Biomass Energy Sector Planning Guide

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Contents

Preface

Worldwide, an estimated 2.6 billion people – nearly 40 % of the global population – depend on traditional biomass for cooking, of which 95 % live in Sub-Sahara Africa and developing Asia[1]. In some developing countries biomass accounts for more than 90 % of primary energy consumption. While this proportion may decline, it is unlikely that absolute consumption of biomass will decrease over the coming decades due to population growth and urbanisation. Urbanisation is associated with a transition from firewood use to charcoal use, resulting in lower overall efficiencies and therefore higher primary consumption. In spite of government policies aimed at substitution, it is unlikely that alternative fuels (such as kerosene, LPG or electricity) will offset the increasing demand for biomass energy for cooking because of its affordability and availability, especially in rural areas.

What is biomass energy?

Biomass is defined as "material of biological origin excluding material embedded in geological formations and transformed to fossil" i.e. biological material derived from living or recently living organisms. It includes wood, crops, algae, and other plants, as well as agricultural and forest residues. Biomass energy provides heat or power that originates directly from biomass.

The most widespread forms of biomass used for energy are firewood and charcoal, referred to jointly as woodfuels or woody biomass. Solid biomass is a slightly broader term that also includes materials such as agricultural residues (e.g. corn cobs, rice husks). More detailed definitions of important terms can be found in *Annex A*.

The scope of this guide is limited to **solid biomass for energy purposes,** including heating, cooking, industrial processes and electricity production. Liquid biofuels are excluded because they mainly cater for a different market (transportation). Other fuels that could replace biomass (e.g. LPG, biogas) are included only insofar as they provide potential alternatives to solid biomass.

1) IEA (2011). *World Energy Outlook 2013*

Although negative perceptions of biomass energy are widespread, biomass is not necessarily an unsustainable or backward fuel. Sustainability depends on the practices applied in the value chain; for example forest management techniques and the efficiency of conversion and use. Three commonly held misconceptions tend to associate biomass fuels with deforestation, indoor air pollution and underdevelopment.

Firstly, deforestation results from a range of causes which may include population growth, low agricultural productivity and land use policies. As wood for energy is often a by-product of land clearing for other purposes, eliminating the use of biomass is unlikely to lead to a significant reduction in deforestation rates. Deforestation is a problem that requires a diverse array of solutions, well beyond biomass energy issues.

Secondly, indoor air pollution is not a necessary outcome of using biomass fuels. If burned efficiently and cleanly in modern appliances, the emissions of carbon monoxide and particulate matter from biomass are low. The installation of chimneys can also significantly reduce indoor air pollution. Encouraging efficient and clean use of biomass may be a more cost-effective and culturally acceptable solution to reducing health risks than aiming for substitution with other fuels that may be imported, more expensive or less familiar.

Thirdly, biomass use is commonly associated with poverty and underdevelopment and biomass fuels are therefore regarded as undesirable by policy makers. However, causes are often confused with effects; biomass use is unlikely to be a cause of poverty, rather a reflection of economic constraints. In fact, biomass production and trade has a poverty alleviation effect; in many countries the production and sale of wood and charcoal are important sources of rural income, albeit mostly taking place in the informal sector.

The introduction of this document provides an overview of biomass energy sector management in the form of answers to five questions:

- What is the objective of this guide?
- Why is woody biomass important?
- Why is biomass energy sector governance needed?
- What are the governance challenges in the biomass sector?
- What are key factors of biomass energy sector governance?

This Guide describes a methodology consisting of a preparation stage and six subsequent stages for restructuring biomass governance, each stage, consisting of several steps and having its own objectives and output:

- **Preparation**
  Lead Institution and Preliminary Objectives
- **Stage 1**
  Analysis and Team Formation
- **Stage 2**
  Baseline Sector Analysis
- **Stage 3**
  Development of Scenarios
- **Stage 4**
  Formulation and Selection of Interventions
- **Stage 5**
  Strategy Formulation and Action Planning
- **Stage 6**
  Adoption and Implementation

The methodology works towards the formulation of a biomass energy strategy. It should however be noted that a strategy is not necessarily the desired outcome for every country. The process can be concluded at the end of each stage, with useful outcomes. The desired outcome should be formulated based on a needs analysis at the start of the intervention (*Steps 2* and *6*).

This guide is based on experience of EUEI PDF and GIZ in Botswana, Lesotho, Malawi, Rwanda, Mozambique, Ethiopia, Tanzania, Nepal and Sierra Leone. Even though this guide is largely built on experience in Africa, it has relevance beyond Africa and the methodology can be applied in all countries where biomass is the main fuel for households and small enterprises. This Guide is a revision of the Biomass Energy Strategy (BEST) Guide published by EUEI PDF and HERA in 2011. As a Strategy is not necessarily the right output for every country, the scope and set up of this Guide has been adapted to facilitate other outputs as well.

We kindly invite the reader to use this Guide to support cooperation among stakeholders and the development of governance structures in the biomass energy sector. As the methodology can always be improved based on application and experience, we welcome your comments and suggestions. Please contact us using *info@euei-pdf.org*.

Mirt stove at
Habesha Tikus Injera Share Company
in Ethiopia

◀ Girl with firewood in Uganda

Introduction: The woody biomass context

1. What is the objective of this guide?

This guide recognises the importance of governance of the biomass energy sector, and provides a methodology for developing more efficient cross-sectoral management structures.

The development of efficient management structures for the biomass energy sector requires coordination between stakeholders from different sectors, agreement on a shared goal, reliable sector data, awareness of trends and the development of an action plan to improve governance of the sector. This Guide provides practical, step-by-step guidance to facilitate these processes.

The Guide can be used by stakeholders in government institutions to develop efficient and coordinated ways to manage the biomass energy sector. Such institutions may include ministries and government agencies responsible for energy, forestry, gender, lands, environmental protection, rural development and agriculture. It can be also be used by civil society and donors as a tool for raising awareness of the biomass sector within government and prompting action to improve its management.

2. Why is woody biomass important?

Although woody biomass often does not receive a lot of attention in energy policy and regulation, it is a very important source of energy in many countries.

- **Biomass energy is widely used:** Nearly 40 % of the global population depend on traditional biomass for cooking, and the number is growing in absolute terms. Additionally, many small scale industries depend on biomass to fulfil (parts of) their energy use, e.g. brick firing, tea and tobacco drying and curing and fruit and fish drying. In some countries, biomass accounts for more than 90 % of total energy consumption.
- **Sustainable wood production safeguards forest functions:** Woodfuel demand can create an incentive for sustainable forest management ("protection through use"). Sustainably managed forests provide added value such as carbon storage, soil protection and preservation of ecosystems.
- **Wood energy is locally available:** Established biomass value chains (e.g. charcoal or fuelwood markets) exist in most developing countries, efficiently and cheaply supplying energy to households and businesses.
- **Wood energy supports domestic economies and reduces dependency on energy imports:** Whereas fossil fuels are often imported and contribute to a foreign exchange deficit, biomass energy comes mostly from rural areas and provides reliable employment and income to rural areas.

More details on the importance of biomass can be found in Sepp, GIZ (2010): *Wood energy; Renewable, profitable and modern* (see *Annex B*).

3. Why is biomass energy sector governance needed?

A suitable and functioning regulatory framework can move biomass activities from the informal to the formal sector. This provides security for producers and traders to invest in better and more sustainable production methods. It also opens the way for government to intervene positively in the sector.

Key to addressing the challenges affecting of the biomass sector is to increase the political priority given to biomass by governments and other stakeholders, and to develop effective ways to manage, regulate and support the sector.

Holistic biomass energy sector governance can lead to the following positive outcomes:

- Acknowledgement of the contribution of biomass to improving energy access. This can allow governments to allocate budget shares and address the issue more prominently and proactively.
- Development of long-term planning, particularly on the supply side (e.g. sustainable harvesting, reforestation), where results can be expected only after several years.
- Wider awareness among stakeholders and a greater acceptance of the need for intervention.
- Inter-sectoral coherence on policies and strategic actions within the different related sectors and integration of biomass energy in both energy and forest policies.
- Reduction of incremental costs and promotion of sustainable practices (technologies, fuels or methodologies) to the point where they can be disseminated by market mechanisms.

