Bioenergy in Africa – Time for a Shift?

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Mankind has always depended on biomass to satisfy its basic needs for heating and cooking. This is still true today, especially for people in developing countries. Biomass still provides cooking fuel for 2.4 billion people and a vast majority of African people depend on it for their energy needs. However, the increasing energy demand, the often non sustainable extraction rates, inefficient production methods and hazardous usages lead to negative health impacts and other social and environmental implications.

Simultaneously, several African countries are considered as future strongholds of modern bioenergy production, due to their perceived vast amounts of available land. Bioenergy is one of the major components of a sustainable energy future but as such it becomes a driver for increased land use.

As a result, Sub-Saharan Africa is confronted with an increased need for biomass production both domestically and from other parts of the world, whether for electricity, transport or heat purposes. To secure a sustainable development of this resource requires strong local and regional governance.

This paper analyses the barriers and conditions to successfully mainstream responsible bioenergy development in Africa and suggests a way forward for a sustainable development of the sector. Furthermore, it focuses on actions that governments and companies can take in order to ensure bioenergy sustainability. It also highlights some examples of positive moves. More comprehensive information on WWF’s global stance on bioenergy can be found in WWF’s Global Bioenergy Position Paper.

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Energy Context

Energy demand in Africa as a whole is expected to double, from 500 million tonnes oil equivalent (Mtoe) in the year 2000 to 1 000 Mtoe in 2030. In Sub-Saharan Africa, traditional biomass is still dominating the energy mix. While traditional bioenergy consumption numbers presented in the next paragraph may seem impressive, they need to be put in the right context. We remind the reader that, for the year 2005, the per capita overall energy consumption in developing countries was less than 1 000 kilograms of oil equivalent (kgoe) compared to about 4 000 kgoe in Europe and about 8 000 kgoe in the US. Tanzania and Mozambique consumed about 500 kgoe per capita, and Senegal less than 300 kgoe.

Traditional Bioenergy

Traditional bioenergy is essential to Africa and is growing. Biomass energy, mainly through wood and charcoal, represents about 80% of the total energy consumption in Sub-Saharan Africa, and up to the equivalent of one third of the total household economy. In some countries, just five percent of the population have access to power, and in some rural areas only two percent. The continent is the world’s largest consumer of biomass energy through
firewood, agricultural residues, animal wastes, and charcoal and it is the only continent that has seen a significantly increased production since 1961. The total number of people relying on traditional biomass as a source of heating and cooking fuel in Africa is still to increase 54% from 646 to 996 million until 2030.

In 2007 the global amount of wood used as fuelwood and for charcoal production reached 1.9 bn m$^3$ of which about 0.6 bn m$^3$ in Africa. This is roughly equivalent to the entire European consumption of sawnwood, wood-based panels and paper & paperboard. African industrial roundwood production is relatively limited with about 0.08 bn m$^3$ in 2007.

Traditional bioenergy is a significant driver for land-use change and CO$_2$ emissions. Although Africa’s CO$_2$ emissions from fossil fuels only account for 2.5 percent of the global emissions, the African share of global CO$_2$ emissions from land use change is around 17 percent. The biggest driver for land use change and deforestation in Africa is agriculture (permanent and shifting agriculture). However, traditional biomass use is an important driver for forest degradation and conversion in particular around urban centres. For instance, Tanzanians consume more than 2 650 tons of charcoal each day, or 968 488 tons per year. To produce that quantity using traditional methods, the rural population have to clear-cut the equivalent of 331,7 hectares of forest every day. To meet this consumption, more than 121 061 hectares of forests are destroyed. In Madagascar, 80% of wood consumption comes from firewood and charcoal, representing 18 million m$^3$. A large share is not harvested at sustainable levels.

Traditional bioenergy is often used inefficiently and is at the origin of health and other social impacts. Inefficient charcoal conversion technologies increase the need for biomass raw materials. The use of solid biomass is prone to considerable heat losses through incomplete combustion and inefficient equipment (e.g. in three-stone fires and traditional stoves). Furthermore, the use of other renewable energy sources such as the sun can further decrease the need of wood biomass. This will have positive implications for health. According to estimates of the World Health Organization, more than 1.6 million deaths and over 38,5 million disability-adjusted life-years can be attributable to indoor smoke from solid fuels affecting mainly children and women. Reliance on traditional biomass energy may also act as a barrier to poverty alleviation or may even be a factor contributing to adverse living conditions: where biomass resources are scarce or used inefficiently, their procurement, especially fuelwood collection in rural areas, may devour a considerable portion of time that household members, especially women, could allocate more efficiently to other tasks.

Solutions exist. A large number of complementary and alternative sustainable options exist, such as improved efficient char coaling techniques, cooking stoves combined with wood plantations, solar cookers, electric cookers etc. For instance the technology of using UV-radiation to purify and heat water can reduce the need of fire wood by 1 kg per litre of water. Also, non traditional biomass sources based on agricultural waste, bio-ethanol or plant oils for instance can be efficient substitutes.

However, the negative trend of unsustainable traditional biomass is expected to continue in Africa unless action is taken. A move away from unsustainable traditional biomass towards better practices and alternatives is urgently needed. This will not only require access to technology and financing but also good governance, regulations and a sustainable management of the supply chains.

