

STUDY ON SOLAR WATER HEATER AND ITS SYSTEM PERFORMANCE

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ABSTRACT

Solar energy is one of the renewable energy which it is the simplest and is easy to use. Solar water heater use the solar energy from the sun to generate heat (not electricity) which can then be used to heat water for showering, space heating, industrial processes or even solar cooking. Solar energy is the primary energy source for our planet as it is responsible for providing energy for planet growth (photosynthesis) and providing the warmth that makes our planet habitable. Solar water heater device has been around for even 100 years. A solar water heater is one of the most effective ways of cutting a household's carbon footprint by reducing reliance on dirty fossil fuel usage. Solar power system has been applied to heat water for night time activity in rural areas. The system will provide hot water availability out the day. The solar water heater used for supplying hot water during the day. Solar water heater is a solar collector box, insulation material, and absorber plate.

Keywords: *Solar Water Heater, History, Performance of Solar Water Heater*

I. INTRODUCTION

Solar water heating device that mimic those used in residences to capture energy in the form of solar radiation and convert it to thermal energy. This thermal energy is next transfer to water (to be used as domestic hot water) in the form of heat. In doing this student gain a better understanding of the three different types of heat transfer. The advantage of the radiation provided by our sun. Converting it to thermal energy to generate electricity, heat water and cook food [1]. Solar water heating is the conversion of sunlight into renewable energy for water heating using a solar thermal collector. Solar water heating system comprise various technologies that are used worldwide increasingly solar water heater system are designed to hot water for most of the year [2]. Power storage is a very common problem in our country and most of our work gets interrupted due to sudden power cut and voltage fluctuation. Solar power is one of the alternatives to the electricity.[3] Solar power is clean green electricity that is created from sun light, or heat from the sun. Solar energy is sustained and totally inexhaustible, unless fossil fuel that are finite. It is also non-polluting source of energy and it does not emit any greenhouse gases when producing electricity. The one of the popular device that harnesses the solar energy is solar hot water system. Water heating typically represents a high percentage of energy consumption in homes and business; in some cases 30% dramatically reduce energy bills without any environmental impact. [4]

II. HISTORY

There are records of solar collectors in the United States dating back to before 1900-comprising a black-painted tank mounted on a roof. In 1896 Clarence Kemp of Baltimore, USA enclosed a tank in a wooden box, thus creating the first 'batch water heater' as they are known today. Although flat-plate collectors for solar water heating were used in Florida and Southern California in the 1920s there was a surge of interest in solar heating in North America after 1960[5]The earliest solar hot water collectors, dating back to the nineteenth century, were tanks filled with water and painted black. The downside was that even on clear, hot days it usually took from morning to early afternoon for the water to get hot. And as soon as the sun went down, the tanks rapidly lost their heat because they had no protection from the night air in 1909, William J. Bailey patented a solar water heater that revolutionized the business. He separated the solar water heater into two parts: a heating element exposed to the sun and an insulated storage unit tucked away in the house so families could have sun heated water day and night. The heating element consisted of pipes attached to a black-painted metal sheet placed in a glass-covered box. Because the water to be heated passed through narrow pipes rather than sat in a large tank, Bailey reduced the volume of water exposed to the sun at any single moment and therefore, the water heated up faster. Providing hotter water for longer periods put Bailey's solar hot water heater, called the Day and Night, at a great advantage over the competition [6]

III. NEED FOR STUDY

solar water heater system is an effective water heating system without electricity. This study is especially designed to know that factor influence the customer to the purchase of solar water heater and their level of satisfaction. This study helps to know the problem faced by the customer while using solar The water heater. The study helps to understand how far the customers are satisfied with solar water heater.[7]

IV. SYSTEM PERFORMANCE

Solar water heaters through the combination of two part a storage tank and a collector. The storage tank is a well insulated container that stores the circulating water. Solar collector which is usually located on a rooftop. The collector consist of either a long coiled copper pipe through which water flows or a series of parallel pipe across which water flows (perpendicularly). Radiation energy from the sun is absorbed with the collector, travels through the pipe via conduction. After the water has passed through the collector and absorbed heat. It returns to the storage tank an increase the temperature of the remaining water via convection. This process repeat until the water in the tank is sufficient hot so that it may be used as domestic hot water (for showers and baths) [3] System uses a commercial collector and a storage tank in a drain-down configuration. The collector is single-glazed with a selective surface copper absorber. The system contributed 40% of a hot water load. The net solar efficiency was 27% and the collector efficiency was about 28%. The high collector efficiency was partly due to the large hot water demand (the family includes five young children). The average preheat temperature was only 86°F (300C), which kept the collector temperature low and improved the efficiency. The average hot water output temperature was relatively low at 120 op (49°C), partly because the gas-fired water heater could not always keep up with the water use. Had the output temperature been 140°F (60°C), as in the other systems, the solar fraction would have been only 30%.This system performed remarkably well despite a serious control flaw. Due to an improperly placed sensor or a faulty controller, the collector pump cycled on and off an average of 49

times per day, draining the collector each time. [8] The solar collector performance model is mainly analogous to the one embodied in program sun, except that it represents only one physical component. Therefore, the program COLTEST, in which it is embodied, carries a single computational module. That computational module contains the same interfaces with environment and other components as the solar collector. In collector performance is determined by the intensity and angular performance of solar radiation, by ambient temperature and by the tempera-true of fluid entering it from storage or a conversion by the device. Energy output from the collector is described by the rate of heat extraction from it and the temperature at which that heat is removed [9] Solar water heater can also provide financial saving by reducing energy costs. After your water heater is properly installed and maintained. Try some additional energy-saving strategies to help lower your water heating bills especially if you require a back-up system. Some energy saving device and system are more cost effective to install with the water [10]

