

BIOMASS ENERGY STRATEGY (BEST)

COOKING ENERGY INTERVENTIONS

LESSONS LEARNED AND RECOMMENDATIONS

WORKING PAPER

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Abbreviations

BDS	Business Development Services
BEST	Biomass Energy Strategy
BMZ	Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung (Federal Ministry of Economic Cooperation and Development)
CA	Capacity Assessment
CBO	Community-Based Organisation
CD	Capacity Development
DGIS	Netherlands Ministry of Foreign Affairs
EAC	East African Community
EC	European Community
ECOWAS	Economic Community of West African States
FEMA	Forum of Energy Ministers of Africa
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (German Technical Cooperation)
IAP	Indoor Air Pollution
LPG	Liquefied Petroleum Gas
MDGs	Millennium Development Goals
NGO	Non-Governmental Organisation
ProBEC	Programme for Basic Energy and Conservation
PRSP	Poverty Reduction Strategy Paper
R&D	Research & Development
UNDP	United Nations Development Programme
SME	Small and Medium Enterprise

Executive Summary¹

Today biomass fuels constitute the primary source of energy for about 90% of households in many developing countries. The bulk of energy from biomass fuels is consumed by households, mostly for cooking purposes. Across the developing world the biomass energy sector provides employment to tens of thousands of people and contributes millions of dollars to local economies through tax revenues and incomes. Biomass fuels also constitute a source of energy which is locally available, renewable, reliable and often forms a part of the local way of life. Despite of its many advantageous effects, biomass energy is seldom given high priority in energy policies and poverty alleviation strategies, as it is still regarded as “traditional”.

Nevertheless, in recent years a number of developing countries have started to introduce Biomass Energy Strategies (BEST) in order to ensure the sustainable management and use of biomass resources. One of the most successful and widely applied measures within the framework of BEST is the introduction of energy-efficient cooking stoves. The dissemination of improved stoves can yield manifold benefits in the form of advantageous health, environmental and economic impacts. It is therefore crucial that governments attach high importance to the subject, for example through the implementation of BEST.

Biomass Energy Strategies describe the key interventions needed to achieve sustainable biomass use, both on the supply-side and on the demand-side. A recently developed **BEST-Guide** offers policymakers and energy planners a systematic, step-by-step approach for the development of a national BEST (GTZ/EUEI PDF 2007). One part of the BEST-Guide that so far has not been elaborated in great detail, however, are the more **practical recommendations** on key success factors for the successful and sustainable implementation of cooking energy interventions. The explanation for this ‘knowledge gap’ is that, until now, past experiences and lessons learnt in this area have not been analysed in a systematic and comprehensive manner.

This document is supposed to supplement the BEST-Guide by describing the major lessons learned in the field of cooking energy interventions, with a strong focus on the dissemination of improved stoves. In particular, **this document outlines the potential role of government in demand-side interventions in the cooking energy sector** within the frame of wider Biomass Energy Strategies. Thereby, the document is intended to facilitate the planning process and provide policymakers and energy planners with a sound basis for sustainable implementation.

The role of the government

A general theme arising from experiences with demand-side cooking energy interventions is that the government should not be directly involved in the dissemination of cooking technologies through the production or sale of stoves. A commercial market-based approach supporting private entrepreneurs has been proven to be more effective and sustainable. The **role of government** should rather lie in the formulation of an enabling policy framework, the integration of cooking energy into research and development efforts, the promotion of awareness raising campaigns as well as the provision of required public funds.

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The question of which organisational unit within the government should take over responsibility of implementation depends to a large extent on national circumstances. Government authorities are characterised by differing operative responsibilities and interests. Thus certain agencies may be more suitable for implementation of interventions than others. While it is necessary that one agency leads the strategy development process, it is recommended to involve all relevant government agencies in implementation efforts. One ministry is not enough to solve the multi-sectoral issues associated with biomass energy.

The list below describes the potential role of different government agencies in cooking energy interventions.

Government agency	Potential role in cooking energy interventions
Ministry of Energy (MoE)	The responsibility of the MoE is to ensure the sustainable and efficient use of biomass energy. It therefore needs to integrate biomass energy into the overall policy framework (e.g. PRSP, environmental and forest programmes). Moreover, the MoE should have the intersectoral lead to mainstream biomass energy issues into other sectors. Another role of the MoE is the balancing of fuel prices (e.g. with rising kerosene prices people will move back to fuelwood).
Ministry of Health	The Ministry of Health should recognise the importance of Indoor Air Pollution (IAP). Its role could lie in awareness raising, impact monitoring and the development of emission benchmarks.
Ministry of Education/Information	The Ministry of Education can play a role in awareness raising and information campaigns, for instance by introducing cooking energy issues into formal education.
Ministry of Housing	The Ministry of Housing has a potential role through the setting of technical norms e.g. for IAP (emission benchmarks) or for housing schemes (clean kitchen).
Ministry of Social Development	Cooking energy interventions can build on / piggy back on the structure of existing social programmes.
Ministry of Finance	The Ministry of Finance will be responsible for mobilising external financial resources, setting taxes and approving subsidies or reduced import duties (e.g. for stove inputs).
Ministry of Economic Affairs/Industry/SME Promotion	The Ministry of Economic Affairs can provide assistance to stove producers in the fields of business development services (BDS), technical training and microfinance.
Ministry of Research and Technology	The Ministry of Research and Technology can fund Research & Development (R&D) activities in cooperation with local users and producers to ensure satisfactory stove quality.
National Bureau of Standards	The Bureau of Standards can set norms for improved stoves and ensure quality control.

Ministry of Agriculture/ Forestry/ Environment	The Green Sector has an important role with respect to biomass energy supply-side management strategies (natural resource management, land-use rights issues, woodlots, sustainable charcoal production, etc.).
Local government authorities	In recent years, many countries have moved towards greater decentralisation of planning processes. This results in a more important role of local government authorities in ensuring sustainable biomass energy supply and use on the local level.
Parliamentary committees	Parliamentary committees are often responsible for approving budgets related to interventions proposed by government ministries (e.g. awareness and research programmes).

Some of the above tasks may be initiated by the government but can eventually be handed over to e.g. NGOs for implementation. The effective coordination between all the involved government agencies and other relevant actors (NGOs, private sector, donor agencies) needs to be ensured, for example through the establishment of an intersectoral steering committee.

