

CHAPTER 2

SOURCES OF ENERGY

➡ **Energy** is the power required to run a machine or to assist human in production.

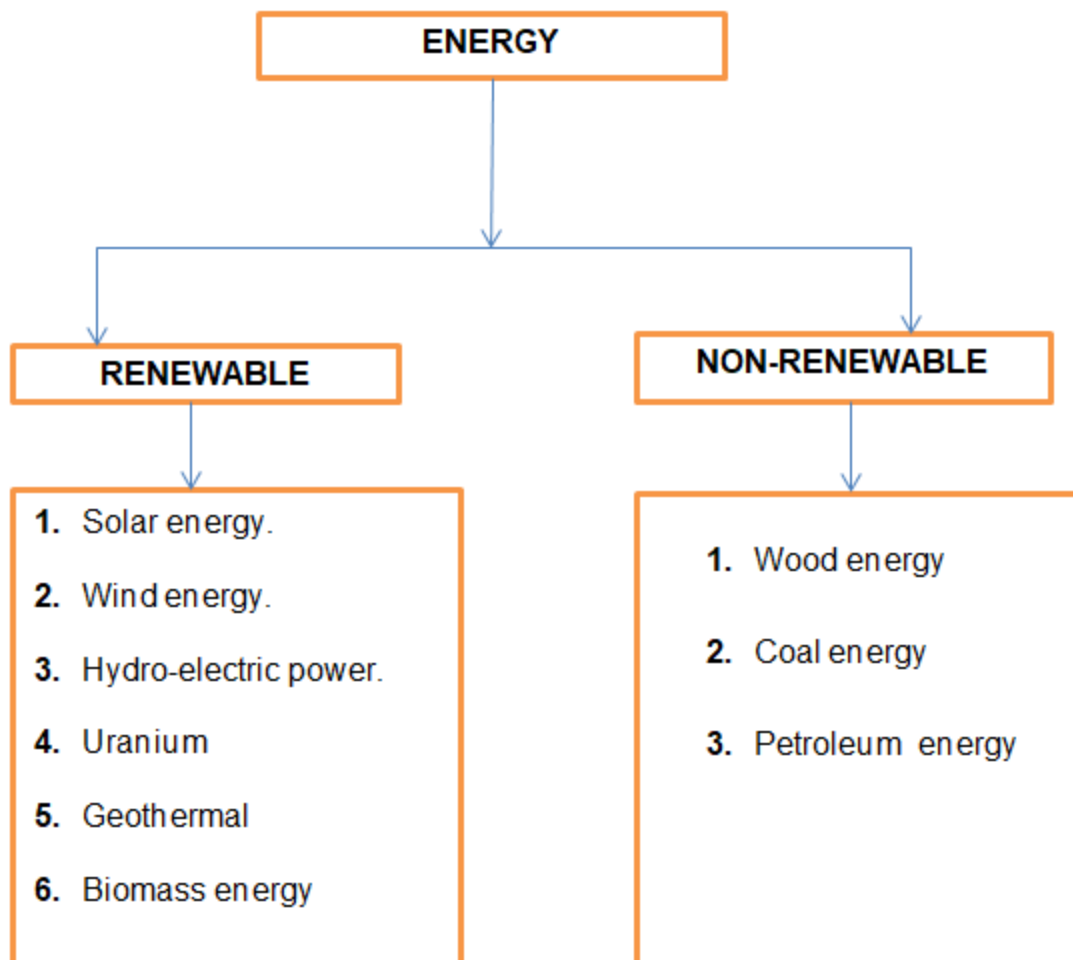
➡ **Power** is the amount of work done per unit of time.

➡ TYPES OF ENERGY

1. Renewable.

2. Non-renewable.

- **Renewable:** those sources that can be regenerated and used over a long period of time.
- **Non-renewable:** are exhaustible if they are not well managed.

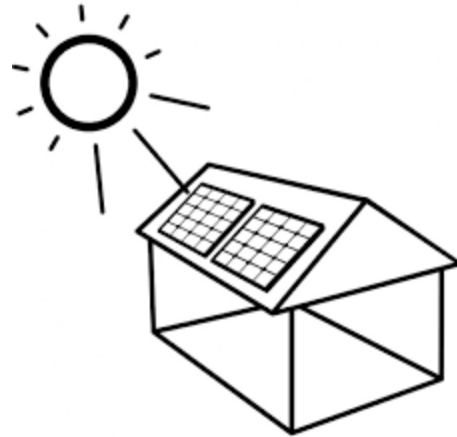


➡ **RENEWABLE SOURCES OF ENERGY**

1) **SOLAR ENERGY**

➡ **USES OF SOLAR ENERGY**

- Heating of water
- Lighting homes
- Drying crops
- Pumping.



