

Solar water heater

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https://wiki.lowtechlab.org/wiki/Chauffe-eau_solaire/en

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 Difficulté **Moyen**

 Durée **2 jour(s)**

 Coût **40 EUR (€)**

Description

This technology allow to heat water thanks to solar energy

Sommaire

Sommaire

Description

Sommaire

Introduction

Étape 1 - The way it works

Étape 2 - Construction of the reservoir

Étape 3 - The heating chamber

Étape 4 - Assembly of the lines

Étape 5 - Assembly

Étape 6 - Support

Étape 7 - Connect

Étape 8 - More

Notes et références

Commentaires

Introduction

The water heater describe below is inspire by the model present in the SERTA (service of Alternative Technology) in Brasil
It works perfectly in a tropical or hot climat. It hasn't been tested in a temperate region yet

Matériaux

- Pipe pvc 20mm
- Elbow pipe pvc 20mm
- T pvc 20mm
- Adhesive tape for plumbing
- Plastic bottle
- Reservoir

Outils

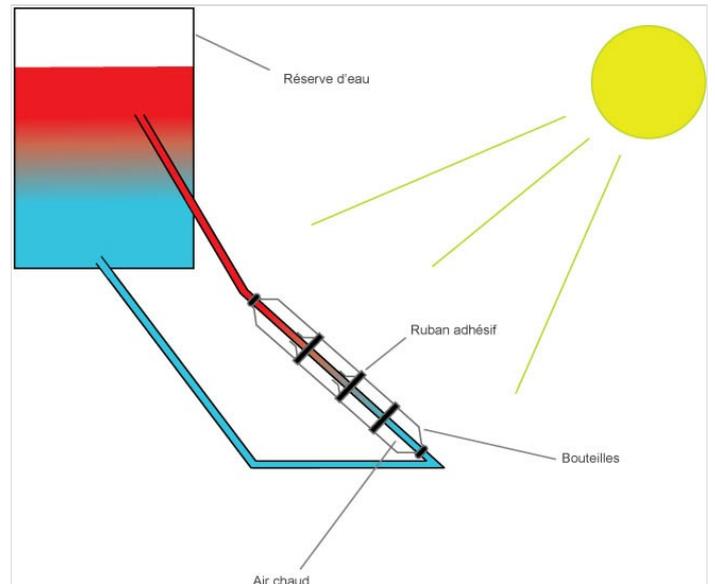
- Glue pvc
- Sand paper
- Rag

Étape 1 - The way it works

This system work thanks to a thermal expansion concept
When the water heat, it fills more space. So its density is weaker than the cold water one. So, hot water will always be above the cold water.

Explanation of the system:

The water at the bottom of the reservoir (cold) goes down by simple gravity until it reaches the end of the system. Little by little, at the contact with the hot air confined in the bottle (greenhouse effect), the water gets warmer and by consequence goes up in the pipe before going back to the reservoir



Étape 2 - Construction of the reservoir

In your reservoir, you will have to make a hole for the passage of the pipes

If you have a metal reservoir, it is easier to use metal pipe that you will weld. Otherwise, it is also possible to use pvc pipes fixed with cement.

For a plastic or resin reservoir, the best solution is to use pass-walls. It is also possible with glue or special resin to seal the pipes

Make :

- A hole at the bottom of the reservoir for the exit of cold water
- A hole a little bit upper for the arrival of hot water
- An other hole more higher for the exit of hot water, the one you will use.

Finally, you could choose between making a hole at the top of your reserve for the inlet of cold water, or simply getting the water by a pipe that you will put on the side of the reservoir.



Étape 3 - The heating chamber

The creation of the chamber is very easy : cut the bottom of the bottle in a way that you could slot them together (picture).
The more complicated step is to slot at the base of your pile two bottle in the opposite direction, in a way that the edge of the chamber are neck.
/!\ Wait before sealing with the adhesive tape !



Étape 4 - Assembly of the lines

Start by passing the tubes in the chambers created before, and cutting them in way that when you slot the T in the tube, the neck of the bottle be almost in contact with the T.
Stick the T on the tubes (the chamber around the tube) then use adhesive tape to fix the bottle between them, and the necks at the end of the T pipes.

A line must be realized with elbow pipe to close the system.

How to glue :

Frost with sand paper with thin grain the part you have to assembling.

Clean it with a rag soak in stripper.
Apply the glue at the entry of the female part and on the whole male part.
Slot immediately completely, without twist.
Clean the glue drip.

The drying time is about 1h, but if the water is here to be consume, it is advised to wait between 12 and 24 hours for the toxic solvant to disappear.



Étape 5 - Assembly

Étape 6 - Support

Create a shelf (in wood for example) with two lines at different height, who will form a gentle slope. Only the tubes with the T pipes will be in contact and fixed (here with iron wire) at the frame shelf. The high line must be lower than the bottom of the reservoir ! It is recommended to put the reservoir in high.



Étape 7 - Connect

Connect with the help of the tubes the line of the T pipe at the bottom to the hole near the bottom of the reservoir and the line of the T pipe of the top to the hole at the middle
Glue !

Étape 8 - More

You could realize this system with as much heat chambers as you want.
The length of the chamber can be modify to, but the more link there will we, the possible heat leak it could be.
You must orientate the system for it to take as much as possible the sun during the day (oriented south).
(Other example of production in picture)



Notes et références

This system is installed at SERTA (Serviço de Tecnologia Alternativa), Brazil.
Serta website