Key elements of cooking energy interventions

In terms of **planning of the concrete actions**, past experiences with cooking energy interventions suggest that **four elements** are necessary for the successful dissemination of efficient stoves:

1. *The efficiency and quality of improved stoves is secured.* Poor quality and efficiency of improved stove technologies represent an important barrier to successful stove dissemination. This can be addressed by undertaking research and development (R&D) activities and by ensuring quality control.
2. *The marketed stoves are affordable for the customer.* For low-income households, stoves represent a high initial investment and this prevents them from purchasing the product. The government's role in a sustainable, commercial dissemination approach is to support the market development of products that are geared towards poor households, for example through promotion and awareness campaigns or R&D. The government should not aim to distribute stoves to the customer free of charge or at reduced prices through the provision of 'direct' subsidies on stove cost.
3. *The supply of improved stoves in both urban and rural areas is ensured.* Stove production and distribution can be carried out more effectively by private entrepreneurs than by government bodies. However, these entrepreneurs - if existing – may require assistance to help them overcome lack of technical or business management skills or insufficient access to finance.
4. *End-users are aware of the availability and benefits of improved stoves.* People from low income communities, who may be characterised by low level of basic education, are often not well informed about biomass energy efficiency, available stove technologies and their potential benefits. Initiatives will need to provide them with relevant information in order to convince them to purchase efficient and high quality products.

These above elements (relating to *quality, price, supply, and demand*) need to be adequately considered by those involved in the planning process. Nevertheless, the presented

recommendations are not rigid in the sense that they can be applied in all countries in the same way. They should rather be viewed as a description of the numerous available options that policy makers can choose from - based on their local circumstances - and then adapt accordingly.

Finally, it needs to be stressed that this study only looked at the demand-side dimension of a biomass energy strategy, namely the dissemination of efficient stove technologies. In reality, demand and supply-side interventions will need to be addressed simultaneously to ensure a sustainable balance between biomass demand and supply. The corresponding supply-side interventions thus remain important and will be addressed in a future effort.

1 Introduction

Today biomass fuels constitute the primary source of energy for about 90% of households in many developing countries (GTZ 2005). The bulk of energy from biomass fuels is consumed mostly for cooking purposes. In spite of significant efforts and expenditure on electrification, the number of people depending on biomass energy is projected to increase from 2.5 billion people today to about 2.7 billion by 2030 as a result of population growth (IEA 2006).

The reliance on traditional biomass as a major source of energy does not constitute a problem in itself. Biomass fuels in fact constitute a source of energy which is locally available, renewable, reliable and often forms a part of the local way of life. Moreover, the biomass energy sector provides employment to tens of thousands of people and contributes millions of dollars to local economies through tax revenues and incomes. Nevertheless, the excessive and inefficient use of biomass can result in non-sustainable supply systems that contribute to deforestation and other environmental damages. Inefficient biomass energy use is also associated with severe health risks such as Indoor Air Pollution (IAP). Furthermore, declining biomass resources increase both costs of wood fuel as well as the time spent by women and children on fuel collection. The hazardous health effects of traditional fuel use may also cause considerable costs for the health sector, thus putting significant strains on government budgets (World Bank 2006).

These problems can at least partly be alleviated by programmes aiming to ensure the sustainable management and use of biomass resources. For this purpose, a number of developing countries have recently introduced Biomass Energy Strategies (BEST).

The development and promotion of national biomass energy strategies can lead to several beneficial outcomes (GTZ/EUEI PDF 2007):

- A formal process of strategy development will help to bring greater awareness and acceptance to biomass energy. Policy makers and the public are often not aware that biomass energy is an issue affecting the majority of the population and that interventions are therefore urgently required. For example, Poverty Reduction Strategy Papers (PRSPs) generally give marginal priority to modern household fuels for cooking and heating or traditional biomass management. A recent review of over 50 PRSPs found that energy policies are heavily skewed towards rural electrification, as opposed to heating and cooking fuels (UNDP 2007). In this context it can be emphasised that rural electrification measures need to be broadened to include biomass energy if they want to address the needs of the poor. Furthermore, biomass energy should not be seen as a “traditional” – and by implication undesirable - fuel only used by the poorer parts of the population. Instead biomass should be promoted as a *modern, competitive fuel* that, if used the right way, possesses many potential advantages over other energy sources.
- Achieving greater awareness of biomass energy implies that all problems related to biomass use, such as environmental degradation or health problems, can be addressed openly and with a variety of stakeholders. As biomass energy is a cross-cutting issue, the discussion process related to a biomass energy strategy needs to involve stakeholders from different sectors (energy, forestry, health, rural development, etc.). The acceptance of policy interventions can only be achieved by ensuring the coherence of policies in the various sectors and coordinated action of all relevant stakeholders.
- Interventions in the area of biomass energy often take place in a sensitive policy field. Measures such as regulation of fuelwood supply affect the poorest segments of the

population, often taking away an important source of their livelihood. A biomass energy strategy can bring together resources and stakeholders in order to address the needs of the poor.

- At present, a variety of proven efficient cooking technologies and established techniques exist that can help to overcome the problems associated with biomass use. These technologies have been introduced on the level of projects and programmes for several decades now, giving rise to a wide range of best practice examples. In order to have a significant impact on the national level, however, these isolated micro-level interventions need to be scaled up into national level programmes. A biomass energy strategy can contribute to scaling up these interventions by providing the overarching framework that allows stakeholders to effectively carry out their respective roles.
- A biomass energy strategy forms the basis for preventive action and long-term planning. Crisis management may provide short-term solutions to certain problems on the supply side (for example deforestation). However, it cannot offer long-term solutions to any of the underlying structural problems.
- The improvement of livelihoods of the poorer segments of the population through a coordinated and sustainable strategy has the potential to increase the political legitimacy of local and central government authorities.

In recent years several commitments with regard to biomass energy have been reached on an international level, such as the Beijing Declaration on renewable energy for sustainable development in 2005, an ECOWAS White Paper in 2005, or parts of the East African Community (EAC) energy access strategy adopted in 2006-07. The fact that most of these commitments have been made recently seems to imply that the sector is receiving increased attention from policy makers (GTZ 2007a).² To further specify these committed targets, governments in a number of countries are supported to develop national biomass energy strategies (sometimes also labelled as household energy strategies).

