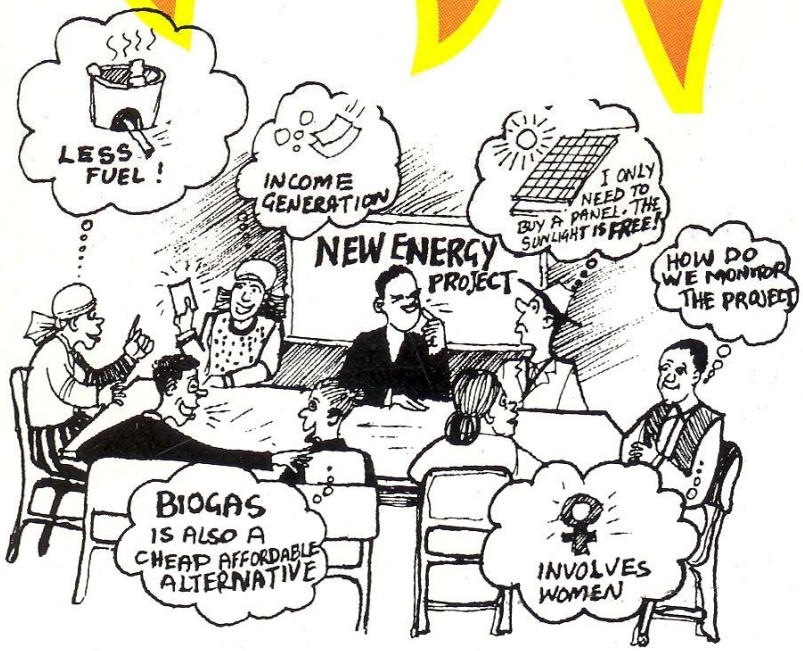
Appropriate Household Energy Technology Development

Training Manual



KENYA

Lydia Muchiri
May Sengendo

Appropriate Household Energy Technology Development

Training Manual

By Lydia Muchiri and May Sengendo

Table of Contents

Acknowledgements

The content of this manual was developed through working with partner organisations from 1995 to 1998. We wish to recognize the contribution of the women, men and children in the communities where energy programme have been undertaken. lIndeed, their indigenous knowledge about household energy technologies has contributed towards making the technologies more appropriate.

The manual is a product of the combined efforts of the staff of the Energy programme and partner organisations. Thanks go to other Intermediate Technology (lIT) Programme staff for taking time to review the drafts.

Thanks to the Department of Women and Gender Studies, Makerere University for the support accorded while collecting information and writing this manual.

We are grateful for the constructive critical assessment made by the participants of the Regional Household Energy Consultative Workshop, held in Arusha, Tanzania, in November 1998.

Finally, thanks to the project donors especially the Department for International Development, (DfID), for the support given to the project and for the development and preparation of the manual.

Introduction

The Household Energy Regional (HER) Project's objective is to build the capacity of agencies in the East African region to implement effective household energy activities, by providing technical advice and facilitating information sharing. One of the strategies undertaken to achieve that objective is to develop a training manual and other materials to support energy activities. The development of the manual is a result of the recommendations made during the 1996 project review and mid-term evaluation. It is aimed at strengthening the efforts of the project and complementing the training materials offered by the project.

Sustainability of activities is a key issue in community development projects carried out by Intermediate Technology. To achieve that purpose, the training manual is developed and prepared in a way that will provide users with the necessary skills on energy planning, implementation and monitoring of energy activities and how they impact on gender. The manual provides clear gender-focused monitoring and evaluation indicators which guide the user in establishing the implications of energy interventions on the roles, rights and responsibilities of the communities.

Foreword

Intermediate Technology (IT), has a strong commitment to enhancing the capacity of partner organisations to plan and implement gender-focused programmes, intended to benefit resource poor communities. IT Kenya further recognises that women and men have different needs, interests, roles, skills and knowledge. Hence, for sustainable impact on communities with whom IT Kenya is involved, the views, skills, knowledge and experiences of both women and men are considered important attributes. Consideration of these attributes in the training activities of the energy programme is one way that IT Kenya endeavours to disseminate interventions that cater for their needs.

During implementation of programmes, development practitioners are increasingly recognising the different roles that different members of the community play. Additionally, they are recognising the fact that the community needs are diverse and numerous and they need different approaches to address them. For instance, both women and men always play significant, but usually different roles in the provision a use of energy. In the past, development activities tended to ignore the fact that understanding of technical skills, knowledge and capacities are crucial in meeting the basic needs. This attitude is, however, changing as awareness is being created through different for a.

Over the years, IT Kenya has worked with communities in the field and has accumulated a wealth of knowledge and understanding on community needs, as they try to cope with life's issues. The organisation has used this experience in many of its activities to build local capacities to ensure a sustainable future for communities. IT Kenya has also proved, through its many projects, that appropriate technologies play a significant role in improving livelihoods of poor people. The experience provides particular insights into technology development issues. An important part of the work of IT Kenya is lobbying for best practices and influencing their adoption through sharing information on its experiences, approaches and lessons. This has been, to a greater extent, achieved through publications, workshops and seminars, training and participating in national and international networks.

In the area of energy, IT Kenya, through its Energy Programme, has undertaken activities in the East African region mainly helping and supporting agencies working with communities to implement effective household energy activities. The activities have, to a greater degree, focused on developing people's capacities through participatory techniques. For instance, the programme has, among other issues, introduced a participatory approach popularly known as PEOPLE (Participatory Exploration of Options for Local Energy), for establishing community energy problems, finding solutions and implementing the identified option together with communities. This approach has been designed for use by development workers from development organisations, government ministries, individuals and local community groups.

Technical and non-technical training on various appropriate energy options (including indigenous fuel-saving technologies), has been offered to partner organisations through workshops and seminars, with a view to building their capacity and establishing networks.

By working through a range of community agencies with varied goals and objectives, Intermediate Technology has managed to support a wide range of initiatives addressing various development concerns such as reduction of the burden women face as fuel collectors; conservation of the natural resources and environment; income generation through commercialisation of improved stoves; empowerment of the disadvantaged in the family; health improvement, and household food security.

This manual chronicles IT Kenya's attempt to lay foundations for recognizing the community role in identifying and addressing their needs, so that it is valued, strengthened and built upon in project interventions. In addition, this manual is intended to enable development practitioners in the field to implement effective energy interventions. It provided practical tools for training of those working with communities and are in a position to influence planning and implementation of energy activities at different levels. Some of the activities could be used for training at the grassroots level. Apart from

providing the development workers with a tool for training, it will assist in harmonising training messages provided by different individuals and organisations, thus making it easier for the community members to understand messages from different trainers.

I believe that this training manual will be a helpful tool for those organisations seeking to implement effective energy programmes and I therefore recommend it for them. Any feedback based on experiences in using the manual will also help improve it. Thanks.

