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Sustainable Assessment of Renewable Energy using Solar Appliances

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Abstract:
Drinking water and cooking is the major necessity for people all over the world. It accounts for major share of energy consumption in developing countries. So by using the solar power salt water can distillate into drinking water and cooking the food and process namely water distillation and solar cooking.

Keywords: Solar still, Aluminium plate, Temperature (200-300^{0}C), Carbon filter.

1.INTRODUCTION

Solar stills technology is currently the most proven solar thermal electric technology. This is primarily due to nine large commercial scale solar power plants, the first of each has been operating in the California Mojave Desert since 1984. Large fields of stills collector supply the thermal energy used to produce steam for a Rankine steam turbine. With increasing the population of the world and especially our country this method is essentially must. In nineteenth century recognized the potential of sun ‘s energy to provide heat for cooking and other purposes and design appropriate tools to harness it. Solar cookers have many potential benefits, both to their and to the environment. A frequently cited advantage of solar cookers is that they reduce users dependence on fuel sources for cooking.

2.SOLAR ENERGY

Solar Energy is also used for heating of water for residential and industrial uses for bathing, cooking, sterilizing, heating and cooling and more. This form of solar energy conversion is accomplished in a manner very similar to the solar thermal collectors used for "steam-to-turbine-to-electrical" generation. It is an important source of renewable energy and its technologies are broadly characterized as either passive solar or active solar depending on how they capture and distribute solar energy or convert it into solar power. Active solar techniques include the use of photovoltaic systems, concentrated solar power and solar water heating to harness the energy. Passive solar techniques include orienting a building to the Sun, selecting materials with favourable thermal mass or light-dispersing properties, and designing spaces that naturally circulate air

3.METHOLOGY

3.1 SOLAR DISTILLATION:

In this method now firstly, we gone filter the carbon particles present in the water and now the carbon filtered water is sent to other open tank where the top of the tank is placed with solar still all these are done in open environment under sun light where due to heat the water gets evaporated due to heat and now the evaporated water is collected but the still which is filtered water.

Selection of sun light area
Collecting saline water
Passing through carbon filter
Filling water in open tank
Covering upper surface with solar still
Evaporation
Collection of vapour
Result and discussion
Conclusion

3.2 SOLAR COOKING

When it comes to cooking then sure we need more heat and this heat is produced by the reflector that is present under the vessel this reflector converts the solar energy into the heat energy and finally it is used for cooking.

Selection of sunlight area
Absorbing the solar energy
Reflecting as heat energy
Focus the heat to vessel
Result and discussion
conclusion

MATERIAL USED FOR COOKING

After considering the above factors and coming up with a solar cooker design it was important to now determine the appropriate materials for construction. This is very important as it has to stay with our objective of designing and constructing an efficient and economical solar cooker. The materials chosen should not only be standard but also cost effective and also not make the design to fail. The materials that were selected are to be used in different parts of the cooker. After research and careful considerations these four basic materials were chosen for our design.

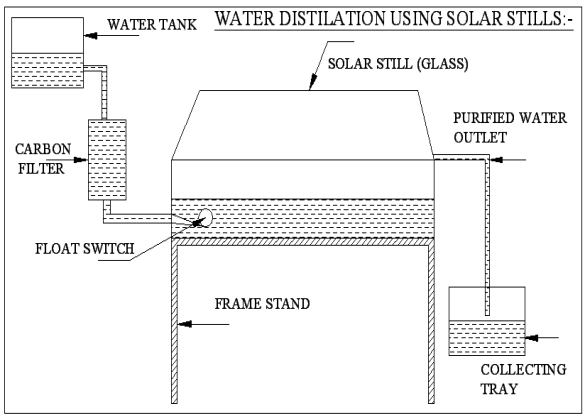
1) Steel
2) Aluminum Foil
3) Iron
4) Aluminum

