HEP-Publication

Measuring Successes and Setbacks

How to Monitor and Evaluate Household Energy Projects

HEP Household Energy Programme
ITDG Intermediate Technology Development Group
FWD Foundation for Woodstove Dissemination

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1995

GTZ/HEP and ITDG
with
THE FOUNDATION FOR WOODSTOVE DISSEMINATION

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Preface

This publication has emerged out of a joint project between GTZ, ITDG, FWD, and, originally, Association de Bois de Feu. Their attention was drawn to the need for training materials in monitoring and evaluation by requests for assistance from project partners and by a lack of information about why household energy programmes succeed or fail. Although participatory approaches had become popular in principle, it was clear that advice on how to base projects on the priorities of users and producers was sorely lacking. With the manual, GTZ, ITDG and FWD hope to equip project staff to use monitoring and evaluation to give beneficiaries a clearer voice in the context of household energy projects, e.g. donor agencies, implementing organizations, NGOs, household energy projects or projects with a household energy component, project managers, field workers, consultants, etc.

In 1990 representatives from the three organisations and their partners gathered in Arusha, Tanzania. Staff from GTZ (Germany, Pakistan, Tanzania, Kenya), ITDG (the UK, Sri Lanka), FWD (Kenya), CEMAT (Guatemala), ASTRA (India), CARMATEC (Tanzania), *East-West Center* (USA) and *Association Bois-de-Feu* (ABF, France) attended. The project was planned during this workshop, designating the major task as the production of training materials on the monitoring and evaluation of household energy projects. Workshop participants redrafted a framework for a manual, improving on a skeleton produced by ITDG. They recommended that the manual should be field-tested by stove and household energy projects to ensure that the ideas are useful and that the joint GTZ/ITDG/FWD endeavour followed a participatory approach.

A substantial amount of work followed to produce a draft of the manual, refining the framework further, writing advice on planning, selecting indicators, and compiling or elaborating methods for measuring and designing indices. During this process the draft was critically assessed in Sri *Lanka's Rural Stove Programme* (ITDG). Once the drafts were ready (in English and French), they were sent to twelve projects in Africa, Asia and Central America. Eight participated fully in assessing the value of the manual over fifteen months and reported their evaluations initially through a three-part questionnaire. National representatives from these projects and from GTZ/ITDG/FWD/ABF came together in Berlin in 1993. The initial findings of the field-test were presented, further assessment was made collectively, the manual was revised by participants on the basis of their experience of using it, and strategies were devised for promoting household energy programmes internationally.

This publication is the result of a collective effort on the part of household energy specialists (about half women, half men) from fifteen countries working over four years. Their contribution was coordinated by a GTZ and ITDG project team. They jointly prepared this book for publication and they take responsibility for any errors or omissions. The members of the team are:

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Contents

Part A:

1. How to use the book

This is not a handbook, a manual or a set of guidelines laying down the definitive A-Z of how to do monitoring and evaluation (M&E). There is no one way to do it. Different projects have radically different policies, approaches and resources and they find themselves in varying economic, cultural, political and technical environments. While we cannot offer the recipe, we can suggest some of the ingredients for making their own appropriate dish, catering for their particular needs, objectives and circumstances.

This manual tries to make a case for the advantages of doing comprehensive, rather than bitty and irregular, M&E. It offers advice and ideas about planning and doing M&E and suggests methods for carrying out the various tasks. But first we will explain how to find your way around the sections.

Part A

It is recommended that everyone reads Part A. We begin by describing how to use the book and what M&E means. These activities mean different things to different people, so you may not agree with the definitions found here. In fact, we hope our interpretation stimulates debate rather than defines monitoring and evaluation.

We then set out arguments for why it is important to do M&E. If everyone could read this passage, translated into appropriate languages if necessary, project commitment to the process of M&E may be greatly enhanced. When people see how M&E can serve their interests, they are likely to incorporate it into their project work. The next section explains how to do this.

How to plan M&E includes four main sections. We offer ideas about planning, applying a participatory approach, collecting baseline information, and communication. This section is relevant to the concerns of more than just planners. We hope that all those participating in the project may find this section worth reading.

Part B

When developing and using a M&E system, the foremost question should be:

Who needs which kind of M&E information, and when ?

Each individual project should, therefore, analyze who needs which information for what purpose, when, and to which degree of accuracy.

Part B of this manual tries to integrate two major questions within a project according to project levels, sectors, and groups of actors:

What to measure

with methods or research topics relating to those questions, recommending in particular:

What to consider and
What to do with the information.

After a short introduction which puts the major key questions for each section, Part B of the manual offers you the overview of **the complete, collected indicators for each section**, such as the section of producer, user or project management, as shown below. The term "section" is understood as a domain of intervention of the project (stove production and distribution often combine to form a homogenous process and are difficult to separate, that is why stove distributors are listed under "producers", while producers are viewed as a part of "distributors"; commercial and owner built production/ distribution is represented separately).

The main structure of Part B is the following:

1. **M&E for management**
2. **M&E with producerst distributors**
3. **M&E with users**
4. **Further research work into household energy and environment**

Each project level is integrated in the following sub-structure: indicators are listed in the left-hand column **What to measure.** The right-hand column is divided into important questions **(What to consider)** and some recommendations concerning important parameters determining the indicators **(What to do with the information).** Using the detailed list of the presented **indicators** in this manual each project should identify and evaluate (only) the relevant indicators according to the achievement of its objectives. - see the following example.

An example of this chronological M&E structure is given below:

Example: You decide to monitor your project. You will therefore concentrate on "actual potentials and capacities at the stove producers", which might present an important indicator for the achievement of the project's objectives. That means you want to identify groups of potential stove producers according to different production levels and types of stoves. You may even know the causes of problems and constraints of stove production. In this case, turn to chapter **4.2 M&E with producers:** where you will find all indicators subsumed under "M&E with producers" that are of importance for your project. You then enter into the chronological M&E structure.

4.2. M&E WITH PRODUCERS
4.2.1 PRODUCTION POTENTIAL AND CAPACITY

What to measure	What to consider	What to do with the information
Potential stove producers/ builders on different levels for different types of stoves	- How many metalworkers/ blacksmiths/ceramic builders are working in this villlage/ area/urban centre? - On which level do they produce? (semi-industrial, handicraft, etc?) - select groups of potential stove - Is there a seasonal shift of available workers?	- count number of potential stove producers - identify types of potential stove producers - select groups of potential stove producers according to different production levels and types of stoves

2. What and why M&E

What is M&E ?

Monitoring is collecting and compiling information related to the project. It is the systematic selection of pieces of information that help you to judge the project's strong and weak points. Monitoring aims to observe, describe and communicate how well the project is going. It also airs different viewpoints and tries to give a voice to all the interest groups involved in or affected by the project activities.

Evaluation is the step that follows monitoring. The information collected during monitoring the results of the project, is evaluated (or compared and judged) in an analytical way against the objectives of the project. As a first step it is crucial to identify the relevance of each indicator according to the achievement of the project's objective(s). It might confirm the positive results of the work, leading to the expansion of particular activities, or point out negative consequences, in which case a change in objectives is probably needed.

For other concepts related to M&E, see the Glossary in Annexe 4.

Why M&E ?

You may ask: "If we are promoting improved stoves, why do we need to monitor what we are doing? Why can't we just get on with it?" In this section we try to offer an answer to this question. M&E should be neither a way of supervising and policing people, nor a tool for establishing data cemeteries. It should benefit all the interest groups or stakeholders in a project, most importantly; it can ensure and enhance benefits for the users and producers. It is an indispensable part of managing a project, and so is of most immediate concern to project managers or leaders.

From the manager's perspective, distinguishing between **progress and impact** is valuable. While running your project from day-to-day, you can use M&E to check whether the progress of project activities is going according to plan. If it is not, you can use M&E to look for the causes of trouble, to identify and to learn from mistakes and to solve the problems or devise a new plan. If you do not monitor, you will have no way of improving efficiency and effectiveness.

Even if your project is following a plan smoothly, you still need to know what impact it is having on users and producers. Impacts are found by looking at the results of the project's activities. These might be shorter term, such as a reduction in fuel consumption as a result of

10,000 people using new stoves, or longer-term, such as a reduction in pressure on biomass resources as a result of lower fuel consumption. If your monitoring information reveals that the impact is not positive enough, (e.g., only the richest people are buying new stoves), then the plan should be challenged and possibly altered.

Besides these management functions of M&E, the information generated will be appreciated by other groups. For example, all project staff can use the information to improve their work as they go along and explain their progress to others. They will also feel more committed to the project when they know about its effects on users and producers. The users value, for example, information about the health consequences of cooking with new stoves. Producers will get technical assistance if they monitor problems, e.g. how many ceramic stoves have been cracking in the kiln. Researchers and donors will find M&E useful to understand stove development, expand their knowledge and influence funding decisions. In summary, information gathering from M&E will be useful for the following groups:

Who	**Why**
For managers	to plan, organize, and guide the project more effectively through M&E of both progress and impact.
For users/producers	to find out about potential benefits and ensure that their interests are represented.
For staff	to explain and to translate (e.g. to visualize) the progress of their activities and guide their decisions.
For partner agencies	to learn from mistakes and success of stove development for their own projects and gain support from others.
For researchers	to understand the process and impact of stove development.
For donors	to decide which type of project to support.

We hope that using this book will help all these groups. It offers a way to monitor and evaluate, which does not require enormous resources, specialist skills, or a familiarity with social science jargon. Thus, it could serve the interests of all participants of household energy projects in a very cost-effective manner. Ultimately, it can enhance the working and living conditions of stove users and producers.

3. How to plan M&E

Planning an efficient M&E requires flexibility. Essentially there are three steps to follow:

1. Collect base-line data;
2. Plan M&E as part of project activities;
3. Apply a participatory approach.

3.1 Plan M&E as part of project activities

It is not only the right amount and type of information that makes for successful M&E. Another aspect of M&E is to incorporate it into the planning process according to resources available. M&E activities should be planned together with other project activities. When planning it is wise to set priorities for different project activities and develop the criteria that define their success. An M&E which is integrated into project planning costs the least effort, is realistic in time schedule, and takes into account resource availability.

As examples:

Let's say you want to promote and disseminate stoves in the village of Fantasia. Naturally you are interested in the acceptability of the stoves amongst user households. You might decide that this question is important enough to warrant a survey. You plan to launch a promotion and sales campaign that lasts one month. Your M&E planning could be like this:

1. Note down how many households have been reached through the campaign. Note also how many stoves have been sold as a result. Make sure you can find the buyers again when you want to talk to them (e.g. by writing down their name and address). Preparation for the M&E should take place at the same time as the campaign, not forgetting to tell those involved why you need the information.

2. To gather information on acceptability you may decide to carry out a survey with user households one month and three months after the campaign. You may like to know how many of the improved stoves are still in use or, if they are not, why people are not using them any more. But you can already prepare a set of questions which reflect the ideas on acceptability of the new stove (e.g. whether it is used, for what purpose, difficulties and so on).

   There are certain questions which must be answered before you start the survey, like: Who is responsible for survey work? Who designs the questions? Who collects the data? Who will summarize it? How many households should be surveyed? Is the project ready to react to a possible negative outcome from the survey? What is the potential for changing the present promotion/sales campaign? The questions should consider all relevant aspects in the context of planning, organizing and implementing M&E according to a project's needs for information, the staff should be ready, and the time and transport available.

3.2 Apply a participatory approach

Monitoring and evaluation activities can scare people. Too often it is understood as the management checking on individual work performance. Also, too often it is used as a tool for controlling staff. This negative connotation discourages cooperation amongst those holding the information the project management needs. It can result in over rosy pictures of project realities. This can make information very unreliable and possibly useless for any project planning based on M&E.