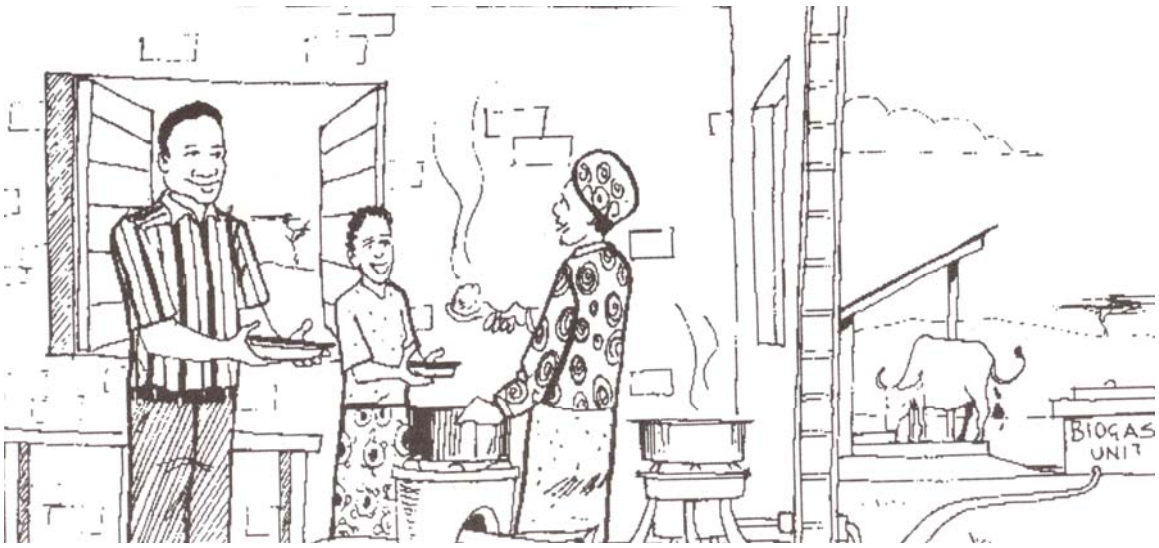
Maina Keengwe, Country Director, IT Kenya, February 1999.

Section A

An Overview of the Manual and Its Purpose

1 Background

Intermediate Technology Development Group's (ITDG) mission is to build the technical skills of poor people in developing countries, enabling them to improve the quality of their lives and that of future generations. Training has been identified as a major strategy for achieving the organisation's goal, especially in building the capacity of partners, government ministries and communities to implement effective development projects.



IT helps build the technical skills of poor people in developing countries enabling them to improve the quality of their lives

Building their capacity enables and guides communities to assess their energy needs and identify appropriate options for energy technologies. Although support materials exist in form of technical information on how to construct different stove types, there are no training materials for implementers working in energy programmes ant to guide users of household energy technologies.

As a strategy for informing and influencing on best practices, training creates awareness on appropriate household energy technologies and incorporates a knowledge base for alternative policy change which various actors apply.

The manual is based on a training needs assessment done after requests by project partners. The manual is also based on the experiences of the Energy Programme staff gained during the implementation of the Kenya project activities. The experiences helped the authors to articulate the training needs of household energy-related activities. The assessment identified some categories of training needs which include:

- Improved stove construction methods.
- Stove designs – mud stoves and ceramic stove construction skills
- Technology choice, dissemination and marketing strategies.
- Kiln construction, use and maintenance.
- Product design and evaluation methods.
- Technical support on scientific knowledge for design, clay mixtures and maintenance of stoves.
- General household energy issues and initiating energy programmes.

2 Purpose of the Training Manual

The manual serves as a guide for organisations carrying out household energy activities. It is aimed at ensuring systematic and effective implementation of energy activities and follow-up plans for monitoring and evaluation of training activities. The strategy for capacity-building as the main focus for this manual is intended to:

- guide in identification of energy training needs of the communities working with development organisations.
- provide possible guidelines for applying gender responsive planning and skills development for sustainable energy programmes.
- guide organisations and communities in formulating gender-focused monitoring and evaluation indicators for sustainable energy programmes.

3 Relevance of the Content

The training manual is a guide for development staff and any other workers in energy-related activities. It therefore focuses on training guidelines from specific energy issues. The manual offers information on application of skills and concepts which can be practised by the actors in the household energy sector. The materials will be use by staff of energy-related projects, organisations and development agencies involved in energy activities at the community level. Some specific qualities of the manual include:

- easily adjusted information (materials) to suit different environments and socio-cultural conditions.
- practical demonstrations where possible.
- themes reflecting energy priorities for communities.

4 Language

This manual is written in English and may be translated into other languages to cater for different users.

5 Monitoring and Evaluation Guidelines

It is recommended in this manual that the following should be addressed when monitoring and evaluating the training course:

- examining the effectiveness of the training (the extent to which the training is applicable to the energy needs and constraints of the communities).
- commitment: what organisations have done after training. This could include skills and concepts learnt, value of training to the organisation and community.
- possible ways of ensuring participants, acquisition and retention of skills.
- achievements made after training by looking at:

Individual level

- the ability gained after training
- the extent to which the individual is capable of applying gender and energy planning, implementation, monitoring and evaluation skills.

Organisational level – Observable/measurable changes on

- household energy activities incorporated in organisational planning and activity implementation
- objectives achieved through efficient and effective planning and implementation of household energy activities.
- capacity built in the organisation to apply gender aspects in order to implement sustainable energy activities for improved livelihoods
- follow-up plans and activities undertaken at organisational and community level, as well as establishment or strengthening of networking activities in the energy sector.
- established or improved flow of information and exchange of skills and expertise among organisations and communities.

Policy changes at organisational and national level

- organisations and communities develop and promote best practices which can be used to influence government policy
- establish or strengthen strategies to make household energy an important issue in the national agenda and in budgeting for government energy activities.

6 Some Hints for Successful Learning Sessions

This manual assumes a participatory approach to training which is based on the assumption that people learn more when their own knowledge and capacity is recognised. This, therefore, influences the choice of methods used in training.

The facilitator should prepare for the training using the following questions as guidelines:

- Why train?
- What component of training should be dealt with and at what time?
- How should training be undertaken?
- Who is to be trained?
- When should the training be carried out? (e.g., after consultation with partner organisations to agree on suitable dates)
- Which logistical format should guide the trainer during preparation? (e.g., objectives, materials needed, time, procedure, content).
- Where should the training be carried out?
- How should we evaluate effectiveness of training?

Your check list

1. Characteristics of the trainees
    - Literacy level
    - Age group
    - Level of experience
    - Level of interest (e.g., use exercises to stimulate interest)
    - Constitution of the group (socio-economic status, and representation of men, women and children where necessary)
    - Expectations of the group
    - Norms and values of the participating society

The characteristics of those to be trained should be taken into account

2. Practical factors
    - Interpretation/language
    - Size of group
    - Materials for training
    - Proximity of training location in relation to the participants' residences.

3. You as a trainer
    - Awareness of your own strengths and weaknesses.
    - What do you feel comfortable and confident dealing with?
    - Distribute tasks of the training activity to ensure that the communities play an active role

4. Skills to be imparted
    - Community understanding of the situation and ability to contribute to the training
    - Choice of applicable and practical methods to ensure skills are imported
    - Aim of the training should be clear, and applicable to the attitudinal change required.

Section B

Training Framework for Energy Activities

Issues identified for training	Objectives	Concepts/skills trained	Expected outputs
B1. Energy technology and development issues Planning household energy initiatives	• To enable participants to acquire participatory skills for recognizing the need for, and initiating household energy related activities.	• Simplified skills for identifying household energy problems and solutions. • Identification of strategies for assessing the appropriateness of existing indigenous technologies. • Skills for planning household energy projects.	• Increased ability to work towards achievement of sustainable energy use • Household energy problems analysed
B2 Energy technology design and generation *(The following are used as examples).* • Mud and ceramic stove production techniques. • Kiln construction techniques	• To enable participants to assess the need for household energy technologies and match them with appropriate technology designs • To build institutional and individual capacity to design the household energy technologies	• Time trend analysis of technological innovations on stove designs within the region, country, locality • Gender concern in technology design and generation • Material selection and mixing skills • Skills for constructing different stove types.	• Levels of demand and supply for household energy technologies determined in relation to type of technology design (stove). • Ability gained to undertake decisions on appropriateness of design structures • Technologies designed to meet the needs of users
B3 Technology choice Appropriateness of different types of stove technologies and other household energy options.	• To enable participants to examine factors that determine the choice of, and appropriateness of technology options available, in order to assist communities to gain sustainable development • To enable participants to appreciate the labour and cash investment needed to acquire identified technologies • To discuss factors that might affect sustainability of the technologies	• Determining the choice of a technology • Gender relations analysis in the household decision making • Expenditure/income decisions (control and access to income and other resources)	• Efficient use of resources available to communities to acquire appropriate technologies • Knowledge of options of technologies utilised to make appropriate choices • Use of family resources to acquire technologies