The Fossil Fuel Sector
Next to traditional bioenergy, Africa relies heavily on fossil fuels. Fossil-fuel-fired electricity generation supplied 81 percent of the region’s total electricity in 2006, and this reliance is expected to continue through 2030. Demand for electricity in Africa will grow at an average annual rate of 2.6 percent in the IEA World Energy Outlook 2009 reference scenario. Coal-fired power plants, which were the region’s largest source of electricity in 2006, accounting for 46 percent of total generation, are projected to provide a 37 percent share in 2030, and natural-gas-fired generation is projected to expand strongly, from 25 percent of the total in 2006 to 39 percent in 2030. Africa’s crude oil consumption has more than doubled since 1980, from 1.4 million barrels a day to about 3 million barrels a day in 2006. According to recent data from BP’s statistical energy reviews, Africa had proven oil reserves of 117.481 billion barrels at the end of 2007 or 9.49 percent of the world’s reserves and in 2007 the region produced an average of 10 million barrels of crude oil per day, 12.5 percent of the world total. However, apart from the few oil exporters with Nigeria and Angola dominating, Sub-Saharan Africa consists of a large number of low-income countries, many of which are highly dependent on oil imports as a source of primary energy and are strongly affected by oil price volatility.

This reliance threatens several people’s livelihoods and entire economies. A majority of people and businesses do not have much margin to cope with increased fossil fuel prices. The oil and coal exporting countries’ GDP is very much dependent on fossil fuels and renewable energy production would help diversifying their economies.

A move away from oil and coal products in favour of renewable energy including home-grown bioenergy would be highly desirable.

Non-traditional Bioenergy

Non-traditional bioenergy enables a diversification of bioenergy feedstocks. It uses new forms of biomass or new conversion methods to produce energy. It is mainly used in power plants and in transportation. It is also increasingly a source of energy for the rural communities in the form of biogas, briquettes, or liquid fuels for lighting or cooking. Some sources of non-traditional bioenergy are similar to traditional bioenergy, such as manure, wood, or agriculture waste. Others are relatively new but have been grown for a long time for other purposes: sugarcane, oil palm, soy... New conversion methods also enable a broader use of organic materials to produce bioenergy. Wood and waste or even algae for instance may become sources of liquid biofuels for transport.

Non-traditional bioenergy plays an important role in our future energy mix. Policy makers around the world are promoting solutions including more efficient energy use and renewable energy sources. In order to build up a carbon free, clean and renewables-based energy sector, strategies are needed for the long term but also for immediate needs. Some technologies may not yet be ready for commercial use. In this context, so called first generation biofuels, i.e. biodiesel from plant oil or bioethanol from crops rich in sugar/starch, are seen as an important complement, especially in the transport sector. In the longer term, countries should look at electrification of the transport sector and at smarter ways to move people and freight. Aviation and shipping may continue to depend on liquid biofuels for a longer time. For these remaining biofuels, solid biomass and algae for transport energy are likely to develop into trade commodities.

Non-traditional bioenergy currently plays a small role in the global energy mix: about 2%. However, some countries have slowly built up a large bioenergy industry. Brazil has achieved a 50% biofuel market share of the gasoline-powered fleet by February 2008. This is the result of long term stable support policies. In Africa, few countries have experienced a stable growth of non-traditional bioenergy. Nevertheless, Africa is seen by many in the industrialized world as a future supplier of bioenergy due to its large amounts of land and
cheap labour force. The most active countries in promoting biofuels production include Ethiopia, Tanzania, South Africa, Malawi, Mozambique, Kenya, Cameroon, Uganda, Burkina Faso and Nigeria that have allocated several million of hectares of their land to biofuels, still with notable differences in national strategies.

The driving forces behind the developments in these countries are the desire to reduce dependence to imported fossil fuels, to improve rural energy supply and rural economies, but also to attract foreign investment money. Indeed, for most of these countries production of bioenergy is geared towards the external markets, thus making these countries net exporters rather than producers to meet internal demands. Investments have been boosted by the policies set in regions such as the EU and the US.

Good governance, regulations and a sustainable management of the supply chains are paramount to ensure a sustainable development of these new markets.

**Recognizing opportunities & challenges**

**Sustainable bioenergy based on traditional sources and waste**

Alternatives to the unsustainable use of traditional bioenergy sources exist and are diverse; they include the use of crop waste and solid biomass to generate electricity, heat, and liquid biofuels; animal dung and human excreta to produce biogas; and better and more efficient use of biomass, e.g. plantation forests and fuel-efficient stoves. Often there are ways to achieve a combination of desirable results, e.g. creating hedges from bioenergy crops to protect food production, by-products such as bio fertilizers, feed for cattle etc. Sometimes interesting win-win situations also enable nature protection. Removing invasive plant species, increasing the land value through sustainable biomass harvesting, sustainable forest management combined with pellet production from sawmill residues, efficient char coaling techniques belong to the possibilities. In particular, agriculture and forestry residues and the organic part of municipal waste present a huge potential that is currently largely untapped. If efficient resource mobilisation is possible, waste can be used for several energy applications such as biogas or biomass boilers, or even liquid biofuels. The use of residues will have implications on soil carbon, water use, drought tolerance etc. Since African soils are often depleted and need organic amendments to restore organic matter the use of organic residues for energy should always be assessed carefully.

