



Impactreport Impactreport

Efficient Use of Biomass for Cooking

Category: Poverty Reduction and Health

Around two billion people in developing countries are still living in rural or peri-urban areas and depend on biomass energy such as wood fuel, charcoal, agricultural and forest residues and other plant matter for their daily needs. This especially concerns the women, who are generally not only responsible for cooking, but also for the fuel supply. They need decentralised, affordable, efficient, safe and clean energy services for their basic needs of cooking, baking and heating. Energy is required for small-scale productive use to allow rural households to engage in other economic activities (such as food processing, street restaurants, baking, beer-brewing). In sub-Saharan African countries, it is estimated that 70–90% of all primary energy is fuel wood used for cooking. Between 20–30% of total biomass energy goes into the small-scale productive sector.

During the last 20 years, GTZ has been supporting more than 20 national projects and regional programmes with the efficient and sustainable use of biomass energy for households and small businesses. Most of these projects have been carried out in Africa. Through the use of more energy-efficient technologies (improved stoves), the use of alternative renewable energy

sources (e.g. solar, green fuels) and the introduction of more efficient firewood and improved kitchen management, hundreds of thousands of households have been able to improve their everyday lives and thousands of artisans who produce and sell these technologies have made a profitable business out of it.

Challenges

Because biomass energy will, by necessity (not by choice), remain the most widely used fuel in the near to medium future, efforts in the early eighties concentrated on energy security. Efficient technologies were developed, adapted and tested, appropriate dissemination concepts, strategies and methodological approaches and organisational setups were identified and initial impact assessments were carried out. These showed that it was possible to achieve considerable improvements in energy savings (at least 50%) at individual household level and up to 70–80% at small business



Picture above:
Mozambican stove producers
presenting their inserts for portable
stoves (source: GTZ-ProBEC).

Picture on the right:
a Zimbabwean cook enjoying
her new improved Jetegahuni stove
(source: GTZ-ProBEC).



As the degree of deforestation increases, so does the amount of time spent on searching for firewood.

The Mirt stove consists of a coverable concrete ring, a side opening for fuel, a chimney and a cover.

level, but the real challenge is to reach economies of scale, in order to make the technologies accessible to the majority of the poorer sectors of society.

Strategy

Large-scale promotion required the development of more comprehensive concepts, strategies and integrated approaches, where continuous technology improvements, substitution with other energy carriers, better management systems and complementary measures go hand in hand with the application of instruments for planning and implementation. The framework changed from individual projects to integrated national and regional technical cooperation programmes with a focus on commercialisation to foster long-term sustainability.

Main steps

The fields of intervention now concentrate on motivating decisionmakers at various levels to include energy saving in their policies and to provide an enabling environment such as access to credit schemes, tax reductions for raw materials, import licenses for planning and implementing household energy programmes as part of their own agenda.

National steering committees, consisting of policy makers and implementers, are assisted in defining their own tasks. These include drawing up national policies and implementation strategies, quality control of up-to-date conservation technologies as well as monitoring tasks.

Project support focuses on:

- Training and capacity building of technical institutes, governmental extension services of different sectors, professional NGOs and interested private producers. The subjects are selection, adaptation and promotion of energy-efficient end-use technologies, conducting marketing surveys and business management, maintenance and quality control, monitoring and carrying out of impact studies.
- Demonstration projects showing that an integrated approach (intersectoral, interorganisational and private sector cooperation as well as interlinkages between various levels of policy making and implementation) can achieve substantial benefits for households and small businesses in a relatively short time.

- Networking and cooperation, with regional seminars providing opportunities for local and national experts to meet and discuss their experiences, newsletters produced in rotation by different countries facilitating the exchange of information and national experts advising each other.

Benefits and Impacts

Studies show that positive impacts are realised, contributing to poverty alleviation at multiple levels.

Economic impacts:

Statistics indicate substantial economical effects at household and small business level. Even more convincing are the figures in those cases in which widespread dissemination was achieved:

- Savings in time and money for households: up to 30% of monthly income when fuel is bought and time savings of between 10–20 hours weekly, allowing women to engage in productive labour.
- Establishment of small production enterprises with hundreds of new jobs in each country: in Mali, for instance, more than 400 technology producers were trained and more than half remained in business after project support ended.
- In Kenya, a payback period of two and a half months for an improved stove was calculated as compared to a service life of three years. A more recent survey showed a lifetime of 8–9 years, which would triple the amount of savings realised. On a national scale, the programme costs of the Women and Energy Project over ten years averaged the annual savings at the end of the programme. Ten years after project support ended, annual production and sales amount to about 15,000 stoves.

Sociocultural impacts:

Even more important for the society are the changes that are taking place within the individual families, particularly in how they think about their environment:

- Through production and marketing of HE technologies, women have gained more self-confidence. Projects in Kenya report that as entrepreneurs, women who had never spoken in communal meetings before were now respected contributors.
- Numerous examples show that in families using energy-efficient stoves, children are better cared for and more

Poor transport and communication networks, very low incomes and lack of access to credit are still obstacles to the dissemination of the more efficient stoves.



children, especially girls, go to school instead of collecting fuel wood.

