

# AFFORDABLE SOLAR COOKERS FOR THE NEEDIEST

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## ABSTRACT

One third of the world still cooks with wood, and for half of those people wood and other biomass are already scarce. Many of them live in sun-rich areas. This paper describes 1) an affordable solar cooker that cooks family meals, 2) a related water pasteurization indicator (WAPI) which saves fuel by eliminating the need to boil water and milk, and 3) effective promotion methods aimed at creating sustainable markets and educating policy-makers. Together these are reducing burdens and costs of fuel gathering, pressure on environments, water-borne intestinal diseases and respiratory diseases from cooking smoke for 30,000 families in Africa.

## 1. INTRODUCTION

Solar Cookers International estimates that in the last decade solar cooker use has increased five-fold worldwide to about 1.5 million households, an increase closely linked to widespread, growing shortages of fuel wood. The Food and Agriculture Organization (FAO) estimates that two billion people still cook with wood, and that half of these are suffering shortages of fuel wood and other biomass to cook daily meals.<sup>1</sup> Many wood-scarce areas are sun-rich, where solar cookers would be not only useful but literally life-saving. The European Commission and solar cooker leaders estimate that one billion people (165 - 200 million households) need solar cookers today.<sup>2,3</sup> This paper describes two new tools and effective promotion essentials to help make solar cooking available to those who could benefit most.

## 2. WHO ARE THE NEEDY?

First, who and where are those who need solar cookers? Most of them live in just twenty-five fuel-scarce, sun-rich countries, primarily in western Asia and eastern Africa.<sup>4</sup> In many areas, wood that was once free is now an increasingly expensive commodity. Where wood is still free it is often at ever-longer distances for women to carry heavy loads – even those who are pregnant, those with infants, the sick and the elderly. Deforestation trends are also altering water supplies. One-third of the world must trek farther and farther for water, which is more and more likely to contain disease organisms. Fifty thousand children die every day from water-borne diseases.<sup>5</sup>

Apart from fuel shortages, traditional wood cooking has many health risks. The links between respiratory diseases and indoor cooking smoke are well documented. The World Bank says eliminating indoor smoke from cooking and heating could cut childhood pneumonia by half.<sup>6,7</sup> Even with fuel efficient stoves there are still soot, air pollution and the burden of getting wood. As solar cooker pioneer Klaus Kuhnke observed, “If cooking with wood were to be introduced as a new cooking method today it would be a tough sell – it is dirty, smelly, unhealthy, unsafe around children and requires a great deal of skill.”<sup>8</sup>

## 3. AFFORDABLE SOLAR COOKERS

To spread widely where they are needed most, solar cookers must be both affordable and easily obtained for at least some of the poor. Distribution through charities may always be needed for elderly and disadvantaged, but is difficult and usually unsustainable until solar cookers are widely known and available through local businesses in many commercial marketplaces



Fig. 1: The cookit, a panel type solar cooker

One example of affordable solar cookers is the recently developed panel cooker called a cookit. The cookit reflector is engineered to focus sunlight onto a cooking pot for several hours without needing repositioning. Heat is retained around the pot by a simple, clear plastic bag. The cookit is often made from cardboard, aluminum foil and glue, and black paint is provided – if needed – for the sides and lid of a light-colored or shiny metal cooking pot. The cookit’s flat reflective panels make it safe around children and easy to make. It is foldable, saves one ton of wood or equivalent fuel per year with regular use, cooks for six people, pasteurizes one liter of water per hour, and pays for itself in two months in fuel savings alone. Cookits can be mass-produced in most countries, and also in cottage industries.

SCI field tested the cookits in Kakuma Refugee Camp in Kenya, starting in 1995. Their clear benefits led SCI to expand that project for eight years and prompted grants from the United Nations High Commissioner for Refugees (UNHCR) and the United Nations Education and Cultural Organization (UNESCO) to begin projects in Aisha Refugee Camp in Ethiopia and two communities in Zimbabwe respectively. In 2000 SCI launched a new project in western Kenya, with a goal to foster commercial dissemination throughout Kenya.

Cookits cost the same or less than other cooking methods to cook meals and pasteurize water, and they reduce a family’s need for diminishing biomass by one third. Independent evaluations of solar cooker promotion projects confirm their high uptake, ongoing use, fuel savings, time and labor savings, and nutrition benefits.<sup>9, 10, 11, 12, 13</sup> According to independent solar cooker promoters that correspond with SCI, the cookit has also been copied and produced independently in twenty-five other countries.

#### 4. A FUEL-SAVING PASTEURIZATION INDICATOR

Another simple tool is a water pasteurization indicator (WAPI). Pasteurization destroys all microorganisms that cause diseases from drinking contaminated water and milk. A small polycarbonate tube contains a wax that melts when water or milk is heated enough to be pasteurized (65°C/149°F). This saves much fuel by eliminating the need to boil water or milk to ensure that the pasteurization temperature has been reached.

