

# Groupe Energies Renouvelables, Environnement et Solidarités (GERES), Cambodia 2006



the **Ashden Awards**  
for sustainable energy

## Commercialisation of efficient charcoal stoves in Cambodia

### Summary

The Groupe Energies Renouvelables, Environnement et Solidarités (GERES) set up the Cambodian Fuelwood Saving Project (CFSP) which has developed a cheap charcoal stove, the 'New Lao' stove. This uses at least 22% less charcoal than the 'Traditional Lao' stoves which are commonly used in Cambodia. More than 130,000 New Lao stoves have been produced by 14 entrepreneurs and sold in Phnom Penh, the capital of Cambodia, over the past three years.

About 95% of Cambodians cook with biomass fuels. This is costly, has adverse health effects and is bad for the environment. Cambodia's great natural biodiversity is threatened by uncontrolled wood consumption. Much of this demand is for timber and a significant amount is turned into charcoal which is the preferred cooking fuel in cities, used by 40% of the population of Phnom Penh. The area of forest is diminishing but the price of charcoal has hardly increased over the last ten years, reflecting a thriving (but largely illegal) trade, and lack of taxes and other constraining factors.

One way of reducing the unsustainable wood consumption is by reducing the demand for charcoal. CFSP have worked with stove users and producers to develop a stove which is more efficient and durable than the conventional bucket-type stoves because of better insulation and controlled air flow. More than 130,000 New Lao stoves have now been sold. The 14 producers work to strict quality standards and are currently producing about 7,000 stoves per month. Although a New Lao stove costs about three times as much as a traditional stove, users are willing to pay for one because they recoup the difference in price within two months through savings on the purchase of charcoal. A network of distributors and retailers has been established and a trade organisation set up that oversees pricing and quality.

The Ashden Award recognises the impressive uptake of New Lao stoves which GERES has been able to achieve, by introducing the stove through the existing commercial channels and making sure that users and all levels of the supply chain gain significant benefits.

### The organisation

GERES was founded in 1976 by French engineers and academics. It is a not-for-profit organisation with a remit to alleviate poverty using renewable energy. GERES started the CFSP in 1997, in collaboration with the Ministry of Industry, Mines and Energy. Their team of 25 operates at national level.

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## **Technology and use**

Many Cambodian families use charcoal stoves for cooking, and most use a ceramic design, commonly called the 'Traditional Lao' stove. This is a portable clay stove contained in a metal liner which is widely used throughout South-East Asia. The word 'Lao' is derived from Chinese term 'Ang Lao' which means 'portable cooking stove made of clay'. CFSP have worked with users and producers in Cambodia to develop an improved charcoal stove, known as the 'Changkhran Lao Thmey' ('New Lao Stove'). This is similar in size and design to the Traditional Lao stove but has key improvements to make it more efficient and also more durable. The design of the New Lao stove is adapted from the Thai Bucket stove.

The New Lao stove is made from a fired clay pot for the charcoal, with a zinc 'bucket' as the outer casing, like the traditional version. In the New Lao, the space between the clay body and the bucket is packed with rice husk. The rice husk improves insulation and thus improves efficiency, and also keeps the outside cool and safe to handle. It also prevents abrasion of the clay body on the metal, thus improving durability. The grate over the charcoal has 37 holes (instead of 12 to 15 in the Traditional Lao stove). These draw in more air, so that combustion takes place efficiently right across the charcoal bed and the heat rises uniformly around the pot. Tapered, ceramic pot-rests around the inside of the body of a standard-sized New Lao stove enable it to accommodate pots with diameters ranging from 200 to 260 mm, while keeping a constant gap of 12 mm around the pot which minimises heat loss.

As of 9 May 2006, 137,052 stoves have been produced and bought by 91,094 families since the commercialisation programme started in 2002. Producers are currently making 7,000 stoves per month, and demand exceeds supply. Some producers have modified the design to suit different needs, such as table-top soup making.

CFSP is concerned with improving the sustainability of fuel supply as well as reducing fuel demand, and is working in a number of different ways to achieve this. One component of the work is the sustainable production of wood for charcoal through community forests and plantations. It is also undertaking field trials of two efficient charcoal kilns, which produce 1 kg of high quality charcoal (energy content 31 MJ/kg) from 4.6 kg of wood, compared with the current lower quality charcoal (26 MJ/kg) requiring 6.5 kg of wood. CFSP is also working on briquetting charcoal-dust and crop waste as additional sources of fuel.

## **How users pay**

At the time of writing (July 2006) 7500 Cambodian Riels = UK£1 = US\$1.8.

The retail price of the New Lao Stove is from 12,000 to 15,000 Riels (£1.70 to £2.00) and is paid in full by the user at the time of purchase. There are no subsidies or credit facilities for users.

GERES has set up a micro-credit fund to help establish the production and distribution network. The money is used by entrepreneurs to buy capital equipment for a production business, a vehicle (such as a light truck or trailer), or to help purchase raw materials in bulk. Credit from this fund is charged at an interest rate of 12% per year, whereas commercial lenders charge at least 2.5% per month, so the fund gives a real benefit to people who want to set up businesses.

