

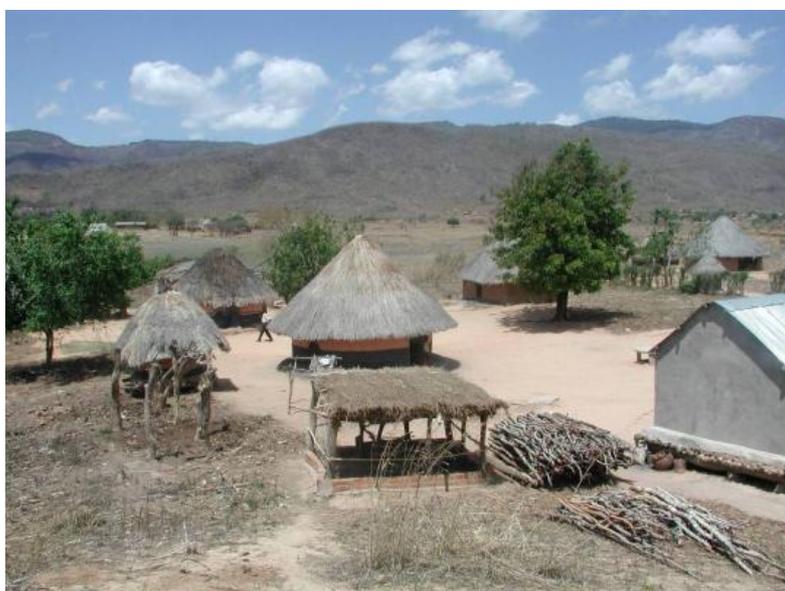
**BIOMASS ENERGY STRATEGY (BEST)**

**WOOD FUEL SUPPLY INTERVENTIONS**

**LESSONS LEARNED AND RECOMMENDATIONS**

***POLICY BRIEF***

April 2009



**Partnership Dialogue Facility (EUEI PDF)**



commissioned by



**Federal Ministry  
for Economic Cooperation  
and Development**

## 1. Background

Wood-based fuels remain the most significant energy source for the majority of developing countries. Worldwide, estimated 2.5 billion people use biofuels mainly for cooking and heating while in poverty-stricken developing countries more than 90 percent are depending on energy from biomass. Alternatives introduced by governments have often failed their purpose to overcome their peoples' overwhelming dependency on firewood and charcoal.

Biomass Energy Strategies (BEST) describe the key interventions needed to achieve sustainable biomass use, both on the supply-side and on the demand-side. The paper at hand links itself to BEST by focusing on the supply-side of wood-based solid fuels. It aims to fill information gaps and pleads for deliberate action in support of optimized, sustainable production of biomass energy. Thereby, it abstains from any attempt to "reinvent the wheel" – instead, the challenge lies in (i) transferring any applying established best practices from sustainable forest management to the production of wood-based fuels, and (ii) providing a well-structured overview of existing knowledge for the benefit of practitioners and policy makers.

It is common understanding that unregulated use of wood-based energy sources may lead to the degradation of forests. Therefore, the aim to manage existing forests sustainably sets narrow limitations on the harvesting of forest products. On the other hand, wood-based fuel harvesting is often not sufficiently taken into account in forest management concepts. The problematic outcome of this is that harvesting and use of biomass fuels in most cases has remained informal, unregulated and non-sustainable. Furthermore, it leads to a situation where forest dependant rural communities lose control over and access to much needed forest produce and eventually, benefits are concentrated in the hands of a small number of intermediaries.

An obvious alternative to negotiate the obstacle successfully was the establishment of wood fuel plantations. However, such plantations often fail to meet the demand due a lack of available land, insufficient tenure security and governance deficits for preventing unregulated access. Furthermore, wood fuel plantations have in many cases gradually been shifted towards production of forest products with higher market value (e.g. poles, construction timber) since wood based fuels are frequently underpriced or not commercialized at all.

Generally, a number of factors can be held responsible for the economic, ecological and social negligence of biomass as a source of energy in many developing countries:

- The use of biomass energy is often regarded as primitive or backwards.
- Biomass fuels are widely associated with the poorest and most disadvantaged of the society often neglected in official government policies.
- Firewood and charcoal has been highlighted as one of the underlying causes of forest degradation and deforestation. Subsequently, governments of developing countries have come under pressure with the effect that their energy policies and strategies highlight the need to shift away from 'traditional' fuels towards LPG, solar energy, hydro-power etc.

