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Q1: define energy resources, briefly explain the wind energy, their advantages and disadvantages.

Ans: Energy resources:

* The energy resources are something that can produce heat, power life, move objects or electricity.
* There are nine major areas of energy resources:
* They fall into two categories:
* Non-renewable energy resources
* Renewable energy resources.
* Nonrenewable energy resources are like coal, nuclear, oil, and natural gas, are available in limited supplies.
* This is usually due to the long time it takes for them to be replenished (to make full or complete again).
* Renewable resources are replenished naturally and over relatively short periods of time.
* The five major renewable energy resources are solar, wind, water (hydro), biomass, and geothermal.

1. Wind energy:

* Wind is a form of solar energy. Wind is caused by the eneven heating of the atmosphere by the sun, the irregularities of the earth’s surface, and rotation of the earth.
* Wind flow patterns are modified by the earth’s terrain, (terrain is defined as the specific physical features of an area of land e.g rocky and jagged coastline bodies of water and vegetative cover).
* This wind flow or motion energy, when “harvested” by modern wind turbines, can be used to generate electricity.

How Wind Power Is Generated

* The terms "wind energy" or "wind power" describe the process by which the wind is used to generate mechanical power or electricity.
* Wind turbines convert the kinetic energy in the wind into mechanical power.
* This mechanical power can be used for specific tasks (such as grinding grain or pumping water) or a generator can convert this mechanical power into electricity to power homes, businesses, schools, and the like.

Wind Turbines

* Wind turbines, like aircraft propeller blades, turn in the moving air and power an electric generator that supplies an electric current.
* Simply stated, a wind turbine is the opposite of a fan. Instead of using electricity to make wind, like a fan, wind turbines use wind to make electricity.
* The wind turns the blades, which spin a shaft, which connects to a generator and makes electricity.

Advantages of wind energy:

* Clean and environment friendly fuel source:
* It doesn’t pollute air like power plant relying on combustion of fossil fuel.
* It does not produce atmospheric emissions that cause acid rain or greenhouse gases (carbon dioxide co2 or methane ch4).
* Noise and visual pollution are both environmental factors, but they don’t have a negative effect on the earth, water table or the quality of the air we breathe.
* Renewable and sustainable:
* Winds are caused by heating of atmosphere by the sun, earth surface irregularities and the rotation of the earth.
* For as long as the sun shines the wind blows, the energy produced can be harnessed and it will never run out, unlike the earth’s fossil fuel reserves.
* Cost effective:
* Wind energy is completely free.
* There is no market for the demand and supply of wind energy’s, it can be used by anyone.
* It is one of the lowest price renewable technologies available today, depending upon the wind resources and the particular financing.
* Industrial and domestic installation:
* Wind turbines can be built on existing farms or ranches where most of the best wind sites are found.
* Wind turbines uses only a fraction of the land which causes no trouble in work for the farmer and ranchers, providing landowners with additional income paid by the owner of the wind power plants.
* Many landowner install smaller, less powerful wind turbines in order to provide part of a domestic electricity supply.

Disadvantages of wind energy:

* Fluctuation of wind and good wind sites:
* Wind energy has a drawback that it is not a constant energy resource.
* Although wind energy is sustainable and will never run out, but the wind is not always blowing.
* This can cause serious problem for the wind turbine developers who will often spend significant time and money investing.
* Whether or not a particular site is suitable for the generation of wind power.
* For a wind turbine to be efficient, the location where it is built need to have adequate supply of wind energy.
* Noise and aesthetic pollution:
* Wind turbine produce noise and visual pollution.
* A single wind turbine can be heard from hundreds of meters away.
* Although steps are often taken site wind turbines away from dwellings.
* Many people like the look of wind turbines, others do not and see it as a blot on the landscape.
* Supply and Transport Issues:
* The major challenge to using wind as a source of power is that it is intermittent and does not always blow when electricity is needed.
* Wind cannot be stored (although wind-generated electricity can be stored, if batteries are used), and not all winds can be harnessed to meet the timing of electricity demands.
* Further, good wind sites are often located in remote locations far from areas of electric power demand (such as cities).
* Finally, wind resource development may compete with other uses for the land, and those alternative uses may be more highly valued than electricity generation.
* However, wind turbines can be located on land that is also used for grazing or even farming.
* Threads to wild life:
* Birds have been killed by flying into the spinning turbine blades.
* Most of the problems have been resolved or greatly reduced through technological development or by properly siting wind plants.

Q2: write a detail note on solar energy:

Ans: Solar energy:

* Solar energy is the technology used to harness the sun's energy and make it useable.
* As of 2011, the technology produced less than one tenth of one percent of global energy demand
* Many are familiar with so-called photovoltaic cells, or solar panels, found on things like spacecraft, rooftops, and handheld calculators. The cells are made of semiconductor materials like those found in computer chips.
* When sunlight hits the cells, it knocks electrons loose from their atoms. As the electrons flow through the cell, they generate electricity.

What is solar energy?

