

EXPERIMENTAL STUDY OF SOLAR WATER HEATING SYSTEM

SUJAY CHATTERJEE

ME 4TH SEM, GRKIST

ABHISHEK TIWARI

ASST PROF. GRKIST

ABSTRACT:

Renewable energy sources are the sources which can recreate by itself, there are many renewable energy sources are available on the earth like solar energy, tidal energy, wind energy...etc but out of them solar energy is most widely used energy for different purpose. It is also a most emerging energy source not only for India but for all over world. Solar energy is used in different fields also for heating water so now a days, plenty of hot water is used for domestic, commercial and industrial purposes. Various resources i.e. coal, diesel, gas etc., are used to heat water and sometimes for steam production. Solar energy is the main alternative to replace the conventional energy sources. The solar thermal water heating system is the technology to harness the plenty amount of free available solar thermal energy. The solar thermal system is designed to meet the energy demands. The size of the systems depends on availability of solar radiation, temperature requirement of customer, geographical condition and arrangement of the solar system, etc. Therefore, it is necessary to design the solar water heating system as per above parameters. The presented work focuses on the construction, arrangement, testing and evaluation of the performance of a solar water heater system. To do so an experimental investigation is done with the help of rising tubes firstly it is done with 3 riser tubes and same procedure is repeated with 6, 7 and 10 riser tubes. The performance of solar water heater is analogized from some parameters like outlet temperature, collector efficiency, solar radiation and daily temperature.

KEYWORDS: Daily temperature, solar radiation, solar collector, solar water heater, collector efficiency, renewable energy sources and riser tubes.

INTRODUCTION:

The need for renewable energy has been recognized globally as population and the demand for fossil fuels increase. The depleting resources of fossil fuels and increased costs have led to the development of new and technologically advanced renewable energy sources. With the government committed to increase the use of renewable sources of energy, they will slowly replace the use of some fossil fuels. The country as a whole is over reliant on imported gas, coal and oil. Solar water heating production has become more appealing in recent years on a global level; however it has been less popular in India to date on commercial projects. With the over reliance on fossil fuels for energy production, the Indian Government have realized the need to research and develop this area further. With India's dependency on fossil fuel in mind, solar water heating, where water is heated directly from the energy of the sun is becoming an increasingly attractive option.

OVERVIEW OF SOLAR WATER HEATING:

Solar energy can be utilized as a form of heat, such as solar water heating and as electricity, such as solar photovoltaic. Solar water heating systems are commonly referred to in industry as Solar Domestic Hot Water (SDHW) systems and it is a technology that is not entirely new. In the 19th century, people used a stove to heat water by burning pieces of wood or coal. In cities, people heated their water with gas manufactured from coal. In many areas, wood, coal or gas could not be easily obtained and hence such fuels were often expensive [42]. To avoid these problems, a much easier and safer way to heat water was created. This was achieved by placing outside a black painted metal tank full of water to absorb solar energy. The disadvantage was that even on clear hot days it usually took from morning to early afternoon for the water to get hot. As the sun went down, the tank rapidly lost its heat because it had no insulation.

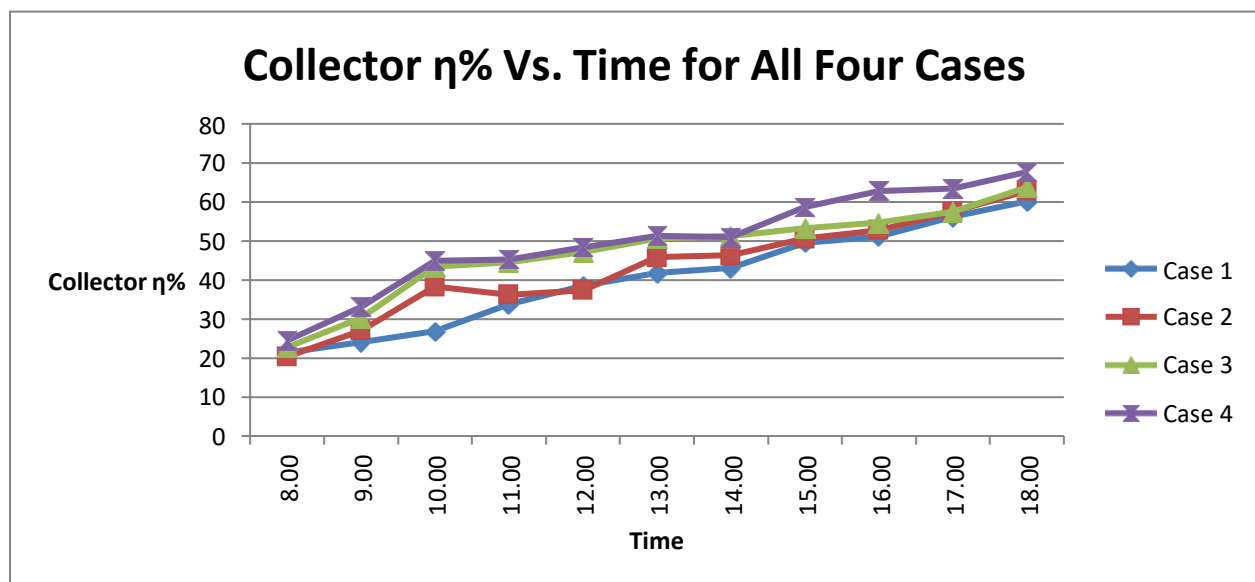
EXPERIMENTAL SET UP CONSTRUCTION:

The experimental setup consists of a flat plate solar collector made up of aluminum riser tubes and black absorber surface covered with glass sheet for trapping solar radiation. The aluminium riser tubes are connected to an outer rectangular frame of PVC pipes for circulation of supply water. There is inlet and outlet provided for supply of cold and hot water respectively. There is also a stand provided for providing inclination to the whole setup.

RESULTS AND CONCLUSIONS:

As we have seen from theoretical and practical investigations that the performance of solar water heater very much depends upon the solar radiation incident on the collector surface. Therefore it is very important to monitor the nature of variation of solar intensity throughout the day. Also it is important to study the variation of average temperatures daily throughout a month, so that we can predict the practical usefulness of a solar water heating system in the Indian scenario.

VARIATION OF SOLAR COLLECTOR EFFICIENCY FOR ALL FOUR CASES:



Variation of Solar Collector Efficiency for all four cases**REFERENCES:**

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