to spend money?

- Which of these energy resources are available free of cost?

Explanation

We engage in various activities to fulfil our needs, for which we need energy. In the past, human labour and animals were used for many tasks. Gradually, man's needs increased and with it, several changes took place in the use of energy resources and devices. Still, man mainly obtains this energy from nature. You must have realized this while answering the above questions. We use petrol, wind, natural gas, sunlight, etc. besides other resources.

Energy resources can be classified in many ways such as conventional–non-conventional, biotic-abiotic, renewable – non-renewable, substance-based – process-based, etc. Let us consider the last classification. The following table shows the characteristics of the energy resources through their classification.

Substance-based Energy Resources	Process-based Energy Resources
Examples - Wood, coal, mineral oil, natural gas, waste matter, atoms.	Examples - The sun, wind, water, tides, and heat from the earth's interior.
Substances do not last perpetually.	Natural processes are perpetual.
Substances get used up.	Processes are always available.
Reuse is not possible.	Reuse is possible.
Availablity is limited.	Availablity is unlimited.
Takes thousands of years to replenish them.	These are easily available in nature.
Except for atomic energy, all other resources are biotic.	All processes are natural.
Generation of energy leads to pollution.	Generation of energy is pollution-free.
Except for atomic energy, all other resources are conventional.	All these resources are non-conventional.
Generation of energy is relatively cheap.	Developing the technology for the use of these resources is expensive.
Being inflammable, these resources cause damage to the environment.	In the long run, these energy resources are environment-friendly.
Type of power generation: Thermal and atomic.	Type of power generation: Thermal and kinetic.

Figure 9.6 : Cooking on a Stove

Figure 9.7 : Roasting on a Coal Burner

Figure 9.8 : Cooking on a Kerosene Stove

Figure 9.9 : Removing Baked Items from an Oven

Figure 9.10 : Cooking on a Gas Stove

Using these energy resources, we can undertake the following kinds of power generation – hydel power, thermal power, atomic power, geo-thermal power, etc. In thermal power stations, it is necessary to burn the energy resources directly to generate electricity. Kinetic energy can also be used to generate power or electricity.

Do it yourself !

Figures 9.6 to 9.10 show that various energy resources are used for cooking food. List them. Now classify them using the chart we have studied. Discuss whether we can use alternate energy resources for cooking.

Do you know?

The demand for energy is constantly on the rise due to the growing needs of human beings. Solar energy and wind energy are easily available to us. But the power generated using these resources has to be stored in sufficient quantities to ensure continuous power supply. At present, it is very expensive to store this energy. Effects are on to make these resources affordable through research.

Explanation

✲ Substance-based Energy Resources

- **Wood:** In villages, wood is used on a large scale for cooking on earthen stoves.

Figure 9.11 : Cooking on an Earthen Stove

- **Coal:** Long ago, plant and animal remains got buried due to earth movements. They were then decomposed due to pressure and heat, leaving behind the element, carbon. That is how coal was formed.

Coal is used for different purposes according to its quality. Low-quality coal is used for cooking, and coke and high-quality coal is used in industries, as also in thermal power stations.

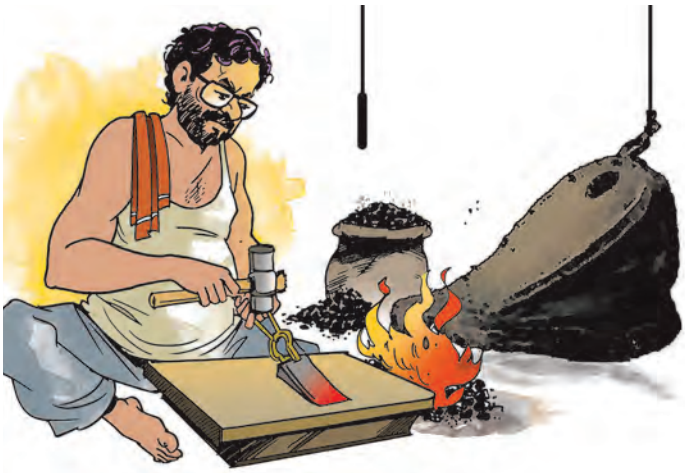

Figure 9.12 : A Blacksmith at Work

- **Mineral oil and natural gas:** Like coal, these were also produced due to earth movements. Mineral oil is found under land surface and also below the ocean floor.

