

## UPESI RURAL STOVES PROJECT

# KENYA

BEATRICE KHAMATI NJENGA

**T**he Upesi Project, supported by the Intermediate Technology Development Group (ITDG), was initiated in 1995 to promote the adoption of more efficient stoves in rural areas of western Kenya. Its goal was to improve the living and working conditions of women in rural households by enabling a significant and increasing number of women and their families to benefit from fuel-saving wood-burning stoves. The project set out to test and demonstrate the effectiveness of new approaches and technologies for commercialisation of Upesi stoves in five districts in western Kenya.

By working with interested women's groups and involving them in the design and field-testing of the stoves, the project was able to take advantage of women's knowledge and experience. Besides training the women in stove production, distribution and installation, the project focused on improving their marketing skills as well. This has been a critical element in enhancing the ability of women to earn income from stove-related activities.

Over 16,000 stoves have been installed, providing significant poverty alleviation for members of the women's groups, and their families. The benefits to men and women in the project areas include improved health and time savings for users of the energy efficient stoves, as well as relief from pressures caused by wood fuel shortages.



## Reliance on wood for rural energy

Kenya has about 30 million people, 85 per cent of whom live in approximately four million households in rural areas. The average per capita annual income is about US\$290, derived mainly from agriculture and tourism. The major sources of energy are biomass, hydro, imported petroleum, and geothermal resources, with growing utilisation of modern solar and wind technologies. Overall, traditional biomass is the largest single source of energy, providing about 75 per cent of final energy demand, and over 93 per cent of rural household energy needs.

Energy use patterns vary significantly between rural and urban areas and also among different economic levels. The preferred forms of energy continue to be electricity and liquefied petroleum gas (LPG), but these are inaccessible to the majority of Kenyans. A 1994 welfare survey showed that only 3 per cent of Kenyans use LPG for cooking. The national electricity grid is mainly hydro powered and supplies under 40 per cent of urban households, and less than 2 per cent of rural households. The electricity is primarily used for lighting. Poor urban households use biomass in the form of charcoal for cooking, while in the rural areas fuel wood and agricultural wastes are the predominant fuels for cooking and heating. Approximately 85 per cent of rural and 50 per cent of urban households use kerosene for lighting. While only a few households currently have access to solar energy, the numbers are increasing steadily, with about 10,000 new households added per year.

Women and children suffer the most from over-reliance on limited biomass energy resources in rural areas. They are the main procurers and consumers of wood fuel for domestic use and generally have very limited access to modern, clean and efficient energy technologies. Consequently they spend considerable amounts of time and energy involved in the drudgery of gathering fuel and performing basic daily tasks, and are exposed to high levels of air pollution and associated illnesses related to smoke from wood fuel fires.

## Improved cookstove development

Following the 1980 United Nations Conference on New and Renewable Sources of Energy, many organizations began to work individually and collaboratively on improved stove development and dissemination. The organizations involved in the early 1980's included the newly created Kenya Ministry of Energy, the Appropriate Technology Centre, the Kenya Energy and Environment Organization (KENGO), United Nations Children's Fund, Maendeleo ya Wanawake, CARE-Kenya, the Intermediate Technology Development Group and GTZ, the German technical cooperation organization. Among the more popular stoves introduced were the charcoal-burning Kenya Ceramic Jiko, and the wood-burning "Kuni Mbili" and "Maendeleo Jiko"—known also as the "Upesi stove".

The Kenya Ceramic Jiko stove, inspired by the "Thai bucket", was developed through a design process spearheaded by the Ministry of Energy. KENGO was responsible for making the Jiko stove available and popular in several countries in Eastern Africa, and in the 1980's the Appropriate Technology Centre was recognised as the regional focal point for training on stove design and testing. The Jiko stove easily found acceptance among urban stove producers who were initially offered free training and marketing support by KENGO, working with the Ministries of Energy, Agriculture, and Environment and Natural Resources. Although most producers and dealers of the Jiko stove have been men, many women in small urban areas have benefited immensely from the technology. A recent study reported that women selling and using the Jiko stove in arid and semi-arid areas significantly improved their standards of living through gains in time and income.

