

SOLAR COOLING SYSTEM RELATED PROBLEMS AND RESTORATIONS: A REVIEW

Rushikesh G. Lavhale¹, Prof. J.P. Morey²

¹Student, Dept. of First year Engineering, Prof. Ram Meghe Institute of Technology & Research Badnera, Maharashtra, India,

²Asst. Professor, Dept. of Mechanical Engineering, Prof. Ram Meghe Institute of Technology & Research Badnera, Maharashtra, India.

Abstract - Solar cooling system allude to devices and processes that the advantage of using water or salt solution, and can be used as stand-alone systems. Cooling can be provided by both active and passive systems. The capacity of solar cooling devices is generally at its peak when insolation, i.e. solar irradiation, is highest. It can ideally meet the needs of countries in sunny weather areas where the demand for cooling is high. The main goal of this review paper is to provide a general overview of existing solar cooling technologies and problems regarding to solar cooling systems. For the purpose of this review the definition of solar cooling was not limited to technologies using solar radiation for air conditioning of buildings. Other applications such as cooling of water, refrigeration of sensitive goods, e.g. medicaments or desalination of seawater, were also included.

Key Words: Solar cooling system, solar panels, solar energy, collector system, heat.

1. INTRODUCTION

Solar cooling system is a system which is operated on solar power. This is done by using passive solar, solar thermal energy conversion and photovoltaic conversion i.e. sunlight to electricity. Through 2012 funding for new air conditioning research and development program which was created by act of 2007 created in 2008 (The U.S. Energy independence and security) due to this multiple new technology innovations and mass production economies of scale are develop and demonstrate. Solar cooling system might play an increasing role in zero-energy and energy-plus buildings design. In the 19th century, the most common fluid for absorption cooling was a solution of water and ammonia. Now a day, the combination of lithium bromide and water is also in most common use.

2. Solar Cooling System

In solar cooling system, common solar thermal system which is made up by the solar collectors or solar panels, a storage tank, a control unit, pipes and pumps and a thermally driven cooling machine A typical layout of a solar cooling plant is shown in fig 1.

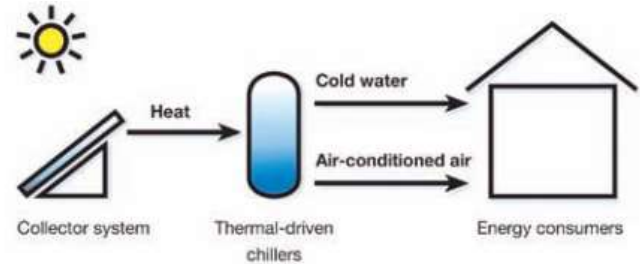


Fig -1: Solar cooling system

3. PROBLEMS RELATED TO SOLAR COOLING SYSTEM

3.1 Weather Dependent

Solar energy panels used for cooling have one obvious requirement i.e. The Sun. If you choose solar cooling system, you could have a significant problem on days where the skies aren't clear enough for the panels to soak up the sun's energy. The problem mainly focused if you have a bad weather, a bad weather season or a bad weather region. Solar powered cooling system is simply not effective in areas that do not have many hours of strong sunlight.

3.2 Tracking the Sun

For optimal efficiency, solar energy panels need to constantly be directed towards the sun. Ideally, panel adjustments should be made each season, but most solar panel owners usually mount them in a fixed position for the latitude of the area they're in, which means they are not optimally positioned for year-round use.

3.3 Cleaning

Solar panels need to be oriented and cleaned. Cloudy weather condition is not suitable for the system. Solar energy systems are normally set up at high on a roof, but with snow and sleet, it becomes tricky and hard to clean.



Fig -2: Solar Panels Cleaning

3.4 Limited Power Supply

Solar panels don't put out a lot of power. If a panel the average size can provide about 200 watts. Limited power output solar panels need to consider sq.ft. of home and electric usage.

3.5 Expensive Batteries

Batteries are very costly to store the energy. Power storage issue is side of the system, require maintenance. Batteries are expensive, high to maintain, and less durable.

3.6 Easily Breakable

Solar panels are unsafe to damage from storm, hail and falling tree limbs. They are also costly to replace.



Fig -3: Easily Breakable

3.7 High Set-up Cost

Battery costs and replacement panel cost is high beside that the initial set-up cost for solar energy systems can be high. It is affordable in areas where there is constant sun and cooling required. In small scale set up investment not affordable due to high maintenance.

3.8 Problem of Overheating

In the summer solar cooling system produce more heat comparatively to other seasons High sunlight is good condition for the system but it is also increases the problem of overheating.

Factors that affect efficiency of solar cooling system -

- Cable thickness
- Temperature
- Shading
- Inverter Efficiency
- Battery Efficiency

3.9 Direction of the solar panel

Direction of the panels is also important to produce power. South or south east direction chooses to set up the solar panels for maximum output. So this also limitation while installing the solar panel.

3.10 Annual Maintenance of Solar Panel

There are no moving parts and the input fuel is free but annual maintenance and recurring cost is high. Maximum output performance, the system required cleaning. The maintenance costs are higher compared to battery replacement every 3-5 years. To ensure high generation and low maintenance cost, regular monitoring through data loggers is highly recommended. Maintenance cost for smaller solar power system is about 2%.

4. CONCLUSIONS

From the literature review, it is observed that, the energy and water are the basic necessity to lead a normal life on this earth. Solar energy technologies and its usage are very important and useful for the developing and under developed countries to sustain their energy needs. There are many problems regarding to solar cooling system. Solar cooling system depends on the weather condition. It is not effective in bad weather areas. In this system cleaning and energy conversion is major problem. Set up cost is very high. It is necessary to overcome on these problems.

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