Advantages of these systems include large carbon emission savings if well managed; sustainable local energy production; provision of a stable energy supply compared to wind and solar energy; creation of local employment; and, in some cases, saving time and work.

Drawbacks include the need for an adequate supply of resources - biomass is often not readily available, meaning the production of materials may require long processes such as sowing, planting, harvesting, drying, storing, fuel conversions, mechanical conversions, and transportation; risk of competition with other land uses; and climate limitations, e.g. for biogas viability.

Economics, cultural resistance and technology are additional barriers to these new energy sources. Alternative technologies struggle to gain markets as long as firewood remains readily available. In several countries inefficient combustion of fuelwood or charcoal is still the cheapest and most accepted energy source for low income people. Next to economics, project failures are also often due to social aspects. For instance, gathering organic sources of biomass, including animal and human excreta, is not necessarily acceptable in certain societies. There may also be resistance to moving away from traditional cooking methods, and
technologies are not always adapted to cultures and local needs. Indigenous villagers in the Khata area of the Terai, Nepal, commented that the design of an improved cook stove they had been given did not fit well with their work pattern. Members of an extended family would all work together in the fields and come home to eat quickly before returning to the fields. For this, they cooked communally using large pots, which did not fit on the improved cook stoves. Indeed, while it is desirable to slowly move away from traditional biomass energy use, especially in areas where this resource is scarce, it will not disappear overnight.

Hence, there is a need to develop robust solutions for more sustainable extraction, production, value chain and use of traditional bioenergy while putting strategies and policies in place to slowly switch to other renewable energy sources, based on biomass, wind, sun, or small hydro... Much awareness-raising and education is needed, as well as adaptation of technologies to local needs. The following stories describe options for sustainable traditional bioenergy production. For other examples of sustainable bioenergy projects or even other renewable energy alternatives, please consult the report “Sun, Wind, Water & More – Renewable Energy in WWF Field Projects, 2009”.

Sustainable Wood Energy Supply in South-West Madagascar

In South-West Madagascar, a rapid deterioration of the forests has been observed due to the uncontrolled harvesting of forest resources for energy purposes. Wood comes from natural forests made up of dry formations of calcareous plate and xerophytic thickets of the spiny forest eco-region, universally recognized for its exceptional biodiversity and endemism. In 2007, the city of Toliara consumed 288,782 tonnes of fuel wood while only 64,000 tonnes could be produced sustainably in the region. This unsustainable harvesting results in soil depletion, desertification and loss of economic opportunities for the 80% of the population living in rural areas. The energy supply itself is threatened over the long term, with consequences for women and children’s work loads and for people making a living from fuel wood production and trade.

Recognising the social and environmental importance of wood energy production, WWF started a project in close cooperation with national and regional forestry entities. Aim is to support the implementation of a sustainable wood energy supply strategy in the region, by strengthening the capacities of administrative services and local authorities to assist and monitor the sector, carrying out planting of alternative and useful energy species with village communities and the private sector and assisting village communities in the sustainable management of forest areas for charcoal production, including improved carbonization techniques. Up to now, the villagers have planted selected tree species on 250 hectares. Despite difficulties due to climatic circumstances, the local population has shown a strong appropriation of the project. This leads us to believe that this socio-economic dynamic should expand quickly over the coming years. Very recently, this project has found new political support. A regional law has been enacted to regulate wood-based bioenergy supply chains. Measures include the delimitation of production zones, the organisation of the upstream supply and commercialisation, wood flow control and incentives for the long-term resource management sustainability. The pilot project will serve as an example for this law’s implementation in the entire region.

Community Afforestation in Kenya

Kenya’s forest resources cover only around 6% of the country’s 58.2 million hectares and are estimated to be decreasing by 2% annually. Firewood is mainly a rural fuel with over 90% of Kenya’s rural population depending on it. Charcoal made from wood, on the other hand, is mainly an urban fuel, with 82% of the urban population using it, and is produced by rural people as a source of income. In 2002, the Youth to Youth Action Group, with financial support from Thuiya Enterprises Ltd., initiated a community driven commercial afforestation project, using two types of Acacia tree to make charcoal, in order to enhance the livelihoods of the local communities. Charcoal has previously been considered as relatively illegal, so those involved in this initiative have to overcome social barriers to manufacture it. There is a high level of collaboration between several groups of actors, with legal contracts ensuring that each party gets paid for their efforts. The project has already increased forest cover significantly, and training in farming skills has enabled the farmers to earn short-term income through fast-growing crops and honey production. Farmers can sell wood directly, but need permits for charcoal production. On the negative side, most men sign the contracts with their sons, rather than
with their wives, and levels of corruption are still a cause for concern. The project looks positive, but a critical mass is needed before sustainability can be assured.

