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COMPETE

Competence Platform on Energy Crop and Agroforestry Systems for Arid and Semi-arid Ecosystems - Africa

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INTRODUCTION

This work has been conducted in the framework of the project COMPETE (Competence Platform on Energy Crop and Agroforestry Systems for Arid and Semi-arid Ecosystems - Africa), co-funded by the European Commission in the 6th Framework Programme – Specific Measures in Support of International Cooperation (Contract No. INCO-CT- 2006-032448).

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Executive Summary

The scope of this paper is to discuss the existing financing mechanisms for biofuels and agro forestry in Africa, and in doing so to identify the main barriers facing energy crop projects. This paper applies to Least Developed Countries in general, in particular to the arid and semi-arid areas of Africa. However as a result of the significant information available on biofuels, this report has a strong emphasis on biofuels.

The advantages of energy crops (biofuels) in comparison to fossil fuels are: low associated GHG emissions, reduced air pollution and continuous production (suitable for baseload generation). However these advantages are often overshadowed by the negative environmental and social effects associated with their production. For example higher food prices, expulsion of tenants for land conversion, water misallocation, deforestation, reduced soil fertility and overall land degradation. (COMPETE Work Packages 1 and 2 will focus on Current land use patterns and impacts and improved land use strategies in the context of sustainability.) Carbon savings from biofuel use compared with petrol and diesel are also hugely dependant upon crop variety, growing location, and the harvesting and processing methods applied.

Despite this there are a number of strong driving forces pushing energy crop use forward:

- Energy security
- Policy, e.g. EU Renewable Transport Fuel Obligation
- Governmental regulations and incentives (e.g. tax reductions / blending mandates)
- Decreasing fossil fuel resources and price increases
- Increase in world demand for transport fuels
- Development of new agricultural markets for income generation in rural areas
- Land availability in Africa (to be covered by WP1)

The biofuels industry is one of the fastest growing energy industries in the world, seeing a 17.6% increase worldwide in 2006 and becoming the 3rd fastest growing renewable energy sector. This was aided by the $2.3 billion injection of funds from venture capital and private equity fund investors. Production has been skewed towards South America especially Brazil, Columbia, Guatemala and Peru. In Africa, there are a number of energy crop ventures, but not on the same scale as South America (see page 9 for details). Development has been hindered by the high capital costs and risks associated with projects.

The capital costs of energy crop technology in comparison to those involved with other RET's leads to biomass often providing the most attractive option. This has lead to the financing of bioenergy developments through existing environmental funding mechanisms; such as Kyoto Protocol Mechanisms (CDM, JI and ET), "green banks", government funding and Voluntary Carbon Markets. Government funding (primarily tax schemes, grant financing and subsidies) has been used to finance a number of projects, for example tax incentives in support of flex-fuel cars in Brazil and Grant finance for Scottish Biomass Support Scheme in Scotland. Subsidies have been identified as a necessity to increase the economic viability of agroforestry and energy crop schemes.

Carbon finance through Kyoto Protocol mechanisms such as CDM and JI schemes allows Annex 1 countries to achieve GHG reductions obligations by acquiring reductions from other sources. The CDM allows trade in CER's between non-Annex 1 countries and Annex 1 countries. However, of the current CDM projects registered so far very few are in Africa, and few are from bioenergy or agro forestry projects. A number of barriers currently exist in the implementation of bioenergy projects; donor and host countries must meet three basic requirements: ratification of the Kyoto protocol, establishment of a designated authority and voluntary participation. Implementation of bioenergy projects has also been hindered by the lack of relevant methodologies. Of the 6 proposed biofuel methodologies submitted only one has been approved by the CDM, and this is for the production of bioenergy from waste cooking oil rather than from energy crops. In addition any potential CDM project must also meet 3 principal criteria; environmental additionally, project additionally and sustainable development delivery. In Africa, The Nairobi Framework, Capacity Development for the CDM, Carbon Finance for Sustainable Energy in Africa and the UNEP: Forestry/Bioenergy CDM in Africa projects have been identified as four of the main efforts established to scale up CDM activities in Africa. Other Carbon financing mechanisms for energy crop and agroforestry based developments exist through the Voluntary carbon market (for example through schemes such as Plan Vivo), donor assisted RE projects and commercial investment.

Inherent barriers associated with financing energy crop cultivation in Africa are centred around the high risk associated with low and unpredictable land fertility and water availability, especially in the arid and semi-arid regions. Alongside this, financial sector shortcomings, such as lack of funds, lack of sector know-how and willingness to invest in RET's, politics, limited expertise in project sponsors; infrastructure etc. has meant that bioenergy financing mechanisms in Africa have been ineffective to date.

A survey of funding opportunities, focusing on East Africa, illustrates the main sources of funding for energy crops and agroforestry developments, and the problems associated with each:

Commercial Banks Bank penetration is extremely low, with inadequate branch infrastructure outside of the main urban centres. Most commercial banks prefer to invest in government bonds rather than lend to private sector companies, although this is improving with the advent of banks such as Equity, K-Rep, and Family Finance which have made the SME sector their core market. These banks have experience of medium and long term project based lending, but now operate as commercial banks. Given their experience, they should be more open to renewable energy projects.

Bonds Bonds are a form of debt usually invested by non-bank financial institutions, unsecured, they can be backed by a bank or other form of guarantee. The main advantage of bonds is that the pricing is usually lower than bank debt, and the risk profile of the investment can be tailored. Bonds are usually issued as tradable instruments (eg. on the Nairobi Stock Exchange) and will therefore need to comply with trading regulations. It is unlikely that a bond issue will be feasible at the start of a project. However, once a project is running and generating positive cash flows, issuing bonds may become a viable option.

Development Finance Banks (DFB) Development finance banks (DFB) are a viable alternative to commercial banks for debt finance, but vary considerably in their lending criteria. All the DFBs have lengthy appraisal processes. It will generally require six months or more after presentation of a detailed financing proposal to run through the appraisal process, obtain approvals for financing, completing documentation, and meeting all the conditions precedent to disbursement.

The East African Development Bank has the core objective of promoting sustainable development within Member States and emphasises opportunities, amongst others, for Agriculture and Agro-Processing and Infrastructure development (Including Energy, Information and Communication Technology).

A number of international DFB's are also active in financing renewable energy projects; (DEG, FMO, IFC and E+Co).

All of the development finance banks listed above can provide investments in the form of both debt and equity. However, there are also a few investment institutions which specialise in providing investment capital.

Interest in investing in Africa has increased over the last 1-2 years. As a result, there are a number of other funds in the process of being set up, and there may therefore be additional sources of financing available in the near future.

For projects in Africa political risk insurance is also required, of which there are two main sources available for projects in East Africa, the Africa Trade Indemnity and the Multilateral Investment Guarantee Agency.

In summary this study aims to give an overview of the needs and approaches for energy crops and agroforestry financing in arid and semi-arid Africa. When taking into consideration the great range and variety of problem situations for each technology, within various context frameworks, it is quite clear that such a study cannot produce a standard set of reproducible recipes for energy crops/agroforestry finance. It is clear that each situation requires a specific diagnostic and tailor-made approach for financial closure. However, some general conclusions can be made concerning the rationale of energy crop and agroforestry-based financing mechanisms, and the important considerations when forming a strategy.

On a global basis, energy crop/agroforestry, especially biofuel projects are financed through a number of sources including corporations, private equity, commodity traders, the stock market, investment banks, venture capitalists, plantation owners and agricultural processors. Alternative methods available to those who seek funding without relinquishing control can be derived from government grants, joint venture partnerships and R&D funds.

In the tight financial context (i.e. lacking funds / financial sector infrastructure) that prevails in most African countries and in particular in the arid and semi-arid areas of Africa, financing energy crop/agroforestry projects is much more challenging.