4. What are the governance challenges in the biomass sector?

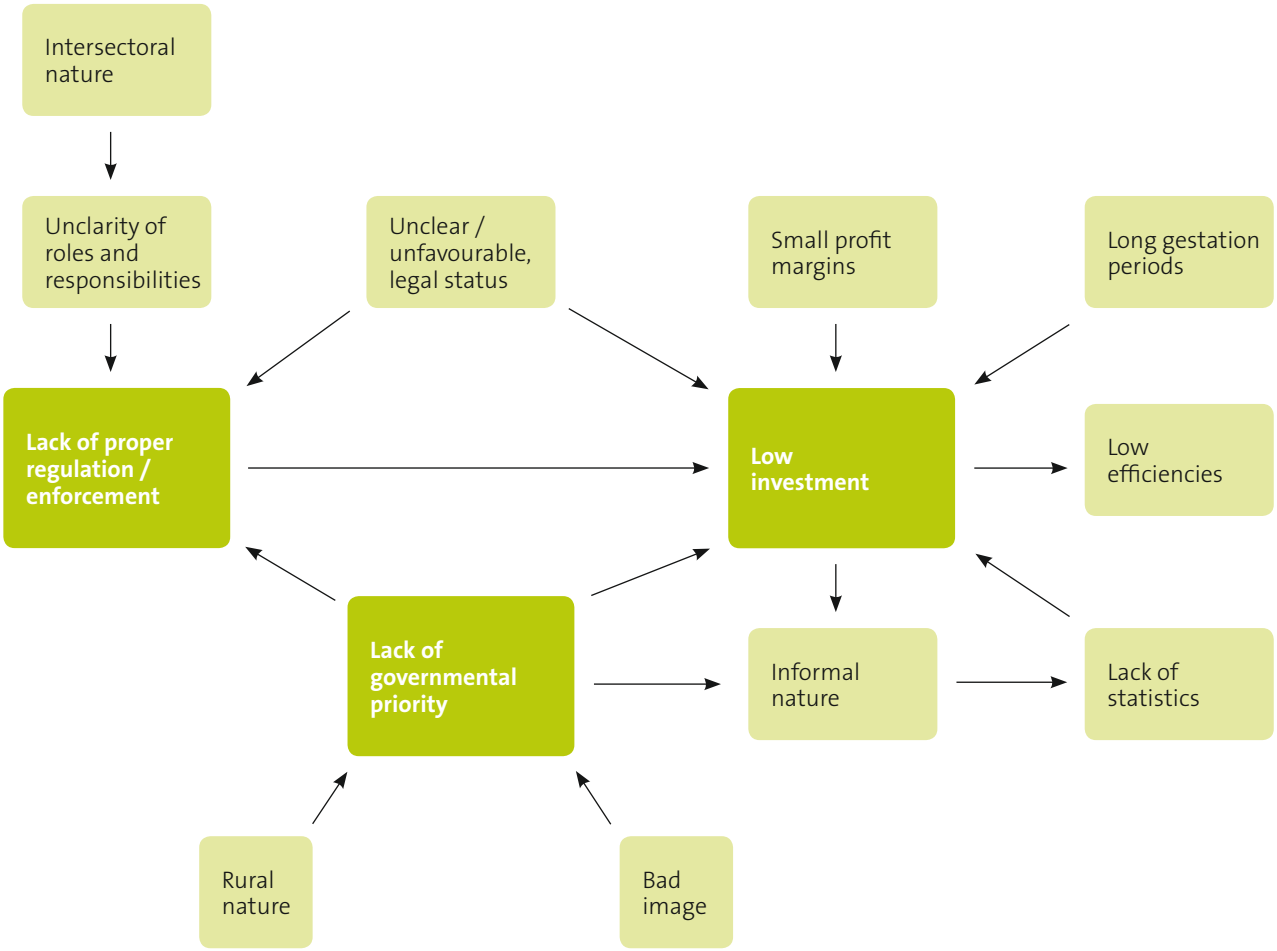
Managing and regulating the biomass sector has proven complicated. It is important to understand the reasons for this, in order to improve the governance regime.

- **The inter-sectoral nature of biomass energy:** The biomass sector is closely linked to a number of different sectors, most importantly energy, forestry, rural development, industry and agricultural processing, possibly resulting in conflicting regulation by different government institutions. It creates the need to clarify responsibilities, achieve a common understanding of sustainable management and develop a workable policy and regulatory framework.
- **The rural and informal nature of biomass energy:** Worldwide, 84 % of the households dependent on traditional use of biomass live in rural areas. Production and conversion of woody biomass is largely carried out by rural households as an informal income generating activity or for domestic use. Another important user group of biomass energy is the agricultural sector where many processes (drying,

curing) are fuelled by woody biomass. Negative impacts linked to inefficient production, processing and use of biomass fuels are therefore mostly seen in rural areas far from the cities where political priorities are set. Together with gestation lags (time between investment and profits), small margins and unclear rights and regulations, investment in modern and efficient technology in the biomass sector is often unattractive.

- **The legal status of biomass for energy:** A considerable share of the sector operates outside the law due to a lack of regulation, a lack of enforcement, or even a ban on charcoal in some countries. This makes it difficult to engage effectively with stakeholders and offers a breeding ground for corruption. Also due to tenure arrangements that may be unclear and permit free wood harvesting, biomass prices frequently reflect only exploitation costs (labour, transport and capital), excluding reforestation costs.
- **The lack of accurate and reliable information on the sector:** Facts and figures concerning the central role of biomass energy are often inaccurate or undocumented. The informality, complexity (and sometimes illegality) of production and marketing networks makes supply and demand much more difficult to measure than for fossil fuels or electricity.
- **The negative image of biomass:** Biomass tends to be associated with deforestation, under-development, poverty and negative health effects. This image steers policy makers towards the replacement of biomass by other fuels, instead of improving sustainability of the sector. In spite of the focus on alternatives, it is unlikely that biomass use will decrease in absolute terms over the coming decades.

The above mentioned factors result in low prioritisation of the biomass sector in government institutions, which leads in turn to low institutional capacities and budgets, and unclear regulation. This weak institutional framework, together with low prices, modest profits and high risks, discourages investment in efficient production, conversion and consumption of solid biomass.


Intersectoral nature
Unclarity of roles and responsibilities
Unclear / unfavourable, legal status
Small profit margins
Long gestation periods
Lack of proper regulation / enforcement
Low investment
Low efficiencies
Lack of governmental priority
Informal nature
Lack of statistics
Rural nature
Bad image

5. What are key factors of biomass energy sector governance?

Three preconditions have proven essential for a better management of the biomass energy sector.

The first prerequisite is a **strongly motivated government**. Support from a high level in the public sector – preferably ministerial level – is required to drive the process of developing and implementing improved biomass energy governance. This support can be demonstrated by assigning staff and budgets to support the process.

The second prerequisite is **capacity**; institutions and individuals with the right capacity and clear mandates in the energy and forestry sectors allow high level deliberations to feed into new policy and regulation, and subsequent implementation.

The third prerequisite is a genuine **willingness among the relevant institutions to cooperate** in developing a shared vision of the desired future for biomass energy, and to adapt their own policies and structures accordingly. Distinct roles of the different institutions and absence of competition over budgets and responsibilities help facilitate such cooperation.

Additional success factors include:

- **Integration with related initiatives:** Connections to existing strategies and frameworks may encourage wider interest in the reform process and could move biomass up the political agenda. Such frameworks may be international (e.g. Agenda21, UNCCD, UNFCCC, UNCBD, UNFF, SE4ALL), regional (e.g. ECOWAS, SADC, CILSS) or national (e.g. green growth, poverty reduction, NAMAs). Coordination may include harmonisation with donors to ensure compatibility with their activities.
- **Incorporating the role of women:** Specifically addressing women's energy needs and roles in the supply chain, and ensuring equal access by women and men to resources (financial or otherwise) ensures that benefits accrue to both men and women. Furthermore, acknowledgement of the roles of women may lead to more suitable and efficient governance structures.
- **Communication, information, and public awareness:** Improving governance requires awareness of the challenges and opportunities of the biomass sector among stakeholders. An accompanying communication policy outlining solid justifications and differentiated approaches for each target group and appropriate communication channels can be an invaluable supporting instrument.
- **Capacity development:** Strong institutions are more likely to grasp the objectives of the process and agree upon the distinct roles of each stakeholder. Assessment of capacity gaps and needs for capacity development can therefore facilitate the design of appropriate interventions.

- **Knowledge of the value chain:** Full understanding of the biomass value chain (forestry practices, price- and market structures and consumer preferences) within government institutions and market players will lead to the incorporation of financial and economic realities.
- **Awareness of risks and flexibility:** A risk analysis of potential problems can allow for early adaptation of the process to pre-empt difficulties that may be encountered during the process. Potential risks include conflicting interests between institutions, resistance to power shifts, lack of funding to implement agreed interventions, lack of institutional ownership, and entrenched corruption.

▲

Unloading wood at
Tora Tea Factory in Burundi

◄ Traditional charcoal kiln in Madagascar

Guide: Developing biomass energy governing structures

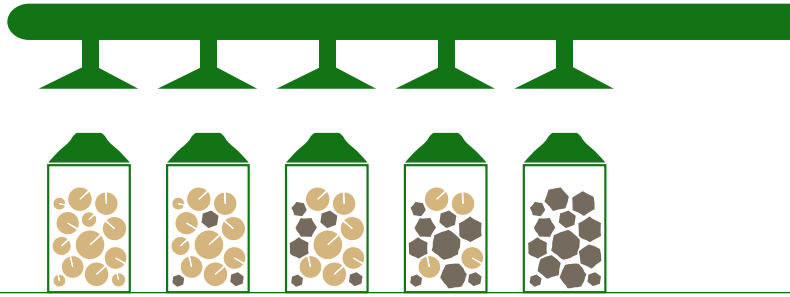
This Guide outlines six stages for improving biomass energy sector governance, leading to a fully implemented biomass energy strategy. However, the process may be ended at any stage, according to the country's own needs.

The structure of this Guide is as follows:

The country's specific needs are analysed in the first stage, providing guidance to the roll-out of subsequent stages. Skipping stages is not recommended, as each stage builds on the outputs of earlier stages.

Each stage is divided into a sequence of concrete steps. These steps are highly process-oriented; the processes described are as important as the eventual outputs in the form of published documents. The objective at each stage is to achieve a common understanding amongst the stakeholders and a consensus on necessary actions, before proceeding to the next stage.

Several decision points are indicated where stakeholders evaluate the progress up to that point, and make decisions on the way forward. It is important that these decisions on future direction are made collaboratively and are jointly agreed on by the stakeholders.



Preparation
Lead Institution and Preliminary Objectives

Stage 1
Analysis and Team Formation

Stage 2
Baseline Sector Analysis

Stage 3
Development of Scenarios

Stage 4
Formulation and Selection of Interventions

Stage 5
Strategy Formulation and Action Planning

Stage 6
Adoption and Implementation

▲ Steering Committee Meeting ▲ Stakeholder forum ● Decision point

◀ Charcoal production in Cambodia

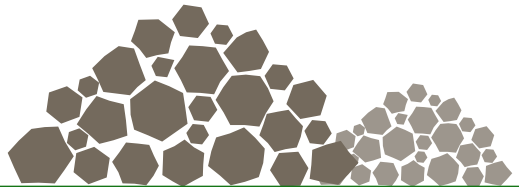
Preparation
Lead Institution and Preliminary Objectives

Outputs:

- Identification of the owner(s) of sector governance improvement
- Definition of preliminary objectives
- Provisional project outline

Step 1
Assignment of a lead institution

Effective revision of biomass energy governance requires active leadership by one institution. As biomass is a cross-cutting theme, with several responsible ministries, the Lead Institution should ideally be an overarching government agency, such as the Office of the President or the Prime Minister's Office, rather than a line ministry. The Lead Institution should have the legal mandate to divide tasks between relevant ministries and ensure their active participation. It is important that the interest in the biomass sector is internalised in this institution, and does not depend on an individual.