However, M&E has another aim. It helps you to understand if and why the project does or does not achieve the results it is aiming for. Everyone involved (managers, project staff, the producers, the distributors, and the users), should recognize that good M&E serves the project and is not used for controlling individuals or as an instrument of power. Blaming a technician for an unsuccessful stove will only cause his/her resentment. Getting irritated with users because they are not using an improved stove helps no one, especially since it is probably the design of the stove which is inadequate. Since the entire project works towards its objectives, and single individuals are very rarely responsible for failures, M&E would be an ineffective and expensive way of controlling staff.

M&E involves gathering, analyzing and using selected pieces of information. You, as a planner, will be in a stronger position, the more reliable information you have. Therefore, you need to create an atmosphere of trust to encourage your informants to be outspoken. If you give people cause to be suspicious, they may only tell you the nice things and avoid criticism. **M&E is a waste of resources if it merely produces compliments and flattery.**

M&E should be a way of communicating within a sensible structure, an exchange of information and opinions, and not merely reporting from one side to another. It is never a process of feedback for the project management and donors alone; it should always provide a forum for staff to reflect on strong and weak points. It should encourage constructive criticism, helping everyone to strengthen successes and mend vulnerable points while moving closer towards the desired impact of the project.

For example:

Assume that you want to find out about the acceptability of the improved stove you promoted one month ago in the village of Fantasia. Before embarking on discussions or surveys with users, make sure that the following people are all participating:

- the promoters
- the technician
- the people who selected the village

The involvement of all these people before the survey is carried out will make sure that staff members get a chance to speak, and planners have the opportunity to listen. Implementation staff can reflect on the performance of particular activities, and express their personal viewpoints. The discussion before the actual survey can provide you with a lot of valuable information, so that your questions to users can concentrate on the really essential topics. As a result plans will benefit from an exchange of many perspectives, rather than suffer from a narrow focus; M&E will encourage constructive self-evaluation rather than a series of checks on the performance of people's work.

M&E can be a tricky endeavour for the project management and for the staff. But it is the management who should create a positive attitude, by enabling full participation through exchanges of information and viewpoints. This will reduce suspicion, inspire commitment and make projects more answerable to the needs of stove users, producers and distributors.

If you wish to have more detailed information than provided here on how to plan M&E, we recommend that you also use the FAO training manual entitled: Guidelines for Planning, Monitoring and Evaluating Cookstove Programmes. (Copies are available from Regional Wood Energy Programme, FAO, Phra Atit Road, Bangkok 10200, Thailand)

3.3 Collect baseline data

The ultimate aim of your project is to improve the situation for a certain group of people. In other words, you are working towards a beneficial change. The success of your project is defined by how much you achieve with the group of people you are working for. If you want to measure the success of the project you must reflect on the quality of change. The changes you are aiming for are specified in the project's planning documents, e.g., cooks use an improved stove instead of a traditional one, households consume less fuelwood than before, and time spent providing fuel is reduced etc.

These and other changes are only measurable if the project knows what the situation was like before it started. To put it in more technical terms, a set of baseline data is necessary if you want to monitor and especially evaluate the results of the project's work. This does not apply for the long-term alone, but equally for short-term impact. For example, if the project does not know how much fuel a traditional stove consumes, it cannot measure how much fuel is saved by the improved version. If no one documented how much stove producers earned before the project, any increase or decrease in income levels after introducing stoves cannot be assessed.
The type of baseline information you need will be determined by your objectives. However, there is some standard information which should be available in every household energy project:

- **Fuel availability in the household and area of the intended beneficiaries**
  (collected; purchased; both; seasonal differences);

- **Cooking practices**
  (type of food; frequency of cooking; indoor/outdoor cooking location);

- **Fuel consumption**
  (type of fuel; amount of fuel; seasonal differences);

- **Traditional stoves**
  (purpose of use; type of fuel used; fuel efficiency; advantages for users; purchased/owner built; price; raw materials);

- **Women's workload**
  (time spent on building/maintaining the traditional stove, providing fuel, cooking; responsibilities for cooking/fuel provision; other work areas);

- **Households**
  (average size; availability of cash income; control over household expenditure);

- **Fuel shortage**
  (awareness within households, especially those controlling household expenditure; interest in new technologies);

- **Producers/production**
  (number of potential producers; income level; raw material; average production skills; successful existing products; interest in new products);

- **Distributors**
  (distribution network/shops; interest in new product, existing distribution channels of comparable products);

- **Household Energy Policies**
  (importance of household energy in national planning);

- **Cooperation**
  (activities of other organizations or projects in the field of household energy).

Baseline data should be documented so that it can be referred to during M&E. Such documentation is also a great help to new project staff and when writing reports to donors and supporters. However, be wary of generalizations! What might be true for one village, area, or urban centre is not necessarily true for others. Official statistics, therefore, can only give you the trend. Household energy projects work with the user groups at the grassroots level and need locally relevant information. So, collecting project specific baseline data is never a waste of time as long as you use it in your work.

3.4 Communicate with all participants and partners

The process which provides the fuel for monitoring and evaluation is communication. At each stage - collecting baseline information, checking on progress, recording results, storing data, presenting and imparting information to others - communication between people is the means. Reaching objectives more effectively is hopefully the end.

It is wise to make the most of the particular situation you find yourself in, for example, whether you are located in a project which is donor funded or sponsored by the national government. It is just as important to wrap one's argument in the right kind of package.

You propose the following communication alliance between the different kinds of people and agencies involved in household energy:

1. Energy users	**(women, men, children in households, institutions, small scale enterprises)**
Audience	Southern governments and NGOs (including community organizations)
Message	Description of household energy problems, needs, solutions and demands for assistance.
Mode	This can be delivered verbally or in written form by people as a group or by their representatives. At the most decentralized level, the most appropriate mode of communication has to be chosen according to circumstances by the energy users themselves.

2. Southern governments and NGOs	
Audience	Other Southern governments/NGOs, their donors, international agencies who can help influence Northern donors/policy-maker
Message	Successes and failures in their experiences of giving assistance to energy producers (e.g. charcoal producers, wood sellers, etc.) and users, gathered through monitoring and evaluating. Evidence of the importance of household energy as a basic survival need.
Mode	Offering advice to other Southern agencies is done very effectively through personal contact (e.g. meetings/visits) and brief reports. Donors require denser reports/publications, with arguments backed up with `scientific' and hard economic data, lobbying through the press, meetings, and developing a network of work contacts. Bilateral and international agencies need information to target donors, but also stories about particular people and communities solving problems (so that development issues are presented to political and administrative decision makers, who will then give financial and campaigning support).

3. International campaigning agencies	
Audience	Northern donors/policy-makers/members of the public, universities and schools
Message	Successful strategies carried out by Southern agencies/communities to solve household energy problems. Evidence of the importance of household energy as a basic survival need. Greater attention required in `invisible' areas (such as women's work, indigenous fuel saving methods, resource poor communities etc). Positive images of the South, stressing the need for support with respect, not dependence.
Mode	Donors, policy-makers, and politicians respond well to punchy reports, with numerical evidence. Northern based international agencies should take advantage of their location and present their arguments in person through visits/meetings/ conferences. The Household Energy Development Organizations Network (HEDON) is beginning to do this (ask GTZ/ITDG for more details). Messages to the public should be mainly directed through the media and publications. Students can be reached by influencing curriculum development, advising teachers, and producing education materials.

The combination of these groups working together could be forceful and transforming. The policymakers want to listen to good arguments, if presented in a convincing way.

This depends upon access to reliable, accurate and up-to-date information gleaned from project monitoring and evaluation.

Part B:

4. How to do M&E

4.1 M&E for Management

Management is most effective when treated as a service for the whole project. It might involve: (1) setting objectives which represent the interests of your chosen beneficiary group; (2) organizing sufficient resources; (3) coordinating the planning, implementation, and assessment, so that objectives can be successfully reached. Managers who inspire will lead better than those who dictate orders.

This section is designed primarily :for managers, planners, communicators, and staff concerned with resources. We have included the main areas to be monitored in the management of household energy programmes ('what to measure'), with ideas in each area about which questions the manager should address ('what to consider'), and suggestions as to 'what to do with the information'. This is not a recipe for management itself, but a list of recommendations about how to use monitoring to enhance the process of managing people and resources.

The key-questions for M&E at management level are:

Does the project have enough resources?

During the implementation of a project, it is essential to keep looking ahead to think about which of the planned activities can really be achieved and whether they will be sufficient for meeting the objectives. In particular, monitoring; activities should be planned far in advance. If they are left to the last minute, when the need for information becomes pressing, there may not be enough money or time for monitoring.

It is not just the timing which is important; the way plans are made is also critical to successful monitoring. The process of planning should involve all the project participants at different times as appropriate. For example, setting new objectives should be carried out in consultation with users and the responsible persons of the partner organizations, while staff training needs should be assessed with individual staff members (see below for advice about participative communication). Finally, planning will only work well if it is related to resources. Each activity should have sufficient finance, equipment, skills, and time allocated to it. The following suggestions indicate how to match activities and resources:

What to Do

Draw up a list of project objectives and activities with staff and participants. Then work out the feasibility of your plans by considering equipment, skills, finance and time. For example:

Equipment	Draw up an equipment list related to the activities to see what is needed, and incorporate the needs assessment into financial planning.
Skills	Decide to what extent skills, which are needed for project activities are already available, and which should be developed. Monitor the performance of staff to see if they have adequate skills and are sufficiently qualified to carry out planned activities. As examples, talk to staff to jointly consider their roles and duties and decide whether: the right staff has been selected for the right job, the work is well distributed amongst staff, their training needs are being met, and work is delegated in a logical manner.
Finance	Set up a clear financial plan which includes income and costs for each activity. Check periodically (e.g. monthly/quarterly) to see if there is enough money allocated for all the plans.
Time	Write a time schedule for the activities, making sure that there is enough time available to achieve the results you intend.

Is there good communication between people?

Good communication practice consists of more than merely circulating documents and talking a great deal. The quality of information and skills exchanged is more critical than the quantity of paper and words. Communication is usually more effective if it involves a two-way dialogue and discussion rather than a one-way monologue with someone giving a lecture. The advantage of a participatory style of communication is that you can ensure a high level of commitment from all participants. On the other hand, it is a mistake to hold lengthy discussions with everyone about everything because staff will become overloaded with meetings and it is not a cost-effective use of their time. It is important to involve individuals in decision-making at the key points of their work or those areas which concern them. An efficient communication strategy involves exchanging the right information between the right people at the right time.

What To Do

Users/Producers/Distributors
Keep a record of how many producers/distributors/users take part in formal or informal planning sessions. Observe how much, and in what way, they have contributed to the process of making decisions about the project. During and towards the end of the project find out what they know about the project's objectives and activities, and if the information is sufficient and useful. This will give an indication of the quality of communication between project staff and beneficiaries.

Project Staff
A participatory oriented project needs a good and effective communication between all groups and persons affected. Check the degree of the participatory approach during planning and keep a record of which project staff takes part in formal or informal planning sessions. :During and towards the end of the project find out what they qualitatively and quantitatively know about the project's policy and progress, and ask them to evaluate the usefulness of the information. In particular, what do they know about policies, time schedule, activity plan, and work delegation (i.e., who is responsible for doing what). Find out whether the staff is well motivated and satisfied. These will give an indication of the quality of communication between project management, staff and beneficiaries.

Co-operating Agencies

Find out whether they are getting information required for their work and/or to enable co-operation. Look at number and type of channels used for passing information to cooperating agencies (e.g. newsletters, journals, discussions, training courses, technical assistance visits, seminars, answering enquiries etc.). Hold interviews with partners to evaluate the usefulness of information. For example, note whether after communications with another agency, the project's stove design has been successfully copied and modified in a neighbouring region.