Biomass Energy Strategies describe the *key interventions* needed to achieve sustainable biomass use, both on the supply-side and on the demand-side.³ One of the most successful and widely applied demand-side interventions within the framework of BEST is the introduction of energy-efficient cooking stoves. The dissemination of efficient stoves can yield manifold benefits in the form of advantageous health, environmental and economic effects. It is therefore crucial that governments attach high importance to the subject, for example through the implementation of a BEST.

The focus of the present document lies on demand-side interventions in the cooking energy sector, primarily the dissemination of improved stoves. In particular, this document outlines the potential role of government in demand-side interventions in the cooking energy sector within the frame of wider Biomass Energy Strategies. By describing the major lessons learned for cooking energy interventions, the document is intended to facilitate the planning process and provide policymakers with a sound basis for sustainable implementation. Systematic reviews of past experiences with cooking energy interventions (or in fact wider BEST) have not been carried out until now, despite their practical relevance for energy planners and policy makers.

² In these documents, however, biomass is often mentioned in conjunction with biofuels. Improved stoves, for example, are rarely mentioned explicitly, but rather seem to be represented through broader terms such as modern energy, energy efficiency or reduced indoor air pollution.

³ A *strategy* is defined as a key intervention used by an organisation or a government institution to achieve a policy aim.

The study is based on a review of relevant literature on biomass energy strategies. In addition to information on strategies on the macro level, the review includes information related to cooking energy programmes and projects on the micro and meso level. Many of the lessons from the programme and project level are extremely relevant for the wider context of a nation-wide strategy. Thus, they can provide useful inputs into the formulation of cooking energy interventions in the framework of wider biomass energy strategies (or, in fact, the development of similar programmes).

The next chapter explains the analytical background of the study. The roles of the government and other stakeholders involved in cooking energy interventions are described in chapter three. Chapter four provides practical recommendations for the successful and sustainable planning of cooking energy interventions. A summary and conclusions are given in Chapter five.

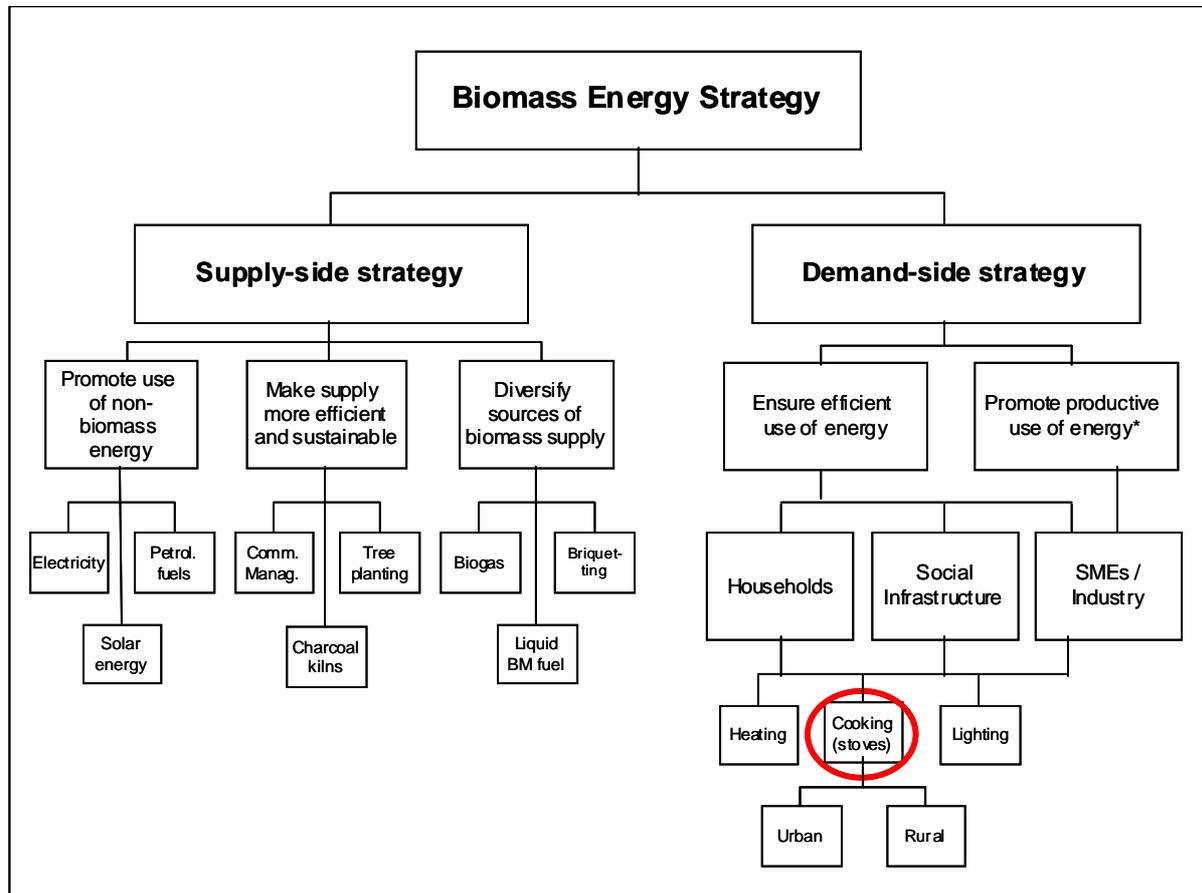
2 Linkages to the Biomass Energy Strategy (BEST)

The overall objective of a biomass energy strategy should be to reach a sustainable balance between supply and demand of biomass energy. Biomass strategies typically focus on both supply and demand-side management strategies (see, for example, ESMAP 1991a, ESMAP 1991b, ESMAP 1994, ESMAP 1997, ESMAP 2002, ESMAP 2007, World Bank 2005).⁴ Supply-side strategies include measures such as improved tree management, biomass briquetting or more efficient charcoal supply chains. It also includes fuel switch e.g. to LPG or biogas. Demand-side strategies include the introduction of efficient stoves, ovens and dryers.

This study focuses on demand-side strategies in the field of cooking energy, due to their relevance in many developing countries in terms of total energy consumption. The most widely applied measure in the area of cooking energy is the introduction of *improved stove technologies*, on which the focus of this analysis lies. This structure is depicted in figure 1 below.

