Scientific Approach to Renewable Energy through Solar Cells

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ABSTRACT

The electricity requirement of the world including India is increasing at alarming rate and the power demand has been running ahead of supply. Generation of electrical power by cold based steam power plants or nuclear power plants causes pollution, which is likely to be more acute in future due to large generating capacity on one side and greater awareness of the people in this respect. The Magneto-hydro-dynamic (MHD) power generation is one of the examples of a new unique method of power generation. The other non-conventional methods of power generation may be such as solar cells, fuel cells, thermo electric generation, thermionic converter, solar power generation, wind power generation, geo-thermal energy generation, and tidal power generation. This paper elucidates about different energy sources, why we are going for non-conventional energy sources, different non-conventional energy sources and comparison between them.

INTRODUCTION

Since the beginning of time, people have been fascinated by the sun. Ancient civilizations personified the sun, worshipping it as a god or goddess. Throughout history, farming and agriculture efforts have relied upon the sun’s rays to grow crops and sustain populations. Only recently, however we have developed the ability to harness the sun’s awesome power. The resulting technologies have promising implications for the future of renewable energy and sustainability. I have given a brief on solar power, how it works, and what may be in store for the future of solar. Solar power is a form of energy harnessed from the power and heat of the sun’s rays. It is renewable and therefore a “green” source of energy. The most common way of harnessing energy from the sun is through photovoltaic (PV) panels- those large, mirror-like panels. These panels set on rooftops, handheld solar devices, and even spacecrafts. These panels operate as conductors, taking in the sun’s rays, heating up, and creating energy. Just like wind power, solar power is a virtually unlimited and inexhaustible resources. As technologies improve and the material used in PV panel become “Greener”, the carbon footprint of solar power becomes smaller and the technique becomes more accessible to the masses. Similarly to wind power, solar power is contingent upon the weather and the amount of sunshine present in a specific location. This means that geographically areas lacking in sunlight or areas that frequently experience cloudy weather, may have difficulty utilizing solar power effectively. Every hour the sun beats down with enough power to provide global energy for an entire year. It takes an average of eight minutes for energy to travel from the sun to earth. Scientists have used solar energy to power spaceships since 1958. Most solar panels used today have an average life expectancy of between 20-40 years. Additionally, solar power is an expensive endeavour. The technologies often require a large amount of land, and they can be extremely costly. Scientists are hard at work to find an affordable, efficient solution for harnessing solar power.

MATERIALS AND METHODS

Solar cells, also called photovoltaic(PV) cells by scientist, convert sunlight directly into electricity.

Solar panels used to power homes and businesses are typically made from solar cells combined into modules that hold about 40 cells. A typical home uses about 10 to 20 solar panels to power the home.

Concentrating solar power (CSP) is a power generation technology that uses mirror or lenses to concentrate the sun’s rays to heat a fluid and produce steam. The steam drives a turbine and generates power.

Solar tower technologies uses a ground based field of mirrors to focus direct solar irradiation on to a receiver mounted high on a central tower where the light is captured and converted into heat. The heat drives a thermo-dynamic cycle, in most cases a water-steam cycle, to generate electric power. Solar cells are thin silicon disks that convert sunlight into electricity. These disks act as energy sources for a wide variety of uses, including calculators, and other small devices, telecommunications, rooftop panels on individual houses and for lighting ,pumping for villages in developing countries.

RESULTS AND DISCUSSIONS

In 2000, the United Nations Development Programme, UN Department of economics and social affairs and world energy council found that solar energy has a global potential of 1575-49837 EJ (Exajoules) per year.
Total global annual solar energy potential amounts to 1575 Exajouls (minimum) to 49837 (maximum). Data reflects assumptions of annual clear sky irradiance, annual average sky clearance and available land area. All figures given in exajouls. Solar thermal technologic can be used for water heating, space heating, and space cooling and process heat generation.

Shuman built the world’s first solar thermal power station in Maadi, Egypt between 1912-1913.

**Water heating:**

Solar hot water system use sunlight to heat water. In low geographical latitudes (below 40 degree) from 60 to 70% of the domestic hot water usage with temperature up to 60°C can be provided by solar heating system.

**Heating, cooling and ventilation:**

In the United States, heating, cooling and air conditioning (HVAC) systems account for 30% of the energy used in commercial buildings and nearly 50% of the energy used in residential buildings. Solar heating, cooling and ventilation technologies can be used to offset a portion of this energy. Thermal mass is any material is any material that can be used to store heat from the sun in case of solar energy. Common thermal mass materials include stone, cement and water. Historically they have been used in air climate or warm temperature regions to keep buildings cool by absorbing solar energy during the day and radiating stored heat to cooler atmosphere at night.

**Cooking:**

Solar cookers use sunlight for cooking, drying and pasteurization. The simplest solar cooker first built by Horance De Saussyre in 1767.A basic box cooker consists of an insulated container with a transparent lid. It can be used effectively with partially overcast skies and will typically reach temperature of 90-150°C.

**REFERENCES**


**TABLE**

Annual solar energy potential by region (Exajouls)

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<thead>
<tr>
<th>Region</th>
<th>North America</th>
<th>Latin America</th>
<th>Western Europe</th>
<th>Central and Eastern Europe</th>
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<th>Middle East and North America</th>
<th>Sub Saharan Africa</th>
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<tbody>
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<td>181.1</td>
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<td>154</td>
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**TABLE**

Annual solar energy potential by region (Exajouls)

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<th>Region</th>
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<th>South Asia</th>
<th>Centrally Planned Asia</th>
<th>Pacific OECD</th>
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