MSBTEs Study Material

<Program Code:**CE**>: <Course Code:**22447**>: <Course Name:**Environmental Studies**>:
<**Unit-II:Energy Resources**>: <**UO: 2a**>: <**Study Material**>

<**1. Mr. N. Sulbhewar** **2. Swati Ingale**>	<**11 July 2020**>	<**Dr. D. K. Parbat**>
Key words Forest Water Land Mineral Energy	**Learning Objective:** UO 2a: List various natural resources.	**Diagram/ Picture** 
Key Questions: What is Resources? What is Natural Resources? State the Functions of forest resources	**Concept Map:**  	**Types of Natural Resources** 1. Forest Resources 2. Water Resources 3. Land Resources 4. Mineral Resources 5. Energy Resources
	Explanation of Concept: **Natural Resources** Resources that are drawn directly from the nature and used without modifications are called Natural Resources. E.g.: air, water, minerals etc. **Functions of forest resources** • **Productive Functions:** Timber, bamboos, food, essential oils Latex, medicines etc. • **Protective Functions** Conversation of soil and water Prevention of drought Protection against wind, cold, radiation, noise. • **Regulative Functions** Absorption, storage and release of gases, water, mineral elements. **Importance of Water** • Water is an essential natural resource for sustaining life. • Water is one of the most important substance on earth. • If there is no water there would be no life on earth. • All plants and animals must have water to survive. • Water forms 60% of our body weight. • Water is a renewable and limiting resource.	**Key Definitions/ Formulas:** **Resources:** Anything, which is useful to man, or can be used to produce a useful thing, can be referred as 'resources'. Example: rocks, minerals, soil, rivers, plants & animal. **1. Forest Resources** • Forest is an area with a high density of trees, together with other plants, covering a large area of land. • Forests are home to 50% to 90% of earth's species. • These forests not only produce innumerable material goods **2. Water Resources** • Earth is known as the "Blue Planet" because 71 % of the Earth's surface is covered with water. • About 97% of the earth's water is strong saline. • The rest 3% is freshwater. • Fresh Water Sources 1. Glaciers- 70% 2. Underground Water- 29% 3. Rivers and lakes- 1% • Only 1 % is pure and usable water. **Uses of water:** Agricultural Uses Industrial Uses Household Uses Recreational Uses

Solved word Problem: Answers of above questions are covered in study material.	**Uses of Land Resources** 1. Agricultural Land: **Agricultural land** is typically land devoted *to* agriculture. It is land capable of being ploughed and used to grow crops. 2. Habitat for animals and plants: A **forest** is a large area of **land** dominated by trees. **Forest** is a **habitat** for many plants and **animals** because it provides a suitable environment for them. 3. Industrial and commercial Area: Commercial area is generally reserved for businesses like offices, retail stores, restaurants or bars. 4. Residential Area: **Residential area** means land used as a permanent residence or domicile, such as a house, apartment, nursing home, school, child care facility. **Uses of Minerals** ► Development of industrial plants and machinery. ► Generation of energy e.g. coal, lignite, uranium. ► Construction, housing, settlements. ► Defense equipment weapons, armaments. ► Communication- telephone wires, cables, electronic devices. ► Agriculture – as fertilizers, seed dressings and fungicides ► Jewellery– e.g. Gold, silver, platinum, diamond. **Renewable sources of Energy** ► The unlimited sources of energy which will not be exhausted in any near future are known as the renewable sources of energy. ► These energy sources are continuously replenished at a constant rate. **Non-renewable of Energy** ► The exhaustible sources of energy that once used, cannot be reused are known as non-renewable sources of energy. ► These sources of energy are known as fossil fuels and these took millions of years to form and cannot be regenerated in a matter of years.	**3.Land Resources** ► Land is among the most important natural resources. It covers up only 29% of the earth's surface ► Land is a naturally occurring finite resource. It provides the base for survival of living beings. It holds everything that constitutes terrestrial ecosystems. **Uses of Land Resources** 5. Waste Disposal Area (Landfills) :**Proper** solid-**waste** collection and disposal is **important** for the protection of public health, safety, and environmental quality. 6. Mineral source: **Mineral** resources are **the** most **important** benefits obtained from land as it accelerate Industrial and economic development of a **country** **4.Mineral Resources** ► Minerals are naturally occurring, inorganic, crystalline solids having a definite chemical composition and characteristic physical properties. ► Minerals are exhaustible. **Types of Minerals** ► Metallic minerals – e.g. Bauxite, Haematite, iron, copper, silver, gold etc ► 2. Non-metallic minerals – e.g.Coal, Limestone, Marble, Granite, sand, stone, salt, phosphate **5.Energy Resources** ► The substances from which we produce energy are known as energy sources. ► We need energy for our day to day life. ► The energy we use are of two broad categories: 1.Renewable energy 2.Non-renewable energy **The renewable sources of energy include:** 1. Solar power 2. Hydro power 3. Wind energy 4. Tidal energy 5. Geothermal energy 6. Biogas **The Non-renewable sources of energy include:** 1. Coal 2. Petroleum 3. Natural gas
	Application of Concept/ Examples in real life:	**Link to YouTube/ OER/ video:**
Key Take away from this UO: **Student can List various natural resources.**		