Sisal in Tanzania

The Tanga region in Tanzania depends on sisal as its most important cash crop. Using current production methods, only 4% of the actual plant is recovered as fibre, the residue either burnt, producing carbon dioxide, or rotted naturally, producing methane. At a sisal growing and processing company, this residue is now converted to biogas, and then to electricity, used to power the processing factory and excess power can be used by those living on company premises. Further plans include doubling the power output from 150kW to 300kW, and developing biogas for vehicles and piping fuel to households. The company has strong social interests and has transferred land to local farmers on which they grow sisal which they buy. The increased income has enabled them to build better houses, buy bicycles, mobile phones and better clothes, along with access to electricity and cleaner drinking water. Electricity is used to provide light for work in non-daylight hours, and to run small-scale industries, which can subsequently increase incomes. The company provides energy services to the local schools and hospital. It is difficult to assess the full impact of the Cleaner Integral Utilisation of Sisal Waste for Biogas and Biofertiliser as only phase one has been completed. However, higher standards of living, alongside increased levels of employment have already decreased rates of migration from rural to urban areas.

While such initiatives are important, there is an urgent need to scale up activities and to mainstream them through government policies. The African Biogas Partnership Programme (ABPP) started in 2008 could provide a good example of scale. It aims to reach 70 000 households by 2013. Target countries are Rwanda, Senegal, Burkina Faso, Ethiopia, Tanzania, Uganda and Kenya.

Sustainable bioenergy based on non-traditional crops

Energy crop production has become a new trend in Africa. Drivers include global demand, security of energy supply, private sector interest and the economic attractiveness of such investments for African countries’ economic development. Most of the investors are from outside Africa while there is little effort made from within to support local investors. Such bioenergy has advantages but may also constitute new challenges. Provided that challenges are recognized and policies are in place to tackle these, this source of energy can substitute traditional biomass and promote energy access, create rewarding employment, be a source of income, reduce energy-based greenhouse gas emissions, stimulate the revival of agriculture in some regions and possibly halt or even reverse soil degradation. The jatropha example below illustrates some of these advantages. However, weak governance and irresponsible investments can on the other hand create distortions on local food markets, displacement of people and irreversible damage to ecosystems. Agriculture production may also cause soil erosion, water stress, and pollution due to the use of various inputs. There may be land-grabbing issues, bad labour practices or even slavery. Much of the perceived available land is also likely to include small holder livestock production and pastoralist systems and land availability should be cautiously assessed. Often companies investing in bioenergy in Africa are small players relative to those operating in Brazil, Germany and the USA. Their management capacity and level of accountability to ensuring adherence to commitments remains largely unverified.

Continued pursuit of bioenergy development within this context is likely to have indiscriminate negative long-term implications and increased efforts are needed to establish appropriate policies. Some countries, like Mozambique and Tanzania, have established such tools, with variable rates of success. For instance, concerns have been raised on the usefulness of the draft Tanzanian (liquid) biofuel guidelines. In particular, issues about the capacity to implement the guidelines given the absence of a policy implementation strategy and legal
frameworks that can support the implementation of the policy and guidelines\textsuperscript{xi}. Also, several issues remain unresolved, for instance issues related to land-use\textsuperscript{xiii}.

We are facing a tremendous challenge. Bioenergy can provide benefits to producing countries but these benefits will not come automatically. Land-use, forestry, and agriculture faced issues before the bioenergy debate, and it is unclear whether the development of bioenergy will face similar problems. For instance, it is recognized that Africa in general suffers from low agriculture productivity. An increase in bioenergy investments will not automatically resolve these issues. Fundamental structural changes are needed in these sectors and short-term, stop-gap measures focusing on bioenergy alone are insufficient.

But we have seen that the discussion on bioenergy sustainability in Europe has been beneficial for discussions on various crops’ sustainability. Due to its novelty, its importance and potential impacts, bioenergy could trigger some government and corporate decisions in Africa to the benefit of sustainable bioenergy and agriculture in general.

\textbf{Jatropha oil in Mali\textsuperscript{xiii}}

The Garalo Project in the Garalo commune, Mali, was established to provide the local community with access to electricity produced from Jatropha oil. Small-scale farmers are at the heart of the business model supplying Jatropha oil to a hybrid power plant. Electricity is then sold by a private power company to residential and business consumers. Out of a forecast of 10,000 ha of Jatropha, 600 ha, involving 326 rural families, are already under cultivation on land previously allocated to cotton - a product which has significantly dropped in market value over recent years. The project provides a stable income to farmers as well as access to non-traditional energy services for the community, both having stimulated the local economy. Furthermore, producer and consumer rights have been promoted through the establishment of co-operatives and associations.

\textbf{Promoting opportunities & dealing with challenges}

Various options exist, are under development or should be considered in order to offer the best chances for a sustainable bioenergy development.

\textbf{International sustainability criteria}

Concerns about the long-term environmental and social impacts of large scale bioenergy development contributed to the establishment of a variety of processes aiming to develop sustainability criteria for bioenergy production and use. Most of these efforts are in agreement, at least at principle level about the topics which need to be addressed. These are mostly related to agricultural and forestry practices in general, and are not necessarily directly related to bioenergy: land conversion, water use, soil protection and social requirements. But bioenergy developments added at least two more concerns: the overall GHG balance of bioenergy production and use, and the indirect impacts (including indirect land use change and impacts on food prices). The Roundtable on Sustainable Biofuels\textsuperscript{xliiv} has gone through an extensive consultation and has ensured broad stakeholder participation. It offers a good standard for liquid biofuels. While the RSB has not specifically developed a standard for other types of bioenergy, such as solid biomass for electricity, its guiding principles can still be used as a support tool. This standard builds on previous commodity specific efforts, such as the Better Sugarcane Initiative or the Roundtable on Sustainable Palm Oil, that offer more advanced but less biofuel specific standards. The status of some relevant roundtables is summarised in annex I.