This paper concludes that the most relevant financing sources for energy crops- and agroforestry-based developments in these regions are smart subsidies, corporate financing (FDI), R&D funds, joint venture partnerships, carbon credit financing and (if packaging the projects to international standards is possible) funding from mechanisms such as the GEF, the African Rural Enterprise Development (AREED, which operates in Mali, Ghana, Tanzania, Senegal and Zambia) or the Community Development Carbon Fund (CDCF, which can consider purchasing carbon from a variety of land use and forestry projects).

Furthermore, it is crucial to integrate financial risk management instruments into any holistic financing strategy for energy crops and agroforestry-based developments. Getting political approval for using soft credits from donors to co-finance energy crop/agroforestry projects seems a realistic option. Wherever possible, local farmers in rural areas of arid and semi-arid Africa should be included in the process.

1 INTRODUCTION

Energy crops are agricultural plants harvested to be exploited for their energy content. They are from biological material - both food crops, as well as non-food crops - and there are numerous such crops. Examples include corn, sugarcane, willow or switchgrass. Processing of energy crops is done for instance through combustion (e.g. biomass), anaerobic digestion (e.g. biogas), distillation or fermentation, gasification and acid hydrolysis. Once processed, energy from energy crops comes in various forms, i.e. gaseous (e.g. methane from decomposition of biomass), liquid (biomass converted to liquids primarily for transportation) and solid (wood and other biomass generally used for combustion for heat).

Used for heating, transport or electricity generation, the importance of energy crops has increased significantly over the past years. In Germany, for example, the production of biodiesel has doubled in the past 15 years and the required land mass covers more than 1.2 million hectares.

Agroforestry is - according to the World Agroforestry Centre - a collective name for land use systems and practices in which woody perennials are deliberately integrated with crops and/or animals on the same land management unit. The integration can be either in a spatial mixture or in a temporal sequence. There are normally both ecological and economic interactions between woody and non-woody components in agroforestry. Benefits of agroforestry include the contribution to food security by restoring farm soil fertility for food crops as well as the reduction of deforestation and pressure on woodlands by providing fuelwood grown on farms.

One important characteristic of this report is that there is a significant amount of information available on biofuels, but only very limited information agroforestry. This report has, therefore, a strong emphasis on biofuels.

Advantages of energy crops

In simple terms, biofuel production emits a reduced amount of greenhouse gas (GHG) emissions (e.g. resulting from cultivation activities and transport of energy crops to the respective processing plant). This is due to the fact that when energy crops are exploited for their energy content - for instance through combustion or gasification - only the CO_2 is emitted to the atmosphere that was previously extracted for the growth of the energy crop, illustrated in Figure 1. When compared to the CO_2 emissions resulting from the combustion of petrol and diesel for transport, biofuels have the potential to contribute to an overall reduction of GHG emissions. Furthermore, energy crops have the potential to reduce air pollution.

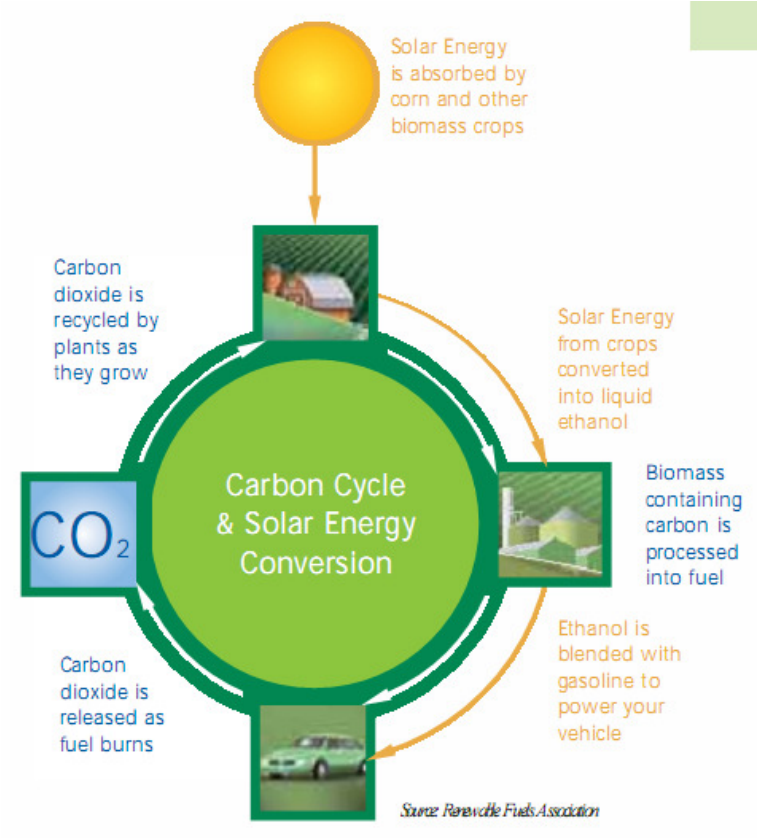

Figure 1: Carbon Cycle and Solar Energy Conversion

Source: Renewable Fuels Association

However, there are adverse effects related to the production of energy crops, both of an environmental, as well as of a social nature. Examples of such adverse effects include competition with land use for food production leading to higher food prices (in the U.S., corn futures rose to over $4.38 a bushel, the highest in ten years), expulsion of poor people from their land for conversion to energy crops, water misallocation, deforestation, possible increased use of agrochemicals leading to reduced soil fertility and overall land degradation, significant dependence on policy support or a complex supply chain. Recent scientific studies have determined that the carbon savings from using biofuels compared with petrol and diesel vary hugely, depending on what crop is grown and where, how it is harvested and processed, and other factors.

One of the main benefits of energy crops, with respect to their energy exploitation is that they do not have the disadvantage of intermittency, unlike other renewable technologies such as solar or wind. Energy crops provide storable and controllable energy and are, therefore, well-suited for base load (i.e. continuous) generation of energy.

Driving factors for interest in energy crops

- Energy security
  - Diversification of energy sources and technologies
- Policy, e.g.
  - Blending of biofuel into transport fuels
    - e.g. EU has committed to source 5.75 per cent / 10 per cent of all transport energy from biofuels by 2010 / 2020, and
    - the Renewable Transport Fuel Obligation (RTFO) implemented by the UK government regulating that 5 per cent of fuel sold must come from a renewable source by 2010.
- Decreasing resources of fuel for transport (peak oil) which in combination with increasing demand for transport fuels leading to a higher price for petroleum (see Figure 2).

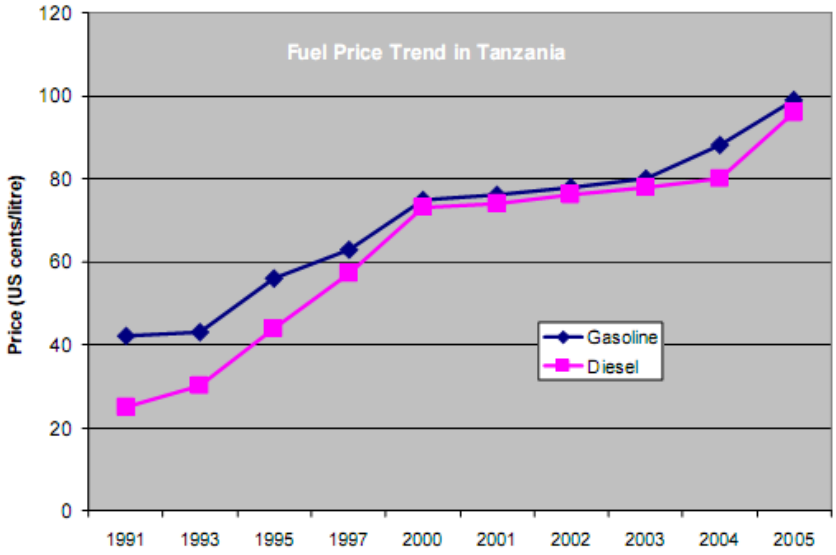

Figure 2: Fuel price trend in Tanzania
Source: Opportunities for Biofuels in Tanzania (WIP)

- Increase in world demand for transport (e.g. most of China and India will increase their mobility rate as the economy allows more people to own vehicles). Leading to a further increase in transport-related green house gas (GHG) emissions - which already account for about one quarter of worldwide GHG emissions.