## **Training and support**

CFSP initially focused the stove programme on Phnom Penh, where the demand for charcoal is greatest, and thought it was important to distribute the stoves through the normal commercial routes. Most traditional stoves were being made by a cluster of skilled family pottery businesses in Kompong Chhnang Province and then taken by oxcarts into the city. CFSP therefore discussed the production of the new stoves with the existing stove producers, and trained a group of them. The main difference between producing Traditional and New Lao stoves is the need for precise

dimensions. Training can be done in about two weeks, but a further three to four months of follow-up are needed to ensure quality production. Currently, 14 family businesses are making the New Lao stoves, and are decentralised in 5 provinces.

These producers, along with the distributors and retailers formed ICoProDAC, the Improved Cookstove Producers and Distributors Association of Cambodia. This organisation takes responsibility for quality control, regulates prices and facilitates promotions. Each stove has a unique serial number allowing it to be traced back to source. Quality is checked by random sampling every three months. This is a system that GERES believe would be easy to replicate as more stoves are sold in different parts of Cambodia.

'Copy-cat' designs appear from time to time. However, since demand for New Lao stoves exceeds the supply from the current producers, CFSP welcomes these producers to their training programmes, to teach them to produce stoves of the right quality and design. CFSP had trained six copy-cat producers by the end of 2005 and was scheduled to train a further two.

No specific training is required for stove users, since the stove is used in the same way as the Traditional Lao stove.

## **Benefits of the project**

The stoves save charcoal. CFSP has conducted controlled field tests, based on a procedure which follows how customers actually use the stoves. These tests indicate that the New Lao stove saves on average 22% of charcoal compared to the Traditional Lao stove. This saving may not look impressive compared with claims that are often made for improved stoves; however, such claims are often based on laboratory tests (which normally show higher savings than found in everyday use), and on comparisons with an open fire rather than a reasonably efficient conventional stove. For instance, laboratory tests of the New Lao stove show a 30% saving compared with the traditional stoves. In addition, there is considerable anecdotal evidence which suggests that the savings are higher in practice, possibly because owners of New Lao stoves become more aware of their charcoal consumption, and adapt their cooking practices. For instance, many restaurant owners who use the New Lao stove to cook for more than four hours per day claim that it halves charcoal use.

Based on their field trial saving of 22%, CFSP estimates that the New Lao stove saves an average family about 0.46 kg of charcoal per day. Assuming the current production of 1 kg charcoal from 6.5 kg wood, this represents a saving of about 1.1 tonnes of wood per family, or a total of 100 ktonnes of wood per year for the 91,000 families currently using the New Lao stoves. Most of the wood used to supply charcoal to Phnom Penh is harvested unsustainably, so this reduction in demand directly reduces deforestation and greenhouse gas emissions. The current saving in CO<sub>2</sub> emissions is estimated to be about 91 ktonnes per year

Users find that their improved stove creates less smoke and soot, making the kitchen both safer and cleaner to work in. The improved heat transfer means that food cooks more rapidly, and the rice husk ash insulation makes the bucket cooler and safer to handle. The New Lao stove has a longer life than the traditional model – saving on raw materials, labour and transport. Café owners in particular appreciate using a stove that is not easily damaged through frequent use.

At a retail price of £1.70 to £2.00, the New Lao stove costs around three times as much as a Traditional Lao stove, but it is more durable and typically lasts for two to three years, compared with only a half to one year. The savings on charcoal repay the additional cost within two months.

A study made by CFSP showed that producers make an average profit of £0.46 from a New Lao stove, compared with only £0.07 for a Traditional Lao. Distributors and retailers make similar profits. This distribution of profits through the supply chain has raised the living standards of over 200 families. There has been no in-depth study on the increase in living standards, but restaurant owners claim that they get significant financial benefits from the charcoal saved.

Currently, the main constraint to take-up in Phnom Penh is a lack of supply of New Lao stoves. CFSP is working to solve this through their programme to train stove producers. In other parts of Cambodia, people are still not familiar with the benefits of the improved stove, so would be less willing to pay the extra purchase price, and active dissemination programmes are needed to establish the market.

## **Management, finance and partnerships**

CFSP is organised into four interrelated teams. The technical team carry out research and development on cooking stoves, train and monitor producers, and are responsible for quality management. The promotion and marketing team raise awareness of improved stoves by producing publicity material and facilitating business meetings between stove producers and other stakeholders. The foresters' team work on energy plantations, and the administration team manages the credit facility and ensures smooth running.

CFSP was created by GERES in collaboration with the Cambodian NGO Development and Appropriate Technology and the Ministry of Industry, Mines and Energy. It has funding from the EU until the end of 2006.

## **Use of the Ashden Award**

GERES recognise the need for more artisans to be trained to manufacture and distribute improved cooking stoves. Part of the Ashden Award will be used to improve the facilities of a vocational training centre which they have started. New stove production centres will be established in other provinces: Kampong Cham, Kampot and Bantey Meanchey. GERES would also like to use part of the Award to document the story of their stove work.

*This report is based on information from the application submitted to the Ashden Awards by GERES, findings from a visit by one of the judges to see their work in Cambodia, discussions between Iwan Baskoro and the Ashden judges at interview and a presentation by Iwan Baskoro at an Ashden Awards seminar.*

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July 2006.*

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