B4 Technology transfer and dissemination Dissemination strategies including: • Delivery of information and skills to the communities. • Marketing strategies for household energy technologies.	• To enable participants to acquire skills for increased household energy technology production and marketing • To enable participants to gain investment and innovation capabilities in order to actively participate in solving household energy problems	• Skills for producing more efficiently based on either known indigenous pottery skills or acquired skills. • Marketing and distribution skills/strategies for energy technologies transfer • Product awareness and advertising skills	• Increased participation of partners/government ministries and communities in dissemination of appropriate energy technologies • Increased ability for those trained to train/pass on skills to others • Appropriate policy change at the organisational, national and regional level, as a result of information and skills gained • Positive and supportive attitude between producers and users of technologies realised
B5 Monitoring and evaluating energy programmes.	• To impart participatory skills to enable participants to involve communities in monitoring and evaluating household energy projects or activities	• Enhancing livelihoods and sustainability of programmes • Awareness creation for consideration of different gender roles an needs for the individual and the household • Indicators for monitoring energy programmes	• Coordinated decisions made involving communities at all levels of project implementation • Reasonable distribution of benefits for women, men and children within the household.

Section C

Training Themes and Topics

Theme One

Energy Technology and Development Issues

Topic 1.1: Planning household energy initiatives

Objective

- To identify and practice methodologies for identifying household energy needs and options

Time: 1 to 3 hours

Content and procedure

- Participants discuss, in groups, existing indigenous knowledge that can be used to identify community needs and options. Guide participants to identify different ways through which these methods can be used.
- Participants discuss in groups, the limitations and possibilities of using these methods in identifying community energy needs.
- Let participants go through some exercises from the participatory Exploration of Options f or Local Energy (PEOPLE) approach, one of the participatory methods which can be used to identify energy needs and options

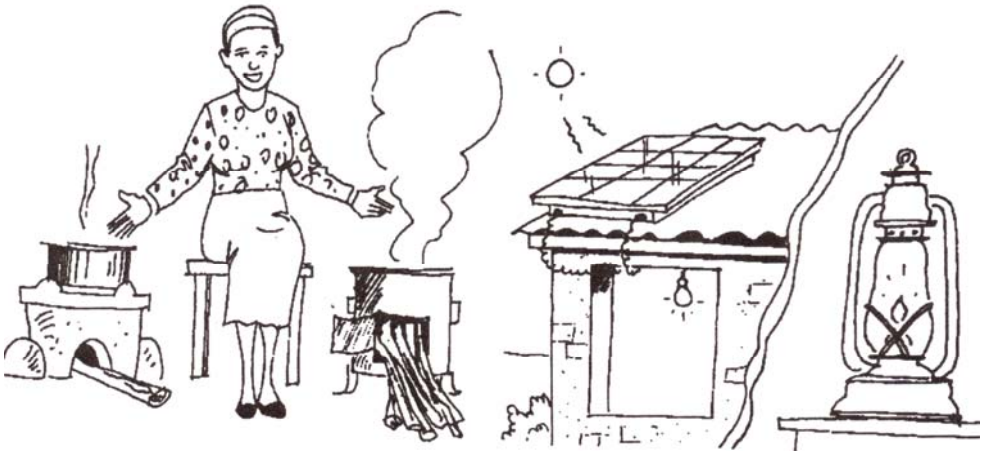
User's notes

Definition of the 'PEOPLE' approach

The approach enables communities and grass root agencies to jointly identify their energy problems and assess ways of addressing them. The aim is to maximise people's participation in decision-making, considering many options, not just one solution (particularly drawing on indigenous knowledge and local adaptations).

Why PEOPLE Approach?

- Many organizations make assumptions about needs. An example is where they many receive a need to save fuel, or impose a nee such as saving trees.
- Many do not look at different options, or at broader household energy needs other than fuel saving.
- Many assume that providing a list of options and assessing them is to be done by the agency, not the community.



Maximisation of available options enables communities to choose the most appropriate solution

Why use participatory methodologies?
Participation in any area of development is not easy. Thos involved in development work need to learn to change attitudes, and communities need to learn to participate in projects designed to benefit them. Participation is usually easier with a community group where no one has worked before, because they do not have any preconceived ideas regarding extension workers.

There are different levels of participation in which people:

- Contribute time as a tool for cheap labour, or a tool to sell a technology or idea
- Provide information to the agency or development worker
- Contribute funds
- Participate in an on-going project.

If the community decides what options to undertake, the project may take a completely different course. They may identify problems and solutions the agency would rather ignore. The agency has to be flexible.

The community decides what options to undertake

Examples from the PEOPLE Approach

The underlying principles of participatory needs assessment in stoves and energy work take into account that:

- Woman and men have a wealth of traditional knowledge which t hey use as coping strategies to deal with energy problems and to appraise new options
- The role of the outsider is to learn, convene, and catalyse sharing of information among the communities Involvement of marginal groups provides techniques for people to assess their situation, and in the process, suggest new options.
- The aim of the PEOPLE approach is not to introduce any specific energy technology. It is to encourage communities to better understand their energy problems, and assess ways of addressing them and expand their choice and access to appropriate interventions.

Example 1: Using the fuel scarcity and availability trend analysis

Objectives

- To identify changes in fuel availability over time
- Too discuss fuel wood scarcity indicators

Activities

- Discuss important issues about fuel availability, fuels used, time spent and distance travelled to collect fire wood and where firewood is collected.
- Find somebody among the participants who knows the village well, both the present and the past conditions and who is willing to share the knowledge. Encourage others to air their views on this subject.
- Discuss the time period to be covered, for example, before and after independence. Use the dates to compare situations during that period and the present.
- Let the participants decide which method to use to present the trend. Pieces of wood, stones, leaves could be used to show the trend, i.e., 10 stones to represent a certain period, and 5 stones another.
- Discuss to cross-check the information

Scarcity of fuelwood and other energy sources should be discussed

Example 2: Resource changes within the community

Objective

- To identify changes in fuel wood sources over time

Activities

- People draw a map of their own community showing key general features indicating where fuel is collected, bought or grown. I should also indicate who controls land.
- Either draw another map, or mark on the same one, to show where they use to get fuel in the past.
- Let them indicate where they think they will get fuel in the future.
- Discuss reasons for any changes.

Example 3: Energy and work in the household

Objective

- To establish the implications of the division of labour in the household on the energy needs.

Activities

- Discuss with participants and identify the activities undertaken in the daily lives of the household

- Guide participants to identify the type of activity and the energy it requires. Such activities include cooking, warming, branding, etc
- Let the participants identify who undertakes each of these activities
- Record the findings in a table form on charts.
  (More examples and information can be obtained from "the PEOPLE Approach manual," a publication of IT Kenya).

Topic 1.2: Participatory planning for energy projects

Objectives

- To identify ways through which technical change can take place by involving women and men in planning energy activities.
- To examine communities' capability in innovating methods to ensure sustainable energy use

Time: three and a half hours

Content and procedure

- Guide communities to map out how they would like their environment to look and why it is important
- Discuss factors hindering community participation in energy projects
- Establish the community's understanding of the energy problems as identified in the energy needs assessment
- Identify strategies for addressing identified energy problems
- Guide communities to prioritize and choose energy technology options
- With reference to the options chosen, guide them to establish gender concerns in technology design and generation as outlined in the theme on technology design and generation.