External Policy-Makers

Find out whether they are getting positive information about the project. Consult journals/policy papers/project reports, and hold individual interviews to consider what effect the information (sent out by the project) is making on other policy-makers. Record any policy comments which may have been positively or adversely affected by the project work and observe changes in stove, energy, forestation and importation policies,, initiated by relevant decision making institutions. Describe the influence of the project on decisions made, e.g. by reviewing the national 5-years plan.

4.1 M&E for Management

4.1.1 Organization and Leading

What to measure	What to consider	What to do with the information
Adequate involvement in planning of relevant people/institutions and beneficiary groups	➢ What relevant institutions exist? ➢ Who takes part in planning sessions? ➢ What contribution do external relevant people/institutions and beneficiary groups make?	➢ analyze existing constraints ➢ find out reasons for implementation/non-implementation
Flexibility of plans	➢ To what extent are the recommendations of studies implemented? ➢ Were projects plans of operation changed?	➢ give reasons for changes in plans
Allocation and delegation of tasks	➢ On the basis of which criteria is your staff selected? ➢ How do you delegate work? ➢ How do you control whether all tasks are satisfactorily fulfilled? ➢ How do you motivate your staff? ➢ Is the amount of work adequately distributed among all staff members according to the plans? ➢ Are the resources adequately allocated to the tasks and objectives?	➢ compare the efficiency of work output with planned activities and objectives ➢ check problems caused by unbalanced and ineffective allocation of resources ➢ analyze constraints ➢ describe incentives given
Development of management structure and tools	➢ What is the division of responsibility? ➢ Who gives recommendations and input for the project's approach/strategy, and who directs its implementation?	➢ analyze group dynamic processes and constraints and identify necessary support from the project for the improvement of the management structure, for the provision of training
Management qualifications **Integration with project partners**	➢ Do written agreements with relevant institutions exist? ➢ Who takes part in the planning session? ➢ What contribution do project partners make?	➢ list all project partners and adequacy of integration ➢ describe quality of information level, participation and contribution of project partners
Necessity, length and quality of training	➢ What type of training is provided to whom (producer, builders, men, women, counterparts)? ➢ Is the qualification of the instructors and the training provided adequate for meeting training needs?	➢ compile a list and identify beneficiaries ➢ use existing check lists for post-evaluation and feed back from training courses ➢ find out degree of satisfaction with training provided ➢ if necessary, revise the content of the training courses

Resources		
Budget	➢ How much money is plannes for the different activities?	➢ assess whether enough money is allocated to the planned activities
Cost control	➢ Are the running costs adequate for the plans?	➢ set up a clear financial plan which includes income and costs for each activity. Check periodically (e.g. monthly, quarterly) to see if there is enough money allocated to the plans ➢ check fields of expenditure
Cost-benefit relationship	➢ What are the results compared to the input?	➢ set up or check cost-benefit relation
Equipment	➢ What functioning equipment (technical instruments, transport, etc) is available?	➢ see if there is sufficient equipment for the planned activities
Appropriate staff selection	➢ On the basis of which criteria is your staff selected?	➢ check if all relevant criteria are included in the respective job descriptions
Skills	➢ What is the level of staff qualifications?	➢ identify possible training needs
Time	➢ What is the time frame for the planned activities?	➢ write a time schedule for the activities making sure that there are enough staff available to achieve the results that the project intends ➢ compare measures implemented and results with the time schedule
Time schedule control	➢ Are there any delays in the timing of the project? ➢ What are the reasons for delays?	➢ if there are any delays, adjust it

4.1.2 Communication and public relations

What to measure	What to consider	What to do with the information
Information channels	➢ Have information channels been established? ➢ Are they used to transfer information intensively? ➢ Who obtains this information? ➢ Is this information easy to understand (e.g. for beneficiary)?	➢ check adequacy of type and number, of information channels against tasks ➢ evaluate if all relevant information is assured all the time for all partners
Flow of information	➢ Who is informed about implementation stages and results? ➢ How does the project management in-form the staff about what is going on? ➢ What mechanism does the project management use to keep the staff informed?	➢ describe flow of information considering all partners ➢ check with staff/all partners if quantity and quality of information is adequate according to their information needs ➢ describe freqency and quality of information
Public Relations	➢ Is there any public information about the project? ➢ How is the information distributed? ➢ What is essential to this information?	➢ measure the adequacy of information ➢ check if the project is presented correctly ➢ check if the right key persons for the distribution of information are involved ➢ if not, identify adequate key persons or institutions (media)

4.1.3 Baseline information

What to measure	What to consider	What to do with the information
Fuel Use		
Fuel prices	➢ What does the unit of wood cost (per bundle, donkey, camel, pick-up, truck, etc) in different areas/districts?	➢ analyze fuel market (price and weight of fuel, development of black markets) periodically ➢ transfer total price onto kg-basis
Fuel switch	➢ Which fuels are used during the year and how often? Is there a seasonal fuel switch (e.g. are harvest waste and dung used and are they needed for other important purposes?)	➢ notice/report changes ➢ estimate importance for stove policy ➢ observe and evaluate the importance of fuel switch ➢ correlate it with price fluctuation of fuels
Innovative Capacity		
Identification of existing stove design	➢ Which different stove models exist? ➢ Which type is mostly used? ➢ Who uses them? ➢ What advantages/disadvantages do existing stoves have?	➢ compile number of different stove-models ➢ identify characteristics of different user groups (rural/urban, accessibility to fuel-wood and other fuel, income groups) ➢ note technical and handling (dis)advantages ➢ use them to influence the technical development of improved stove/s
Stove Performance		
Efficiency of existing stoves	➢ What is percentage of energy released by the fire?	➢ calculate efficiency of the stove ➢ evaluate difference between models with and without modification
Local modifications to product and equipment	➢ Which modification exists? ➢ How do they influence efficiency and durability?	
Level of carbon dioxide emitted in smoke from stoves	➢ How much carbon dioxide is emitted?	➢ evaluate strain on health from indoor air pollution
Resource Suitability		
Suitability of raw materials	➢ What type of metal is available? ➢ What does it cost? ➢ What is the quality of the clay available? ➢ What is the traditional way of building a metal/clay stove?	➢ judge the quality of existing materials ➢ select the most appropriate material for the technical development of improved stoves ➢ identify problems and constraints

4.1.4 Political Framework, Environmental Policy and Legislation

What to measure	What to consider	What to do with the information
Fuel subsidies and import regulations	➢ Does the massive dissemination of stoves influences actual fuel subsidies? ➢ What is the impact of the project on previous importation of fuels (i.e. kerosene, LPG, etc) and its prices?	➢ contact institutions affected, projects, administrations ➢ observe/evaluate regularly price policies and changes of actual fuel prices on local and regional markets
Policy on improved stoves - Subsidies on stove	➢ What is the influence of the project on national policy on improved stoves? ➢ It is only a “dissemination institution” or also a project that determines the national policy in stoves? ➢ Is household energy integrated in the national policies of environment? ➢ If yes, in how far?	➢ observe changes in stove, energy, forestation, importation policies
Forest regulations	➢ Is there a link between the policy on stoves and forests? ➢ If yes, what are the crucial points of this cooperation? ➢ Are some forest issues (e.g. tree planting), integrated into the dissemination approach of the project? ➢ If yes, how important is this type of activity within the project? ➢ What is the impact of this activity?	

4.2 M&E with producers / distributors

During the implementation of the project compile a profile or `performance chart' on each production unit, with at least the number of producers, number of stoves produced and sold, and problems encountered regularly recorded. Below you will find the key areas which will concern the stove producers and distributors, and which could be usefully monitored by the project.

The key questions are:

How successful is the production?

A smoothly running and profitable small enterprise requires: (1) a popular, good quality, affordable and accessible product:; (2) adequate skills in the areas of production, marketing, management of people, and business; (3) sufficient income and benefits, and investment capital where necessary; (4) careful management of time and labour.

How successful is the distribution and marketing?

A thriving stove enterprise relies on efficient distribution and marketing. There are at least six aspects to consider when marketing stoves: (1) product; (2) price; (3) promotion; (4) place; (5) timing; (6) profitability.

Do producers / distributors make enough money?

There may be at least two reasons why it is important to check that producers/distributors are making enough money through selling stoves. Firstly, a commercial stoves project relies on the production and marketing enterprises being profitable. If there is no increase in income for the producers/distributors, they will not consider it worthwhile to invest their time and money in a new stove business. Secondly, if producers/distributors are amongst the intended beneficiaries groups, through monitoring you could usefully find out whether the project is meeting their needs.

What is enough money'? It might be simply `more than before', or a net income of at least twice the minimum wage. This judgement can only be made by the producers but the project can assist them in working out what their profit is.

Who has control over the income?

If income generation is one of the project's objectives, then you will need to know who is gaining from the benefits, especially in the case of women's (semi-)commercial stove production. Poorer households may be as concerned about the timing of income as they are about the amount. If the market for stoves allows them to sell a batch whenever they choose in order to raise cash quickly (e.g. to pay for school fees), this may be a more important benefit than earning a small, steady income over time. You might consider who has access to income earning opportunities (e.g. women/men, young/old, and rich/poor). If some groups have gained a greater proportion of benefits, you may want to find out what impact this has within and between production units or households.

How many jobs are being created and for whom?

If job creation is one of the project's objectives, then you will need to know who is benefiting from the new opportunities. You might consider whether new jobs, or the consolidation of old jobs, have been equally accessible to women/men, young/old, and rich/poor. If some groups have gained more employment, then you may want to find out whether this has led to relatively more or less equitable distribution of income and to social improvements overall. It may also be worth considering whether any jobs have been endangered by the project (for example, with a decline in the demand for fuel, those who sell it may have lost business).

Is the stove production and marketing going to last?

As far as the beneficiaries are concerned, a household energy project is only truly successful if the opportunities for securing benefits are sustainable over time. For example, if a stove is popular, users will want to have a sustainable supply of the product (or materials to build it) so that they can buy or make a replacement when necessary. Income generation for producers and distributors is only assured if the production capacity and marketing channels are secure.