MSBTEs Study Material

<Program Code: **CE**>: <Course Code:**22447**>: <Course Name: **Environmental Studies**>:
<**Unit-II:Energy Resources**>: <**UO: 2b**>: <**Study Material**>

<1. **Mr. N. Sulbhewar** **2. Swati Ingale**>	**<11 July 2020>**	**<Dr. D. K. Parbat>**

Key words
Renewable
Non-renewable
Cyclic

Learning Objective:
UO 2b: Describe Renewable, Non-renewable and Cyclic resources.

Diagram/ Pictur

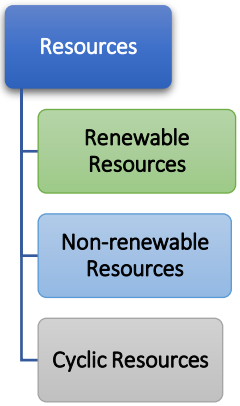
Key Questions:

What is Renewable Resources?

What is Non-renewable Resources?

What is Cyclic Resources?

Concept Map:



Types of Resources
1. Renewable Resources
2. Non-renewable Resources
3. Cyclic Resources

Explanation of Concept:

- **Examples of Renewable Resources**
  1. Solar power
  2. Hydro power
  3. Wind energy
  4. Tidal energy
  5. Geothermal energy
  6. Biogas

1. Solar power

- The Sun is a powerful source of energy that provides the Earth with as much energy every hour as we collectively use in a year worldwide.
- It is the life sustaining source of energy. The solar energy helps in maintaining the changes in the atmosphere and climate cycle.
- **Uses:**

1. Solar Cooker
2. Solar water heater
3. Solar electricity generator

2. Hydro power

- Hydro power is the energy derived from the falling water or running water.
- Falling water is channeled through water turbines which rotates a shaft and drives an electrical generator, converting the motion into electrical energy.
- Dams are constructed across the river is used for generating Hydro electricity
- **Uses:**

1.Itcan generate **power** to the grid immediately, they provide essential back-up **power** during major **electricity** outages or disruptions.
2. Hydropower efforts produce a number of benefits, such as flood control, irrigation, and water supply.

Key Definitions/ Formulas:

1. Renewable Resources

- Resources that can be replenished naturally in the course of time are called Renewable Resources.
- These energy sources are continuously replenished at a constant rate.

1.Solar power

2. Hydro power

Solved word Problem:

Answers of above questions are covered in study material.

3. Wind energy

- Winds are caused by the uneven heating of the atmosphere by the sun, the irregularities of the earth's surface, and rotation of the earth.
- Large wind farms consist of hundreds of individual wind turbines which are connected to the electric power transmission network.
- **Uses:**

1. The wind energy can be converted into mechanical and electrical energies to generate electricity using wind mills.

4. Tidal energy

- The energy derived from the rise and fall of the sea tide is converted into electricity at Sea shore.
- **Uses:**

1. Tidal energy is used to rotate turbines and generate electricity.
2. Energy Storage – Tidal Energy can also be used as a store of Energy.

- Although not yet widely **used**, **tidal energy** has the potential for future electricity generation because **Tides** are more predictable than the wind and the sun.

5. Geothermal energy

- Geothermal energy is thermal energy generated and stored in the Earth.
- This is the heat of the interior of the earth present at volcanic regions, geysers or hot springs.
- **Uses:**

1. It is utilized to generate electricity.
2. It is used for heating building, raising plants in greenhouses, drying crops, heating water at fish farms, and several industrial processes, such as pasteurizing milk.

6. Biogas

- Biogas plant turns dung and organic waste into a clean, nonpolluting, low cost fuel and organic manure which can be distributed in the fields.
- Gobar Gas is a smokeless domestic fuel. It can be produced from cattle dung and other farm organic matters.
- The methane gas is generated from Gobar Gas Plant which having high Calorific value.
- **Uses:**

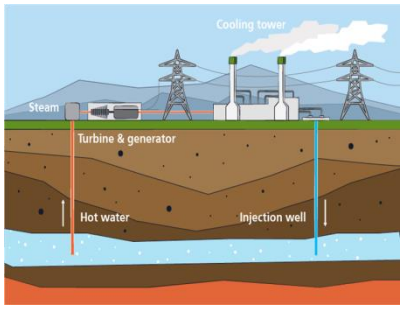
1. It is used for cooking purpose as well as for lighting the outdoor street lamp.

