Purification Of Sea Water Using Lenses And Solar Energy

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Abstract- *The purpose of this project is to design a water distillation system that can purify water from nearly any source, a system that is relatively cheap, portable, and depends only on renewable solar energy. The motivation for this project is the "limited availability of clean water resources and the abundance of impure water available for potential conversion into potable water. In addition, there are many coastal locations where seawater is abundant but portable water available. Our project goal is to efficiently produce clean drinkable water from solar energy conversion. Distillation is one at many processes that can be used for water purification. This requires an energy input as heat, electricity and solar radiation can be the source of energy. In our project we use solar energy, which converges by lenses attached on the surface of the plant. Solar distillation is an attractive process to produce portable water using free at cost solar energy. This energy is used directly for evaporating water inside a plant. It is an Energy-efficient option because we use solar energy and convex lenses for the purification of seawater. Solar Distillation is an attractive alternative because at its simple technology non-requirement of highly skilled labour for maintenance work and low energy consumption. The use of solar thermal energy in seawater desalination application has broad uses.*

Keywords- Distillation system, Renewable Solar Energy, etc.

I. INTRODUCTION

Water is a precious resource that is scarce in many parts of the world and is gradually becoming insufficient in the rest of the planet due to population growth and water contamination. It is predicted that in the next decades, water will substitute oil as the principal driver of the global economy.

Wastewater purification and seawater desalinization are two processes that could guarantee fresh water supply for most parts of the world. Water purification by distillation is a low-tech and low-cost process that can be easily implemented anywhere on the world. The only major drawback is that it consumes a lot of energy. However, the sun is an abundant and inexhaustible energy source that is available almost anywhere on the planet that could be used for water purification by distillation.

Water is a basic necessity of man along with land and air, Fresh water resources usually available are rivers, lakes and underground water reservoirs.

About 71% of the planet is covered with water. yet all of that 96.5% of the planet's water is found in oceans, 1.7% in groundwater, 1.7% h glaciers and the ice caps and 0.001% in the air as vapor and clouds, Only 2.5% at the Earth's water is freshwater and 98.8% of that water is in ice and groundwater. Less than 1% of all freshwater is in rivers, lakes and the atmosphere.

Solar energy is a very large inexhaustible source of energy. The power from the sun intercepted by the earth is approximately 1.8x100000000000MW, which is many thousands times larger than the present all commercial energy consumption rate on the earth.

Solar water distillation is a solar technology with a very long history and installations were built over 2000 years ago, although to produce salt rather than drinking water, but here we use solar energy to purify sea water.

II. INNOVATION

This plant **eliminated the need for energy** storage and exhibited higher efficiency translating to fresh water.

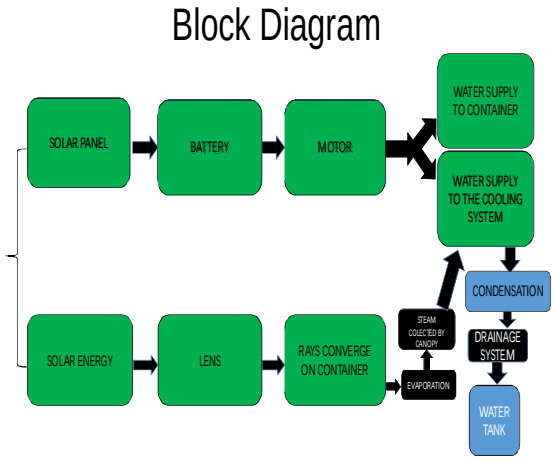
It is a useful way to **reduce both cost and energy consumption** to provide electrical energy which supplies water and the lenses converge solar rays which evaporate water. Steam released will be collected into the canopy. Here we use a water cooling system for condensation. A canopy is attached to the cooling system so that it can collect the entire vapor released through evaporation.

Our project centers on converting roughly 99.6% of water that is, in its natural form, undrinkable, into clean and usable water. After researching and investigation, we outlined our needs to be the following:

- Able to purify water from virtually any source, included the ocean
- Relatively inexpensive to remain accessible to a wide range of audiences
- Easy to use interface
- Intuitive setup and operation
- Provide clean useful drinking water without the need for an external energy source
- Reasonably compact and portable

Our aim is to accomplish this goal by utilizing and converting the incoming radioactive power of the sun's rays to heat and distill dirty and undrinkable water, converting it into clean drinkable water.

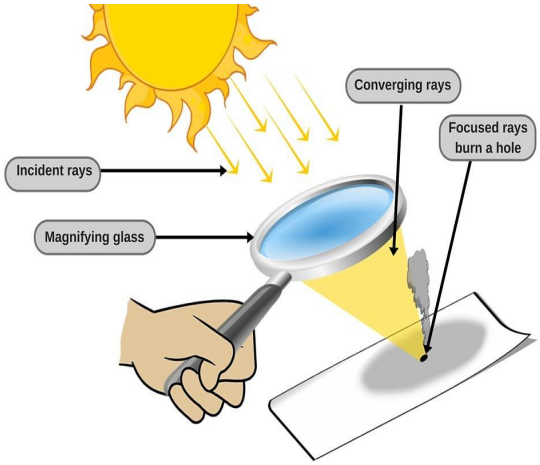
A solar parabolic trough is utilized to effectively concentrate and increase the solid angle of incoming beam radiation, increasing the efficiency of the system and enabling higher water temperatures to be achieved.



