Improved Cooking Stoves
개량형 조리용 화로

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Conventional Cook Stoves

Open cooking fire: 3-stone, open pit, etc.

Conventional Cook Stoves

Conventional clay stoves

Problems of conventional cook stoves

- Use of firewood

1) Deforestration
2) Women & Children labor
3) Scarcity, regulations (→ crime record of the people)

- Indoor Air Pollution (IAP)

1) WHO: 1.6+ mio. death/year
2) CO: non-irritating, colorless, tasteless, odorless (product of incomplete combustion)
3) CO2, black carbon, etc.

- Low efficiency

Wasted heat (3-stone fire: only 10 to 15% efficiency)

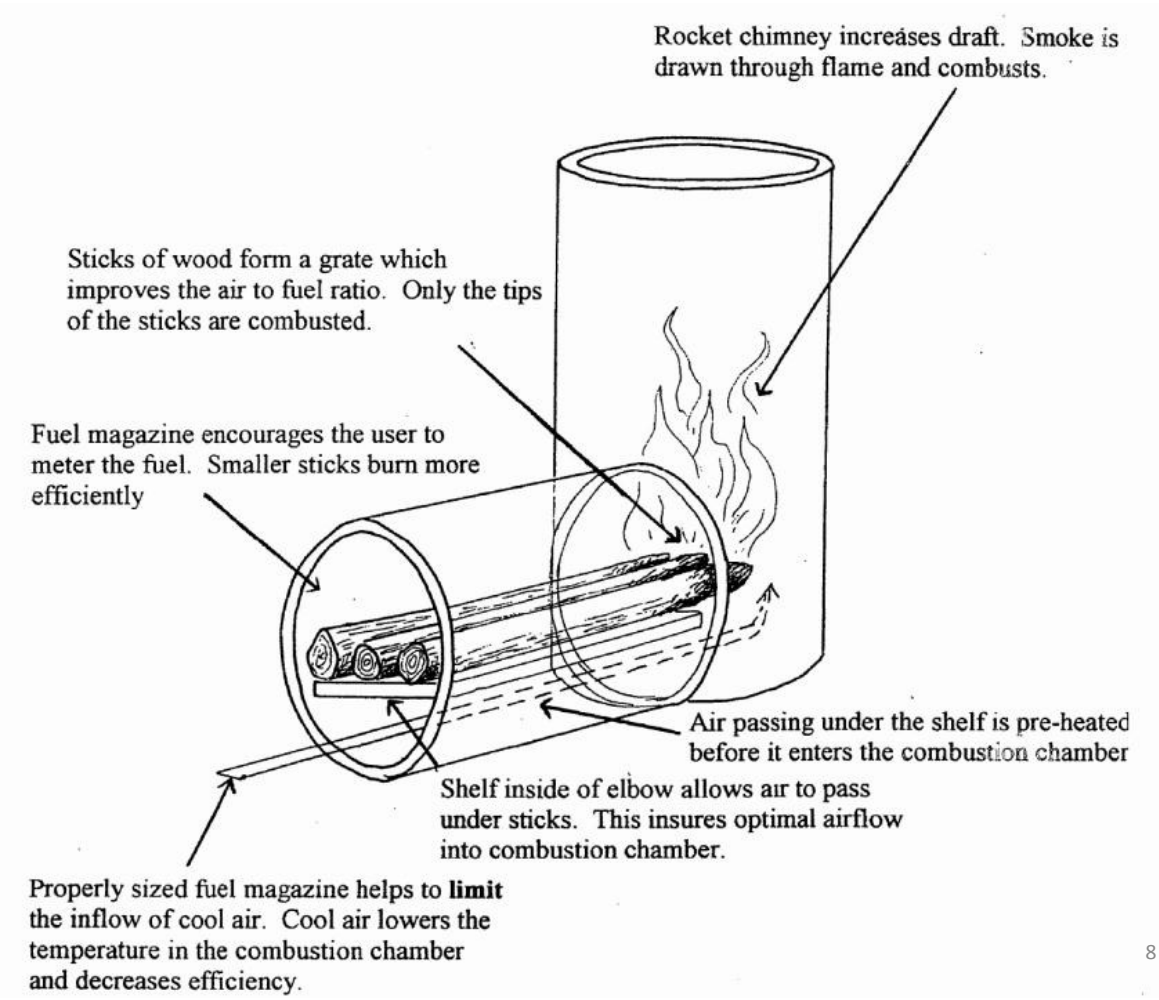
ICS options – 1) Chingwa Stove

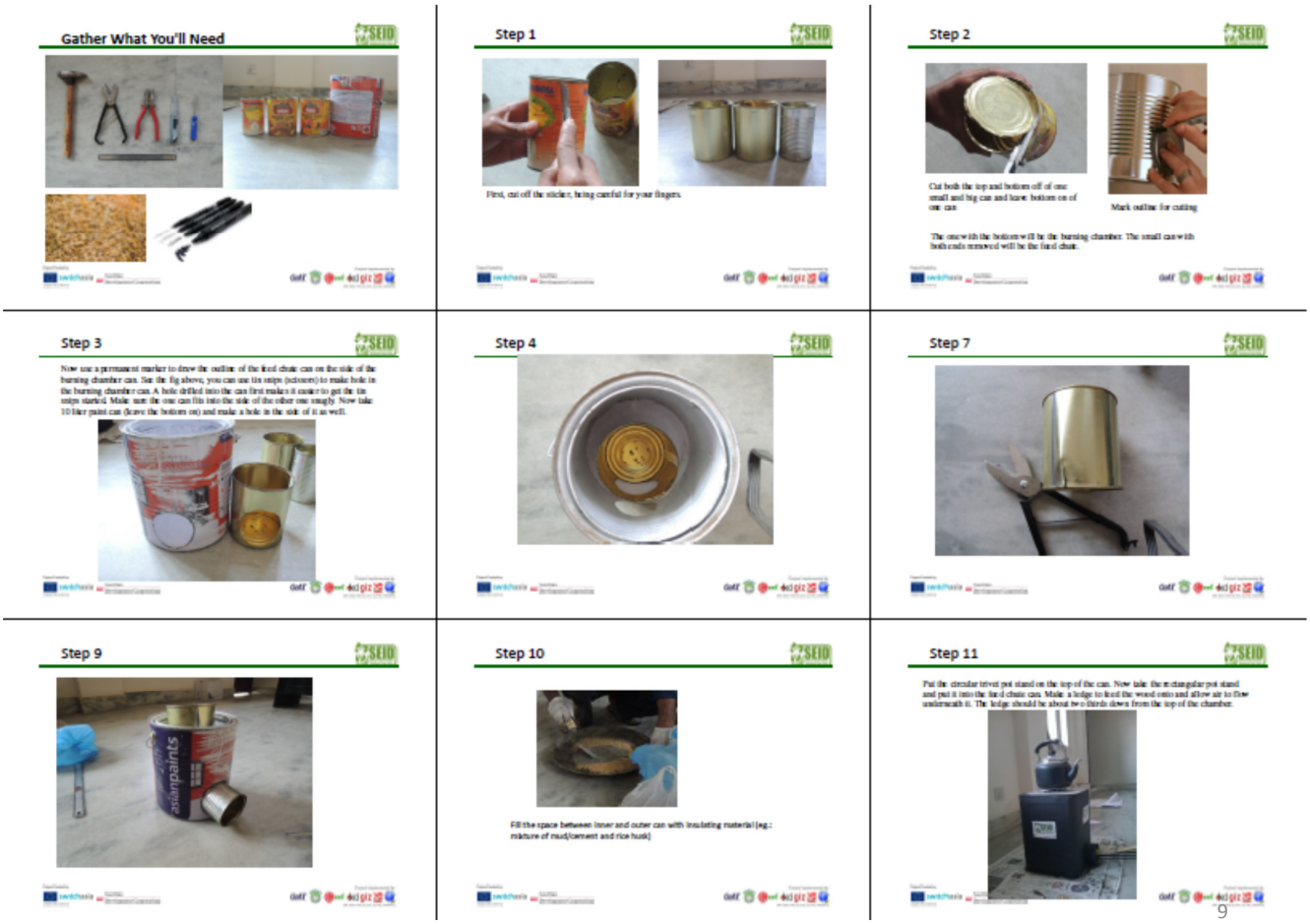
- The Chingwa energy-saving stove was developed in 2002 for the population living in deforested and sensitive ecosystems **in Zimbabwe**. It was further developed and adopted in Uganda, Tansania, Kenia, Mali and Niger. It emits **relatively little smoke** and shows an efficiency of **84%**. Chingwa means bread. The stove is made of **bricks and mud**. It is fitted with a metal grate, a pot hole and a hot plate. An oven can be incorporated for bread baking. It has **a chimney that takes the smoke out** of the room thereby improving the kitchen environment. This stove was widely disseminated by government of Zimbabwe through the Department of Energy and NGO's like Zimbabwe Women's Bureau, Africa 2000 and several churches.

Chingwa Stove

Justa Stove

- The Justa stove (pronounced Hu-sta) adopted the principles of clean combustion known as the **Rocket elbow technology**. The Rocket lbow is an easy-to-build, highly adaptable and inexpensive cooking device characterized by a hollow L-shaped shaft made of ceramic or clay that acts as the **combustion chamber**.




