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DESIGN AND FABRICATION OF WASTE WATER MANAGEMENT USING SOLAR ENERGY

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Abstract – Human Society lacks the freshwater and conventional source of energy. As per the current scenario, the industries working under the concept of manufacturing photovoltaic (PV) as they are highly exploited. However, in the future the market will tend to shift towards exploring the field of solar heat pipe as it produces more heat compared to Solar Panels and due to cost efficiency. This paper will be based on sample of basin water being treated into fresh water. The pH value of the freshwater was found between 6.9-7.1 which clearly brings out the neutrality of water. The temperature of the produced hot water reached as high as 90 ^{o} with average temperature being around 48 ^{o}C.

Keywords-Neutrality,Photovoltaic, Conventional, Efficiency, Panels

I.INTRODUCTION

The source of energy available from sun is always unlimited. It has always been a challenge to capture the energy and use it for the treatment of wastewater. The Fresh Water is very scarce resource. There are occurrences of natural calamities which limit the access of water. As per the report from the UN, number of people who lack access to freshwater for drinking will increase from 1.2 billion to 1.9 billion in 2025. Despite the situation very less water is available on earth for drinking. This brings to notice that proper management of waste water will be the good way bridge the water with proper supply demand gap and this must be achieved using the renewable source of energy on the environmental grounds and on cost basis which will aid the supply of clean water. This project aims to explore the opportunity for converting the waste water from the basin into freshwater for drinking.

II. LITERATURE REVIEW

In the world, there are lot of ways the energy is being generated or will be generated. However, when compared to the early decades, the usage of fossil fuels have been reduced due to heavy production of green house gases and increase in the rate of global warming. There has been a slight change of approach since then by researching on the ways to tackle the inexhaustible energy sources such as wind energy or solar energy. The waste water is managed using the solar energy panels which brought a slight change in the concept of waste water management. The merging concepts in the solar heat pipes have increased the rate of management due to its higher efficiency and reduced cost.

III. CONEPT OF WASTE WATER MANAGEMENT

The management of waste water in practice are the activities for collection, purification, storage and transfer of water. The generation of waste water cannot be eliminated or recycled completely. So the concept of managing waste water is required. The management of water is very important because it directly implies on the health of living beings. Proper waste water management even adds to the aesthetic value of environment which is useful for well-being. The concept of waste water management is highly dependent on the type of water which is going to be treated. The methods sued in different types of waste water management are different. Though the nature of waste and composition depends on the development of that area. The waste water is highly generated in the developing countries. The concept of waste water management could be summarized as to: Reduce the amount of waste water which is generated; treat the water if reuse is not possible.

IV. METHODOLOGY

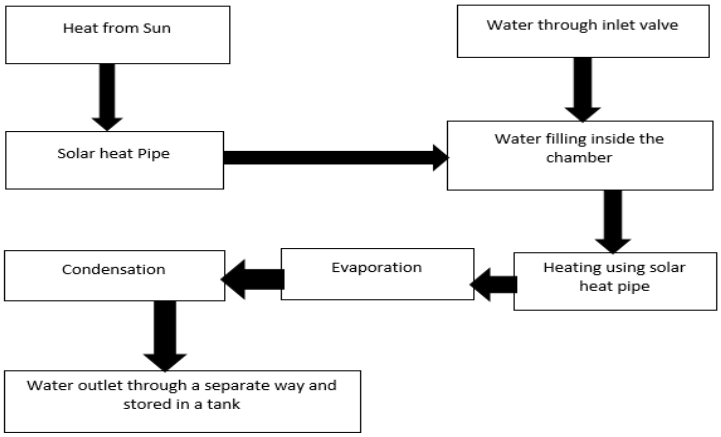

Fig. 1 Methodology of process

The solar heat pipe absorbs the heat from sun. Then waste water is fed in the chamber using the inlet valve. As the water comes into contact with the heat pipe and as the pipe gets heated due to sun. The water starts heating up and evaporates. The water droplets slide in the glass and gets condensed where the condensed water is stored in the tank.

V. EXPERIMENTAL SETUP

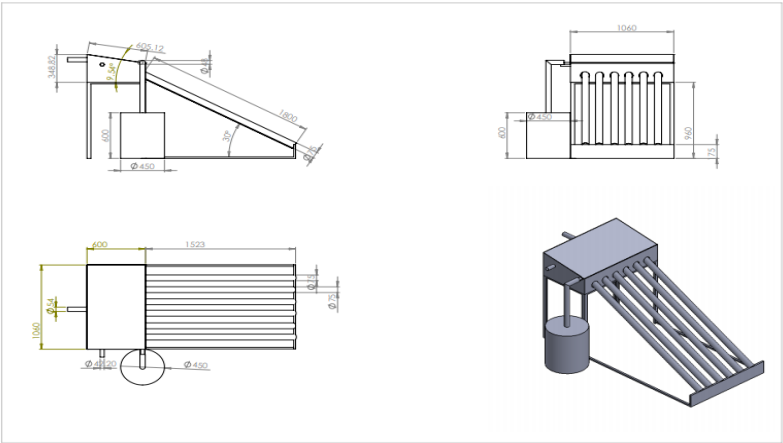

Fig 2. Design of the setup

The chamber is made using the mild steel (MS) sheet metal with 0.5 mm thickness at an angle of 10^0. Similarly the glass slab of 3mm thickness is placed on the chamber. The angles is kept so that the solar heat pipes along with the water inside the chamber gets heat from at most of the time in day. The chamber is insulated with plywood to reduce the heat loss. The water get evaporated and slides slowly and drips on the outlet valve where the water gets stored in a separate tank. The solar heat pipes used here are made from copper and is fixed along the angle of chamber to minimize the contact between and sun continuously.

Specification	Dimension
Basin Area	0.618 sq.m
Top glass Area	0.7 sq.m
Glass Thickness	3 mm
Mild Steel thickness	0.5mm
Slope of the Glass	10^0

Table 1: Dimension of the Designed Solar Setup

VI. RESULTS

Specimen of Waste Water from basin water was used for the testing purpose. The use of the following readings was to understand the change in the pH value and the removal of dissolved or suspended solids. The fabricated unit worked successfully and the process of treating waste water into freshwater was successful. The quantity of production was relatively higher between 10:00AM to 3:00PM in the unit. The rate of production decreased as there was increased angle in solar radiation which decreased the penetration inside the chamber.

Physic-Chemical Characteristics	Feed-Water	FreshWater (After Condensation)
pH value	8	6.9-7.1
Total Solids (mg/L)	900	0
Total Dissolved Solids (mg/L)	750	0
Total Suspended Solids (mg/L)	180	0
Sulphates (mg/L)	150	0
Phosphates (mg/L)	0.03	0
Chlorides	197	100

Table 2: Results after the process

VII.CONCLUSION

Several discussions are still in this project. The rate of conversion would have been higher if the level of water at the initial stage is kept low. The efficiency depends on the area of the chamber and to increase the efficiency proper insulation should be provided from all sides. The Total Dissolved Solids, Total Suspended Solids, Sulphates and Chlorides were reduced after the conversion resulting as a proper drinking water. The time period of maximum output from the setup has been understood and will be used for the future projects.

VIII. FUTURE SCOPE

From the study of chamber and the pattern of solar radiation, we aim on designing and fabricating a larger mechanism for waste water treatment. In the present scenario, the sewage is directly thrown into the water bodies. In using this type of system, the water after condensation can be directly used for drinking. Conversion of even small amount of water will be very helpful as the final result will be large.

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