- Compared to a switch from current petroleum-based transportation to hydrogen or electric vehicles, the cost of vehicle and infrastructural changes is much less for biofuels.

- Development of new agricultural markets leading to income generation in rural areas.

- Governmental regulations and incentives (e.g. tax reductions or blending mandates).
- Land availability in Africa - here the example of Tanzania (Figure 3.).

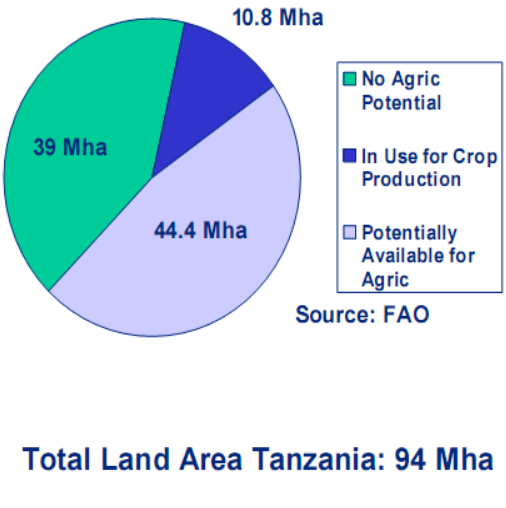

Figure 3: Land availability in Tanzania
Source: Opportunities for Biofuels in Tanzania (WIP)

Biofuels – Status

Biofuels are one of the fastest growing energy industries in the world. In 2006 biofuels grew 17.6 per cent worldwide, becoming the 3rd fastest growing renewable energy option, only led by solar energy (29.1 per cent) and wind energy (26.4 per cent). Despite the latter two energy options having the advantage of much earlier promotion and therefore the benefit of being more widely marketed and known.

In 2006, venture capital and private equity investors injected $2.3 billion into biofuels operations, and biofuels IPOs (Initial Public Offerings) raised $3.1 billion worldwide.

The production of biofuels is heavily skewed towards South America, with the main energy crop growers - Brazil, Columbia, Argentina, Guatemala and Peru- provide nearly 80 per cent of all biofuels (World Bank Group statistics). When taking into account not only production, but overall biofuels-related activities (policies, market penetration, investment levels, etc.), Brazil, the U.S. and Germany are the market leaders in the biofuels industry.

In Africa, examples of energy crop (in particular biofuels) and agroforestry developments include:

- A biodiesel factory in Southern Ethiopia whose construction started in late 2007. Once completed, it will have the production capacity of 250 tons fuel each day from castor beans and jatropha, which are easy to grow in the area.
- An existing biodiesel plant in Mozambique - inaugurated in August 2007, but currently idle, not for lack of mechanical parts, electricity, or funds, but because of the poor quality of raw material it was built to convert: copra, dried coconut meat that yields coconut oil, as a source of biodiesel.

- A biofuel processing project in Tanzania. The project involves large-scale planting of jatropha oilseed crops for the production and distribution of crude and refined products. Sun Biofuels -a UK-based producer of biodiesel that has invested $20 million into the project in which it owns an 88% stake- had applied for 20,000 hectares in 2005, but authorities were able to offer just 9,000. The process of land acquisition for the project is at an advanced stage, awaiting the President's agreement. The acquisition means that 11 villages in one of the oldest districts in Tanzania must relinquish land to the investor. The annual yield per hectare is up to 8 tonnes of jatropha seed, which contain over 30% oil. At $320 per tonne, this will translate into production of jatropha crude oil worth $768 a hectare a year.

- A planned 30,000 ha sugarcane plantation and ethanol processing plant, known as Procana, in Gaza Province in Mozambique. This project has already seen its investor, the multinational Central African Mining and Exploration Company (CAMEC), engaged in fierce debate over water management, land rights and ethical concerns.

- The launch of a five-year research programme known as 'Policy Innovation Systems for Clean Energy Security' or PISCES – led by the African Centre for Technology Studies (ACTS), a Nairobi-based science, technology and environmental policy intergovernmental organization. The programme is funded by the UK's Department for International Development (DFID).

Examples of the application of biofuels include E-10 (gasoline with 10 per cent ethanol) and B-20 (diesel with 20 per cent biodiesel). E-10 can be used in most cars and reduce lifecycle GHG emissions by about 3 per cent. B-20 can be used in most trucks and reduce lifecycle GHG emissions by about 25 per cent, depending upon the crop used. Full penetration of E-10 and B-20 (for example, under renewable fuel standards) would reduce transportation CO_2 emissions by about 7-10 per cent.

However, the effects of energy crop production have considerable impacts, most likely even on a global level. Recent reports have warned of rising food prices and rainforest destruction from increased biofuel production. As a result, the EU, for instance, aims at establishing a certification scheme for biofuels which would be introduced along with a clampdown on biodiesel from palm oil which is leading to forest destruction in Indonesia. Related to this topic, EU Environment Commissioner Stavros Dimas said it would be better to miss the biofuels-related EU targets than achieve them by harming the poor or damaging the environment.

Among the main factors hindering growth of bioenergy in developing countries, especially in Africa, is the ability to finance such capital intensive and often highly risky projects. In view of the importance of this topic, this paper will dwell on financing mechanisms for funding of energy crops/agroforestry developments in arid and semi-arid Africa.

Geographical scope of this paper

This paper applies to least developed countries in general, but in particular to arid and semi-arid areas in Africa. Figure 4 indicates the aridity zones in Africa:

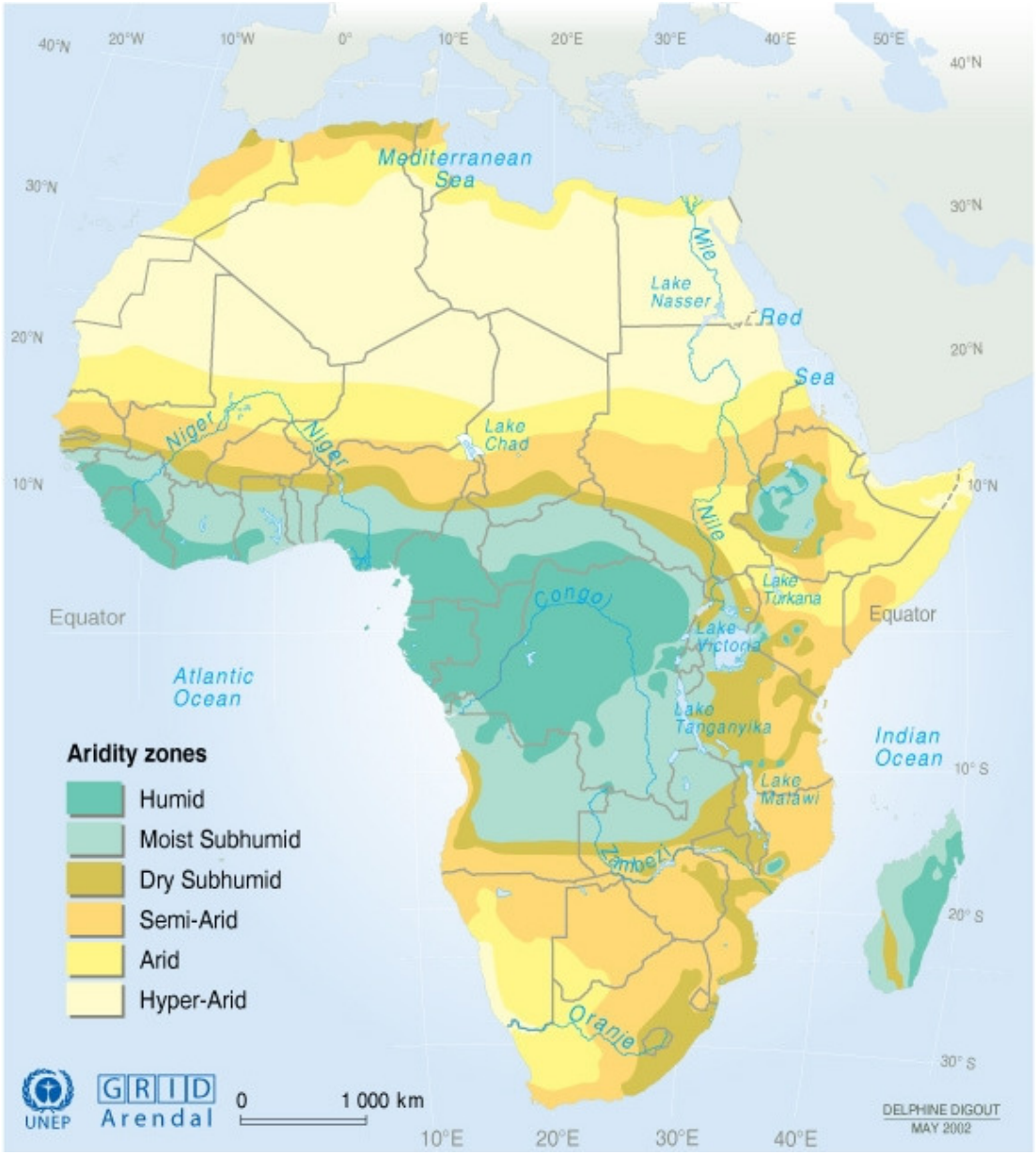

Figure 4: Aridity Zones in Africa

Source: World Meteorological Organisation (WMO) and UNEP

2 EXISTING FINANCING MECHANISMS FOR ENERGY CROPS AND AGROFORESTRY

2.1 Capital costs of different Renewable Energy Technologies (RETs)

Figure 5 shows the capital cost involved with various different RETs, including energy crop technologies:

RET technologies and Capital Cost ($m) to be financed				
Size	Micro	Small	Medium	Large
RETechnology	<100kW	100kW-1MW	1-20MW	>20MW
Biomass		0.1-0.8	0.8-16	>16
Geothermal			2-40	>40
Hydropower	<0.1	0.1-1	1-20	>20
Wind power	<0.1	0.1-0.9	1-18	
Solar Thermal	<0.3	0.3-3	3-60	>60
Solar PV	<0.6	0.6-6		

Figure 5: Renewable Energy Technologies and capital cost to be financed
Source: USAID - Best Practices Guide: Economic and Financial Evaluation of RET

Even though the local circumstances differ significantly, the table shows a clear trend that biomass is -compared to the other RETs- the most attractive RET with respect to its capital cost.

2.2 Introduction to existing financial mechanisms globally

Although there is a great deal of private participation on the investment on the production, commercialization and use, bioenergy developments are getting a great push from the existing environmental funding mechanisms, Kyoto protocol Mechanisms (CDM, JI and ET), the “green banks”, the governments in developed countries and Voluntary Carbon Markets.

2.3 Government financing

Three of the main forms of government financing are tax schemes, grant financing and subsidies.

Tax schemes

Examples of government tax schemes include

- Tax credits
- Tax holidays on income
- Eco taxes: Eco-taxes / green taxes on non-renewable forms of energy reduce the gap in the market prices of RE and non-RE forms of energy
- Tax exemptions/rebates: used to either reduce the cost of the investment or to increase the RE-investors net revenue after taxes from the sales of the output
- Import duty and sales tax on RET components
- Accelerated tax deductions for investments in renewable energy
- Tax breaks on returns from investments in environmentally sound initiatives
- Tax rulings to allow for accelerated depreciation of energy efficient or lower emission capital equipment

Brazil has made good use of a tax incentive to support “flex-fuel” cars. In 2003, the government decided that cars capable of burning ethanol should be taxed at 14%, instead of 16% for their exclusively petrol-powered counterparts. In 2004, the first full year that “flex-fuel” cars were on sale, they accounted for more than 17% of the Brazilian market. Last year, they scored an even bigger success, overtaking petrol-driven models for the first time since the 1980s and taking 53.6% of the market for new cars.

Grant financing

Grant finance does not substitute for private capital, but is used in ways that leverages the amount of private finance for RE, even when the short-term gains are not evident. A European example includes the Scottish Biomass Support Scheme which was just recently boosted by £3 million to a total of £10.5 million (to be shared across 74 schemes). The scheme provides grants to support both supply chain, heat, and CHP installations. It is open to a range of organisations from producer groups to businesses.

Subsidies

Subsidies are needed to bridge the gap between economic and financial viability of energy crops and agroforestry projects. These should be conducted using smart subsidies reaching intended markets only, and by encouraging least cost options to achieve social goals at a least cost, while providing incentives for business to serve target markets – wherever possible the strengthening of local markets should be made a priority.

Public budget subsidies for RETs/energy crops/agroforestry can have three potential subsidy targets:

- Cost of investment
  - Direct capital subsidies
  - Soft loans
  - VAT exemption
  - Import duty exemption
  - Accelerated depreciation
  - Tax holidays on income
  - Subsidies to exporters of RET/energy crops/agroforestry equipment
  - Subsidies to relevant R&D
- Price of output
  - Topping-up premiums to producers
  - Production tax credit
  - Topping-up premiums to consumers
  - VAT/exercise duty exemptions
  - Public green electricity purchases
- Operating cost
  - Subsidies to the marketing of energy crop/agroforestry-based energy

Most subsidy instruments in the table are complementary to each other, and the few that are direct alternatives can be modified to co-exist. There is, thus an “infinite” range of subsidy combinations.

An analysis undertaken by KfW revealed that there are seven justifications of RET subsidies -which include and therefore also apply to energy crops and agroforestry-, each driven by a specific motivation:

- Subsidies given to RETs to compensate for price distortions in the energy market, which prevent economically viable RETs from competing on equal footing with conventional power supply (e.g. subsidized natural gas prices in thermal power);
- Subsidies to RETs to compensate for the non-inclusion of external costs in the financial cost of production of conventional power (environmental costs or macroeconomic costs of fuel price risks);
- Subsidies to RETs to compensate for weaknesses in the financial markets, which prevent RETs from getting access to debt finance on competitive terms with conventional power plants;
- “Market jump-starting” subsidies to RETs with a mass market potential (household PV-systems), which create the minimum demand needed to motivate entrepreneurs to invest in an effective marketing and after-sales-service infrastructure for the RET;

- "Learning curve" subsidies to RETs with a strong potential for technological progress (wind energy, PV-systems). They create the mass market demand which motivates manufacturers of RET to invest considerable amounts in R&D bringing down each year the cost of production of new generations of the RET. Subsidies, which increase consumer demand for new RETs, thus, expand the market directly in the short term and, by accelerating the rate of cost reductions in the subsidized RET also in the long term;
- "Sustainable development" subsidies to RE. These subsidies allow RETs with an economic cost of production higher than conventional power production (according to conventional economic cost analysis) to gain market shares. Because conventional power production uses finite resources and contributes to global warming it is not considered to be sustainable;
- "Picking the winner" subsidies to R&D in potentially promising RETs that are at the pilot stage of development.

2.2.2 Carbon financing

Although there is a great deal of private participation on the investment on the production, commercialization and use, biofuels are getting a great push from the existing environmental funding mechanisms, Kyoto protocol Mechanisms (CDM, JI and ET), the "green banks", the governments in developed countries and Voluntary Carbon Markets.