- **Examples of Non-renewable Resources**
  - **1. Oil**
  - **2. Natural gas**
  - **3. Coal**
  - **4. Nuclear fuels**

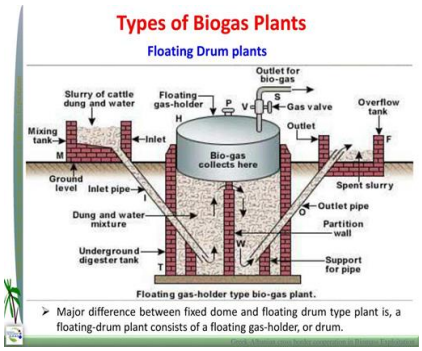
3. Wind energy

4. Tidal energy

5. **Geothermal energy**



6. **Biogas**



2. Non-renewable Resources

- Resources that exist in limited supply and can not be replaced if they are used up are called Non- renewable Resources.
- These energy sources are Exhaustible

1. Oil

- ► Liquid petroleum -crude oil- is the only nonrenewable resource in fluid form.
- ► Industrial nations, with the U.S. far in the lead, are the biggest consumers of crude oil.
- ► **Uses:**

1. For Getting Gasoline, heating oil, and diesel fuel.
2. Manufacturers utilize oil as the base for Some products like plastics and industrial chemicals.

2. Natural gas

- ► Natural gas is a fossil fuel formed when layers of buried plants, gases, and animals are exposed to intense heat and pressure over thousands of years.
- ► Once drillers extract natural gas, processing plants remove the propane and butane to obtain liquefied petroleum gas (LPG)
- ► **Uses:**

1. LPG is used as a household and industrial fuel
2. LPG is also used as a fuel in Vehicles.

3. **Coal**

- ► Coal is the product of millions of years of pressure on original plants organic matter buried underground.
- ► It is a combustible black or brownish-black sedimentary rock.
- ► Anthracite, the purest form of coal, contains about 94 - 95% of carbon.
- ► **Uses:**

1. At the power plant, coal is commonly burned in a boiler to produce steam. The steam is run through a turbine to generate electricity.
2. It is also used for metallurgical, industrial and domestic purposes.

4. Nuclear fuels

- ► Nuclear power, or nuclear energy, is the use of exothermic nuclear processes, to generate useful heat and electricity.
- ► The term includes nuclear fission, nuclear decay and nuclear fusion.
- ► **Uses:**

Nuclear fuel is used in nuclear power stations to produce heat to power turbines for electricity generation.

Example of Cyclic Resources

- ► For example, water used in industry and domestic ways can be cleaned and used again for similar or other purpose. Such resources are given the name of Cyclic Resources.

3. Oil

4. Natural gas

5. Coal

6. Nuclear fuels

3. Cyclic Resources

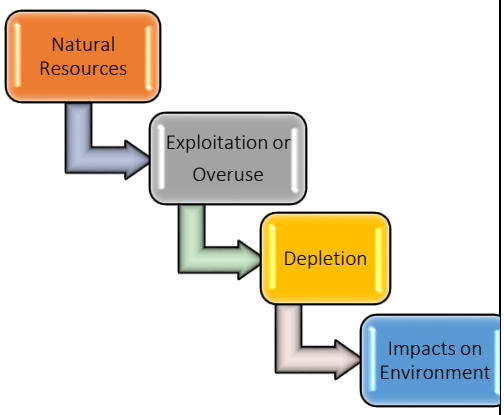
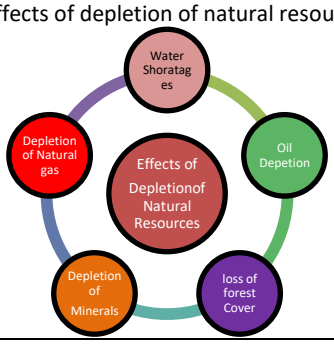
The resources which can be used again and again after passing through some processes are known as cyclic resources.

	Application of Concept/ Examples in real life:	**Link to YouTube/ OER/ video:**

Key Take away from this UO:
Information about various Renewable, Non-renewable &Cyclic Resources

MSBTEs Study Material

<Program Code: **CE**>: <Course Code:**22447**>: <Course Name: **Environmental Studies**>:
<**Unit-II:Energy Resources**>: <**UO: 2c, 2f**>: <**Study Material**>

