A REVIEW ON SOLAR ASSIST AIR CONDITION SYSTEM AT INDIA

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ABSTRACT

Now a days, solar-powered air conditioning has witnessed an increasedprogress because air conditioning system is almost a must in every building in India where the outside temperature in summer is higher than 55 C .This paper investigates the design and performance of solar-powered air conditioning system integrated with photovoltaic (PV) system which consists of PV panels, solar charger, inverter and batteries. However, air-conditioning is the dominant energy consuming appliances in most of today office buildings. Today most of the small office buildings deployed conventional cooling technologies which typically uses an electrically driven compressor system that exhibits several clear disadvantages such as high energy consumption, high electricity peak loads demand and in general it employ refrigerants which Solar assisted air conditioning system produces cooling with considerably less electricity demand than conventional air-conditioning systems .have several negative impacts on the environment. .The solar assisted conditioning system uses the heat from the solar radiation to drive a thermally driven chiller such as absorption chiller . And for solar collecting , currently Evacuated tube solar are used to produce high temperature approximate 88c .At which heat source is made heat energy

1. INTRODUCTION

In tropical weather country like Malaysia, the demand for cooling of indoor air is growing due to increasing comfort expectations and increasing cooling loads. Air-conditioning is the most common cooling mechanism and it has become a necessity for providing indoor cooling in the all office buildings in Malaysia. However, air-conditioning the dominant energy consuming appliances and it consumed approximately 40% of the total electricity consumption in comparison to lighting and other electrical appliances in office buildings[1]. The higher temperatures experienced in Southern Europe widely

2. PROJECT RESULTS

The results of the project are:

• Increased awareness of the benefits and opportunities offered by the wider penetration and utilization of SC technologies.

• Evaluation of solar technologies (including chillers).

• Market characteristics in each participating island.

• A detailed analysis of the non-technical market barriers of both heating and cooling technologies and recommendations to overcome them.
• Training of key market actors in insular areas and the development of a methodology and multilingual training material to train various categories of professionals involved in SC and chilling system[2]

3.MAIN COMPONENTS IN A SOLAR ASSISTED AIR CONDITIONING SYSTEM

The main components in the solar assisted air conditioning system can be divided into five main components namely:-

1. solar collector
2. hot water & chilled water storage
3. chiller (cold production)
4. cooling towers
5. fan coils

3.1 SOLAR HEATING

The calculation of summer thermal gains in solar installations needs to consider the time variability of heatgains, due to quick variations of solar radiation across the whole day. Instantaneous thermal flux (definedas the heat that penetrates into a structure at any given point in time) entering a building does not turnitself immediately into a heating gain because of the thermal inertia of structures. It is therefore importantto take notice of that in order to avoid errors when estimating cooling plant capacity.The proper way to proceed in designing solar cooling installations is to calculate the cooling load as wellas the exact heat extraction rate.[2]

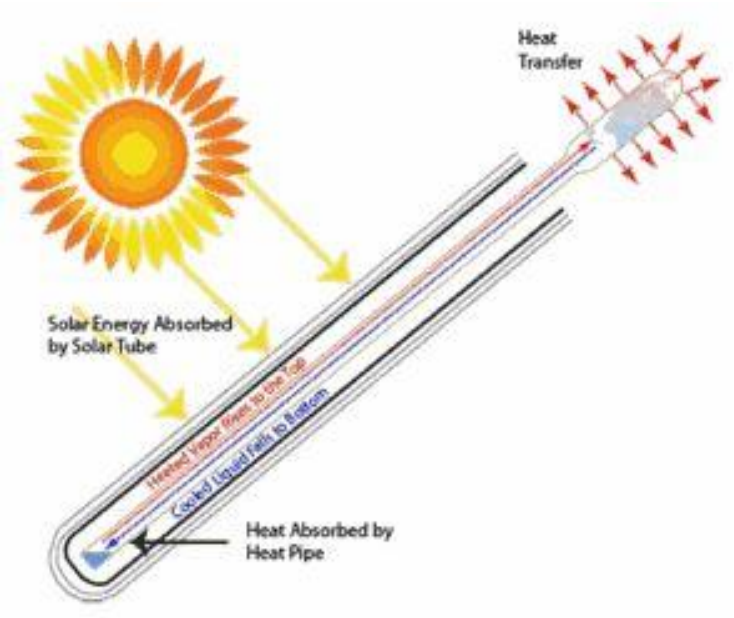

Fig1-Solar heating process [6]

4. SOLAR PHOTOVOLTAIC (SPV) TECHNOLOGIES

Photovoltaic converters are semiconductor devices that convert part of the incident solar radiation directly into electrical energy. The most common PV cells are made from single crystal silicon but there are many variations in cell material, design and methods of manufacture. Solar PV cells are available as crystalline silicon, amorphous silicon cells such as Cadmium Telluride (Cd-Te), Copper Indium dieseline, and copper indium gallium dieseline (CIGS), dye sensitised solar cells DSSC and other newer technologies such as silicon nano particle ink, carbon nanotube CNT and quantum dots. Thin films currently account for 10% to 15% of global PV module sales. They are subdivided into three main families:

(i)Amorphous (a-Si) and micro morph silicon (a-Si/μc-Si)

(ii) Cadmium-Telluride (CdTe), and iii) Copper-Indium-Diselenide (CIS) and

Copper-Indium-Gallium-Diselenide (CIGS).

