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Solar Cooker Dissemination in Kenya – A Case Study

March 2007

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INTRODUCTION

Limited access to modern energy services places severe constraints on the Kenyan economy. Shortages of cooking energy restrict women from participating fully in economic and civic life. The scarcity of fuelwood has forced the majority of Kenyan households to move down, rather than up the energy ladder. Diets are limited to foods that cook rapidly and provide less nutrition. Drinking water often goes untreated. Women and girls use poorly burning biomass such as crop residues and branches cut from live trees to make daily meals and expose themselves to smoke levels many times higher than recommended.

In a rural community near Lake Victoria, Elizabeth, like over a thousand other area women, bought a cooking tool that is revolutionizing her life and that of her family. She says: "I use solar energy to cook food and heat drinking water to safe temperatures. My charcoal, firewood and gas are saved for use when it is dark or rainy. The best part is I can run an errand or do laundry while our meals cook. Cooking beans and stews is easy now. I cough less and my eyes don't water like they used to. I bought my solar cooker – it's called the CooKit - from my cousin who received special training so she could make money from selling CooKits."

Solar Cookers International (SCI) empowered over three thousand women like Elizabeth and forty-three across Kenya like her cousin so that they and their families can benefit from free energy for cooking and pasteurizing water. SCI has recently expanded to two additional project sites to further spread local, market-based access in Kenya.

Our goal is to establish self-sustaining spread of affordable solar cookers in Kenya by the year 2010. Towards this we aim towards uptake of solar cookers in multiple communities, establishing direct sales through a trained network of local women and laying the foundation for popular demand for inexpensive, user-friendly solar cookers.

BACKGROUND AND RATIONALE FOR THE PROJECT

While many ways are proposed to address the cooking energy needs of households in developing countries, very few make use of clean, largely untapped, renewable energy sources. An

affordable, entry-level solar cooker is currently available and Solar Cookers International (SCI) is pioneering its introduction into the Kenyan marketplace through our Sunny Solutions initiative. We started in an impoverished corner of Kenya in 2003, where soils are degraded and cooking fuel is scarce and expensive.

The initiative recently expanded local access to solar cookers in two new areas where households experience severe cooking fuel scarcity and its accompanying health, economic, and environmental challenges. Three areas of Kenya already experience direct health and economic benefits, new income generation opportunities for women. The initiative also provides evidence that affordable cookers, sold above wholesale cost, can spread locally in Kenya.

An inexpensive, panel-type solar cooker called the CooKit was first introduced in refugee camps as a relief measure starting in 1995. Over the next eight years, SCI implemented what proved to be successful participatory methods for disseminating solar cookers. Seeking to broaden our efforts in a manner that would result in independent, market-based access to solar cookers, we adapted our approach to meet women's needs for energy and income generation. In a further development, the CooKit, previously factory-made in Nairobi, can now be hand-assembled, increasing the profit margin on each solar cooking kit sold and allowing decentralized production. Each solar cooking kit contains a CooKit, cooking bags, a water pasteurization indicator (WAPI), and an instruction booklet. The kit is sold for $6 in Nyakach and returns a profit of $1.25 to the vendor. It pays for itself in less than three months of use and can save one ton of wood per year. The Sunny Solutions initiative will gradually expand to serve multiple communities in effect creating popular demand for a high-impact, low-cost cooking technology.

SCI seeks to increase access to energy in order to serve underserved and unserved poor people as a strategy towards economic development. Introduction and commercial spread of solar cooks will advance Kenya's progress towards meeting its Millennium Development Goals. Combined, the health, social, and economic benefits of using the clean, smoke free energy to cook food and pasteurize water will have a significant impact at the household level. Solar cookers complement other improved cooking technologies, allowing families to achieve maximum fuel savings.

The Sunny Solutions initiative addresses several of Kenya's development challenges:

Negative Impact of Fuelwood Scarcities

Currently Kenya has less than 1.7 percent remaining forest cover[1]. What little remains is threatened by commercial logging interests and the need for cooking fuel. Data from Practical Action-Eastern Africa indicates that 89 percent of Kenya's energy consumption is in the form of biomass, with much of that used to meet basic cooking needs. One third of rural Kenyans use charcoal and ninety percent of them use wood, crop residues, dung, and other combustibles for daily cooking. When desperate, people resort to cutting of live trees – a practice that contributes to denuding land, soil erosion, and depletion of water resources and generates much smoke in the kitchen. Since smoke is heavier than air, pollutants from burning wood and charcoal constitute about 20% of greenhouse emissions[2]. Burning of dung and crop residues further depletes soils and increasing already harmful air pollution.