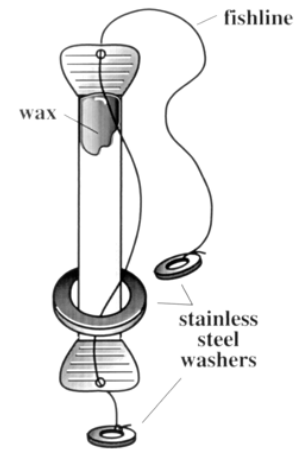


Fig. 2: A water pasteurization indicator (WAPI)

### 5. DISSEMINATION STRATEGIES

These tools are affordable and can be produced in most countries. The introduction methods are equally important. This paper started by describing the needs which solar cookers address. Those needs affect the poorest disproportionately. How does one market to the neediest?

#### 5.1 Creating sustainable commercial markets

Effective marketing of any new product recognizes that most of us are not risk-takers. Very few, especially among the poorest, will be the first to step forward to try a strange new idea, especially where it targets only the neediest. The way to reach the neediest fastest appears on the surface to be very indirect: the first to try solar cooking in new areas are nearly always school teachers and other professionals with a bit of extra income, time, education and energy to try new ideas.

Solar cookers, like all other new and different products, must first be tried and endorsed by trend setters and local leaders who find them useful, convenient and beneficial for themselves. Humanitarian groups are frequently puzzled when the neediest seem disinclined to try something new. Solar cookers commercially marketed to upscale and

moderate-income families make it much easier in the end for the neediest to dare try solar cooking, and this therefore is an important step toward uptake among the poor.

### 5.2 Removing barriers to commercial equity

Successful marketing of solar cookers also requires advocacy among policy makers, both governmental and nongovernmental, at many levels within and beyond countries. The fuel shortages and health hazards burden so many millions – especially women and girl children. Yet, these problems seem strangely invisible in public discussions of topics directly related: hunger, malnutrition, poverty, environmental degradation, economics, education – especially for girls, and public health issues such as respiratory and intestinal diseases.

Further, many governments subsidize unsustainable fossil fuels by 20% or more. Such subsidies make solar devices appear more expensive when they are actually cheaper. The old biases against solar cookers (still frequently uttered by policy makers based on decades-old stories) – “too expensive, dangerous to the eyes, too different to be accepted, too slow, unstable in the wind, and hard to maintain,” to name just a few – are way out of date.

SCI has found the following are essential for creating new markets:

- Work with local women to adapt local foods to solar cooking with satisfying (often preferred) results.
- Orient community leaders and engage their support.
- Introduce, instruct and follow-up about 100 pilot households with solar cookers through group workshops for neighbors.
- Several months later select the most enthusiastic new solar cooks and offer added training for them to become trainers.
- Support new trainers for one to two years to demonstrate solar cooking at public events, lead group workshops, teach their neighbors and distribute (for refugees) or sell (in settled communities) solar cookers for family income. In the refugee camps, women refugees ran such a program very effectively.
- Facilitate production and distribution systems to assure wide access to supplies and maintenance services.
- Create public awareness and a sustainable market for producers and distributors and to help new trainers become successful micro-entrepreneurs.
- Educate policy makers in and out of governments to support solar technologies as much or more than fossil fuels and nuclear energy.

## 6. CONCLUSION

SCI has demonstrated and documented acceptance, benefits and cost effectiveness of affordable solar cookers and solar water pasteurization indicators among 30,000 families in fuel-scarce, sunny regions of Africa - 20,000 refugee families in Kenya and Ethiopia and 10,000 families in settled communities in Zimbabwe and Kenya.<sup>14, 15</sup>

According to SCI correspondence with hundreds of independent solar cooker promoters worldwide, cookits and WAPIs have been copied in at least 25 other countries. Independent evaluations of two projects confirm high uptake, ongoing levels of use, fuel savings, time and labor savings, nutrition benefits. In Aisha Refugee Camp in Ethiopia, 94% of ITS 2000 families adopted solar cooking in three years. A cookit can be produced in most countries for about \$5 US., lasts about two years and can save a ton of firewood per year.<sup>16</sup> Families who use their solar cookers to pasteurize family drinking water report reduced diarrheal diseases deadly to children.<sup>17, 18</sup>

SCI has consultative status at the United Nations and facilitates information exchange among independent solar cooker experts worldwide. At an Asia/Africa Seminar of Solar Cooker Leaders in February 2005, participants committed to collaborate to educate governments and other policy makers about both the needs for and multiple benefits of affordable solar cookers and related tools in sun-rich, fuel-scarce regions of the world. In fact, solar cookers assist progress toward all eight of the United Nations Millennium Development Goals for the year 2015.<sup>19</sup>

## 7. ACKNOWLEDGMENTS

The cookit panel cooker was developed by a dozen SCI volunteers, starting with Roger Bernard in France. The WAPI grew out of microbiologist Robert Metcalf's decades of research on solar water pasteurization<sup>20, 21</sup> with help from Dale Andreatta. Metcalf has also introduced a Petri film from the food industry to water sanitation industries for simpler, cheaper water testing for E. coli. SCI's Barbara Knudson designed the group-workshops-for-neighbors dissemination strategy and proved its effectiveness in Kakuma Refugee Camp. Countless other solar cooker pioneers have contributed to the effective dissemination methods.

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