

In August 2016 during the *Ersasmus+ Transition in Action II Youth Exchange Program* we built a two-burner rocket stove and a heated bench with an international group of 25 young people. This document is a summary of the working process and its aim is to give an overview and inspiration for similar projects.

<http://kozossegek.atalakulo.hu/transition-in-action-ii>

ROCKET STOVE WITH HEATED BENCH

Rocket stoves are cooking (and heating) devices, which are designed to be fueled by small diameter wood (e.g. thin branches) and due to the shape and materials used for their combustion chamber are very efficient - much more than just cooking on an open fire.

PLANNING

NEEDS Like with all projects it is important to look at the reasons and needs for the build. You should be asking and answering questions such as: Who will use the stove? How many people will they be cooking for typically? What sort of pots and pans will they want to use with it?

In our case the purpose was twofold. Firstly it will be used by a small family on a regular basis, so a smaller burner was needed. Secondly larger quantities will also be cooked here either for food processing (e.g.: jams) or meals for events such as workshops.

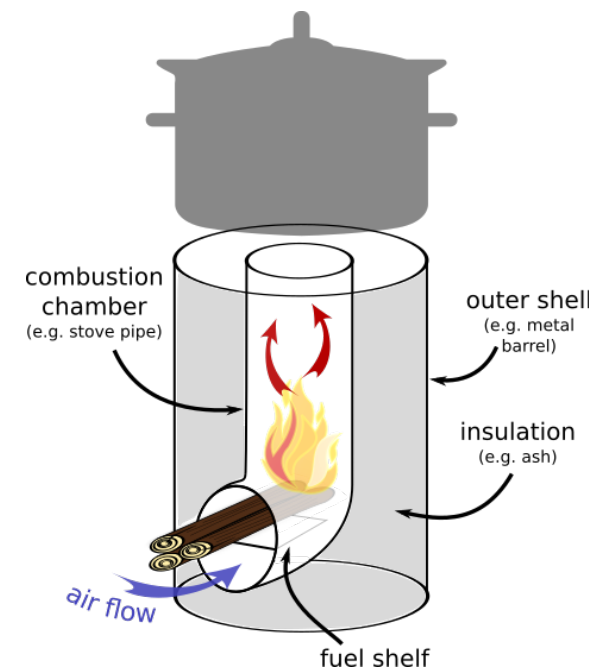
LOCATION Before thinking of the specific design it is important to know where it will be exactly. You have to think of where the wind comes from, if there are buildings around and if you need to think of building an additional structure such as a roof for protecting it from the rain.


Our stove was going under an open roof structure which was specifically built for this, and is located next to a traditional summer kitchen which has water supply making it ideal for cooking situations.

MATERIALS Firstly you should know what is available locally especially what materials can be acquired for free such as old fired bricks, mud bricks, tiles, metal parts, clay and sand.

We found old adobe (mud) bricks in the neighbourhood we could have for free and old fired bricks and tiles we could also use.

DESIGN Make sure you understand the principles behind a rocket stove (watch some videos, read about it or even build a mock-up using cans if you haven't used one before). Decide on the dimensions of your combustion chambers and then think about other features you might want to include - e.g. a step to comfortably reach the stove top, a bench for sitting, a chimney or a surface to put ingredients on. Make drawings of your design, especially of the cross section so you know how the combustion chamber will look like.





We decided to include a **heated bench**. For this we needed to design the **flue paths** under the sitting area. We also needed a **flue pipe** (chimney) to draw the smoke through the bench. If you have a longer flue path like this its very important to include a shortcut for the smoke to directly go from the rocket to the chimney to warm it up, otherwise it wont be able to draw the fire through the long cold path and it will just smoke through the **fuel-feed**. We also had to have a **metal cover** for the larger rocket so the smoke would go through the chimney and the bench. But this gave us an added feature of either using the rocket without the chimney (direct fire on the bottom of the pot, but the pot will get some charring) or using the stove without the bench but with the chimney giving us a metal stove top for either direct grilling or with pots you don't want to get char stains on. We also included a small "**skirt**" for directing the heat next to the bottom of the pot for the large rocket. Another thing to include is easily accessible **holes for cleaning** the flue (they are small pieces of bricks plastered in with mud that can be removed for cleaning every few years).



PREPARATION

Clear the area where you want to build (probably under a rain-protected area). Think about how you will transport the materials there and how you will access them during building. Depending on the size of the build you might want to construct a pool for soaking and mixing your clay and mixing it to the right consistency of mud. It is always good to have a dense flat surface to build on. You can pound the earth, even include a layer of plastic sheet to prevent ground water coming up. You can even make a concrete base if you are thinking very long-term.