* Solar energy is one of the fastest growing and environmentally sustainable trends in renewable energy.
* Light and heat from the sun is converted into electricity using photovoltaic (PV) solar panels installed on the roof.
* Energy efficient homes and business know that solar energy is a smart investment that will benefit them in the long run.

Solar energy:

* Every square meter of our planet is hit by the sun with more than 1,360 watts of power.
* ½ Energy is either reflected back into the space or absorbs by the atmosphere.
* About 700 watts of energy reaches our earth surface.
* Summed over ½ of the earth that the sun shining on, that is 89 petawatts of energy.
* Solar power in Morocco is enabled by the country having one of the highest rates of solar insolation among other countries about 3,000 hours per year of sunshine but up to 3,600 hours in the desert. Morocco has launched one of the world’s largest solar energy projects costing an estimated $9 billion. The aim of the project is to create 2,000 megawatts of solar generation capacity by the year 2020.

How solar works:

* Solar panels convert the sun’s energy into electricity.
* A control device changes this electricity, enabling it to power electrical items.
* The electricity then passes through a breaker box to outlets in the building.
* Items such as a refrigerator and lamp can plug into the outlets for the power.

Pitfalls (a hidden or unsuspected danger or difficulty)

* Solar energy doesn't work at night without a storage device such as a battery, and cloudy weather can make the technology unreliable during the day.
* Solar technologies are also very expensive and require a lot of land area to collect the sun's energy at rates useful to lots of people.
* Despite the drawbacks, solar energy use has surged at about 20 percent a year over the past 15 years, thanks to rapidly falling prices and gains in efficiency. Japan, Germany, and the United States are major markets for solar cells. Solar electricity can often pay for itself in five to ten years.

Solar cells advantages and disadvantages:

Advantages:

* Moderate net energy yield.
* Little or no direct emissions of co2 and other air pollutants.
* Easy to install, and expand as needed.
* Competitive cost for newer cells.

Disadvantages:

* Needs access to sun.
* Needs electricity storage system or backup.
* High costs for older systems but decreasing rapidly.
* Solar-cell power plants could disrupt desert ecosystems.

Solar cooking:

Solar cooker is a box that traps some sum’s energy to heat, cook, and pasteurize water and other food materials.

Advantages and disadvantages of solar cooking:

Advantages:

* Save energy and time: Solar cooking involves no recurring expenses on fuel.
* Water and milk pasteurizer: Free up bacteria.
* No overcook: there is no fear of scorching the food.
* Flavor and retention of nutrient: Being a slow process ensures better and more nutritious cooked food.
* Pollution free energy: It does not pollute the environment, and conserves conventional energy.
* No maintenance: Solar cookers are durable and simple to use.

Disadvantages:

* Social awareness and acceptance: Low level of social awareness about solar cooking technology among masses.
* Non-commercial: Solar cooking is still non-commercial, evolving technology; it is mostly not “cutout” for the task.
* Climate dependence: A solar cooker works well only on a clear sunny day.
* High cooking time: Solar cooker consumed more time as compared to conventional cooking.

Q3: What is eutrophication, and types of eutrophication in detail.

Ans: what is eutrophication?

* The process when a body of water such as a stream becomes over enriched in nutrients mainly nitrates and phosphates is called eutrophication.
* Harmful algal blooms, of eutrophication commonly known as red/brown tides and hypoxia, formation of dead zones in the water body.
* When the average concentration of soluble inorganic nitrogen exceeds 0.30 parts per million (ppm) and the soluble inorganic phosphorus exceeds 0.01 ppm, algal blooms may appear.
* During the summer the algal bloom problem usually becomes more intense with adverse effects on the whole biota of the lake.
* Waterways are naturally low in nutrients; this limits the growth of water plants.
* One of the most serious ecological problems of open water sources such as lakes, oceans and reservoirs.
* It is characterized by dense algal and plant growth owing to the enrichment by phosphorus and nitrogen nutrients needed for photosynthesis.
* As a result, it often contributes to the formation of extensive mats of floating plants.
* Examples of the plants include algal blooms, Nile cabbage and water hyacinths.
* The nutrients come from animal wastes, fertilizers and sewage which are washed by rain or irrigation into the water bodies through surface runoff.
* Eutrophication can also take place naturally over thousands of years as the lakes grow old and get filled with sediments.
* Human activities top the list that speeds up the degree and rate of eutrophication through both point-source and non-point source discharges of the chemical nutrients (phosphates and nitrates) into water systems.

Types of eutrophication:

There are two types of eutrophication;

* Natural eutrophication.
* Cultural eutrophication.

1. Natural eutrophication:

* Natural eutrophication is process of lake aging characterized by nutrient enrichment is known as natural eutrophication.
* This process gradually converts the original oligotrophic lake into a eutrophic lake.
* Natural fertility of lakes is increased by addition of nutrient rich loads of sediment and organic matter from the catchment area.
* This permits the production of larger quantities of phytoplankton and algal blooms, and other aquatic vegetation, including aquatic weeds, water hyacinth, water fern, and water lettuce, which in turn provide more ample food for herbivorous zooplankton and fish.