- Accurate and up-to-date forest inventory data are often not available as a prerequisite for sustainable woodfuel production.

Framework conditions for a deliberate, sustainable production of wood-based solid fuels are deteriorating in the face of both mounting land-use competition, and the ever increasing complexity of societal demand for forest resources. Growth of international and domestic timber trade brought forest resources under pressure and shifted the sector's attention towards the production of valuable commercial timber. On the other hand, population growth associated with low agricultural productivity and increasing demand for food and cash crops has created strong incentives for the conversion of forests into other land uses. In addition, the growing threat to forest resources have led to the formal protection of remaining natural forests in various categories and kinds and are therefore rendered inaccessible to poverty-stricken communities dependent on wood-based fuels and other non-timber forest products. These scenarios have in common that underpriced commodities such as firewood are of low priority in land use decisions, In consequence, proponents of wood-based solid fuels face growing difficulties in identifying areas suitable for reforestation as well as for promoting sustainable wood-fuel production in forest management systems.

Based on the foregoing conditions the mainstreaming of sustainable wood-fuel production is essential in forest management and land use decisions. Approaches have to aim to (i) discourage unregulated production and use of wood-based fuels, (ii) promote technical innovation and management capacity at all levels, and (iii) improve framework conditions and business opportunities for legitimate stakeholders along the wood-fuel production chain. The ultimate goal, however, is to end the present undervaluation of wood-based fuels, and to turn them into adequately priced marketable commodities.

A shift towards a well-regulated, sustainable biomass energy sector requires a dramatic change in perception, behavior, commitment and the willingness of relevant stakeholders to participate in this process. Therefore, the present document outlines potential roles, functions and responsibilities of these stakeholders clustered into the three categories of **Shapers** (central and local governments), **Facilitators** (donor agencies, NGOs, research organizations) and **Implementers** (communities, private sector). At national level, the Department of Energy and the Forestry Department should spearhead the implementation of policy formulation and implementation, while other relevant ministries and stakeholders take over responsibilities in accordance with their mandate and function. Central governments play a key role in developing cross-cutting as well as sector-specific policies and setting development priorities, while local governments are the principal proponents of implementation-oriented planning and administration. Donor agencies, representing the second category, typically provide advisory support, capacity development, knowledge and technology transfer, and funding, while NGOs typically engage in awareness building, lobbying, mobilizing funds for development, and advocacy. Research organizations provide information, analysis and innovation. The third category includes communities and the private sector who principally react to framework conditions and absorb support provided by the first two stakeholder categories.

The following observations and conclusions are drawn from the discussion above and serve as the base for subsequent recommendations on the biomass energy sector:

1. Wood fuels have considerable potential in respect to providing environmental friendly, renewable source of energy, promoting rural development and promoting small and medium-sized businesses and pro-poor employment.
2. Where wood-based fuels do contribute to resource depletion and inequitable socio-economic outcomes, this must be ascribed to governance deficits and ensuing market failures.
3. Replacing wood-based fuels does not seem a viable option for many developing countries.
4. The promotion of SFM alone does not suffice to address wood fuel supply deficits.
5. Factors such as availability of land limit the feasibility and performance of forest plantations as a means to produce large quantities of wood based fuels on a sustainable basis.
6. If wood-based fuels are to be produced in a coordinated and sustainable manner, structural disincentives must be removed in order to establish adequate pricing that reflects the true costs of sustainable woodfuel production.
7. Targeted policy interventions, governance support and deliberate value-chain development are required with a view to formalising energy business, promoting production and sustainable management of forests and woodlands, and levelling the playing field for a wider range of resource-dependent stakeholders.

## 2 Recommendations:

**Promote woodfuel as a modern energy carrier:** Wood-based fuels can be “modernized” all along the production chain. Wood-energy is versatile and displays a high potential for technological innovation. Furthermore, sustainable production of wood-based fuels can serve as an engine for sustainable rural development and can create incentives for landowners and farmers to manage woodlands better, and to invest into fuelwood plantations. Therefore, a consensual vision statement for the promotion of sustainable wood energy production of all relevant government authorities is required describing the desired situation in the long term of 15-30 years. It should address four basic principles: (i) environmental and climate-friendliness, (ii) security of supply, (iii) economic efficiency and compliance as well as (iv) health and safety requirements.