[1] The Courier, UNESCO, 2006

[2] http://www.solarcooking.org/newsletters/scrdec99.htm#financing

Maintaining Household Health

The World Health Organization states that "*indoor air pollution from solid fuel use is responsible for more than 1.6 million annual deaths and 2.7% of the global burden of disease…This makes this risk factor the second biggest environmental contributor to ill health, behind unsafe water and sanitation. Dependence on polluting solid fuels to meet basic energy needs represents one of the biggest threats to children's health. Acute lower respiratory infections, in particular pneumonia, continue to be the biggest killer of young children and cause more than 2 million annual deaths. This toll almost exclusively falls on children in developing countries.*"[3] Scarce fuel also means unsafe drinking water is not heated to control water-borne diseases, and slow-cooking nutritious foods such as beans are dropped from family diets. In Kenya, water and smoke related diseases are among the top five major causes of mortality in children under age five years. According to PSI, current estimates show that the country has an annual incidence of between 3.5 and 4.6 severe diarrhea episodes per child.[4] Poor nutrition, smoke and unsafe drinking water are also a health threat for people with AIDS.

Limited Economic Development Opportunities for Women

According to Kenya's National Rural Energy Task Force, *"all people are dependent on energy , as energy services facilitate livelihoods…Lack of access to adequate, affordable, reliable, safe and environmentally benign energy can place severe constraints on development … energy scarcities for basic services hinders economic and social development."*[5] In some rural areas, wood shortages combined with private land ownership means wood is no longer free and nearby but is a commercial commodity, and prices continue to rise as traders must travel farther to obtain it.

Women and girls are disproportionately affected by the lack of access to energy, especially cooking energy. The International Center for Research on Women (ICRW) concludes that because of time spent on tasks such as fetching water and collecting firewood, women and girls shift time away from agricultural production and other types of income-generating activities, and even cooking[6]. These tasks also limit opportunity for women and girls to improve their lives through education, civic participation, and other activities, and further compromise their ability to break free from the cycle of poverty.

PROJECT APPROACH

To address these challenges, Solar Cooker International has introduced high impact, low-cost clean energy technologies in three sunny areas of Kenya. In 2003, SCI launched the Sunny Solutions initiative, to enable local market-based access to solar cookers. Low-cost solar cookers have been manufactured in Nairobi since 1995 for SCI projects serving refugees in Kenya and Ethiopia. An adaptation in 2005 now allows decentralized production of quality, hand-assembled CooKits within Kenya.

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[3] The Health Effects of Indoor Air Pollution Exposure in Developing Countries, N. Bruce, R. Perez-Padilla, R. Albalak, WHO 2002

[4] http://www.psi.org/where_we_work/kenya.html#

[5] Energy Sector Development Strategy, Rural Energy Task Force, Final Report, Kenya Ministry of Energy, 2003

[6] Infrastructure Shortfalls Costs Poor Women Time and Opportunity, ICRW, 2005

SCI estimates that sale of 150,000 solar cookers would assure independent, self-sustaining spread in Kenya. SCI is building the capacity of local women to use solar cookers at home, in their food businesses, and to generate income from sales of solar cookers so that by the year 2010, five thousand households in three or more communities benefit from the use of solar cookers.

Our pilot project in Upper and Lower Nyakach Divisions, in Nyanza Province has confirmed that public awareness coupled with local access can translate into strong demand for solar cookers. Local women sold over 3,000 low-cost cookers, with uptake by over 15% of the Nyakach population in three years. Their clients report monthly savings of US $2.60-8.00. Boiling water requires expensive fuel. A recent survey on water treatment practices in Nyakach found that households that boiled some times and solar water pasteurized the remainder of the time reported half the overall incidence of diarrhea for children under age five compared to households that only boiled. We anticipate self-sustaining local access to solar cookers in Nyakach by 2008.

Description of the solar cooker used

Panel solar cookers are the first solar cookers that are truly affordable to the world's neediest. In 1994, a volunteer group of engineers and solar cooks associated with Solar Cookers International developed and produced the first "panel" cooker, the CooKit. Elegant and deceptively simple looking, it is an affordable, effective and convenient solar cooker. It requires a dark, covered pot and one plastic bag per day or one high-temperature plastic bag per month. With a few hours of sunshine, the CooKit makes tasty meals for 5-6 people at gentle temperatures, cooking food and preserving nutrients without burning or drying out. Larger families use two or more cookers. The CooKit weighs half a kilogram, folds to the size of a big book for easy transport. CooKits are now produced independently in 25 countries from a wide variety of materials at a wholesale cost of $3-7 US. We expect that the new hand-assembled CooKits will outlast the manufactured CooKits which last for two years.