4.2 M&E with Producers

4.2.1 Production Potential and Capacity

What to measure	What to consider	What to do with the information
Potential stove producers/ builders on different levels for different types of stoves	➢ How many metal-workers/black-smiths/ceramic builders are working in this village/area/urban centre? ➢ On what scale do they produce? (semi-industrial, handi-craft, etc?) ➢ Is there a seasonal shift of available workers?	➢ count number of potential stove producers ➢ identify types of potential stove producers ➢ select groups of potential stove producers according to different production levels and types of stoves
Availability of resources: - Suitable raw materials - Local skills - Finance - Equipment - Transport	➢ What raw material do you use? ➢ Where do you buy the raw material? ➢ Do you feel there is a lack of raw material? (If yes, when, how often, why? Does that affect your production output negatively?) ➢ Do you keep raw material in stock? ➢ How do you pay for the raw materials? ➢ Are the raw materials delivered or do you have to pick them up? ➢ Do you own any transport facilities? ➢ How many employees are working for you? ➢ How many of them are trained? Who trained them? What did they learn? ➢ Do you already produce (traditional) stoves?	➢ For each production unit: ➢ check quality and quantities of raw materials available ➢ plan activities throughout the project according to the results ➢ analyze the raw material market and its rules ➢ consider potential lack, and reasons for lack of raw materials ➢ identify number of skilled personal ➢ identify and report on possible production unit ➢ calculate preliminary production costs for each stove
Capacity of stove production units - Managements skills - Ability - Interest in enterprise/task and management - Stove production	➢ Do you promote your products? ➢ To whom do you sell your products (user, salespeople, etc.) ➢ Are women among your clients? ➢ Would you like to introduce a new product into your production set? ➢ Would you like to produce (new kind(s) of) stove(s)	➢ compare production capacity of different producers with planned production and dissemination objectives ➢ if insufficient, identify additional producers ➢ check different levels of product quality, resources, motivation

4.2.2 Production

What to measure	What to consider	What to do with the information
In case of commercial production		
Sustainability of stove production without external control/advice on sales effectiveness		
- Ability of producers to manage the stove production by themselves after the end of the project	➢ Which raw materials do you use? ➢ Where do you buy the raw materials? ➢ Is there a lack of raw materials? (If yes, when, how often, why? Does that affect your production output negatively?)	➢ Develop **"Performance Chart"** of each producing unit, including indication of sustainable production and commercialization: ➢ no. of trained stove producers ➢ no. of stoves produced per time unit ➢ autonomous enterprising without external influence ➢ producers' management ➢ raw material procurement ➢ building up appropriate promotion activities ➢ input of adequate skills, etc. ➢ increase of no. of employees for stove production ➢ motivation and interests
- External effects: lack of raw materials	➢ If there is a lack, which of your products do you prefer producing, keeping in mind the limited raw material? ➢ Do you keep raw material in stock? ➢ How do you pay for raw materials? ➢ Are the raw materials delivered or do you have to pick them up? ➢ Do you own any transport facilities? ➢ How many employees are working for you? ➢ How many of them are trained? Who trained them? What did they learn? ➢ Is there a seasonal shift in available workers? Does that represent a constraint for your production? How do you solve the problem? ➢ Did you promote and advertise the stoves? ➢ What role does stove production play in your workshop? ➢ Do you regularly control the quality of the stoves produced?	➢ identify causes of constraints (e.g. lack of motivation, training, etc) ➢ check the raw material market, identify reasons for a possible lack, or price fluctuations ➢ check and calculate adequacy of raw materials, finance, equipment, skills and transport facilities of each production unit for planned activities throughout the project
- High quality of stoves - Durability	➢ Do the stoves correspond to the dimensions developed? ➢ Is a quality control guaranteed? How is it organized? ➢ Who is responsible for the quality control?	➢ correlate no. and percentage of corrently built stoves with total no. of stoves built ➢ for each production unit ➢ for the total stove production

Adherence to dimensions	➢ Do the stoves correspond to the dimensions developed? ➢ What do you use in order to ensure the right dimensions? ➢ in the first phase of stove production keep regular contact with **producers**, observe and measure dimensions	➢ correlate number and percentage of correctly built stoves with total no. of stoves built ➢ for each workshop/production unit ➢ for all producers ➢ if necessary, organize follow-up training course
Profitability for stove producers	➢ What does the raw material cost? ➢ What does the labour cost? ➢ What do the stoves cost? ➢ Are there any distribution costs, such as costs for storage and/or transport? ➢ How many stoves did you sell this week/Month? ➢ Do you know the profit you make per stove (exactly)? ➢ How many stoves should be produced and sold to ensure you a good income? ➢ Is the entrepreneur's profit (remuneration) included in the production costs? ➢ What other products do you produce/sell?	➢ calculate **production and/or distribution costs** (in case of distribution through producer or separately in case of in-dependent salespeople) per unit and related to production scale ➢ consider **fixed and variable production costs:** investment/depreciation or capital costs overhead costs operating costs working capital costs ➢ calculate **breakeven point** (consider maximum costs for raw material and labour and minimum prices for the stoves) ➢ calculate **profit per time unit**: no. of stoves built in time unit (e.g. week) multiplied by the profit per stove (= price per stove minus production and/or distribution costs) ➢ compare profit per time unit with profit per time unit in other business and also with other income generating activities ➢ calculate minimum price of the stove = production and/or distribution costs + necessary profit per stove ➢ compare minimum price with maximum price of the stove that the consumer will pay ➢ give the information to the producers ➢ compare results periodically throughout the project

In case of owner-built stoves:		
Sustainability - Stove quality and quality of material	➢ In case of owner-built stoves, contact and observe stove users in order to check quality of materials and adherence to dimensions (sampling see Annex 3: Social Science Methods) ➢ What kind of material did you use for the stove construction? ➢ How did you prepare the raw material (i.e. clay)?	➢ analyze quality of materials ➢ check adherence to dimensions
- Dimensions	➢ Do the stoves correspond to the dimensions developed? ➢ What do you use in order to ensure the right dimensions?	➢ correlate number and percentage of correctly built stoves with total no. of stoves built
- Maintenance	➢ Do you protect your stove (e.g. against rainfall)? If yes, how? ➢ Have you already repaired your stove? ➢ Do you repair your stove regularly? ➢ If yes, when and how often?	➢ check rate of reparation, maintenance and replacement and relate it to the period after the awareness raising campaign/training
- Rate of replacement	➢ Have you ever totally replaced your stove? ➢ If yes, why? What is your motivation?	

4.2.3 Dissemination and marketing

What to measure	What to consider	What to do with the information
Total no. of stoves disseminated	➢ How many stoves did you sell last week/month/year? ➢ How many stove builders are trained? ➢ Who trained them? ➢ Is there an increase in stove production? Are there seasonal shifts? If yes, why? ➢ Is a quality control guaranteed? How is organized? Who is responsible for the quality control?	➢ use information collected during project phase to measure the impact against objectives set ➢ for the individual production unit, use "Performance Chart" including indication of sustainability production and commercialization no. of trained stove producers no. of stoves produced per time unit motivation and interests ➢ identify causes of constraints
Acceptability and profitability for stove distributors **Speed of dissemination** **Product quality**	➢ How many stoves did you sell last week/month? ➢ Which other products did you sell? ➢ How important is your sale of stoves compared to the other products? ➢ Do you use your own advertising materials or do you initiate advertising activities? What kind of material/activities? ➢ What is the price per stove? ➢ Are there any distribution costs for storage / transport? ➢ What kind of transport facilities are available? ➢ Where do you sell the stoves? In how many places do you sell them? ➢ Did you hear any comments or critical remarks from your clients concerning the stoves and their quality? ➢ What is the interest in stoves judging by the reaction of your clients?	➢ calculate the price per stove minus cost for distribution minus distribution costs (storage/transport) ➢ identify no. of stoves sold/built per time unit ➢ analyze possible constraints to the dissemination ➢ contact producers, stove distributors, retailers, whole-salers, periodically and check quality of stoves on the market

Degree of commercia-lization	➢ How many stoves did you sell last week/month? ➢ What kind, and how many other products did you sell in the same period?	➢ analyze how the producer contacts customers (or whether customers contact producer, motivated by the project's promotional campaigns)
Effectiveness of dis-semination channels	➢ To whom do you sell the stoves? (retailers/Wholesalers, directly to women, etc.) ➢ Are those the same clients who buy other products? ➢ Which groups are the best customers? ➢ Do you sell in this district/village/town or in the whole area? If yes, how do you organize the dis-semination, e.g. the transport? ➢ Do you use own transport facilities for the stove dissemination? ➢ How do you anticipate the demand for stoves? ➢ Are you satisfied with the number of stoves sold?	➢ correlate the level of the demand with the marketing potential for this area ➢ calculate the proportion of stoves distributed through commercial chan-nels ➢ correlate this figure with the no. of stoves disseminated by the project as part of the promotional campaign ➢ also correlate no. of stoves sold with other products sold

4.2.4 Enterprise Development

What to measure	What to consider	What to do with the information
Degree of diversification, proportion of stove production per producer **Dependence/independence of stove production from project**	➢ Which other products do you produce? ➢ How important is your production of stoves as compared to other products? ➢ Who are your clientele for the other products? ➢ Are they the same as those who buy the stoves? ➢ Are you obliged to open new dissemination channels for stoves? ➢ Is the stove production integrated into your production and distribution system? ➢ Do you employ additional staff for stove production? ➢ Is there a reasonable demand for stoves? If yes, what do you think the reasons are?	Use Performance Chart, count and classify enterprises according to their production capacity and output: ➢ No. of enterprises in production ➢ consider regularly importance of stove production compared to other products: compare stove production (no. of stoves produced and quality of stoves) per time unit since beginning of stove production to no. and type of other products produced per time unit ➢ No. of jobs created (men/women, consider also seasonal shifts ➢ No. and kind of groups benefiting from stove production
Income generation **Other income gained/ lost**	➢ How many stoves are disseminated? ➢ Are there any other beneficiary or non-beneficiary groups negatively affected by the stove production and dissemination	➢ correlate this figure with the market potential (=no. of households in the target area) and the time during which x number of stoves were disseminated ➢ consider also the progression of stove dissemination ➢ compare stove production to other products sold ➢ compare results with data gained during the pilot and the implementation phase respectively, and analyze development ➢ collect socio-economic data of relevance for the household energy projects ➢ identify other groups or interests that are positively or negatively affected, e.g. stove producers gain, fuel sellers lose
Job creation	➢ How many stove builders are trained ➢ How many of the trained stove builders are actually producing stoves? ➢ Is an internal training guaranteed/already implemented? ➢ How important is the product “stove” as a part of their total production?	➢ identify long-term objectives and development effects relating to the following points: **quantity of stoves produced** **time** **returns** **increase of working capital** **craftspeople trained and employed** **judge quality of training available** **labour used** ➢ compare results with data gained during the pilot and the implementation phase and analyze development

4.3 M&E with users

The key questions for M&E with users are:

Are the new stoves building on local know-how?

Designing an improved stove does not necessarily entail an entirely new invention. Often, certain improvements can be made to the existing stove to overcome its disadvantages. Cooks should always be involved in this process and their suggestions or changes should be part of the technical development. They might even improve the new stove without external assistance, but their success at fuel conserving improvements can be usefully broadcast to other cooks by outsiders.

Are the new stoves popular?

The popularity of a product is the most important measure of its success. If the product meets the expectations of people and it is accessible and affordable, then the demand for it will increase. Once the new stove has become popular, users tell each other about it, thereby promoting the stove without the project's involvement. Thus producers and distributors are bound to be happy to deal with a popular product.

Do the new stoves use more or less fuel?

One of the major advantages of the new stove should be that it uses less fuel than the old one. Your laboratory tests might indicate this result, but it does not necessarily apply to the field situation. Often different types of fuel, or low grade/wet fuel is used by cooks. Inappropriate fire management practices might mean that women put too much or over-large pieces of fuel into the new stove, thus canceling out potential. savings. It is essential to test the new stoves with the cooks while they are using them.

Do the new stoves reduce women's workload?

If new stoves use less fuel and women have to purchase or gather wood from a great distance, stoves have the potential to significantly reduce women's workload. A faster cooking stove can also reduce the amount of time spent supervising the fire. Aside from alleviating part of a substantial work burden for many women, timesavings can also free up time and energy for other activities.

Do the new stoves save money?

New stoves can save money if:

1. the fuel saved would have been purchased;
2. the payback period of a new stove (= cost of the stove divided by savings per time unit) is much lower than the lifetime of the stove. Releasing money, even if it is a small amount, enables households to spend cash on different items, thereby potentially improving their quality of life.

Do the new stoves improve health, safety and convenience?

Health, safety and convenience mean different things to different people. For women, improvements in this areas usually have top priority. They can present an important potential impact on the stove dissemination since significant benefits are offered by this very low cost option.

Is stove dissemination going to last?

Many programmes disseminate plenty of stoves during the first few years, but find the rate tails off once they withdraw their support. There can be many reasons for this: people bought the stoves initially because they were impressed by the advertising but found the design did not live up to expectations; the manufacture of stoves became unprofitable; the users were not prepared to pay for the stove because they had become accustomed to subsidized prices, and so on, Making your programme sustainable is only possible if you meet the needs of the different interest groups, and ensure that they have the capacity to carry on producing, selling, and using the stoves.

