

Solar Powered Herbdryer



As the garden and the different herbs we planted are becoming bigger we felt the need of having a solar dryer to dehydrate and preserve more and more food. Here on Tinos island we have a lot sun radiation and a generally warm climate which should give us optimal conditions for working with the solar dryer. The passive design fits nicely into our sustainability approach and goes hand in hand with perma culture practice.

The design of the dehydrator is greatly inspired by the work of Dennis Scanlin from the Appalachian State University. While i was looking at the design it came to my mind that it would be great to use an old Solar heater panel as heat trap. We discovered that it is fairly easy to find panels from old solar water heaters at recycling place or at you're local plump-er. They have everything you need inside: good insulation at the back, very good solar glass for optimal absorption of radiation and a really good copper heat absorber. So we changed the design a bit in order to fit everything to our panel. We increased the actual drying box a bit and switched to side opening doors. The benefit in this design lays in the recycling aspect and the lower amount of building effort.

The initial design was made in order to build it at one of our perma culture seminars but we didn't have the time this year. So we decided to build it now.

Improvements

From the initial design to the final build we made some changes that came to us while building(described further down). Also i came across a nice study from Dennis Scanlin that was published in 1999 while writing this article (Study). While reading it i saw that the design described here could surly be improved further. One thing would be to place the copper heat absorber in a diagonal way instead of flat us we did. Also a way to control the size of the air inlet and outlet seams to be a must have. This will help to fine tune temperature and airflow in order to achieve maximum drying. The other important part is, by closing the air vents, to avoid a reverse thermosiphoning in night time that will suck cold air through the unit resulting in rehydration of the material.

Credits: Text : Marilia Kalouli and Nicolas Bedau Illustration : Nicolas Bedau

Resources:

a lot of inspiration for our system came from:

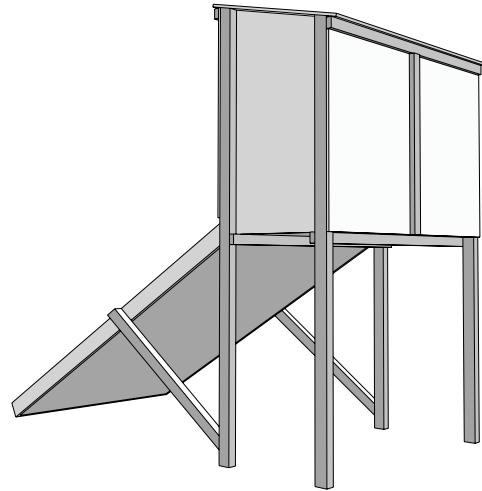
<https://www.motherearthnews.com/diy/tools/solar-food-dehydrator-plans-zm0z14jjzmar> for further reading take a look at the study that has very detailed information on the

thermal design:

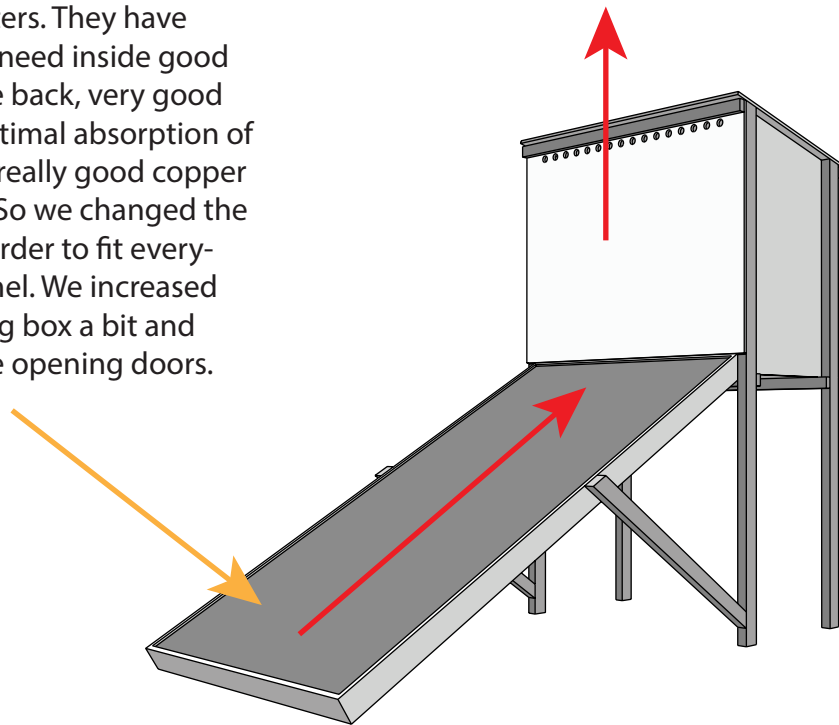
http://www.rivendellvillage.org/Solar_Food_Dryer.pdf