Theme Two

Technology Design and Generation

Topic 2.1: Gender concern in technology design and generation

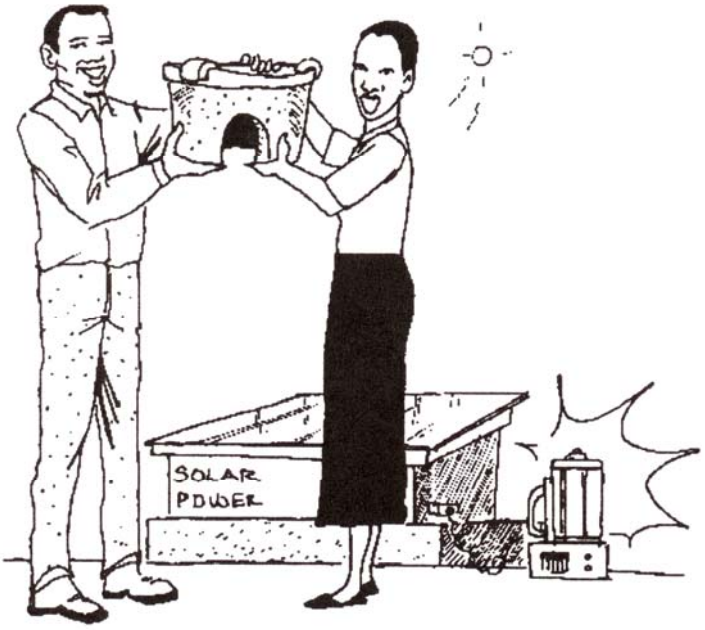
Objective

- Identify the implications of gender roles and needs in stove design and production

Time: 1 hour 30 minutes

Content and procedure

- Discuss socio-cultural values, norms and practices which should be considered in the design of technology and how design may affect their adoption.
- Carry out an analysis of gender roles and division of labour in the home
- Identify intervention points where technology may be required to ease work and save time.



An analysis if gender roles and division of labour should be carried out

Practical Activity

Activity 1

Role play on identification of gender needs and what technological intervention is needed

Actors: Two women and a man: Wanjiku, 70 years old, Namusisi, 20 years old and recently married, and her husband, Ben.

It is the rainy season and the family lives in a village known as Bbira in Uganda.

Narrator

Wanjiku: Why are you not using the three-stone fire Namusisi?
You will not have a long lasting marriage if you do not use it.

Namusisi: Although I carried the three stones from my parents' home, I have kept them beside the "sanifu" stove that I use.

Wanjiku: What do you mean by a "sanifu" stove? *(Goes to Namusisi's kitchen to see the stove).*

Namusisi: "Sanifu" means "improved". This stove cooks food faster, uses less fuel wood and produces less smoke. You spend less time collecting firewood.

Wanjiku: But tell me, what is the difference between this stove and the three-stone fire?

Namusisi: Ah! Ah! Let me explain. *(Discusses the major features of an improved stove).*

Ben: Namusisi, is food ready? I am very tired and hungry. *(He peeps into the kitchen and Wanjiku calls him.)*

Wanjiku: Ben, come and see this! Do you know hat your wife uses to cook?

Ben: Oh mother, you like the stove? I made it for her. I can also make one for you in your kitchen. Your friends might see it and like it too. (he goes on to explain about the materials required to make the stove).

Ben explains how an improves stove works to his mother

Namusisi: You also need to identify where the stove should be located in the kitchen so that it works efficiently.

All: A well-utilised stove saves time.

User's notes

Key issues to be emphasised include the location or positioning of the stove, materials for making it, the benefits of using it, labour required to build it and the basic features of an improved stove.

Activity 2
Identification of stove technology designs and assessment of their appropriateness

Topic 2.2: Mud stove design and gender consideration: An example

Objectives

- To understand change in fuel availability over time
- To share experiences on prevailing energy situations in the region
- To encourage discussion on the basic characteristics of improved stoves
- To learn how to construct different mud stove technologies

Time: One to two days depending on number of mud stove technologies identified by the community

Content and procedure

- Discuss historical origin of mud stoves
- Assist participants to give examples of indigenous technical knowledge on mud stove production
- Using case studies discuss mud stove technology dissemination, successes and failures
- Examine the gender division of labour: who undertakes the activities which require energy (men, women and children).

Practical activity

Demonstration and construction of different types of mud stoves according to the identified needs of the communities

User's notes

Technology design can be examined fro a gender perspective through examining the gender division of labour:

- Who undertakes the activities which require energy
- Who should participate in the consultation of the design of the energy technology?

Examples of the activities include;

Activity	By whom?	How often?
Cooking	Women	
Lighting	Women, men and children	
Cattle branding	Men	
Food preservation	Women	

It can also be examined by assessing the design in relation to the user. The guiding issue, in this case, is to identify who the energy users are. In order to undertake this activity, let the participants draw up a chart showing:

Activities undertaken at community and house-hold level which require energy	Who undertakes the activity? (women, men, children)	Type of energy required

The activities outlined by the communities are practised in specific locations which have certain implications in the way work is done. The gender work and location issues should be one of the basis for consideration of the design of an energy technology. For example, the Lorena stove has to be built in the kitchen and in a specific position in order to:

- Trap sufficient air to facilitate complete combustion
- Support the chimney
- Facilitate easy feeding of firewood, ease of use and safety in the kitchen.

However, such a stove technology design might require re-location of the position of the fireplace, compared to a three-stone fire.

The user should not be able to link the activity to the design of the energy technology. This not only governs the choice of technology but also the extent to which it can be adopted and used. The Lorena stove as an example, requires a lot of soil material which might not be found easily. One might therefore choose a stove that requires less material. The ceramic stove, on the other hand, can either be bought or made. Making requires particular soils (clay), and specific equipment and skills, and the process of making it is long, compared to mud stoves.

CASE STUDY

Alternative energy technologies improve adoption rates

The Mt. Elgon Conservation and Development Project, in Mbale, Uganda embarked on the promotion of the two-pot mud stove in the project area as a strategy for reducing fuel consumption. The stove proved very successful particularly in the areas where good solid were available. However, adoption rates in some other areas were very low, sometimes leading to people abandoning the new technology. Lose review revealed that the low adoption rate was due to frequent cracking of the stove which required very constant repair. This was a result of unavailability of good soils for producing durable stoves. The project sought further advice from Intermediate Technology, Kenya, and affected a recommendation to promote ceramic stoves through a commercial approach in these areas where the two-pot mud stove had failed. Extensive training in groups in ceramic stove production followed. Production followed and today the groups produce the "Serichi" stove which as proved very popular in the areas where the two pot stove had completely failed.

Source: Imelda Lwanga, Project Manager, Mount Elgon Project.
Case study developed by Sengendo and Muchiri

User's notes

About mud stoves

The basic principle common to mud stoves is the shielding of the fire against draught. Construction of mud stoves involves a range of indigenous or local knowledge in mud-mixing, binding, moulding, shaping and finishing the completed stove products from different soil types such as clay and ant-hill soil. Apart from this, mud stoves require a period of drying before they are ready for use.

They are not fired before use, are usually made from available soils and require very low level of kills to make. They are owner-built and therefore cost very little. The main difference between clay-lined stoves and mud stoves is the need for resources to make or possess. Because the technology is simple, it is easily adapted and copied.

Mud stoves, however, require constant repair and maintenance. If maintenance is not satisfactory, there is continuous deterioration of the stove and this discourages the users. Mud stove promotion, therefore, requires constant follow-up. They require shelter from rain and other adverse physical effects. In some cases, mud stoves are laborious to make and once make are bulky. They are not easily transported as they break. That aspect reduces opportunities for their commercialization.

