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A Specific Review on Electricity Generation by Using Solar Energy

[1]Kaustubh D. Agashe, [2]Nilesh Karkhele, [3]Ranjit Bansode

[1]Assistant Professor, Department of Mechanical Engineering, PVG's COET & GKP IOM, Pune, India

[2,3]Student, Department of Mechanical Engineering, PVG's COET & GKP IOM, Pune, India

***Abstract* - Coconut trees are a major source of income, food, fuel and many other useful things. Coconut branches are used to make shades, to make coverings from rain, to make decorative items. Coconut leaves are majorly used to make brooms which need delicately cleaned leaves. The branch of coconut trees is used as fuel in boilers or as firewood. To cut the leaves and branch considerable human efforts are required. Usually people use traditional Sickle-like equipment. This method is injurious and it exhausts the person. We have designed a mechanism that can be implemented to cut the leaves efficiently and in a way that bolsters the production with the help of technology. Hence motivation for the project is to reduce the human assistance required and increase the efficiency of the operation and to ensure safety while operation. The project is intended to be an automated and least effort process. During this project we aspired to comprehend research papers and find a suitable optimized solution for the problem. A traditionally used method is challenged during the project to reduce human efforts and implement use of technology in the agriculture field so as to facilitate farmers with emerging technologies to enhance their production.**

Keywords: Automation, Agro-Tech, Machine development, ease of operation.

Introduction

Solar energy is the radiant heat and light from the Sun that is captured by a variety of technologies, including solar architecture, solar thermal energy (including solar water heating), and solar power to produce electricity. It is a crucial source of clean energy.

Here onwards the review of all the documents is generated. The top atmosphere of the Earth gets 174 peta watts (PW) of solar energy, or insolation. The remainder, or 122 PW, is absorbed by clouds, oceans, and land masses while only around 30% is reflected back to space. At the Earth's surface, the solar light spectrum is primarily distributed in the visible and near-infrared regions, with a minor portion in the near-ultraviolet. The majority of people on earth reside in regions with annual insolation rates of between 3.5 and 7.0 kWh/m^2/150 to 300 watts/m^2.

Today energy is the main inspiration for socio-economic development. But due to the incremental rate of environmental concern, renewable energy provides a significant interest. The continuous increase in demand of electrical energy is one of the major issues worldwide. The threat of decrease in natural resources from fossil fuel makes this a more severe problem which is facing humanity. To overcome this issue, the industries, researchers and consumers have to reorganize the way how they can generate and consume energy from non-conventional sources. Employment of RE sources and improved energy savings techniques are major key elements in which this challenge can be overcome permanently. In the Arabian Gulf region, where a lot of solar radiation is available, renewable sources such as solar energy should play an important role. Renewable sources have other advantages like reduced global warming and reduced environmental pollution since there is no Carbon Dioxide emission to the environment. [1]

Extensive fossil fuel consumption in almost all human activities has led to some undesirable phenomena such as atmospheric and environmental pollution, which have not been experienced before in known human history. Consequently, global warming, greenhouse effect, climate change, ozone layer depletion, and acid rain terminologies started to appear in the literature frequently. Since 1970, it has been understood scientifically by experiments and researches that these phenomena are closely related to fossil fuel uses because they emit greenhouse gases such as carbon dioxide (CO_2) and methane (CH_4), which hinder the long-wave terrestrial radiation escape into space, and, consequently, the earth troposphere becomes warmer. In order to avoid further impacts of these phenomena, the two concentrative alternatives are either to improve the fossil fuel quality with reductions in their harmful emissions into the atmosphere or, more significantly, to replace fossil fuel usage as much as possible with environmentally friendly, clean, and renewable energy sources [1].

