

LESSON NOTES

Subject: Basic Science

Year/Level: **9**

Week 25

Strand	3: ENERGY
Sub Strand	3.1 : ENERGY SOURCE AND TRANSFER
Content Learning Outcome	Investigate different sources of energy.

Energy

- ❖ power to change things.
- ❖ ability to do work.
- ❖ lights our towns and cities
- ❖ powers our vehicles
- ❖ runs machinery in factories.
- ❖ warms and cools our homes
- ❖ cooks our food
- ❖ plays our music
- ❖ gives us pictures on television.
- ❖ Joule:
 - unit of energy
 - equal to 0.2388 calories.
- ❖ When man lived in caves and began to hunt, he would make a fire to roast the animal he had hunted. He used the firewood he found in his surroundings for this purpose and thus man began to make use of heat energy. The substance that produces energy on burning is called “fuel”.

Sources of Energy

- ❖ The Sun is our principal source of energy.

TYPE OF ENERGY	DEFINITION	ADDITIONAL INFORMATION
Wood/firewood Energy	used as fuel in rural areas	<ul style="list-style-type: none">• One kilogram wood gives about 1700 kilojoules of energy.• use of wood for fuel could cause the:<ul style="list-style-type: none">✓ destruction of forests✓ endanger the environment.• Charcoal:<ul style="list-style-type: none">✓ formed when wood is burnt in insufficient air.✓ burns without producing smoke.

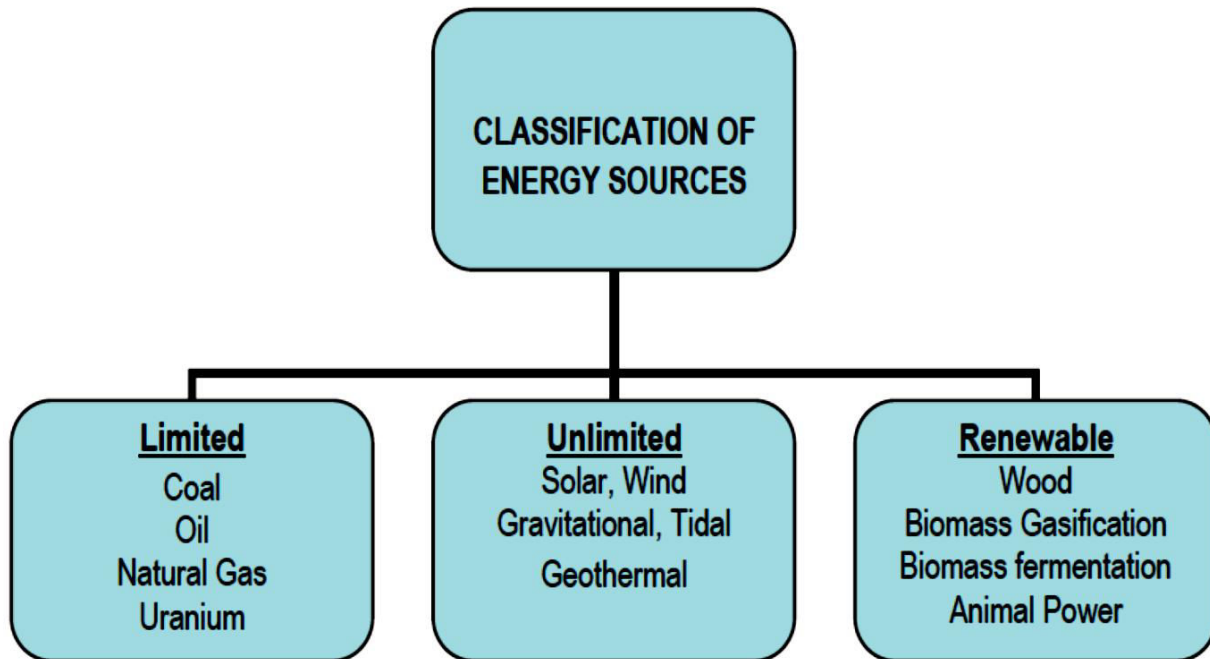
TYPE OF ENERGY	SOURCE OF ENERGY	ADDITIONAL INFORMATION
Wind energy	kinetic energy associated with the movement of atmospheric air.	<ul style="list-style-type: none"> • used for hundreds of years for: <ul style="list-style-type: none"> ✓ sailing ✓ grinding grain ✓ irrigation. • convert kinetic energy to more useful forms of power. • Wind turbines: <ul style="list-style-type: none"> ✓ transform the energy in the wind into mechanical power which can then be used directly for grinding. ✓ further converting to electric power to generate electricity. ✓ can be used singly or in clusters called ‘wind farms’. Example as in Butoni Wind Farm (on-trial basis)
Hydro Power Energy	electricity produced from generators driven by water turbines	<ul style="list-style-type: none"> • Water turbines: <ul style="list-style-type: none"> ✓ converts the energy in falling or fast-flowing water to mechanical energy. ✓ Water at a higher elevation flows downward through large pipes or tunnels. ✓ falling water rotates turbines, which drive the generators, which converts the turbines mechanical energy into electricity. • <u>Advantages of hydroelectric power</u> <ul style="list-style-type: none"> ✓ continually renewable ✓ produces no pollution. ✓ Example in Fiji is the Monasavu hydro power.
Solar energy	<ul style="list-style-type: none"> ❖ radiant light and heat from the Sun that has been harnessed by humans since ancient times using a range of ever evolving technologies ❖ changes light energy from the sun directly into electricity. 	<ul style="list-style-type: none"> • <u>Solar cells found in:</u> <ul style="list-style-type: none"> ✓ Solar powered calculators ✓ Watches ✓ satellites. • <u>Solar panels:</u> <ul style="list-style-type: none"> • painted black to trap the heat energy from the sun. • Heat trapped is used for heating the water flowing through the panels. • Hot water is either used or stored in insulated tanks for use in the future. • Found in rooftop of houses/ tall buildings. • A partial list of solar applications includes space heating and cooling through solar cooker, solar cell, solar heater etc.
Geothermal energy	<ul style="list-style-type: none"> *heat from within the earth *use the steam and hot water produced with the earth to heat buildings or generate electricity. 	<ul style="list-style-type: none"> • renewable energy source because water is replenished by rainfall and the heat is continuously produced inside the earth. • generated in the earth’s core, about 4 miles below the surface. • Temperatures hotter than the sun’s surface are continuously produced inside the earth by the slow decay of radioactive particles, a process that happens in all rocks. • An example is the Savusavu Hot Spring.