We would like to underline that standards and certification schemes do not have significant control of what happens outside the “farm gate”. Impacts by aggregated use, e.g. water use, or wider social implications can be difficult to handle for certification schemes, especially in environments with weak overall governance. Therefore governments securing a robust investment environment, e.g. by having credible environmental and social impact assessment
procedures, mapping and zoning of available land, broad support by civil society etc. will make it easier for standards to deliver and hence will also likely be more successful to attract foreign capital.

**African Governments**

Several African governments face at least two bioenergy related issues: First, traditional bioenergy use and its related economic, social and environmental impacts keeps growing while efficient cooking stoves projects or other renewable energy projects with scale are scarce. Second, the development of bioenergy crops is occurring within a policy and legal vacuum. Several options exist to respond adequately to these two issues:

- **Prepare an energy strategy for the country with a priority for energy access, and demonstrate how bioenergy contributes to this plan.** Energy access should come first. Non-traditional bioenergy cropping complements the strategy. The strategy should be accompanied by national and/or regional policies, laws, action plans as well as capacity development in ensuring appropriate enforcement.

- **Encourage the sphere of national and local entrepreneurs to promote sustainable energy.** Small farmers, business peasants and local traders could invest in small local energy businesses if a level playing field existed and provided the right economic drivers are identified. They could reach the poor and the isolated more effectively than conventional private energy investors or the government. However the mobilization of such local capital can only be possible with strong and long term commitment from governments and development agencies enshrined in regulations, incentives, and support for local capacity and energy literacy amongst energy consumers.

- **Allocate resources to create local capacities and promote energy literacy to ensure the effective involvement of local people and their organisations in the energy planning and decision making processes.** Capacity and knowledge are the key elements to empower the poor to participate in the energy debate - and in the production, implementation, operation, maintenance and use of local energy infrastructure.

Regarding bioenergy based on traditional sources:

- **Support the development of a sustainable wood supply chain for heating and cooking.** Too often this activity is considered as “non commercial” and is overlooked while it has an economic value for a large part of the population. A sustainable wood supply chain requires economically sustainable plantations (including private plantations); better management practices; suitable local governance; professionalization of the actors at the different supply chain levels in order to adopt more efficient conversion methods and to control biomass flows; efficient use of the resource through support for efficient stoves; accompanied by a promotion of alternatives to fuel wood. Only a sustained long term promotion effort will enable people to accept and afford more sustainable traditional biomass energy sources. A well managed wood supply chain, for instance using community energy forests, will increase the country’s vegetative cover and ecological balance, while providing livelihoods for many people.

- **In parallel, support alternative renewable energy sources in order to make them affordable and interesting to the majority of the people.** In both instances, a coordinated mobilisation of means and players, in which the government has an important role to play, will be key to success.
Define, together with donors, specific time-bound targets, allocate resources and define monitoring mechanisms to address energy access for the poor. Countries like Brazil and China have shown the political will and are succeeding in delivering energy access to the poor\textsuperscript{xlvii}.

Regarding bioenergy based on non-traditional sources:

- **Develop national policies, laws, action plans and guidelines for non-traditional bioenergy cropping.** Some non-governmental efforts are already taking place in terms of establishing tools that can influence best practices. In many cases standards already exist for various crops and have already shown to be effective. In Mozambique and Tanzania, efforts to translate the standards such as those from the Roundtable for Sustainable Biofuels are taking place. In Tanzania, the RSB standards have been translated in Kiswahili and distributed to various stakeholders and industries for use. WWF Tanzania and Mozambique are also in the initial phase of working with selected investors to pilot the RSB Standards and to suggest areas that will need to be reinforced. These initiatives are taking place but will need support from governments.

- **Liaise with international certification organization in order to draw lessons and adopt best practices** that will guide the industry in Africa. This is important, not only for accessing external markets but also as a way of ensuring environmental sustainability in producing countries. Furthermore, this engagement will ensure an African voice in the development of these schemes.

- **Promote land- and water use planning and mapping** and take into account food production and nature protection. In most African countries producing bioenergy, land use planning has not been properly done, although governments are supportive of the idea. The Brazilian agro-economic zoning for sugarcane can serve as an interesting example for land-use planning\textsuperscript{xlviii}. As far as land-use planning is concerned, African governments must also recognize that a major part of their population are living on the country side and may or may not have legal or customary rights of land. Major plantation investments should not undermine existing land rights or land use. Instead fair transparent processes should be promoted to acquire free consent by local people, where these people are rightfully compensated or becoming part owners of the investment. The planned Daewoo agriculture investment in Madagascar failed to take this into account, which led to unrest and even contributed to a shift in government\textsuperscript{xlix}.

- **Reduce the subsidies provided to carbon-intensive energy options (e.g. coal, oil and gas) and price carbon in favour of non-polluting alternatives like sustainable bioenergy.** It is unlikely that developing country governments will have sufficient funds to support the development, up-take and establishment of bioenergy on par with fossil fuels.