## Rural stoves programmes

The success of the charcoal-burning Kenya Ceramic Jiko stove in urban areas affected subsequent programmes to introduce rural wood-burning stoves, primarily by creating false expectations among donors and implementing agencies. Over the years, improved stoves have been more difficult to introduce in rural areas because stoves cost money and the traditional three-stone cooking system is free. Rural people are generally very poor and women and children mostly collect their fuel wood for free, so there is less incentive than in urban areas to spend money on a stove for reasons of fuel conservation. Promotion and sales of the stoves have also been difficult because production and distribution of rural stoves have been conducted by women's groups with little or no experience in competitive marketing.

In 1986 ITDG joined with KENGO to initiate a new project focusing on the stove needs of households in rural areas. This study found that the most acceptable and efficient stove was the Maendeleo or Upesi stove designed and tested by GTZ at the Appropriate Technology Centre as part of the Women and Energy Project of Maendeleo ya Wanawake organization. Groups of women potters around Kisumu were trained to produce the already successful Kenya Ceramic Jiko as well as the Upesi stoves. The same women's groups were also involved in tree planting and agricultural activities for income generation.

In many rural areas, the Ministry of Agriculture's extension officers in home economics and agriculture were already engaged in "kitchen improvement" and nutrition projects. They became key promoters of improved stoves, because of the health and hygiene benefits of the stoves. Through funding from GTZ, the officers bought and distributed stoves at a nominal controlled price. The price was based on an estimation of what rural women would be willing to pay. Thus was established a secure marketing channel for the women's groups, and a steady but small income from stove production, irrespective

## BUILDING A BETTER STOVE: THE UPESI

The Upesi stove, sometimes called the Maedeleo, was developed by the Ministry of Agriculture in Kenya, ITDG (the Intermediate Technology Development Group) and GTZ (the German Agency for Technical Cooperation). It uses a standard ceramic liner that can be produced by artisans and women in the informal sector. The liner is then installed into a hearth made from mud and stone.

The stove is designed to burn wood, although it can also burn crop waste, such as maize stalks and cobs, and animal dung. It uses about 40 per cent less fuel than three-stone open fires, with up to 60 per cent less smoke.

Many users say they are able to cook much faster on a Upesi than on an open fire. They also cite improved kitchen health, safety and hygiene as other advantages. In addition, the market for the stove has grown considerably, which is a good sign that the Upesi meets the needs of its users for a clean, efficient and fast-cooking stove.



of the quality of the stoves. After about eight years, however, support from GTZ ended and the government's home economics officers were unable to continue their marketing services on a large scale.

## The Upesi Project

In 1995, ITDG's Rural Stoves West Kenya ended and a new phase focusing on commercialisation was initiated as the Upesi Project. The new project launched an intensive campaign to improve the sustainability of stove-related income-generating activities among women's groups.

The intended outputs of the project were as follows:

- ▲ Adaptation and production of quality Upesi stoves by the women's producer groups and local institutions.
- ▲ Strengthening of the capacity of women's producer groups and distributors in the marketing of stoves.
- ▲ Development of concrete commercialisation strategies to expand consumers' stove choices and increase incomes.
- ▲ Establishment of a network of key actors in energy saving technologies and marketing.
- ▲ Broad dissemination of stove production and commercialization techniques throughout East Africa and internationally.

The project worked primarily with eight women's groups, with differing levels of marketing skills and knowledge. Some were in villages where fuel wood could be collected free, while others were in wood buying areas. The women, who previously had been involved in various agricultural and pottery activities for income generation, took the initiative to approach development agencies working in energy and seek technical support in developing alternative income generating activities.

The Upesi stove was selected for production through field trials that showed it could provide fuel wood savings of up to 43 per cent compared to a three stone fire, and appeared to have a life span of four years. Some stoves have reportedly been used for up to seven years. During the field tests, the affordability of the stove was determined on the basis that "if an ordinary lady can sell bananas or a chicken to afford a stove, then the price is ok". Thus KShs. 70 was considered an acceptable price for an installed stove. Later, the Upesi project raised the price to KShs. 120, to reflect actual production costs.