⁴ Exceptions are the “National Biomass Energy Demand Strategy” in Uganda (Government of Uganda 2001) or the rural energy strategy of Malawi, which focuses only on the supply side (ESMAP 2005b).

Figure 1: Biomass energy strategies – demand and supply side measures



Source: GTZ

* Productive use of energy is most often interpreted in a narrow sense as ‘income-generating use’ of energy. In a wider sense the term also includes ‘social uses’ of energy for health or education purposes.

A systematic approach to developing a biomass energy strategy is described in a recently developed ‘Biomass Energy Strategy (BEST) – Guide’ (GTZ/EUEI PDF 2007). According to the ‘BEST-Guide’, the development of a biomass energy strategy can be broken down into several distinct steps, which apply to both the supply and demand side:

1. Definition of vision and mandate: What is the final goal and who defines it?
2. Analysis of initial situation: What is the problem and who is involved?
3. Scenario development: Which way is the best to reach the goal?
4. Decision on key interventions: What has to be done?
5. Action planning: Who does what by when and with which resources?
6. Monitoring and evaluation: How can the results be measured?

Of course such a step-by-step approach represents a rather idealised framework that is helpful to structure and simplify a quite complex process. In practice, policymakers and energy planners are still faced with the question of how to actually implement these proposed work steps. The focus of this study is to facilitate implementation of demand-side cooking

interventions by providing recommendations that are based on practical experiences and concrete lessons learned. For some of the mentioned work steps established methods are presently available, for example regarding Scenario Development or Monitoring and Evaluation. These issues will therefore not be addressed in this survey.

Other areas, however, have not been systematically analysed until now. For instance, the key factors for successful planning of cooking energy interventions (step 5: ‘*action planning*’) – and the role of the government in these efforts - have not been comprehensively explored yet.. For this reason, the present study provides policymakers and planners with the main lessons learned specifically for this area. The aim is to facilitate the planning process of demand-side cooking energy interventions and provide a sound basis for sustainable implementation.

3 Roles and Potentials of Different Stakeholders

In general, there exist different types of delivery mechanisms for increasing access to energy services in rural areas. The role of the government in delivering these services will vary according to the chosen mechanism (ESCAP 2005):

- Market-based models: several market-based business models to increase energy access in rural areas have been developed (e.g. concession approach, fee-for-service or the rental model, leasing model, cooperatives model, E+Co model) though these are usually applied to electricity or commercial fuel supplies.
- Government-managed models, which may take several forms (e.g. control and command model)
- Mixed models with private sector or NGO participation in government-managed initiatives which may be called for in some cases

The most appropriate delivery mechanism will depend on the energy technology in question as well as local circumstances. In rural electrification programmes market-based models, government-based models as well as mixed models have been implemented with varying results.

A general theme arising from experiences with demand-side cooking energy interventions is that the government should not be directly involved in the dissemination of cooking technologies through the production or sale of stoves. A *commercial market-based approach* supporting private entrepreneurs has been proven to be more effective and sustainable (Barnes et al 1994, Kammen 1995, Barnes and Kumar 2002, ESMAP 1991a, ESMAP 2002, GTZ 2008b, Smith et al. 1993, World Bank 2005). The *role of government* should rather lie in the integration of cooking energy into research and development efforts, the promotion of awareness raising campaigns, the provision of required public funds and the formulation of an enabling policy framework that provides incentives to the private sector (see also chapter six). For example, in India numerous stove programmes were initially hampered by central planning, lack of market mechanisms and excessive bureaucracy. The country eventually modified its programme based on this experience (Barnes et al. 1994).

3.1 The Role of the Government

A variety of stakeholders within the government have a role to play in the balancing of demand and supply of biomass energy. Relevant stakeholders within the government not only include the energy sector, but several other sectors such as forestry, agriculture, environment, industry, health, education etc. Biomass energy thus cannot be regarded as an isolated sub-sector but as an integral part of the development process, and the inclusion of biomass in general energy policies and rural development projects needs to be encouraged.

The question of which organisational unit within the government should take over responsibility of implementing cooking energy interventions depends to a large extent on national circumstances. Government authorities are characterised by differing operative responsibilities and interests. Thus certain agencies may be more suitable for implementation of interventions than others. It should be kept in mind that the Ministry of Energy is not the only suitable lead implementation agency. For example, the GTZ stove programme in Peru has started to work together with the Ministry of Health, health services, and social programmes, but not the Ministry of Energy. In Bolivia, a GTZ programme is starting to cooperate with local government authorities as well as the Ministry of Education, which is interested in introducing efficient stove technology in the context of school lunch programmes.

While it is necessary that one agency leads the strategy development process, it is recommended to involve all relevant government agencies in implementation efforts. As said above, one ministry is not enough to solve the multi-sectoral issues associated with biomass energy. In practice it may not be easy to secure the involvement other ministries, especially if they are not yet fully convinced of the importance of biomass energy.

A list describing different government agencies and their potential role in cooking energy interventions is given below.

Table 1: Overview of government actors and their potential roles in demand-side cooking energy interventions

Government agency	Potential role in cooking energy interventions
Ministry of Energy (MoE)	The responsibility of the MoE is to ensure the sustainable and efficient use of biomass energy. It therefore needs to integrate biomass energy into the overall policy framework (e.g. PRSP, environmental and forest programmes). Moreover, the MoE should have the intersectoral lead to mainstream biomass energy issues into other sectors. Another role of the MoE is the balancing of fuel prices (e.g. with rising kerosene prices people will move back to fuelwood).
Ministry of Health	The Ministry of Health should recognise the importance of Indoor Air Pollution (IAP). Its role could lie in awareness raising, impact monitoring and the development of emission benchmarks.
Ministry of Education/Information	The Ministry of Education can play a role in awareness raising and information campaigns, for instance by introducing cooking energy issues into formal education.
Ministry of Housing	The Ministry of Housing has a potential role through the setting of technical norms e.g. for IAP (emission benchmarks) or for housing

	schemes (clean kitchen).
Ministry of Social Development	Cooking energy interventions can build on / piggy back on the structure of existing social programmes.
Ministry of Finance	The Ministry of Finance will be responsible for mobilising external financial resources, setting taxes and approving subsidies or reduced import duties (e.g. for stove inputs)..
Ministry of Economic Affairs/Industry/SME Promotion	The Ministry of Economic Affairs can provide assistance to stove producers in the fields of business development services (BDS), technical training and microfinance.
Ministry of Research and Technology	The Ministry of Research and Technology can fund Research & Development (R&D) activities in cooperation with local users and producers to ensure satisfactory stove quality.
National Bureau of Standards	The Bureau of Standards can set norms for improved stoves and ensure quality control.
Ministry of Agriculture/ Forestry/ Environment	The Green Sector has an important role with respect to biomass energy supply-side management strategies (natural resource management, land-use rights issues, woodlots, sustainable charcoal production, etc.).
Local government authorities	In recent years, many countries have moved towards greater decentralisation of planning processes. This results in a more important role of local government authorities in ensuring sustainable biomass energy supply and use on the local level.
Parliamentary committees	Parliamentary committees are often responsible for approving budgets related to interventions proposed by government ministries (e.g. awareness and research programmes).

