

Solar Powered Air Cooler

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ABSTRACT

Air-conditioning is one of the major consumers of electrical energy in many parts of the world and causes energy shortage. However, most ways of generating the electricity today, as well as the refrigerants being used in traditional vapor compression systems, have negative impact on the environment. In hot and humid conditions the need to feel relaxed and comfortable has become one of few needs and for this purpose utilization of systems like air-conditioning and refrigeration has increased rapidly. The demand can be expected to increase because of changing working times, increased comfort expectations and global warming. These systems are most of the time not suitable for villages due to longer power cut durations and high cost of products. Solar power systems being considered as one of the path towards more sustainable energy systems. This system can greatly improve indoor air quality by allowing more ventilation while tightly controlling humidity. Despite increasing performance and mandatory energy efficiency requirements, peak electricity demand is growing and there is currently no prevalent solar air cooling technology suited to residential application especially for villages, schools and offices. This project reviews solar powered air cooler for residential cooling and air conditioning.

Keyword: - Solar energy, Photovoltaic cells, Centrifugal fan, Charge controller, Storage and conversion.

1. INTRODUCTION

Solar energy is the light and radiant heat from the Sun that influences Earth's climate and weather and sustains life. Solar power is sometimes used as a synonym for solar energy or more specifically to refer to electricity generated from solar radiation. Solar energy technologies can provide electrical generation by heat engine or photovoltaic means, space heating and cooling. This paper reveals the comfort conditions achieved by the device for the human body. In summer (hot) and humid conditions feel uncomfortable because of hot weather and heavy humidity. So it is necessary to maintain thermal comfort conditions. The present air-cooling methods are evaporative coolers, air conditioning, fans and dehumidifiers. But running these products need a source called electricity. The producing of electricity is ultimately responsible for hot and humid conditions, i.e., global warming. Sunlight can be converted into electricity using photovoltaics (PV), concentrating solar power (CSP), and various experimental technologies. PV has mainly been used to power small and medium-sized applications, from the calculator powered by a single solar cell to off-grid homes powered by a photovoltaic array. A solar cell, or photovoltaic cell (PV), is a device that converts light into direct current using the photoelectric effect. Need of such a source which is abundantly available in nature, which does not impose any bad effects on earth.

1.1 Need For Renewable Energy

Renewable energy is energy generated from natural resources—such as sunlight, wind, rain, tides and geothermal heat—which are renewable (naturally replenished). Fuel deposit in the will soon deplete, fuel scarcity will be maximum. Country like India may not have the chance to use petroleum products. Climate change concerns coupled with high oil prices, peak oil and increasing government support are driving increasing renewable energy legislation,

incentives and commercialization. Solar power stations (s.p.s) provide a cost-effective solution even though work on solar photo voltaic and solar thermo electric energy sources has been extensively pursued by many countries. European Union leaders reached an agreement in principle in March 2007 that 20 percent of their nations' energy should be produced from renewable fuels by 2020, as part of its drive to cut emissions of carbon dioxide, blamed in part for global warming.

2. COMPOENTS

2.1 Solar Panel: - A solar panel is a device that collects and converts solar energy into electricity or heat. It known as Photovoltaic panels, used to generate electricity directly from sunlight. A solar power technology that uses solar cells or solar photovoltaic arrays to convert light from the sun directly into electricity. Photovoltaics, is in which light is converted into electrical power. It is best known as a method for generating solar power by using solar cells packaged in photovoltaic modules, often electrically connected in multiples as solar photovoltaic arrays to convert energy from the sun into electricity. The photovoltaic solar panel is photons from sunlight knock electrons into a higher state of energy, creating electricity. Solar cells produce direct current electricity from light, which can be used to power equipment or to recharge a battery. Photovoltaic devices are also used to produce electricity in optical wireless power transmission.



2.2 Fan: - A standalone fan is typically powered with an electric motor. Fans are often attached directly to the motor's output, with no need for gears or belts. Smaller fans are often powered by shaded pole AC motors or brushed or brushless DC motors. In our case it is powered by dc motor having three blades.



- 2.3 Dc Pump:** - A pump is a device used to move gases, liquids or slurries. A pump moves liquids or gases from lower pressure to higher pressure, and overcomes this difference in pressure by adding energy to the system such as a water system. Pumps work by using mechanical forces to push the material, either by physically lifting, or by the force of compression. Conversion of added energy to increase in kinetic energy increase in velocity. Conversion of increased velocity to increase in pressure. In this case, DC pump is used.



- 2.4 Battery:** - In our project we are using secondary type battery. It is rechargeable type. A battery is one or more electrochemical cells, which store chemical energy and make it available as electric current. There are two types of batteries, primary (disposable) and secondary (rechargeable), both of which convert chemical energy to electrical energy. Primary batteries can only be used once because they use up their chemicals in an irreversible reaction. Secondary, also called rechargeable batteries can be charged and discharged many times before wearing out. After wearing out some batteries can be recycled.



- 2.5 DC motor:** - The D.C motor is used to control the direction of hot air flow. In our project, the hot air is distributed in all directions with the same rate by using D.C motor tilting mechanism. The working principle explains that, when a current carrying conductor is placed in a magnetic field, a force is produced to move the conductor away from the magnetic field.



2.6 Buck converter: - The buck converter is a ubiquitous DC-DC converter that efficiently converts a high voltage to a low voltage efficiently. Efficient power conversion extends battery life, reduces heat, and allows for smaller gadgets to be built



3. WORKING

Solar panel consists of number of silicon cells, when sun light falls on this panel it generate the voltage signals then these voltage signals are given to either buck converter or charging circuit. Depending on the panel board size the generated voltage amount is increased. In charging circuit the voltage signal from the board is gathered together and stored in the battery. Whereas in buck converter the output voltage is regulated to 12V DC. The water from the tank is made to pass through the tube which in turn wets the wood-wool honey comb walls at the back of cooler. A fan is provided at the centre in such a way that the supply for the fan is coming from the battery which stores the current from the solar pane or directly from the buck converter. When the water falls on the wood wool honey comb walls due to gravity, the fan is made to run, so that the cool air will be supplied all the way through. At the bottom of the tank, there will be a DC pump which pumps the water again to the top. The power for the DC pump is coming from the battery connected to the solar panel. The fan and pump is controlled separately with help of manual operated switch.

4. CONCLUSIONS

The project carried out by us has very less Cost of generation of power since the source of power is free and available in plenty and then is no power interruptions. This project has also reduced the cost involved in maintenance So as comparing the cost of this product with the products available in the market solar product appeals better and affordable for common people. This solar product perfectly suits for villages, schools and offices and thus prevention from the power cut problems. The above method is eco friendly and natural, electricity savers. Durability of our product is more thus minimizing the cost. By completing this project, we have achieved clear knowledge of comfort cooling system for humans by using non-conventional energy. This project would be fruitful in both domestic and industrial backgrounds

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