Introduction

Rocket stoves are simple cooking stoves that can be assembled from a few basic components. Considered to be efficient and relatively inexpensive to operate, the rocket stove derives its name from the appearance of the piping that extends horizontally from the main portion of the unit.

Rocket stove has been first times introduced by APROVECHO research centre (Oregon, USA) since 1976.

Simplified stove theory

- The Rocket Stove Principle is maximizing combustion and heat transfer efficiency.
- Wood doesn't burn
- Wood gets hot and releases volatile gases that then combust
- For this to happen we need to have sufficient temperature
- If wood is heated to 650 degrees Celsius (and sufficient oxygen is mixed with the volatile gases) the result is complete combustion. The products of clean combustion are CO2, water vapour and heat.
- A lot of heat , roughly speaking , dry wood has half the energy per kg as gasoline, if it is utilized
- Smoke is wasted energy

Construction

Dr Winiarski rocket stove:

- Insulated low mass combustion chamber
- Stove power is controlled by regulating the fuel supply not the air intake

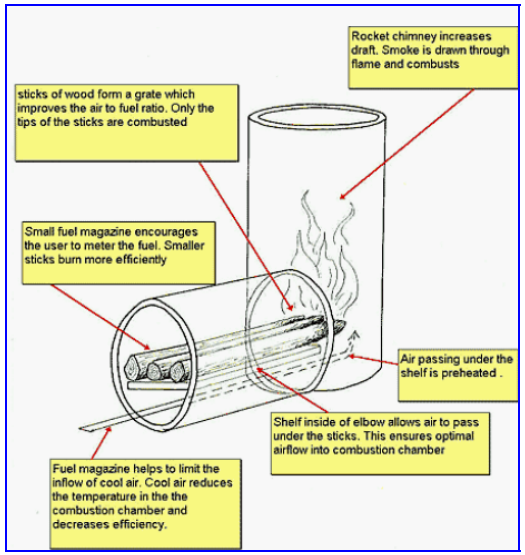


Figure 1 Rocket stove principle

- Internal shelf allows sticks to form a grate. Stick/air/stick/air
- Small amount of high velocity air is drawn under the coals and the wood 'grate' which improves air to fuel mixture
- Horizontal feed chamber is convenient
- Since its invention in 1984 over 15,000 rocket stoves have been built
- Optimising heat transfer by forcing hot flue gases around pot

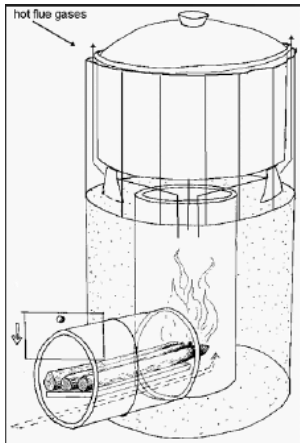


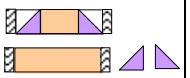
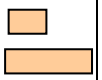
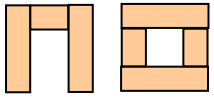
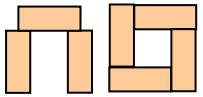
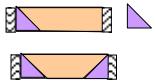
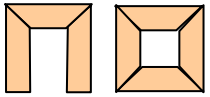
Figure 2 Rocket stove with heat exchanger/skirt

- Rocket stove heat exchanger/skirt is to minimize the gap between the skirt and the pot while maintaining the cross sectional area of the combustion chamber (for average size pots 1 cm is good rule of thumb)
- With this heat exchanger, overall efficiency can be improved by 50% or more
- Make it adjustable to accommodate different size pots
- Make it as tall as feasibly possible
- The stove's bricks can be made of Clay + an organic material, such as fine sawdust or ground coffee husks

REEPRO Modifications

- Adaptive research on use of rice husk or sawdust as organic materials

Table 1 Rocket Stove modifications

Mould Modification	Bricks	Stove assembling
	 5 6	
	 11	
	 2 9	

- Usually rice husk is everywhere available in Laos and Cambodia while not always so with sawdust
- These bricks can then be placed in a metal stove body or in a mud stove (figure 3)

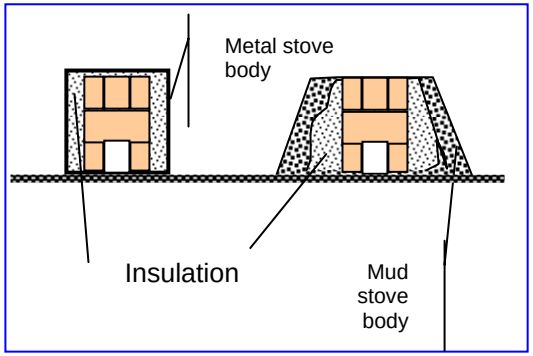


Figure 3 Placement of bricks

- Multi-brick shape mold and several brick modifications have been made by REEPRO project.

Benefits

- Heat utilization efficiency of rocket stove is around 33-36%, compared to 10-12% of open fire one.
- Rocket stove consumes less wood
- Traditionally in developing countries, fire wood collecting is burden job of women and children, therefore, rocket stove can save times and labor of women and children
- Less hazardous smokes due to complete combustion
- Cleaner kitchen and pots

Contact address

Faculty of Engineering. National University of Laos.
Friendship Road. Vientiane. Lao PDR
Contact person: Dr Khamphone Nanthavong
Tel. : 856-20 5414347
Fax : 856-21 314382
E-mail : khamphon@fe0nuol.edu.la

The REEPRO project receives funding from the European Commission within the COOPENER Programme.
The sole responsibility for the content of this document lies with the authors. It does not necessarily reflect the opinion of the European Communities. The European Commission is not responsible for any use that may be made of the information contained therein.

REEPRO

Promotion of the Efficient Use of Renewable Energies in Developing Countries

Rocket stoves

Intelligent Energy Europe

EIE-06-256 REEPRO

DGS REEPRO Rural Renewable Electrification