

BREAKING NEWS FROM THE CENTER FOR DEVELOPMENT WITH SOLAR ENERGY

By David Whitfield – Director - CEDESOL Foundation

PROVING CULTURAL ACCEPTANCE

A RECENT STUDY DOCUMENTS EVIDENCE OF LONG TERM SOLAR COOKER USE IN A DEVELOPING COUNTRY

Bolivia, one of the poorest and least developed of the Latin American countries has an infant mortality rate of 66.7, the highest in South America. Diarrhea (36%) and respiratory diseases (20%) are the principal causes for this condition. According to the November 27, 2003 Bolivian newspaper Los Tiempos article titled, “Bolivia is the Country Where Children Die the Most”, children are dying for preventable reasons and the aggressive vaccination programs don’t seem to be doing enough. They don’t understand why, but we suspect IAP (Indoor Air Pollution) to be a significant contributor to the death toll.



According to the latest estimates, Bolivia’s population will increase to 9,600,000 inhabitants by 2007. The urban population has increased at the rate of 5% annually to 60% while the rural population decreases at the same rate and is currently close to 40%.

In the rural areas around 56% of the population did not complete elementary school and lack skills useful in urban situations. 30% of Bolivians are ethnically Quechua, 25% Aymara, 30% mestizo and 15% white. About 40% live in the high planes called altiplano, 30% live in the valleys and 30% low lands or tropics. Fully 70% of the country’s population is below the poverty line.

52% to 74% of the rural population use biomass as their principal cooking fuel, while about 20% in the urban areas still depend on it as a principal household fuel. Many of these families rely on biomass because of economic constraints.

Approximately 800,000 families rely on biomass as their primary fuel source, while the rest back up a nonrenewable fuel with biomass. The largest sector of Bolivia's population is said to live on less than \$2 a day. Extreme poverty and lack of employment are factors in social unrest.

CEDESOL's vision of improved stoves is the integrated use of efficient biomass, retained heat and solar cooking. More emphasis is placed on retained heat and solar cooking as they present the primary cultural barriers, but provide the most economical, energetic and health improvements, because cooking in those systems requires no energy inputs from contaminating sources.

Referring to documenting solar cooker use, Darwin Curtis a cofounder of Solar House Hold Energy made an important observation,

“The toughest question from the skeptics is: ‘What evidence do you have that populations will actually adopt solar cooking on a permanent basis?’ Anecdotal evidence, even mountains of it, will not convince them. Only statistical data rigorously assembled and interpreted can make our case.”

During the summer of 2005 CEDESOL hosted Christopher Pell, a researcher from University College, London. Chris was preparing a treatise on the results of our extensive work introducing solar cooking in rural Bolivia. Chris's paper is now complete and helps address the question posed by Curtis. It has been summarized by Melanie Szulczewski, a scientist with Solar Household Energy, Inc. (SHE) and is reprinted below with their permission. It will be useful to all those interested in advocating solar cooking to those unconvinced of the technology's viability.

We urge you to read it and circulate it, to all those interested in the possibility of solar cookers making a long term impact in the war against poverty and reducing environmental degradation. Please feel free to include the pictures we've added, depicting these systems in use in Bolivia.

Lasting Impacts of a Solar Cooker Project in Bolivia
By Melanie Szulczewski, Ph. D.
Solar Household Energy, Inc.
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Under the auspices of the French NGO Bolivia Inti, alternative energy experts David and Ruth Whitfield introduced solar cooking to many villages in Bolivia between 2000 and 2003. After demonstrating solar cookers in public forums, they then trained those people expressing interest in how to make and use solar cookers.

Research was conducted in the central highlands of Bolivia in 2005 to assess the continuing impacts of solar cooking on participants of these solar cooking courses conducted by the Whitfields. The researcher, Chris Pell of the University College London, interviewed 170 people with and without solar cookers to determine whether their use affected household fuel consumption.