Gather What You'll Need
Step 1
First, cut off the sticker, bring careful for your fingers.
Step 2
Cut both the top and bottom off of one small and big can and leave bottom on of one can
Mark outline for cutting
The one with the bottom will be the burning chamber. The small can with both ends removed will be the fuel chute.
Step 3
Now use a permanent marker to draw the outline of the fuel chute can on the side of the burning chamber can. See the fig above, you can use tin snips (scissors) to make hole in the burning chamber can. A hole drilled into the can first makes it easier to get the tin snips started. Make sure the one can fits into the side of the other one snugly. Now take 10 liter paint can (leave the bottom on) and make a hole in the side of it as well.
Step 4
Step 7
Step 9
Step 10
Fill the space between inner and outer can with insulating material (eg.: mixture of mud/cement and rice husk)
Step 11
Put the circular trivet pot stand on the top of the can. Now take the rectangular pot stand and put it into the fuel chute can. Make a ledge to feed the wood onto and allow air to flow underneath it. The ledge should be about two thirds down from the top of the chamber.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Advanced ICS of GrAT

- The aim of the cook stove developed by GrAT is to provide cooking services using locally available low-cost materials and to improve on the already existing Elbow Rocket Stove concept by introducing a secondary air system.

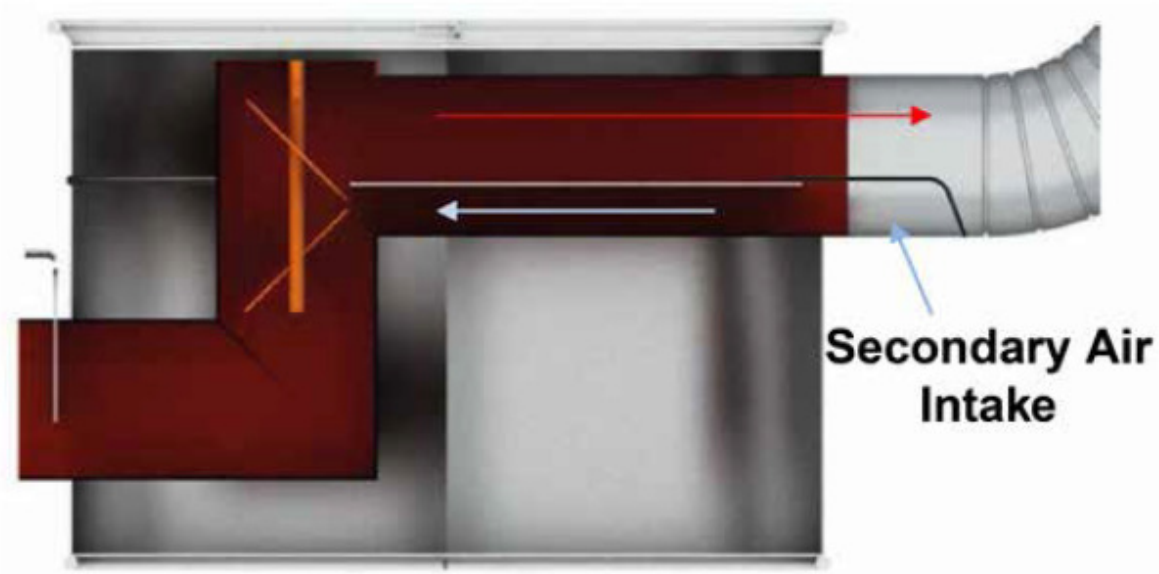
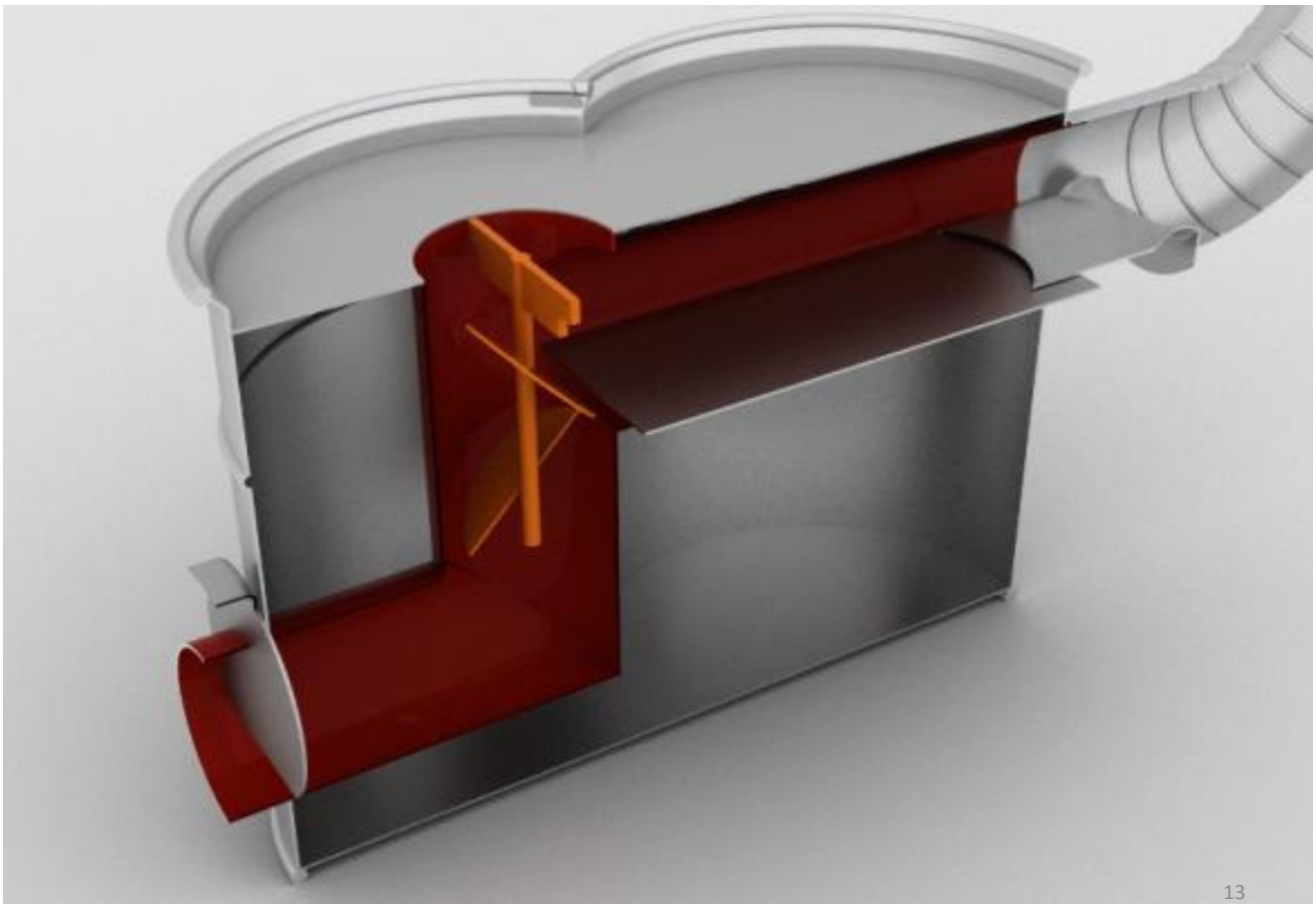