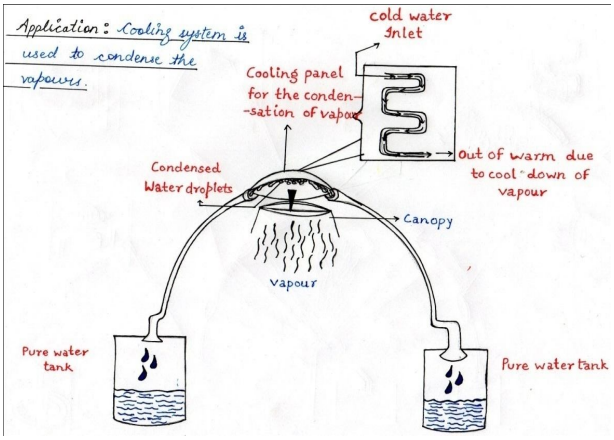
2.1 EQUIPMENTS USED

- Lens
- Cooling System
- Canopy

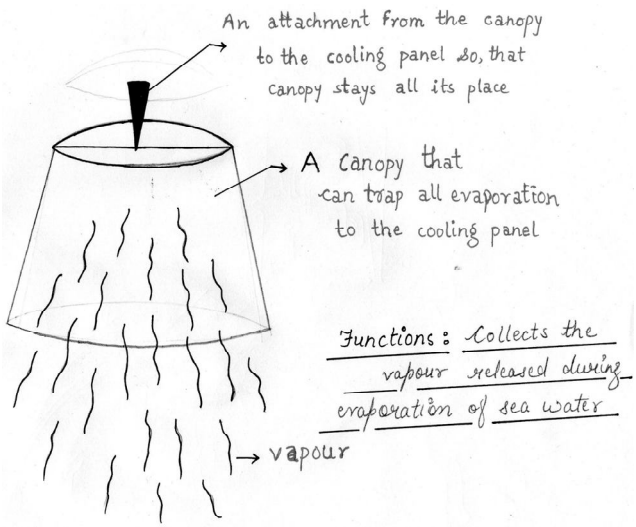
Lens- The solar concentrator convex lenses are designed its plane side to face the sun (parallel light source), and the convex lens surface to face the **focus**. These lenses are also used as a solar energy concentrator for solar furnaces. Convex lenses have originally been developed for concentrating photovoltaic application.



Cooling System- It is used for the condensation of vapour.



- **Canopy-** It is used to collect the vapour released during evaporation of sea water. It traps all vapour to the cooling system.



III. EXPERIMENTAL PROCEDURE

Solar water distillation is a solar technology with a very long history and installations were built over 2000 years ago, although to produce salt rather than drinking water, but here we use solar energy to purify sea water.

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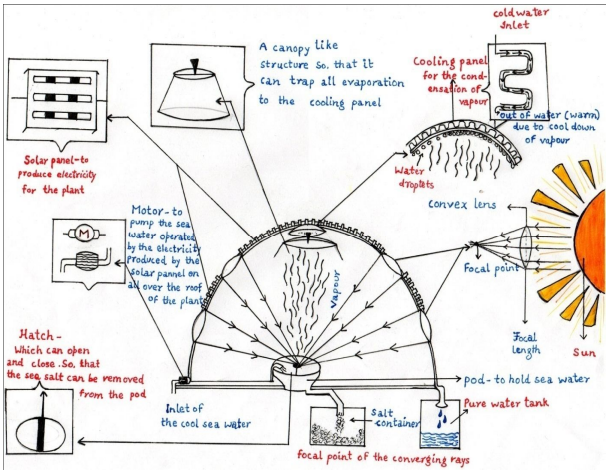
3.1 LAYOUT OF EXPERIMENT



IV. RESEARCH AND DEVELOPMENTS

The Center staff determined that the proposed system for desalination of water had merit but was probably not feasible to construct and implement in a cost-effective manner in its current configuration. An investigation into a more effective manner of distilling water commenced by researching existing systems for concentrating solar energy. This became a notion for several reasons, because most notably the heat generated by the solar concentrator could be used to distill water and also operate a conventional power cycle, for example through a steam turbine or a Sterling engine. Further, solar heat collected during the day could also be stored in liquid or solid media like molten salts, ceramics, and concrete. At night, it could be extracted from the storage medium and, thus, continue turbine operation.

V. CONCLUSIONS

As the world's population continues to grow, existing water supplies will become increasingly insufficient. As more and more water is required to meet mankind's needs, desalination of sea water will become an increasingly important source of useable water. Any comprehensive plan addressing mankind's energy usage or ecologic impact must account for the effect of desalination; responsible development requires attention to the most energy-efficient methods of purifying water.

From this exhaustive literature review, it is found that various methods are developed for distillation of water. These methods are subject to the demand of fresh water, quality of water source and the involved expense. Conventional Reverse Osmosis systems are currently prevalent domestically but at the cost of plenty of waste water. Non-conventional water purifiers like solar stills have unlimited potential but their usage is inadequate due to lesser output rate. Humidification dehumidification process is the most appropriate option for fresh water production and combined system for simultaneously hot water production. The multi-effect distillation method can be used for mass production of fresh water. The detailed review reveals that there is a need to develop a hybrid system of water purification which can overcome the limitations of all existing water purification systems.

VI. ACKNOWLEDGEMENT

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