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Solar energy has been used since time immemorial to dry agricultural products, to provide space heat in cold seasons, or to create ventilation in homes, applications which are still used in many developing countries. More than 2,000 years ago, Heron of Alexandria constructed a simple water pump driven by solar energy, and in 214 B.C., Archimedes of Syracuse used concentrating solar mirrors to set fire to Roman ships (Vanderhulst et al., 2006). The sun showers the earth with a nearly infinite supply of energy. Each day more solar energy falls to the earth than the total amount of energy the planet's 5.9 billion inhabitants would consume in 27 years. While it is neither possible nor necessary to use but a small portion of this energy, the potential of solar energy was hardly tapped. Only in the last few decades, when growing energy demands, increasing environmental problems, and declining fossil fuel resources made us look to alternative energy options, has the attention been focused on truly exploiting this tremendous resource (NREL, 2002). The sun is the main energy source of the earth. Almost all of the natural energy sources (excluding nuclear and geothermal energy) on the earth are a converted form of solar energy. For example, water cycle, wind cycle, and other energy systems require solar energy as the primary driving source. Due to being a relatively environmentally friendly energy form, solar energy systems have covered a wide range of applications in recent years. It is also a relatively infinite energy source compared to fossil energy forms (Atagunduz, 1989)1. Flat-plate collectors: The basic working principle of these collectors is based on the conversion of the solar energy to the thermal energy. Flat-plate collectors are made of a glass cover as a transparent material, an absorbing plate, and a body. Radiation passed through the glass plate is absorbed by the solar plate. This plate is covered with paints or special surfaces for high absorbing properties. Almost 90% of the solar radiation felt on the surface is absorbed by these plates. The remaining are radiated back as thermal radiation and convective losses. 2. Concentrating collectors: These collectors are used to obtain higher enthalpy water or other processing fluids. Usually, temperatures above 140ıC cannot be obtained by flat-plate solar collectors, and concentrating collectors are utilized above 140ıC. Concentrating collectors are made of two components, namely, the optical system and the receiver. The function of the optical system is to direc and focus the solar rays to the receiver. The function of the receiver is to absorb the solar rays and convert it to thermal energy. The receiver is made of absorber, protection, and isolation parts. The ratio of open space for solar rays to the receiver space where the solar rays will be absorbed is called the condensing ratio. Concentrating collectors can be classified according to their condensing ratios (Atagunduz, 1989): flat receiver and flat reflectors pipe or spherical-shaped receiver and parabolic reflectors pipe or spherical-shaped receiver and flat, moving reflectors in separate rows pipe or spherical-shaped receiver and flat, single-moving reflectors. 3. Evacuated-tube collectors: Evacuated tubes are the absorber of the solar water heater. They absorb solar energy converting it into heat for use in water heating. Evacuated tubes have already been used for years in Germany, Canada, China, and the UK. There are several types of evacuated tubes in use in the solar industry [7].

There are two types of electric heating, resistance heating and induction heating. There are two advantages of resistance heating. First one is low cost and the second one is easy to maintain but there is one disadvantage is its low efficiency. Another method is induction heating, in this method inverter topology supplies high frequency current to the induction coil by producing an alternating magnetic field. Alternate magnetic field is applied to a ferromagnetic pan to produce eddy current and hysteresis, which is used to heat up the pan. Domestic induction hobs have high efficiency and energy saving [1]. Because of increasing efficiency and reducing switching loss generally class E resonant inverter is used, in which IGBT is used to reduce cost. To design and implement prototype of low powered and cost-effective micro-inverter which is designed for rural area where solar module is used to run AC loads along with DC loads [2]. During cooking process to increase the efficiency and the energy saving an induction hob has been focused to provide maximum power to the pot in more efficient way [3]. Pulse width modulation technique is used to control temperature of induction cooker.[4]

Thin film technology has the cheaper cost, while the concentrator techniques have the higher efficiency and the suitable price. This technique can be considered as one of the promising technologies for its attractive cost of energy especially in places that are exposed to a relatively high solar irradiance like the Middle East and North Africa region. The highest efficiency cells may not be economical always, for example a multi-junction cell with 30% efficiency based on exotic materials such as gallium arsenide or indium selenide produced at low volume might cost one hundred times more than an 8% efficient amorphous silicon cell in mass production, and able to deliver only about four times the output []. Another important factor is heating of the solar cell. As the cell gets heated up the efficiency will decrease. Actually, a 1°C temperature increase in solar cells will result in 0.45% of efficiency decrease. One of the methods used to solve this issue is to u-se a visibly transparent silica crystal layer over the solar panel. The silica layer emits heat into space in the form of infrared radiation allowing the cell to be cooled by approximately 13 °C, since this layer behaves like a thermal black body [6].

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There are two main technologies for solar thermal electricity generation, i.e. Photovoltaic (PV) technology in which sunlight is used to generate electricity, and solar thermal technology in which the solar heat is used for electricity generation or for supporting steam and hot water to supply a turbine to produce electrical power. The overall efficiency of a solar thermal system can be narrowed by a sum of 20% as a result of boundaries of turbine efficiency. Figure 3, demonstrates the solar thermal conversion diagram to produce electricity. [1]

The reasonable application with the suitable prices for heating water is the evacuated tubes panel technique. This technique may be loaned by governmental laws which can make guidance to replace solar water heating instead of electric water heaters. It is expected that the use of solar thermal technologies in both water heating and electricity generation will strongly increase in the MENA region due to the facility of technology use and due to its low cost. PV technologies have rapid development but with high- cost variations. The Third-generation technologies have high operating efficiency at a reasonable cost, which is suitable for low power applications. Other laboratory PV cells such as multi-junction cells with high efficiency and high price levels may be suitable for military and space applications. Laborers are not required. This machine can be used for domestic application as well as for small, medium and big scale businesses. In the process of completion of the work our ideas and thoughts are developed towards and Technology used while building the equipment. Finally, we conclude that this machine is a better option to be used by farmers to reduce human fatigue and save the operation time. This project has a YouTube scope in growing bamboo grass industry for cleaning of bamboos.[2]

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