Technical or financial assistance alone can neither induce nor achieve the required policy change necessary to realize such a vision. They need to be backed up with targeted policy advisory support on the national level. Furthermore, interagency cooperation must be enhanced along with the revision of policy agendas. Thus, the vision statement must be mainstreamed into the technical service culture from central to local level. Implementation of such a vision entails a stepwise process requiring a continuous refinement of respective framework conditions, organizational and procedural aspects, and technological development. The paper illustrates this process by comparing different stages of modernising the wood-fuel production chain. Practical implementation and up-scaling of this vision requires awareness raising, lobbying and PR measures to ensure that support to biomass energy production generates lasting and self-sustaining impact.

**Promote informed decision making:** The development of the sector towards sustainable woodfuel production requires informed decision making. Generally, efforts to improve the informational basis of policy making and subsequent implementation of wood fuel policies should focus on (i) identifying information gaps and needs of stakeholders, (ii) measures to improve information and knowledge management (IKM), and (iii) capacity development and pilot-interventions with a view to collecting supplementary data.

Precise data on the woodfuel value chain are necessary to provide an excellent entry-point for shaping sound policy frameworks and offer opportunity to the various stakeholders to add knowledge, innovation capital and technology at each step of the value chain. Forest-specific terms and concepts, the use of conversion factors, the misrepresentations and knowledge gaps regarding the use of wood-based fuels as well as the specifics of forest management may lead to disharmonised approach regarding supply calculations, planned harvesting measures, and transportation schemes. To alleviate these constraints, FAO has published a “Unified Bio-Energy Terminology” as well as a guide outlining simple rapid methods to verify existing data, to fill the gaps in the information chain, and to conduct more reliable surveys. In addition, FAO introduced the WOOD-fuel Integrated Supply/Demand Overview Map (WISDOM), a GIS-based tool to support national wood energy planning.

**Implement economic policies with a view to correcting market failures:** A further issue is the generally weak market position of forestry with subsequent under-valuated and underpriced products, despite growing scarcity of wood. Underpricing generally translates into wasteful and inefficient production and consumption of wood-based fuels and creates formidable disincentives for forest management and tree growing. Changing this situation implies (i) a mutually synergetic approach of adequate use regulation and enforcement (taxation), (ii) a strategic shift from open-access forests towards secure tenure and sustainable forest management (formal agreements and cutting permits), and (iii) an introduction of fuel-saving combustion technology.

**Assure adequate land tenure/user rights for wood fuel production:** Unregulated access to forest resources and unchecked exploitation are directly linked to forest resource tenure. It is widely recognized that security of tenure is one of the most significant framework conditions necessary for sustainable forest management. Tenure arrangements must hence be adequately reflected in wood-fuel policies. The document identifies several actions that need to be taken to support the strategic shift from demand-driven exploitation to production-oriented management. It promotes three basic types of instruments to support tenure reform and tenure security: (i) the promotion of joint management arrangements, (ii) incentive systems, and (iii) capacity development.

**Improve governance capacity to reorganize the charcoal production sector:** Targeted modernization of the wood-fuel supply chain and the establishment of vibrant wood-fuel markets require a consolidated government approach. However, sector administrations, prominently the forestry administration in many countries, are either weak, or themselves forced to prioritize other forest management goals over sustainable wood-fuel supply. Thus, in order to improve government capacity towards a formal and sustainable wood-fuel sector a possible solution may lie in the

creation of institutions specifically assigned to cross-cutting woodfuel planning, strategy development, resource monitoring and evaluation on all levels, and operational support. Attributed to the latter function would be a wide range of public relations and awareness building, training and extension, and lobbying for policy support for the goal of sustainable wood-fuel production. Such institution would be fundamental for the facilitation of multi-stakeholder participation and involvement of the private sector. In addition, capacity development also needs to reach out to the policy and legal services. Energy sector institutions and forest sector agencies should solicit, and rely on support by authorized law enforcement agencies and the judiciary.

