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''Biomass'' as a vital source of renewable energy

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Abstract

The annual energy consumption is abnormally huge. The conventional source of energy are decaying day by day at a very fast rate. Enhancing global energy crisis. It is due to limited conventional source of energy such as natural gases, oils, coats, wood, and fossils fuels. So it is the crying need of the day to search out an alternative source of energy like non-conventional or renewable energy, which covers the fields of solar energy, wind energy, tidal energy, hydel energy, geo thermal energy, and bio fuel energy etc. The conventional sources of energy are fossil fuels covering natural gases, oils, coals, woods etc. These are being consumed day to day in our various uses at a tremendous rate with the growth of industries and various technologies being developed in our countries and in the world too, which causes global warming affecting worsely raising of environmental temperature, various sorts of pollutions, natural calamities such as melting of glaciers abrupt raising of sea levels and flood levels, abnormal breaking of clouds etc. pollutions and temperature rising give birth to various types of diseases like dengue, EPS, heat stroke etc causing devastations of natural and human resources. To meet this crisis we have to quest for non-conventional sources of energies. In our country also attampts are being made to recover non-conventional energies from wastes, garbage's, human and animal excreta. The renewable energy sources are solar energy, wind energy, hydel energy, ocean energy, geothermal energy and biomass energy. The aim of the present paper is to harnest the useful economical and affordable energy from biomass which is energy from living things and from their dead form.

Keywords:- fossils fuels, Bio fuels, renewable energy.

1. Introduction

Out of various sources of renewable energy solar energy is vast and unending different from of energy can be derived from it. It is non-polluting and eco-friendly but it is too much costly to transform it into useful works. So to meet the global energy crisis it is the need of the day to search out other energy sources which should be economical and eco-friendly. Some of different forms of renewable energy are wind energy, hydel energy, ocean energy, geothermal energy and biomass energy can be studied for using it in the useful service to the society and the nations as these produce non pollution effect on the nature. The biomass is the best source available in vast amount in living forms such as green plants and trees, vegetable plants, bushes in the jungle are solid forms, bio diesel and biogas are liquid and gas forms. Sea plants and algae are too much useful source of biomass energy. The aim of the present paper is to generate energy from biomass using different technology.

2. Forms of renewable energy sources

Solar cells

The most widely used and technically developed types of solar cell is the Sillicon cell. Its popularity stems not from its scientific excellence but from the fact that it builds on the extensive solid state technology and manufacturing experience of the semiconductor industry. Silicon is chemically stable and yields cells of long lifetime potential in the earth's environment. Most commercial cells yield 10% conversion efficiency; some now approach 15% in reliable quantities. The cost of solar silicon cell is, however, so high that their use as an energy supply for terrestrial applications is limited to specialized remote installations where the cost of power is minor compared to other costs, or where the service is essential, as with remote telephones or remote Instrumentation sites. Single crystal silicon of ultra-high purity is doped through its bulk with arsenic to produce p-type silicon. This type of cell is called a pn-junction solar cell. One can also reverse the types, yielding an pn-junction solar cell.

Silicon itself responds to photons of solar wavelength, the absorption producing an electron-hole pair. If the silicon is sufficiently pure and structurally perfect, this electron- hole pair (EHP) exists for a considerable time before finally spontaneously recombining. If, however, there are impurity centers and structural imperfections, as between different crystals of a multi-crystalline silicon wafer, there is a high probability that the electrons and holes will recombine quickly. For this reason, high purity and crystalline perfection are necessary to make a high efficiency silicon cell.

Wind energy

Wind energy is a form of solar energy. Wind energy (or wind power) describes the process by which wind is used to generate electricity. Wind turbines convert the kinetic energy in the wind into mechanical power. A generator can convert mechanical power into electricity. Mechanical power can also be utilized directly for specific tasks such as pumping water. The generation of wind energy is done with windmills of various sizes.

