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## Sustainable energy from trees: Adopting an integrated approach to biomass energy: Policy Brief

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# Sustainable energy from trees

## Adopting an integrated approach to biomass energy

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### References

1. IEA (2006). *World Energy Outlook*. Paris, IEA/OECD
2. GEF (2013). *Africa will import – not export – wood*. Chevy Chase, MD, Global Environment Fund.
3. World Bank (2011). *Wood-Based Biomass Energy Development for Sub-Saharan Africa: Issues and Approaches*. Washington, D.C., World Bank
4. Babanyara, Y. Y. and Saleh, U. F. (2010). "Urbanisation and the Choice of Fuel Wood as a Source of Energy in Nigeria." *Journal of Human Ecology* 31(1): 19-26
5. Ministry of Energy (2012). *National Energy Policy, Third Draft*. Nairobi, Republic of Kenya
6. Ministry of Infrastructure (2011). *National Energy Policy and Strategy*. Kigali, Republic of Rwanda
7. Ministry of Energy (2012). *Mozambique Biomass Energy Strategy*. Maputo, Government of Mozambique
8. SEFA (2013). *Achieving Universal Energy Access Sustainable Energy For All*. New York, United Nations
9. Davidson, O., Chenene, M., Kituyi, E., Nkomo, J., Turner, C., and Sebitosi, B. (2007). "Sustainable Energy in sub-Saharan Africa." *ICSU Science Plan*, ICSU Regional Office for Africa



Photo courtesy of Oliver Johnson

### Importance of biomass energy

Traditional wood-based biomass encompasses firewood, charcoal, branches, leaves and twigs. Its importance in Sub-Saharan Africa (SSA) is clear: over 90% of the population rely on firewood and charcoal for energy, especially for cooking [1,2]. Traditional biomass is especially prevalent amongst the urban poor and those in rural areas. Although urbanization brings people physically closer to centralized electricity systems, limited economic growth and job opportunities often mean that the majority of the urban poor are unable to access electricity and thus do not transition to using modern energy sources. This leads to increased demand for firewood and charcoal in urban centres [3,4].

As Figure 1 shows, the impacts of continued biomass energy use are felt across many sectors of society, such as health, agriculture, forestry, education, economy, trade, energy and environment. The important role and various impacts of biomass energy within rural and urban societies have not gone unnoticed, and many countries in SSA are now beginning to address biomass energy production and consumption seriously.

### The challenge

**Wood-based biomass energy is a complex and contested issue.** Around the world, billions of people remain dependent on traditional wood-based biomass – firewood and charcoal – for the majority of their energy needs.

**The debate over its continued use is highly polarized.** Advocates of wood-based biomass energy underscore that it is cheap and supports the livelihoods of those involved along their supply chain. They note that, according to the World Bank, biomass use in Sub-Saharan Africa is set to increase over the next 20 years. Meanwhile, opponents of wood-based biomass energy argue against it because of its well-documented negative impact on health and the environment.

Adding further complexity to the issue is the way wood-based biomass energy is rooted in social, cultural and economic practices, making it very difficult to change the way people use it.

**To ensure sustainability, wood-based biomass requires a cross-sectoral integrated approach.** This means considering interventions to improve energy access from multiple perspectives; for example, nutrition and health impacts, educational opportunities, gender equality, agricultural productivity and economic development. Bringing together different stakeholders and decision-makers in these sectors to design projects, programmes, strategies and policies will increase the likelihood of achieving sustainable, long-term changes in the way people produce and consume energy to support their lives, productive activities and community services.



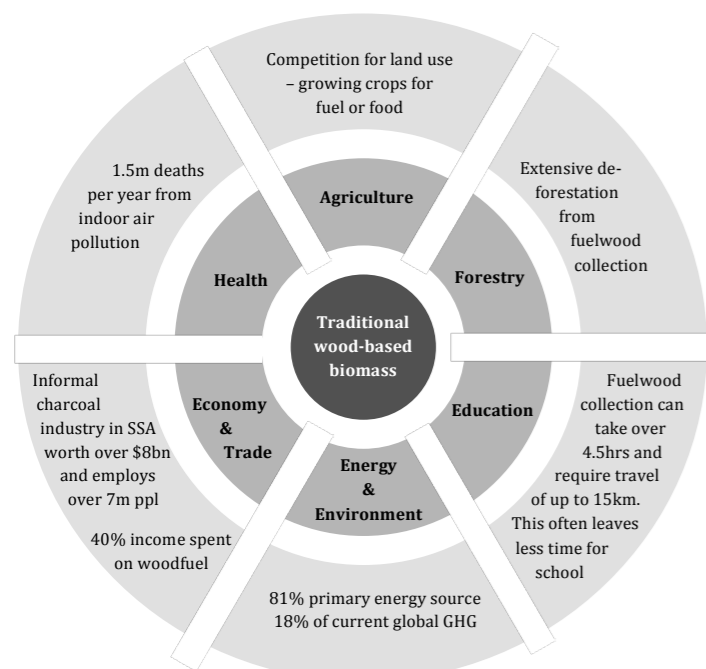


Figure 1. Importance of biomass energy across sectors

Source: Authors' own

## Pursuing integrated biomass energy

A review of energy policies and national biomass strategies for Kenya, Mozambique, Rwanda, Uganda and Tanzania [5,6,7,8,9] reveals some major similarities in the visions, challenges and strategies associated with further development of the biomass energy sub-sector. Common objectives include:

- The **need for more sustainable biomass production systems** to reduce pressure on forests and trees while reversing land degradation caused by charcoal production, as well as having fuelwood near homes. This can be achieved through agroforestry.
- The need for **more efficient carbonization processes** that yield well in conversion of wood to charcoal with low emissions.
- **More efficient transportation and marketing structures.**
- More **efficient utilization of biomass energy**, for instance, through development and adoption of improved cook stoves that consume less fuel and produce less emissions.

