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UNIQUE FEATURES OF GENERATING ELECTRCITY FROM SOLAR ENERGY

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Abstract
The Solar Energy is produced by the Sunlight is a non-vanishing renewable source of energy which is free from eco-friendly. Every hour enough sunlight energy reaches the earth to meet the world's energy demand for a whole year. In today's generation we needed Electricity every hour. This Solar Energy is generated by as per applications like industrial, commercial, and residential. It cans easily energy drawn from direct sunlight. So it is very efficiency & free environment pollution for surrounding. In this article, we have reviewed about the Solar Energy from Sunlight and discussed about their future trends and aspects. The article also tries to discussed working, solar panel types; emphasize the various applications and methods to promote the benefits of solar energy

Keywords: Renewable energy, Solar panel, Photovoltaic cell, Modelling of PV Panel, Solar Concrete Collector.

Introduction

Every day, the sun radiates (sends out) an enormous amount of energy. It radiates more energy each day than the world uses in one year. Solar energy is a renewable energy source. The sun's energy comes from within the sun itself. Like most stars, the sun is made up mostly of hydrogen and helium atoms in a plasma state. The sun generates energy from a process called nuclear fusion. During nuclear fusion, the high pressure and temperature in the sun's core cause nuclei to separate from their electrons. Hydrogen nuclei fuse to form one helium atom. During the fusion process, radiant energy is released. It can take 150,000 years for energy in the sun's core to make its way to the solar surface, and then just a little over eight minutes to travel the 93 million miles to Earth. The radiant energy travels to the Earth at a speed of 186,000 miles per second, the speed of light. Only a small portion of the energy radiated by the sun into space strikes the Earth, one part in two billion. Yet this amount of energy is enormous. The sun provides more energy in an hour than the United States can use in a year! About 30 percent of the radiant energy that reaches the Earth is reflected back into space. About half of the radiant energy is absorbed by land and oceans. The rest is absorbed by the atmosphere and clouds in the greenhouse effect. In addition to supplying a large amount of energy directly, the sun is also the source for many different forms of energy. Solar energy powers the water cycle, allowing us to harness the energy of moving water. Solar energy drives wind formation, allowing us to use wind turbines to transform kinetic energy into electricity. Plants use solar energy in the process of photosynthesis. Biomass can trace its energy source back to the sun. Even fossil fuels originally received their energy from the sun.

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How We Use Solar Energy

People have harnessed solar energy for centuries. As early as the seventh century BCE, people used basic magnifying glasses to focus light from the sun to make fire. Over a century ago, a scientist in France used a solar collector to make steam to power an engine. Solar water heaters gained popularity in the early 1900's in the southwest United States. Today, people use solar energy to heat buildings and water and to generate electricity.

The Greenhouse Effect

Radiant energy (light rays) shines on the Earth. Some radiant energy reaches the atmosphere and is reflected back into space. Some radiant energy is absorbed by the atmosphere and is transformed into heat (dark arrows). Half of the radiant energy that is directed at Earth passes through the atmosphere and reaches the Earth, where it is transformed into heat. The Earth absorbs some of this heat, but most of the heat flows back into the air. The atmosphere traps the heat. Very little of the heat escapes back into space. The trapped heat flows back to the Earth. This is called the greenhouse effect. The greenhouse effect keeps the Earth at a temperature that supports life.

A solar collector is one way to capture sunlight and transform it into heat energy, or thermal energy. The amount of solar energy an area receives depends on the time of day, the season of the year, the cloudiness of the sky, and how far one is from the Earth's Equator. A closed car on a sunny day is a solar collector. As sunlight passes through the car's windows, the seat covers, side panels, and floor of the car absorb it. The absorbed energy transforms into thermal energy that is trapped inside the car. A greenhouse also makes a great example of a solar collector. Solar Space

Heating Space heating means heating the space inside a building. Today, many homes use solar energy for space heating. There are two basic types of solar space heating systems: passive and active. Hybrid solar systems are a combination of passive and active systems. Passive Solar Design A passive solar home is designed to let in as much sunlight as possible. It is a big solar collector. Sunlight passes through the windows and heats the walls and floor inside the house. The light can get in, but the thermal energy is trapped inside. A passive solar home does not depend on mechanical equipment to move heat throughout the house. For example, awnings may be designed to let in light in the winter when the sun is lower in the horizon, yet shade the windows in the summer when the sun is higher in the sky.

Passive solar buildings are quiet, peaceful places to live or work. They do not rely on machinery and heat the walls or floors rather than the air inside. Passive homes can get 30 to 80 percent of the heat they need from the sun. They store their heat energy by using thick walls and building materials that retain heat well like masonry, concrete, stone, and even water. If a passive home incorporates blowers or fans, it is then called a hybrid solar system. Active Solar Design An active solar home uses mechanical equipment and other sources of energy to collect and move thermal energy. One example of an active solar system consists of dark-colored metal plates inside frames with glass tops. These systems are often mounted on the roof or in a location with good solar exposure. The metal plates absorb sunlight and transform it into thermal energy, which heats up a fluid inside the collector. The warmed fluid is moved into the

house via a pump and the thermal energy of the fluid is transferred to the air or water inside the home. These solar collectors are stored high on a roof where they can collect the most sunlight. They need to be placed in an area where they will not be shaded by trees or other buildings. Heat can be stored in a large tank filled with liquid, or even in rock bins underneath the house. Both active and passive designs usually include some sort of backup system like a furnace or wood stove, in case of extreme cold or cloudy weather. Solar Water Heating Solar energy can also be used to heat water for household use. Heating water for bathing and washing is the second largest home energy cost. Installing a solar water heater can cut that cost in half. A solar water heater works a lot like solar space heating. In our hemisphere, a solar collector is often mounted on the south side of a roof where it can capture sunlight. The sunlight heats water and stores it in a tank. The hot water is piped to faucets throughout a house, just as it would be with an ordinary water heater.