If it is not possible to execute the project under a central institution, then the ministry responsible for forestry or energy could take the lead. The preferred institution will vary by country but should have:

- True interest in the biomass sector, demonstrated by existing activities in sustainable forestry or the biomass energy value chain;
- Formal power to regulate (part of) the biomass supply chain, and willingness to alter existing policies and practices; and
- Willingness to make budget and manpower available for the process and for implementation of actions that will follow.

Step 2

Define preliminary objectives and a provisional project outline

The Lead Institution sets the preliminary objectives and provisional outline of the intervention. If a donor is involved (e.g. through financing), its interests may also need to be reflected. Objective and outline depend on the availability of information, the structure of and main challenges in the biomass sector, and the capacities and budgets that can be made available by the relevant stakeholders. As not all of these factors may be known at this point, only a preliminary objective and outline can be set, which can be revised in *Step 6*, as more information has become available and additional stakeholders have become involved.

Examples of valid preliminary objectives might be:

- Better coordination between government institutions in the biomass energy sector, including adapting policies and regulation;
- More constructive cooperation between stakeholders in the biomass energy sector;
- Higher levels of awareness of the scope, size and organisation of the sector among senior politicians and technocrats; or
- Generating better data on the state of the sector to inform planning decisions.

With the objective(s) of the process formulated, a project outline can be developed, based on the stages suggested in this guide. Dependent on the objective and available time and budget, it can be decided up to which step the processes described in this Guide will be followed. These steps, together with a planned timeframe, form the project outline.

Stage 1
Analysis and Team Formation

Outputs:

- Functioning inter sectorial implementing team
- Stakeholder agreement on a vision for the biomass energy sector
- Overview of the policy environment

Step 3
Assess the political and policy environment

The objective of a political and policy assessment is to find where biomass governance fits in the existing policy environment, whether current governance structures support further development of the sector and ensuring compatibility of biomass energy interventions with existing structures.

In the institutional and regulatory assessment, the following aspects should be analysed:

- **Policy framework:** Which policies regulate energy, forest management and land use? What do they say about biomass energy? Are they consistent, implemented and enforced?
- **Institutional responsibilities:** Which ministries and departments are responsible for which aspects of biomass energy? What are their mandates, resources and capacities? What is their interest in biomass energy? (This will be elaborated in *Steps 4* and *13*).
- **Regulatory structures:** What laws and regulations relate to the production and use of biomass energy and land tenure? What licences are required to produce, trade or transport biomass? How effective is their enforcement? Do provisions exist to monitor if woodfuel is harvested sustainably and legally?
- **Financial aspects:** What revenues are collected from biomass energy? Are there any subsidies influencing the production and usage of biomass energy? Are there any national or international financial programmes influencing the biomass sector? Are there subsidies or other financial incentives for other cooking fuels?
- **International aspects:** What bilateral or regional agreements or regulations relate to the management of energy, including biomass energy, land use and forestry?

Relevant documents to consult may include policies, strategies and regulation on energy, forestry, land and land use, rural development, environment and poverty reduction. The effectiveness of existing structures is just as important to assess; lack of enforcement of regulation and systemic corruption may be impeding effective governance. While corruption may be a sensitive topic, it must be discussed with the stakeholders, because of its possibly far-reaching influence on prices and practices in the biomass energysector.

Step 4
Conduct a stakeholder analysis

The objective of the stakeholder analysis is to

- Disclose both formal and informal sector structures, by mapping the roles, responsibilities and interests of the different stakeholders; and
- Determine the role that each stakeholder could play in the process

A stakeholder in the biomass sector is a person, group or organisation, public or private, that has a legitimate interest in production, processing, consumption, or regulation of biomass energy. The stakeholders in the biomass energy sector generally include:

Table 1 Overview of stakeholders

Government	Private sector	Civil society and international community
▶ Ministries / Agencies of: ▶ Energy ▶ Forestry ▶ Agriculture ▶ Lands ▶ Environment ▶ Health ▶ Education ▶ Rural Development ▶ SME, Trade and Industry ▶ Women's Affairs / Gender ▶ Finance / Planning ▶ Universities	▶ Forestry companies and private concessionaires ▶ Energy companies ▶ Agribusinesses (tea, tobacco, etc.) ▶ Woodfuel producers, transporters and traders ▶ Stove producers ▶ Petroleum/LPG distributors ▶ Private energy companies ▶ Timber industry ▶ Financial institutions, e.g. microcredit banks ▶ Farmers – large and small	▶ International and local NGOs working on energy access, rural development, environment, forestry and gender ▶ Donors, UN bodies and lending agencies ▶ Research institutions (which may be government) ▶ Consumers (households, industries and institutions)

As women are the main collectors of woodfuel and users of biomass for household cooking energy, and are often active in stove production, charcoal trading, agricultural processing and commercial and institutional cooking, their roles should be explicitly identified and recognised in the stakeholder analysis.

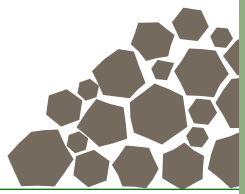
For each stakeholder the following characteristics are important:

- Mandates, roles, activities and interests in relation to biomass energy, and whether these support or impede the development of a sustainable sector;
- Resources, expertise and capacities (this preliminary assessment can be followed up with a more detailed assessment in *Step 13*);
- Experiences and main lessons learned (for example in the dissemination of improved stoves, promotion of alternative fuels, forest and landscape restoration or agro-forestry);

Mapping of the stakeholders according to their level of influence and their support to sustainable sector governance enables the identification of "champions" and "critical stakeholders", as shown in the table below. Champions can play a vital role in development and implementation of new governance structures. Meanwhile, critical stakeholders can jeopardise the process if they do not think it serves their interests. Both champions and critical stakeholders must be involved in the following steps.

Table 2 Mapping of stakeholders

	Influential	**Less influential**
Supportive	This is an important group that can function as the main "champion" of biomass sector interventions and motivate others to become involved.	These stakeholders can play an important supportive role, for example by dedicating human capacities to the process.
Opposing	This is a critical group that may jeopardise the process if not taken on board. It is important that they are strongly involved in the process and that their interests are incorporated.	Although these stakeholders are not critical for the success of restructuring governance, their interests should be considered in the development process.



Step 5
Compose a coordination structure

The objective of a coordination structure is to

- Facilitate and organise the process;
- Integrate the interests of different stakeholders;
- Coordinate cooperation.

Restructuring biomass energy sector management requires a transparent organisational structure that represents all stakeholders to achieve a true understanding of the problems and opportunities of the sector. Early involvement of stakeholders will also help create awareness and ownership of the process, maximising the chances of their later support in the implementation of proposed interventions.

A well-defined coordinating structure with clear and mutually agreed responsibilities and lines of reporting and communication provides a strong structure for cooperation. The structure described in this section consists of a Lead Institution, a Steering Committee, technical support and a group of wider stakeholders and has worked in past projects, but arrangements should be tailor-made to fit the country situation and existing cooperation and governance structures.

Lead Institution

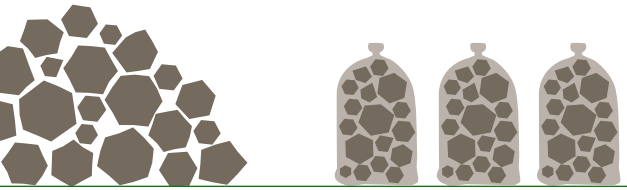
The Lead Institution has been appointed in *Step 1*.
Its responsibilities include:

- Chairing the Steering Committee (SC);
- Preparing and inviting SC members for meetings;
- Actively contributing to SC discussions;
- Liaising with consultants and donors (if any);
- Taking over all responsibility for strategy development.

Steering Committee

The Steering Committee (SC) should be officially mandated to guide the process and make decisions on the scope and planning of the sector governance restructuring. The SC comprises of key decision-makers from the ministries responsible for energy, forestry, lands, environment, gender and SME or trade and industry. Depending on the level of decentralisation of governance, the ministry responsible for decentralisation or local government could also be involved. The SC is chaired by the Lead Institution, which also takes an organising role, and may be assisted by consultants.

The representatives assigned to the SC should have decision making power and are preferably not lower in the hierarchy than Director or Deputy Director level, to enable efficient decision making within the Steering Committee. If these stakeholders already meet on a regular basis in an existing body, then it would be preferable to use this body



as the Steering Committee rather than creating a stand-alone SC for biomass energy reform.

Efforts must be made to ensure that female perspectives are acknowledged in the Steering Committee. It should be noted that not every woman is representing the female perspective, and the representative of the female perspective is not necessarily a woman. This role can be taken on by the ministry that is responsible for women's affairs or gender, a national women's cooperative or a consumer organisation.

Responsibilities include:

- Making executive decisions;
- Setting targets and monitor progress;
- Providing strategic input;
- Providing quality control;
- Implementation (possibly).

Technical support

Technical staff

Restructuring the governance of the biomass energy sector requires technical inputs and feedback on market structures, forestry, law, technologies, and existing government structures from sector specialists. To benefit optimally from the knowledge and experience available in the participating government organisations, each SC member should have technical support assigned from within their organisation. Each SC member organisation should ideally appoint one or two persons to provide this technical backup.

Responsibilities of the technical staff include:

- Providing technical support to the Steering Committee;
- Providing technical knowledge and statistics to any consultants involved in the process;
- Providing feedback on draft documents.

Consultants

In most cases, the day to day work will be carried out by a team of consultants, hired by either the lead organisation or a donor. These consultants should not only have relevant technical knowledge, but also in-depth knowledge of the country, its governing structures and the capacities available, allowing them to act as intermediaries to foster cooperation among stakeholders. The team of consultants should comprise both technical specialists (in energy, forestry and policy development) and individuals with moderation and conflict resolution expertise to guide the coordination processes.