4.3 M&E with users

4.3.1 Existing stoves – Fuel consumption and conservation

What to measure	What to consider	What to do with the information
Fuel consumption of existing stoves		
Type of fuel consumed	➢ What kind of stove are you using? ➢ What kind of fuel(s) do you use for your stove(s)? wood, branches, agri. Residues, charcoal, LPG, kerosene (in different seasons of the year) ➢ use test procedures (Annex 2)	➢ give an overview of different types of stoves in use ➢ calculate percentage of different fuel types of the toal amount of fuel consumed ➢ compare the fuel consumption pattern of users of improved stoves with that of users of traditional stoves ➢ correlate fuel consumption with size of household and type of stove used ➢ correlate fuel collectors and fuel purchasers with usage of an improved stove
Amount of fuel consumed	➢ How do you get your fuel (in winter/summer – dry season/rain season)?	
Access to fuel consumed	➢ Do you own trees? ➢ If you have to buy your fuel, how much do you pay? ➢ Do you find it difficult to get fuel? If yes, why?	
Advantages/disadvantages of existing stove	➢ What do you think are the advantages of your stove? What do you like about your stove? ➢ Why is the stove constructed as it is? (refer to peculiarities of the stove design)? Do you think its design is advantageous according to special cooking habits or to other functions (smoke, heating, etc.)? ➢ Why do you still use an open fire (three-stone fire), do you see any advantage of this stove according to your cooking habits (other advantages besides cooking?) ➢ What do you dislike about your stove? Prorize disadvantages!	➢ list advantages and disadvantages ➢ use the information in promotional campaigns and for technical development
Expectations of improved stoves	➢ Imagine you were buying a new stove. In what respects should it be better than the one you have?	➢ collect suggestions from the target group for further stove development ➢ use the information in promotional campaigns

4.3.2 New Stoves – Fuel Consumption and Conservation

What to measure	What to consider	What to do with the information
Technical impact of modifications - **on product**	➢ Are you using an improved stove? ➢ Did you change the stove at all to make it work better? ➢ If yes, what exactly did you change?	➢ see how many households of your sample actually use an improved stove ➢ recors people's tendency to modify stoves ➢ see how users modify the improved stove ➢ assess ideas for modifications suggested by the targeted group ➢ record people's flexibility in adapting cooking technologies ➢ see if the use of an improved stove changes cooking habits
- **on equipment**	➢ Are you using different pots or pans from those you used before? Which kind?	
Fuel consumption and efficiency of improved stoves	➢ ascertain that the interviewed household uses the improved stove and answers the following questions accordly:	
Type pf fuel consumed **Amount of fuel consumed**	➢ What kind of stove are you using? ➢ What kind of fuel do you use with your stove? wood, branches, agric. Residues, charcoal, LPG, kerosene in different seasons of the year ➢ use test procedures presented in Annex 2	➢ compare the fuel consumption pattern of users of improved stoves with that of users of traditional stoves ➢ compare the fuel consumption of households of equal size: for improved stove users and for traditional stove users ➢ calculate pay back period by calculating the difference in expenditure for fuel between the traditional and the improved stove and estimating the savings in correlation to the stove's price ➢ compare the outcome with the same correlation made during pilot phase ➢ see whether the analysis during pilot phase helped you to identify successful target areas

Prevalence of fuel conservation	➢ Do you think it is necessary to plant more trees? If yes, who should plant the trees? (government, rich people, people who use fuelwood, project, village community) ➢ Have you ever planted trees? If yes, when, why, where? If not, why not?	➢ see how many users of an improved stove are aware of the necessity for planting trees ➢ assess whose responsibility it is to plant trees, according to people's opinions ➢ find out who planted trees and refer to them in promotional campaigns ➢ see if the project can help to solve the problems mentioned, that prevented people from planting trees
Expenditure for fuel	➢ How much money did you spend on fuel using the traditional stove and do you spend now since you began using the improved stove? (per day/per month/per year)	➢ calculate the difference in expenditure for fuel between the traditional and the improved stove. If prople cannot answer, it shows you that they are unaware of expenditure savings for fuel or that the saving rate is marginal ➢ calculate pay back period ➢ if there is no difference in expenditure for fuel between the traditional and the improved stove, evaluate if the savings allow other, additional fuel use (additional cooking, baking or water heating, etc) ➢ seasonal differences
Fuel Conservation	➢ How important is the fuel saving rate of improved stoves in relation to the fuel conservation in this region?	➢ count no. of households with and without improved stoves in this area ➢ multiply each number by measured fuel consumption in the field (with and without improved stoves) and calculate the individual and the total fuel savings (in tons of wood) ➢ translate this amount into hectars of wood in this area and calculate the amount of wood saved (per year) through improved stoves, if the cutting of wood is the main reason for desertfication.
Changes in cooking and fuel gathering pattern	➢ Are you cooking differently with the improved stove? ➢ Do you think you need less fuel now than before you began using the improved stove? ➢ If yes, what kind of fuel do you save most? (purchased/collected fuel?) ➢ If you are using less fuel since you began using the improved stove, does that save time for gathering fuel? ➢ If yes, what are you doing with the additional time? ➢ Measure the actual fuel consumption for improved stove users, traditional stove users and users who use both stoves over a certain period of time in sampled households (see Annexes 2-4)	➢ see if the use of an improved stove changes cooking habits ➢ assess the awareness of actual fuel saving ➢ compare with field test data to see if fuel saving is really achieved ➢ correlate with the fuel consumption pattern ➢ see if there are non-monetary advantages of fuel saving ➢ see if users allocate their saved time to activities that improve their standard of living ➢ calculate fuel consumption patterns per household according to type of fuel and amount of fuel consumed ➢ measure degree of fuel savings ➢ estimate the importance of time saving for the interviewed households

4.3.3 Acceptability and benefits for users

What to measure	What to consider	What to do with the information
Afforedability of stoves for different income groups Identifyincome groups according to level of income – regular or irregular	➢ Who brings money into the household? ➢ How often does money come into the household? ➢ Who is responsible for the money that comes into the household? ➢ Who is allowed to spend money? ➢ Can you classify the general standard of living of the people in this area/village/district and of this household? Develop and mark a scale. ➢ Do you think this household can afford an improved stove? If not, why?	➢ Verify affordability of stove in relation to household income (note changes of price and income since pilot phase): ➢ link economic situation with actual purchase of improved stoves ➢ use information for later target group area selection ➢ see if there is a correlation between regular/irregular income and the purchase of an improved stove ➢ compile information about income contribution to, and distribution within, the household ➢ see if those who are allowed to spend money have been reached through the promotional campaign ➢ link self-definition of target group with your own judgement of how well off or poor the household is ➢ correlate your judgement of the economic situation of the household with your judgement of the economic situation of the village/area. Show if the household reflects the average standard of living ➢ see whether the households that purchased a stove are in the economic situation you expected them to be in. Compare with target group definition as outlined in the project planning documents ➢ estimated percentage of potential buyers of an improved stove taken from your sample
Expenditure for kitchen equipment	➢ Can you show me the kitchen tools that you had to pay for? ➢ Who buys/bought them for you? ➢ Do you know how much they cost?	➢ evaluate "kitchen investment level", i.e. total value of kitchen items, estimate average durability and annual expenditure for them ➢ add up the expenditures for kitchen tools and compare with the investment for an improved stove
Expenditure for improved stove	➢ How much money would you spend on a better stove? ➢ Who would buy the stove for you?	➢ assess the price range within which people are willing to pay for an improved stove ➢ give information about limitations for stove price increases ➢ see if the people buying stoves have been addressed by promotional campaigns ➢ compare whether the price is the same as the one the project calculated; especially if stoves are sold through shops/merchants
Cost of an improved stove Rate of damaged and destroyed stoves	➢ How much did you pay for your improved stove? Please note the project price for a stove, if there is one! ➢ Is/are the improved stove(s) damaged? ➢ How long has the damaged/destroyed stove been used?	➢ count how many households of your sample had damaged and destroyed stoves ➢ categorize the degree of damage according to the (worn-out) parts of the improved stove ➢ calculate the averafe life-span for improved and traditional stoves ➢ if many damaged stoves are used, include message on importance of repalcement in the information campaigns

Micro-economic benefits (see also Manual for the mi-cro- and macro-economic analysis of Household Energy Projects evaluating the stove use and its economic benefits. Author: Habermehl, Helga Editor: Household Energy Programme – GTZ, 1993)	➢ How important is the price of the stove in relation to the income and potential savings?	➢ calculate pay back period of the improved stove for a new investment: = cost of the stove divided by savings (in money or time) per time unit (days, week) ➢ pay back period (time unit) for a replacement = cost of improved stove minus cost of the traditional stove, divided by savings per time unit ➢ for urban users, and if stove is owner-built: calculate a shadow price for the stove on the basis of average wages for women (consider time for building, training, repairs) and add the price of the stove attachment purchased ➢ for rural users: calculate a shadow price for the stove or evaluate pay back period only via time units ➢ calculate net earnings (net savings) per time unit (year) and relate it to household income, expenditures of the household or daily/weekly expenditures for living (food and other goods) and/or minimum wages (all figures related to time unit), net savings per time unit (year):= fuel savings (money) minus cost of the stove per time unit ➢ correlate household budget and/or expenditure shares for purchased fuelwood, and determine their reduction when the improved stove is used ➢ calculate net earnings (net savings) for life-span of the stove and relate it to price of the stove (expressed in percentages) ➢ rural households: calculate shadow prices for time savings, consider the availability of income generating activities for women, and whether the gathering of biomass fuelwood is combined with other activities ➢ evaluate the costs of other available energies and stoves and compare them to the costs of the improved stove and its consumption

4.3.3 Acceptability and benefits for users (continued)

What to measure	What to consider	What to do with the information
Usage rate Frequency of use	➢ How many times a day do you use your stove? ➢ What is the combination of stoves for different usages? Do you use: only a traditional stove only an improved stove both a traditional and an improved stove different types of improved stoves (metal and clay) ➢ If different types are in use, which stove(s) do you use most often?	➢ assess the importance of the improved stove as compared with the traditional stove ➢ form three groups of users according to the categories given in the question, and correlate with fuel consumption pattern regarding type of fuel and amount of fuel used
Purpose of use	➢ Can you tell me what you cook/bake with your stoves? ➢ When is it better to use the traditional stove? ➢ When is it better to use the improved stove?	➢ compare with field test data about fuel consumption for traditional and improved stoves ➢ calculate the actual savings if households uses mostly/only improved stoves and the potential savings if mostly/only traditional stoves are used ➢ compare the results with those of pilot phase ➢ assess the advantages of traditional/improved stoves from the users' point of view ➢ identify the weakness of each type of stove ➢ see if negative results (as anticipated during pilot phase) could be improved by now
Seasonal variation of usage	➢ When you think about the different seasons of a whole year, is there a time when you prefer using one or the other stove?	➢ correlate the above results("purpose of use") with seasonal fuel consumption patterns ➢ see if availability of certain fuel types promotes the usage of the improved/traditional stove ➢ compare the results periodically

Symbolic or cultural values		
Like or dislike of the stove design from aesthetic point of view	➢ Do you find the improved stove nice-looking? If not, why do you use it? ➢ What would you like to change?	➢ correlate answer with the usage of improved stove and see if designs is impor-tant of users ➢ absorb ideas from the target group ➢ see if the changes in design made after starting phase are reflected in the answer ➢ see if the knowledge about the improved stove is passed on from actual users to potential users
Gain of prestige within the community through stove purchase	➢ Do the people of the village/neighbourhood come to your house to have a look at your improved stove? ➢ Do other people think you are modern because you use a improved stove? If yes, why?	➢ assess if its modernity is positively valued by the targeted group, and if the improved stove is associated with being modern, and therefore attractive to purchase ➢ use the information for promotional campaigns