<1. **Mr. N. Sulbhewar 2. Dr. N.S.Raman**>	**<11 July 2020>**	**<Dr. D. K. Parbat>**
Key words Natural Resources, Depletion, Impacts on environment	**Learning Objective:** UO 2c: State the causes and effects of depletion of resources. UO 2f: State the impacts of over use of natural resources.	**Diagram/ Picture** 
Key Questions: What are caused of depletion of natural resources? What are effects of depletion of natural resources? What are impacts of over use of natural resources on environmrnt?	**Concept Map:** 	**Depletion of Natural Resource** ► Resource Depletion occurs when the renewable and non-renewable natural resources become scarce because they are consumed faster than they can recover.
	Explanation of Concept: **Causes of depletion of Natural Resource** 1. Overpopulation: ► "Population growth is driving all of our resource problems, including water, agricultural land and energy," ► The Earth can only produce a limited amount of water and food, which is falling short of the current needs. 2. Overconsumption: ► This is the excessive and unnecessary use of resources. ► Natural resources in many regions are owned by private companies but they misuse it for getting more profit. 3. Wastage: ► Without paying much attention, we use a lot of electric energy each day from charging electronics to watching TV ► Similarly Water is also wasted in various domestic and industrial works. 4. Deforestation: ► Natural calamities like hurricanes, forest fires, parasites and floods destroys the Forests ► Human activities as agricultural expansion, cattle breeding, timber extraction, mining, oil extraction, dam construction and infrastructure development.	**Key Definitions/ Formulas:** **Causes of depletion of Natural Resource** 5. Mining of Minerals and Oil. ► The increased exploitation of different minerals has led to some of them entering into a production decline. For example, minerals such as Gasoline, Copper, and Zinc production are estimated to decline in the next 20 years. 6. Technological and Industrial Development: ► Industrial and technological advancements have also driven the demand for virgin materials for research, development, and production. ► More resources are hence being used to satisfy the industrial demands, increasing the rate of natural resource depletion. 7. Pollution and Contamination of resources: ► The poor quality of wastewater effluents is responsible for the degradation of the receiving surface water body. It is harmful for the aquatic ecosystem. ► The wrong Agricultural practices contaminates the land resources and make it unsuitable for cropproduction Effects of depletion of natural resources 

Solved word Problem:

Answers of above questions are covered in study material.

Overuse of Natural Resources

- We derive numerous useful substances from natural resources but when 'need' turns to 'greed' it starts over exploitation.
- **impacts of Overuse of Natural Resourceson environment**

1. Deforestation.
2. Desertification
3. Soil erosion
4. Land Slides
5. Extinction of species

1. Deforestation

► **Causes of Deforestation**

1. Construction of Roads
2. Mining
3. Hydroelectric projects
4. Forest fires

► **Effects of Deforestation**

The loss of trees and other vegetation can cause climate change, desertification, soil erosion, fewer crops, and flooding, increased greenhouse gases in the atmosphere.

2.Desertification

► **Causes for the origin of manmade deserts**

1. Removal of trees .
2. Modern methods of agriculture instead of more traditional.
3. Over exploitation of fertile soil particularly in areas of low rainfall by cultivating cash crops.

► **Effects of Desertification**

- It reduces the ability of land to support life, affecting wild species, domestic animals, agricultural crops and people.
- The reduction in plant cover results in Drought leads to accelerated soil erosion by wind.

3. Soil erosion

► It is the washing or blowing away of the top layer of the soil.

► Causes of soil erosion

1. RAINFALL- raindrops directly strike the soil surface and detach the soil particles.
2. WIND- transportation of soil and sand particle by wind is best seen in deserts and along the seashore.
3. BIOTIC FACTORS- overgrazing by cattle, cutting down of trees, agricultural activities, construction of buildings and laying of roads.

► Effects of soil erosion

1. It washes away the nutrients in soil resulting in infertility of the soil.
2. It has led to increased pollution and sedimentation in streams and rivers, clogging these waterways
3. Degraded lands are also often less able to hold onto water, which can worsen flooding.

1. Deforestation

- Deforestation is the clearance of forests by logging and/or burning.
- Trees absorb greenhouse gases and carbon dioxide and produce the oxygen we breathe.
- Forests are the habitats of millions of species.

2.Desertification

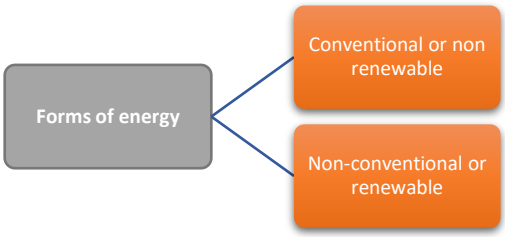
3. Desertification is a process by which fertile land becomes desert.