Kyoto Mechanisms

The United Nations Framework Convention on Climate Change (UNFCCC) and its related Kyoto Protocol (1997) is a multilateral agreement under which industrialised countries (Annex I countries) will reduce their combined greenhouse gas emissions by at least 5 per cent compared to 1990 levels by the period 2008 to 2012, primarily by investing in cleaner technologies in developing countries. This became legally binding on 16 February 2005, after ratification, thereby committing the Annex I parties accounting for 61.6 per cent of the total 1990 global carbon dioxide emissions to achieve the 5 per cent reduction by 2012.

Kyoto is a 'cap and trade' system imposing national caps on the emissions of Annex I countries – on average 5.2 per cent below their respective 1990 baseline over the 2008 – 2012 period (first commitment period).

Clean Development Mechanism (CDM) and Joint Implementation (JI)

Kyoto includes flexible mechanisms which allow Annex I countries to achieve their greenhouse gas emission obligations by acquiring GHG emission reductions from other sources. The Clean Development Mechanism (CDM) provides for trade in certified emission reductions (CERs) between non-Annex I countries and Annex I countries and thus supports sustainable development with respect to greenhouse gas emissions reduction in developing countries while helping Annex I countries to comply with their commitments under the Kyoto Protocol.

Under the CDM mechanism, developed countries or businesses can invest in clean technologies in developing countries. The emission reductions achieved from the implementation of these projects can be used to offset developed countries' emission quotas under the Kyoto Protocol. The CDM has two main objectives: a) to reduce emissions and b) to support sustainable development of developing countries. An agreement stating that the proceeds from the fees associated with CDM activities will be used to cover administrative costs and to assist vulnerable developing countries in adaptation measures was reached. This agreement and the second CDM objective - sustainable development delivery- distinguish the CDM from the other two mechanisms.

As far as the spatial distribution of CDM projects, the map below demonstrates that out of the 896 CDM projects registered so far, Africa only has a very small proportion of registered CDM projects as illustrated in Figure 6.

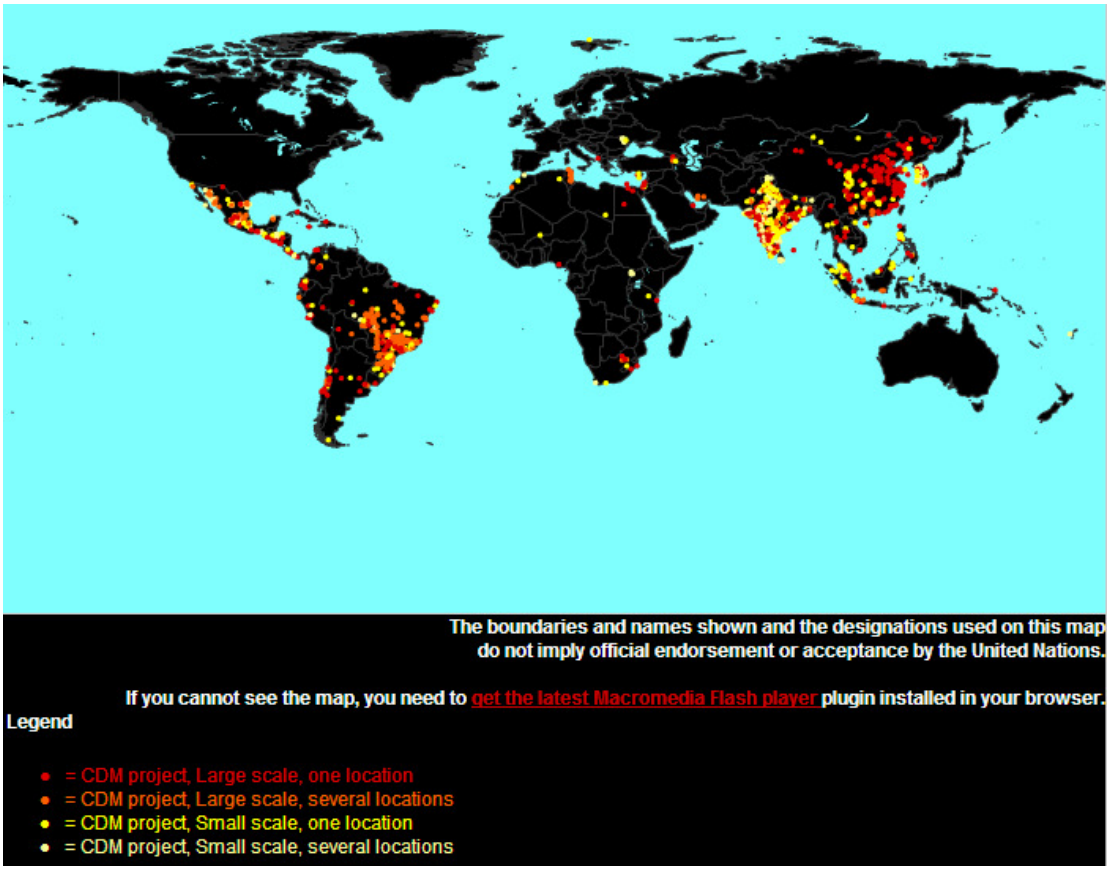

Figure 6: CDM projects location
Source: UNFCCC / CDM website

These 896 registered CDM projects have resulted in 102,544,493 issued Certified Emissions Reductions (CERs). With respect to the CER issuance rate, almost 86 per cent of all requested CERs have been issued. The expected number of CERs -resulting from the at least 2800 projects in the CDM project pipeline- until the end of the first commitment period (i.e. end of 2012) is at least 1,150,000,000.

The second market-based instrument (i.e. JI) allows developed governments or businesses in those countries to invest in emission reductions or sequestration projects applied in Central and Eastern European Countries. JI does, therefore, not apply to African countries.

These mechanisms as well as domestic actions would support developed countries to achieve emission commitments. Furthermore, through CDM project implementation, sustainable development is encouraged in developing countries. Regarding the significance of the CDM mechanism for developing countries (Non-Annex I countries), even though developing countries do not have GHG emission restrictions, they can benefit by receiving carbon credits resulting from GHG emission reduction projects. However -as indicated by the above map- Africa so far only has a very small proportion of CDM projects registered.

Governments' eligibility

In order to participate in CDM activities donor and host countries must meet three basic requirements: a) ratification of the Kyoto Protocol, b) establishment of a Designated National Authority (DNA) which is in the focal point for the CDM administration in the country, this authority also assesses the sustainable development criterion of CDM proposals and c) voluntary participation.

Barriers for the CDM implementation

As it can be noticed these requirements demand participating governments to build up a vast level of human and institutional capacities that for some countries, in particular the African region, represent barriers for the CDM implementation. For example, in mid 2004 in Africa there were only 10 DNAs while in Latin America and Caribbean countries, 21 (UNFCCC 2004a). These figures represented 20 per cent and 70 per cent of the number of countries in each region respectively that had signed the Kyoto Protocol by that date. By January of last year (UNFCCC 2007) these figures have increased to 30 and 26 respectively. They represent 70 per cent and 78 per cent of the countries that had ratified the Protocol. This shows that after the coming into force of the Protocol counties of Africa started to become more active or interested in the climate policy opportunities. However, the number of DNAs has increased for African countries in the last two years, the CDM delivery (in terms of number of projects registered) still demonstrates that experience on the CDM institutional aspect need to be addressed.

Another important barrier for the CDM implementation of bioenergy projects is the lack of relevant methodologies. There have been six proposed biofuel methodologies all of which have applied to earn credits for the substitution of fossil fuels in the transport sector (one also included the substitution of diesel in electricity generation). Only one has been approved for use by the CDM Executive Board (EB) – AM0047 which applies to projects that produce bio diesel from waste cooking oil and not from energy crops. The remaining 5 projects have either been rejected or are in the process of being re-submitted to the board.