4.3.4 Women's workload

What to measure	What to consider	What to do with the information
Fuel savings	➢ Interview the person who normally cooks in the household: ➢ Do you think you need less fuel now than before you began using the improved stove?	➢ assess the awareness of precise fuel savings ➢ compare with field test data to see if fuel saving is really achieved
Purchased fuel	➢ If yes, what kind of fuel do you save most? (purchased/collected fuel?) ➢ If not, why do you use it?	➢ correlate with the fuel consumption pattern
Collected fuel	➢ How much money or time do you spend on fuel using the traditional stove? (per day/per month/per year) ➢ How much money or time do you spend on fuel since you began using the improved stove? (per day/per month/per year) ➢ Measure the actual fuel consumption for improved stove users, traditional stove users and users who use both stoves over a certain period of time in sampled households (see Annex 2: Technical Test)	➢ see if the type of fuel saved is the same as the fuel used usually ➢ compare the results periodically, especially if technical changes to the stove have been implemented ➢ calculate the difference in expenditure for fuel between the trad. and the improved stove ➢ calculate pay back period ➢ evaluate the importance of fuel saving through the important stoves for different income groups ➢ calculate fuel consumption patterns per household according to the type of fuel and amount of fuel consumed ➢ assess awareness of time savings
Tima saving Cooking Cleaning	➢ Do you think cooking goes faster with the improved stove? ➢ Who cooks? ➢ Is it easier to clean the improved or the traditional stove?	➢ use for promotional campaigns and technical development ➢ assess awareness of easier handling and improved hygenic conditions ➢ compare answer with project aim of hygenic condition
Maintenance and repair	➢ What do you maintain or repair on the improved stove? ➢ Which stove causes you more maintenance and repairing work?	➢ see what can be repaired/maintened by the users and what leads to stove replacement ➢ check if technical changes have been implemented ➢ check if maintenance is a constraint for stove using
Fuel gathering/purchasing	➢ If you are using less fuel since you began using the improved stove, does that save you time for purchasing (gathering) the necessary fuel? ➢ If yes, what are you doing with the additional time?	➢ see if there are non-monetary advantages of fuel saving ➢ see if users allocate their saved time to activities that improve their standard of living

Money saving	➢ Do you find that the improved stove helps you to save money spent on fuel?	➢ assess the monetary advantage of using an improved stove ➢ assess if promotional campaigns could raise the awareness for money saving through the use of an improved stove ➢ compare results with those of pilot phase
for fuel	➢ If yes, do you have any idea how much per day/week/month?	➢ correlate money savings with results of reduced wood consumption as demon-strated by the field tests (see "fuel saving")
	➢ How important is the saved money for you?	➢ correlate it with price of stove and its life-span ➢ correlate with the usage of an improved stove ➢ see if people are willing to invest money in an improved stove because they are convinced it helps them save
for stove	➢ Which stove is cheaper?	➢ evaluate the importance of money saving through improved stove for different income groups
	➢ How long does a traditional stove last until you need a new one? ➢ How long does an improved stove last until you need a new one?	➢ correlate information with calculation of life-span of an improved stove

4.3.5 Living conditions

What to measure	What to consider	What to do with the information
Health improvement		
Changes in nutrition caused by the use of an improved stove	➢ Do you cook different meals since you began using an improved stove? ➢ If yes, what do you cokk now that you could not cook before using it?	➢ see if there is an effect on nutrition. Judge if change of utrition is an improvement ➢ compare results with those of pilot phase
Amount of boiled water for drinking	➢ Do you boil your drinking water? ➢ If yes, can you show me how much water you boil for drinking every day?	➢ see if the usage of an improved stove promotes boiling of drinking water ➢ correlate the size of household with the amount of boiled water ➢ compare results with the evaluation during pilot phase
Water heated for washing	➢ For interviewer: ➢ Describe the size of the container in which the drinking water is boiled, and how many times a day it is filled to boil the water ➢ If people do not boil their water water daily, find out for which occasion they boil it	
Smoke	➢ Think about the different types of fuel that you use for cooking – which type of fuel smokes more/less? ➢ Which stove produces more smoke? ➢ Does the smoke bother you when cooking? ➢ If yes, what are you doing to reduce it? ➢ Do you think that smoke is bad for your health?	➢ assess the awareness of fuel that smokes ➢ correlate with fuel consumption pattern to see if fuel that smokes is likely to be used ➢ compare with the results of the correlation made during pilot phase and see if your promotional campaigns on using less smoky fuel had a positive effect ➢ assess the awareness of smoke caused by different stoves models ➢ compare with results during pilot phase ➢ assess the importance of smoke as a negative aspect of cooking ➢ compare the users' judgements with your field data on smoke emission ➢ correlate with usage of new stove and see if promotional campaigns had positive effects
Safety Increase		
Incidence of burns and scalds	➢ Do you sometimes burn yourself when cooking? ➢ If yes, do you burn yourself more often using the improved or the traditional stove? ➢ Is there a danger for children with regard to the improved stove?	➢ see if the usage of an improved stove reduces burns ➢ compare with the results of the evaluation during pilot phase
Incidence of fires	➢ Which fire is easier to control? ➢ Have you heard of a fire having been caused by an improved stove/traditional stove?	➢ see if the usage of an improved stove reduces the likelihood of fires
Priorities in safety increase	➢ What do you find best about the improved stove?	➢ compare the information periodically with your project aims and the contents of your promotional campaign

4.3.6 Awareness

What to measure	What to consider	What to do with the information
Level of knowledge on:		
Effectiveness of promotional campaigns Awareness of stoves	➢ Where did you first hear about the improved stove? ➢ What did you hear about them? ➢ Where/through which media did you hear about them? ➢ What is, the most important advantage of the stove? ➢ What is your experience of the stove as concerns it´s advantages? ➢ Whaqt are other advantages? ➢ Why did you buy an important stove? ➢ If you did not buy an improved stove, do you know where you can buy it? ➢ Do you know its price? ➢ What are its disadvantages?	➢ compare the information with the promotional channels set up by the project ➢ conduct a representative and statistically reliable survey to analyze the impact of the promotion campaigns both on users and non-users ➢ list priorities and frequency of mentioned advantages as well as aspects of awareness of stoves
Distribution channcel for stoves	➢ Where did you buy the improved stove? ➢ Where would you like to buy the next improved stove?	➢ compare the information with the distribution channels set up by the project ➢ assess new ideas for distribution channels for the target group
Energy saving	➢ How could people help to save energy? ➢ Do you think most people try to save energy? ➢ If not, why not? ➢ Can you tell me how you are trying to save energy?	➢ compare with the issues raised by the promotional campaigns and see if you can add some new aspects ➢ gain information on the general awareness of the saving of energy ➢ correlate with your judgement of the economic situation of the village/household ➢ correlate with fuel consumption pattern ➢ compare with the issues raised by the promotional campaigns and see if you can add new aspects
Health conditions	➢ Do you think using an improved stove is good for your health? ➢ If yes, why do you think it is good for your health?	➢ collect information about the general awareness of health improvement ➢ correlate with fuel consumption pattern ➢ correlate with usage/non-usage of an improved stove ➢ compare with the issues raised by promotional campaigns and see if you can add new aspects
Environmental issues	➢ Do you think it is necessary to plant more trees? ➢ If yes, who should plant trees? (government, rich people, people who use fuelwood, project, village community, etc.)	➢ see how many people are aware of the necessity for planting trees ➢ correlate with usage/non-usage of an improved stove ➢ assess whose responsibility it is to plant trees according to people´s opinion ➢ correlate with your judgement the economic situation of the village/household

	➢ Have you ever planted a tree? ➢ If yes, when and where? ➢ If not, why not?	➢ find out who planted trees ➢ correlate with their economic situation and with usage/non-usage of an improved stove ➢ compare with the answers given during pilot phase and see if the project could encouraged people to plant trees
Sustainability (replace-ment/awareness creation)	➢ When did you buy/build your first stove? ➢ Is your stove damaged/destroyed? ➢ If yes, how did you notice that something is wrong with your stove? ➢ Is the performance still the same as when it was quite new? Do you think a damaged stove is as useful as a new one? If yes, why? ➢ If your stove is damaged/destroyed, do you plan to buy a new one? ➢ Why have you not bought a new one yet? ➢ If <you have already bought a second/third improved stove, why did you buy it?	➢ rate of replacement ➢ correlate rate of replacement with numer of households with damaged/destroyed stoves ➢ identify constraints for replacement

4.3.7 Further Research into Household Energy and Environment

Beside the indicators presented in the sections above a wider range of research topics might be highly relevant to your M&E, which may regain too many resources for a household energy project. So far, it is recommended that household energy projects work with research institutes by encouraging them to investigate the following:

Health Impact

- see whether adequate methods are available to measure CO, C02 and other toxic emissions of traditional and improved stoves
- compare the quantities of emissions
- estimate the reduction of smoke by improved stoves in relation to hygienic and medical aspects

Pressure on biomass resources

- collect data on forestation costs and fuelwood consumption - per capita or household; for cooking, heating, lighting, etc. calculate ratio to other fuel
- analyze rate of deforestation

Greenhouse gases

- estimate level of carbon dioxide emitted in smoke from stoves, try to estimate the forests or trees saved and amount of carbon dioxide absorbed

Annex 1: Glossary

Monitoring
collection, analysis and use of information about the process, impact and context for improving the project. It provides an indication of the project's successes and failures.

Evaluation
review and appraisal of the project's performance in relation to its stated objectives, and the investigation of its impact on the participants and their communities.

Objectives
goals which are set while planning the project and can be verified by the achieved results of the project activities and their performance. They may, be short-term, specific outcomes (such as the provision of training for potters) or long-term, developmental objectives which relate to impact (for example, the reduction of pressure on biomass resources through the use of stoves).

Process
use of resources, the project activities and their combined, resulting performance.

Impact
changes brought about by the project either positive or negative, planned or unplanned affecting participants and non-participants.

Context
factors which affect the project, positively or negatively, but which cannot be influenced by the project e.g., fuel prices, government policy on stoves, climatic changes, political stability, etc.

Criteria
standards against which the performance of the project can be assessed. For example, a criterion of the success of a stove may be that it enables 30% faster cooking than the traditional three stone fire.

Indicators
pieces of information required for comparing objectives with performances, and for assessing progress. For example, a perfect use of 90% of the disseminated stoves might indicate that the project has developed an effective awareness raising.

Annex 2: Technical Tests

It is recommended that efficiency testing procedures are standardized so that results can be compared. Procedures and results must also be reproducible and well documented. Furthermore, efficiency tests should take into acount the cooking practices of a given region or country. Since these factors vary widely, the requirements for the measurement of stove efficiency are often very different. To resolve this problem, international standards for testing the efficiency of wood-burning cookstoves were developed at a Volunteers-in-Technical-Assistance (VITA) Conference in 1982 in which major donors and institutions of Improved Stove Programmes were involved. At this conference, three test procedures were established, that will be described in detail on the following pages. These three testing procedures are not to consider as three alternative but complementary tests with different objectives:

Water Boiling Test
Objective: to compare the techrdcal ***efficiency*** *(%) of* the traditional stove with the one of the improved stove. Efficiency means here the heat (energy) utilized for boiling water.

Controlled Kitchen Test
Objective: to test the stove according to local conditions (preparing local meal) and to compare the ***specific wood consumption*** *(KJ per kg meal prepared)* of the traditional stove with the one of the improved stove.