In some countries *para-statal agencies* are already responsible for rural electrification or biomass energy demand and supply-side measures. In Mali, it was found that both the Directorate of Nature Conservation and the Directorate of Energy often neglect household energy topics and, due to insufficient resources, tend to focus instead on their “main” responsibilities. Thus, in the World Bank funded Household and Universal Access (HEURA) project it was agreed to channel support through a newly established national rural energy services agency, AMADER (Agence Malienne pour le Développement de l’Energie Domestique et de l’Électrification Rurale) and a rural energy fund, FER (Fonds d’l’Electrification Rurale) (World Bank 2003). Other examples include the ‘Agence Nationale d’Electrification Rurale des Energies Domestiques’ (ANERED) in Guinea Bissau or the ‘Agence pour l’Accès Universel aux services’ (APAUS) in Mauritania (Khennas 2006). In Senegal, the existence of a household energy unit (Cellule des combustibles domestiques - CCD) under the Ministry of Energy has contributed to more coherence in the field of household and biomass energy (Khennas 2006).

3.2 The Role of Other Stakeholders

Some of the tasks related to demand-side cooking energy interventions may be initiated by the government but can eventually be handed over to NGOs, the private sector or rural communities for implementation. As governments are quite often limited in their resources, partnerships for implementation of the strategy may be called for. Support from other stakeholders, such as NGOs, can be garnered through consultative processes. These types of consultative processes will also allow policy makers to obtain valuable information on household energy requirements, market trends and current resources in order to design an appropriate strategy.

The roles of the different stakeholders are described in more detail in the following.

Private sector

As noted above, successful stove dissemination is characterized by a commercial market-based approach where the government does not get involved in stove production and distribution. Efficient stove distribution is most commonly related to the small-scale production of stoves for low-income populations. In these cases governments may provide assistance to stove producers and sellers in the form of technical assistance in production and marketing. It may also facilitate the access to credit (see also section 4.3). In the case of large-scale (industrial) production of biomass stoves for urban households or social institutions, governments could provide additional assistance, e.g. in the form of reduced import levies.

End-users

The successful market penetration of an improved stove depends on a behavioural change of the end-user in terms of cooking habits and the proper use of the stove and fuels. This implies that the user has to be included in the dissemination process from product development to market development. Indeed, practical experience shows that successful stove interventions have been accompanied by extensive involvement of users in the design, testing, production, and dissemination of stoves, while major disappointments have been associated with top down, technocratic approaches (Barnes and Kumar 2002).

NGOs

In many successful stove programmes, local NGOs, CBOs or women's associations are heavily involved. Local organizations have become regional resource centres for stove design, dissemination and monitoring, and they played a significant role in the further spread of stove programmes especially in Africa (Kammen 1995, GTZ 2006). Implementing agencies could thus often make greater use of these organisations in the dissemination of stoves (Barnes et al. 1994, World Bank 2005). Advantages of such organisations in implementing stove programmes are their non-bureaucratic nature, their ability to react quickly, their strong commitment as well as their relative closeness to users. On the other hand, problems may develop if involvement of too many parties leads to fragmentation of efforts. Some NGOs have also been accused of being primarily founded to absorb donor funding without paying tax - and not to achieve stated development objectives. NGOs in the past have further engaged in the free distribution of stoves, thereby leading to problems of market distortion (see section 4.2 for a discussion of subsidies).

Research organisations

The government can provide funding for research organisations. Research and development (R&D) is essential for the development of energy policies and strategies and for practical

implementation, since promoted technologies are often new to rural or urban areas and research is necessary to adapt technologies to local socio-economic conditions (ESCAP 2005). These R&D activities, especially in the case of small-scale artisan stove production, have to take place in close collaboration between researchers, producers and end-users.

Some research organisations such as universities or specialised institutions may also be used to carry out *Capacity Development (CD)* activities for stakeholders who lack sufficient capacity to fulfil their role in implementing the interventions. These CD activities should be based on a targeted approach, ensured through a preceding *Capacity Assessment (CA)*.⁵ Support of CD interventions is also a potential field of engagement for donors.

Donor agencies

International donor agencies, along with governments, have funded many stove projects in both rural and urban areas, from the conservation of charcoal to the conservation of wood and other biomass. To put donor involvement in perspective though, it should be noted that at least in Asia some of the major investments in stove programmes have come from the countries themselves, while the involvement of donors has been modest.⁶ For example, in India and China the majority of the investments were generated by the countries themselves. In Thailand as well as in other Asian countries, improved stove development began in the private sector (Barnes et al. 1994). In contrast, the funds allocated by other governments, for instance in some southern African countries, have been low in relation to the magnitude of biomass users in the respective countries.

In any case, donors need to take care that they align their activities to the given development goals of a partner countries. Some donors have been found to provide money for one particular concept (e.g. “promotion of biogas for households”) without considering whether they are actually in line with relevant nation-wide strategies. But donors not only have to align themselves to the goals and strategies of the partner country, they also have to ensure an effective coordination with the activities of other donor organisations.⁷ For instance, in Senegal the close collaboration between the Bank (financier) and the Dutch Cooperation (co-financier) throughout the implementation process was a key factor of the success of the PROGEDE project (World Bank 2005).⁸

International donors can also serve a role in the facilitation of information exchange on the technical and managerial aspects of stove interventions. Barnes et al. (1994: 23) note that “a common complaint about past donor assistance, for example, has been that survey and other research done in the context of a particular stove programme has never been put into a form that makes it easily available and useful for other programmes. This has resulted in the frustrating paradox that senior management of donor organizations feel that they have already funded enough research, but programme managers and stove designers feel a strong need for more information.” Donors may support information exchange by facilitating the networking between stakeholders in the biomass energy sector. They may also promote

⁵ See also GTZ/EUEI PDF (2007) and GTZ (2008a).

