Field Testing of Stove Powered Thermoelectric Generator

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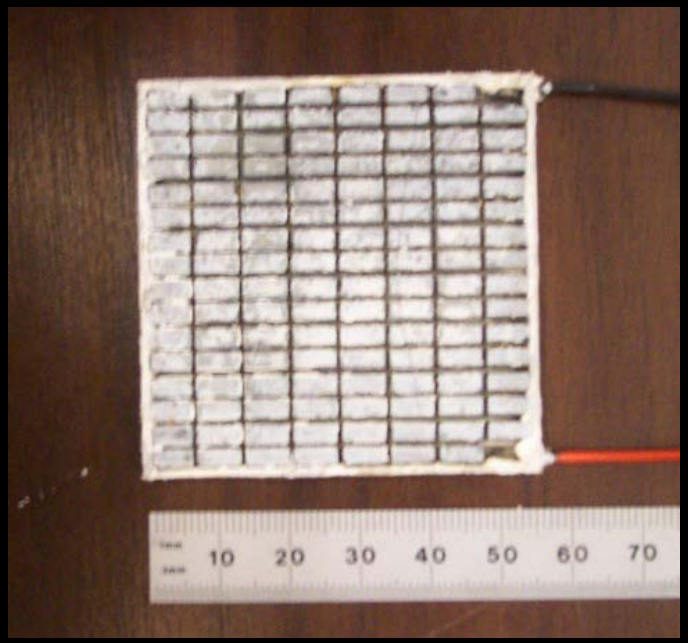
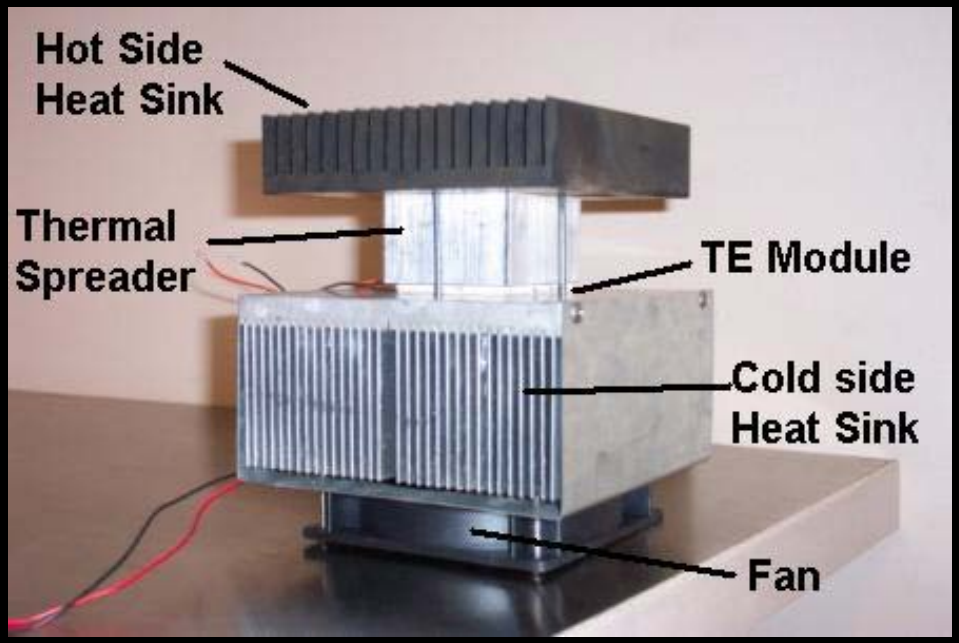
OVERVIEW

- Overview of TEG stoves
- Field Testing in Nicaragua
- Field Testing in India
- Field Testing in Nepal
- Future Work