➡ **ADVANTAGES OF SOLAR ENERGY**

1. Cheap- absolutely free.
2. Easily available in all parts of the world.
3. Easy to trap and require minimal maintenance cost.
4. Clean, no pollution.
5. It can be stored and used later.
6. It can be used in a different ways.
7. It is an inexhaustible.
8. Lessens the dependence on oil.

➡ **DISADVANTAGES OF SOLAR ENERGY**

1. Has limited use.
2. The storage batteries are cumbersome and must be replaced often.
3. Solar panels are expensive.
4. Solar technology is new most people do not use it.



2) WIND ENERGY

➡ ADVANTAGES OF WIND ENERGY

1. It is an inexhaustible source of energy
2. It is cheap source of energy
3. It is clean source of energy which does not pollute the environment
4. It can be produced on a small-scale basis for local consumers.
5. The land between the windmills can be used for other purposes e.g. agriculture.
6. It is an excellent supplement to other sources of energy such as the sun.

➡ DISADVANTAGES OF WIND ENERGY

1. Relatively expensive to maintain.
2. Low energy production.
3. It is not fully reliable because the wind may change direction.
4. Requires large tract of open land.
5. Generates low energy compared to the cost incurred in the making of windmills.

➡ PROBLEMS FACING THE EXPLOITATION OF WIND ENERGY IN SOMALILAND

1. Lack of appropriate technology
2. Lack of data on wind regime
3. Lack of proper promotion strategies.

3) GEOTHERMAL ENERGY

➡ ADVANTAGES OF GEOTHERMAL ENERGY

1. Cheap- no actual fuel is used to turn the turbines.
2. It is an inexhaustible source of energy.
3. It reduces the overdependence on the exhaustible energy sources.
4. It is good supplement to other sources of energy.
5. The cost of operating is low compared to hydro-electric.

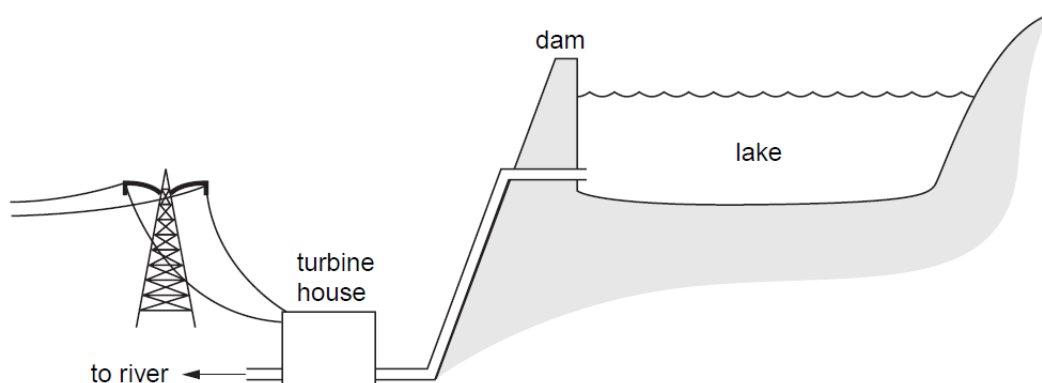
➡ DISADVANTAGES OF GEOTHERMAL ENERGY

1. There is a lot of noise.
2. It is not available in many areas.
3. Requires advanced technology.
4. The gases that are released together with the steam may be harmful to the environment.
5. Low energy production.

4) HYDRO-ELECTRIC

➡ FACTORS THAT FAVOR THE LOCATION OF HYDRO-ELECTRIC POWER

1. **Steep gradient** to provide fast-flowing water with massive hydraulic force to drive the turbines.
2. **Constant supply of a large volume of water** to ensure continuous generation of power.
3. **Hard basement rock** to provide a firm foundation for the construction of a dam. The basement rock should be non-porous to prevent seepage.
4. **Presence of a deep valley** to save on the cost of construction of the dam to provide space for a reservoir.
5. **Sparse population** so to minimize relocation of people.
6. **Availability of market** for the power so as to justify its production.
7. **Availability of capital** for construction of hydroelectric power project and for maintenance of the projects.