## Stakeholder participation

Important factors responsible in the Upesi Project have been stakeholder participation and the project's responsiveness to the knowledge and changing needs of the beneficiaries. Working partnerships among project sponsors in the region provided learning opportunities for ITDG to develop improved

project strategies, and helped to establish a relatively stable background for the project.

Of particular significance was the fact that the women's groups involved had themselves approached the development agencies. Project beneficiaries were involved from the beginning in the design, development, selection and field testing of the stoves. Every revision of the marketing strategy was done in consultation with the women groups and the women came up with the content of promotional materials including posters and radio advertisements.

### KEYO WOMEN'S GROUP

This group was named by founder-member Lucia Alai. Keyo is the name of a huge tree commonly grown on homesteads in the area. The idea was to avoid a name with filial or clan connotations, in order to encourage open membership. The group, which began with five members, got involved with stoves in 1986, after seeking technical assistance from a CARE-Kenya Project in the area. Their stoves were initially marketed through home economics officers with GTZ funding. Today, the group has approximately 28 members producing, selling and installing stoves. They have links with artisans in Kisumu town who buy their stoves in bulk. Some members have benefited from bicycle loans, which have eased their marketing efforts.

Lucia Alai is the person in charge of liner production in the group. She grew up without formal education, learning basic literacy and numeracy through an Adult Education programme. At the start of her involvement with stoves, she was a peasant farmer with a jobless husband, barely able to make ends meet, providing her own farm labour. Today, Lucia is a qualified production trainer and has visited Tanzania on a training mission. She is able to pay over KShs 7,000 per year for farm labour and inputs, and school fees amounting to KShs 2,500. She also employs labourers to work clay for her liners. At the start of the stove business, Lucia says, her neighbours and in-laws despised her choice of occupation saying it was "playing with clay like children". Now Lucia is a respected member of the community, and several previous detractors have joined the group.



Women's participation was enhanced by the fact that they had been in contact with women leaders in the field, the home economics officers. These government extension officers may have distorted the earlier stove market through subsidised distribution, but they were certainly key agents in creation of awareness of the benefits of improved stoves in the rural areas.

One of the primary barriers to participation by women was that they did not have enough time and could not be away from home for long periods. Because of women's many domestic and community responsibilities, it was important to ensure that any new activity was compatible with their other ongoing duties. Many women became involved in stove production due to pottery skills acquired in connection with household activities, but needed training in marketing skills. Yet any new training and marketing activities needed to fit with their existing responsibilities.

## Commercialisation strategies

The marketing approach for the Upesi project was developed over a period of five years. The producer groups represented isolated focal points in vast rural areas. Most of the potential users were far from the producers, the road network was poor, and motorised transport was generally unavailable. A strategy was needed to ease the transition from a controlled market to a relatively free market, where the prices reflected the full costs of production, marketing and provided a reasonable profit margin. The new strategy was piloted with the Keyo Women's group, after which it was adapted to the very different conditions of each producer group. The strategy was based on insights gained from a visit to an ITDG stove project in Sri Lanka, as well as a marketing study in the project area.

Identification of key stakeholders for support was an important part of the strategy. The relevant government departments, major NGOs and existing stove producers in the area were informed of the project's intentions and its interest in developing marketing plans.

Training was also seen to be critical as there were a number of different actors or intermediaries involved in the marketing chain, including stove producers, distributors, retailers, promoters and installers. These intermediaries typically became involved in the project after seeing a stove demonstration, or through others already producing or selling stoves. Producers were trained in group dynamics, stove production, costing and pricing, record keeping, forging marketing links, and responding to consumer demands. For retailers, there was in-depth training in customer relations and sales promotion, as well as costing and pricing.