CooKits complement other cooking methods needed at night and on cloudy days. Coming about twenty years after the first efforts to replace open fires with improved cooking stoves, the CooKit uses no fuel at all. The CooKit is both user-friendly and environmentally friendly. Families can save scarce, expensive for when they cannot solar cook and when economically capable, add other, higher cost cooking improvements such as modern biomass, smoke hoods, biogas, or liquefied petroleum gas.

The **value of CooKits** is outlined in the following manner:

<u>Addressing fuelwood scarcities:</u>

- Solar cooking one meal a day, three times a week has been proven to reduce fuelwood consumption and related smoke by one third.
- The CooKit saves more than four times its value in fuelwood each year. With careful use and storage, a CooKit can be used for two years, reducing fuelwood consumption by two tonnes.

Improving health

- The CooKit can pasteurize household drinking water, making it safe to drink.
- The solar cooking process is smokeless, reducing respiratory diseases and eye irritation
- Solar cooked foods retain vitamins, nutrients and their natural flavors; there is no smoky taste; the foods cook slowly in their own juices. Nutritious, slow-cooking traditional foods (beans, root crops, and some grains) are restored to the family diet
- Clean up is easy as the food never burns or sticks to the cooking pot.
- Solar cooks frequently report that the money they save on cooking fuel purchases is used to for many essentials, such as extra food, school supplies, and medical care.
- Without having to gather wood or dung, breathe smoke, and tend a fire – all associated with traditional cooking – solar cooking is easy and safe for people with AIDS and other illnesses, the elderly, disabled and young orphans.

Enhancing household and women's economic status

- The CooKit represents a new opportunity for women to capitalize on an underserved market and better meet their own cooking energy needs
- Solar cooking saves time as there is less need to tend a fire or collect firewood. A person can cook while at work, at the market, or tending crops. Young girls can attend school instead of searching for fuelwood.
- Solar energy is free and abundant in many areas of Kenya, providing a safe, clean, healthy supplement to traditional fuels.

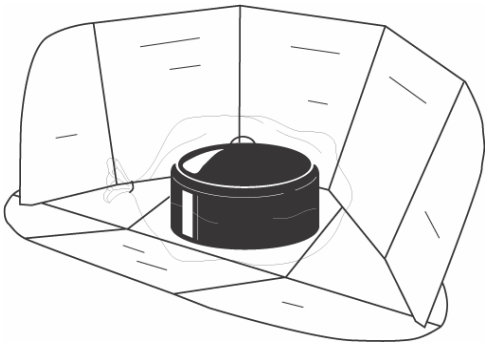

Figure 1: The CooKit

Background on Project Sites

Nyakach

In 2003, SCI began introducing and creating a market for solar cookers in four of the fourteen administrative areas of Nyakach, with 113,000, primarily of the Luo ethnicity. This community was selected from 150 applicants from all over Kenya. Near the equator and close to Lake Victoria, there is abundant and intense sunshine for over six months of the year. People are poor, there are few employment opportunities, agricultural and fishing resource bases are increasingly degraded, and wood and charcoal have become scarce and very expensive. The construction of a hydro-electric dam is attracting outsiders and bringing some hope of development, especially to those in Nyakach, despite the fact that many cannot afford to pay for electricity lines, let alone

electric stoves. The Nyakach area has been ravaged by the AIDS pandemic and has poor roads due to decades of neglect by the Moi government. Eating habits in this area are ideal for solar cooking – most foods are boiled and meals are traditionally eaten at mid-day and in the early evening. A favorite local staple, omena (minnows), is considered most tasty when solar cooked. Sixteen trainees were selected in May 2003 from 16 women's groups, with fifteen attending the training workshop in June 2003. Most remained and new ones added, with a total of twenty-three formally becoming solar cooker vendors in July 2005.

Kadibo

Practical Action carried out research on fuelwood use in Kadibo Division, which is a few kilometers from Kisumu, the third largest city in Kenya. Here too the population is primarily Luo, with many involved in the fishing industry or in informal trade in nearby Rabuor town and Kisumu. Despite its proximity to Lake Victoria, the area is virtually devoid of vegetation. Women resort to using Papyrus reeds as cooking fuel. The reeds generate a lot of smoke and must be carefully attended to. Practical Action provided information on smoke reducing strategies including solar cookers to villages in Kadibo and nearby divisions. Solar Cookers International has met with local leaders who are eager to address the area's fuelwood crisis. We are presently gathering preliminary information on fuelwood use, socio-economic conditions and public health in North Nyamware sub-location (pop. 5000), one of three Kadibo sub-locations. Eight SCOREPS were recruited in October/November 2006 and trained in December 2006.