Wind is caused by the uneven heating of the atmosphere by the sun, variations in the earth's surface, and rotation of the earth. Mountains, bodies of water, and vegetation all influence wind flow patterns, Wind turbines convert the energy in wind to electricity by rotating propeller-like blades around a rotor. The rotor turns the drive shaft, which turns an electric generator. Three key factors affect the amount of energy a turbine can harness from the wind: wind speed, air density, and swept area.

Hydel energy

The energy in the flowing water can be used to produce electricity. Waves result from the interaction of the wind with the surface of the sea and represent a transfer of energy from the wind to the sea. Energy can be extracted from tides by creating a reservoir or basin behind a barrage and then passing tidal waters through turbines in the barrage to generate electricity Hydro power is one of the best, cheapest, and cleanest source of energy, although, with big dams, there are many environmental and social problems as has been seen in the case of the Tehri and the Narmada Projects. Small dams are, however, free from these problems. This is in fact one of the earliest known renewable energy sources, in the country (since the beginning of the 20th century).

In fact, for the last few hundred years, people living in the hills of the Himalayas have been using water mills, or chakki, to grind wheat. The 130 KW small hydropower plant in Darjeeling set up in 1897, was the first in India. Besides being free from the problem of pollution, such plants are also free from issues and controversies that are associated with the bigger projects, namely affecting the lives of thousands of people living along the banks of the rivers, destruction of large areas under forest, and seismological threats.

Geothermal energy

Geothermal energy is thermal energy generated and stored in the Earth. Thermal energy is the energy that determines the temperature of matter. The geothermal energy of the Earth's crust originates from the original formation of the planet and from radioactive decay of materials (in currently uncertain but possibly roughly equal proportions. The geothermal gradient, which is the difference in temperature between the core of the planet and its surface, drives a continuous conduction of thermal energy in the form of heat from the core to the surface.

Biomass energy

People have used biomass energy-energy from living things-since the earliest ''cave men'' first made wood fires for cooking or keeping warm. Today, biomass is used to fuel electric generators and other machinery.

Biomass is organic, meaning it is made of material that comes from living organisms, such as plants and animals. The most common biomass materials used for energy are plants, wood, and waste. These are called biomass feedstocks. Biomass energy can also be a non-renewable energy source. Biomass contains energy first derived from the sun: Plants absorb the sun's energy through photosynthesis, and convert carbon dioxide and water into nutrients (carbohydrates). The energy from these organisms can be transformed into usable energy through direct and indirect means. Biomass can be burned to create heat (direct), converted into electricity (direct), or processed into biofuel (indirect).

Thermal Conversion

Biomass can be burned by thermal conversion and used for energy. Thermal conversion involves heating the biomass feedstock in order to burn, dehydrate, or stabilize it. The most familiar biomass feedstocks for thermal conversion are raw materials such as municipal solid waste (MSW) and scraps from paper or lumber mills. Different types of energy are created through direct firing, co-firing, pyrolysis, gasification, and anaerobic decomposition. Before biomass can be burned, however, it must be dried. This chemical process is called torrefaction. During torrefaction, biomass is heated to about 200^0 to 320^0 Celsius (390^0 to 610^0 Fahrenhit). The biomass dries out so completely that it loses the ability to absorb moisture, or rot. It loses about 20% of its original mass, but retains 90% of its energy. The lost energy and mass can be used to fuel the torrefaction process. House gase syngas can be converted into fuel (such as syn during torrefaction, biomass becomes a dry, blackened material. It is then compressed into briquettes. Biomass briquettes are very hydrophobic, meaning they repel water.

This makes it possible to store them in moist areas. The briquettes have high energy density and are easy to burn during direct or co-firing.

Direct Firing and Co-Firing

Most briquettes are burned directly. The steam produced during the firing process powers a turbine, which turns a genetaror and produces electricity. This electricity can be used for manufacturing or to heat buildings.

Biomass can also be co-fired, or burned with a fossil fuel. Biomass is most often co-fired in coal plants. Co-firing eliminates the need for new factories for processing biomass. Co-firing also eases the demand for coal. This reduces the amount of carbon dioxide and other greenhouse gases released by burning fossil fuels.