Thermoelectric Generator

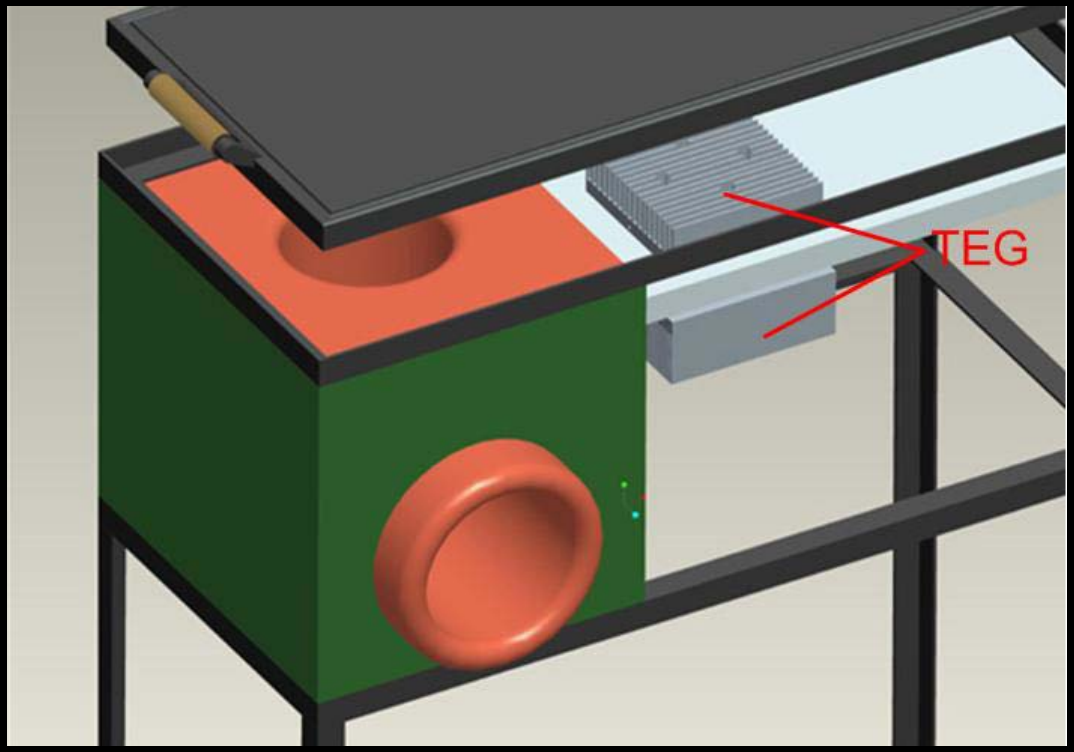
- A thermoelectric module converts excess thermal energy into electricity
- Requires a heat sinks to drive heat through the module
- See ETHOS 2005 & 2006 for more





