



A REVIEW ON ENERGY CONSERVATION USING SOLAR ENERGY AND RADIANT COOLING

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ABSTRACT

This article can allow user to minimise electricity in home lighting system with the help of sun panel and cooling system by means of radiant cooler. At present, the country is dealing with a notable lack of electricity, which influences the humans living all over the country. This article speaks about energy conservation by means of solar panel and radiant cooler. Photovoltaic panel converts heat energy from sun into electrical energy. This electrical energy is supplied to charge controller which regulates the energy. Regulated energy is stored inside the lead acid battery. The saved power is in DC form that is converted into AC by a medium power inverter. This is essentially ideal for rural areas where there may be an excessive amount of load shedding. This stored solar energy can be used to operate the pump for pumping cold water through the radiant cooler in order to absorb the heat from the sun so that a cooling effect will be provided inside the room. This setup reduces the use of A.C's and fan in the room and also use of solar panel reduces the use of electricity.

Key words: Solar energy, radiant cooling, energy conservation, photovoltaic panel.

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1. INTRODUCTION

People can work for the bigger social goals of strength conservation and environmental protection at the same time as they keep drastically on their electricity bills. Conservation measures can reduce home electricity expenses through 50% with a modest investment.[1-4]

Residential energy utilization is about 22% of total country energy use. Commercial and industrial usage is about 25%. Many countries are significantly ahead of India in promoting home electricity conservation. Future increases in fuel charges will make conservation investment even greater cost effective. Doing a small number of huge things, a big number of the free or low cost matters or a aggregate of both will do. Specific exact information on home energy conservation appears below.[5-9]

Using less fossil fuel power will assist us with air pollution, acid rain, climate change, oil spills, habitat loss, dependence on foreign imports, and countrywide security. Retrofitting present houses is vital for the reason that 60% of our 214 million dwellings will still be in use in 2050.[10]

Different exact approaches to save electricity and money are using a extra fuel mileage vehicle and living in a smaller house. The energy saving measures are divided into categories based on whether or not they affect heating, cooling, ventilation and water heating or home equipment, lights, and many others. They are further classified by way of price and financial savings estimates. Lots of those measures make feel in terms of air satisfactory, health, humidity, consolation, and safety, renovation of device, or aesthetics in addition to saving energy. For instance, sealing air leaks prevents back drafting and carbon monoxide spillage from combustion equipment.[11-15]

The mankind should turn its interest to long run everlasting kind of energy resources. The maximum tremendous such source is sun strength. Solar power shows promise of turning into a dependable power provider without new demand of a notably technical and specialized nature for its wide unfolds usage.[16-20]

Every year, the sun emits 2000 times energy than the total global consumption. Assuming 8 hours of light on a mean on the globe, with the exception of water our bodies, we get approximately 60×10^{15} KWh of energy in one year. Using effectively 5% of this electricity we will get 300×10^{13} KWh of energy, which is about 60 times more than the global consumption. In addition, there is no pollution also.

Solar energy has the following advantages over other energy. [22]

- The power from the sun is honestly unfastened after the preliminary price has been recovered.
- Relying at the usage of electricity, paybacks may be very quick when compared to the price of common electricity resources used.
- Sun and other renewable energy systems may be stand-alone system.
- The sun offers a unlimited supply of solar power.
- The usage of sun power displaces other energy which generally results in a proportional lower in greenhouse gas emissions.
- The usage of sun energy is a beginning in market.

2. RADIANT COOLING WITH SOLAR ENERGY

F. Kreith and J. F. Kreider [1] had a detailed study about this solar energy. It recognizes that the transitioning from a fossil fuel-based economy to a sustainable energy system imposes challenges for engineering, while emphasizing the inter-relation between the social, economic, environmental, and technical aspects of the sustainability challenge. It also describes the energy economics and the methodology for an economic assessment to give useful financial insights and enable comparisons between the various energy options.

Jae-WeonJeong and StanleyA. Mumma[2] finished a study to broaden a simplified cooling ability estimation model for a suspended (free-hanging type) steel ceiling radiant cooling panel,through statistically reading panel performance records generated by means of a proven analytical panel version,the impact of various design parameters and their mixtures on the panel cooling capacity become anticipated. After which a linear regression equation became derived as a function of important design parameters and interactions which have significant outcomes on the panel capacity. In this analysis, eight single parameters and thirteen two-factor interactions confirmed significant effect at the panel cooling capacity. Consequently, a simplified regression version for a free hanging panel became derived as a characteristic of those selected parameters. The proposed model could estimate the panel cooling capacity not only for the natural convection but additionally for the combined convection circumstance found in a mechanically ventilated space.