Pyrolysis

Pyrolysis is a related method of heating biomass. During pyrolysis, biomass is heated to 200^0 to 300^0 C (390^0 to 570^0 F) without the presence of oxygen. This keeps it from combusting and causes the biomass to be chemically altered. Pyrolysis produces a dark liquid called pyrolysis oil, a synthetic gas called syngas, and a solid residue called biochar. All of these components can be used for energy. Pyrolysis oil, sometimes called bio-oil or biocrude, is a type of tar. It can be combusted to generate electricity and is also used as a component in other fuels and plastics. Scientists and engineers thetic natural gas). It can also be converted into methane and used as a replacement for natural gas. Biochar is a type of charcoal. Biochar is a replacement for natural gas. Biochar is a type of charcoal. Biochar is a carbon-rich solid that is particularly useful in agriculture. Biochar enriches soil and prevents it from leaching carbon sink Carbon sinks are reservoirs for carbon-containing chemicals, including greens.

Gasification

Biomass can also be directly converted to energy through gasification. During the gasification process,a biomass feedstock (usually MSW) is heated to more than 700^0 C ($1,300^0$ F) with a controlled amount of oxygen. The molecules break down, and produce syngas and slag.

Anaerobic Decomposition

Anaerobic decomposition is the process where microorganisms, usually bacteria, break down material in the absence of oxygen. Anaerobic decomposition is an important process in landfills, where biomass is crushed and compressed, creating an anaerobic (or oxygen-poor) environment. In an anaerobic environment, biomass decays and produces methane, which is a valuable energy source. This methane can replace fossil fuels. In addition to landfills, anaerobic decomposition can also be

implemented on ranches and livestock farms. Manure and other animal waste can be converted to sustainably meet the energy needs of the farm.

Biofuel

Biomass is the only renewable energy source that can be converted into liquid biofuels such as ethanol and biodiesel. Biofuel is used to power vehicles, and is being produced by gasification in countries such as Sweden, Austria, and the United States. Ethanol is made by fermenting biomass that is high in carbohydrates, such as suger cane, wheat, or corn. Biodiesel is made from combining ethanol with animal fat, recycled cooking fat, or vegetable oil. Biofuels do not operate as efficiently as gasoline. However, they can be blended with gasoline to efficiently power vehicles and machinery, and do not release the emissions associated with fossil fuels.

Biomass and the environment

Biomass is an integral part of Earth's carbon cycle. The carbon cycle is the process by which carbon is exchanged between all layers of the Earth: atmosphere, hydrosphere, biosphere, and lithosphere. The carbon cycle takes many forms. Carbon helps regulate the amount of sunlight that enters earth's atmosphere. It is exchange through photosynthesis, decomposition, respiration, and human activity. Carbon that is absorbed by soil as an organism decomposes, for example, may be recycled as a plant releases carbon-based nutrients into the biosphere through ptohosynthesis. Under the right conditions, the decomposing organism may become peat, coal, or petroleum before being extracted through natural or human activity.

Algal Fuel

Algae is a unique organism that has enormous potential as a source of biomass energy. Algae, whose most familiar form is seaweed, produces energy through photosynthesis at a much quicker rate than any other biofuel feedstock-up to 30 times faster than food crops.

Algae can be grown in ocean water, so it does not deplete freshwater resources. It also does not require soil, and therefore does not reduce arable land that could potentially grow food crops. Although algae release carbon dioxide when it is burned, it can be farmed and replenished as a living organism. As it is replenished, it releases oxygen, and absorbs pollutans and carbon emissions.

Conclusion

The above study shows that out of various sources of renewable energy the biomass materials are spread on vast ground. These provide energy which is ecofriendly, non polluting and economically affordable. It is the duty of the technocrats to harvest such energy using different technology to meet the global energy crisis and to accelerate the growth of their nations. If such biomass materials are

thrown carelessly hither and thither or brunt mercilessly, this would cause global warming and various forms of pollution high could damage the health of living beings and nature.

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