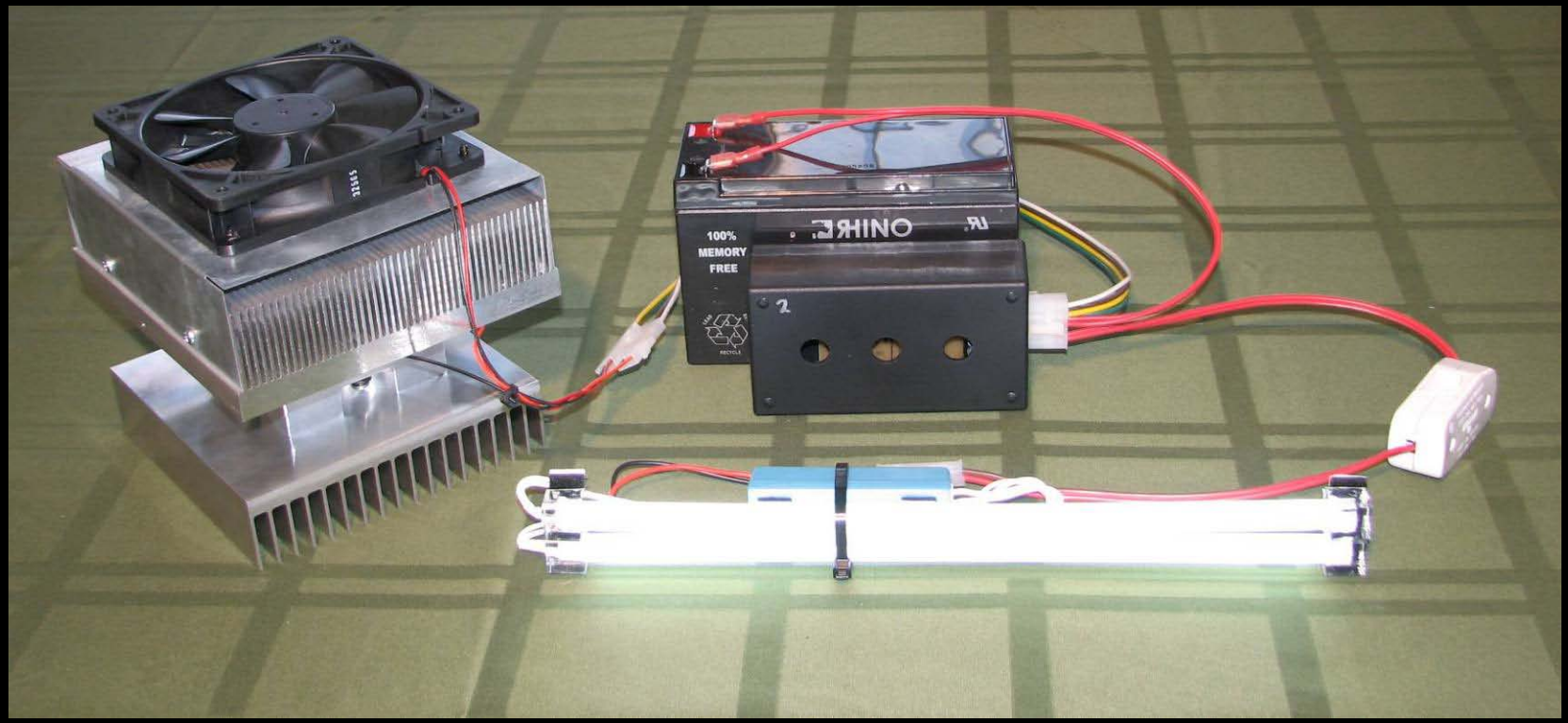
Thermoelectric Generator

- Heat sink is placed in hot gas stream to bring thermal energy to the module



Thermoelectric Generator Kit

- Heat sinks
- Fan
- Battery
- Thermoelectric module
- Charging Circuit
- Light



Field Testing

Field Testing is currently underway in

Nicaragua

India

Nepal

Nicaragua Field Testing

Sponsored By:

Winrock International – Rogerio Miranda

Field Testing :
Colorado State University- Dan Mastbergen, Sachin Joshi
Prolena – Marlyng Buitrago

Nicaragua Field Testing

(5) 16W kits were sent to Prolena for field testing

Nicaragua Field Testing

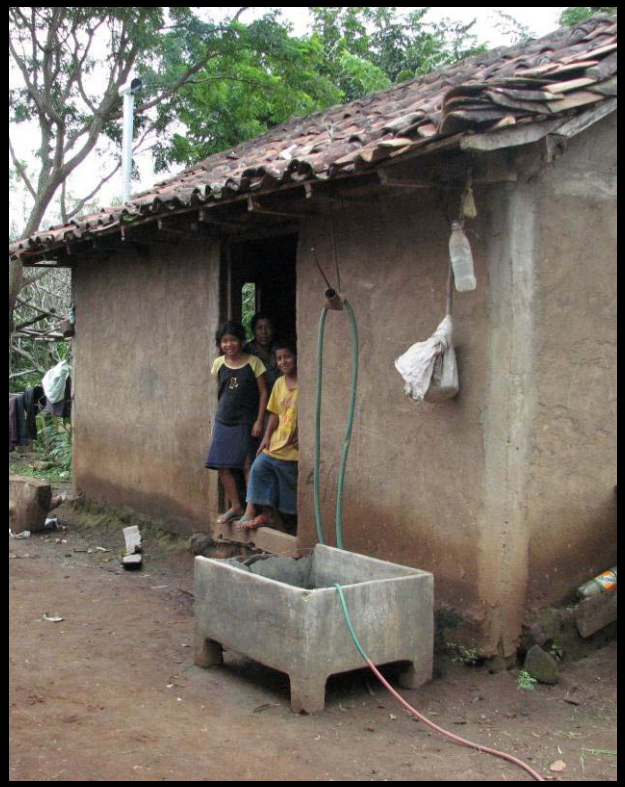
Stoves were constructed and tested at Prolena before taking to the field