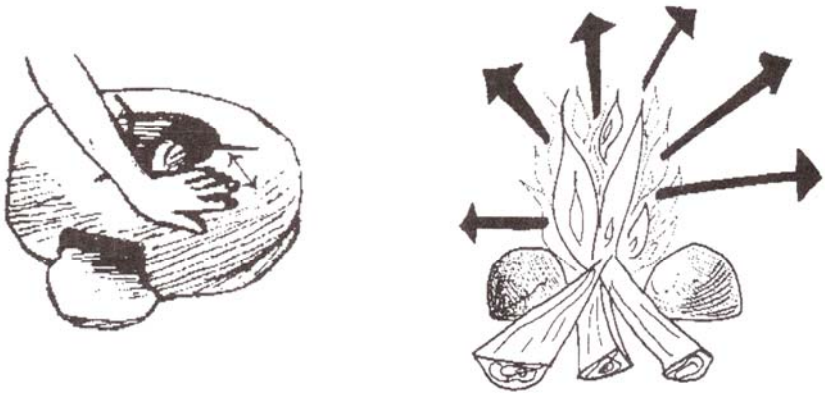
Mud stoves require shelter from rain and other adverse physical effects

Basic features

All improved biomass stoves have some common characteristics. These include an enclosed fire chamber. Insulated walls, and, in some cases, close fitting links between the pot hold and the pot. The features are related to specific dimensions. These affect the efficiency of the stove, the durability, cost of production and use. It is not possible to generalise the dimensions and the following are just guidelines.

The thickness of the walls

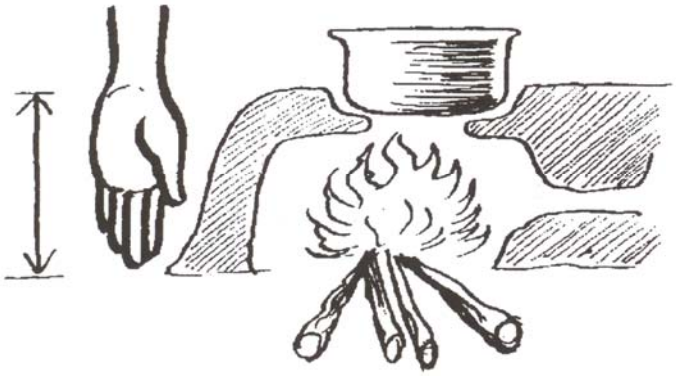
The thicker the wall, the better the stove since thick walls conserve heat and minimize cracking. Although thick walls slow down the heating process in the initial stages of lighting, they act as insulators, t hereby improving performance once the stove heats up.



Thick stove walls are good because they conserve heat

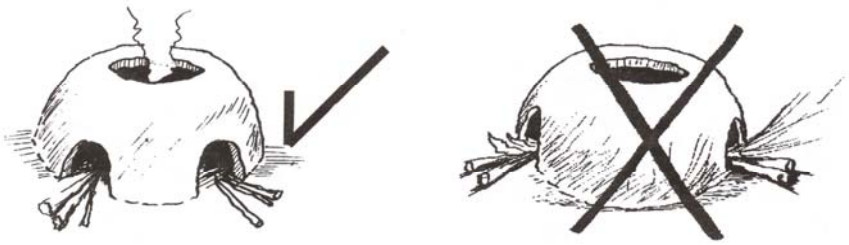
The height and size of the fire chamber

This affects the rate at which the pot gets heated. If too low, the fire will engulf the pot and if too high the flames do not reach the pot, both resulting in fuel wastage.



The fire chamber height should be neither too high nor too low

Position of fire entrance
For a two-door mud stove, the fire entrances must be positioned adjacent to each other to allow wind to blow into both doors to collect the flames below the pot, and not through one door and out through the other.



The fire entrances should be adjacent to each other

Chimney position
The chimney should be placed at an angle in relation to the potholes to minimize heat loss.

The chimney position should be at an angle in relation to the potholes

(More details on mud stove construction can be obtained from "Appropriate Mud stoves in East Africa" manual, a publication of IT Kenya).

Topic 2.3: Ceramic stove production: An example

Objectives

- To examine stove design and learn skills for ceramic stove construction
- To assist participants to understand and practise quality requirements for ceramic stove production.
- To equip participants with skills for construction, finishing and firing of a range of ceramic stoves.
-

Materials and equipment required

Paddle moulds, pot-rest moulds, cutting mould, a table or work board, clay soil and prepared clay, water, finished dried stoves, polythene sheets, knife, cardboard, wooden boards, or sacking, plastic spatulas for smoothing, piece of cloth or sponge, fine sieved ash.

Pot-rest mould

Time; 3-4 hours, depending on the number of stove types demonstrated. This should be followed by another activity to impart skills in ceramic stove production.

Content and procedure

- Identify indigenous pottery skills which can be utilized for ceramic stove production
- Discuss historical origin of ceramic stove production (successes and failures)
- Identify sources of materials such as clay (if possible in nearby location) and discuss appropriate ratios
- Discuss the process of clay preparation, soil ratios and reasons for these
- Discuss moulding procedures for different stove types

Practical activity

- Clay identification and preparation
- Moulding and finishing different types of stoves
- Stove drying and firing

User's notes

Ceramic stoves are made by potters using a mould to shape clay into the form of stove liners. These are then dried, fired and either built into the kitchen or cladded with metal to make them portable. There are different designs using either charcoal or firewood. There are many different aspects in the identification of pottery clays, the preparation of the clay, making of the stove, and understanding the causes of, and solutions to problems that may occur.

Though quite easy for a skilled potter, learning how to make ceramic stoves is a little difficult for lay people. Experience will, however, help to solve problems in the production process.

Where there is good clay, there will usually be a history of pottery, and potters who know where to find the clay sources and how to prepare it. If, however, there are no pottery activities, one will need to find a clay source. Seek out local knowledge when doing this. After sources are identified, it is important to test the clays. The best test is to take the clay through the whole process of moulding, drying and firing. Use some of the test stoves for cooking to see if they are strong and will last.

The trainers should ensure that there are sufficient well dried stoves during the training to facilitate a demonstration on the firing of the stoves.

(More information can be obtained from "How to Make and Upesi Stove – Guidelines for Small Businesses" and "The Kenya Ceramic Jiko – A Manual for Stove Makers" by Hugh Allen).

Topic 2.4: Kiln construction and use: An example

Objectives
- To examine the strengths and weaknesses of the existing bonfires/firing systems
- To identify alternative simple and affordable methods of firing pottery products with reference to the "Better Bonfire" kiln
- To learn how to construct and use the "Better Bonfire" kiln.

Materials and equipment
Fire clay building bricks, polythene sheet, stones, murram (clay gravel/latrine mix), sand, anthill soil, building earth, water, reinforcing rod, tie or binding wore, (optional: chicken wore), rammer, pick, tape measure, builder's line, mason's hammer, spade or hoe, wheelbarrow, plumb line, spirit level and mason's trowel. For firing: A pre-prepared kiln, ready to fire stoves, firewood, dried grass or straw, ash and cow dung.

Time: Five hours

Content and procedure
- Discuss the strengths and weaknesses of the existing traditional firing systems
- Discuss the qualities and necessary requirements for firing ceramic products and identify labour and investment requirements
- Identify and discuss material requirements for the construction of the "Better Bonfire" kiln
- Introduce skills on how to construct and use the "Better Bonfire" kiln. Plan with the participants an easy way of following up skills training. Plan a separate 5 days training in kiln construction and use.