Figure 141: Stove with a sliding inlet door



Advanced ICS of GrAT (1/3)

- The interior pipe work is made of industrial steel pipe. The fuel wood is loaded and the vertical pipe section is the combustion chamber.
- One of the design concepts of the stove includes creating turbulence in the combustion chamber. The turbulence causes combustion gases to mix better with air which results in more complete combustion and significantly less emissions. To achieve more vigorous mixing metal fins are inserted in the combustion chamber.
- The combustion gases then travel up the pipe and heat up the cooking pot by direct contact.

Advanced ICS of GrAT (2/3)

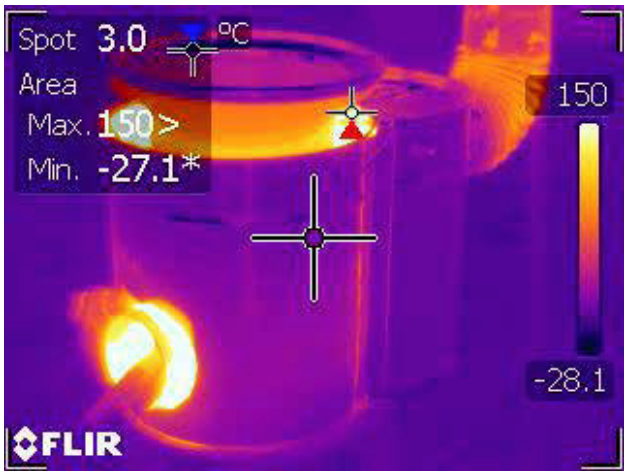
- Next the flue gases, which still have a significant amount of heat, travel through the horizontal pipe in the second section of the stove while transferring some of its heat energy to the second surface. Thus, this design can serve two functions: it can actively cook one dish and use the heat of the flue gas for slow cooking or to keep a second dish warm.
- Another important concept in this stove design is the introduction a of secondary air supply which is preheated by the flue gas air before it enters the combustion chamber. The secondary air enters at the bottom of the chimney elbow and then travels to the combustion chamber while absorbing heat from the counter flowing flue gases.

Advanced ICS of GrAT (3/3)

- The warm air facilitates the combustion of flammable volatiles in the top of the combustion chamber which leads to a more complete and thus effective combustion process.

- Lastly, the stove has a sliding inlet door which reduces heat losses to the environment when the stove is not being fuelled. This slide can also be used for controlling the primary air supply.

Advanced ICS of GrAT



감사합니다!

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