Nicaragua Field Testing

Prolena employees were instructed on TEG assembly and monitoring

Nicaragua Field Testing

Stoves and lights were installed in four rural households



India Field Testing

Sponsored By:
NCIIA and Global Innovation Center

Field Testing in Collaboration with:
SEWA and SELCO (India) & College of Business (CSU)

India Field Testing

- Stoves were manufactured in JAYNIX (near Bombay) and transported to SEWA Bank (Ahmedabad) and SELCO (Bangalore)

India Field Testing

- Household Selection was done based on market segmentation with help from SEWA Bank and SELCO
- (2) 16 W and (3) 8 W units were installed.
  - 3 Stoves in Urban Slums
  - 2 Stove in rural household

- All households were involved in home based business

India Field Testing

SELCO technicians were instructed in installing stoves and do the weekly monitoring.

Nepal Field Testing

Sponsored By:
Mondialogo (Daimler Chrysler and UNESCO)

Field Testing in Collaboration with:
STARIC/Nepal

Nepal Field Testing

(3) 8 W and (2) 16 W Stoves were manufactured in KTM and transported to villages

Nepal Field Testing

Traditional Stoves were used day and night for cooking and heating

Nepal Field Testing

Enthusiastic Response from the users.

Nicaragua Field Testing

- Stoves have been monitored on a bi-weekly basis for two months

- Monitoring includes:
  - User feedback
  - Stove maintenance
  - Energy generated per day
  - Hours of stove usage
  - Hours of light
  - Hours of TV

Reports of the visits: December 23rd and 29th; and January 5th and 12th.

Date	23-Dec-06			
	HOUSES			
	1	2	3	4
NAME	Nicasio Barrios	José Emiliano Barrios	Freddy Pérez	José A. Alemán
Is the light working	yes	yes		yes
Is the T.V working	yes	n/a		yes
How long have you been running the light	1h	2 h		3,5 h
How long have you been running the TV	2h	n/a		2,5 h
Has the Buzzer gone of	no	yes		yes
How many hour a day, do you use the stove	6 h	6h		6 h
How often have you cleaning the heat sink	every day	every day		every day
Do you have any other comments / problems about the stove or generator	All is ok.	All is ok.	the stove is in Proleña	all is ok
SYSTEM CHECK				
Are the fans running when the stove is hot	yes	yes	yes	yes
Battery	11836	n/a	n/a	12444
Energy (w-m)	922	n/a	n/a	11266
Time	2, 22, 48	n/a	n/a	75,15 , 36
V	4076	n/a	n/a	2900
I	2368	n/a	n/a	1976
P	9430	n/a	n/a	5320
reset	yes			no
observation		n/a = doesn't apply	n/a = doesn't apply	

Nicaragua Field Testing

Generator Performance

- Average cooking time 4-5 hr per day
- Average energy generated – 40-50 W-hr per day
- Average lighting provided – 2.5 hr per day
- Average TV usage -- 1.5 hr per day

Problems Encountered

- Generator #2 – First user only used stove 1 hr/day, changed to different user
- Generator #3 – loosened screws drastically reduced generator output, easily fixed
- Generator #4 – Device overheating melted module leads after 2 months of operation
- General reduction in output of all generators over 2 months

Future Work

- Continual Monitoring of stoves in three countries.
- Carry out necessary modifications to TEGs and stoves depending on the field data – technical and market.
- Develop business strategies for high volume production and dissemination

Thank you !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Kitchen Improvement

Before

After

Kitchen Improvement

Before

After