N.Matsuki, Y.Nakano, T.Miyanaga, N.Yokoo and T.Oka [3] did a study to outline a half and half framework which is a blend of brilliant cooling and low temperature aerating and cooling incorporated with ice stockpiling framework. This paper reports the watched warm environment of the chamber and consequences of tests with subjects to handle the ideal temperature and moistness of the room. Likewise, a possibility examination for the half and half framework utilizing adapted air as a refrigerant was additionally concentrated on with a PC estimations. This framework produces agreeable environment and it is additionally conceivable to spare vitality utilization because of the lessening of power that could have been utilized on a fan.

Maxime Tye-Gingras, and Louis Gosselin [4] decides an ideal demonstrating strategy for warmth exchange computation of low warm mass hydronic brilliant cooling or warming boards with serpentine tube format. It presents another semi-systematic methodology taking into account an understood investigative demonstrating technique to unwind the warm symmetry condition between tubes that is generally utilized.

2.1. Solar Panel

Photovoltaic board convert sun oriented power straightforwardly into electric energy. This electric energy is supplied to the charge controller. In a Photovoltaic board, cells were patched together to create a 36 cell string (or extra). This string was overlaid among toughened glass at top and an electrical back contact.

2.2. Charge Controller

A charge regulator is just like the voltage regulator. It controls the voltage and current coming from the solar panels to the battery. Mostly 12V panel gives out approximately 16V to 20V, so if there's no law, the battery gets damaged by overcharging. Many of the batteries want round 14V to 14.5V to get absolutely charged.

2.3. Battery

The working unit of the battery is a cell. Number of cells was connected in series to supply required voltage value of the battery which normally varies with the inverter rating. They must deliver constant output strength because the inverter provides a steady output voltage to the load.

As the voltage decreases in battery, the current will increase to keep steady voltage output and consequently constant energy output. This voltage and current then supplied to the inverter.

2.4. Inverter

This power in inverter is capable of producing about 300V. You could energize the inverter from the battery to produce 50Hz AC supply. The inverter supply sufficient backup energy to light upto three 100W bulbs for two hours, provided that the battery is complete charged. The battery may be charged by battery charger circuit every time when it gets discharged. Inverter provides output of 230V, 50Hz AC supply. This output is then given to the load.

2.5. Radiant Cooling Systems

Standard cooling technologies are depends on electrically driven refrigerating machines. These have a few drawbacks: they activate elevated amounts of crucial power utilization, motive high and highly-priced electricity top burdens and more regularly than no longer utilize refrigerants with poor ecological outcomes.

This is the vicinity sun orientated cooling turns into likely the most important aspect. The sun, even as warming up systems, moreover conveys the vitality to chill them. The enormous fascination of this framework is that the most hottest days have the first-class requirement for cooling and, all of the while, provide the finest practicable sun based totally power choose



Figure 1 Solar cooling systems

Solar cooling system have the gain of the usage of harmless running fluids which include water or solutions of certain salts; they are environmentally safe. Additionally, they could make massive power financial savings in traditional power of among 40% and 60% in chilled water systems.

This additionally diminishes the load on power lattices, which could right here and there reap their capability, restrict on warm days.

3. APPLICATIONS

Most normally utilized approach for using electric energy received after photovoltaic transformation is particularly joining the load to solar panel. We associated numerous loads to the solar panelat exclusive occurrences and watched the impact. Energy from the sun beams change all through the day, for that reason outputs of the panel also changes. i.e. greater energy is received at noon and less in other sunny times. PV can be applied for primary electric use of lighting, cooling and water lifting. It likewise discovers its utility in electronic programs in which a nonstop low voltage deliver is needed.

Finest downside of sun energy lies inside the reality that in maximum energy availability for few hours a day. This disadvantage can be rectified by attaching a battery which may be charged while daylight is available and can be used at the time of want in absence of daylight.

4. CONCLUSIONS

Through this paper we're looking to blend solar panel and radiant cooler a good way to conserve the energy and to reduce using power. Photovoltaic panel converts sun energy immediately into electrical electricity. The electrical energy is given to charge controller. Charge controller regulates the power. Regulated power is stored in the lead acid battery.

The saved electricity is in DC form which is transformed into AC via a medium power inverter. This is largely ideal for rural regions where there is too much load losing.

This stored solar energy can be used to operate the pump for pumping cold water through the radiant cooler in order to absorb the heat from the sun so that a cooling effect will be provided inside the room. This setup reduces the use of A.C's and fan in the room and also use of solar panel reduces the use of electricity.

The cold water that is used to absorb the heat from sun will be heated and this will be cooled again by using ground water cooling technique. This is a less expensive technique and conserves the energy that might be used for cooling purpose.

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