Solar Herb dryer design inspired by Dennis Scanlin



The design of the dehydrator is inspired by the work of Dennis Scanlin at the Appalachian State University. We discovered that it is fairly easy to find panels from old solar water heaters. They have everything you need inside good insulation at the back, very good solar glass for optimal absorption of radiation and a really good copper heat absorbers. So we changed the design a bit in order to fit everything to our panel. We increased the actual drying box a bit and switched to side opening doors.



Materials

Wood Beams



Wood Beam
2,5 x 4,5 cm
Total = 32,4m



Wood Beam
4 x 6 cm
Total = 10m

Plywood



Plywood sheet
250 x 125 x 1,2 cm
Total = 2 sheet



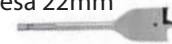
Wood screw with sink head
45 x 6 mm aprox. 20 pieces
18 x 4 mm aprox. 80 pieces



Mosquitonet fabric
= 110 x 580

Tools

Fresa 22mm



Chisel



Hammer
Sandpaper around
80 - 200 grain size
Bit set for drill

Wood drills with center peak: 5, 8, 10, 12



Wood clamp x 3



Jigsaw



Drill



Wood glue
waterproof



Wood Stapler



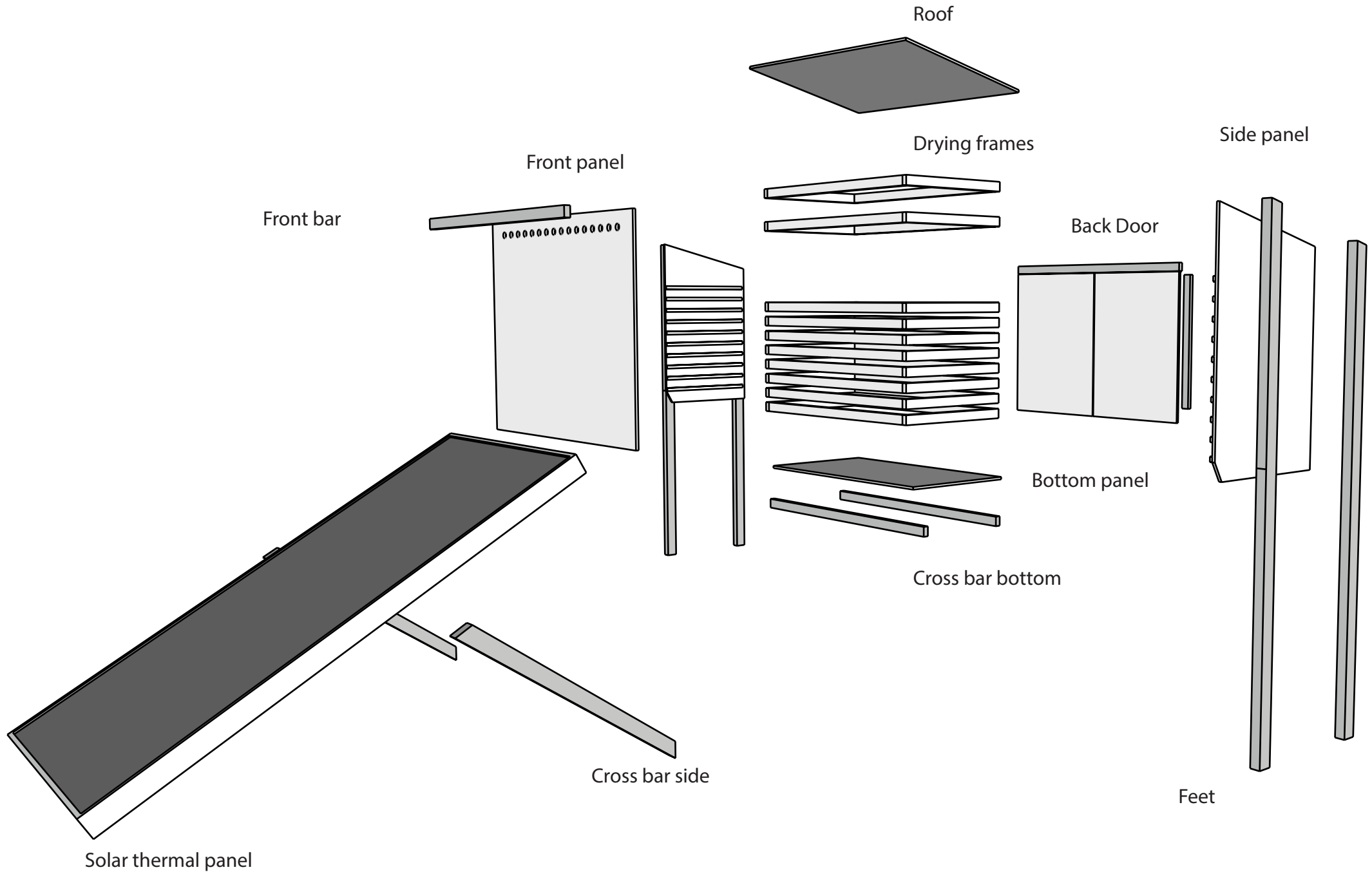
Disk saw



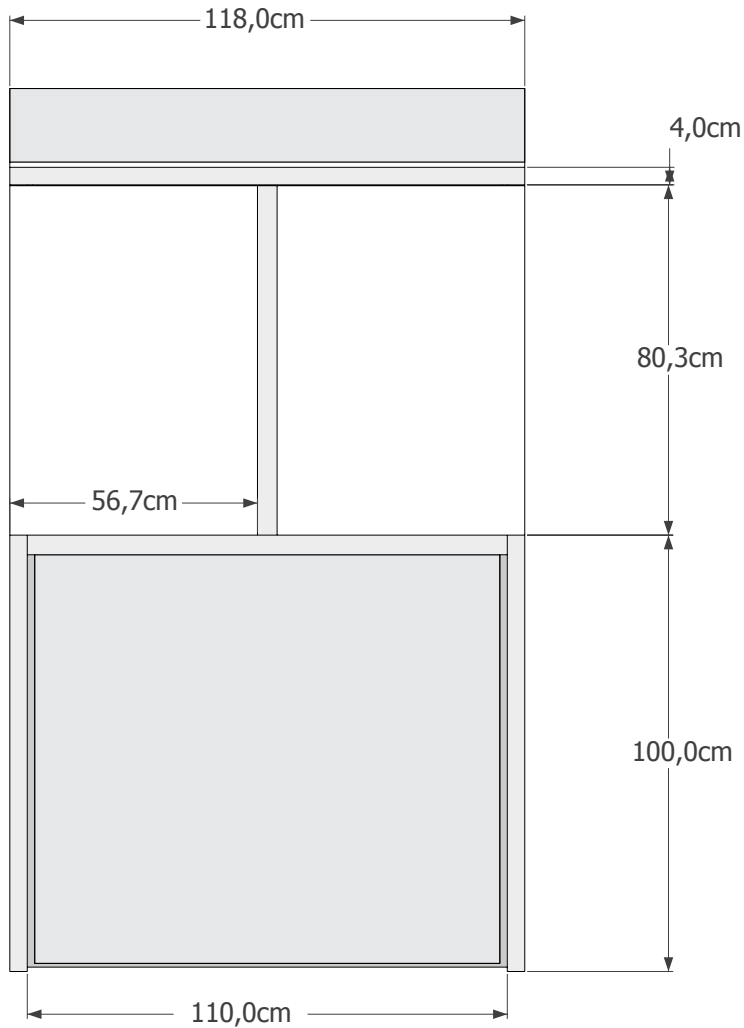
Angel grinder