Responsibilities of the consultants include:

- Assisting the lead organisation in organising and documenting SC meetings;
- Collecting, analysing and presenting data;
- Producing a baseline and scenarios;
- Bringing in international perspectives and experiences;
- Developing intervention options and action plan.

Additional stakeholders

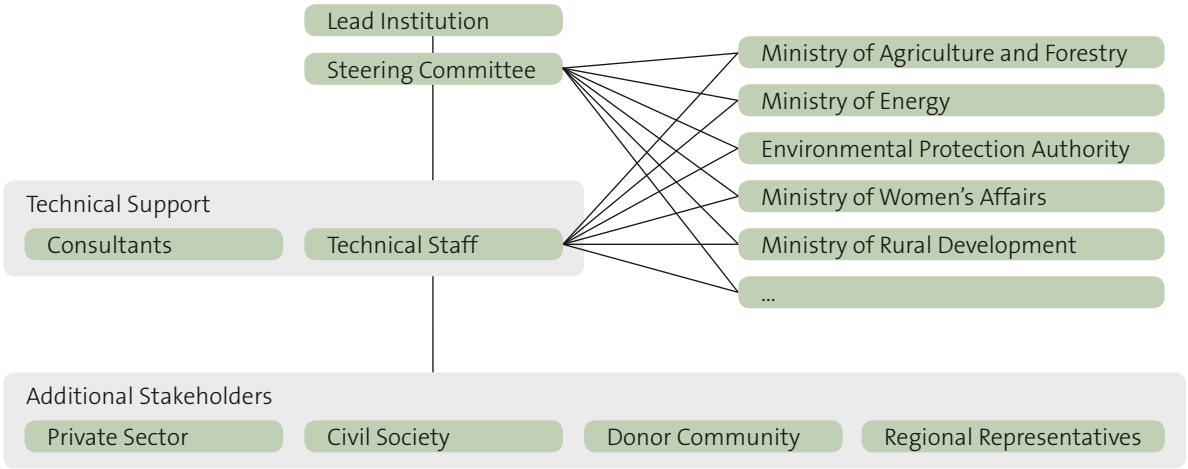
Reviewing plans and draft documents by non-government stakeholders allows the integration of their ideas in the restructuring process. Invited stakeholders should include private sector, civil society and donor representatives, who must be given the opportunity to provide inputs e.g. during workshops at crucial stages in the process. Representatives from regional or district government could also be involved in the wider reference group, depending on the level of decentralisation and the variation in biomass supply and use in the country.

Responsibilities of the wider reference group:

- Provide feedback on findings, analysis and proposals;
- Share experiences and knowledge;
- Implementation (possibly).

Figure 1 represents an overview of cooperation between stakeholders

Figure 1 Overview of the cooperation structure among the different institutions



Step 6:
Formulate a vision and re-assess objectives

The objective of vision formulation is to reach agreement on a desired state of the sector in the future, as the agreed target to aim for.

A collective vision, developed and unanimously agreed on by the SC, defines the objective for the sector. A vision is a shared idea for how the biomass market should be organised in the medium term (15 – 30 years). The vision should address four basic principles;

1) security of supply,
2) environmental and climate friendliness,
3) economic efficiency and
4) health and safety,

and should be as clear, realistic, and measurable as possible.

Guiding questions to define a vision are:

- How should biomass energy be produced and supplied? Which improvements in the value chain are desirable and feasible? (e.g. sustainable forest management, efficient conversion techniques, production cooperatives, source of rural income)
- How and by whom should biomass energy be used? (households, industries, institutions)
- Is biomass a desired and feasible source for electricity production?
- In the long run, is it preferable to improve sustainability of the current situation, or are alternative fuels available, affordable and preferred?

It is important that all members of the SC are aware that the vision will become the guiding concept throughout the restructuring process. As the stakeholders will bring in contrasting views and interests, significant effort from the Lead Institution may be required to convince influential and opposing actors of the merit of new approaches to achieve sustainable use of biomass. Active involvement of technical staff ensures feasibility and comprehensiveness of the formulated vision. The vision should ideally be in line with existing frameworks such as the national poverty reduction strategy and national energy policy.

Experience shows that forestry sector stakeholders tend to support a vision for biomass energy that includes commercial and household use of wood, together with state support for forest management practices and reforestation. Environmentalists on the other hand, may view the exploitation of forests negatively and may want to steer away from the use of woodfuels altogether. This desire may be shared by some energy specialists and politicians who see biomass as backward.

These opposing views can only be solved by discussion, knowledge sharing and mutual explanation of positions. A technical explanation of how forest resources can be used sustainably may contribute to mutual understanding.

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Improved charcoal production in Burundi

With the vision agreed, the SC should discuss the desired final output: what type of document or structure is needed to realise the vision? Examples are an overview of the state of the sector, an analysis of the main problems in the sector, a coordination structure between stakeholders or a government strategy. This determines how far the governance revision process will need to progress through the stages outlined in this Guide.

Once the final output is determined, the Lead Institution should identify and initiate the processes required for its formalisation. Official Strategy documents must often be approved by Parliament, for example, while other outcomes may be approved at ministerial level.

Decision point:
Evaluate whether existing regulation is providing sufficient support and whether the key stakeholders are committed to the intended process and reform.

If existing government policies directly oppose revision of biomass energy sector governance, it is important that the institutions involved are willing to review those policies. The influential but opposing stakeholders (see *Step 4*) should be heard and explained the vision.

The Lead Institution and Steering Committee members should explicitly express their belief in sustainable biomass as a recognised component of the energy mix, and be active and motivated to continue the process.

If these prerequisites are not met, the process is bound to experience difficulties in later on. It is therefore not advisable to continue before all stakeholders are actively engaged and agree on the vision. This may require restructuring of the process, including redefining preliminary objectives and scope.

Stage 2
Baseline Sector Analysis

Outputs:

- Overview of the state of the sector
- Analysis of main challenges
- Decision on scope of the process

Defining the scope of restructuring efforts requires in-depth understanding of the state of the sector. A sector analysis should therefore be carried out to establish the current energy supply and demand situation. Collection of the relevant data may require survey work alongside existing sources such as household livelihood or socio-economic surveys. The time and budget required depends on the availability and reliability of existing data. It is strongly advised that if there is little reliable and up to date information available, sufficient time and funds are reserved to collect this information. However, a balance will have to be struck between the optimal data set and resources available.

Step 7
Establish the baseline supply and demand situation

The objective of the baseline is to gain an overview of the prevailing situation in the sector, including demographic and economic statistics, market structures, and supply and demand characteristics.

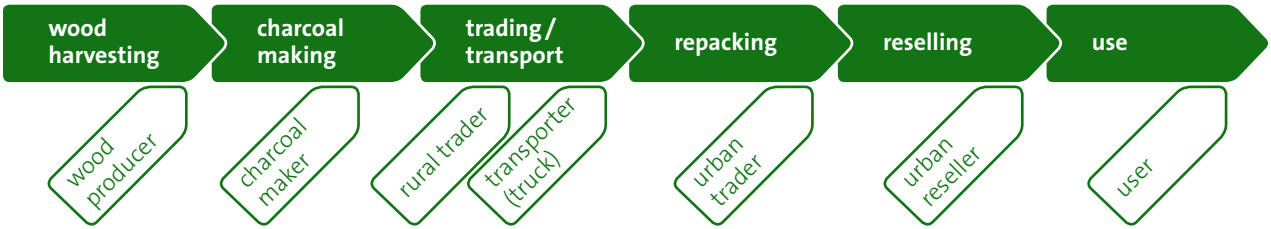
General statistics

General demographic and economic parameters are the starting point for baseline analysis. Demographic information should include population size and distribution, projected population growth rates by region and urbanisation rates. Economic data should include household income and expenditures, income growth, and main sources of income for the rural and urban population. This data helps establish the number of people who have to be supplied with energy, their demands and their ability to pay. Usually such information can be obtained from national statistical bureaus, based on census data.

Understanding the biomass energy value chains

Value chain analysis identifies the activities performed in order to deliver biomass from source to consumer. The value chain will vary by fuel, by region and between rural and urban areas. The biomass energy sector comprises many different value chains, e.g. commercially traded fuel wood for industrial use, charcoal for household use and collected fuelwood for private consumption. An example of a charcoal value chain is provided in *Figure 2*.

Figure 2 Example of a possible charcoal value chain



Understanding the dominant biomass value chains ensures that the right processes and stakeholders are included in the steps that follow. The Steering Committee should decide which particular value chains are elaborated, based on the relative importance of different fuels, production methods and challenges. The value chains of other fuels could be included if they currently provide a considerable share of cooking and heating energy, or hold great potential to do so in the future. A separate value chain for the most widely used types of cook stoves should be analysed.
The following parameters need to be assessed for each value chain:

- Who are the stakeholders in the supply chain?
- How is the supply chain organised? Who cooperates with whom?
- Who holds the power in the supply chain and who receives profits at different points?
- What is the size of the sector (in absolute and monetary terms)?

The value chain exists within a regulatory environment, which was analysed in *Step 3*. The link between regulations and value chains should be explored by answering the following questions:

- To what extent is there political interference in the supply chain? (e.g. licensing, taxation, regulation)
- Which part of the supply chain operates in the informal sector?
- Does the value chain include significant illegal activities and/or corruption?

Supply side

The supply side comprises all stages before the fuel reaches the final users, and includes the production, marketing and sales of fuels and of appliances such as improved cook stoves. The following parameters need to be assessed to gain a complete picture of the supply side of the sector:

- **Forestry:**
  - Land cover by category (e.g. different forests types, agricultural land, built-up areas).
  - Mean annual biomass production for each type of land cover, including agricultural residues and animal wastes, as well as wood.
  - Biomass availability based on the usable portion of the annual increment and accessibility (some sources will be too remote or subject to access restrictions, such as reserves and parks).
  - Ownership and user rights of the identified biomass resources and the land on which they grow.
  - Whether the production of woodfuel is an activity in itself, or mainly a by-product from other forestry activities, such as timber production or land clearing for agriculture.
- **Other biomass sources:** availability of non-forest biomass resources (non-forest trees, agricultural residues) that may be available – currently or potentially – for energy purposes
- **Technology use:** technologies applied in the supply chain and their efficiencies
- **Supply of cooking equipment:** production, sales, availability, efficiency and quality of improved cook stoves, availability and affordability of cooking appliances for other fuels
- **Geography:** major producer centres, transport routes and centres of distribution and retail

For well-regulated energy sources such as LPG, kerosene and electricity, information should be available from the energy ministry or private sector players such as oil companies and power utilities. Characterising biomass energy resources is more complex, requiring an assessment of standing stocks and annual yields. This may be available from national land use assessments. If reliable data are not available, rough measurements could be derived from sampling the most important land use types, or a regional focus could be adopted that concentrates on the most important production areas.

