Rocket Stoves for Sub-Saharan Africa

By Peter Scott

Since Aug 2003, myself and my partner, Jayme Vineyard, have been working with GTZ ProBEC (Program for Biomass Energy Conservation) and EAP (Energy Advisory Project) as well as World Food Program and innumerable small businesses to introduce the Rocket Stove principle to a number of countries in Sub-Saharan Africa (Uganda, Lesotho, Mozambique, Malawi, and Zambia) . Most of our work has focused on building institutional stoves (stoves for boarding schools, tea estates, prisons etc…) but we have also built bread ovens, household stoves and kilns. In March, one of our project partners in Malawi (Eastern Produce Tea Estates) asked us to help them design a new stove that would be more fuel-efficient then their existing open fire. The estate cooks for 40,000 people /day so a new stove design would have far reaching impacts on the health of the workers and the forests.

The tea estate's open fires uses **170 kg of wood** every day to cook enough corn porridge for 55 people (half a 220Liter

Using Rocket stove principles; we built a new 100 Litre wood cook stove that uses only **13 kg of wood** to cook the same amount of food. The stove was made with locally available materials and cost about US$80. No smoke and no chimney

A visual comparison between the quantities of wood used (170kg) for the open fire vs. the amount of wood used (13kg) for the 100L Rocket stove. Independently tested by EP Lauderdale Tea Estates (Malawi)

We also built them a 200L stove that uses 9.5 kg –13 kg of wood to cook enough Nsima for 220 people (or approximately 160 kg less wood to cook twice as much food!). These 2 stoves have cut the estate's fuel consumption by more than 90% as compared to the open fire.

(Note: you might be wondering why the 200 Liter stove uses less wood than the 100 Liter stove. Well, The 200L stove is better insulated and has a more precise fire flow path than the brick stove. If you want to know more about how that works, write me a letter, or better yet, come to Aprovecho as an intern!)

As you can see from the pictures, these stoves produce almost no visible smoke and yet they have no chimney. This is one of the unique aspects of the Rocket Stove that amazes people each day, all around the world. Devoted readers of Boiling Point know that Dr Larry Winiarski and Aprovecho Research Center developed the Rocket Stove - a unique system for cleanly burning biomass - back in the early 80's.

The key to producing a smokeless stove is to find inexpensive, local, and durable materials for the Rocket Stove combustion chamber. In Malawi, we have been blessed to work with Dedza Pottery. They have helped us produce a insulative refractory brick that is light (.67 g/cc) and durable.

In other countries we have also used pumice blocks, vermiculite and non-insulative ceramic surrounded with insulation.

The photo on the left shows an (incomplete) Rocket stove combustion chamber made from Dedza refractory brick

One retrofitted 250L Oil Electric stove

In Malawi we also worked with the prison to improve their cooking systems. These electric oil stoves (photo left) were two of four oil electric stoves that were donated to the Mulanje prison. These stoves cost an estimated US$ 3,000 each but were only in operation for a few weeks to a month before they broke. When no one was capable fixing the stoves, the prison administration went back to their traditional open fire.

In March 2003, we took the broken stove apart, salvaged most of the material, and rebuilt it as a wood fired rocket stove. Some new sheet metal was used for the combustion chamber but the new Rocket stove could be made, with time permitting, entirely from the used stove. (Smoke in the picture is from the open fires)

If you would like more info about any of these stoves, please contact me at apropeter@hotmail.com