The data showed that 92.7% of the solar cooking course participants continue to use their solar cooker three to five years after the course ended. In fact, 62.4% of all participants use their solar cooker at least once a day during the dry season, demonstrating a lifestyle change that incorporates solar cooking into their daily lives. The solar cooker now supplements their other energy sources: gas, wood, or a combination of gas and wood.

Solar cooking provides numerous advantages, including health, environmental, and economic benefits. For families in developing countries, the strongest of these may be the economic benefit of buying less fuel for their other cooking methods. Pell found that there was a significant difference (at the 95% confidence level) of the monthly fuel expenditure per household between families with a solar cooker and those without one for those households that purchase but do not forage for their fuel wood. Households with solar cookers spent an average of 5.95 Bolivianos per household member per month in the dry season and 6.70 Bolivianos in the wet season, while households without solar cookers spent an average of 9.94 Bolivianos in the dry season and 10.39 Bolivianos in the wet season. This demonstrates a savings of 3.99 Bolivianos per month in the dry season and 3.69 Bolivianos in the wet season. These families reduced their fuel expenses by 40.1% and 35.5% in the dry and wet seasons, respectively.

Further analysis of the data reveals that the more the solar cooker is used, the lower the monthly fuel expenditure per household. This confirms with statistically significant results the direct link between using solar cookers and reducing fuel expenses.

Although both the seasonal and daily frequency of solar cooker use varied greatly among households, it is clear that its advantages have caused over 90% of participants to continue to use their solar cookers years after their initial training. This resounding acceptance of solar energy as an alternative fuel provides numerous benefits, including statistically significant savings in fuel expenditure, a reduction in the inhalation of toxic smoke and of the environmental degradation due to the consumption of fuel wood.

(as of this date, 1 \$US is approximately 8 Bolivianos – information provided by CEDESOL)

Public demonstrations and hands on workshops are some of the techniques used to disseminate this technology





Examples of Solar (box, panel and parabolic), retained heat and efficient wood cookers fabricated by the small Bolivian company SOBRE LA ROCA.



SOBRE LA ROCA produces 2 sizes of solar box cookers, standard and double.





Folks are always impressed to see so much vapor boil out when the solar cooker is opened, and then the real fun begins . . . eating the juicy food cooked in them.



In this case baked chicken and potatoes delighted a group of leaders from all over Bolivia. They couldn't wait to return to their villages and spread the good news

The CEDESOL Foundation (Center for Development with Solar Energy) is actively engaged in reducing indoor air pollution in residences and reducing fuel consumption in schools, predominately in rural areas throughout Bolivia. Solar cookers fabricated by Sobre la Roca are one of the tools used to combat this unseen assassin in the kitchen.

Since November 2005 CEDESOL has been involved in a pilot project introducing Ecological Cookers into rural populations in the arid high mountainous regions of North Potosi Bolivia, in conjunction with an international Technical Cooperation Agency



A happy campesino carries his new efficient and low fuel biomass stove home.





The educational or cultural backgrounds of the users vary





Simple and safe low-cost and durable





This is the type of roads traveled to get to the areas studied



With fuel so scarce no wonder folks are excited about this new way of meeting their basic needs.







A Quechuan Indian observes in amazement the results of cooking potatoes in a “home made” retained heat cooker.



Schools and institutions can also benefit from this improved technology as we can observe below. This institutional rocket stove uses a 100 liter pot, has a chimney and the cooks say it is so easy to use that the students can operate it.



In Tomaycuri, one school used to need 3 cooks working from 7 am till 13:30 pm to cook lunch for 380 students. Now with 2 Institutional stoves, one person cooks from 9 am till noon, and the exciting news is the fuel they once used in one day now is enough for the whole week!

CEDESOL continues to find ways to improve lives while protecting the environment. For information on how you can adapt this technology in your area contact David Whitfield - david.cedesol@gmail.com

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