If extensive new land use mapping is required, it should ideally be done as a stoned-alone exercise as it will require significant budgets and time. References to woodfuel survey and resource mapping methodologies are provided in *Annex B*.

Charcoal resale in Mozambique

Demand side

The demand side is defined as the final use of biomass for energy, consisting of cooking in households, institutions and commercial enterprises, as well as agro-processing and other productive activities such as fish smoking or brick firing. It is also important to identify competing (non-energy) uses of biomass (e.g. construction, furniture production) in order to assess whether these directly compete with energy use.

The following parameters need to be assessed to characterise the demand:

- **User categories:** household, institutional and commercial users of biomass energy, including the informal sector.
- **Consumption purposes:** demands for domestic, institutional and commercial cooking, heating, industrial use (e.g. brick burning, lime burning), agro-processing (e.g. tea drying, tobacco curing, sugar production) and electricity production.
- **Major consumption centres:** mostly urban areas and industrial complexes
- **Fuel types:** different fuels used for cooking and heating (biomass fossil fuels and fossil alternatives), quantities consumed and trends in fuel use.
- **Fuel costs:** prices paid by households and industries, as well as end-user costs considering the efficiency of combustion, share of income spent on energy and trends in fuel prices.
- **Technologies used:** conversion appliances (stoves, heaters, dryers), efficiencies, availability, adoption rate and affordability of improved technologies.
- **Consumer preferences:** fuel preferences, cooking patterns and limiting factors for fuel switching.

Where relevant, the results should differentiate between urban and rural areas, income groups and company size.

As non-biomass fuels such as LPG, kerosene and electricity may fulfil part of the energy demand for heating and cooking, they should be included in data collection. Furthermore it is useful to assess current limitations on and requirements for the uptake of these fuels; affordability, availability or convenience may be factors affecting uptake.

Information on demand may already be available from socio-economic or household surveys, or may require additional empirical survey in households, institutions and businesses, monitoring of commercial woodfuel traffic to urban centres, and collection of commercial data on volumes and prices of fuels sold in different markets. Information on non-biomass fuels will normally be available from utility companies and private fuel suppliers. Sample surveys among a cross-section of woodfuel consuming industries may be required to establish their consumption.

Decision point:
Is sufficient information available to provide a concise, country wide picture of the biomass sector?

The level of detail required depends on the scope and objectives formulated earlier. As a general rule, the information should be up to date, reliable and representative. The members of the Steering Committee and technical staff should review and explicitly accept the information base.

If sufficient information is not available, the process should not be continued. The options then are to:

a) Focus regionally, concentrating on the most important supply or demand centres and collect information relating to these areas only;
b) Initiate a separate research project to collect the relevant data, which goes beyond the scope of this Guide.

Step 8
Analysis of baseline sector data

The objective is to analyse existing connections between supply and demand in the biomass energy sector.

Sustainable biomass supply means that annual volumes of extraction do not exceed mean annual growth. An overview of biomass consumption and production at the national and regional level, composed in *Step 7*, permits a first assessment of sustainability. This will identify important biomass supply areas and consumption centres. Biomass energy country maps may be useful to visualise the main parameters and highlight areas with a surplus, deficit or balance, showing the main producer sites, user centres and transport routes.

Analysis of the baseline data answers the following questions:

- What are the main problems faced by the biomass energy sector?
- Who are the most affected stakeholders?
- Which are the most affected regions?
- What are the main obstacles to a sustainable biomass energy sector?

Decision point:
Do Steering Committee members agree with the sector analysis and the project outline and is there sufficient government ownership to proceed?

There are three options at this stage:

Negative: The preconditions for success are not in place. Examples:

- Poor quality of the sector analyses due to deficiencies in the approach or data
- Unresolvable differences in the perception of the current situation between stakeholders
- Insufficient demonstrated commitment from stakeholders

In any of these cases, there is little value in continuing.

Partly positive: Certain conditions are lacking, but can be resolved. Examples:

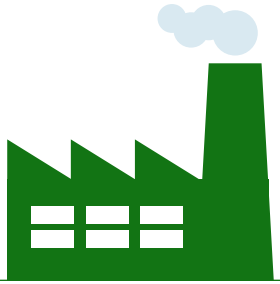
- Deficiencies in the quality of the sector analysis can be addressed through additional efforts.
- Policy is supportive, but key stakeholders are not on board; however, there is scope for resolving differences through lobbying.

In such cases, it is advisable to extensively revise the scope of the project in *Step 9*, keeping in mind the failing preconditions. If no agreement can be reached in *Step 9*, the approach should be discontinued.

Positive: Conditions have been met, with partners ready to proceed to the next phase. The details of the next phases will be agreed upon in *Step 9*.

The outcomes of the data collection and analysis should be verified by the Steering Committee, technical staff and stakeholders (defined in *Step 5*). A joint understanding of the baseline situation prepares the ground for joint decisions. This is a potentially complex process as findings may not correspond with official policy or the views of certain key stakeholders. If there are influential stakeholders who disagree with initial findings or their implications, this impasse must be resolved before continuing. This will require clear leadership from the Lead Institution and the Steering Committee.

It is advisable for the results of the baseline analysis to be presented in a report that is made publicly available. In many countries, reliable information on the biomass sector is scarce and the results may be of use to other projects and may help to create awareness of the current state of the sector. If the process is continuing to the next phase, the results may also be presented in a report together with the scenario analysis.



Step 9

Confirm the scope, planning and process

The objective of this step is to achieve stakeholder agreement on the way forward.

With the information from the sector analysis and a functioning coordination structure available, the Steering Committee should re-assess the objectives and scope, as preliminary defined by the Lead Institution in *Step 2*, and formally agree on a time horizon and process. These discussions should be led by the vision that was agreed upon in *Step 6*.

Scope: The scope determines which key sectors will be covered and the level of geographical detail. Based on the data analysis, it may be decided to focus on certain sectors or certain regions. Also, the exact time horizon should be decided on, i.e. the period of time which the resulting interventions are expected to cover.

General recommendations for the scope of the process are:

- Focus on the genuine, specific problems in the country or in certain regions, based on the findings of the baseline sector analysis.
- Take the needs of biomass users, domestic or commercial, and long term sustainability of supply as a starting point.
- Concentrate on current uses of biomass energy, but consider also possible future uses (e.g. export or electricity production).
- Consider other fuels to substitute for biomass energy where deemed appropriate.

Planning: The time frame for the process depends on the defined objectives and scope. If the expected outcome is a document that needs political approval (e.g. in Parliament), then timings in the national political system may be important (e.g. dates of elections or phases of national planning cycles). It will be helpful to brief the approving body (e.g. Parliament) at this point on this process of revising governance structures.

In the planning, sufficient time should be reserved for discussions, assessment of draft outcomes and stakeholder consultations. In order to sustain motivation during the process, planning should be as realistic as possible, bearing in mind the specific characteristics of the country and its governance structure.

Responsibilities: The Lead Institution, Steering Committee and technical staff should agree on a division of responsibilities and tasks and the budgets for these activities, including time, labour and costs of participation in meetings and workshops. It is common for key tasks to be out-sourced to consultants, who should work closely with government staff to ensure institutional buy-in and to build capacity in the responsible authorities.

Productive use of bagasse
at Sosumo Company in Burundi

Milestones: Important milestones should be set, e.g. dates for meetings of the Steering Committee, expected deliverables from the consultants, deadlines for feedback on the deliverables and any stakeholder workshops that are envisaged during the process. A rough time schedule for the process provides stakeholders with clear expectations about their involvement.

The scope, planning, responsibilities and milestones will effectively form Terms of Reference for all stakeholders in this process. These agreements should be formalised in a written agreement, signed by the Lead Institution and the Steering Committee.

Stage 3
Development of Scenarios

Outputs:

- Insight into plausible future developments
- Insight into the impact of physical, economic, social and policy framework conditions
- Insight into the impact of different potential interventions
- Decision on specific objectives
- Further insight into mandates and capacities of stakeholders

Scenarios show how supply and demand may develop under prevailing or likely conditions. They provide insights into expected consumption, resource shortages and market shares of different fuels, among other things, providing a foundation upon which to build a set of coherent interventions. Scenario development and analysis should be logical, consistent and comprehensible, based on storylines that describe future developments. The horizon of these scenarios should be between 15 and 30 years, ideally matching the time horizon of other government strategies such as those for poverty reduction or economic development.

Changes in the biomass sector are caused by internal or external drivers. External drivers describe changes in physical, economic, social and policy conditions which are not directly influenced by the biomass energy sector (e.g. population growth, household size, GDP and rates urbanisation and economic growth). These drivers do not differ between the various scenarios. In contrast, internal drivers are directly influenced by changes in the biomass energy sector (e.g. availability of firewood). Models are used to reveal the relation between the drivers and biomass supply and demand.

Step 10
Develop a prognosis for future supply and demand

A "business as usual" (*BAU*) scenario provides a picture of the most likely future development of the sector in absence of any new interventions.

In this scenario, external drivers are assumed to evolve as per current trends. Based on the data collected and analysed in *Stage 2*, biomass demand and supply is projected over the defined period. This BAU scenario will show the geographical and temporal demand and supply patterns and provides a first indication of where complications could appear (e.g. rising prices, shortages). The scenario should be tested for robustness by running tests with small changes in the input variables. The robustness, accuracy and limitations of the scenario should be clearly explained to the stakeholders it is shared with.