Promoters and installers were trained in stove-promotion messages, carrying out successful demonstrations, and establishing linkages with communities. The idea was to have as many people as possible spreading information and carrying out demonstrations of the stoves. Thus a team of promoters

was identified to visit homes, churches, market places, grain milling centres, schools and other public places. Other organizations such as the Anglican Church of Kenya in Eldoret diocese, the Marantha Mission of Kenya and the Ministry of Energy were involved in creating awareness and providing possible linkages.

ITDG sponsored radio promotions in local languages, which added value to the stove's image. Drama and songs were used for awareness creation. ITDG also provided advertising billboards. Posters, banners and flyers were produced in collaboration with intermediaries, to ensure that the selling messages were appropriate. The promotion was aimed at creating an attractive modern image for the stove and creating awareness of its benefits.

Stove producers and distributors were encouraged to use non-motorised transportation to link up to major roads. Over 40 bicycles were provided through a mutually agreed repayment scheme. All the transportation equipment carried Upesi promotional messages.

Marketing incentives included providing quality stamps for producers, and promotion signs for distributors with over 150 stoves. Promoters selling 100 stoves per month were given a bicycle loan and a certificate. Other incentives included tee-shirts and trophies.

## Benefits to women users

The primary intended beneficiaries of the Upesi project were women and their families in rural households of western Kenya. At the final project evaluation, 16,000 stoves had been manufactured, purchased and installed.

According to the evaluation, users of the Upesi stove derived the following benefits:

- ▲ Savings of up to KShs. 7,200 per year (rural wages average KShs. 800 per month).
- ▲ Health cost savings of KShs. 260 per year.
- ▲ Time savings of about 10 hours per month.
- ▲ Smoke reduction of 60 per cent.
- ▲ Reduction of acute respiratory infections in children by 60 per cent and in mothers by 65 per cent.
- ▲ Reduction of conjunctivitis in children under five by 70 per cent and in mothers by 67 per cent.

## Income generation

A total of eight producer groups, or at least 50 women, were trained directly by the project, and so were at least 23 promoters, eight retailers and five distributors. On average, stove producers devoted two to three days a week to stove production. Every active group member could sell 510 stove liners and earn KShs 15,300 in a year, or KShs. 1,275 per month. If producers sold directly to the users, then they could make

an extra KShs. 50 per stove for installation. Stove promoters made an average of KShs. 15,000 per year. As a result of stove-related activities, these women were able to enjoy a significantly higher standard of living.

Acquired production and marketing skills also enabled women to travel to distant places to provide training to others. Women from the Keyo Women's group have trained producers in Tanzania on a fee basis. Active women in the producer groups have also learned new skills useful for other business ventures. With increased confidence and social status, several women have since become active in community development committees. Thus stove production has also provided a launching pad for realising other ambitions.

Over all, wider commercialisation of stoves can have a significant impact on community poverty alleviation. With increased income, women are able to help support their families and pay for children's school fees, thus reducing school dropout rates. This is particularly significant for girls as they are always the first casualties when parents cannot afford school fees. Children of stove producers are also learning important skills for income generation, and acquiring knowledge about energy and environmental conservation as they observe and help their mothers. In addition, women producers provide employment opportunities to others who work as labourers in the procurement, processing or transporting of clay, liners and fuel wood for firing the liners.

## Environmental conservation

The issue of fuel wood shortages in Kenya cannot be over-emphasised. Any technologies that improve the efficiency of fuel wood use have real benefits to society. In west Kenya, the Upesi project has introduced an awareness of the need to conserve energy not only among those households that bought the stoves but also in many others exposed to stove demonstrations and promotional talks in public gatherings and at show grounds.

In much of the project area, fuel wood is harvested from live trees and sold in the market. The project evaluation revealed fuel savings of 90 kilogrammes per month for each household using Upesi stoves, representing 40 per cent savings in fuel use, which can have a positive environmental effect in terms of less felling of trees. The Upesi Project has also influenced an international research institute to support improved stoves as part of an effort to replenish and conserve the Kakamega forest in West Kenya.

