

Solar Water Distiller

Hardware components

1000W Halogen Lamp	× 1
PVC Pipes	× 2
Acrylic Sheets/Transparent Sheets	× 1
Texas Instruments MSP-EXP430G2 MSP430 LaunchPad	× 1
Plastic Foam Board	× 1
SG90 Micro-servo motor	× 1
5V Water Pump	× 1
A Tub to hold Sand	× 1
5-6V Battery	× 1
Relay Board	× 1
Solder Gun	× 1

Software apps and online services

[Texas Instruments Energia](#)

Scalability of This Project

The beauty of the Solar Water Purifier lies in its simplicity. Scaling it into a long term project to meet college water needs will not require much investment considering the cost of materials utilized and the amount of energy consumed.

About

This project is titled Solar Water Distiller. It uses the basic principle of distillation to purify Sewage Water into Pure Potable Water.

Principle

There are two PVC pipes in this project. The lower one of the bigger radius holds the dirty sewage water whereas the upper one of the lower radius holds the fresh distilled water. The water in the lower PVC pipe is heated using a 1000W halogen lamp (which acts a prototype of the Sun in this experiment). The rays entering the transparent sheet heat the water and the convection currents cannot escape out of the model thus creating a greenhouse effect, thereby increasing the temperature inside. The sand on the outside has a low specific heat capacity. Therefore, it gets heated up faster and the water inside the lower PVC pipe is heated using conduction. Thus all the three modes of heat transportation i.e. conduction, convection and radiation are used to heat the water.

After 10-15 minutes of continuous exposure of the model to the Halogen Lamp, the water begins to evaporate and condense on the Transparent Sheet above. The Transparent Sheet is shaped in such a way that it is V in shape so that the water condensed, due to gravity flows to directly above the Upper PVC pipe. Then the condensation process happens and the water collects in the upper pipe.

Procedure

Step 1: A butterfly valve is used to control the inlet flow into the lower pipe. Initially, the valve is open and lets the water flow in. As the water reaches the desired water level, the water sensors and MSP430 send the command to the servo motor which closes the valve and the water flow stops.

Step 2: The halogen lamp heats up the water in the lower pipe and the water evaporates.

Step 3: The water vapors condense on the transparent sheet and when the size of condensed water droplets increase, they get collected in the upper pipe.

Step 4: Once the water in the Upper pipe reaches a certain level, water sensors and MSP 430 activates the Water Pump and the pure condensed water is drained out of pipe through a pipe.

Conclusion

Overall, it's an intermediate level hard project which can be taken up by any group of enthusiastic students/professionals and will take about 6-7 hours to complete it.