TYPE OF ENERGY	SOURCE OF ENERGY	ADDITIONAL INFORMATION
Ocean Thermal Energy or Ocean Thermal Energy Conversion (OTEC)	<p>*turn the solar energy trapped by the ocean into useable energy.</p> <p>*found in tropical oceans where the water temperature differs from surface to deeper into the sea.</p>	<ul style="list-style-type: none"> • ocean surface it can be at least 20°C hotter or cooler than the temperature at a deeper sea level. • relatively clean • will not produce more pollutants that contribute to global warming. • OTEC plants: <ul style="list-style-type: none"> ✓ most suitable for islands around the tropical region of the East Pacific Ocean. ✓ can provide both energy and pure water at the same time with a relatively low cost.
Wave Power Energy	<p>wind blows with enough consistency and force to provide continuous waves and there is tremendous energy in the ocean waves.</p>	<p>Wave Power Devices:</p> <ul style="list-style-type: none"> ✓ extract energy directly surface motion of ocean waves or from pressure fluctuations below the surface. ✓ designed to be installed in near shore, offshore and far offshore locations. ✓ intended to be installed at or near the water's surface, they differ in their orientation to the waves with which they are interacting and in the manner in which they convert the energy of the waves into other energy forms, usually electricity.
Nuclear Energy	<p>*Changes can occur in the structure of the nuclei of atoms. These changes are called <u>nuclear reactions</u>.</p> <p>*Energy created in a nuclear reaction is called <u>nuclear energy</u>, or <u>atomic energy</u></p>	<ul style="list-style-type: none"> • Nuclear is produced naturally and in man-made operations under human control. • Nuclear fission: <ul style="list-style-type: none"> ✓ nuclei of atoms are split, causing energy to be released. ✓ atomic bomb and nuclear reactors work by fission. ✓ Uranium: <ul style="list-style-type: none"> ❖ Main fuel used to undergo nuclear fission to produce energy ❖ has many favourable properties. ❖ Uranium nuclei can be easily split by shooting neutrons at them. ❖ Once split, multiple neutrons are released which are used to split other uranium nuclei.

Chain reaction.

- In nuclear fusion, the nuclei of atoms are joined together or fused.
- This happens only under very hot conditions.
- The Sun like all other stars, creates heat and light through nuclear fusion.
- In the Sun, hydrogen nuclei fuse to make helium.
- The hydrogen bomb, humanity's most powerful and destructive weapon, also works by fusion.
- The heat required to start the fusion reaction is so great that an atomic bomb is used to provide it.
- Hydrogen nuclei fused to form helium and in the process release huge amounts of energy thus producing a huge explosion.

Classification of Energy Sources



ACTIVITY:

1) List down the 7 Sources of energy.

- a) _____
- b) _____
- c) _____
- d) _____
- e) _____
- f) _____
- g) _____

2) Define Nuclear Reaction.

...STAY SAFE... 