Kitchen Performance Test
Objective: to compare the *wood consumption in the field (kg per day per household and person)* of the traditional stove with the one *of* the improved stove.

Note:
Inspite of these standardized test procedures and calculations you will find regional modifications and little deviations from the presented formulas depending on special cooking habits, fuel use, the duration of the measurement of the simmering phase or different ratings of evaporated water (i.e. in the case of boiling "dolo" in Burkina Faso or the production of sirup *of* palmfruits in Thailand). These deviations must be inquired into before testing is begun. In West African Sahel Countries, see the definition of the "rendement thermique", "Consommation specifique" et "Puissance" in the "Test d'eboullution de l'eau - Methodologie pour foyers ä bois, CILSS, Ouagadougou, 1986". Be careful with translations: the word "efficiencies", used here in a more global sense by introducing the three test procedures, can not always be translated as "rendement" in French. It is only equivalent to the word "efficiency" in the context of the waterboiling test.

Sources:

- VITA, Testing the efficiency *of* wood- burning cookstoves, Arlington, May 1985
- FAO, Guidelines for the Monitoring of Pilot Stove Development Schemes, Rome 1985
- Association Bois de Feu, Manuel pour réaliser des enquêtes de consommation de combustibles en milieu domestique, Aix-en-Provence, Paris 1986
- FAO, Guidelines for planning, monitoring and evaluating cookstove programmes, Rome 1990

Waterboiling Test

Characteristics:
The Water Boiling Test measures efficiencies during the high power phase when water is brought to the boiling-point.

Water Boiling Test results should provide reliable comparisons as long as the producers are not varied, and are well documented. Consistency in seemingly minor matters, such as use or not use a lid, the type of pots, and fire maintenance, are important for the results.

Objectives:
- to compare the efficiency of stoves (traditional and improved) under similar laboratory conditions
- to measure the wood consumption of a stove that is needed to boil water
- to analyze the influence of different parameters of the stove-pot-system on wood consumption
- to measure the stove's quality of heat transfer

Actors:
- trained project staff/ technicians

Equipment:
- a balance for measuring fuelwood and mass of water
- a thermometer
- a chronometer or a watch for measuring the time from the starting to the boiling-point
- a hygrometer
- a form for recording data and calculations (see next page)

Advantage:
- theoretically, the overall efficiency in percentage of different stove models can easily be compared because of the quasi-standardization of the testing procedures and calculation

Disadvantage:
- cooking is only' simulated by boiling water
- the real situation of cooking a traditional meal is not considered
- cooking habits (i.e. long simmering phase for beans that consumes a lot of wood) are not respected

Waterboiling Test

Test No.:............... Date:............. Operator Locality
.... Height:............(m) Temperature: ....(°C)
Pressure: .... Wind: .... Relative Humidity (RH): .... (%)
Moisture content of wood (dry wood basis): x = ...

Type of pot: ....Sketch of stove, grate and pot (dimensions):
Outer Diameter of pot: ....(mm)
Height of pot: ....(mm)
Weight of pot: ....(mm)
Capacity of pot: ....(litres)

Type of stove: ....
Inner diameter: ....(mm)
Wall thickness: ....(mm)
Weight of stove: ....(kg)
Type of grate: ....

Type of wood: ....
Weight of wood: .... (kg)
No. of pieces: ....
Diameter: and length: ....(mm)

Use small wood sticks to start the fuel burning = **starting fuel:** A_1 = ... (kg)

Water temperature (start): T_1 = ...(°C) Water temperature (boiling): T_2= ....(°C)
$T_2 - T_1$ = ...(°C)
time till boiling: t_b = ...(min) ....(sec) = ...(sec)

Weight of empty pot with lid and thermometer M_1 = ...(kg)
Weight of pot with 2/3 capacity of water, lid and thermometer **at start** M_1 = ...(kg)
Weight of pot with 2/3 capacity of water, lid and thermometer **at boiling point** M_2 = ...(kg)

Boiling **water** produced: $M_3 = M_2 - M_1$ **...................(kg)**

Weight of **wood** at start: B_1 = ...(kg)
Rest of wood at boiling point: B_2 = ...(kg), Remaining charcoal at boiling point: C_2 = ...(kg)

Dry wood consumption: **WC = ($A_1 + B_1 - B_2$) x (100% - x%) -1,5 x C_2 =..............(kg)**

Power: **P_h = WC x 19000/t_b (sec) = ...(KW)**

Efficiency: **E = (4,2 x 100 x 100 % / 19000) x (WC x 100/M3 (T2-T1)) = ... (%)**

Controlled Cooking Test

Characteristics:

The **Controlled Cooking Test** - also known as **Standard Meal Test** - was developed to reflect efficiencies achieved when cooking. In the Controlled Cooking Test, a regular meal representative of a region or country is cooked to simulate actual cooking procedures carried out by local households. Cooking efficiencies derived from these tests should correspond more closely to "actual" household efficiencies. That means, the technical efficiency of the stove is tested in relation to his cooking function. Given the many variables in the Controlled Cooking Test that could affect efficiency results, these tests require careful measurements of ingredients and documentation of pot sizes, pot types, fuel and sequencing of procedures by the cooker.

Objectives:

- to measure the specific wood consumption of traditional and improved stoves during the preparation of a local meal
- to compare the specific wood consumption of different stoves while preparing
- the same local meal with the same quantities of food, ingredients and fuel
- to identify deviations in the specific wood consumption and to identify the
- influences that effect those deviations (e.g. techniques, handling, etc.)

Actors:

- trained project staff

Equipment:

- a balance for measuring fuelwood, food, water
- a chronometer or a watch measuring the time from the beginning to the end of cooking
- a thermometer
- a hygrometer
- form for recording data and calculations (see next page)

Advantage:

- reflects technical capability and efficiency to serve local cooking functions (cooking, baking, heating, etc.)
- reflecting cooking habits and real field conditions, the Controlled Cooking Test gives more information than the Waterboiling Test (which in this sense is merely
- a "specific Controlled Cooking test, boiling water")

Disadvantage:.

- analysis of efficiency is limited
- unlike the Water Boiling Test, tests are not comparable world-wide because the efficiencies depend not only on technical parameters (stove models, pot sizes, etc.)but also on the specific heat capacity of specific food and local cooking tradition

Controlled Cooking Test

Test No:…………………Date:………………………Operator Locality:
……………………………Height: .... (m)………Temperature: ……………………………………(°C)
Pressure: ....Wind: ………………………Relative Humidity (**RH**)…………………………(%)
Moisture content of wood (dry wood basis): **x** = ...

Type of pot:………………………………Sketch of stove, grate and pot (dimensions):
Outer Diameter of pot:....................(mm)
Height of pot:…………………………..(mm)
Weight of pot:……………………………(mm)
Capacity of pot:………………………(litres)

Type of stove:.......................
Inner diameter:...............................(mm)
Wall thickness:…………………………(mm)
Weight of stove:…………………………..(kg)
Type of grate:.......................

Type of wood:........................
Weight of wood:……………………………(kg)
No. of pieces:........................
Diameter: and length:......................(mm)

Use small wood sticks to start the fuel burning = **starting fuel**:A_1 = ... (kg)

Food temperature (start): $\mathbf{T_1}$ = ...(°C) Water temperature (boiling):$\mathbf{T_2}$= ....(°C)
$T_2 - T_1$……………………………(°C)
time till boiling:…………………….$\mathbf{t_b}$ = ...(min) ....(sec) .... (sec)

Weight of empty pot with lid and thermometer $\mathbf{M_1}$ = ...(kg)
Weight of pot with 2/3 capacity of food, lid and thermometer at start $\mathbf{M_1}$ = ...(kg)
Weight of pot with 2/3 capacity of food, lid and thermometer **at boiling point** $\mathbf{M_2}$ = ...(kg)

Food prepared/cooked $M_3 = M_2 - M_1$ =................(kg)

Weight of **wood** at start: $\mathbf{B_1}$ = ...(kg)
Rest of wood at boiling point: $\mathbf{B_2}$ = ...(kg), Remaining charcoal at boiling point: $\mathbf{C_2}$ = ...(kg)

Dry wood consumption: WC = ($A_1 + B_1 - B_2$) x (100% - x%) -1,5 x C - (kg)

Specific Standard Consumption: SSC = WC x 100/M3 (T2-T1) = ...(kg) dry wood/kg food prepared

Kitchen Performance Test

Characteristics:

The implementation of the Kitchen Performance Test is most efficient if it is used for individual case studies in households where stoves will be introduced.

It needs to be done two times:

1. before a stove programme or project is started (to record traditional stoves)
2. after the adaption of an improved stove.

The Kitchen Performance Test is so far a wood consumption field test and it is a more realistic, and an even more specific, test than the Controlled Cooking Test. Through this test, the wood consumption per person and day will be assessed in households. Using individual families and "normal" household conditions, household cooks prepare their usual meals on traditional and/or improved stoves. These tests also show the impact of a new stove on the overall use of energy by the household. Observations of the real cooking habits of individuals allow reflections of potential differences between the real fuel savings through improved stoves and the fuel savings predicted by the Waterboiling Test in the laboratory. This test can therefore be far more than a measure of stove efficiency through combining scientific data gathered with active household participation. It has to be done over a period of seven days.

Objectives:

- to compare the wood consumption of traditional and improved stoves concerning
- the impact of the use of improved stoves on fuel consumption by the household and
- fuel savings (through technical and operational improvements)
- to demonstrate the fuel saving potential of a new stove in the household, and to understand, illustrate and to correct operational practices of stove users

Actors:

- women/cooks of households
- trained investigators evaluate (interviewing, observing and measuring)

Equipment:

- balance for measuring fuelwood
- forms for recording data and calculations (see next page)

Advantage:

shows the wood consumption - and the real fuel saving potential of new stoves - under field conditions

Disadvantage:

- tests cannot be compared like Water Boiling Tests because the individual fuel saving rate depends on parameters like the number of household members which eat together, correct use of new stove, multiple use of the stoves (i.e. water heating, cooking of traditional medicine, etc.).

Kitchen Performance Test

Basic data

Town/ Village:	No. of test:....................................
Name of the household:...	District:..
Name of evaluator:	Time of passage: ....
	Date of beginning of survey:………

Survey

Day of survey	FIRST FUEL rested	FIRST FUEL added	SECOND FUEL rested	SECOND FUEL added	COMMENTS/ OBSERVATIONS
1	///// kg	……………….kg	////kg	kg	(e.g. No. of eaters,
2	.... kg	…………kg	.... kg	.........kg	food cooked per day,
3	.... kg	………….kg	.... kg	.........kg	meals per day, etc.)
4	.... kg	.............kg	.... kg	.........kg	....
5	.... kg	.............kg	........................kg	kg	....
6	.... kg	.............kg	....kg	.........kg	....
7	.... kg	.............kg	.... kg	.... kg	....
8…………. .. kg			……………kg		…………………

Calculations

	FIRST FUEL	SECOND FUEL
Total fuel added:	.... kg	.... kg
Fuel left last day:	.... kg	.... kg
Total fuel consumed during survey:	……………… kg	.... …………………kg
Duration of survey:........ days		
Total consumption per day per household:	**...... kg**	**......... kg**
Number of persons eating meals together in this household: ....persons		
Consumption per day per person:	**......... kg**	**......... kg**

Comments of evaluator: (duration of cooking, operational habits, etc.)
………
………
……………………………………………………………

Annex 3: Social Science Methods

Method:

Sampling
A simplified process of M&E because not every member of a population or of the stove users need be interviewed and/or observed before generalizations can be made about the target population. Instead, samples may be drawn and, if they are drawn correctly, results from the study of samples will accurately represent the wider populations from which the sample is drawn. The process of sampling greatly reduces the time and money required to perform M&E.