The traditional firing system has its strengths and weaknesses

Practical Activity
Five days. This could be done at a later date.
- Constructing the "Better Bonfire" kiln
- Firing stoves using the "Better Bonfire" kiln.

User's notes
Many traditional potters still fire their pots in an open bonfire, or a bonfire in a traditional pit. Although this method is cheap and simple, it does not work well in wet or damp conditions. It also uses a lot of fuel wood and dried grass. There are designs of kilns that are more efficient, but also expensive, difficult to build, use or even maintain. Others are designed to use other fuels such as gas, oil or electricity.

Rapid and uneven heating and cooling processes (as in the case of traditional bonfires) may result in higher numbers of cracked stoves. Firing losses can however be reduced by slowing the heating and cooling stages of the firing, and by ensuring that the heat is distributed evenly. The Better Bonfire Kiln was developed by IT Kenya as an alternative method of firing pottery products. This intermediate kiln is made using local

materials, is simple to build, use and maintain and requires less fuel and reduces cracking. Good quality materials and care in construction will result in long lasting and effective kilns.

The better bonfire kiln

The trainer should ensure that a kiln is constructed about one month before the actual training, at the selected training venue, ready for the stove firing exercise.

(More details an be obtained from the publication "How to Build, Use and Maintain the Better Bonfire Kiln" published by IT Kenya)

Theme Three

Energy Technology Choice

Topic 3.1: Appropriate technology choice

Objectives

- To generate ideas on the factors that determine the choice of an energy technology
- To examine the characteristics of appropriate household energy technologies
- To assess the gender power relations in the household which determine access to and use of improved household energy technologies

Time: 2 hours

Content and procedure

Participants are assisted to discuss factors that determine the choosing of an energy technology. They are encouraged to:

- Discuss the skills needed for labour inputs
- Consider cost of the technology
- Discuss the characteristics of an appropriate technology in relation to the socio-cultural and environmental aspects of an area, taking into account the ease or difficulty in the availability of local raw materials
- Discuss issues of control and maintenance of the technology chosen, paying attention to skills needed for maintenance
- Suggest suitable production methods and workplace to make use of available production techniques

User's notes

Appropriateness of an energy technology

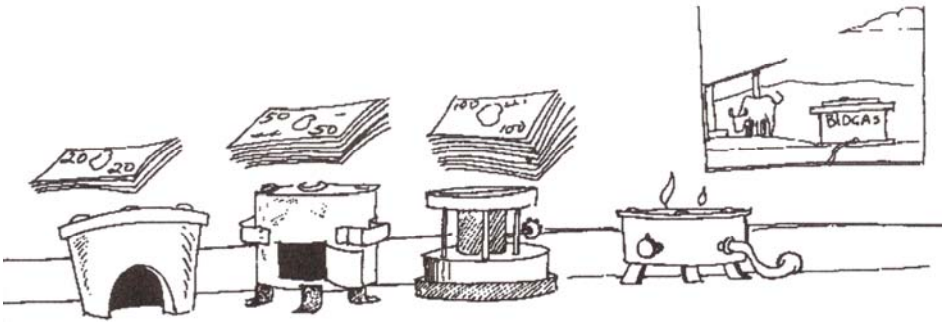
An appropriate technology is one that:

- Is suited to the environment in which it is used
- Meets the basic human needs of the majority of poor people
- Makes full use of local natural resources
- Is consistent with the ecological needs of the environment, and
- Is efficient and offers comparable levels of productivity to the alternatives.

It is advisable and beneficial to involve a community n determining the type of technology best suited to their socio-economic environment to develop self-sufficiency.

Appropriate technologies

- Are low in capital costs, thereby making final product low in cost
- Use local materials wherever possible
- Are small enough to be affordable
- Can be understood, controlled and maintained by communities wherever possible
- Enable people to work together to collectively bring improvements to their communities
- Make technology understandable to the people using it and thus suggest ideas for further innovation
- Are flexible so that they can continue to be used or adapted to fit changing circumstance and a particular socio-cultural environment



Appropriate technologies are cheap, use local resources and are affordable

Knowledge of energy technology
Technological choice may be limited by lack of knowledge of what exists. The availability of the energy technology in question will be compared with available resources in the community or country. Information must therefore be made available to the community to enable it to make informed choices. Channels and methods for information delivery should be participatory in order to be effective.

On the other hand, technology choices may be known but may not be available because no one is producing them due to lack of skills and inputs. Choice of a technology will depend on the needs it is meant to satisfy and the income levels of those aspiring to acquire it.

Skills required for the use of the energy technology
The extent to which the technology usage differs from the indigenous ways of performing a certain tasks will influence technology choice. It is therefore important to identify ways through which the community uses technology under consideration. The purpose and the use of the technology should be related to the skills. In situations where the user lacks the skills, this will hinder adoption of the technology.

Topic 3.2: Implications of income availability on choice of technology

Objective
- To examine the extent to which household income levels influence access to an energy technology or the extent to which household income can enable or hinder affordability of an energy technology.

Time: 1 hour

Content and procedure
- Discuss factors governing accessibility of an energy technology
- Discuss gender differentials in income acquisition between men and women in a household
- Establish who undertakes the decision to purchase an energy technology for use in the home

CASE STUDY

NGOS influence government for commitment to supervise quality of energy technologies in Zanzibar

Energy is a critical factor in Zanzibar's economic and social development. Effort is being made in order to ensure adequate supplies of key forms of energy. The country relies on imported petroleum-based fuels, whose purchase contribute to its balance of payments deficit.

Under biomass, wood fuel is the most important energy source representing 90% of the total energy consumption. Fuel wood therefore constitutes the backbone of the socio-economic well-being of the vast majority of the Zanzibar population.

High level consumption of charcoal and firewood has led to over-utilisation of wood from the forests, especially in the coral rag area. Improved stoves where therefore initially introduced to combat deforestation and, later on, for kitchen cleanliness. Within the households, it was realised that income expenditures were being reduced in terms of money spent on fuel acquisition and health care for illnesses related to household hygiene. This link between hygiene, income status and energy conservation has enabled manufacturers of improved stoves to influence policy makers to design energy policies to help communities and organisations promote efficient utilisation of energy technologies. Energy technologies, especially improved cook stoves, have become income generating activities in the 1990s in Zanzibar. Due to the domestic responsibilities attached to women's work in the household, the women were more eager to adopt, utilise and learn techniques of energy technology production, especially the fuel efficient stoves, compared to the men.

Government take up supervisory role for quality monitoring

At present, the role of the Zanzibar Department of Energy and Minerals is to co-ordinate and supervise the work of the stove producing groups in Zanzibar. Earlier, the Department of Energy and Minerals was providing training to women groups in the manufacture of ceramic lines in collaboration with Intermediate Technology The women were more organised into groups unlike men who preferred tow work as individuals. The initial women's groups were Bado Tupo at Kisauni and Hatujali at Kiembe Samaki, and they were both pottery groups. Besides ceramic liners production, the groups also produce ceramic flower jugs, pots with lids and other pottery products which also generate income. These groups have worked as role models for environmental protection through "stoves for income initiatives". At present more people get involved in stove manufacturing. New groups have been formed including Sanifu women's group, at Urusi, Kidongo Chekundu artisans and Meli Nne potters.

Although new groups have become involved in the manufacture of improved stoves in Zanzibar, importing ready-made stoves from Dar-es-Salaam still continues. This is attributed to the fact that the quality of the local stoves produced in Zanzibar and the quantity has not yet satisfied the market.

The main problems encountered by the local stove producers are:

- Lack of trained artisans for metal claddings
- Scarcity of raw materials for metal claddings
- Lack of pottery skills, and
- Competition with imported stoves.

Due to the above constraints many producers are still importing claddings from Dar-es-Salaam – and expensive process. The challenge is now on the women who consider stoves production as the major income earner.