Kajiado

A Peace Corps volunteer in Kajiado learned about solar cookers and contacted our office for assistance with introducing solar cookers to his students and the community. Waterborne diseases and indoor air pollution from cooking fires are important health issue for the local Maasai people. Practical Action notes that average smoke levels in Kajiado area kitchens were recorded at over 100 times the accepted international standards. Water collection is laborious involving distances of 10-15 kilometers. This American volunteer was attached to the African Inland Church, which operates the schools, a hospital, a mobile clinic, a therapeutic center for polio victims and trains traditional birth attendants. SCI conducted initial solar cooker demonstrations at four sites in September 2005 and established a presence in Kajiado in 2006, with training of SCOREPS delayed until January 2007 due to heavy rains.

IMPLEMENTATION METHODOLOGY

SCI uses a three-stage approach to solar cooker dissemination in Kenya: First, SCI introduces solar cooking to community leaders, women's groups, and members of the public. Second, enthusiastic women are recruited and trained as solar cooker representatives. Third, we assist these representatives in further promotion of the CooKit leading to microenterprises providing sales and after-sales services.

Stage 1 – Introduction

Using the sun to cook food or pasteurize water is a concept unknown or very new to most Kenyans. With assistance from our partners, SCI facilitates the initial exposure to solar cooking. Practical demonstrations are coupled with information sessions targeting local opinion leaders

such as chiefs and other government officers, leaders of women's groups, health professionals and representatives of development agencies. Local foods and water sources are used in the cooking and pasteurization demonstrations. The demonstrations and information continue to include women's groups, market women, teachers, and frontline health workers. Cooking kits were made available for trial at home by very keen women at each site. Attendance at a training session and a commitment to provide feedback is required in order to receive a cooking kit. These women are visited at home or during weekly savings groups meetings.

Stage 2 – Recruitment and Training

In Kenya, women are the primary cooks and therefore the best spokespersons for a new cooking device such as the CooKit. Based on staff and partner observations, women who use their CooKit frequently, are particularly enthusiastic about solar cooking, have prior sales experience or outgoing personalities are be invited to train as solar cooker representatives (SCOREPS). Training consists of a four-day intensive hands-on course followed by occasional skill building sessions on specific or advanced topics. SCI uses a participatory approach in all our projects. Therefore the solar cooker representatives participate in developing marketing strategies appropriate for local conditions and sharing successful approaches with their peers.

Stage 3 – Promotion, sales and after sales services

Once trained, the solar cooker representatives with support from the SCI site supervisor continue with product demonstrations and make cash and installment sales. Some demonstrations are aimed at the general public while others target a particular group such as women's groups or teachers at a certain school. SCI provides basic marketing materials and supplies such as distinctive aprons, shirts and bags (for visibility, credibility, and 'brand association'). Direct marketing is reinforced by SCI-sponsored public service announcements on radio and special events.

The representatives earn commissions from SCI based on the number of demonstrations carried out and three follow-up visits to new solar cooks. After the profit margin given to representatives for each sale, the revenues are used to offset the wholesale cost of additional supplies. Other after-sales service includes pot and lid painting and sales of cooking bags. As the local demand for solar cookers grows, SCI gradually reduces commissions and the frequency of public demonstrations.

SCI seeks to also build skill within the local community. To this end, SCI has developed a number of tools for capacity building.

Tools for introducing solar cookers:

1) Solar cooker demonstrations including: cooking of local foods, pasteurizing water, explaning the process and answering questions while the food cooks, and distributing of food samples to participants
2) Local language, two-sided flyers explaining the economic and health benefits of solar cookers and how and where to buy them and information on SCI with contact location and telephone number

3) Radio messages, calendars (for sale), selective distribution of our regional newsletter featuring solar cooker activities in Africa, and signboards in key places (ex: at markets, on the highway).

Tools for the solar cook:

1) Local language instruction booklets in Swahili, Luo and Maasai languages explaining how and when to use solar cookers, their different applications including water pasteurization, and a few recipes. This is a reference for solar cooks at project sites and a key information piece for outsiders who purchase solar cooking kits.
2) Upon purchase of a solar cooking kit, a new user receives up to three follow-up visits. These home visits are an opportunity for the SCOREP to answer questions, reinforce basics such as CooKit orientation and ratio of food to water, troubleshoot and gather feedback from the cook.
3) Based on demand, staff share what they know about saving cooking energy or other types of solar cookers and refer requests for more information to the appropriate contacts.