1. Cultural eutrophication:

* When die process of eutrophication is speeded up by human activity, it is called cultural eutrophication.
* About 80 per cent of the nitrogen and 75 per cent of the phosphorus added to lakes and streams has its source in human activities.
* This human-generated nutrient input is derived from several sources, including domestic sewage, agricultural fertilizers, detergents, livestock wastes and industrial wastes.

Q4: write a detail note on causes of eutrophication?

Ans: Causes of eutrophication:

1. Fertilizers (nitrates and phosphates)

* Eutrophication is when fertilizers used by farmers leak into water courses.
* When these nutrients are washed by surface runoff into lakes, rivers, oceans and other surface waters when it rains; the hungry plankton, algae and other aquatic plant life are well fed and their photosynthesis activity is increased.
* This causes dense growth of algal blooms and plant life such as the water hyacinths in the aquatic environments.

1. Concentrated animal feeding operation:

* Contributor of phosphorus and nitrogen nutrients
* Plaguing the water bodies by recurring cyanobacteria and algal blooms.
* Feedlots (factory farms) = also called concentrated animal feeding operation (CAFOs).
* Huge warehouses or pens designed energy-rich foods to animals living at extremely high densities.
* Over ½ of the world’s pork and poultry come from feedlots.
* It discharge high scores of the nutrients that find way into rivers, streams, lakes and oceans where they accumulate in high concentrations thereby.

1. Direct sewage discharge and industrial waste into water bodies:

* In some developed country Sewage water is directly discharged into water bodies such as rivers, lakes and oceans.
* As a result, it introduces high amounts of chemical nutrients thereby stimulating the dense growth of algal blooms and other aquatic plants which threatens survival of aquatic life in many ways.
* Some countries may also treat the sewage water, but still discharge it into water bodies after treatment.
* As much as the water is treated, it can still cause the accumulation of excess nutrients, ultimately bringing about eutrophication.
* The direct discharge of industrial waste water into water bodies presents similar outcomes.

1. Aquiculture:

* Aquiculture is a technique of growing shellfish, fish and even aquatic plants (without soil) in water containing dissolved nutrients.
* As a highly embraced practice in the recent times, it also qualifies a top ranking contributor to eutrophication.
* If aquiculture is not properly managed, the unconsumed food particles together with the fish excretion can significantly increase the levels of nitrogen and phosphorous in the water thereby resulting in dense growth of microscopic floating plants.

1. Natural events:

* Natural events such as floods and the natural flow of rivers and streams can also wash excess nutrients off the land into the water systems thus causing excessive growth of algal blooms.
* Also, as lakes grow old, they naturally accumulate sediments as well as phosphorus and nitrogen nutrients which contribute to the explosive growth of phytoplankton and cyanobacterial blooms.

Q5: Write a detailed note on the following:

1. Biomass energy:

* Biomass is organic material that comes from plants and animals, and it is a renewable source of energy.
* America is the largest wood pellet exporter in the world.
* Right now, 182 pellet plants has been registered in USA.
* Most of the American wood pellets has been shipped to European countries. Most of the exported wood pellets are bulk wood pellets which are ordered by the European power plants used for electricity and power generation.
* Biomass contains stored energy from the sun.
* Plants absorb the sun's energy in a process called photosynthesis.
* When biomass is burned, the chemical energy in biomass is released as heat.
* Biomass can be burned directly or converted to liquid biofuels or biogas that can be burned as fuels.

EXAMPLES:

Examples of biomass and their uses for energy:

* Wood and wood processing wastes—burned to heat buildings, to produce process heat in industry, and to generate electricity.
* Agricultural crops and waste materials—burned as a fuel or converted to liquid biofuels.
* Food, yard, and wood waste in garbage—burned to generate electricity in power plants or converted to biogas in landfills.
* Animal manure and human sewage—converted to biogas, which can be burned as a fuel.

Advantages of biomass energy:

* Biomass energy is a renewable fuel source
* Biomass energy production results in minimal environmental impact.
* Alcohol fuels are efficient and clean burning.
* The ability of biomass fuels is universal.

Disadvantages of biomass energy:

* Expensive to make.
* Haven’t found ways to store the energy.
* Also requires more fuel.
* Requires more land.
* Can lead to deforestation, desertification and soil erosion.

1. Hydropower energy:

* Hydropower energy is power derived from the energy of falling water or fast running water, which may be harnessed for useful purposes.
* Since ancient times, hydropower from many kinds of watermills has been used as a renewable energy source for irrigation and the operation of various mechanical devices, such as gristmills, sawmills, textile mills, trip hammers, dock cranes, domestic lifts, and ore mills.
* A trompe, which produces compressed air from falling water, is sometimes used to power other machinery at a distance.
* The United States is the fourth largest producer of hydroelectricity in the world after China, Canada and Brazil.
* The Grand Coulee Dam is the 5th largest hydroelectric power station in the world.

Advantages of hydropower energy:

* Hydropower is a Renewable energy.
* Generally do not required fuel.
* It is a constant energy.
* It doesn’t create pollution

Disadvantages of hydropower energy:

* Requires flowing water.
* Can interfere with view.
* Disrupts the ecosystem.
* Causes mudslides.

THE END.