4.WORKING PRINCIPLE

4.1 SOLAR DISTILLATION

The solar energy assisted water purification depends on the nature of Total Dissolved Solids (TDS) in the water content. TDS level of more than 35000 ppm is referred as saline water, while less 10000 ppm as brackish water. Permissible limit of TDS in fresh water is just 500 ppm. Desalination techniques, which are used for seawater can be direct or indirect depending upon the type of system.it can be through thermal processes, or using electric power as shown in figure. Distillation system are mainly classified as passive solar still and active solar still. It is process of using a heat source to evaporate water and then condense it to make it free from the impurities. The distillation of impure is achieved by utilizing a heat source which can be obtained from a conventional fossil-fuel source like coal or from a renewable energy source like solar, biomass etc. with the systems like MEF evaporators, solar stills etc. solar photovoltaic panels can be used to provide electricity for the RO systems, electrolysis etc. use of solar energy for distillation can be categorized into direct collection systems where solar energy is used to produce distillate directly in the solar collector, and indirect collection systems, where two sub-systems are employed, one for solar energy collection and other for distillation. The solar still, which is widely used process for solar distillation, works on direct collection principle. But solar stills require large area for the efficiently of these systems are quite low. The use of concentrating solar energy for distillation can prove to be a suitable solution to the existing challenges. Concentrating solar power (CPS) uses direct sunlight and mirrors to boil water instead of a fossil fuel as a heat to receive the sun's energy. These systems are classified by their focus geometry as either line-focus concentrators (parabolic through collectors (PTC) and linear Fresnel collectors) or as point-focus concentrators 9centarl receiver systems, parabolic dishes and Scheffler systems). CSP has several advantages by higher efficiencies, lower investment costs, an inherent thermal storage capacity that enables steam generation during cloud cover or after sunset and a better hybrid operation capability with other fuels to meet base-load demand. solar energy can be used to provide sustainable solution for fresh water supply. As per the literature, the use of solar energy in desalination process is one of the best applications of renewable energy all over the world.

WORKING MODEL



ADVANTAGES

- Least maintenance cost
- No rent for electricity utilized
- It is simple to operate

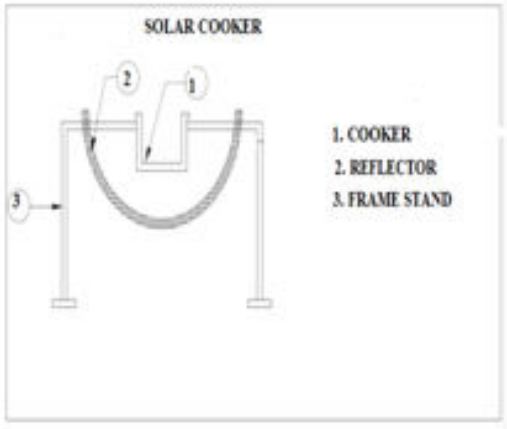
LIMITATIONS

- High initial installation cost
- Need shadow free area
- Slow process

4.2 SOLAR COOKING

The principle of our project is converted solar energy into thermal energy. In our Project, the type of concentrating system that is possible to use in a heating application is the parabolic dish. This has a bowl-shaped reflector that focuses the sun onto a relatively small receiver. A parabolic dish collector is similar in appearance to a large satellite dish, but has mirror-like reflectors and an absorber at the focal point. A parabolic dish system use to concentrate the sun's rays onto a receiver located at the focal point in front of the dish. In some systems, a heat engine, such as a Stirling engine, is linked to the receiver to generate electricity. This complicates their practical application for water and space heating. Most parabolic dish systems are very sophisticated systems used for electricity generation or very simple systems for cooking food on a small-scale

WORKING MODEL



4.2.1 CONCENTRATING SUNLIGHT:

Some device, usually a mirror or some type of reflective metal, is used to concentrate light and heat from the sun into a small cooking area, making the energy more concentrated and therefore more potent.

ADVANTAGES:

- Pollution free
- Least maintenance cost.
- No transportation from long distance
- No rent for electricity utilized
- No fuel required for operation
- It saves time, as the cook need not be present during cooking in a solar cooker.
- It is durable and simple to operate.

LIMITATIONS:

- High initial installation cost
- Care should be taken for Cooking
- Need large size of solar panel area for high power output.
- System needs permanent installation and shadow free area throughout the year.

5. NEED FOR SOLAR

1. High cost or Unavailability of commercial fuels – Kerosene, Coal, cooking gas and electricity.
2. Deforestation caused by increasing firewood consumption.
3. Use of dung and agricultural waste as fuels instead of for soil enrichment.
4. Diversion of human resources for fuel collection.
5. No moving parts
6. co2 free
7. Renewable
8. Jobs and economic growth

6. CONCLUSION

Solar energy is free, environmentally clean, and there is recognized as one of the most promising alternative energy recourses options. In supplying the needed energy solar cooking can fully or partially replace the use of firewood as like solar distillator can replace lots of electricity No artificial energy is needed to cook or filter it can be done naturally under sunlight and mostly all we humans just keeps away the sun due to sunstroke but many useful works which needs lot of energy but can be done easily with the use of solar energy.

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