Equally important is the tree planting encouraged as part of the project. In 1999, stove producers planted 2,500 seedlings, while other intermediaries planted another 3,773 seedlings as part of the move to replenish the wood used for manufacturing the stoves.

It should be noted, however, that clay procurement for increased levels of stove production could have adverse environmental impacts on soils and riparian ecosystems. To enhance environmental sustainability, therefore, it will be necessary to include training in land reclamation and soil conservation. It may be necessary to carry out an environmental impact assessment on this.

## Project continuity

The project made significant progress in establishing a market for improved stoves through a network of promoters, retailers and artisans who buy from existing producer groups and then construct and install stoves for customers. The current market appears to be viable since the stoves are produced and sold through a market chain in which every actor earns a reasonable income.

Through the project, individuals and groups in the marketing chain have acquired a variety of potential income-generating skills, and it may be assumed that they can survive independently of ITDG. Internalisation and ownership of new knowledge and skills has been shown by the participant's adaptation of knowledge to changing circumstances. In the case of the Upesi stove, women producers and artisans have been able to come up with at least seven new innovative stove designs to meet consumer demand.

Other indicators of project viability include the following:

- ▲ Almost all (97 per cent) of the stoves installed are still in use.
- ▲ Seven out of eight women's groups trained are still producing stoves.
- ▲ Since 1999, groups have started producing their own promotional materials.
- ▲ New partnerships have been forged on training and information sharing, with strong networks emerging across the East African region.
- ▲ Local women are able to offer training to potential producers on request, even in Tanzania and Uganda.
- ▲ Women have begun to venture into male-dominated artisanal work, which diversifies their income-generating potential.
- ▲ Awareness of the improved stoves has spread over wider areas in the region, thus enhancing the potential market.

One variable, however, that may adversely affect expanded stove production is the availability of clay and other raw materials. This threatens basic continuity of the activities, and also the quality of the products.

## LESSONS AND CHALLENGES

The project has demonstrated that rural stoves can be commercialised to provide multiple benefits to women, children and other poor people. Increased income-generating opportunities for women have benefited whole communities. By learning new skills related to stove production and marketing, women can considerably increase their incomes. As more actors enter the field of rural stove production and sales, promotional network densities will be increased, which can further enhance marketing and income opportunities.

The fact that improved stoves were originally introduced into the project region on a subsidised basis probably slowed down commercialisation, as the stakeholders had to completely change their way of thinking about the stove business.

Other constraints also affected the efficiency and cost-effectiveness of the project.

- ▲ The conventional flow of manufactured products is from urban to rural areas. The Upesi project was attempting a new feat—to produce and sell new stoves commercially within rural areas, and also sell them in some urban areas.
- ▲ Stove installation services have to be marketed and coordinated together with the sale of the clay stove liner. This makes the Upesi stove an awkward retail item.
- ▲ The project had to create from nothing rural stove purchasing agencies, and then offer subsidised training to the interested parties.
- ▲ The producers and promoters had a low capital base and

no access to micro-credit schemes, and therefore could not buy stoves in bulk. Although there are many micro-credit financiers in the country, they have made limited inroads into the rural areas.

- ▲ Transport continues to be a major constraint and improved roads, rather than bicycles, are needed.
- ▲ Quality control has been a problem when new groups have entered the field without sufficient training. Although it is an indicator of success that stoves are considered a viable income-generating activity, poor quality discredits good technology and erodes the market for the improved stoves.

The experience in West Kenya has proved that introduction of rural stoves is not as straightforward as dissemination of urban stoves. It may be relatively easier for producers to change their habits because of immediate and easily quantifiable gains. Users, however, especially those with access to free wood and little incentive to save fuel wood, may take longer to appreciate the benefits of improved stoves.

Overall, commercialisation of a new technology for the rural poor has proved to be a tedious and expensive process. The lessons learned from the strategies explored in the Upesi project can help make replication of the experience elsewhere less expensive. This is an important area for donor funding; there is a pressing need for documentation of useful experiences.

*By working with interested women's groups and involving them in the design and field-testing of the stoves, the project was able to take advantage of women's knowledge and experience.*