⁶ The required levels of financial support for stove programs are in general quite modest when compared to e.g. costs per user in rural electrification initiatives.

⁷ Greater alignment and coordination are two of the main goals set out in the Paris Declaration on Aid Effectiveness from 2005.

⁸ Another success factor was the financial flexibility awarded to the project by the donors which enabled a number of necessary adjustments by the borrower in the course of the project. Furthermore, the continuity of core Bank staff from project preparation to closing allowed for a high level of relevant know-how and thus contributed to improving the quality of donor operations.

the publication of experiences or the creation of databases, possibly facilitated by the government or research centres.

Coordinating body

The inclusion of stakeholders such as NGOs, private sector or donor agencies in addition to public bodies requires an effective cooperation and coordination between involved parties. Coordination is required at various levels in order for stakeholders to perform their functions efficiently. On a project level, experiences with past stove programmes indicates that the best programmes are characterised by a high degree of interaction between stove users, builders and designers and implementing agencies (Barnes et al. 1994).

The need to mainstream biomass energy into other sectors such as agriculture or education requires an effective coordinating mechanism at the sectoral level. In Kenya, at least 3 ministries address biomass energy related issues, namely the Ministry of Energy, the Ministry of Environment, Natural Resources and Wildlife and the Ministry of Agriculture. This has sometimes resulted in conflicting decrees and confusion caused by multiple government organs developing strategies on biomass. In order to adequately harmonize their strategies, a single institution has been proposed to manage biomass energy, established as a regulatory organisation under the Ministry of Environment, Natural Resources and Wildlife (Energy Alternatives Africa 2003).

One way to ensure synergy building and efficient coordination of relevant stakeholders is to establish a steering committee, coordinated by the body in charge (e.g. Ministry, para-statal agency) and including all involved actors. One example of such a steering committee is the 'Comité Intersectoriel de Mise en oeuvre des Synergies entre le secteur de l'Énergie et les autres Secteurs Stratégiques pour la réduction de la pauvreté' (CIMES) in Senegal. It is formed by representatives from government bodies, private sector, rural communities and civil society with the objective to create synergies between energy and other sectors and to ensure that the energy component is taken into account in poverty reduction strategy programmes (Khennas 2006). The effective functioning of a steering committee will depend on its ability to provide a forum for open and critical dialogue. This will depend in turn on the mandate and the specific motivation of attendance of the members. A committee in which members are only taking part to fulfil a formality is not likely to be of much benefit.

A coordinating institution at the intermediary level, e.g. a NGO, government body or private concession holder, may also provide an effective link between the national and local levels. One example at the intermediate level is the Intermediate Technology Development Group, which has successfully played a coordinating role in countries such as Sri Lanka and Zimbabwe. In this case, however, the focus extended beyond biomass to other energy sources (ESCAP 2005).

4 Key Elements of Cooking Energy Interventions and Role of the Government

Past experiences with cooking energy interventions suggest that *four elements* are necessary for the successful dissemination of efficient stoves:

1. The efficiency and quality of improved stoves is secured
2. The marketed stoves are affordable to the customer
3. The supply of improved stoves in both urban and rural areas is ensured
4. End-users are aware of the availability and benefits of improved stoves

These four elements (relating to *quality, price, supply and demand*) should be adequately considered by those involved in the planning process. The four elements are described in greater detail in sections 4.1 – 4.4.

It is important to note that the presented recommendations are not rigid in the sense that they can be applied in all countries in the same way. They should rather be viewed as describing the numerous available options that policy makers can choose from - based on their local circumstances - and then adapt accordingly.

4.1 The Efficiency and Quality of Improved Stoves is Secured

Why is this element important?

Poor quality and efficiency of improved stove technologies represent an important barrier to successful stove dissemination. This applies to decentralised stove production in the informal sector as well as to factory finished products. Addressing quality issues involves undertaking research and development (R&D) activities and ensuring quality control.

What is the role of the government?

The government can ensure adequate stove quality through funding and promotion of *research and development (R&D)* activities. R&D on efficient stoves will focus on adapting existing technologies to local circumstances instead of developing new technologies if costs are too high or local research capacity is lacking. Technology adaptation means making products affordable and producible with local skills and resources, resistant to local climate, as well as adapted to the needs and tastes of local consumers. Adaptation strategies should be needs-based, using research on technologies to meet the needs of the local population (ESCAP 2005).

R&D that is based on a needs-based principle needs to secure a close interaction between researchers as well as local producers and users (UNDP 2000, Barnes and Kumar 2002).⁹ This way it can be ensured that stoves are adjusted to local conditions, skills and materials as well as to user preferences and purchasing power. In the case of large-scale stove

⁹ This also includes allowing an eclectic pattern of energy security. As Kammen (1995) points out, the energy ladder may be a too simplistic view of energy decision-making. In many African settings, families may acquire new cooking technologies while keeping more traditional stove models in use. Stove programmes should go along with this process by offering households a diverse set of energy technologies which they can choose from based on their specific needs.

production, a market survey collecting data on consumer preferences may substitute the close interaction with the user.

One solution to avoid stove designs that are imposed from the top would be to establish local cookstove training centres where locally adapted designs and management approaches for community workshops can be discussed with community leaders. Another proposition is to provide small-scale decentralised funding to groups of women, households or communities in order to experiment with and assess various energy technologies (improved stoves, PV systems, solar dryers, etc). This could result in technology resource centres that provide a wide range of technical advice. These types of approaches could promote locally adapted designs technology choice instead of technology dependence (Kammen 1995).

There is also a need for continued field testing and monitoring during the development stage. Improved stoves should thus be introduced on a trial basis. One successful example of such approach can be found in Ethiopia where a British NGO was able to develop and disseminate over 600 000 stoves of one type and over 54 000 stoves of a second type through an iterative approach of needs assessment, design, product trials, re-design and performance monitoring (EC/UNDP 1999).