4. Soil erosion

	4.Land Slides ► Causes of Landslides 1. Rain 2. Cyclones 3. Earthquakes 4. Volcanoes 5. Unsafe Mining Activities ► **Effects of Landslides** The cost to repair structures, loss of property value, disruption of transportation routes, medical costs in the event of injury, loss of timber, Water availability. **5. Extinction of species** ► **Causes of Extinction of species** 1. habitat fragmentation 2. natural disaster 3. decline in population numbers due to poor reproduction **4.** overexploitation of species for human **use** ► Effects of Extinction of species extinction can also impact populations of prey, which can cause dramatic ecosystem and food web changes.  **Pyrenean Ibex.** **Solutions for Conserving Natural Resources** ► Controlling deforestation ► Reducing oil, mineral consumption ► More exploration and use of Renewable source of energy like biogas, biofuels etc ► Protecting wetlands and coastal ecosystem ► Awareness creation ► Treatment of industrial wastes and sewages before release in the water bodies. ► Rain water harvesting. ► Ensure the recycling of wastes. ► Sustainable farming practices like crop rotation. ► Constructions of reservoirs	**4. Land Slides** ► It is the movement of rock, earth, or debris down a sloped section of land.  **5.Extinction of species** ► Extinction occurs when species are diminished because of environmental forces  **Formosan Clouded Leopard**  **passenger Pigeon** 
	Application of Concept/ Examples in real life:	**Link to YouTube/ OER/ video:**
Key Take away from this UO: • Know the Causes and effects of depletion of resources • Understand impacts of over use of natural resources on environment.		

MSBTEs Study Material

<Program Code: **CE**>: <Course Code:**22447**>: <Course Name: **Environmental Studies**>:
<**Unit-II:Energy Resources**>: <**UO: 2d**>: <**Study Material**>

<1. **Mr.AnantFulzele** **2. Swati Ingale**>	**<11 July 2020>**	**<Dr. D. K. Parbat>**
Key words Conventional Nonrenewable, Nonconventional, renewable	**Learning Objective:** UO 2d: State advantages and disadvantages of forms of energy.	**Diagram/ Picture** 
Key Questions:	**Concept Map:** 	
	Explanation of Concept: **Forms of energy** There are two forms of energy – 1. Conventional or non-renewable form of energy The various forms of energy included in conventional form can be given as follows- ❑ Thermal energy ❑ Nuclear energy **Conventional form of energy –** ❑ **THERMAL ENERGY** ➢ Thermal energy refers to the energy contained within a system that is responsible for its temperature. ➢ Heat is the flow of thermal energy from high temperature to low temperature. ➢ Thermal energy is the internal energy of an object due to the kinetic energy of its atoms and/or molecules. **ADVANTAGES OF THERMAL ENERGY** ➢ It is one of the most abundant energy sources ➢ Being versatile; can be burned directly, transformed into liquid, gas or feedstock ➢ It is inexpensive compared to other energy sources ➢ It can lower overall amount of greenhouse gases (liquefaction or gasification) ➢ It is Leading source of electricity today ➢ By-product of burning (ash) can be used for concrete and roadways	**Key Definitions/ Formulas:** **Forms of energy** 2. Non-conventional or renewable form of energy The various forms of energy included in non-conventional form can be given as follows- ❑ Solar energy ❑ Wind energy ❑ Tidal energy ❑ Geo thermal energy ❑ Biomass energy ❑ Hydro power energy **Conventional form of energy –**  **DIS-ADVANTAGES OF THERMAL ENERGY** ➢ Source of pollution: emits waste, SO_2 , Nitrogen Oxide, ash ➢ Coal mining mars the landscape ➢ Physical transport is difficult ➢ Technology to process coal into liquid or gas is not fully developed ➢ Solid is more difficult to burn than liquid or gases ➢ High water content reduces heating value ➢ Dirty industry—leads to health problems ➢ Fossil fuels create more pollution and emissions

Solved word Problem:

Answers of above questions are covered in study material.

- **NUCLEAR ENERGY**
  - Nuclear power, or nuclear energy, is the use of exothermic nuclear processes, to generate useful heat and electricity.
  - The term includes nuclear fission, nuclear decay and nuclear fusion.
  - Nuclear fuel is used in nuclear power stations to produce heat to power turbines for electricity generation.

ADVANTAGES OF NUCLEAR ENERGY

- It provides clear power with no atmospheric emissions
- It is useful source of energy
- Its fuel can be recycled
- It gives low cost power for today's consumption
- It is viable form of energy in countries that do not have access to other forms of fuel

Non-Conventional form of energy

- **SOLAR ENERGY**
  - Solar energy is obtained from the sun by capturing the solar radiation and converting it into another form of energy for performing various activities
  - The conversion of solar energy into thermal energy can be done by using solar collectors, whereas in photovoltaic cells, the direct sunlight is used to generate electricity

ADVANTAGES OF SOLAR ENERGY

- Solar energy is clean, noise free and renewable form of energy which causes no pollution
- Very little maintenance is required to keep solar cell running as there are no moving parts in it.
- In the long run it can give high return on investment due to the amount of free energy, solar panels produced

- **WIND ENERGY**
  - Winds are caused by the uneven heating of the atmosphere by the sun, the irregularities of the earth's surface, and rotation of the earth.
  - Large wind farms consist of hundreds of individual wind turbines which are connected to the electric power transmission network.