A **sampling frame** is a list of **sampling units** - such as individuals, households, families or stove-producers - in the population from which a sample is selected. Urban centres, villages, rural regions or all stoveproducers are possible sampling frames.

The **size of the sample** required is decided on the basis of the characteristics of the target population, the topics being studied, the completeness of the sampling frame, the resources available to the evaluator and/or the project, and the degree of accuracy necessary for the project to be worth doing all.

Types of sampling:

Random sampling means that every individual in the population has an equal chance of being selected for the sample; selection occurs by chance.

A **systematic sample** is a specific type of restricted sample. Every nth unit is selected, after a number between 1 and n is randomly chosen as the starting point. Systematic samples are considerably quicker and cheaper to draw than other samples.

Stratified samples are selected to ensure that appropriate numbers of members from small subgroups are included in the sample. The population is stratified through the creation of a sampling frame (i.e. town) for each stratum (i.e. socio-economic groups, districts, professional groups, etc.) and a sample of each is selected. The percentage drawn from each stratum may be the same or different, according to the needs of the project.

A **cluster sample** involves the selection of groups or clusters of sampling units. All of the units in the clusters are then studied (i.e. all households in one or n selected villages or districts of the capital). The clustering of respondents greatly reduces the cost of data collection, for each "visit" to village or "entry" into an institution (i.e. clustered metal-workshops on a handicraft market) guarantees many potential respondents.

Non-random sampling is discouraged, as it is risky to generalize from non-random samples in order to draw larger populations (i.e. in the case if you choose conclusions about households of relatives of the project staff only).

Purposive samples, whereby the evaluator chooses individuals presumed representative of the population (i.e. to test the social acceptability of stoves you interview the village chief and/or his wife).

Creating a sample is not easy. In the frame of large scale household energy projects you will usually find a wide range of cooking practices, disparities in wealth, political participation, access to fuel, several different ethnic groups, an unequal balance of stove users and non-users. All these factors could reflect high variations and extremely different degrees of stove dissemination, stove acceptance, different fuel-saving rates, etc.

A sample is a smaller representation of the target population, therefore it must be both:
- representative of the total population and
- statistically significant.

Although this M&E guideline cannot fulfill expectations of a complete handbook of empirical methods, it will further provide an orientation on "How to choose samples for different types of household energy projects and target groups", and "How to prevent errors in choosing a sample".

Example 1: Dissemination approach and monitoring - Statistical problems with purposive or non-random samplings

There are household energy projects where the sampling is automatically purposive. For example, if the project implements action programmes for villages, the people who receive the stove are chosen by the community and/or the village chief. Or, in the case of a project's basic-needs-approach, a group that has little access to resources (landless, unemployed) may be chosen to receive a new stove. Thus a representative sample may not be involved in the monitoring. It is then very difficult to draw any general conclusions about acceptability, or the effect on household fuel consumption for the whole population. Therefore it is important to know how the stove user differs from the rest of the population if definite conclusions are to be drawn.

The same problems can arise with non-random samplings, e.g. if only relatives of the project staff are monitored in order to economise on personnel, financial resources, and time.

Example 2: 50 households from nearly homogenous areas

For areas where patterns of fuel use, income levels, cooking practice, kitchen types, are nearly homogenous, a sample of **1 % to 2 % of total households** in the area or **a maximum sample of 40 to 50 households**, chosen at random, is sufficient to deliver statistically significant results. Such a homogeneity is rarely observed. That is why such a small sample can only be chosen in relatively "isolated" project-areas, like a group of neighbouring villages with about 100 households each. This is very rarely observed, therefore the sample must be more extensive.

Example 3: Small dissemination requires total sampling

When less than 300 stoves are disseminated - e.g. during the starting or pilot phase - all households should be monitored, as great variations in performance and acceptance are usually observed. (It could be useful to note either the home address of customers, and/or do encourage them to participate in monitoring by reducing the stove price so that their houses will be found again more easily). Above this number, random samplings are best used.

Example 4: 50 households from each sub-group of a stratified sample

Stratify your sample into existing sub-groups (ethnic groups, income groups, rural areas, etc.) on the basis of accurate baseline data or official census information. After having divided the population into homogenous groups (= stratified the sample), the sample can be calculated by **multiplying the figure 40-50 by the number of groups**. The sample can be chosen at random.

Example 5: Starting phase: 30 % in rural areas with high variances between villages

During the initial field test phase (starting phase and pilot phase) most projects will find high variances within a village or between villages in relatively small areas. The following procedure is therefore recommended for the starting phase in rural areas. For example: three villages with around 100 households each, that are either different ethnically, socio-economically and/ or ecologically, are chosen by the project for pilot activities. 30% to 50% of households are chosen at random (= 100 households) and are offered the use of an improved stove. The performance and acceptability are monitored. Taking such a large sample at the beginning ensures that there is a high probability that all different groups will be represented.

Example 6: Stratification by income and access to fuelwood in urban areas

Studies in urban household energy projects show that the urban population can largely be stratified according to income level and physical, financial and legal access to fuelwood, as these factors appear to have the greatest influence on stove acceptance. Each of these groups can be sub-divided into three categories (i.e. high, medium, low income; easy, difficult, no access).
If each group must have 40 to 50 households, chosen by random, then the minimum sample size is 6 x 40-50 = 240 to 300 households. These figures of 240 to 300 households will guarantee statistical significance and will show the influence of income on stove acceptance).
It has been found that around 10% to 20% will either not participate or cooperate, not fill out questionnaires, or move. Add these 10% to 20%, so that the total sample will then include between 300 and 400 households.

Example 7: Socio-geographic, demographic stratification, quoted by quarters in an urban area

In urban areas, random sampling can also be conducted on the basis of socio-demographic stratification. For example, if there are types, or even defined categories of districts that represent socio-economic sections of a population such as: outskirts with rural and agricultural standards and physical access to fuelwood, marginal and peripheral squatter areas inhabited by landless and unemployed families that must buy the fuelwood, semi-peripheral residential areas inhabited by middle income groups that purchase wood on local markets, central residential areas of high income groups and governmental employees who buy wood in larger quantities and who have transport facilities for buying "cheap" wood in rural areas, etc..
It is important to find out whether such a socio-geographic stratification of districts has already been established by official censuses or basic national/regional socio-economic and/or demographic studies (i.e. expenditure surveys of different urban districts).
Then choose 50 households in each category of district at random and add 10% to 20% of the total households to prevent a high deficit loss.

Method:	**Interview**
is:	a face-to-face interpersonal situation in which the evaluator asks responders questions designed to obtain answers pertinent to the M&E indicators "What to measure". The questions, their wording and their sequence define the extent to which the interview is structured.
types of interviews:	The most structured form is the **scheduled-structured interview,** in which the questions, their wording and their sequence are fixed, and are identical for every responder. It ensures that if variations appear between responses, they can be attributed to the actual differences between the responders and not to variations in the process of interviewing. In this case standarized questions are used.
	The **nonscheduled-structured interview** allows responders considerable liberty in expressing their definition of the situation, although the encounter between the interviewer and interviewees is structured, and the major aspects of the study are explain to them. The nonscheduled-structured interview permits the evaluator to obtain and to registrate details of personal reactions, specific emotions and opinions. The trained interviewer, having previously studied the situation, is alert and sensitive to inconsistencies and omissions of data that may be needed to clarify the problem. In this case, open questions are used.
	A nonscheduled interview is a nonstructured, or **nondirective,** form of interviewing. Here, no prespecified set of questions is employed, nor are the questions asked in a specific order. Furthermore, no schedule is used. With little or no direction from the interviewer, interviewees are encouraged to relate their experiences, to describe whatever events seem significant to them, to provide their own definitions of their situation and to reveal their opinions and attitudes as they see fit. The interviewer has a great deal of freedom to probe various areas and to raise specific issues during the course of the interview.
	In this case, a questionnaire guideline can be used or even not, but only the important aspects must be present in the interviewer's mind.

In the tables "what and how to measure" you will find recommendations of standardized and open questions under the coloumn "what to use". They are listed according to the indicators.

A questionnaire should be constructed with both open and standardized questions so that all necessary (and also subjective) informations given by the interviewees are covered.

Instrument for Interview:	**open question**
means that:	interviews are asked to give an opinion on a subject. They are free to respond to a question whichever way they like, and are not limited by existing codified answers.
does not mean that:	responders are obliged to select one or more of the specific categories provided by the interviewer
advantage:	- open questions can be used when not all of the possible categories of answers are known , or when the interviewer wishes to see what the interviewee views as appropriate categories. For example, the open question, "what would you like to change about the improved stove?" (indicator: symbolic or cultural values) may reveal some information that the researcher did not anticipate, in addition to the already known. - open questions allow the responder to answer adequately, and in as much detail he/she likes, and to clarify and qualify his or her answer. - open questions can be used when there are too many potential answers

Instrument for interview	**standardized question**
is:	a question in which response categories are specified, and/or a fixed alternative supplied. The responder should answer "yes" or "no" or choose from a series of answers.
Is not:	a question that allows for free response from the interviewee.

Instrument:	**Observation**
is:	the primary technique for collecting data on nonverbal behaviour. It involves not only visual data collection, but also data collection via the other senses, such as hearing, touching or smelling. The use of the observational method neither precludes nor excludes simultaneous use of other data-gathering techniques, such as interviews. Often, it represents a supplementary method to others.
types of observation:	**Participant observation** means the observer is a regular participant in the activities being observed, and that his or her dual role is generally not known to the other participants. For example, a blacksmith, trained and/or employed by the project, trains a group of blacksmiths in his own original environment. Simultaneously, he controls the impact of the training by observing the capability, behaviour and opinions of each participant in order to report the results to the project.
	Nonparticipant observation , on the other hand, means thatthe observer does not participate in group activities and does not pretend to be a member. Normally, he/she is a stranger in the natural environment of the observed persons.
advantage:	- Observation allows for an in-depth understanding of events or issues - It allows the researcher/evaluator to observe the targeted individuals/ groups in their natural environment - Method is flexible and allows the researcher to be surprised and/or to concentrate on any variables that prove to be important - It is not restricted like a standardized questionnaire or interview - "Field notes" can even be easily recorded and analyzed by modern electronic media, i.e. photographs or videotape recording the construction of stoves or their use during a cooking demonstration -
disadvantage:	- Observation represents a potential for loss of detachement and loss of objectivity. Lack of control over extraneous variables that may affect the data as well as difficulties of quantification - The evaluator is directly exposed to the subjects, which may be emotionally difficult - There is a potential for floundering if the researcher obtains little information of value - Data collection may suffer from problems of reliability and validity

Instrument:	**Documentation**
is:	The primary technique for reporting data.
aspects of documentation and their advantages	The documentation of M&E results is very important for the internal and external flow of information and the proceeding reflection and discussion of results. The documentation can be efficient if the following aspects are respected:
	- A survey record can be very useful to present “what you evaluate, where, by what methods and for how long”. This survey record can also be used as the introduction of your report. - Structure the questionnaire in a logical way in order to facilitate the interview. Additionally, a well-listed questionnaire can be used to establish the headlines of your table of contents. - Tables and figures can make it easier to visualize and present complex data, not only for internal use and discussion, but also for the presentation to outstanding persons or institutions (i.e. funding organizations). They could be actualized periodically which does not mean to establish new documents after M&E activity, but only to add new results. - Percentage values should not be used for a total sample which includes less than 50 units (if the 50 cases do not present the total sample frame). Percentages wouldn not reflect a real respresentation. In that case, it would be better to mention the total units, i.e. 10 out of 50 units (households) instead of 20%.

Annex 4: Index of indicators