A number of computer simulation programmes are available for scenario development (e.g. LEAP from the Stockholm Environment Institute; see *Annex B)*. Simple scenarios can also be generated relatively easily using Excel or other spread sheet software. Such software is more widely available and the calculations behind the scenarios can be more easily checked and explained to the relevant stakeholders.

Often, stakeholders expect substitution of biomass use by other fuels, such as LPG and electricity, and therefore a declining demand for biomass. However, any switch to LPG and electricity by the urban middle class can be offset by population growth (increasing demand for cooking and heating energy) and urbanisation (leading to a switch from fuelwood to charcoal with lower value chain efficiencies due to losses in the carbonisation process), which are likely to result in a net increase in biomass energy demand.

Step 11
Develop alternative scenarios

Alternative scenarios illustrate how the sector can develop under certain assumptions how the sector can develop under certain assumptions, including potential interventions that may contribute to a more sustainable wood fuel sector.

Two types of alternative scenarios can be developed: normative and descriptive scenarios. Normative scenarios take a desired state of the sector (the vision as defined in *Step 6*) as a target and assess the changes required in biomass supply and demand to achieve that. Descriptive scenarios evolve based on historical trends or current processes in the biomass energy sector, or on specific parameters selected and fed into the scenario software.

Alternative scenarios are developed based on assumed changes in internal drivers that may vary among scenarios, and could include:

- Energy prices
- Adoption of improved technologies by users
- Production potential of woody biomass (changes in yields and area of forest)
- Availability and affordability other cooking and heating fuels
- Improved conversion efficiencies in charcoal production

The selection of internal drivers to be modelled in the alternative scenarios has a significant impact on the outcomes of subsequent stages, and should be based on priorities, the analysis in *Stage 2* and the vision defined in *Step 6*. The interrelation between variables is complex and probably perceived differently from different positions, and should therefore be agreed upon by the Steering Committee. It is advised that the scenario analysis covers both supply and demand side changes.

It is advisable for both the baseline and alternative scenarios are presented in a concise report that is made publicly available. This report can be a reference work for other projects, and can help the process gain momentum by illustrating the current and future situation expected under certain assumptions.

Alternative scenarios can combine all sorts of assumptions on the future biomass sector. It is important that the storyline addresses both supply and demand aspects. If no changes are assumed in a certain areas, this should be mentioned explicitly. Storylines may have different levels of detail, a balance should be found between accuracy and data availability. An example of a storyline is the following:

In 2025, 75 % of the households will use improved cookstoves on average consuming 50 % less wood or charcoal than current stoves. Forest practices are assumed to remain unchanged, but average charcoal production efficiencies rise to 25 %. The forest area is expected to increase by 10 % due to reforestation efforts. Woodfuel use in the industrial sector is expected to remain unchanged. All changes are expected to occur evenly between next year and 2025.

Step 12
Define specific objectives

The objective of this step is to further specify the way forward. The formulation of objectives for the biomass sector allows the definition of appropriate interventions.

Comparison of the alternative scenarios with the baseline scenario provides insight into the impact of the different internal drivers and therefore shows the areas where interventions in the sector would be most effective. Based on this information and on the vision as defined in *Step 6*, the Steering Committee can decide upon the objective(s) of the interventions. *Table 3* below shows the relation between the objectives and the vision.

Table 3 Relation between vision and objectives

Combined objectives to realise the vision

vision
Objective 1
Objective 2
...
Objective n

At this stage, the focus should solely be on these objectives. The specific actions that need to be taken to reach these objectives will be defined in *Stage 4*. The objectives could include any of the following:

1) Sustainable biomass supply
2) Efficient biomass use
3) Availability of viable fossil fuels
4) Availability of alternative biomass fuels, produced from agricultural by-products
5) Sufficient institutional capacity for implementation

Decision point
Are the objectives in line with current energy policy?

If not, either:

- Continue with the process, making a note of the inconsistency and the need to adjust policy when it comes up for scheduled review and ensuring that the need for such a change is explicitly accepted by the responsible ministry and the Steering Committee.

or

- Adapt the objectives to fit the existing policy

or

- Discontinue the process at this point. The outcomes of the previous steps can be used in awareness-raising and activity formulation by relevant stakeholders.

Step 13
Re-assess stakeholder capacity and mandate

The objective of this step is to collect the necessary information to permit an efficient division of tasks among stakeholders. This assessment should address a range of government, private sector and non-profit organisations and specifically address capacities that are relevant to the objectives selected in the previous step. If capacity gaps are identified, external support may be needed to build the required knowledge and skills.

Stakeholder assessment should go beyond the human capacity of individual employees, because individuals' power to act depends also on management structures and processes in their organisation. Therefore, a systematic assessment of stakeholder capacities must analyse all levels of capacity: individuals, organisations and the institutional environment. Such a capacity assessment can form the basis for targeted capacity development interventions. Some of the information collected during *Steps 2* and *3* may be relevant and could be used during the assessment. References to more information on methods for capacity assessment can be found in *Annex B*.

Stage 4:
Formulation and Selection of Interventions

Outputs:

- Overview of potential interventions
- Selection of preferred interventions

Step 14
List and prioritise potential intervention options

With the objectives defined in *Step 12*, suitable interventions can be developed. In order to obtain a complete overview from which a strategic selection can be made, a "long list" of potential interventions should be created, summarising all possible actions that could contribute to achieving the objectives. The list can best be generated during a brainstorming session, based on the baseline and scenarios defined earlier. *Table 4* on the next page shows the relationship between the vision, objectives and interventions.

The interventions that are presented should directly relate to earlier findings, notably the objectives as defined in *Step 12* and the stakeholder capacity as mapped in *Step 13*. For each potential intervention, the following preliminary information should be provided:

- **Intervention:** concrete actions to be taken;
- **Specific objective:** How the intervention helps achieve specified objective(s);
- **Time** needed to become effective (short, medium or long term). Although the general objective is based on the horizon of the vision, individual interventions can be aimed at shorter periods, such as two or four years;
- **Budget:** low, medium or high costs;
- **Required framework conditions**, assumptions and prerequisites for success, including required capacities;
- **Interdependencies** between interventions (one intervention may have to be preceded by another);
- **Potential externalities**, positive or negative, particularly effects on vulnerable groups such as the poor and women.

Table 4 Relation between vision, objectives and interventions

	Combined objectives to realise the vision	Interventions to achive the objectives
vision	Objective 1	Intervention 1.1 with specific objective 1.1
		Intervention 1.2 with specific objective 1.2
		...
	Objective 2	Intervention 2.1 with specific objective 2.1
		Intervention 2.2 with specific objective 2.2
		...
	...	...
	Objective n	Intervention n.n with specific objective n.n

Based on time, budget, framework conditions, interdependencies and potential externalities, a "shortlist" of potential interventions can be extracted by selecting the most feasible and effective interventions from the longlist. These are best chosen strategically; actions that complement each other to increase impact, a mix of short term and long term actions and a combination of supply and demand side interventions. The options selected should be consistent with the vision formulated in *Step 6*, and baseline sector analysis and scenarios developed in *Stages 2* and *3*.

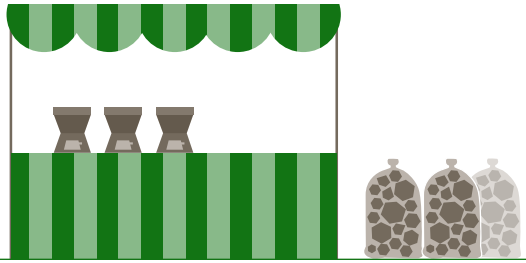
The interventions can best be selected by the wider stakeholder group as defined in *Step 5* to benefit from the different viewpoints of stakeholders, perhaps in the form of a workshop, where the different categories of interventions are discussed in parallel sessions. To enable the stakeholders to make informed decisions, the intervention options should be listed clearly, with their characteristics.

Table 5 demonstrates a possible way of presenting an overview of the long list of potential interventions. How many objectives and how broad or narrow these objectives are formulated, depends on the vision defined previously and the resources available for implementation.

The outcome of these sessions should be a set of agreed, realistic, efficient and coherent priority interventions. The number and scope depend on the needs of the sector, resources (budget and capacities) available, time horizon for implementation and priorities set. These factors will have been analysed in earlier stages. Some of the interventions may be proposed as pilots to determine acceptance and effects to avoid misallocation of resources by first evaluating the potential before replication. Interventions may also be proposed (initially) for certain regions of the country.

Table 5 A possible way of presenting an overview of potential interventions

Objective	Intervention	Time	Budget	Framework conditions / assumptions	Interdependencies	Possible externalities (esp. for the poor and for women)
Increase sustainable forest yields	Operationalise participatory forestry management (PFM)	Medium to long term	High	Functioning control mechanisms	Capacity building of regional government structures	Exclusion of women and poor/ landless
	Increase efficiency of charcoal production	Medium term	Medium	Feasible technologies available	Charcoal making must be legalised. Credit schemes available for investment	...
Decrease charcoal demand	Promote efficient fish smokers in coastal areas	Short to medium term	Low	Appropriate technologies available	...	...
	Promote improved cookstoves in households	Medium to long term	Medium	...	...	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...



It is likely that the sector analysis will have revealed regional differences, especially between consumption and production centres. Sparsely populated, forested areas with extensive charcoal production may require different measures than urban consumption areas. Furthermore, uptake of technologies may be more likely in one region than the other, because of economic factors (e.g. improved charcoal kilns), level of economic activity or cooking habits (e.g. improved cookstoves). Therefore, some interventions may be targeted at certain regions only, or may be piloted in defined areas.

Two publications providing practical and concise lists of potential interventions are *Wood fuel supply interventions* (Sepp, Mann, EUEI PDF/GTZ, 2009) and *Cooking energy supply interventions* (Attigah, EUEI PDF/GTZ, 2009) (see *Annex B*). A non-exhaustive selection of possible interventions is provided below.