- **Select the feedstocks and analyse the overall value chain analysis of the industry.** Bioenergy development in Africa has mainly been associated with jatropha and sugar cane cultivation, with isolated cases of using cassava, sorghum and other feed stocks. The choice of feed stock is important in terms of ensuring best decisions on land uses, food security issues as well as usage of the products. In Africa, jatropha has been made “the crop” for bioenergy development albeit without adequate scientific knowledge\textsuperscript{1}. This has also lead to disappointments among farmers in for instance Mozambique and Zambia, where out grower schemes have failed, illustrating where lack of know-how, governance and short sighted investment capital may undermine a crop and even bioenergy per se. It
highlights that more research and development is needed in order to provide sound scientific justification for choosing any particular feedstock and its varieties.

Companies

We would like to encourage companies to not only focus on large-scale bioenergy cropping, but also to support projects in the field of biomass plantations, efficient cookstoves, alternative technologies for local energy use. These projects are often financially viable if well developed, and there is a myriad of local entrepreneurs that wait for support. Such projects generate multiple benefits.

When it comes to bioenergy cropping at the larger scale, several tools exist to improve economic, social and environmental performance. Companies should take responsibility for their projects’ impacts on people and the environment. Bioenergy projects by the private sector have an important role to play in the clean energy economy, and they can be sustainable.

- As a first step, transparency about projects and practices is important. This is part of a company’s Corporate Social Responsibility, CSR, which is frequently used as reference by companies for communicating sustainability. The ten universal principles on human rights, labour, environment and anti corruption under UN Global Compact is also a frequent reference by businesses. These are, however, often self declarations by companies where the actual performance is unclear. One step further is the Global Reporting Initiative which includes guidelines regarding different sustainability topics and where the higher level of reporting happens through third party auditors. Many companies also refer to ISO 14 001 or equivalent, a management certification where the company decides which performance level it aims at.

- Companies should go beyond transparency and reporting. The most credible option to verify performance for a certain resource management is when the performance level, often referred to as principles, criteria and indicators, has been defined by a multi-stakeholder process. Thereafter the management system should be credibly third party certified against the performance level in this multi-stakeholder supported standard. These schemes must move as soon as possible to setting minimum acceptable sustainability standards and to link support for best performing (GHG balance, environmental and social) bioenergy production patterns.

- Private sector investments should seek to comply with voluntary standards that have been or are in development by multi-stakeholder groups in compliance with ISEAL guidelines. The certification system within ISEAL that has been active the longest is the Forest Stewardship Council (FSC) with almost 130 million certified hectares. Regarding bioenergy FSC today is mostly relevant for certifying solid biomass, but as second generation ethanol develops, wood will also become an attractive alternative for liquid biofuels. As already mentioned earlier the Roundtable on Sustainable Biofuels (RSB) is in development and pilot testing of the principles and criteria is ongoing. Other relevant systems are the Better Sugar Initiative (BSI) and the Roundtable on Sustainable Palm Oil (RSPO). Since the European Union is moving forward with its “meta-standard” system, which recognises existing commodity standards, some new standards may be developed. One of them is ISCC.

- The third party certification is critical as it provides assurance to the end users of credible claims regarding sustainability. Additionally, embedding third party standards within a corporation’s operations will bring operational discipline to ensure that production is more likely to continue long into the future in a manner that enables the use of natural resources
without depleting them beyond their ability to replenish. Third party certification should be sought for current and planned bioenergy investments so that existing projects are improved and future developments are created in a sustainable manner.

- **Before initiating any greenfield projects for bioenergy production, the companies involved (e.g. investors, producers, processors, traders, and end users) should undertake an environmental and social impact assessment (ESIA).** This process not only is required for certification by most third party schemes, but also provides insight into what can be improved upon to create a successful bioenergy project. Such ESIA should include the identification of feedstocks which are less “risky”: degraded, idle land, waste products, increased productivities in existing plantations...

- **Companies should also engage with governments and non-governmental organizations to create national and regional dialogues that promote sustainable bioenergy development.** Some tangible outcomes of these processes can include mapping of high conservation value areas as well as “no-go” and “go” zones and responsible cultivation areas within the nation’s borders. Brazil provides an excellent example to follow with their sugarcane zoning rules.

- **A final set of tools of specific importance to bioenergy production are the Cramer Criteria, the Biofuels Environmental Sustainability Scorecard developed by the World Bank and WWF or the IADB scorecard.** These tools can help companies undertake a critical thought process to determine the long term feasibility of a project and whether they are socially and environmentally appropriate in the first instance.

Companies should undertake the aforementioned processes with serious diligence in order to ensure that natural resources are utilized in an appropriate manner that does not threaten ecosystem and catchment health, while granting the companies a social license to operate.

**Governments in importing countries**

Many regions’ economies rely on relatively cheap and energy dense fossil fuels. Energy use in the EU in 2007 was 16 697 TWh of oil, coal and natural gas, and only 1421 TWh of renewable energy. The same year Africa was using 3713 TWh of oil, coal and natural gas and almost the same amount of renewable energy sources, 3437 TWh. These differences are mirrored in these regions’ greenhouse gas emissions, and even more so in per capita emissions. For climate change reasons but also for security of supply governments of important energy consuming regions have to act now.