Projects' eligibility

In addition to the above requirements, any potential CDM project -regardless the project size- also needs to justify three principal criteria: a) Environmental additionality b) Project additionality and c) Sustainable development delivery.

Examples of energy crop-based CDM projects

As of May 2007, 20.4 per cent of all CDM pipeline projects were biomass energy projects and 5.7 per cent were biogas projects. However, only one out of all of these bioenergy projects was a biodiesel project. There are several reasons for this development. Firstly, it is hard to demonstrate investment additionality (biofuel directives may already be in place, how to take into account subsidies, including those for diesel, net IRR gain for bioenergy projects not generating CH_4 reductions are on average between 0.5 per cent and 2.0 per cent). Secondly, there are significant barriers, such as the high risk involved, high initial capital costs and other financing challenges or the high degree of coordination needed (upstream/downstream complementarities, fuel specifications and social acceptability of new products). And thirdly, the existing methodologies are poorly suited to sectors and projects that characterize Africa's bioenergy potential.

Bioenergy-based CDM-related programmes

According to the UNFCCC, there is only one bioenergy-related project (which started in December 2006) that will enhance the expertise of the involved countries, identify and implement pilot projects and building and promoting a network for relevant technical cooperation. This is a 'CDM for Francophone Africa' programme planned by France. The recipients will be seven francophone African countries and it is coordinated by UNEP with 2.3M € granted by the French Global Environmental Fund.

Future CDM activities in Africa

So far, there is an imbalance with respect to the CDM project host countries' distribution as illustrated in Figure 7.

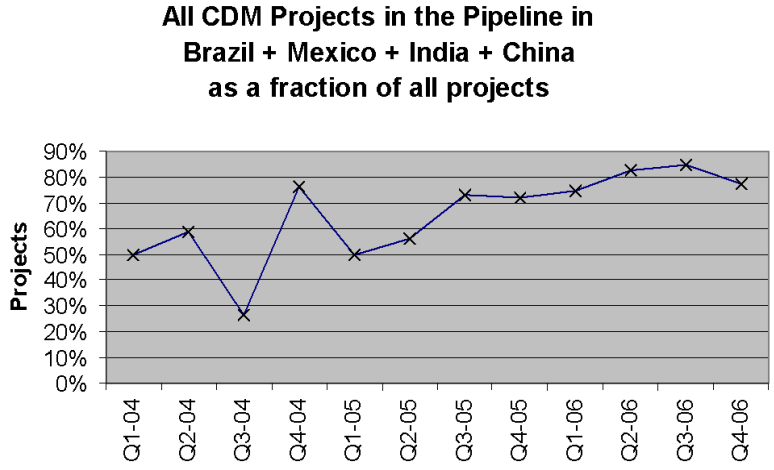

Figure 7: CDM Project Host Country Imbalance

Source: UNEP-Risoe Centre

Figure 8 below shows that only a small fraction of projects in the CDM pipeline is, therefore, in Africa:

Total in the CDM Pipeline	Number		2012 kCERs	
Latin America	472	**35,6%**	302716	**21,3%**
Asia & Pacific	800	**60,3%**	1012325	**71,1%**
Europe and Central Asia	16	**1,2%**	4667	**0,3%**
Sub-Sahara Africa	21	**1,6%**	74319	**5,2%**
North Africa & Middle-East	18	**1,4%**	29440	**2,1%**
Less developed World	1327	**100%**	1423468	**100%**

Figure 8: Projects in the CDM Pipeline in Africa
Source: UNEP-Risoe Centre

An overview of African CDM projects in the pipeline, Figure 9 reveals that the vast majority of these projects are landfill flaring, wind and EE activities.

Africa	Number	kCER2012	
Egypt	5	12454	1 Landfill flaring, 1 N2O, 1 Wind, 2 Fuel switch
Equatorial Guinea	1	23560	1 Fugitive CH4 from oil-well
Ivory Coast	1	5661	1 Landfill power
Morocco	4	1991	2 Wind, 1 Solar, 1 EE industry
Nigeria	2	25026	2 Fugitive CH4 from oil-well
South Africa	15	19155	3 Biomass, 2 EE industry, 2 N2O, 2 Landfill power, 2 Fuel switch,
Tanzania	1	672	1 Landfill flaring 1 Coal-bed, 1 Hydro, 1 EE households, 1 Biogas
Tunisia	2	4125	2 Landfill flaring
Uganda	1	245	1 Hydro
Total	**32**	**92891**	

Figure 9: African Projects in the CDM Pipeline
Source: UNEP-Risoe Centre

Four major efforts out of all activities that have been established to scale up CDM activities in Africa include:

The Nairobi Framework

This aims at catalysing the CDM in Africa. It was initiated by the United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), World Bank Group, African Development Bank, and the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) with the specific target of helping developing countries, especially those in sub-Sahara Africa, to improve their level of participation in the CDM.

Capacity Development for the CDM (CD4CDM) Activities

This is a multi-year program with local partners, mostly undertaken in Cote d'Ivoire, Mozambique, Uganda, Ghana, Egypt, Morocco, Tanzania, Mauritius and Algeria. The donor is the Netherlands Ministry of Foreign Affairs ($15 million).

Carbon Finance for Sustainable Energy in Africa

This a program mostly implemented in Mali, Cameroon, Ghana, Mozambique and Zambia. Accomplishments will include the set-up of national institutions for regulation and promotion of CDM projects and the development of national action plans. The donors are the UN Foundation and the World Bank ($1 million).

UNEP Project: Forestry/Bioenergy CDM in Africa

This is a 3-year program mostly undertaken in French speaking Africa (Benin, Cameroon, Democratic Republic of Congo, Gabon, Madagascar, Mali and Senegal). The main objectives are to meet short and long-term capacity needs and to pilot existing and future CDM projects in the forestry/bioenergy sectors.

Other carbon financing opportunities for energy crop and agroforestry-based developments

There are a number of other carbon financing opportunities for energy crop and agroforestry-based developments. One specific example is presented below. First, however, the concept of VERs will be introduced, which constitutes the basis of a number of financing opportunities for energy crop and agroforestry-based developments.

Voluntary Emission Reductions – VERs

VER stands for Voluntary Emissions Reductions or Verified Emissions Reductions. Both refer to the emerging market for carbon credits outside the Kyoto Protocol compliance regime. The voluntary market may at present be smaller and less liquid than the compliance market, however, general market opinion is that the wider scope of the voluntary market, and growth led by the private sector, not public policy, means that it has a strong potential to outstrip the mature market size of the compliance regime. The key principles of VERs are additionality, sustainability, verifiability and reliability.

With respect to the project technologies used in VER projects, the range of technologies used in the compliance regime are eligible in the voluntary market, as well as others not currently accepted, such as certain forestry, land use and transport methodologies.

Regarding the factors that drive demand for VERs, there are three main drivers for demand in the voluntary market. Firstly, as a key component of a company's marketing strategy, linked to corporate social responsibility. Secondly, as a profit-making enterprise where financial participants build portfolios of VERs in order to speculate in this market. Thirdly, as a valuable learning exercise for forward-looking companies in business sectors which anticipate being included in a future compliance regime, and which wish to develop a competitive advantage through familiarity with carbon credit market mechanisms. The latter one is particularly important for energy crop and agroforestry-based developments.

With reference to quality labels available for VERs, it is important that all VERs at a minimum should be verified by an independent third-party. The general market requirement as a minimum standard is the Voluntary Carbon Standard (VCS) which ensures additionality, and uses as a basis several of the additionality tests required in the compliance regime.

The Voluntary Gold Standard is a premium quality label which ensures the successful integration of stakeholder feedback, and integrity of environmental impact assessments.