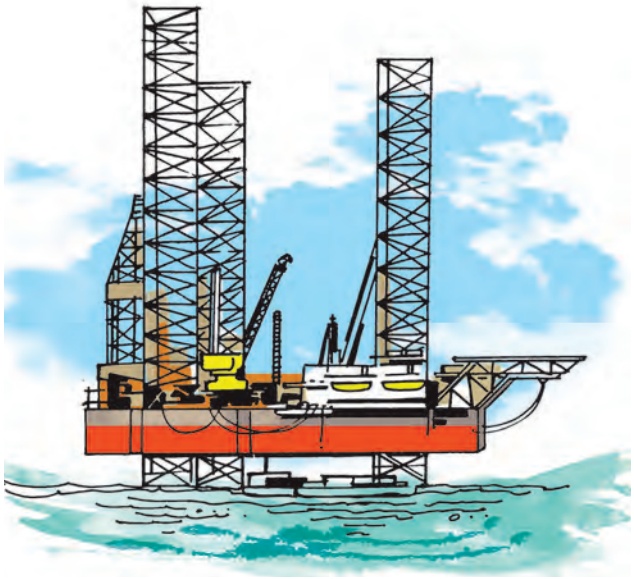

Figure 9.13 : Oil Rig

In most of the mineral oil wells, reserves of natural gas are also found. Mineral oil reserves are limited in nature. However, this oil is in great demand. Hence, its cost is very high. It is called 'black gold' because it has a blackish colour and it is costly. These energy resources are used in thermal power generation. Study the distribution of mineral oil and coal fields in India as shown in figure 9.14.

Make friends with maps!

❇ Use the map to answer the questions given below it.

Figure 9.14

- Name the States which have coal fields.
- Name the mineral oil field in the Arabian Sea.
- Name two States which have coal fields on a large scale.
- Which mineral oil fields are located in North-east India?
- The reserves of which mineral are found in the Godavari basin?
- Which of the States have mineral reserves in the Godavari basin?

- **Biogas** : Biogas can be generated from biotic waste material such as faeces of animals, and dead leaves, shells etc. This energy can be used for domestic needs such as cooking, heating water, lighting lamps, etc. Some farmers have raised biogas plants in their own yards to cater to their domestic needs.

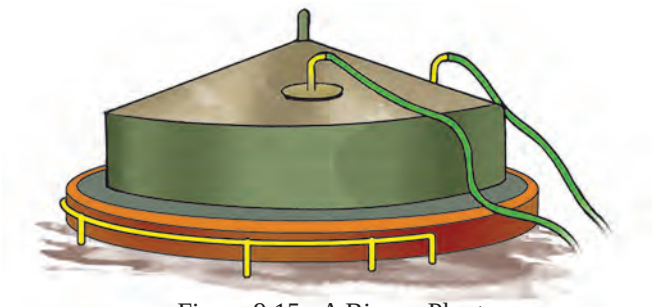

Figure 9.15 : A Biogas Plant

- **Energy from Waste Material :** Waste is generated daily on a very large scale in big, metropolitan cities. Waste disposal is a major problem in such places. This waste can be segregated to use the biotic component to generate gas. This gas can then be used to generate power. In future, this may help to solve the problem of waste disposal in cities. Also, the cities can become self-reliant in terms of their power requirement.

Figure 9.16 : A Plant for the Generation of Energy from Waste

The above energy resources are known as bio-fuels because they originate from the remains of dead plants and animals.