Measures to ensure *quality control* of stove technologies include the adoption of quality standards and the establishment of a quality control system, for example through certification of highly skilled producers or labelling of quality products (cf. ESMAP 1991b, ESMAP 2007). Standards may be established by universities or relevant government authorities. Quality standards for stoves sometimes form an important criterion for international donors with respect to credit approval.

Example

In 2005 the Kenyan Bureau of Standards (KEBS) developed standards for a charcoal stove, the Kenyan Ceramic Jiko (KEBS 2005). This standard describes performance requirements and test methods. It also provides production instructions with detailed images. The test methods are specified in detail to ensure reproducibility at recognised testing establishments within Kenya, and objective acceptance criteria are defined to ensure consistency of assessment. In order to keep abreast of progress in industry, Kenya Standards shall be regularly reviewed.

Quality control is also facilitated by the mass-production of stoves, as opposed to custom-built ones (Barnes et al. 1994, Barnes and Kumar 2002), and by keeping the production process simple (e.g. few number of parts).

Who in the government is involved?

Ministry of Energy and subordinated agencies, Ministry of Research and Technology, National Bureau of Standards, public research institutions.

4.2 The Marketed Stoves are Affordable to the Customer

Why is this element important?

The low level of income of the households depending on biomass fuels is a major barrier to increasing the dissemination of improved stoves. For poor households, stoves represent a high initial investment and this prevents them from purchasing the product. In a market-based approach the stove prices ideally will be geared towards the low purchasing power of these households.

What is the role of the government?

The government's role in a sustainable, commercial dissemination approach is to support the development of markets for affordable products, but not to provide stoves to the customer free of charge or at reduced prices. In the past, implementing agencies of stove programmes such as government bodies or NGOs often distributed the stove for free, or they provided *subsidies* in order to accelerate uptake. The main problem with subsidies is that users often do not value, use and maintain a stove for which the price is too low. Also, high levels of subsidy towards stove cost create market distortions that make it impossible for stove manufacturers to compete freely in the market. Moreover, the use of subsidies is not sustainable as the market will break down once the subsidies are removed.

Experience indicates that the majority of successful dissemination efforts involve little or no 'direct' subsidy for the stove itself (Barnes et al. 1994, Barnes and Kumar 2002, GTZ 2008b, Smith 1993, World Bank 2005). Instead funds are used for e.g. promotion and awareness campaigns or R&D (which could be regarded as 'indirect' subsidies).¹⁰

Example

In the country of Burkina Faso cooking energy interventions have been carried out over the last decades. However, the visible results of these interventions are negligible, and few producers are still in business, due to market distortion created by subsidised stoves. A GTZ intervention started in 2005 took these lessons learnt from the past seriously and avoided offering subsidies. Instead the project strongly promoted information and awareness raising efforts and carried out an extensive marketing campaign in order to facilitate market penetration. This commercial approach has led to high numbers of households using stoves and has increased income of producers.

There may be room for investigating well-designed subsidies that are time-limited, rule-bound and transparent.¹¹ However, it is important to mention that sustainable stove dissemination is possible without subsidies, for instance in regions where wood is scarce. In these areas stoves will be valued more by users because people pay money for fuelwood or have to spend a significant amount of time to collect it (Barnes et al. 1994, Barnes and Kumar 2002).

¹⁰ It is debatable whether subsidies will have advantages for private entrepreneurs producing the stoves. On the one hand, the use of subsidies will increase their profit margin per stove sold. On the other hand, successful market penetration will increase their turnover and thus their total income – which is more likely if subsidies are not used.

¹¹ Such subsidies are sometimes referred to as "smart" subsidies. If several donors are involved, the different donor approaches towards subsidies need to be harmonised.

Further options to overcome the cost barrier for the consumer are the facilitation of end-user financing through support of microfinance mechanisms or leasing arrangements with stove producers.¹² Mass production of stoves or use of local materials in the production process will also help to lower cost of the stoves.

Subsidies or taxes to alternative fuels such as kerosene or coal are closely related to improved stove programmes. Evidence shows that people are willing to switch to alternatives fuels, especially if they are subsidized and made readily available, while removal of subsidies for alternative fuels tends to push households down the energy ladder to increase their use of biomass and fuelwood, at least in the first instance (ESMAP 2005a). Further discussion of this complex issue can be found elsewhere in Barnes (1993), Smith et al. (1993), ESMAP (1991a) or ESMAP (2005a).

Who in the government is involved?

Ministry of Energy and subordinated agencies, Ministry of Finance

4.3 The Supply of Improved Stoves in Both Urban and Rural Areas is Ensured

Why is this element important?

Experience from many cooking interventions shows that stove production and distribution can be carried out more effectively by private entrepreneurs than by government bodies. However, stove producers and distributors - if existing - often suffer from insufficient access to finance and lack of technical or business management skills.

What is the role of the government?

Government assistance to entrepreneurs in rural and urban areas can include support for training in business and marketing as well as technical aspects of stove production.

A Capacity Assessment could establish the capacity strenghts and weaknesses of entrepreneurs and identify suitable CD measures. Relevant training institutions could include, for example, a Micro and Small Enterprise Development Agency.

Example

In the ProBEC project in Malawi, Tanzania and Zambia, entrepreneurs themselves partially engaged in capacity development for stove production by qualifying their own producers to build stoves. These producers are subsequently employed by larger companies (tea estates) who own their own factory canteens.

The facilitation of access to credit for private stove entrepreneurs is a further potential area for government involvement. Here government should not engage in giving out loans (as

¹² These approaches are still in their early stages of development so closer evaluation is needed. See GTZ (2007b) for examples of using micro credit for stove dissemination.

loans from government can easily turn into grants), but instead encourage local banks or microfinance institutions to develop appropriate financing schemes.¹³

Example

E+Co is a not-for-profit company specialised in promoting small and medium clean energy enterprises in developing countries. To this end, E+Co, supports the enterprises through a combination of business development services (BDS) and credits between approximately USD 20.000 and 200.000. In cooperation with BMZ and DGIS, E+Co managed to provide over 130.000 people in Sub-Saharan Africa with modern energy over the course of two years.

Example

In a World Bank project in Senegal, a “revolving credit fund” was established for stove producers. The establishment of the fund was, however, characterised by a delay in the procurement problems of a financial intermediary which was caused both by the World Bank as well as the borrower. Although project targets with respect to stove dissemination were achieved in the end, the implementation of the project was significantly hampered by the delay (World Bank 2005).