Sustainable biomass supply

- Develop a Woodfuel Supply Master Plan for the main supply centres (including tree cover inventory, classification of harvesting zones, analysis of woodfuel flows, development of conditions and technical specifications for sustainable charcoal production).
- Develop District or Regional Woodfuel Management Plans (including rehabilitation and better management of forestry resources, development of management structures at community level, plus additional support schemes such as training, awareness raising and monitoring structures).
- Transfer responsibilities for management of forest resources to local communities (defining rules for sharing of responsibilities and profits, coordination between central government and communities with regard to exploitation).
- Improve regulation and procedures on land rights and usufruct.
- Establish an efficient control system to address exploitation of resources, fiscal fraud, woodfuel transport, quality of production, etc.
- Increase the productivity of forest resources (e.g. through agroforestry, or on-farm tree planting).
- Professionalise the charcoal value chain (e.g. through formal recognition of charcoaling groups, increasing transparency in charcoal transportation, and adjustments to the tax regime to limit corruption).
- Modernise and strengthen woodfuel flow monitoring and control (e.g. improve the permit system for forest products, control system and computerised monitoring of charcoal flows and trade, and related tax revenues).
- Promote the use of improved, low-cost charcoal-making technologies for informal producers (e.g. improved pit kilns).

Efficient biomass use

- Conduct R&D into energy-efficient appliances that may be cost-effective and marketable to future users.
- Investigate end-use appliances on the market, worldwide, and their suitability, or adaptability to the local market.
- Improve efficiency of institutional and commercial woodfuel use, including technological developments and financial support for better stoves, boilers, dryers and furnaces
- Expand the range of appliances offered to consumers (e.g. improved stoves/furnaces) to reduce consumption of and pollution from woodfuel.
- Set up mechanisms to provide consumers (particularly women) in designated regions with access to better appliances and better regulated fuel (micro-credit or subsidies).
- Introduce complementary activities to further reduce woodfuel consumption (e.g. pressure cookers, haybox cookers, energy-saving cooking practices).

Availability of viable alternative fuels

- Promote alternative fuels if appropriate for household, institutional or industrial use (briquettes made from agricultural residues or charcoal dust, peat or biogas, and the required affordable cookers).
- Tackle bottlenecks to the uptake of viable, cost-effective and acceptable alternatives.
- Investigate barriers to expanding the LPG market – e.g. distribution points, standard fittings, credit for cookers and bottles, finance for distribution companies, regulation, and lack of standardisation.
- Look into improving kerosene cooking appliances including standards, safety and efficiency.
- Address the pricing of competing energy sources, such as electricity or LPG, to ensure they are sustainable and pro-poor, and on a level playing field with biomass.
- Maintain a "technology watch" for new fuels or appliances that come onto the market.

Institutional capacity for implementation

- Establish a Biomass Energy Agency or other empowered authority to govern the sector, which could be the successor of the Steering Committee.
- Abandon legislation that prevents a transparent and sustainable biomass energy sector, e.g. a ban on charcoal.
- Address any contradictions between existing policies and laws (e.g. forestry laws may endorse the production of woodfuels under licence, while energy laws may deter it).

A supporting environment

- Improve agricultural productivity to promote higher yields per unit of land and reduce pressure on woodfuel resources.
- Adaptation of regulation such as the energy policy, forest code or a charcoal ban.

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Stove vendor in Benin

Step 15

Specify the selected interventions

The objective is to turn the selected interventions into clearly defined, concrete activities.

The following additional information on each selected intervention must be elaborated:

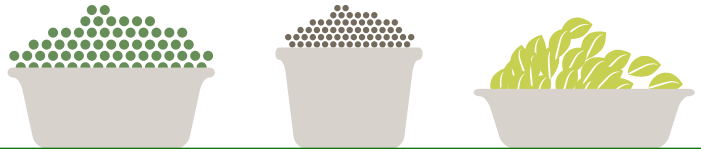
- **Specific objectives** of each intervention, quantified (where possible) and time bound, as sub-objectives of the objectives defined in *Step 12*;
- **Concrete actions** to be taken on the ground;
- **Target group** to be addressed;
- **Responsible implementer:** this can be deducted from the analysis of the political and policy environment (*Step 3*), the stakeholder analysis (*Step 4*) and the more detailed assessment (*Step 13*). When the action is implemented through government, it should be specified which agencies will implement;
- **Mitigation actions** for the externalities as defined in *Step 14*;
- **Detailed budget estimation**;
- **Potential funding sources**, such as government budgets, credit mechanisms, donors or private sector.

Results can be presented in a table, see *Table 6* for an example.

◄ Using efficient stoves for bakeries in Ethiopia

Table 6 Example for presenting the specified selected interventions

Inter-vention	Specific objective	Concrete actions	Target group	Responsible implementer	Mitigation actions	Budget estimation	Potential funding sources
Operation-alise PFM	Introduce incentives for sustainable wood harvesting	Piloting a PFM scheme in 3 communities in the Western District.	Communities in forest areas	Forestry Division, Ministry of Agriculture	Quota for disadvantaged groups. Management Committees must include women.	50.000 over 4 years	Forest revenues Donor countries Y and Z
Increase efficiency of charcoal production	Reduce wood demand for charcoal production	Field testing and labelling of charcoal kilns Promoting and facility of credit facilities in Northern District	Charcoal makers	Ministry of Energy	...	...	...
Promote efficient fish smokers in coastal areas	Decrease wood consumption for fish smoking in coastal areas	Testing and labelling fish smokers. Credit schemes for investment in improved fish smokers. ...	Fish smokers	...	...	...	...
Promote improved cookstoves in house-holds		...	...	...	...	...	...
...		...	...	...	...	...	...
...		...	...	...	...	...	...



It is important that the objectives and the actions are described clearly to ensure a common understanding of the proposed interventions. Also, sufficient resources for biomass energy should be allocated in national and regional budget planning. With clear funding commitments from government, additional funds can often be mobilised from donors, NGOs or the private sector.

To allocate resources and search for funding, it may be useful to include these measures:

- Develop mechanisms to mobilise local capital;
- Encourage greater involvement of local banks in biomass energy investments;
- Introduce smart subsidies for biomass energy initiatives, also as part of rural electrification (electrification together with improved biomass technology) programmes;
- Promote technology acquisition through leasing arrangements, e.g. for charcoal production technologies, institutional stoves, biogas, LPG appliances.

Step 16
Define a governance structure for implementation

Besides the concrete interventions specified in Step 15, restructuring of responsibilities and power in the government should be an integral part of the Strategy. As biomass is a multi-disciplinary topic, a cross-sectoral government body will be most effective for coordination, planning and monitoring (e.g. a Biomass Coordination Office, Biomass Committee or Biomass Unit). This body should:

- Facilitate inter-sectoral cooperation;
- Coordinate interventions and regulation in the biomass energy sector;
- Monitor and evaluate changes in the sector.

This body can be regarded the long-term successor of the Steering Committee. It should ideally be housed outside a particular line ministry, and be awarded a formal mandate to govern the sector by the Prime Minister or other high-ranking official. The most suitable arrangement depends on the governing structure of the country and should be decided on a case to case basis, considering the policy and stakeholder assessments (*Steps 3* and *4*).

Sufficient resources (budget, time) are required to sustain the body in the long term. This budget can originate from government budgets of the relevant sectors (energy, forestry, environment), possibly with a contribution from donors.

Regular meetings between the governing body and the leading stakeholders can serve as a platform to monitor advances and discuss problems and opportunities which may occur during implementation. It is advised that such meetings take place regularly (e.g. quarterly), with outcomes reported back to the relevant ministries.

Stage 5
Strategy Formulation and Action Planning

Outputs:

- Draft Strategy
- Draft Action Plan
- M&E system

Step 17
Formulate a Draft Strategy and Action Plan

A Biomass Energy Strategy is an official, high-level plan that guides government policy in the biomass sector. Its objective is to provide direction for the sector within the defined time horizon (*Step 6*) and to present a package of interventions that can achieve maximum impact with available resources. The exact position of a strategy in the governmental procedures depends on the country's governing structure.

A typical Strategy contains the following components, prepared in the previous stages:

- an overview of the state of the sector (*Stage 2*);
- a vision for the sector (*Step 6*);
- a strategic selection of activities that can lead the sector towards this vision (*Step 15*);
- establishment of governing structures (*Step 16*).

The Strategy should bring together the selected interventions (*Step 15*) efficiently and logically, following the structure of vision, objectives and interventions as defined in *Step 12*. Therefore, the actions should be prioritised. Leading questions in prioritisation are:

- Are the framework conditions (defined in *Step 14*) already in place, or do they need to be created?
- How should the interventions be organised to account for interdependencies?
- How long do interventions need to take effect?
- How could they fit the planning cycles of the government?
- Are budgets available? If not, when might they become available?
- Are sufficient capacities in place in the institutions responsible, or should these be built first?
- Are interventions related to other activities already being implemented, for example by regional governments or donors?

All these questions can be answered based on the sector and stakeholder analyses (*Step 4* and *Stage 2*) and the specification of the actions in *Step 15*.

Once the interventions have been prioritised, an Action Plan can be developed, that describes the short-term actions (5 years) in detail, and medium to long term

actions more broadly, as circumstances may change in the meantime. All information on the intervention that was presented at *Steps 14* and *15* must be considered in the Action Plan. The Action Plan will need to be updated regularly, e.g. every two years.