## Good intentions

One of the main reasons these objectives are not achieved is lack of coordination and harmonization between the many different actors involved in the development, production, diffusion and trade of technologies and processes associated with biomass energy.

Most government ministries have a role to play in the biomass energy system, including ministries in charge of agriculture, consumer protection, crime prevention, education, energy, entrepreneurship and small and medium enterprises (SMEs), environment, tax and finance, forestry, food security, health, trade and industry, infrastructure, land, local government, rural development and standards and regulations, and anti-corruption bodies, amongst others [5,6,7].

### Box 1

#### Integrated planning in Kenya

For example, the Ministry of Energy and Petroleum in Kenya is working with a range of actors to develop a more sustainable biomass energy sector and to promote cleaner and more efficient cookstoves. In order to develop the policy framework, it has collaborated with a range of stakeholders to review existing policy on biomass energy development. The feed-in-tariff policy in December 2012 established a clear tariff for plants that generate between 0.5-10MW of electricity from biomass. Meanwhile, to strengthen the regulatory framework, it is working with the Energy Regulatory Commission, Kenya Bureau of Standards, University of Nairobi, UNDP and other partners to develop standards for biomass technologies and regulations to mandate the use of improved cookstoves in certain institutions.

#### Limited action

However, despite growing awareness of the strong interconnections between actors involved in biomass energy and some success stories (see Box 1), integrated energy planning remains elusive for most SSA countries: the parent ministry is usually left to drive strategies alone, and issues such as capacity, structures and systems for such planning remain weak, follow-up on agreed initiatives does not happen and policy advice remains disconnected. Examples include offering a duty waiver for solar panels but not accessories, and legalizing charcoal production, but not regulating the types of forests from which charcoal may be produced.

This limited action leads to continued barriers to the development, production and consumption of clean and efficient wood-based biomass energy, as summarized in Table 1 below.

Table 1. Barriers to development of integrated biomass energy sector

Barrier	Description
Lack of data	There are no regular and reliable statistics to show levels of production, trade and consumption
Low awareness of technologies	Many communities are unaware of clean and efficient biomass technology options
Poor regulatory framework – no formality	Poor legal and regulatory frameworks for biomass energy mean most operations remain informal/illegal, corruption is rife and increasing transaction costs reduce profit margins
Limited financing	It is difficult to attract investors since most wood-based biomass fuels are usually underpriced (or free), with a supply chain that is largely informal
Weak capacity	Neglect of the sector in public and private research and development and national planning results in poor institutional frameworks and services, marginalized, underfunded institutions and shortage of skilled manpower
Lack of political priority	Unrealistic expectations of transition to modern energy sources makes biomass energy sector a low priority, leading to lower budgetary allocations

Source: Authors' own

## Call to action

The solution to addressing the issues above lies in a **more explicit focus on integrated planning**, based on what is often known as a *systems approach* or *landscape thinking*. Such integrated planning should ensure that development of biomass energy have a common goal aimed at building on the gains, addressing challenges and charting a development path for sustainability, reduction of pollution and diversity in technology.

It is critical for policymakers (and practitioners) to recognize the significance of such systems thinking and approaches in development planning. By looking at products and services along supply or value chains or along life cycles provides a critical framework with which to clarify actors and institutions (including rules/norms and organizations). This perspective also ensures that all relevant actors and policies are identified and targeted.

With this in mind, we call upon the governments of SSA to commit to the following:

- **Support the development of sustainable wood-based biomass supply** by encouraging the establishment of plantations, good agroforestry practices and effective management of forests and drylands.
- **Promote innovation and diffusion of clean cookstoves by supporting research and development, capacity building and awareness-raising.** This involves: undertaking needs assessments, market analyses and baseline data collection; facilitating development of and access to alternative biomass technologies such as briquetting and gasifying biomass, and; investing in efficient production and end-use technologies in order to reduce consumption of fuel, reduce greenhouse gases (GHG) emissions, save lives, make cooking fuels more affordable and increase women's productive time.
- **Improve the legal framework and licensing process** by formalizing and improving regulatory mechanisms in biomass energy to increase revenue and reduce corruption and unsustainable exploitation, and by harmonizing various policies and strategies regarding the development, distribution, trade and use of biomass energy. This should be done by drawing on lessons learnt elsewhere and in other sectors.
- **Establishing a policy forum** to promote stronger inter-sectoral coordination is also required in order to improve the quality and delivery of goods and services.