1. Vacuum Tube Solar Water Heater

More advanced and efficient solar water heating systems utilize vacuum tubes and self-contained **heat pipes to transfer thermal energy** to a secondary tank. The vacuum tube ensures that radiant energy can enter the system, but all energy that gets turned into thermal energy is contained in the tube. The heat pipe absorbs this energy and subsequently transfers it to the large water tank. These systems are significantly more efficient at heating water during cold months, as minimal amounts of thermal energy escape the vacuum tube, allowing nearly all radiant energy to be converted into thermal energy.

2. Molten salt solar power

Relatively recent breakthroughs in molten salt systems are pushing the boundaries of power generation using solar energy. However, much like the previously discussed solar-powered water heating systems, molten salt power plants utilize electromagnetic radiation to melt salt. This molten salt then gets transferred to a heat exchanger, which heats water into steam that is then driven through a steam turbine to generate electricity. Molten salt power plants, such as the Ivanpah Solar Plant, rely on an extensive network of heliostat mirrors to redirect sunlight to a single point, most often referred to as a power tower or central tower. This tower collects the energy from all surrounding heliostats, which is enough power to melt the salt at nearly 1500°F. This molten salt is then stored in insulated tanks, allowing for the energy to be used even when the sun is no longer shining.

Methods and Materials

Nowadays, due to the decreasing amount of renewable energy resources, the last ten years become more important for per watt cost of solar energy device. It is definitely set to become economical in the coming years and growing as better technology in terms of both cost and applications. Everyday earth receives sunlight above (1366W approx.) This is an unlimited source of energy which is available at no cost. The major benefit of solar energy over other conventional power generators is that the sunlight can be directly converted into solar energy with the use of smallest photovoltaic (PV) solar cells. There have been a large amount of research

activities to combine the Sun's energy process by developing solar cells/panels/module with high converting form. the most advantages of solar energy is that it is free reachable to common people and available in large quantities of supply compared to that of the price of various fossil fuels and oils in the past ten years. Moreover, solar energy requires considerably lower manpower expenses over conventional energy production technology.

Discussion and Results

SOLAR ENERGY

Amount of energy in the form of heat and radiations called solar energy. Shown in Fig.1. It is radiant light and heat from sun that is natural source of energy using a range of ever changing and developing of technology such as solar thermal energy, solar architecture, solar heating, molten salt power plant and artificial photosynthesis. The large magnitude of solar power available makes highly appealing source of electricity. 30% (approx.) solar radiation is back to space while the rest is absorbed by ocean, clouds and land masses.

WORKING OF SOLAR ENERGY .PV cells Convert Sunlight to Direct Current (DC) electricity. Charge Controller work as control the power from solar panel which reverse back to solar panel get cause of panel damage. Battery System act as storage of electric power is used when sunlight not available (i.e. night).From this system connected to inverter for convert Direct Current (DC) into Alternating Current (AC).

MODELING OF PV PANEL .A. Solar Cell (Photovoltaic Cell) The cells converted solar radiation directly into electricity. It consist various kinds of semiconductor materials. It has two types: positive charge and negative charge shown on fig.1.This cell technology are used to

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design solar cells with low cost as well as high conversion efficiency. When the cell absorbed photons from sunlight, electrons are knocked free from silicon atoms and are drawn off by a grid of metal conductors, pressure a flow of electric direct current. Solar cell PV made up of many chemicals.

MERITS OF SOLAR ENERGY .It is save up to 20% of energy costs. It can use in Remote Locations. Easy Installation (i.e. does not required any wires, cords etc.).Rooftop which means no new space is needed & every domestic or commercials user can generate their own electricity. It is widely available of sunlight with free of cost, eco-friendly, renewable resource. It has no moving parts and not required any additional fuel, other than sunlight, to produce power. No need of water and fuel.

DEMITS OF SOLAR ENERGY. No generation of energy, when the sun is not shining. Initial cost is high. More area needed for large amount power. For alternating Current (AC) application required of inverter and also storage at night. Production PV systems single silicon crystals is technically challenging, energy, time consuming.

APPLICATIONS OF SOLAR ENERGY .It is used in many applications including electricity, evaporation, heating water, Heating and cooling of buildings, cooking of food, water pumping etc.

Most of the people are aware about non-renewable energy resources. Solar energy has become increase more popular due to their economic benefits. By on Battery Backup, Solar Energy can even provide Electricity 24x7, even on cloudy days and at night. This also used with inter-grid System with Continuously Power supply. It has more benefits compared to other forms of energy like fossils fuels and petroleum deposits. It is an alternative which is promise and consistent to meet the high energy demand. Research on solar cell and solar energy is promise has a future worldwide.

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