- **Atomic Energy:** Splitting of the atoms of minerals like uranium and thorium can be used for power generation. In this process, using very small quantities of minerals, energy can be generated on a very large scale. Only a few countries in the world like India, U.S.A., Russia, France, Japan use atomic energy.

Figure 9.17 : An Atomic Power Generation Plant

✻ Process-based Energy Resources

- **Hydel Power** : Hydel power is the power obtained from the kinetic energy of running water. Hydel power does not cause any degradation of the environment. Also, the water used in generating power can still be used again. Bhakra-Nangal in the Punjab and Koyna in Maharashtra are examples of this.

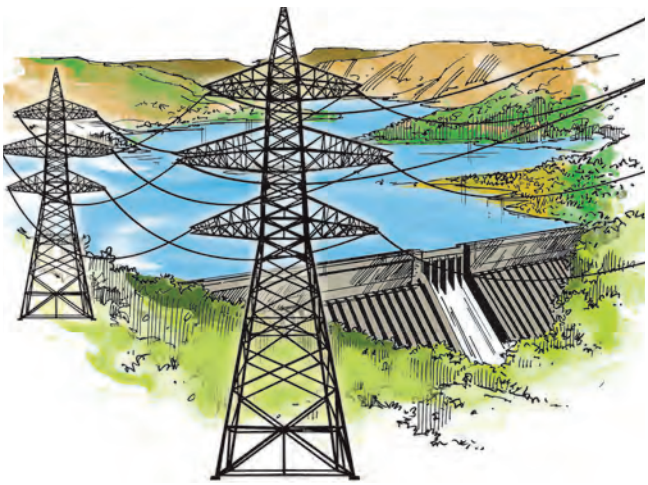

Figure 9.18 : Hydel Power

Name four hydel power stations in our State.

Do you know?

- Nowadays, electricity can be transmitted up to a distance of 800 km from the power generation centre without any transmission loss. Beyond this distance, it cannot be transmitted without loss.
- The power obtained from 1 kg of uranium is equivalent to the power obtained from 10,000 tonnes of coal.
  (One tonne = 1000 kilograms).

- **Wind Energy**: Man has been using this resource since hundreds of years, for example, in sailboats. But nowadays, wind energy is being utilized for power generation. For power generation, a wind speed of 40 to 50 kmph is required. Due to this wind speed, the blades of the windmills turn, generating kinetic energy. This kinetic energy is further converted into electricity.

Figure 9.19 : Wind Energy

This electricity can be used for agriculture, domestic use and industries. In the States of Maharashtra, Karnataka, Tamil Nadu, etc. windmills have been erected at many places.

- **Solar Energy** : We get light and heat from the sun. We have seen that the intensity of solar energy is the maximum in the torrid zone. In a country like India which is in the torrid zone, there is a lot of scope for using this energy. There is a solar power plant at Sakri in Dhule district of Maharashtra. Devices like cookers, lamps, heaters, vehicles can be run on solar power. The generation of solar power depends on the intensity of sunrays and the duration of sunshine.