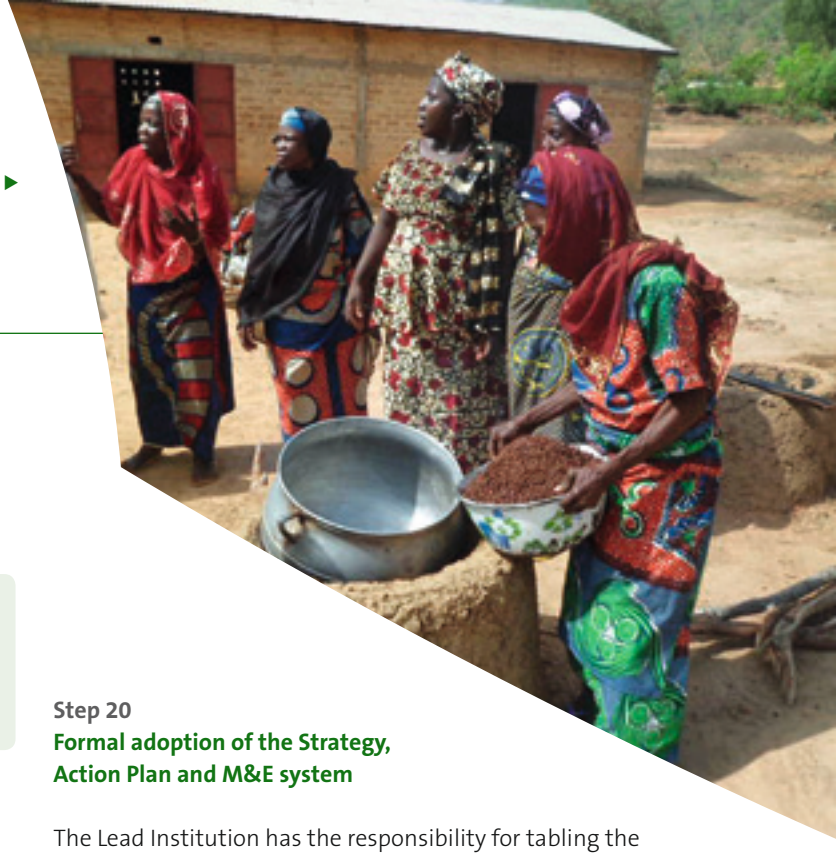
Step 18
Develop a monitoring and evaluation system

Implementation of the Strategy and Action Plan must be monitored and evaluated, to determine whether roll-out is timely and effective. Monitoring and Evaluation (M&E) can also be used to meet accountability obligations to stakeholders and detect whether adjustments of the Strategy and/or Action Plan are required.

Measurable indicators and means of verification must be defined for measuring progress and impacts of each intervention and progress towards overall objectives. Indicators for each of the objectives as defined in *Step 12* should be precise, measurable, objective, unambiguous, uni-dimensional (measuring one thing at a time) and, where relevant, gender-specific. Special attention should be given to the mapping of impact (expected and unexpected) on vulnerable groups such as women and the poor. Indicators can be qualitative or quantitative, depending on what is being measured. It is important that the group of indicators covers the complete scope of the objective they are defined to measure. At the same time, the indicators should be as practical as possible to facilitate cost effective M&E.

The means of verification describes where the information for each indicator will be sourced. This may be statistics from resources that are being generated regularly (e.g. five year household surveys or forestry inventories) or from mile stones achieved (e.g. new regulation accepted or policy document developed). Additional surveys may be required, solely for the purpose of monitoring the progress of the Strategy implementation.

The ongoing M&E obligations fall to the governing body as defined in *Step 16*. To enhance accountability and independence, an evaluation can be carried out by an external organisation at regular intervals, e.g. every two years.



Producing shea butter with efficient stoves in Benin

Stage 6
Adoption and Implementation

Outputs:

- An agreed, officially endorsed Biomass Energy Strategy and Action Plan, with M&E system

Step 19
Agreement on the Strategy, Action Plan and M&E system

Once a Strategy, Action Plan and M&E system have been developed, they must be endorsed by the stakeholder group defined in *Step 5*. This group will also need to approve the governance structure developed in *Step 16*. The Steering Committee should take the lead in securing this endorsement, perhaps through a workshop at which the draft documents are presented, discussed and revised. It is important that participants receive the relevant documents well in advance, so that they can be circulated within their institutions beforehand. Once the comments from the stakeholders have been integrated, the Strategy, Action Plan and M&E system can be finalised.

Step 20
Formal adoption of the Strategy, Action Plan and M&E system

The Lead Institution has the responsibility for tabling the Strategy, Action plan and corresponding M&E system for official approval, possibly assisted by other Steering Committee members. Each country will have its own procedures for formal adoption of new strategies, via Parliament, a Prime Minister or the Council of Ministers. As the Strategy is cross-sectoral, approval by a line minister will not suffice (see *Step 9*). Official endorsement should result in adoption by the ministries or departments responsible for energy, forestry, environment, lands and other related sectors.

At this stage, it may be useful to organise an official launch of the Strategy in the presence of high level representatives of the relevant government institutions, the private sector, regional representatives and donors. Press coverage of this event and distribution of a leaflet on the biomass sector could increase awareness of the Strategy among the general public.

◀ Single mirt stove at a bakery using efficient stoves in Ethiopia

Epilogue

The processes outlined in this guide are aimed at increasing awareness of the sector and its many benefits and challenges, and improving cooperation and coordination among stakeholders, as much as they are intended to result in a Strategy and Action Plan. The adoption of the Strategy and Action Plan is only the starting point for restructuring governance in the biomass energy sector; increased sustainability of the sector can only be achieved through implementation of the results.

Implementation requires resources to be made available to biomass energy; budgets, manpower, capacities, and priority to be given to the sector by governments. This cannot be achieved without a true understanding of the sector and its contribution to the energy supply to households and industries, and acceptance that biomass will remain one of the most important energy sources for the coming decades. When produced sustainably and used efficiently, the country's economy can benefit from a reduction of imported fuels, and industries and households can benefit from an affordable energy source.

▲

Bread baked with an improved rocket baking oven at Malaika Bakery, Uganda

Annex A: Glossary

In this guide, the terminology of the *Unified Bioenergy Terminology*[2] (FAO, 2004) is used. This document provides useful information on conversion factors and units.

Modern and traditional biomass (use)

Traditional biomass is unprocessed biomass-based fuel, such as fuelwood, crop residues animal dung, and leaves and twigs. This fuel is conditionally renewable, depending on the efficiency of use and replanting practices. The traditional way of using biomass (e.g. traditional cookstoves and three stone fires) is often not efficient and can be linked to health problems due to smoke. However, the use of improved biomass technologies can increase the efficiency of conversion and use of traditional biomass while at the same time reducing emissions. This is often referred to as the modern use of traditional biomass.

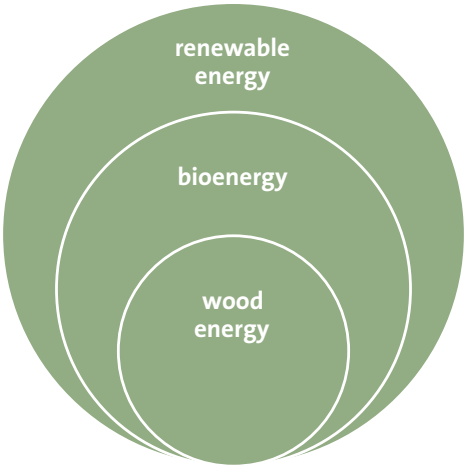
The term modern biomass is often used for processed biomass, which can be used more efficiently than traditional biomass, e.g. wood pellets and briquettes. Modern biomass is often produced on (semi-)industrial scale. The feedstock of modern biomass includes wood residues, energy crops, agricultural residues and household and industrial organic waste. In order to be sustainable, modern biomass feedstock should originate from sustainably managed forests, sustainable agriculture or residues.

2) www.fao.org/docrep/007/j4504e/j4504e00.HTM

Modern biomass use, i.e. the use of improved biomass technologies, can increase the efficiency of conversion and use of traditional biomass while at the same time reducing emissions. This is often referred to as the modern use of traditional biomass.

Figure 3 Relation between biomass, biofuel and bioenergy (based on FAO, 2004)

Figure 4 Relation between renewable energy, bioenergy and wood energy (based on FAO, 2004)



Terminology

biomass: material of biological origin excluding material embedded in geological formations and transformed to fossil

biofuel: fuel produced directly or indirectly from biomass (subdivided in solid and liquid biofuels)

biomass energy, bioenergy: energy from biofuels

biomass by-products, biomass residues: biomass originating from well-defined side-streams from agricultural, forestry and related industrial operations

charcoal: solid residue derived from carbonization distillation, pyrolysis and torrefaction of fuelwood

energy plantation trees: woody biomass grown as short rotation trees specifically for its fuel value

firewood: cut and split oven-ready fuelwood used in wood burning appliances like stoves, heaters and dryers.

forest fuels: woodfuel produced where the raw material has not previously had another use. Forest fuel is produced directly from forest wood by a mechanical process.

fuel: energy carrier intended for energy conversion

fuelwood: woodfuel where the original composition of the wood is preserved

liquid biofuel: liquid fuel produced directly or indirectly from biomass (e.g. ethanol or biodiesel)

short rotation trees: woody biomass grown as a raw material and/or for its fuel value in short rotation forestry

solid biofuel: solid fuels produced directly or indirectly from biomass (e.g. fuelwood, charcoal, briquettes)

wood chips: chipped woody biomass in the form of pieces with a defined particle size produced by mechanical treatment with sharp tools such as knives.

wood energy, forest energy: energy derived from woodfuels corresponding to the net calorific value of the fuel

woodfuels, wood based fuels, wood-derived biofuels: all types of biofuels originating directly or indirectly from woody biomass

woody biomass: biomass from trees, bushes and shrubs

Annex B: Further reading

Biomass market information

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http://www.giz.de/fachexpertise/downloads/giz2012-en-legal-frameworks-renewable-energy.pdf

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WFP (2012). *Handbook on safe access to firewood and alternative energy (SAFE)* *http://documents.wfp.org/stellent/groups/public/documents/newsroom/wfp252989.pdf*

Tools and guidelines

BTG (2013). *Alternative Charcoal Tool* *http://www.btgworld.com/en/references/publications*

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Networks and international cooperation

World Agroforestry Centre
http://www.worldagroforestrycentre.org/our_products/publications

BEFS: Bioenergy and Food Security (FAO)
http://www.fao.org/energy/befs/en/

HEDON: Household Energy Network
http://www.hedon.info/tiki-index.php

GBEP: Global Bioenergy Partnership
http://www.globalbioenergy.org/

GACC: Global alliance for Clean Cookstoves
http://www.cleancookstoves.org/

For more information,
please contact:

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