Source: Khamis Bakari, Department of Energy and Minerals.

Case study developed by Sengendo, Muchiri and Gitonga.

User's notes

For quite a long time, non-governmental organisations wanted to collaborate with government departments to plan for, and implement energy programmes. This has been a challenge to many organisations in the East African region. The case study is an example of women's groups which, through a collaborative effort between NGOs and the government, mobilised themselves and managed t o work as models to initiate formation of other groups and eventually were able to gain government support for supervision and capacity-building in energy technologies.

The major gender-related issues in this case study include:

- Organisations need to consider the gender division of labour in the household in order to know how and what implications the intervention will have on different people in the household.
- Group mobilisation works as a social mechanism for disadvantaged groups and those who seek common ground, in order to seek a collective voice for policy influence
- Gender-focused programmes can be supported by the stage.

Theme Four

Energy Technology Transfer

Topic 4.1: Dissemination and delivery strategies

Objectives

- To guide participants t o identify different methods of disseminating energy technologies
- To identify factors that determine choice of dissemination method and materials

Time;_ 1 hour

Content and procedure

- Guide participants to identify different methods of transferring and disseminating energy technologies
- Discuss the advantages and disadvantages of each of the methods identified within the rural and urban community settings
- Discuss the limitations of these methods in addressing women's men's energy needs
- Identify the methods that can be used to obtain maximum levels of energy technology transfer and dissemination.

User's notes

What strategies?

For successful dissemination, the community must be consulted and involved right from the start of the project. It is important identify and utilise existing local knowledge, skills and materials, and to introduce the simplest technologies first. A collaborative approach enables stakeholders to identify and communicate benefits and drawbacks of each technology to facilitate adoption. This also ensures high adoption rates and sustainability of energy activities. Giving people choices and options to suit individual needs and preferences safeguards against technology rejection where a particular technology does not satisfy the user needs. Incorporating prevailing cultural practices and values also ensures acceptance of technologies. The following case study is used to demonstrate how failure to consult the community before embarking on energy technology dissemination can lead to rejection

Giving people choices safeguards against technology rejection

CASE STUDY

Consequences of top-down approach to issues

After a familiarisation tour of stove-producing groups in Western Kenya, facilitated by Intermediate Technology; Kenya, some Community Development Officers from the Anglican Church of Kenya (ACK), Eldoret region, embarked on a ceramic stove dissemination campaign. They bought stoves from the groups they had visited earlier, and supplied them to communities free, after demonstrations on how to use them. The objective was to have as many families as possible adopt and use the improved stoves. An evaluation carried out later established that the stoves supplied were not only never used, but were also destroyed. Further follow-up revealed that the users were suspicious of these stoves that came free, and associated them with devil workshop. On realising that they had started on the wrong foot, the officers organised demonstrations and exchange visits for 22 group leaders to areas where people were comfortably using the stoves. They were very impressed and gave positive feedback to the community members, who were finally convinced that the stoves had nothing to do with devil worship. Adoption rates increased tremendously after this.

Suorce: Rose Kwena, Community Development Officer, ACK, Eldoret.
Case study developed by Sengendo, Muchiri and Gitonga.

Lessons from the case study

There is need to understand and appreciate the cultural values and practices of a community, and their possible impact on project implementation, before embarking on a development project. It is important to consult the community regarding their energy needs and possible solutions, to ensure acceptability of interventions.

Gender related concerns

Gender concerns can be based on those roles, rights and obligations which society allocates women and men and their roles in energy- related activities. The values and needs attached to the activities will depend on the extent to which women or men will participate and undertake these activities. Technology transfer methods should take into consideration the gender division of labour as this will determine the differences in use and adoption of the technology. The following case study is used to explain gender-based division of labour in the household.

CASE STUDY

Who builds the kitchen? Who cooks?

Mt Elgon Conservation and Development Project embarked on disseminating information about ain improved multi-pot stove in 1992. This was aimed at encouraging communities to use less fuel wood. Project monitoring efforts revealed that by 1994, women had largely abandoned the stoves and gone back to the three-stone fire. A re-examination of the stove in question indicated that there were a number of factors overlooked earlier in the transfer process. In this community, men often held the cash, but were not involved in cooking matter. Yet it was the men's role to build the kitchen structures. The issue of who the kitchen belongs to therefore arose. Women's activities involved cooking different dishes at different times of the day and I n different locations. As such, they could shift the three-stone fires to different sites. The multi-pot stove could not be shifted.

(Adapted from WIDTEC training materials on Gender and Environment: July 1998: Nature Watch march 1998).

Lessons from the case study

There is a need to find out who does what within the home. What can each different person contribute to the utilisation of the energy technology to be transferred? The location aspect however merits some consideration. "Technologies may affect production by re-locating activities"*. In this case study, the technology chosen had restricted women to cook inside the kitchen. Although they were still cooking in one place within the compound, the movement of the three-stone fire enabled them to undertake different activities at the same time. It also provided them with warmth when necessary.

Dissemination methods can include:

- *Training in energy technology use*
  When people know how to use a certain technology, they will be willing to try it out and eventually adopt it.
- *Use of posters*
  In promotion of technologies, especially in a commercial approach. The messages on the posters should clearly reflect gender issues in relation to the energy technology being disseminated.

One effective dissemination method is the use of posters

- *Use of trade marks*
  This ensures that the users are able to differentiate between stove technologies being disseminated and choose brands.
- *Demonstration sites, role models and technology symbols*
  Demonstration sites should be accessible to as many people as possible. Role models are mostly used to indicate success stories but many also be used to illustrate failure in technology transfer and adoption.

Topic 4.2: Promoting household energy technologies through commercialization

Objective

- To examine factors that determine a successful commercialization strategy
- To identify key actors in commercialization as a strategy from promotion and dissemination of household energy technologies.

Time: 4 hours

Method and content

- Guide participants to define what they understand by commercialization
- Identify different actors and tools involved in the process of commercializing energy technologies
- Discuss factors which should be considered when commercializing energy technologies in groups.
- Identify strategies for defining the market and customers
- Identify the methods of marketing which can be undertaken in the community in order to ensure successful dissemination
- Discuss the limitations that might make promotion difficult

User's notes

Use practical examples of marketing strategies employed in marketing other products.

What is commercialization?

It is a process of introducing competitive trading activities to a project. In general therefore, commercialization of stove projects is the process by which project staff assist in producing and selling stoves in order to make money. As a result, entrepeneurs produce and sell stove technologies at their own risk in a competitive market. A market of buyers and sellers is established when there is an on-going demand for stove technologies which producers and sellers are able to meet. Commercial "take-off" is achieved when production and sales continue or expand on their own accord without intervention from project staff.

Characteristics of a commercialized stove project

- Households obtain stove technologies from a commercial seller
- Technology purchasers pay full price, which covers cost of production, transport and mark-ups for profit
- Producers distributors and retailers act according to their own assessments of profit and risk
- Activities are driven by demand for the stove technologies

Advantages of commercialization

- *Sustainability*
  If commercialization works, dissemination of stove technologies will continue after support from development agencies is over.

- *Cost effectiveness*
  Development agencies can increase the import of their resources by making use of activities and drive of the public sector. The sellers will continue to disseminate the technologies in future years without additional input from the project.

- *Expansion*
  - If demand is high, the prospect of continuing profit will motivate greater production and supply
  - If the project is responsive to users' needs the stoves will not only be acceptable to them but will be sought resulting in good sales
  - Users of energy technologies can choose when and where to buy, and can insist on high quality goods.

Disadvantages of commercialization

- Possible loss of control over quality and benefits, as the project is less able to monitor and supervise how people benefit from stoves. Market forces may lead to new designs that are less efficient.