Tools for solar cooker vendors

1) The four-day participatory instruction workshop for sale representatives covers the following topics: information on SCI and our local partner, background on the project and solar cookers, a presentation by a local microfinance group, communications and group dynamics, adult learning techniques, cooking energy conservation, how to do a solar cooking demonstration, rudimentary business concepts and practices, selling techniques, and duties of sales representatives. The trainers practice their solar cooking skills daily during the workshop.
2) In addition to the clothing and other supplies that increase visibility, the SCOREPs have a series of illustrations, each emphasizing key points to convey to new CooKit users such as cook when the winds are calm and cut food into small pieces.
3) Periodic training opportunities: water testing and solar water pasteurizing, microenterprise operation, and marketing techniques.
4) "On the job coaching" during which site supervisors observe solar cooker representatives and later advise on adjustments for the next home visit or demonstration

PROJECT IMPACT IN NYAKACH

It is still too early to assess impact in Kadibo and Kajiado as training of solar cooker vendors took place in December 2006 and from late January to early February 2007, respectively. A comprehensive evaluation of Sunny Solutions in Nyakach is planned for 2008. Interim results are outlined at follows:

Fuelwood Savings

- Savings in the range of $1-3 on weekly fuelwood expense reported by solar cooking households during home visits
- Averted release of an estimated 866 kg of carbon dioxide per year for households solar cooking three times a week

Improved health

- Client reports of reduced frequency of diarrhea, coughing and eye irritation, and of increased ease of providing a hot lunch at home to school-aged children
- Client reports of the value of solar cookers in the care of people with AIDS, the elderly, orphans, the disabled or other disadvantaged groups

Economic opportunities for women

- Sale of CooKits by a team of trained, experienced solar cooks at each site (23 in Nyakach, 8 in Kadibo and 12 in Kajiado)
- Profits of $1.25 or more per sale of solar cooking kits (a CooKit, a water pasteurization indicator, four plastic cooking bags and an instruction booklet)
- Total sale of over 3000 in Nyakach solar cooking kits
- Three women using solar cookers in small restaurants and to make cakes to sell in Nyakach

Capacity building

- Community awareness of solar cookers as a complement to traditional and improved cook stoves and as a cost-effective water treatment method
- Increase involvement in microenterprise activities by women resulting from the SCI-facilitated link to SAGA, a local micro-credit institution
- Cooks' improved control over household resources such as cooking energy, their time, food selection, and often, the money formerly used for fuelwood purchase
- Enhanced self-confidence of solar cooker vendors as a result of learning leadership skills, having a new source of income and public recognition of their ability to teach others
- As skill builds in the community, women teaching their neighbors and relatives solar cooking and water pasteurization skills

Other results

- Attendance at demonstrations resulting in first-hand awareness of the uses and benefits of the CooKit by over 100,000 people in Nyakach
- Availability of low-cost solar cookers for the first time in each area
- Monetary investment in other income generating activities such as farming, caring for tree nurseries and fishing by women

Box 1: *Article illustrating the life-changing benefits of solar cooking*

30 October 2006

Solar Cooking Solution Changing Lives in Kenya
Partnership for a Better Life

The following article is adapted from an article by Julius Ochieng' published by Solar Cookers International.

Seline engaged in small trade, which earned her very little income. With four children to feed, she found it very difficult to make ends meet. As a result, her family mostly ate ugali (maize meal), and vegetables except on the few occasions when they could afford fish. Her children were chronically malnourished; her third-born child, Ras, was nicknamed "a quarter" because her husband said one could carry the child in one palm and not feel any weight. The boy is alive today, and Seline attributes this to the coming of the Solar Cookers International (SCI) Sunny Solutions project in Nyakach, Kenya. To her, this was a blessing.

Seline started solar cooking in March 2003 when the project began. She was one of the most active cooks from the Mbogo Women Group and was trained to teach others to solar cook. Life has changed for Seline and her family. She is now a solar cooker representative (SCOREP) in North Nyakach. Her husband says: "I now eat delicious meals. Look at Ras.... He looks very healthy." Seline says all her children are healthy. The children love solar-cooked foods -- they ask for it every day, she says.

Seline solar cooks on most sunny days. Solar cooking involves the use of a small, portable device that collects energy from the sun to generate heat. Firewood is used only at night and on cloudy days. Therefore, she now collects or buys firewood only once every three days instead of daily. She estimates she saves about $6.60 a month in fuel-wood costs. With her fuel-wood savings and earnings from cooker demonstrations she was able to purchase a goat in early 2004. That goat so far has given birth to four kids.

Seline's cooking and training skills are regarded highly. Young mothers who initially shunned solar cooking have changed their minds and are now buying "CooKits," lightweight panel solar cookers. Neighbors say Seline's family now has a higher standard of living. The family's food is better and family members have nice clothing.

Seline's husband is very proud of her and takes part in looking for customers and putting on demonstrations. He uses the CooKit to train others when Seline is busy. Customers come to them to ask how the cooker works.

As the result of public exposure in Solar Cookers International newsletters and through attendance at SCI events, Seline now has a lot of confidence. The previously shy housewife has gained respect and fame in the village and is now an outgoing and fearless trainer.