**Assist local actors to introduce efficient production options and technologies:** The sixth recommendation is concerned with the efficient production options and technologies for wood-based fuel supply and presents two basic avenues of intervention; (i) the production of wood-fuels in the narrower sense, and (ii) an introduction of improved conversion technologies for charcoal production (improved kilns).

Options for wood-fuel production in the narrower sense are demonstrated along the three production categories of (i) forest plantations, (ii) natural forests (including secondary forests) and (iii) “trees outside forests” (TOFs).

Forest plantations on degraded land as a means of producing fuelwood can yield a wide range of benefits such as specific ecosystem services (soil fixation, water protection, carbon sequestration), reduced pressure on natural forests, amelioration of marginal or degraded land, employment opportunities and a contribution to rural development. Thus, plantations require careful development policies, full stakeholder participation and cross-sectoral coordination. Technically, nitrogen-fixating, site-adapted hardwood species should be selected that coppice readily. Actual selection depends on what can be grown easily on the site, and can be acceptable to the users. Cultivation methods need to be adapted to the skills and resources of the rural people. Furthermore, every plantation activity should be preceded by an economic analysis. Reference is made to a village-based approach in Madagascar (GTZ) and to an out-grower scheme analyzed by FAO.

Wood-fuel production in natural or secondary forests requires a more complex approach because it is normally only a by-product of more valuable production goals. The current document describes woodfuel productions with a particular focus on community based schemes (CBFM, CBNRM) in savannah woodlands since wood-fuel shortages generally occur in such regions. Based on experience of the World Resources Institute (WRI), a number of recommendations are presented which are particularly important when designing and implementing participatory forest management projects for wood-based fuel production:

- Facilitate stakeholder consultation before PFM activities start;
- Carry out baseline studies for assessing success or failure of intended PFM activities;
- Make critical analysis to which extent administrative authority and responsibility should be transferred from government agencies to rural communities (land ownership, sharing of costs and benefits, etc.);

- Ensure that functional institutional frameworks at village level is developed to oversee planning, implementation and monitoring;
- Ensure that management plans developed through participatory action are accessible for communities with low literacy levels;
- Introduce ecological monitoring as a helpful method in natural resource management.

“Trees outside forests” (TOFs) refer to trees on non-forest and non-wooded lands. They fulfil a multipurpose function including soil and water conservation, fencing and energy supply. Therefore, wood-fuel can be a principal product in TOFs. For the purpose of wood-fuel production, fast growing hardwood species that coppice readily, fix nitrogen and can be harvested after 4-6 years should be selected. The World Agroforestry Centre maintains a freely accessible database with information on the management, use and ecology of a wide range of tree species for this purpose. The Centre also published a guide on how to integrate gender issues when programming agroforestry initiatives, since women are mainly affected by the lack of accessible wood-fuel supplies. Another important issue is concerned with the promotion of agroforestry approaches at policy level for their recognition as one of the most important fuelwood supply sources. The socio-economic and ecological advantages of wood-fuel production within agroforestry systems substantially outweigh many expensive, ill-conceived tree plantation programs with a wider diversity of goods and services for the local and national economies.

The options for fuelwood production also include charcoal as the primary energy source in most African countries. However, the common issues characterizing the charcoal production chain in these countries include: (i) unregulated/illegal resource use, (ii) rampant and systematic corruption, (iii) inefficient conversion technologies, (iv) a perception that it is a poor man’s business, and (v) the charcoal business being dominated by a few powerful individuals.

Charcoal consumption is a very controversial issue as the transformation process from wood to charcoal results in considerable energy loss. On the other hand, charcoal burns more cleanly than wood or dried biomass, producing higher temperatures, and it is cheaper to transport and store. Therefore, steps need to be taken to promote improved charcoal-making technologies and thus reduce the amount of raw biomass required, energy losses, and the negative impacts on health, environment and climate.

The current document, therefore, promotes for improved kiln technologies and new funding mechanisms. Since most countries’ capabilities to mobilize domestic budget support for the development of a vibrant biomass energy sector are low and insufficient, the paper outlines global as well as regional initiatives to combat climate change and promote carbon-neutral energy consumption as a source for generating funding for sustainable biomass energy solutions. This includes the Clean Development Mechanism under the UNFCCC Kyoto Protocol, the new REDD mechanism agreed at the 2007 Bali Summit (UNFCCC COP 13) and the potentials of Voluntary Carbon Marketing (VCM).