Advantages of Wind Energy

- Wind Energy is an inexhaustible source of energy and is virtually a limitless .
- Energy is generated without polluting environment.
- This source of energy has tremendous potential to generate energy
- Wind Energy can be used directly as mechanical energy.
- In remote areas, wind turbines can be used as great resource to generate energy.
- In combination with Solar Energy, they can be used to provide reliable as well as steady supply of electricity.
- Land around wind turbines can be used for other uses, e.g. Farming.

DIS-ADVANTAGES OF NUCLEAR ENERGY

- It has potential of high risk / disaster (Chernobyl)
- It has waste disposal problems.
- Waste produced from it is of no use.
- Earthquakes can cause damage and leaks at plants.
- It leads to contamination of the environment (long term)
- Lifetime of a nuclear power plant is limited

Non-Conventional form of energy

DIS-ADVANTAGES OF SOLAR ENERGY

- Electricity generation depend entirely on exposure to sun light which has limitation by climate
- Solar power stations can be very expensive to build as they cannot match the power output of similar sized conventional power stations.
- Solar power is used for charging batteries so that it can be used at night. These batteries can be large and heavy, taking up space and need to be replaced from time to time

Dis-advantages of Wind Energy

- Wind energy requires expensive storage during peak production time.
- It is unreliable energy source as winds are uncertain and unpredictable.
- Requires large open areas for setting up wind farms.
- Noise pollution problem is usually associated with wind mills.
- It can be harnessed only in areas where wind is strong and weather is windy.
- Transmission cost of electricity is more due to remote location of turbine.
- The average efficiency of wind turbine is very less.
- It can be a threat to wildlife and birds.
- Maintenance cost of wind turbines is high as they have mechanical parts.

❑ **TIDAL ENERGY**

- Tides are the waves caused due to the gravitational pull of the moon and also sun (though its pull is very low). The rise is called high tide and fall is called low tide.
- The energy derived from the rise and fall of the sea tide is converted into electricity at Sea shore.

ADVANTAGES OF TIDAL ENERGY

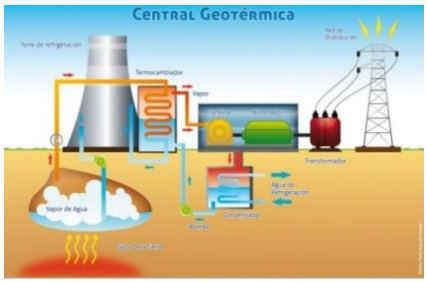
- It is an inexhaustible source of energy.
- Tidal energy is environment friendly energy and doesn't produce greenhouse gases.
- We can predict the rise and fall of tides as they follow cyclic fashion.
- Efficiency of tidal power is far greater as compared to coal, solar or wind energy.
- Although cost of construction of tidal power is high but maintenance costs are relatively low.
- Tidal Energy doesn't require any kind of fuel to run.
- The life of tidal energy power plant is very long.
- The energy density of tidal energy is relatively higher than other renewable energy sources

DISADVANTAGES OF TIDAL ENERGY

- Cost of construction of tidal power plant is high.
- There are very few ideal locations for construction of plant Intensity of sea waves is unpredictable and there can be damage to power generation units.
- Influences aquatic life adversely and can disrupt migration of fish.
- The actual generation is for a short period of time. The tides only happen twice a day so electricity can be produced only for that time.
- Frozen sea, low or weak tides, straight shorelines, low tidal rise or fall are some of the obstructions.
- This technology is still not cost effective and needs more technological advancements.
- Its transmission is expensive and difficult.

❑ **GEOTHERMAL ENERGY**

- Geothermal energy is the energy obtained from the earth (Geo) from the hot rocks present inside the earth.
- This is the heat of the interior of the earth present at volcanic regions, geysers or hot springs.
- Geo-thermal energy is one of the rare forms of energy.



ADVANTAGES OF GEOTHERMAL ENERGY

- It is a renewable source of energy.
- By far, it is non-polluting and environment friendly.
- There is no wastage or generation of by-products.
- Geothermal energy can be used directly. In ancient times, people used this source of energy for heating homes, cooking, etc.
- Maintenance cost of geothermal power plants is very less.
- Geothermal power plants don't occupy too much space and thus help in protecting natural environment.
- Unlike solar energy, it is not dependent on the weather conditions

DISADVANTAGES OF GEOTHERMAL ENERGY

- Only few sites have the potential of Geothermal Energy.
- Most of the sites, where geothermal energy is produced, are far from markets or cities, where it needs to be consumed.
- Total generation potential of this source is too small.
- There is always a danger of eruption of volcano.
- Installation cost of steam power plant is very high.
- There is no guarantee that the amount of energy which is produced will justify the capital expenditure and operations costs.
- It may release some harmful, poisonous gases that can escape through the holes drilled during construction

❑ **BIOMASS**

- Biomass means all materials which come from living organisms. For instance, waste material of plants and animals, wood, agricultural wastes, dead parts of plants and animals.
- Since all living organisms contain carbon compounds, biomass has energy stored in the form of chemical compounds.
- The method of harnessing energy from each one of them could be different.