➡ **ADVANTAGES OF HYDRO-ELECTRIC POWER**

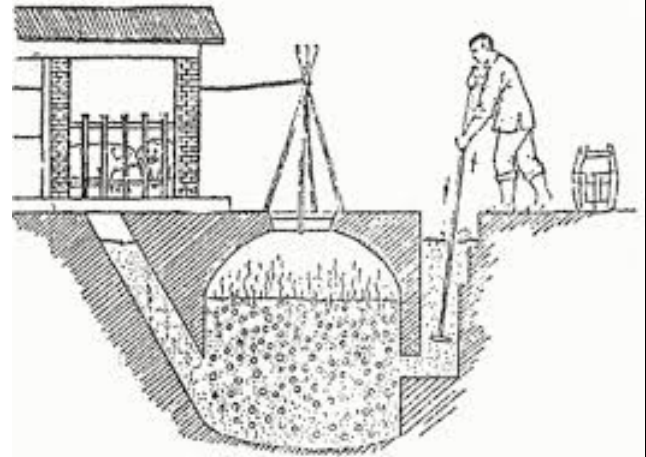
1. Provision of electricity for both industrial and domestic use.
2. Foreign exchange.
3. Fishing ground for local communities.
4. Modifies the local climate and more vegetation is growing around them.
5. Controls flooding.
6. Improvement of infrastructure.
7. Creates employment opportunities.
8. Provides water for irrigation.
9. The government earns revenue from the sale of electricity locally
10. Tourist attraction.
11. Provide water for domestic use.
12. Clean, no pollution.
13. It is an inexhaustible source of energy.
14. Can be transmitted over long distance using cables.
15. It is easy to use as one only needs to operate simple switches.
16. HEP can be put into many uses, e.g. cooking, lighting, cooling and heating.
17. Can be used almost through out the world.

➡ **DISADVANTAGES OF HYDRO-ELECTRIC POWER**

1. Fluctuation of the water levels in the reservoirs.
2. Inadequate capital for HEP development.
3. Siltation of the reservoirs
4. Displacement.
5. Diseases.
6. Separation of people.
7. The initial cost is high.
8. Once generated, HEP cannot be stored.

5) **BIOMASS**

- The main sources of biomass energy include agricultural wastes which consist of crop residue.
- Animal waste such as cow **dung** is also used to produce biogas.
- Biogas is a combustible gas which is generated by the fermentation of organic material such as cow dung.
- Biogas burns with a hot blue flame and can be used for cooking using gas burner



➡ **ADVANTAGES OF BIOGAS ENERGY**

1. Biomass is an inexhaustible source of energy as long as there is organic matter.
2. It is cheap sources of energy as it makes use of waste products.
3. The production of biogas does not require advanced technology.
4. Biomass is available through out the world.
5. Clean burning.

➡ **DISADVANTAGES OF BIOGAS ENERGY**

1. Biogas cannot be used in congested areas such as urban centres because there has to be enough space to set up the digester.
2. It cannot be transported to distant places.
3. It contributes a great deal of pollution particularly if materials are burned directly.

6. URANIUM

- Uranium is a naturally occurring radioactive mineral.

➡ USES OF NUCLEAR ENERGY.

1. Generation of electricity.
2. Making atomic weapons

➡ ADVANTAGES OF NUCLEAR ENERGY

1. It is a reliable source of energy due to a relatively long-lasting supply of raw materials
2. A large amount of energy is produced in nuclear reactors
3. It does not cause pollution

➡ DISADVANTAGES OF NUCLEAR ENERGY

1. Construction of nuclear reactors requires a lot of money and expertise.
2. The waste from the nuclear power plants is highly radioactive.

➡ NON-RENEWABLE SOURCES OF ENERGY

1) WOOD.

- Wood fuel refers mainly to firewood and charcoal.
- This is the most common source of energy particularly in developing countries.
- More than **98%** of **Somaliland's** energy comes from wood fuel.

➡ ADVANTAGES OF WOOD ENERGY

1. It is available throughout the world.
2. No maintenance costs are required.
3. The ashes can be used for plastering traditional houses.
4. It is a cheap source of energy.



➡ **DISADVANTAGES OF WOOD ENERGY**

1. Cutting of trees for wood fuel leads to deforestation and soil erosion
2. Wood fuel is dirty due to the soot and smoke that is given off when wood is burnt.
3. A lot of wood is required because it has less energy output.
4. The gases emitted when wood is burnt pollute the environment.
5. It requires big storage area.

2) **COAL**

- Coal is a black or brown rock chiefly made up of carbon, formed millions of years ago from the compression of vegetative matter.