Land-based bioenergy is one of the currently available renewable energy technologies. Such energy is only available at a large scale in countries blessed with large quantities of land not yet intensively exploited. Often, the countries that are lower energy consumers, such as African countries, are also the countries with this type of land. Some countries are going to become bioenergy exporters, like several African countries, while others will depend on imports, such as several European or Asian countries. The substitution of liquid biofuels to fossil fuels in the transport sector has been at the origin of a massive debate influencing EU and US policy makers. There are concerns that current biofuel types will cause distortions on both the global and local food markets, promote non sustainable practises and water use, further undermine human rights, threaten livelihoods, displace people, threaten biodiversity and cause indirect land use change. There is a need to guarantee bioenergy’s sustainability, and to use it only as part of several other solutions, including drastic measures to reduce energy consumption and move people and freight in smarter ways. Several policy options can help:
Governments should set appropriate renewable energy and energy conservation targets, including bioenergy. Such targets should set the country on the appropriate path to contribute to global greenhouse gas emission reductions of about 80% by 2050. Transport should be tackled as part of the energy mix. Various options can be considered, and modal shift and electrification of transport must be priorities. It is much easier to produce renewable electricity than renewable liquid fuels. Liquid biofuels should progressively be used for aviation and shipping.

Bioenergy may contribute to heating, transport and electricity targets. The total biomass availability and use in the country should be assessed and be subject to serious land-use planning, providing clarity on impacts, including potential indirect effects. This requires a solid framework with policy coherence amongst agriculture, forestry and energy sectors in order to address the risk of conflict between competing land uses and to adopt the most appropriate forms of sustainable energy.

The amount of potential additional bioenergy imports to achieve targets should be assessed, as well as its impact on exporting countries. Preferably, the importing country governments will develop partnerships with their African counterparts in order to prepare for bioenergy trade and foresee and mitigate impacts. Such partnerships may include development aid money to support the sustainable development of the bioenergy supply chains. Financial and technical support must also be provided to African countries for the development of their own renewable energy supply strategies. Such strategies should address technical standards, infrastructure and other economic, social and environmental aspects.

There is an urgent need to align subsidies and other financial instruments with the environmental and social benefits resulting from the use of bioenergy. Such instruments should, in no circumstances, take the form of open-ended income transfers, act as means for protecting national markets or affect the security of global food supplies. In the medium to long term, bioenergy production will have to become economically viable without subsidies.

Governments should ensure adherence to international efforts towards making bioenergy sustainable, as well as support compliance by private sector players to these standards. However, standards should not be used as a protectionist tool to safeguard domestic markets and for creating barriers that affect development in African countries.

As a start, WWF considers that governments should require bioenergy companies (refiners, fuel retailers) to publish annual reports on a representative set of key performance indicators (based on international norms as set out above and agreed through stakeholder consultations) for the main environmental and social issues associated with bioenergy crop growing, processing/refining and transport in any country. This reporting would include GHG balances and should serve as the basis for an international sustainability assurance scheme. Additionally, the exporting countries must be required to develop domestic capacity to implement and enforce the standards and policies on sustainable bioenergy production.

As a second step, governments should list environmental and social sustainability principles and criteria that bioenergy companies in any country have to comply with. The way these principles and criteria are complied with can be flexible, and companies can use voluntary standards to proof compliance, as long as these standards have been accredited by the importing government through a transparent and independent process. This is what has happened in the EU, to some extent at least.
The United Kingdom is the member state that has been a forerunner in the EU when putting environmental requirements on biofuels through the Renewable Transport Fuels Obligation (RTFO). In 2009 the first assessment report was released which indicated that the UK imported biofuels from 19 different countries from 11 feedstocks. The greenhouse gas saving achieved was estimated at 46% compared to fossil fuels. However, only 18% of the biofuels complied with the other environmental criteria. A success key to influence companies towards change in this government work is transparency.

The current situation is leading to a strong will amongst importing countries to support partnerships with producing countries regarding development in technology and policy, e.g. between Brazil and Sweden. The issue of indirect land use change is also high on the political agenda and large displacement impacts are seen as important issues to be handled. This leads to a beneficial situation for African governments and organizations. They can seek financial support from importing countries to strengthen policies, improve capacity, create stakeholder support and collect information necessary, e.g. maps, which can promote responsible bioenergy investments. African leaders should use this opportunity to create development for their nations as a whole and not seek short term benefits for a few.

In this paper we wanted to demonstrate that bioenergy, whether traditional or not, can provide a sustainable source of energy but can also be at the source of several threats. We have listed several options to promote sustainable bioenergy while avoiding negative impacts. We hope that our suggestions will contribute to the broader debate around bioenergy in Africa.
Annex I: Update on commodity roundtables

Forest Stewardship Council (FSC)
- Today 130 million ha of forests are FSC certified forests (5% of world’s productive forests)
- 32% of all certified wood was FSC certified amounting to approx. 133 million m3 of FSC wood traded in 2008-2009
- In February 2010, FSC approved a set of accreditation standards for forest management to increase the quality & performance of the FSC process with clearer and more stringent Principles and Criteria (P&C).
- FSC P&C currently under review. Version 5-0 Draft 3-0 of the P&C is now available for stakeholder comments until May 2010. Approval expected by FSC Membership end of 2010.

