

2003 TAIWAN INTERNATIONAL SCIENCE FAIR

CATEGORY : Engineering

PROJECT TITLE : Waste Not,Want Not

AWARD : Second Award

SCHOOL : St. Stithians College

FINALISTS : Ryan Oettle

COUNTRY : South Africa

Waste Not Want Not

By Ryan Oettle

Many people in South Africa still use open fires for cooking. There is a large amount of wasted heat lost by four methods of heat transfer:- radiation, convection, conduction and evaporation.

I constructed a vessel that would reduce heat loss, and focus the heat emitted from a fire onto the bottom of a pot. I used materials that were cheap and easy to obtain, so that those using open fires would be able to construct similar vessels to save energy and reduce pollution.

The vessels were made up of a standard wire mesh frame that was surround by trial coverings, namely tin foil, asbestos rope, industrial foil, papier mache, ceramic, and 2 ceiling insulators.

5 mls of methylated spirits was burned in each vessel. The temperature gain of 100mls of water in a standard pot was recorded. 5 trials on each vessel were performed. 2 groups of vessel were found. Those that produced high temperature gains, burned quickly, and produced a large amount of soot deposits on the pot, and a second group that did the opposite.

I compared the rate of heating from my best vessel to that of a stove as well as a microwave oven. Heating from the vessel was faster than that of the stove, and slightly slower than the microwave.

I measured the heat emitted from a fire in a three-dimensional pattern and found that the maximal heat was some distance above the flame.

From these results I devised 12 guidelines that would minimize the energy need, and pollution produced, when cooking on an open fire