➡ **CAUSES OF THE DECLINE OF THE USE OF COAL**

1. Use of alternative source of energy which are cheaper e.g. petroleum.
2. Exhaustion of old mines and lack of economically accessible reserves.
3. High cost of production.
4. High cost of transportation.

➡ **TYPES OF COAL**

1. **Peat**: brownish fibrous substance which is in the early stages of coal formation.
2. **Lignite**: brown coal which has a carbon content of less than **4%**, and which gives out only moderate amount of heat.
 - It is used mainly for the production of thermal electricity.
3. **Bituminous**: a coal which has a carbon content of between **45%** and **80%**.
 - Because of this, it gives off more heat than lignite.
4. **Anthracite**: is a very hard coal which has at least a **90%** of carbon content.
 - This enables it to burn with great heat; and little smoke.

➡ **ADVANTAGES OF COAL ENERGY**

1. It is more efficient in generating thermal electricity than oil.
2. Suitable for smelting iron ore.

➡ **DISADVANTAGES OF COAL ENERGY**

1. It is exhaustible source of energy.
2. It is bulky, hence difficult and expensive to transport.
3. Causes environmental degradation.
4. Coal has low heat energy.
5. Causes environmental pollution from smoke produced.

3) **PETROLEUM**

- Petroleum is fossil fuel and is also called crude oil.

➡ **ADVANTAGES OF PETROLEUM**

1. Easily obtained from the ground.
2. Can be transported cheaply and easily by tankers and pipelines.
3. Can be used to generate other sources of energy.
4. Have wide range of domestic and industrial uses.

➡ **DISADVANTAGES OF PETROLEUM**

1. Crude oil is bulky.
2. It is exhaustible source of energy.
3. Burning of petroleum pollutes the environment.
4. It is expensive
5. It is highly flammable.

➡ **ENERGY CRISIS**

- An **energy crisis** is a situation whereby the demand for oil is higher than the amount that is being supplied, leading to high oil prices.
- As the price of oil increases, the prices of almost all other products and services also increase.

➡ **CUASES OF ENERGY CRISIS**

1. Sharp rise in demand.
2. Withholding of oil by producing countries during wars.
3. The depletion of oil reserves.
4. The control of oil resources by a few petroleum-producing countries.
5. Unequal pattern of crude oil distribution in the world.

➡ **EXAMPLES OF ENERGY CRISIS IN THE PAST**

- a) **1973** and **1974** when there was war between Israel and Arab countries. The Arab countries which are **OPEC** members withheld oil supply to Israel supporting countries, USA and the result was sharp increase in oil prices.
- b) 1991 first Persian Gulf War caused by Iraq invasion of Kuwait. Causes of the war were:
 - 1) Iraq's claim that Kuwait was its territory.
 - 2) Kuwait was taking oil from Iraq "oil from Rumaila fields which lay beneath both countries.
 - 3) Kuwait was exceeding the oil production limits set by OPEC.
 - Many Kuwait's oil fields were set on fire and Iraq dumped about 465 million gallons of Kuwait's crude oil to the Persian Gulf. These resulted major oil crisis which was worsened by the trade embargo.
- c) 2003 second Persian Gulf War. Iraq had failed to destroy weapons of mass destruction which she had agreed to do for the 1991 war end. The war led to rapid increase in oil prices from US\$ 35 at start of war to US\$50 by 2004. It forced OPEC members to increase daily crude oil output by 8% to stabilize the price.

➡ **EFFECTS OF ENERGY CRISIS.**

1. Consumption of large amount of foreign exchange due to increased oil imports
2. increased transport cost due to increased fuel prices.
3. Increased cost of commodities.
4. Reduced consumption of goods and services.
5. High cost of production of power using generators.
6. Widespread of unemployment due to lay off in some workers.
7. Depletion of oil reserves due to increased demand.

➡ **MANAGEMENT AND CONSERVATION OF ENERGY**

- 1) **Management of energy:** refers to the effective planning and control of available energy resources.
- 2) **Conservation of energy:** entails using the available resources in the most efficient manner to ensure there is no wastage.

➡ **MEASURES TO CONSERVE ENERGY.**

1. Controlling importation of fuel consuming vehicles.
2. Encouraging people to use public transport.
3. Creating awareness on importance of conserving energy.
4. Planning road network to reduce traffic jams which leads to consumption of more fuel.
5. Development and use of renewable sources of energy, e.g. solar energy.
6. Planting of trees to ensure availability of wood fuel.