A new quality label, the VER+, is not yet widely accepted by the market, but has been recently launched by TUEV SUD, an entity accredited by the UNFCCC to assess compliance projects.

It is possible to try to have VERs certified, for example under the Clean Development Mechanism, in order to demonstrate that they represent genuine and durable carbon reductions

Example of other carbon financing opportunities for energy crop and agroforestry-based developments

Plan Vivo

Plan Vivo is a project developed by the BioClimate Research and Development (BR&D) – a non-profit organisation, which promotes actions to reconcile human development and environmental change.

The system works such that companies, individuals or institutions wishing to offset greenhouse gas emissions can purchase voluntary emission reductions (VERs) via the project trust fund, of the offset project. These VERs are in the form of Plan Vivo Certificates. Plan Vivo Certificates represent units of long-term carbon benefit from sustainable, community based forest management and agroforestry plus associated, quantified, environmental and social benefits.

The project uses the Plan Vivo management system to register and monitor carbon sequestration activities implemented by farmers – a characteristic particularly important to agroforestry and energy crop agricultural activities.

Projects have so far been undertaken in Mexico, Uganda and Mozambique.

2.2.3 Donors

Donor assisted RE projects in developing countries circumvent the capital market problem by providing project finance in the form of donor grants and concessional loans for RE. Local banks are used as on-lending vehicles in this financing modality.

The approach solves the financing problem of RE on an individual project-by-project basis, but does little to assist the development of a local capital market, which is indispensable if a sustainable scaling-up of private investment in RETs is to take place.

This requires an autochthonous financing framework where local equity investors and financial intermediaries play a pro-active role in financing RET-projects. In recognition of this structural weakness, donor finance is shifting from conventional project finance to underwriting risk management instruments that enable local finance institutions to engage in active project lending.

Suggestions to improve the existing donor-based assistance include:

a) for donors to help create creditworthiness (Training for RE project sponsors and RE interested financial institutions, Risk structuring and coverage)
b) for donors to look for leverage, offering assistance (Financial Guarantee, subordinated debt) to bring down the risk of RE to a market attractive level
c) for donors to fund the subsidies for capacity building investments
d) for donors to support private firms by providing financing and/or equipment subsidies. Enterprise development support, seed capital, debt finance, etc.
e) for donors to support Specialized Financial Institutions (RE, Microfinance).
f) for donors to create new financing vehicles like revolving funds, credit lines, and contingent business loans that are forgivable under specified conditions.
g) for donors to reduce (commercial) risks by financial guarantees like for example maturity guarantees, rolling guarantees and pool guarantees.

2.2.4 Commercial options

Commercial bankers and investors may be considered one-dimensional, as all that matters to them is return. Return is sexy - risk is not. And most bioenergy-based developments offer a low return with an extra portion of risk. This makes it complicated (not for investors as there are enough other opportunities) but for the RE promoting community. Adding to this, the risk premium involved in setting up bioenergy-based schemes in Africa is significantly higher than in developed countries.

Figure 10 illustrates how the risk of the different RE varying widely, giving a wide range of risk/cost combinations in the playing field of RE finance:

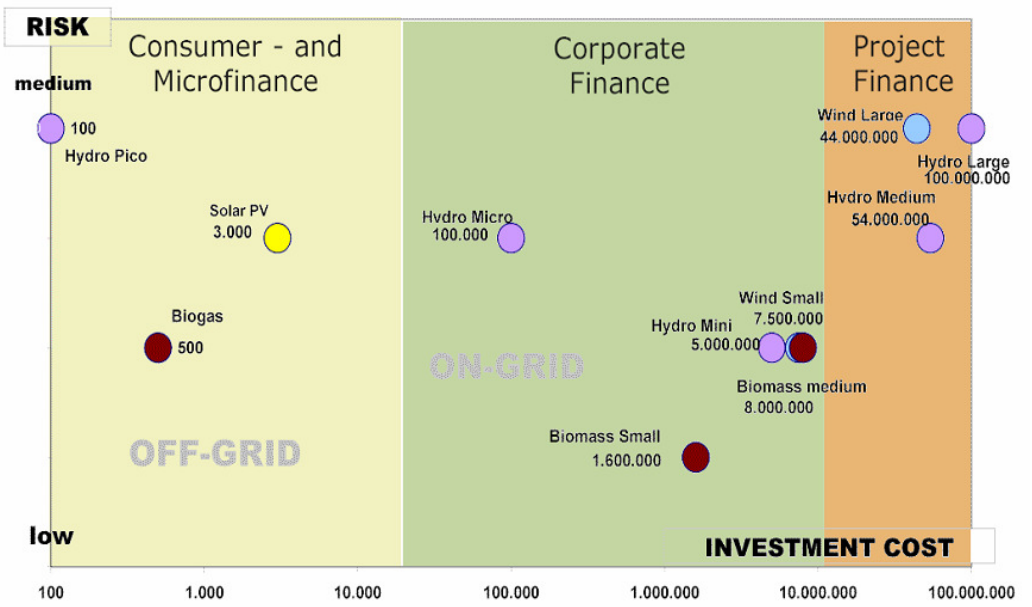

Figure 10: Investment Cost and Risk for different types of RE
Source: KfW – Financing Renewable Energy

Depending on the size, RET sector and region, the relevance of the different sources and instruments for RET finance varies extremely, reaching from private finance from savings or relatives to finance very small RET (pico hydro) to two-digit million credits from advanced domestic banks participating in the project financing.

Thus, RE finance is not only very different for the distinct types of RETs, but is much more segmented by the size of projects and the type of debtor:

- Consumer- and microfinance for off-grid RE projects
- Corporate finance for small on-grid RE projects
- Project finance for large RE projects

3 MAIN BARRIERS ASSOCIATED WITH FINANCING ENERGY CROP PROJECTS

Inherent barriers to renewable energy

- Cost: capital cost intensive structure
- Analysis: insufficient data for prudent project analysis
- Risk: high or unclear risk, including difficulties in guaranteeing cash flow and no enforceable securities

Inherent barriers to energy crop cultivation in Africa

- Low and to some extent unpredictable fertility of land making energy crop cultivation more risky

Financial sector shortcomings

- Lack of funds
- Improper financial conditions, especially the maturity of credits and the requirement for collateral
- Lack of instruments and shortcomings of local financial institutions
- Generally, there are no risk mitigation instruments in Least Developed Countries
- Lack of sector know-how and willingness to invest in RET, low level of awareness and understanding of the RET as well as insufficient information for prudent investment analysis
- LDC-countries have a very low level of financial activities as they do not have much (idle) capital and do not attract much capital from abroad. RETs compete with all other sectors for very scarce local finance
- Exorbitant banking fees in African countries

It takes over $700 to open a bank account in Cameroon - more than the country's per capita GDP. In 10 percent of countries surveyed in a World Bank report, a person must have an equivalent of at least 50 percent of per capita GDP to open an account. The result: only 20 percent of families in Africa have bank accounts. The graphic below shows the share of the population that can't afford checking account fees, see Figure 11.

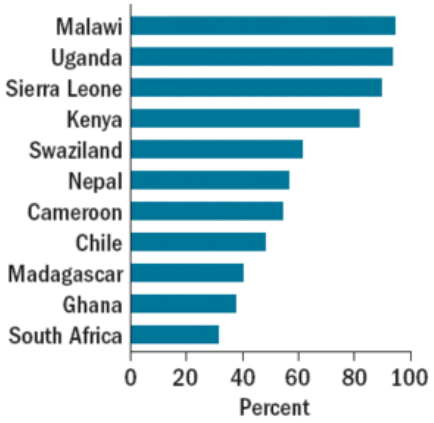

Figure 11: Share of the population that cannot afford a bank account in Africa
Source: World Bank Group

Politics

- Regulatory and policy issues which favour conventional energy types or hamper RETs, e.g. price distortions from existing subsidies and unequal tax burdens between renewables and other energy sources.
- Insecure legislation in the energy sector
- Lack of reliable partners for take off contracts / feed-in laws

Project sponsors

- Weak project developers and lack of project experience
- Limited financial/managerial capacity
- Limited credit-worthiness, particularly due to lack of complementary own funds

Infrastructure

- In the U.S., for example, other facilities and rules have to be enhanced in order to promote green cars; currently, there are only about 700 E85 pumps among the nation's 170,000 gas stations.