(Distributed by the Bureau of International Information Programs, U.S. Department of State. Web site: http://usinfo.state.gov)

LESSONS LEARNED

Over the past three years, valuable lessons were learned during this first attempt at market-based local access to inexpensive solar cookers. The lessons are grouped at follows:

Product Promotion

The awareness creation process used in Nyakach was well executed though drawn out over too long a timeframe. By 2005, SCI staff was clearly making an effort to reduce gradually public demonstrations and to commit SCOREPS to group demonstrations only when requested by a local group. This reduction was no easy task as product demonstrations are the bread and butter of SCOREP earnings. Wide-scale awareness of solar cookers was clearly achieved by late 2005. Almost all Nyakach adults and children (pop. 113,000) know that the CooKit is assembled and available for sale locally. By 2006, indifference to the solar cooking message started setting in with many taking an "I'll buy later or wait to see if SCI starts giving it out free" stance.

In retrospect, marketing might have been even more successful had SCI 1) consulted more widely with Kenyan-based social marketing experts in the initial stages; 2) started sales in July 2003 rather than waiting until October 2003; 3) had restricted activity to the four locations originally selected by the community for the baseline study; 4) used successful solar cooks as spokespeople more frequently; and 5) targeted our marketing message to focus on economic and health benefits. Providing more information in the awareness process about the limitations of solar cooking might have also helped dispel rumors.

Local Access

Enabling twenty-three local women from each part of Nyakach to be the primary spokespersons and promoters of solar cookers was well intentioned. It was meant to assure access to solar cookers in each of the 14 administration locations in Nyakach, with additional SCOREPS in the larger locations. SCOREP performance was mixed with ten or so women remaining active throughout and the remainder showing little motivation or initiative, unless they were guaranteed a commission from participating in a product demonstration. The lesson that emerges is that selection of SCOREPS and solar cooker trainers must be rigorous with a focus on women who already have sales experience and a wide-network of potential clients/contacts. Expectations regarding commissions and other compensation must be clearly from the start and repeated often in the early stages of such an initiative. Changes such as an anticipated decrease in the number of product demonstrations need to be communicated well in advance of its implementation.

The project site (Upper and Lower Nyakach Divisions) and the project partner, the Nyakach Community Development Association (NYACODA), were carefully selected based on the original intent for the project – eventual take over of project operations by NYACODA. Changes in SCI leadership and in NYACODA's capacity resulted in a modification of orientation with increased focus on women's micro-enterprises and commercialization of the CooKit. The change in orientation had some positive as well as some negative repercussions on the project. On the positive side was the spur of innovation with respect to the CooKit, which resulted in the introduction of the OYWA CooKit – a hand-assembled panel cooker which makes decentralized

production possible. On the negative side was the establishment of four fixed sales points – energy shops in each of the four project zones - prior to carrying out a full market assessment.

The shops were in line with increasing decentralized product access: they provided solar cookers, improved stoves and retained heat cookers, maintenance services, and solar cooker accessories. The shops were owned and operated by the SCOREPS in that respective zone. In recognition of the fact that CooKits are fairly slow moving products, the shop keepers were allowed to sell other consumer products that rural folk tend to purchase often. Each SCOREP was encouraged to invest in the shop and also to save money with a local micro-lender for future expansion of the business and their personal micro-enterprises. The shop doubled as a site for CooKit assembly and an office where the SCI zone supervisor could meet with the SCOREPS. Regrettably, SCI did not sufficiently factor in the prevailing poverty in the area and the resistance to group ownership of the shops. While mobile sales by high-performing SCOREPS through their contacts and public and group events remained strong, CooKit sales from shop never really took off. Had it not been for the purchase of 1000 CooKits, pots and related items by World Vision in July 2006, the shops would have folded much sooner. As of the time of writing, March 2007, the shops remained operational until further notice. SCI is quite concerned about the impact closing the shops would have on the SCOREPS and intends to proceed with caution.

Another aspect of local access was the mode of payment. When sales started in October 2003, it soon became apparent that few people in Nyakach were able to make a cash purchase of 550 shillings for a CooKit. SCI accommodated purchasers by accepting installment payments. Purchasers received their CooKit once it was paid for in full. The unfortunate reality was that those who delayed on making installments could not save money on cooking fuel purchases. The introduction of the OYWA CooKit at a price of 450 shillings (US $6.60) boosted cash sales though most families still pay for the OYWA CooKit by installments. SCOREPS strongly advised against imposing a payment schedule despite the labor-intensive aspect of seeking payment from those who promised to pay an installment by a certain date.

