

## Winrock International

### Firefly-Ecostove: Lighting by Woodstoves in Nicaragua by an Integrated Thermo-Electric Technology

Winrock International worked to bring cost-effective and clean cooking and lighting to rural homes, using a proven technology integrating a Thermo-Electric Generator (TEG) into a fuel-efficient, low-emissions wood stove (ICS)—which in this case was the Ecostove manufactured in Nicaragua. Basically, the stove could produce some power for household appliances. On average, the generators produced about 10 – 12 W-hr of net energy per hour of operation. The average stove usage per day was about 4 – 5 hrs. This resulted in about 2 – 3 hours of light and 1 – 2 hours of TV operation per day.



Detail of the stove unit; assembly of the eco-stoves

This project was a partnership between Winrock International, Colorado State University (CSU), and PROLEÑA/Nicaragua. The selected the community for stove validations, provided engineering support for the development of the TEG units and its adaptation into the Ecostoves, built the Ecostoves, installed them, and performed monitoring in the field.

The project had favorable results overall, with some surprises. The stoves were well accepted by the rural households; in fact, the first thing that all four families did was to buy a black and white TV. Families reported to use the stove a bit longer in a few cases, when they need extra light or power for their TV. Every family used the Ecostove for their normal cooking and observed significant reduction in fuel wood consumption and the elimination of indoor air pollution from cooking. In general, the benefits reported by the families were:

- It is easier to light up throughout the day: once warm in the morning, it can easily be fired again and keeps the food warmer for longer
- The cook/house does not smell like smoke after use.
- It is better for the health of the family, with no impact to the respiratory system
- It is economical, saving in firewood consumption

In addition to benefits, the project found some disadvantages to using the stove which included:

- It is too small to use for large groups, such as family gatherings
- It needs to operate several hours in order to have lights and watch TV
- The opening of the combustion chamber is small, limiting the size of the firewood that can be used; requiring extra labor to split the wood