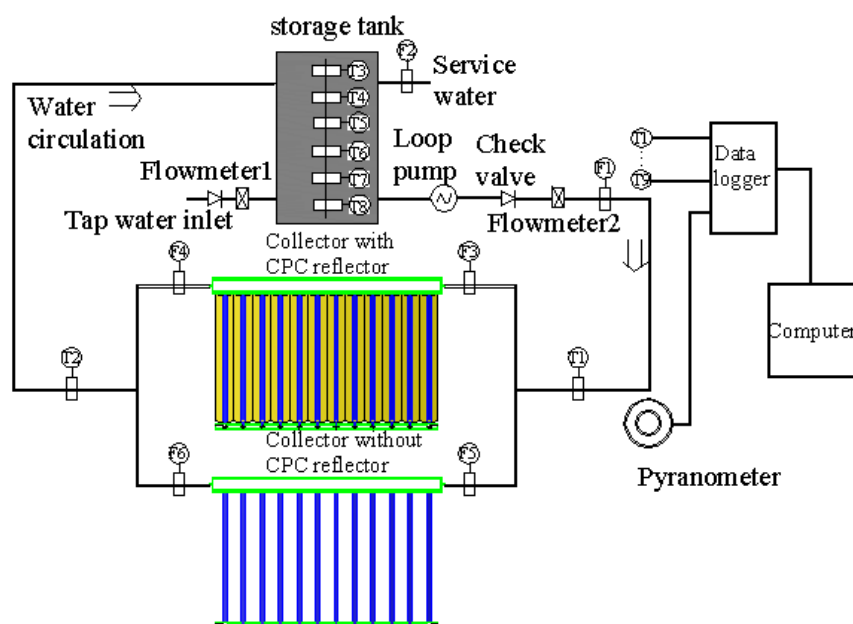


Fig 1:-Solar Water Heater System [11]

V. SYSTEM SPECIFICATION AND INSTALLATION

- Except in rare instances it will be insufficient to install a SWH system with no electrical or gas or other fuel .Many SWH systems have a back-up electric heating element in the integrated tank, the operation of which may be necessary on cloudy days to ensure a reliable supply of hot water.
- The temperature stability of a system is dependent on the ratio of the volume of warm water used per day as a fraction of the size of the water reservoir/tank that stores the hot water.
- The installation of a SWH system needs to be complemented with efficient insulation of all the water pipes connecting the collector and the water storage tank, as well as the storage tank (or "geyser") and the most important warm water outlets. The installation of efficient lagging significantly reduces the heat loss from the hot water system.
- To eliminate the risk of hot water in the storage tank from being cooled that way this is very important. Solar controller may be required.

- The modularity of an evacuated tube collector array allows the adjustment of the collector size by removing some tubes or their heat pipes. Budgeting for a larger than required array of tubes therefore allows for the customization of collector size to the needs of a particular application, especially in warmer climates.
- Particularly in locations further towards the poles than 45 degrees from the equator, roof mounted sun facing collectors tend to outperform wall mounted collectors in terms of total energy output. However, it is total **useful** energy output which usually matters most to consumers. So arrays of sunny wall mounted steep collectors can sometimes produce more useful energy because there can be a small increase in winter gain at the expense of a large unused summer surplus[12]

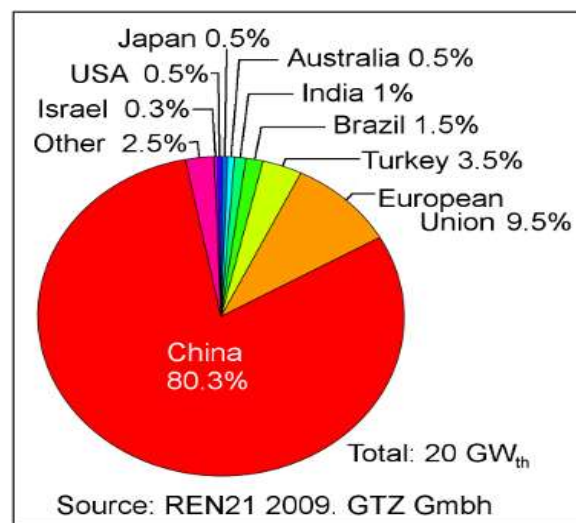


Fig.2 : Solar Water Heater Installation During 2007 worldwide [13]

VI. CONCLUSION

In modern marketing customer is the king. Customer satisfaction is incredibly important for growing a sustainable business. Now it is a customer world the manufacturing give their product which suits the wants and needs of the customer. The present research was concentrated on the customer satisfaction about solar water heaters from this study it can be concluded that solar water heaters stands best because of its no electricity changes and environmental safety. Further there is some kind of promotional activities required to hold the present customer and make new customer. In India offer 100% deprecation claim in the first year itself on installation of commercial solar water heating.

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