Behavior Change and Technology Use

Traditionally, charities have provided goods and services free of charge in Kenya. Even with the introduction of user fees for government and other social benefit services, families in impoverished communities such as those in Nyakach expect to obtain such services free of charge. Most Kenyans are willing to pay a nominal cost for highly subsidized products such as insecticide treated bed nets and chlorine-based water treatments and yet are unaware of the role non-governmental organizations in marketing such brand-name products.

SCI's market-based introduction of the CooKit raised a lot of questions. With the exception of 154 CooKits given out for trial at home to create pool of solar cooks from which to recruit SCOREPS, all CooKits have been paid for either by cash or installments with a profit for the seller. At first, many Nyakach households insisted that SCI should give the CooKits out at no cost and complained that the price was too high. Those complaints largely subsided upon the introduction of the OYWA CooKit in May 2005. Over time, SCI also gained the trust of the community by having local women at the forefront of sales, repeatedly publishing pictures of local people in its calendars and newsletters, and having SCOREPS appear on the radio.

Frequency of use of the CooKits is mixed depending on the household. Some households use their CooKits every sunny day and others seldom use them. Contributors to frequent use include:

- Understanding of the advantages of unattended cooking
- Presence of other solar cooks nearby
- Willingness to carry the CooKit with them to their workplace or farm
- Preference for the taste of solar cooked foods, including local dishes
- Children's appreciation of a hot lunch that they were not required to forage for fuel to obtain
- Ease of heat treatment of household drinking water with solar water pasteurization
- Interest in maximizing fuelwood savings
- Having a household member they trust with the CooKit

Factors that contribute to infrequent use include:

- Lack of a dedicated cooking pot with lid
- Not purchasing plastic cooking bags after the free ones received in the cooking kit are torn or worn
- Absence from the home during weekdays combined with distrust of leaving food cooking all day with no one present
- Fear of damage to the CooKit by unexpected rain, curious children or wandering animals
- Discomfort with planning food purchases and food preparation in advance
- Poor results during an initial cooking session (too much water, started too late, clouds coming in)

PLANS FOR SCALE-UP

The above lessons are already integrated into the expansion of the Sunny Solutions to Kadibo and Kajiado. Kadibo Division was selected due to its proximity to a major urban center, active entrepreneurship by women, and community awareness of the negative health effects of smoke from cooking fires. Kajiado was selected as the district includes a major town and is close to Nairobi. Our Kajiado partner, the Africa Inland Church, is well established in the community and able to facilitate transportation. Both these sites can sustain a majority of cash sales and cover a smaller geographic area. SCI plans, to a greater extent than in Nyakach, to work with local providers of improved stoves and retained heat cookers so that beneficiaries can maximize their fuelwood savings. Sales by SCI supervisors started soon after initial awareness creation, with trained SCOREPS now in place to take over. CooKits were rotated among the members of women's groups with none given away.

SCI's Nairobi staff has initiated a business planning process for nation-wide scale-up of CooKit commercialization. The first phase of commercialization will center on Nyanza Province, where SCI already has a presence in Nyakach and Kadibo, and has introduced the CooKit at numerous events. The hub of operations will be a resource and marketing center set to open in Kisumu in 2008. Other solar cookers will be introduced following introduction of the products by local and foreign manufacturers. As most technology innovations flow from cities to rural areas, promotion of the CooKit in the third largest city in Kenya will accelerate spread to in Nyanza and neighboring Western Province.

CONCLUSION

Three years after the first market based introduction of panel solar cookers in Kenya, good progress has been made. Panel cookers are now available in three communities, one rural, one suburban, and one rapidly urbanizing. In Nyakach, cooking fuel is scarce and expensive but it is now widely known that the sun can cook and make water safe to drink. Lessons learned in Nyakach, particularly reducing the timeframe between initial introduction and the first sale of CooKits, and focusing on cash sales, are being implemented in Kabibo and Kajiado. While adjustments are on-going, plans are underway to take this women's led approach to commercialization of the CooKit to scale, first in Nyanza Province, then nation-wide. As we envisage broader spread of solar cookers in Kenya, let us keep in mind the importance of systematic awareness creation and follow-up and marketing messages that emphasize the positive while clearly explaining the limitations. Even with the existence of a proven market for solar cookers ranging from inexpensive to expensive in Kenya, it is critical to redefine the education/training function of Solar Cookers International (Eastern Africa) to either integrate it better with or separate it from social marketing/commercialization function. Such redefinition will overcome a major market barrier – the common perception of non-governmental organizations as a source of handouts.