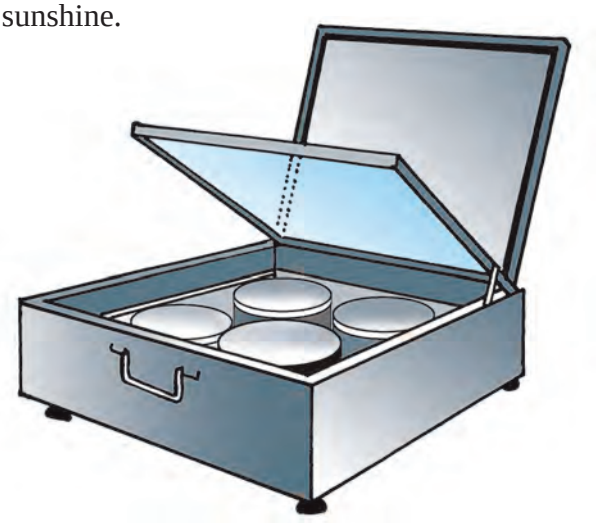

Figure 9.20 : A Solar Cooker

- **Tidal Energy :** Sea waves and tides are movements of ocean water that go on continuously. A technology has now been developed to generate power with the help of the speed and force of waves. Here, too, electricity is obtained from kinetic energy. This energy is pollution-free and everlasting. It can be used on a large scale in a country like India. Efforts are on to start such projects in India.

Figure 9.21 : Energy from Oceanic Water

Do you know?

There are some large-scale solar energy projects –

- Agua Caliente Solar Project (Arizona, U.S.A.)
- California Valley Solar Unit (California, U.S.A.)
- Golmud Solar Park (China)
- Charanka Solar Park (Patan, Gujarat)
- Welspun Energy Project (Madhya Pradesh)

- **Geo-thermal Energy** : Hot water springs have always been an object of curiosity for man. They can be seen at Unapdeo, Vajreshwari, Manikaran, etc.

The temperature in the earth's interior increases by one degree Celsius (1°C) at a depth of every 32 metres. Man has now developed a process whereby this underground heat can be utilized to generate power. One such project is located at Manikaran, Himachal Pradesh in India.

All the above energy resources are abiotic. They cause minimum pollution. They are also known as inexhaustible energy resources.

Figure 9.22 : A Geo-thermal Power Generation Centre

Do you know?

The distance from the earth's surface to its centre is 6373 km. The temperature at the centre is around 4000°C.

Do it yourself !

Form groups of five to eight. Each group should select one or two energy resources. They should use the following points to collect information about the resource they have selected. Collect it from the internet, reference books, newspapers, TV programmes, etc. and also through group discussions.

- Name of the energy resource
- Use of the energy resource
- Estimated cost of power generation
- Advantages and drawbacks in using the energy resource
- Cuttings, pictures, and other available data about the energy resource.
- Environment-friendliness of the energy resource.
- Other alternatives to the energy resource.

Compile the information and present it in the classroom. Choose the best and the most environment-friendly energy resource with the help of all the presentations.

Energy resources must be used very carefully. The demand for energy is increasing all the time due to growing population, urbanization and growing needs of man. It is necessary to use alternative and non-conventional energy resources to meet these needs. It is also necessary to use energy frugally. We must always avoid unnecessary use of electricity. It is easily possible for us to do so.

What will you do?

The whole family has decided that every week, a whole day's electricity is to be saved. What preparation will you make for this purpose?

I can do this!

- *Identify the energy resources among natural resources.*
- *Tell the use of energy resources.*
- *Use energy resources judiciously.*
- *Give information about energy resources in India.*
- *Identify environment-friendly energy resources.*

Exercises

(A) What resource will have to be used for the following work –

(1) Rohan wants to fly a kite.
(2) People in an Adivasi hamlet have to be protected from the cold.
(3) Cooking on a picnic.
(4) Salma wants to iron her clothes.
(5) Starting a railway-engine.
(6) Heating water for a bath.
(7) After sunset, making light available inside the house.

(B) Answer the following questions.

(1) Which energy resource does man use the most? Why?
(2) Why are energy resources needed?
(3) Why do we need to use environment-friendly energy resources?

(C) Explain the differences using the points in the brackets.

(availability, environment-friendliness, advantages and drawbacks)

(1) Mineral oil and solar energy
(2) Hydel power and power from geo-thermal source

*** Activity**

Show the power generation centres on an outline map of India. Write about one of them. Supplement the information with pictures.

Websites for reference

- http://en.wikipedia.org
- http://www. sesky.org
- http://www.globalsecurity.org
- http://geography.about.com

What kind of energy is produced with the help of the devices shown in the photograph?

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