- Potential buyers need purchasing power and as such, the commercial approach many not benefit the poorest of the poor
- The approach requires fund, time and skills that may be new to a project
- Energy technologies that are disseminated through commercialization are likely to be more expensive, with less assurance for quality and performance.

CASE STUDY

Ceramic stoves sustain livelihood

In Missungwi District, Mwanza Region, North West of Tanzania, the Ministry of Agriculture Training Institute, Ukiriguru (MATI-U) supports farmers in nearby villages. The villages are over-populated and people grow subsistence crops on small tracts of land. Cotton which is a cash crop is grown by less than 30% of farmers in this village. Support given to the villages is mainly in skills training in agricultural and livestock development. Since 1988, among other things, MATI-U's programme has been focusing on environmental protection through promotion of improved mud stoves.

While implementing dissemination of mud stoves, two of the women's groups, collaborating with MATI-U (Maria Nyerere and Juhudi women's groups), in Ngudama village, had an opportunity to send representatives on exchange visits to Kisumu, Kenya and Kampala, Uganda. Their aim was to share experiences with local NGOs and groups receiving technical assistance in stove production, from Intermediate Technology Kenya. The women recall t hat their main achievement was in skills acquisition in ceramic stoves production. Unlike mud stoves, ceramic stoves are portable and easy to sell.

Although the women only observed a demonstration of the ceramic stove production, once back home they attempted to make ceramic stoves. Over a period of two years (between 1995 and 1997) they had gained a lot of "on the job skills" and had started marketing the ceramic stoves. Demand for the ceramic stove is on the increase in the nearby Mwanza town.

Ngudama village which used to be one of the poorest villages in the district can now thank the women's groups for improvement of household livelihood through additional income from stove sales and having come up with a strategy for addressing fuel wood scarcity. Although livestock keepers (who are less than 11% of the total of the households in Ngudama), have slightly higher incomes, the average income per family rose.

Women have managed to incorporate ceramic stoves production work with their agricultural work, mainly suing the months available other than October to May when they are busy with crop production. Women have realised that stoves can sell and can be produced hand in hand with crop production activities. Today stove making is done throughout the year.

Although there have been socio-cultural constraints to women's control and access to income in the household, they have managed to use ceramic stoves production to earn their own income.

The two women's groups, namely Juhudi and Maria Nyerere, have reported economic advantages since 1996. For example, the Chairperson of Maria Nyerere, Mrs Mary Lufungulo reported to the District Commissioner of Missungwi District that selling stoves has given members money. In such cases women have to choose between spending money on immediate or long term needs. Due to food shortage in 1997 almost everyone used the money to buy food, uniforms for their children and paid school fees. Giving her own example, Mary bought corrugated iron sheets to support her husband in constructing their house. She is proud that she now lives in a semi-modern house and has bought a bicycle.

The two groups have been recognised by both NGOs and government officials and are offering collaborative support as channels of policy implementation for household energy initiatives.

It is surprising to note that no member of the groups can remember how much money the women used to have before marketing of the stoves. They just explain that they used to ask for money from their husbands to buy salt, soap and small household utilities. One of the members explained that none of them ever dreamt that they would be able to pay school fees and more still, contribute to and even build a house. Now the members of the groups have control over an average of Tsh.20, 000 to Tsh.25, 000 (US$28.6 to US$35.7)* a month from stove sales.

Some individuals within the group have benefited more depending on the level of capital used and labour provision available. In November 1998, Rahel Shigela of Juhudi women's group reported that she made Tsh.918, 000 (Us$1,312) out of stove sales. After buying iron sheets, she had a balance of Tsh168, 000 (US$240) in that same month. The men now want to learn how to produce stoves from the women and are sharing responsibilities in the home.

MATI-U is moving forward with these groups to improve their skills in record keeping and proposal writing, to enable them to source for funding and establish a small-scale ceramic stove production factory which will enable them to request for loans from micro-finance institutions.

Source: Ben Mwenda, Farmers Training Coordinator, Ministry of Agriculture Training Institute, Ukiriguru.
Case study developed by Sengendo, Muchiri and Gitonga.

Theme Five

Monitoring and Evaluating Energy Programmes

Topic 5.1: Formulating gender sensitive indicators for monitoring energy programmes

Objective

- To enable communities and organisations to formulate appropriate indicators for monitoring and evaluating energy activities.

Time: 2 – 3 hours

It is crucial to formulate reliable and appropriate monitoring and evaluation indicators

Content and procedure

Guide participants to formulate monitoring indicators using:

Policy aspects;
Rules, norms and values of communities and organisations which can support or hinder energy-related activities.

Resource use aspects/initial needs assessment;
Explanations for utilisation of energy resources in relation to people's skills and needs.

Design and delivery process;
Issues related to the way communities and organisations view and identify themselves with the process from initiation or modifications of technologies to dissemination

Products and services provided by the communities;
Achievements from activities undertaken by energy programmes which include training for users, producers, extension workers, promotion and dissemination programmes.

Community benefits from energy technology use:
Actual changes in people's lives, attitudes and perceptions.

User's notes
Monitoring is a process that involves collection and analysis of data to ensure that the programme meets the objectives, and needs of users. It is essential in establishing technology acceptability, identifying problems related to the technology and adapting designs to meet changing needs.

It helps estimate the number of stoves in use and frequency of use and to determine the stove's performance compared with currently used cooking systems, thus determining if the new stove is meeting the project specifications. It also helps determine if the targets of adoption and usage are being met, and what other effects the introduction of improved stoves may have.

Monitoring helps determine the quantity, quality and cost of the stoves and if the production process could be improved. It is optimal if monitoring is initiated at the beginning of the programme and continues until the programme is completed.

Guidelines for formulating gender sensitive indicators for monitoring and evaluating the impact of energy programmes

Indicator themes	Example of issues to consider
Policy aspects	• Inclusion of Energy activities in local level development plans • Extent to which local planners involve communities in planning and implementing energy related activities.
Resource use aspects	• Utilisation of information gathered from communities/project experiences, by policy makers at all levels • Positive attitude towards sustainable use of energy resources • Extent to which the community is willing to get involved in and support energy activities • Representation of women and men in community planning meetings related to energy
Design and delivery process	• Community views of the benefits of sustainable energy technologies • Community involvement and willingness to participate in dissemination of energy technologies while taking into account the gender differences in power and decision making in household energy • Community contribution towards the development of appropriate technology designs and the realisation of the different activities women and men undertake • Incorporation of indigenous knowledge in planning, implanting, and monitoring of energy projects • Use and application of local material in designing energy technologies
Products and services provided to	• Records/reports of work done in promoting sustainable energy technologies

the community	• Ability of communities to report objectively (both positively and netgatively0 about changes in energy source accessibility • Communities ability to manage on-going energy activities • Adoption of energy technologies for households taking into consideration the gender roles and needs
Community benefits from energy technology projects	• Time for other productive activities gained from use of appropriate energy technologies • Amount of money spend on fuel • Increased family income from translating energy technology skills into income generation while recognising the contribution of both women and men in the activities. • Positive contribution of energy programmes towards a sustainable environment • Communities able to initiate and sustain effective energy activities.

References

- Marilyn, C., *The AT Reader: Theory and Practice in Appropriate Technology*, IT Publications, 1985
- *Guidelines for Planning, Monitoring and Evaluating Cookstove Programmes: Community Forest Field Manual* by FAO, Rome
- Anderson M., *Technology Transfer*, IT Publications, 19856
- Overholt, *Indicators for Women*.
- Kumaria, *Gender roles in Development*
- Caroline, A and Pete, Y., *Stoves for Sale: Practical Hints for Commercial Dissemination of Improved Stoves*, ITDG.