	ADVANTAGES OF BIOMASS ENERGY ➢ It's a renewable source of energy and comparatively lesser pollution generating energy. ➢ Biomass energy helps in cleanliness in villages and cities and provides manure for the agriculture and gardens. ➢ Biomass energy is relatively cheaper and reliable. ➢ It can be generated from everyday human and animal wastes, vegetable and agriculture left-over etc. ➢ Recycling of waste reduces pollution and spread of diseases. ➢ Growing biomass crops use up carbon dioxide and produces oxygen. ❑ **HYDRO POWER ENERGY** ➢ Hydropower or hydroelectricity refers to the conversion of energy from flowing water into electricity. ➢ It is considered a renewable energy source because the water cycle is constantly renewed by the sun **ADVANTAGES OF HYDRO POWER ENERGY** ➢ Hydropower is fueled by water, so it's a clean fuel source. ➢ Hydropower doesn't pollute the air like power plants that burn fossil fuels ➢ Hydropower relies on the water cycle, which is driven by the sun, thus it's a renewable power source. ➢ Hydropower is generally available as needed; engineers can control the flow of water through the turbines to produce electricity on demand. ➢ Impoundment hydropower creates reservoirs that offer a variety of recreational opportunities notably fishing, swimming, and boating.	**DISADVANTAGES OF BIOMASS ENERGY** ➢ Cost of construction of biogas plant is high, so only rich people can use it. ➢ Continuous supply of biomass is required to generate biomass energy. ➢ Biogas plant requires space and produces dirty smell. ➢ Due to improper construction many biogas plants are working inefficiently. ➢ It is difficult to store biogas in cylinders. ➢ Transportation of biogas through pipe over long distances is difficult. ➢ Crops which are used to produce biomass energy are seasonal  **DIS ADVANTAGES OF HYDRO POWER ENERGY** ➢ Fish populations can be impacted if fish cannot migrate ➢ Hydropower can impact water quality and flow. ➢ Hydropower plants can cause low dissolved oxygen levels in the water, a problem that is harmful to riparian (riverbank) habitats ➢ Maintaining minimum flows of water downstream of a hydropower installation is also critical for the survival of riparian habitats. ➢ Hydropower plants can be impacted by drought
	Application of Concept/ Examples in real life:	**Link to YouTube/ OER/ video:**
Key Take away from this UO: Students can List advantages and disadvantages of various energy forms		

MSBTEs Study Material

<Program Code: **CE**>: <Course Code:**22447**>: <Course Name: **Environmental Studies**>:
<**Unit-II:Energy Resources**>: <**UO: 2e**>: <**Study Material**>

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Key words
Global Use,
Global demand,
Conservation

Learning Objective:
UO 2e: Select appropriate solutions of efficient use of energy.

Diagram/ Picture

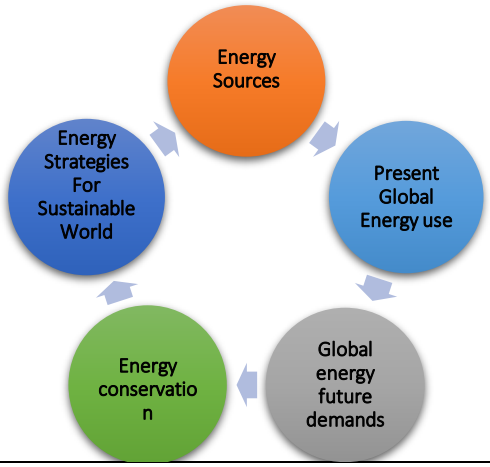
Key Questions:

What is PresentGlobal Energy use?

What are Global energy future demands?

What are the Energy Strategies For A Sustainable World?

Concept Map:



Explanation of Concept:

Present Global Energy use:-

- Energy consumption in developing countries is onlyone-tenth of that in the developed countries.
- Coal and natural gas were the most used **energy** fuels for generating **electricity**.
- The **world's electricity consumption** was 18,608 TWh in 2012.
- In 2018 the total **world energy** came from 64% fossil fuels, 10 % nuclear and 10 % renewable (hydro, wind, solar, geothermal).

Global energy future demands

3. Demand of Natural gas

- It has been the energy source with highest rates of growth in recent years.
- Consumption of gas has increased to 22%.