- NGOs and extension services participating in the introduction of new technologies have been strengthened. They have built up capacities to carry out community meetings for awareness creation, skills training, public relations and monitoring.
- Potential conflicts, e.g. between men and women about meals being ready on time, have been reduced because of less time spent on fuel collection.
- In Kenya, even the conflicts between refugees and local populations about the overuse of resources could be resolved. Joint environmental planning groups have developed strategies to organise the harvesting of fuel wood and to reforest the land.

Health impacts:

Serious health effects due to smoke from traditional stoves can be reduced by using clean-burning technologies:

- Better combustion and ventilation reduce levels of CO and particulate matter in kitchens by at least 30%. A medical dissertation in Kenya showed a lowering of ARI (acute respiratory infections) rates in children under 5 from 59% to 23% and in mothers from 38% to 14%. The incidence of stillbirths and eye infections was similarly reduced.
- Numerous incidental reports show that children are safer and are suffering less from burns, while among women there are less incidents of uterine prolapse due to carrying heavy loads over long distances.
- Families are healthier as a result of better nutrition and more hygiene due to time freed from fuel collection being spent on producing more and better food and boiling drinking water. HIV/AIDS-affected families also benefit when more and different foods can be cooked with the same amount of energy, and respiration is improved through less smoke

Environmental impacts:

At the level of the general environment, the aspects which people are mostly concerned about are those that directly influence their everyday life. Thanks to the use of energy-efficient technologies:

- Fewer trees are being cut and agricultural residues and dung are used again as fertiliser, leading to a reduction in

soil erosion and a higher productivity of the land. A study in Ethiopia has shown significant harvest losses when these fuels were burnt. The cost of such losses over 25 years (1985–2010) was put at more than US\$ 3 billion by Gelder, B.V. O’Keefe (1995).

- Biomass energy conservation projects contribute to balancing supply and demand of fuel wood. If forests are conserved in the long run, fuel wood will remain an affordable renewable (hence CO₂-neutral) source of energy. Most serious problems like the permanent loss of forests as the only affordable source for cooking fuel can be avoided.
- During project execution, it became apparent that energy conservation activities fostered environmental awareness creation in schools. In a school in Tanzania, environmental discussion groups prepared communal radio programmes and put on public theatre sketches.

Lessons learnt

GTZ’s long and continuous commitment to supporting household energy projects has also been a long learning experience. Some of the major findings have been:

- Integrated HE projects that are complementary to other sectors produce synergy effects and are therefore more cost-effective and yield faster results.
- Synergy effects can also be produced through co-implementation with other donors.
- A participatory, gender-sensitive approach improves prospects for technology acceptance.
- Technology acceptance requires that the products are of high quality, affordable, reliable and aesthetically pleasing and produce realistic, tangible benefits.
- Enabling framework conditions are as important as a high-quality product.
- Easier access to credit lines, especially for women entrepreneurs, will speed up the dissemination rate.
- A well-functioning networking system optimises knowledge transfer and exchange



The promotion of the Mirt stove includes organised demonstrations on markets.

Ethiopia Case Study

Ethiopia depends on fuel wood, agricultural residues and dung for 96% of its total primary energy consumption. This demand surpasses sustainable supply fivefold. Injera bread baking accounts for almost 50% of total primary energy consumption of Ethiopia, requiring more than one tonne of fuel wood per household per year. The Ethiopian Energy Studies and Research Center (EREDPC) has developed the Mirt baking stove, which saves

more than 50% fuel. Since 1998, GTZ has developed a fully commercial approach, and since 2000, more than 25,000 Mirt stoves have been produced and sold by private producers, saving more than 12,500 tonne of fuel per year. Biomass savings are equivalent to about 2,000 ha of eucalyptus forests or 10,000 ha of woodland. Two upscaling programmes are ongoing, where sales of 300,000 Mirt stoves are envisaged.

ProBec Case Study

For households, institutions and small business purposes, the SADC region depends to 80% on firewood, charcoal, agricultural and forest residues. Continuing poverty and high costs of 'modern' fuels confine rural and peri-urban people continuing to use these fuels despite their negative environmental, social and health impacts. With GTZ support, SADC is implementing a biomass energy conservation programme in six countries in southern Africa (Lesotho, Malawi, Mozambique, Namibia, South Africa and Zimbabwe). Private producers are trained to produce and market energy-efficient technologies and public services are capacitated to support the private

sector with training, awareness campaigns, and monitoring. National Steering Committees form the institutional framework for policy development, fundraising, and coordination. The regional project office provides training, consultancy services and experience exchange. It supports SADC in lobbying for a renewable energy agenda and in raising funds from international donors and the private sector.

Starting from 2004, the programme is being extended to Botswana, Zambia and Tanzania. NEPAD plans to extend it to other African countries.

Economics of household energy projects: 1994 Kenya project case study

Number of stoves disseminated (during first ten years)	126,000
Share of fuel wood saved	at least 30 per cent
Annual savings of fuel wood	165,564 tonne
Value of fuel saved per year	
· at fuel wood market prices	US\$ 2 million
· if substituted with kerosene	US\$ 7.5 million
Fuel wood saved equal to an area of savannah forest (clear-cut)	8,400 ha
Annual sales of improved stoves after end of project support	-15,000
Total number of stoves sold (till 2004)	-400,000
of which in refugee camps	-100,000

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