Emerging technologies encompass advanced thin films and organic cells. The latter are about to enter the market via niche applications. Concentrator technologies (CPV) use an optical concentrator system which focuses solar radiation onto a small high-efficiency cell. CPV technology is currently being tested in pilot applications. The above technologies are mainly used on roof tops of commercial and residential buildings, and as large scale grid connected power plants. For optimum output, larger installations use tracking devices which change the orientation of the panels to correspond with the trajectory of the sun to focus sunlight directly onto the panels. [3]

Fig-2- Solar photovoltaic technologies[7]

5.SOLAR FLAT PLATE VS. EVACUATED TUBE COLLECTORS

This document has been created to objectively highlight differencesand performance characteristics between flat plate and evacuated tube collectors. It addresses concerns and corrects fallacies and assumptions regarding the two collector types. Information was gathered from various independent third parties which have been noted when applicable.

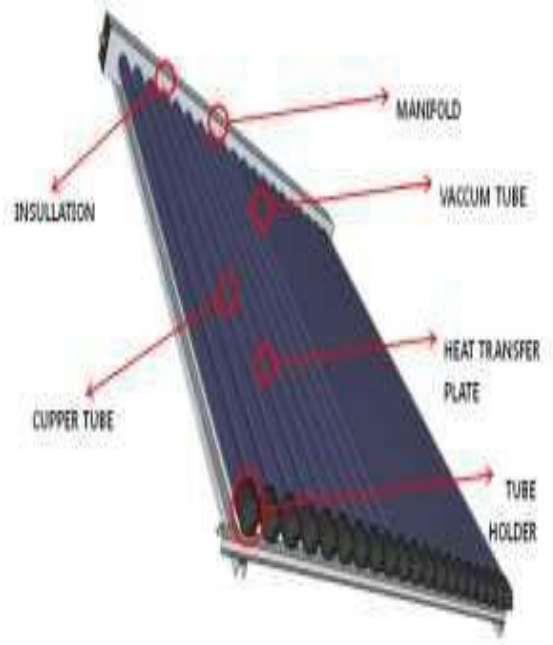

fig.3. evacuated tube solar collector (5)

6.CHILLERS

Chillers are the core of solar cooling plants. If solar panels provide the necessary energy input to theplant, chillers are those machines that are able to produce cooling by utilizing the hot water coming fromthe solar panels. More precisely, a chiller is a machine that removes heat from a liquid via a vapor compression or absorption refrigeration cycle. Most often water is chilled, but this water may also contain20% glycol and corrosion inhibitors; other fluids such as thin oils can be chilled as well. There are different types of chillers: absorption or adsorption chillers have been used for decades buthave been powered mainly by electric motors, steam, or gas turbines. They produce their cooling effective the "reverse-Rankin" cycle, also known as "vapor compression".[2]

7. ECONOMIC & FINANCIAL CONSIDERATIONS

Further to the barriers identified in the previous section, the higher investment costs - required for solarcooling installations- need a very careful analysis of the economic and the financial aspects of the project. This analysis has to start with a feasibility study that will seek to establish the technological, financial andenvironmental viability of the project. Once there is enough evidence that the project is feasible, a moredetailed financial analysis has to be carried

out, in order to establish the financial structure of the projectand identify all available sources of financing.[2]

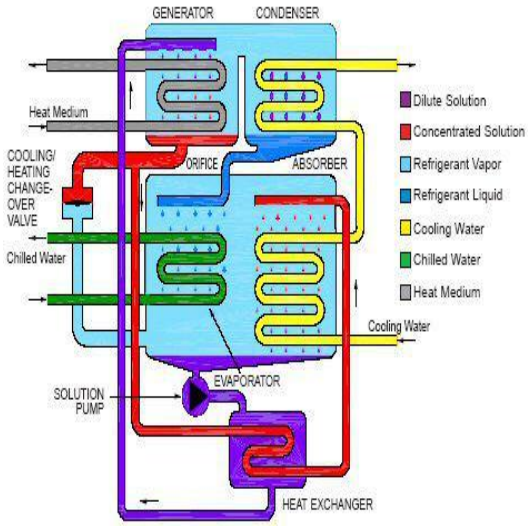

Fig. 4 Schematic Diagram of the absorption refrigeration cycle.

CONCLUSION

Today although the dominating technology of thermally driven chillers is based on absorption, there are still not many manufacturers that produce small absorption chillers in the range of 50kW down to 5 kW. To date, there are not many installation of solar assisted air conditioning system around the world. This is to show that solar assisted air conditioning system is still at its infant stage. There are still no standardized design guidelines that exist and still lack of operational experiences.[1].The investmentcost of solar cooling installations is higher than conventional air conditioning systems. As a result, relatively few installations are in place and this in turn keeps the costof components (such as chillers) relatively highdue to the absence of economies of scale.[2]

REFRENCE

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