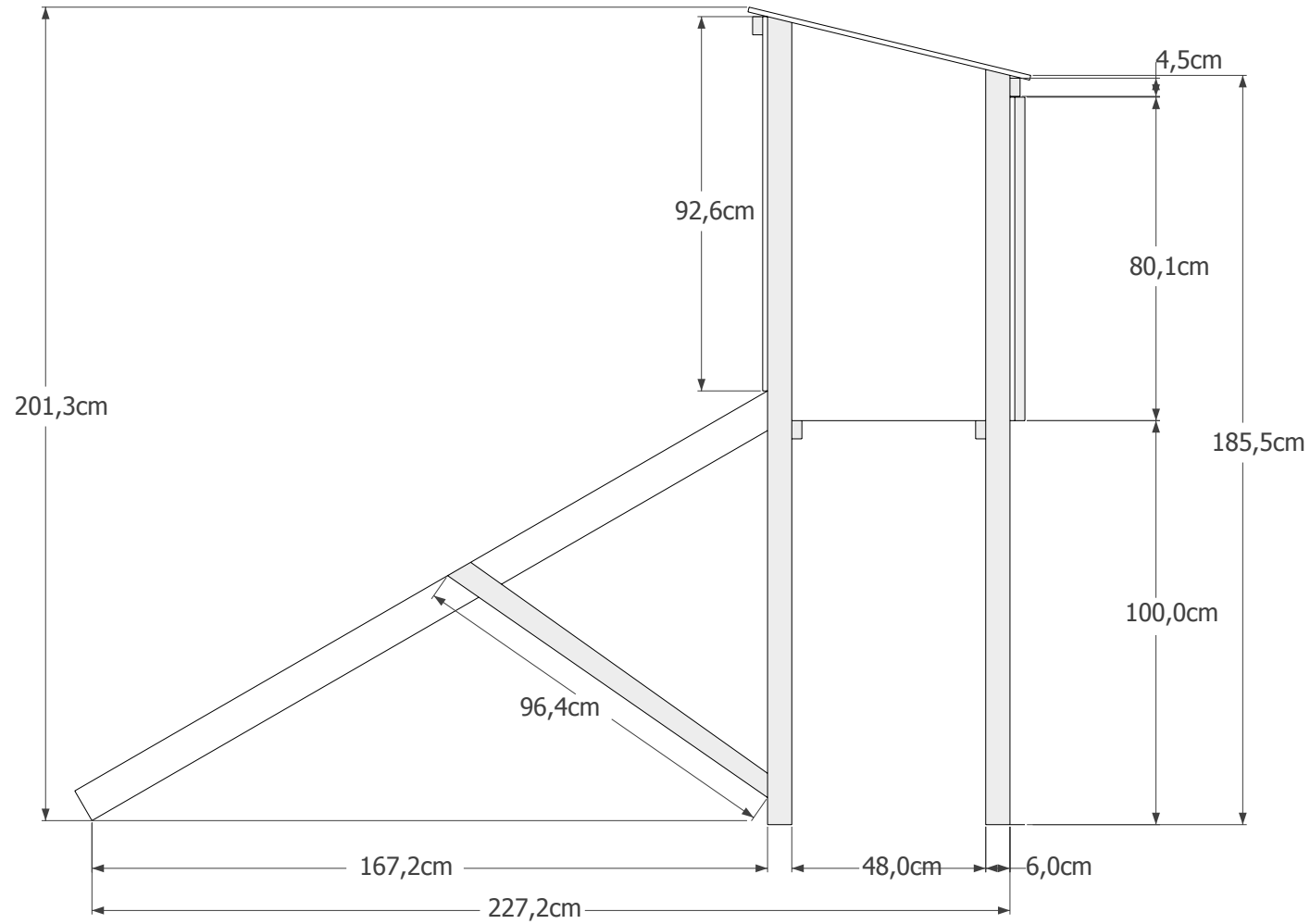
Explosion Drawing with element names



Over all Dimensions

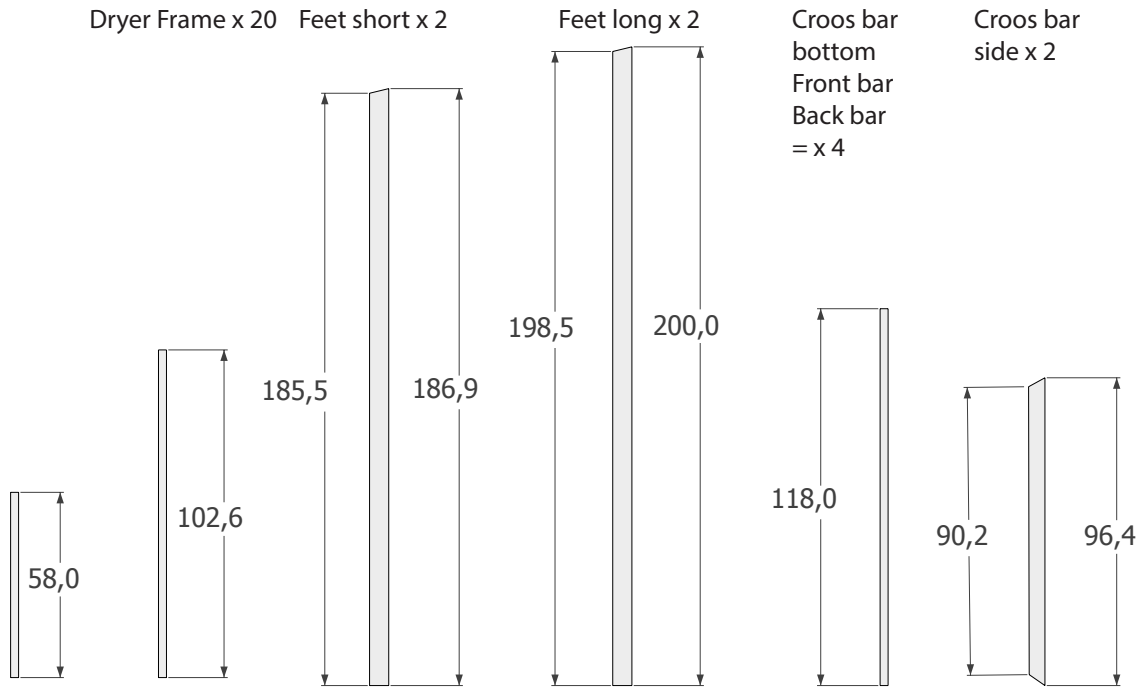


Back View

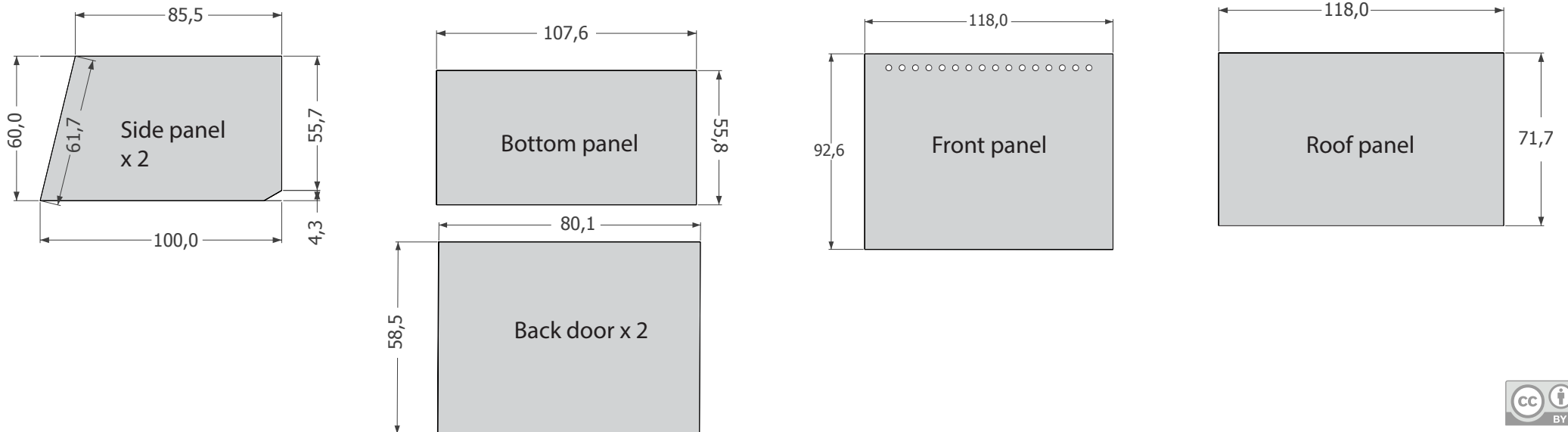


Side View

Frame parts

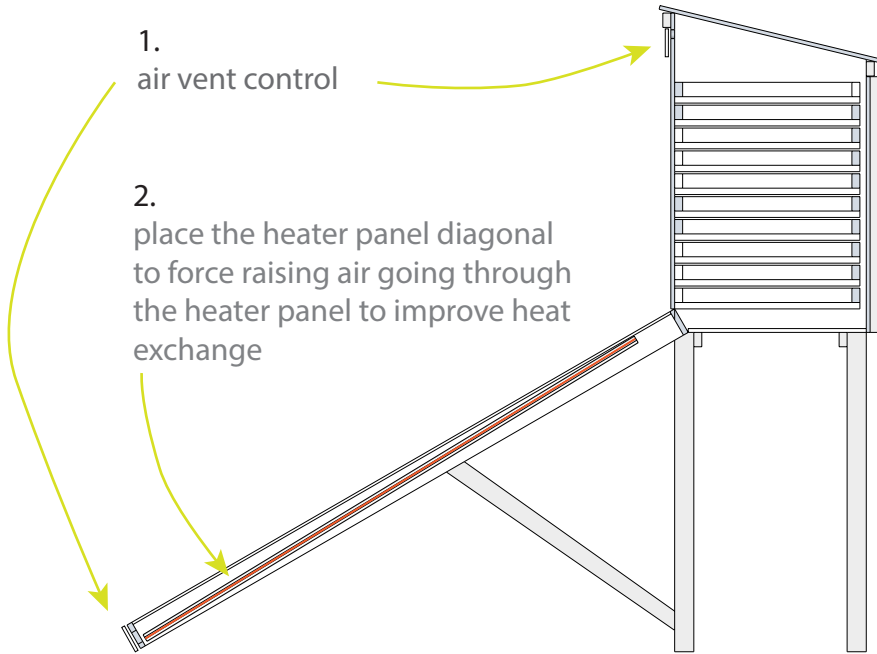


Box parts



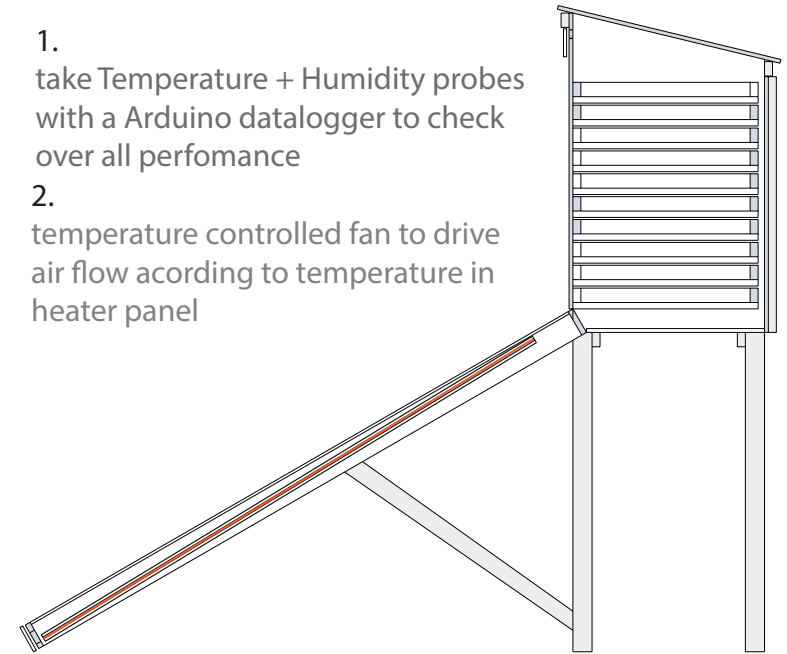
Improvements:

1. air vent control
2. place the heater panel diagonal to force raising air going through the heater panel to improve heat exchange



Research + Upgrade:

1. take Temperature + Humidity probes with a Arduino datalogger to check over all performance
2. temperature controlled fan to drive air flow according to temperature in heater panel



Hope fully:

This guide will help you build one and inspire you to improve the design further, lets green society.....