Wood Stoves for Guatemala

Redesigned Stove

- Increased insulation throughout the stove
- Integrated elbow-shaped combustion chamber for more efficient combustion and better draft
- Smaller air gap under stove top for better heat transfer
- Incorporated grate for more heat transfer to air
- Ash tray for easier cleaning

Improved Efficiency

- More than twice as efficient as the old stove; the redesigned stove uses only a fraction of the wood

Reduced Emissions

- Burning more cleanly, the new stove will further improve the quality of air inside the home environment and provide less soot in the chimney

Offsite Construction

- The combustion chamber is a strong but insulating mix of concrete and porous vermiculite. Meant to be cast in molds in a central location, these can be cast quickly in large batches and then transported to the respective stove sites. This helps minimize offsite construction.

New Business Opportunity

- By using a construction technique for the combustion chamber that is nearly identical to one for constructing a stand-alone rocket stove, we hope to create an opportunity for CES to make and sell rocket stoves.

- The ability to bring one of the highly efficient rocket stoves into a village as a visible demonstration would create a new marketing technique for the larger stove. The CES stove could then be sold as a durable and more sizable upgrade built on the same technology as the rocket stove.

The Rocket Stove

- A cheap, portable and efficient alternative to large wood burning stoves. It does not have the same character or durability of the larger stoves, but can serve a market larger market of users who cannot afford the CES stove.

The Bucket Rocket

- We built and tested a simple version of a rocket stove inside of a bucket. The pot sits on top of the stove, but since it lacks a skirt around the pot, a complete version of the stove would be even more efficient.

- Very Low Cost

- The rocket stove costs a small fraction of the cost of the original CES stove and the improved stove, making it a more economical option for poorer families.

F.W. Olin SCOPE Team

Our Partner

- Development organization based in Guatemala
- Helping Guatemalans help themselves
- Offers a range of product lines and services
- Stimulates local economy by creating jobs and a market, rather than a relief model

The Problem

- Health
  - Dangerous CO and particulate emissions
  - 50% of infant deaths are due to pneumonia (leading cause)
  - Safety hazard - people suffer burns from falling in

- Economic
  - 7.5% below the poverty line
  - $1180. Annual income for family of 4
  - $400: spent on wood for cooking per year
  - $200: spent on wood and per year with an improved stove

- Quality of Life
  - Children have less time to attend school and study
  - Female student drop-out rates are up 45% in rural areas

Original CES Stove

Strengths

- Cost Savings
- Reduced Emissions
- High Flancha Temperatures

Weaknesses

- Low Efficiency
- Plancha Bending
- Cost

Our Goal

- Base Cost of Stove
- Efficiency (Cost of Use)

Building

Testing

The Team

- The team built a version of the CES stove to understand manufacturing techniques and prepare for testing.
- The stove was set up with various thermocouples, thermometers, and a combustion gas analyzer to gather data on the efficiency, boiling times, temperatures, and emissions of the CES stove.

(L-R) Carmelle Tsi, Greg Van Kirk (CEO of CES), Christopher Carrick, Stephen Westwood, Ryan Fritschel, Melissa Martinez (Robin MBA, not pictured)

Advised by Professor Jessica Townsend