Roundtable on Sustainable Palm Oil (RSPO)
- More than 1.8 M tonnes of certified palm oil (CSPO) have been produced since 2008, and close to 0.7 million tonnes purchased by traders, processors and retailers
- In March 2010 only, 136,000 tonnes (or certificates) were purchased from palm oil producers. Today, CSPO represents around 3% of global palm oil production.
- A new Working Group was established by the RSPO Executive Board on GHG emissions.

Roundtable on Sustainable Biofuels (RSB)
- Field testing of version 1 of the RSB Standard ongoing in Germany (canola mill) and Latin America in partnership with the Inter-American Development Bank.
- Pilot projects in the Americas currently under discussion (jatropha; biodiesel from soybean; biodiesel from sunflower; ethanol from sugarcane and next generation biofuels)
- Pilot tests also being planned for other parts of the world, including sweet sorghum, sunflower, sugar cane and jatropha projects in Africa and palm and coconut projects in Asia.

Better Cotton Initiative (BCI)
- Production and principles criteria for Better Cotton (BCI) were finalized in July 2009 and are undergoing implementation until 2012
- The BCI system is being field tested for 2010 cotton production in India and Pakistan
- The “First” Better Cotton harvest is expected before the end of the year 2010
- BCI focus on building partnerships with smallholder farmers in the following key regions: Brazil, India, Pakistan, and West & Central Africa - Benin, Burkina Faso, Cameroon, Mali, Senegal and Togo.

Roundtable on Responsible Soy (RTRS)
- Field testing of draft Principles& Criteria for RTRS soy standard is taking place since May 2009. Up to now, about 224,000 ha being tested in Brazil, Argentina, Paraguay and India
- Related National Interpretation documents now submitted for public consultation
- Final adoption of the RTRS standard to be approved at the next General Assembly of the RTRS Roundtable 9-10 June 2010, Sao Paolo, Brazil

Better Sugarcane Initiative (BSI)
- Version 3 of the BSI standard now approved by BSI Supervisory Board.
- Guidance documents in final process, final BSI standard expected around mid-April 2010.
- Main aim of the BSI Standard is to promote measurable standards in key environmental and social impacts of sugarcane production and primary processing while recognizing the need for economic viability.
Biomass is the most important global renewable energy source, providing about 10% of the annual global primary energy demand. About 80% of this comes from charcoal, wood and manure used for cooking and space heating.

Traditional fuels being burnt under inadequate conditions cause 1.5 million deaths per annum (mainly due to respiratory diseases caused by high concentration of particulate matter and the high level of carbon monoxide) and the mismanagement of the natural resources leads to deforestation and desertification.

http://www.panda.org/what_we_do/footprint/climate_carbon_energy/energy_solutions/renewable_energy/bioenergy/

FAO Background Paper to the Ministerial Conference on Water for Agriculture and Energy, Sirte, 2008

EU Position paper on biomass for the ACP-EU Energy Facility

FAO Background Paper to the Ministerial Conference on Water for Agriculture and Energy, Sirte, 2008

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Forest Products Annual Market Review, UNECE 2009

Biogeosciences, 6, 463–468, 2009 Anthropogenic CO2 emissions in Africa J. G. Canadell1, M. R. Raupach1, and R. A. Houghton

What Drives Tropical Deforestation (LUCC Report Series No. 4), Helmut J. Geist & Eric F. Lambin, 2001

There is a weak correlation between traditional biomass use and deforestation in Africa according to data from the World Bank and IEA http://www.euei-pdf.org/fileadmin/user_upload/Publications/-1_BEST_Background_Paper_13-08-2007.pdf

WWF Tanzania 2007

USAID / JARIALA (2009)

e.g. traditional charcoal production with earth mound kilns that have a conversion efficiency of 10% or less


http://www.panda.org/what_we_do/footprint/climate_carbon_energy/energy_solutions/renewable_energy/bioenergy_access:

http://www.climatesolver.org/show.php?id=1263468

EU Position paper on biomass for the ACP-EU Energy Facility

IEA, 2006


In 2003, net oil exporters were: Equatorial Guinea, Congo, Angola, Gabon, Nigeria, Chad, Sudan, Cameroon, Democratic Republic of Congo, and Cote d’Ivoire

IPCC, 2007


Malawi is one of the exceptions and has been continuously producing ethanol and blending it with gasoline since 1982. Oil companies blend 10 percent ethanol with 90 percent petrol.


Programme Environnement III study for the Madagascar Forest Ministry, 2007


FAO, PISCES, 2009

Bridging the funding gap to ensure energy access for the poor, Practical Action, 2007

Idem


http://www.rsb.org


http://www.unglobalcompact.org/

http://www.fsc.org


McLaughlin 2008

http://www.iadb.org/biofuelsscorecard


Stated in presentation by CEO of UK Renewable Fuels Agency, Nick Goodall, at the World Bioenergy, Clean Vehicle and Fuels conference in Stockholm 2009

http://www.sweden.gov.se/sb/d/11427/a/133181