4. Demand of Renewables:

- The demand for renewable energy wills more than double by 2040, largely backing out coal.
- Hydroelectric power will remain the largest single source of renewable energy, accounting for about half of renewable electricity output in 2040.

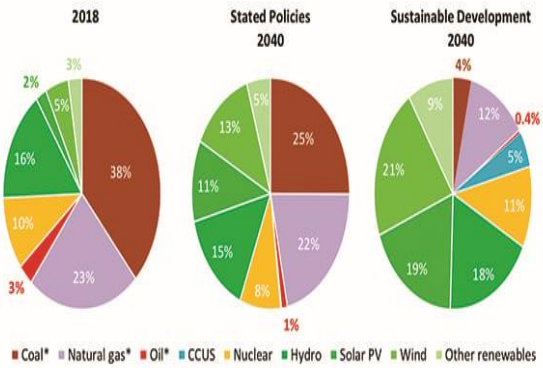
5. Demand of Nuclear power:

- Nuclear power is forecast to grow 87%.
- Its overall share of demand, however, is expected to move from a bit more than 4% in 2012 to not quite 6% in 2040.

6. Demand of other energy sources

- World electricity demand increase at a rate of 2.5%.
- Transportation energy consumption increases by nearly 40% between 2018 and 2050

Key Definitions/ Formulas:



Global energy future demands

- ► World primary energy demand increase by 1.6% per year on an average.
- ► The Energy Information Administration (EIA) recently released it latest International Energy Outlook (IEO), its forecast from 2012 out to 2040 is as follows:

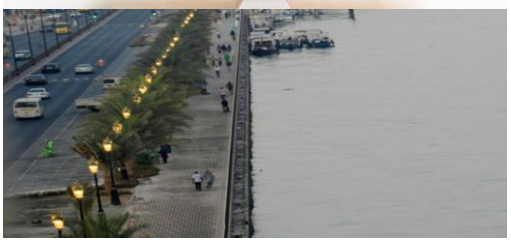
1. **Demand of Oil**

- is the most important and most highly consumed source of energy in the world.
- Demand of oil rise from 85 million barrel per day to 106 mb.
- Developed industrialized countries consume 43 million barrels daily on an average while developing countries consume only 22 million barrels.

2. Demand of Coal

- It is the second most abundant source of energy in the world and is highly used in power generation.
- Coal ranks quite low in terms of consumption. Its demand increases to 26 %

https://www.globalenergyinstitute.org/future-global-energy-demand-and-away

	Energy conservation ► **WHY TO CONSERVE IT ?** • We have limited resources available on earth and our demands are continuously increasing day by day. • It is possible that someday most of the non- renewable resources will be exhausted hence it is necessary to save non-renewable energy resources. • Energy conservation increases national, personal and financial security. **What We Can Do at Personal Level?** ► **At Home** • We should not keep lights unnecessarily switched on. • Reduce the energy your appliances consume by analysing star ratings. • Improve your water heating efficiency to reduce energy costs. ► **At Public Places** • Switch off the fans and lights in the places like bus terminal and railway stations when not necessary. • Switch off the street lights. • Big Hoardings, lightened up for the whole evening and nights are other wastage of power which can be and should be avoided	**Energy conservation** We save our money when we save energy.  We reduce pollution when we save energy  
Solved word Problem: Answers of above questions are covered in study material.	**Energy Strategies For A SustainableWorld** ► Medium-term strategy: • Demand management through conservation of energy, structural changes in economy, model mix in transportation sector, recycling • A shift to less energy-intensive modes of transport • Shift to renewable sources of energy. ► **Long – term strategy** • Efficient generation of energy resources. • Improving energy infrastructure • Creation of urban gas transmission and distribution network. • Improving energy efficiency in accordance with national,socio-economic & environmental priorities. • Promoting of energy efficiency & emission standards. • Programs for adopting energy efficient technologies in large industries. • Deregulation and privatization of energy sector • Streamlining approval process for attracting private sector participation in power generation, transmission & distribution.	**What We Can Do at Global Level?** **Energy Strategies For A SustainableWorld** ► **Necessary condition for socio-economic change to lead to a sustainable world must include:** • Satisfaction of basic needs of the peoples • Economic viability • Self-reliant interdependence of nations • Harmony with the environment ► **Energy strategies for future can be classified as:** 1. Immediate 2. Mid-term 3. Long term ► Immediate term strategy: • Optimum utilization of existing assets. • Efficiency in production system & reduction in distribution losses. • Promoting R&D, transfer and use of technologies forenvironmentally sound energy systems. • Rationalizing Tariff structure of all energy products.
	Application of Concept/ Examples in real life:	**Link to YouTube/ OER/ video:**
Key Take away from this UO: • Knowledge about Global use and future demand of energy • Understand about various methods of energy conservation		