Government may also encourage the production of improved stoves through income tax exemptions and the import of stoves through reduced import duties.

Who in the government is involved?

Ministry of Economic Affairs, Trade and Industry, Micro and Small Enterprise Development Agency

4.4 End-Users are Aware of the Availability and Benefits of Improved Stoves

Why is this element important?

People from low income communities, who may be characterised by low level of basic education, are often not well informed about biomass energy efficiency, available stove technologies and their potential benefits. Moreover, they may not be able to distinguish between high and low quality stoves. Initiatives will need to provide information to end-users in order to convince them to purchase efficient and high quality products.¹⁴

What is the role of the government?

Governments can support promotional and information campaigns to raise awareness of efficient biomass use and the availability of improved stoves. Experience has shown that

¹³ For a general overview on micro-financing options for energy services, see chapter seven of UNDP (2000).

¹⁴ Promotion campaigns, which are essentially designed to stimulate demand, should be carried out only in regions where supply of stoves can be provided in a reasonable time span. Otherwise there is a possibility that customers develop a negative attitude towards the product.

these campaigns are particularly effective when the difference between conventional cooking practices and efficient stoves is practically demonstrated on site, e.g. at markets or fairs (UNDP 2000, Winrock 2004). Information about the various technology options could also be disseminated through a range of communication tools and media to end-users. In many countries the potential contribution of public service advertisements for development does not receive adequate attention. One possibility could be to assign special fees for promoting improved stoves via radio or TV.

It should be noted that information campaigns do not have to rely on facts alone (i.e. focussing the benefits of an improved stove for the customer). They can also make use of images in order to sell the product, for example by portraying stoves as a “modern” form of cooking.

Government authorities may decide to provide stoves in certain public facilities such as schools, or to include relevant information in school or university curricula.

Example

In Uganda information on biomass energy conservation and improved stoves, in combination with other energy related issues, are included in the public school curriculum. In order to raise awareness among children, the Ministry of Energy and Mineral Development (MoEMD) and the Ministry of Education developed teaching materials for primary schools (MoEM/GTZ-EAP 2003). This, along with the high acceptance of the locally marketed stoves and the support of the local leadership, contributed to dissemination rates of up to 90% in some villages. The demand is still high.

Who in the government is involved?

Ministry of Education, Ministry of Health, NGO (contracted)

5 Summary and Conclusions

Biomass remains the most widely used source of energy in developing countries today. The bulk of energy from biomass fuels is consumed by households, mostly for cooking purposes. In recent years a number of developing countries have introduced Biomass Energy Strategies (BEST) in order to ensure the sustainable management and use of biomass resources. One of the most successful and widely applied measures within the framework of BEST is the introduction of energy-efficient cooking stoves.

Biomass Energy Strategies describe the key interventions needed to achieve sustainable biomass use, both on the supply-side and on the demand-side. The focus of this document was on demand-side interventions in the cooking energy sector, primarily the dissemination of improved stoves. In particular, *this document outlined the potential role of government in demand-side interventions in the cooking energy sector* within the frame of wider Biomass Energy Strategies. By describing the major lessons learned for cooking energy interventions, the document intended to facilitate the planning process and provide policymakers with a sound basis for sustainable implementation.

A general theme arising from experiences with demand-side cooking energy interventions is that the government should not be directly involved in the dissemination of cooking technologies through the production or sale of stoves. A commercial market-based approach supporting private entrepreneurs has been proven to be more effective and sustainable. The *role of government* should rather lie in the formulation of an enabling policy framework, the integration of cooking energy into research and development efforts, the promotion of awareness raising campaigns as well as the provision of required public funds.

The question of which organisational unit within the government should take over responsibility of implementation depends to a large extent on national circumstances. Government authorities are characterised by differing operative responsibilities and interests. Thus certain agencies may be more suitable for implementation of interventions than others. While it is necessary that one agency leads the strategy development process, it is recommended to involve all relevant government agencies in implementation efforts.

Some tasks may be initiated by the government but can eventually be handed over to e.g. NGOs for implementation. The effective coordination between all the involved government agencies and other relevant actors (NGOs, private sector, donor agencies) needs to be ensured, for example through the establishment of an intersectoral steering committee.

In terms of *planning of the concrete actions*, past experiences with cooking energy interventions suggest that four elements are necessary for the successful dissemination of efficient stoves:

1. *The efficiency and quality of improved stoves is secured.* Poor quality and efficiency of improved stove technologies represent an important barrier to successful stove dissemination. This can be addressed by undertaking research and development (R&D) activities and by ensuring quality control.
2. *The marketed stoves are affordable for the customer.* For low-income households, stoves represent a high initial investment and this prevents them from purchasing the product. The government's role in a sustainable, commercial dissemination approach is to support the market development of products that are geared towards poor households, for example through promotion and awareness campaigns or R&D. The government should not aim to distribute stoves to the customer free of charge or at reduced prices, through the provision of 'direct' subsidies on stove cost.
3. *The supply of improved stoves in both urban and rural areas is ensured.* Stove production and distribution can be carried out more effectively by private entrepreneurs than by government bodies. However, these entrepreneurs - if existing – may require assistance to help them overcome lack of technical or business management skills or insufficient access to finance.
4. *End-users are aware of the availability and benefits of improved stoves.* People from low income communities, who may be characterised by low level of basic education, are often not well informed about biomass energy efficiency, available stove technologies and their potential benefits. Initiatives will need to provide them with relevant information in order to convince them to purchase efficient and high quality products.

These above elements (relating to *quality, price, supply and demand*) need to be adequately considered by those involved in the planning process. Nevertheless, the presented recommendations are not rigid in the sense that they can be applied in all countries in the same way. They should rather be viewed as a description of the numerous available options that policy makers can choose from - based on their local circumstances - and then adapt accordingly.

Finally, it needs to be stressed that the present study only looked at the demand-side dimension of a biomass energy strategy, namely the dissemination of efficient stove technologies. In reality, biomass energy strategies need to address demand and supply-side interventions simultaneously if they want to ensure a sustainable balance between biomass demand and supply. For example, if the response to fuel shortage is to introduce new fuels then that will also affect the design of the demand-side strategy. The question of best practice recommendations for supply-side interventions thus remains an important area for future research. This will be addressed in a future effort.

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