BACKGROUND ON IMPLEMENTERS

Solar Cookers International (SCI)

Solar Cookers International started in 1987 with a primary focus on education and advocacy on solar cookers, particularly box cookers. Staff and volunteers conducted workshops to train women how to make box cookers at various sites in Central America and Africa. The 1994 exodus of Rwandan refugees to the Congo inspired a team of volunteers to develop a simpler, more portable panel-type solar cooker. The product was demonstrated in Nairobi, Kenya and followed by an invitation from the United Nations High Commissioner for Refugees' office in Geneva to start solar cooker projects in Kenya and later in Ethiopia. Our experience from these field projects allowed us to expand our information exchange program and improve our educational materials in print and online. Our programmatic growth has also spurred technological innovation and inspired many groups to start their own solar cooker projects. Solar Cookers International leads the global solar cooking movement and is a resource for solar cooker experts, advocates and the public worldwide. SCI has identified and assisted 700 independent community groups - many led by women - that promote solar cooking in their communities. Our training materials and dissemination processes have been adopted by many organizations including Solar Household Energy, Inc. in Mexico and Central America, Solar Connect Association in Uganda, EMACE in Sri Lanka, and Seyhan Rotary Club in Turkey, KoZon in Burkina Faso, Mali and now Chad, and SunOvens in Haiti.

SCI-sponsored regional and international conferences have accelerated advances in solar cookers design, dissemination methods and documented benefits. The two were sponsored by the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the South African government in 1999 and 2000 respectively. SCI recently sponsored an international conference held in July 2006 in Granada, Spain, and hosted by Fundació Terra. Spain offers visibility to

European media and policy makers and accessibility for delegates from Asia, Africa, Europe and the Americas.

Solar Cookers International Eastern Africa (SCI EA)
Solar Cookers International Eastern Africa is a registered Kenyan non-governmental organization. With a professional staff of eight Kenyans, it has overseen the field projects, spread awareness of solar cooking and coordinated information exchange with environmental, education, agricultural and domestic energy groups. SCI (EA) currently also provides: a) Technical and other support to other organizations wanting to introduce solar cooking, helping to create ongoing access through sustainable businesses. Most recently, SCI (EA) has assisted solar cooker promoters in Kenya, Uganda, Rwanda, Somaliland, and Tanzania. b) An eastern Africa regional newsletter informs 2,000 people at the local, national, and regional levels about solar cooking workshops, the activities of various solar cooker promoters, and information on the Cookit and other solar cooker designs. c) Educational resources such as instruction booklets for making and using solar cookers in English and local languages.

- Results of SCI led solar cooker promotion for Africa to date are:
- Independent production of CooKits in Kenya, Uganda, and Zimbabwe and twenty-two other countries.
- A network of 23 solar cooker vendors in Nyakach, a rural-area of Nyanza Province, Kenya, that includes 4 “energy shops.” Several independent micro-entrepreneurs sell solar cooked foods.
- Introduction of solar cooking in two more Kenyan communities and training of twenty new solar cooker vendors.
- Support to charities, government agencies, community groups, and others across Africa through information, product demonstrations, supplies, and training.
- An independent evaluation of solar cooking in Aisha Refugee Camp, Ethiopia (pop. 14,000) showed 94% adoption of solar cooking among the camp’s 2,500 Somali families and fuel savings of 32% in just four years, compared to a baseline study. Solar cooks reported spending four to six fewer full days per month gathering firewood.
- An independent evaluation in 2003 in Kakuma Refugee Camp, Kenya documented significant adoption and fuel savings despite the camp’s high rate of turnover and growth from 25,000 to 86,000 people. Nutrition was improved for 15,000 families with solar cookers because they no longer needed to barter food for fuel.
- In Zimbabwe, UNESCO contracted with SCI to introduce solar cookers in two areas of the country. SCI worked closely with the Development Technology Center of the University of Zimbabwe, local Rotary groups and Girl Guides and the Zimbabwe Energy Ministry to spread awareness and encourage sales. An estimated 40,000 families have benefited.

Our projects have confirmed that in areas of scarcity/high cost of cooking fuel, people will adopt, appreciate and reap major benefits from a supplementary new cooking method. We have also confirmed the importance of intensive initial customer instruction and follow-up by local peers as well as the need for steady patience during the several-year start-up process before uptake of solar cooking accelerates. Our refugee and Zimbabwe projects demonstrated that solar cookers

save fuel, food, money, and time and shown that large-scale adoption of solar cooking is possible. We have also shown that local women, even those with little or no formal education, are effective at introducing a new technology to their community.

Our ten-plus years of field work dispelled many myths and revolutionized how tens of thousands African households utilize solar energy, fuelwood, and cooking on fire. SCI responds to 1500 inquires a year from all over the world.

Acknowledgement: The author thanks Margaret Owino, Eastern Africa Regional Director, Solar Cookers International and her staff for their effort and perseverance in making solar cookers more accessible within and beyond Kenya. Asante sana!