We brought our materials (tiles, bricks, adobe bricks) to just few meters away from the roof we were building under. We also constructed a mud pool from reused pieces of wooden planks and lined it with used plastic sheets (this is not vital, as the clay will block most of the water from draining to the ground). For the base, we already had a small concrete patch that was there before and the rest of the area we pounded and leveled with mud to make an even surface.

BUILDING

Once you have your design, your materials and area prepared you can finally get building. If you are more people building think about task division carefully. Either have a coordinator who makes clear each sub-task and always knows what is happening or in some other way make sure that everyone knows who is doing what and there is no double-work or people annoying each other with bad task division.

We had a workshops-like setup as we had an international camp for young people. It was quite a challenge, as people could chose between different workshops each day, therefore the team changed everyday and the newcomers had to be explained what exactly was happening. Sometimes the number of the group was too large and people didn't have enough work. Try to avoid this with better planning (having more than 4-5 people working can be difficult). Take into account when your are working in an educational way with a changing group the build will likely take much longer than if you were building with a fixed group of experienced people committed only to this one project at a time.



FINISHING TOUCHES

Once the structure is ready and you are satisfied your stove works you can think of decorating elements and finishes that will give the final outlook for your creation. The options are infinite and without spending any money you can do really beautiful things. For example you can make embossed shapes using just mud or combining it with straw for additional strength, you can smooth corners and build additional features, you can make mosaics using crap tiles or broken ceramics, or combine any material that you think will fit and last. You can also use lime to whitewash the outside, this will also protect it better from the weather and make it water resistant to some extent, you can mix in natural pigments with your lime or mudplaster to create different colours. It is best to apply the final mud plaster layer once the stove dried for some days so you can cover up small cracks that might have formed. You can also use a slightly more sandy mixture for this which is more flexible and less likely to crack.

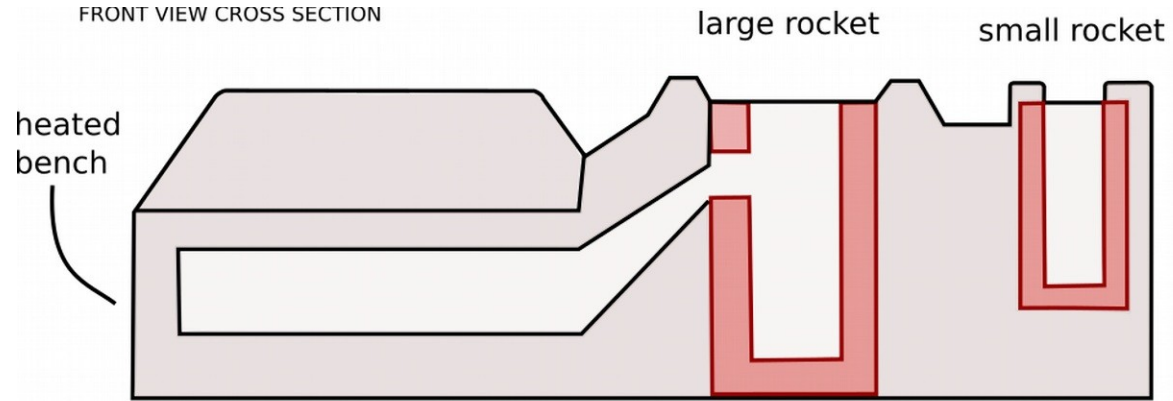
We used mud and straw for creating embossed motifs and also included a cup holder with the same technique. We also made a back support for the bench out of wooden planks and laths which we plastered with mud giving a very solid structure.



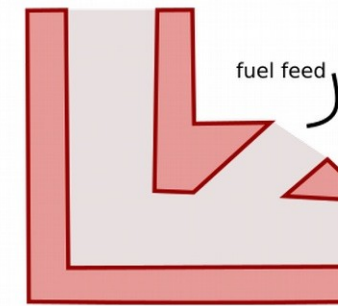
USE

With all custom made heating/cooking appliances you will need some experimentation and time to get to know the specific device; how to fire it up quickly, how much wood to use for certain applications and outcomes (e.g.: different dishes) and which type and size of fuel works best. In general with rocket stoves it is easiest to get the fire going by first feeding small dry sticks through the vertical part of the combustion chamber. Once the fire is going you should switch to feeding it from the front opening to achieve efficient and clean burning with the fire shooting out through the vertical rise.

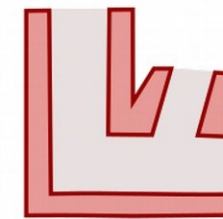
FRONT VIEW CROSS SECTION



COMBUSTION CHAMBER
SIDE VIEW CROSS SECTIONS



large rocket



small rocket

TOP VIEW CROSS SECTION