Project characteristics

- Project size: many RE projects are too small to attract commercial lenders
- Project length: Due to their time horizon, RE have a very long exposure period to risk

Project financing

- Higher ratio of capital costs to operating costs, resulting in a need for longer-term financing at reasonable rates
- High costs, especially for project development and investment costs, very different cost structure with an extreme up-front share and usually low or even very low operational cost
- As RE projects are very capital intensive they are extremely sensitive to the structure and the conditions of capital cost financing
- Often insufficient data for prudent project analysis, due to lack of accurate reports on the supply of "fuel" at specific sites
- Investors need reduced or shared credit risks until confidence in renewables grows and track records of success emerge
- Low returns with positive cash-flows coming first in the long run: In principle, the profile of long-time exposure calls for compensation in the form of higher interest rates and returns on equity. The possibility for that is limited by the low project returns, which make such kind of projects rather unattractive

High transaction cost:

- New technology and less experienced developers make RE projects more complicated and time-consuming from the lenders point of view.

Consequences of weak capital markets for RE

- The absence of long-term, sometimes even medium-term finance in many LDCs is a problem that the private sector faces. This is due to limited long-term funds, as well as the instability of the market.

The inherent problem of RET projects is that these are more capital-intensive than conventional, fossil-fuel based technologies. This in combination with high interest rates, short maturities and low gearing ratios shift the financial price per kWh of RE upwards relative to conventional power. This obviously applies specifically to those energy crop-based technologies that generate electricity.

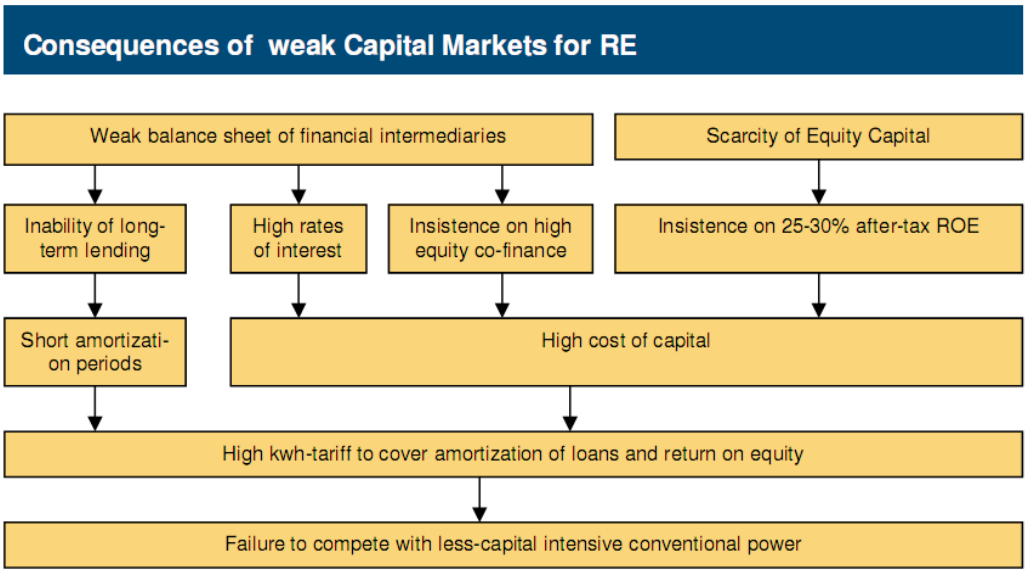

Figure 12: Consequences of weak capital markets for RE developments
Source: KfW – Financing Renewable Energy

As a result of these barriers associated with financing energy crop projects, current bioenergy financing has not been very effective in Africa as demonstrated by the existence of only few projects currently underway, and the fact that no country in Africa is producing any significant amount of biofuels.

Furthermore, the demand for energy crop-related financing in arid and semi-arid regions in Africa faces severe constraints on the supply side of the financial system in these African countries. Depending on the maturity of the financial markets, there is a 3-dimensional gap of financing:

- Amount of funds
- Terms and conditions of funds
- Available financial instruments

4 SURVEY OF FUNDING OPPORTUNITIES

This section contains an overview of opportunities that exist for financing new and additional energy crop and agro-forestry developments in Africa.

4.1 Commercial Banks

There are several common themes running through the commercial banking sector in East Africa. The formation of an effective credit bureau is often cited as important in most markets where significant growth is expected in the retail lending sector. Banks are facing increased levels of competition as aggressive competitors have either just entered or increased their market presence. In Kenya, consolidation and market development have fuelled competition and there has been some consolidation resulting from government imposed minimum capital requirements.

In all markets there is concern about how best to service the unbanked market. For example in all the East African countries, banking penetration is extremely low and the banks are chronically under-represented outside the major urban centres. New products are evident in all the markets. While credit cards are being developed in all the countries, Kenya has seen innovative new offerings such as Mpesa which uses cell phones to transfer cash between individuals. A lack of transparency on pricing is an issue although the Central Banks are becoming more proactive in emphasizing more openness.

A major problem of dealing with commercial banks is the lack of adequate branch infrastructures, particularly in rural areas. More creative distribution structures are being slowly developed, including the use of ATMs and hub and spoke branch networks. Neglect of the SME sector is quite common, but this situation is improving, particularly in Kenya with the advent of banks such as Equity, K-Rep, and Family Finance which have made the SME sector their core market.

The cash orientation of the East African markets has been mentioned as a hindrance to the development of new products. The nature of the property lending environment is also viewed as a major barrier to development.

Most banks in East Africa are small to medium sized and locally owned. The industry is, however dominated by a few large banks, three of which are foreign-owned (Barclays Bank, Standard Chartered, Stanbic). In Kenya seven of the major banks are listed on the Nairobi Stock Exchange, and Stanbic is listed in Kampala. Several of the foreign banks also have partial local ownership.

The commercial banks and non-bank financial institutions offer corporate, commercial and retail banking services, although several large banks also provide investment banking services.

Commercial banks in East Africa are very conservative lenders. Although banks' margins (as measured by the difference between deposit and lending rates) are very high, most banks prefer to invest in government bonds rather than lend to private sector companies.

Established businesses, multinationals, and businesses which are able to offer adequate fixed assets as security will be able to meet their financing needs from commercial banks, and it is important to develop a relationship with one or more banks over some time through trading activity, before approaching banks for financing capital investments. New businesses in particular find it very difficult to obtain medium to long term project financing unless the capital gearing (ratio of debt to equity) is low (well below 50 per cent), or if, as noted above, alternative security to the new project being financed can be offered.

A recent development in commercial banking has been the transformation of local development finance banks (DFCU in Uganda, TDFL in Tanzania, DBK in Kenya) (lending only for long term investments) to commercial banks which have a broader product range. These banks have experience of medium and long term project based lending, but now operate as commercial banks. Given their experience, they should be more open to renewable energy projects, although they do often run into their own financing constraints which limit their abilities to engage in term lending.

4.2 Bonds

Bonds are a form of debt usually invested by non-bank financial institutions. Bonds are usually unsecured, but can also be backed by a bank or other form of guarantee. The main advantage of bonds is that the pricing is usually lower than bank debt, and the risk profile of the investment can be tailored to the financiers' requirements. Bonds are usually issued as tradable instruments (e.g. on the Nairobi Stock Exchange) and will therefore need to comply with trading regulations.

It is unlikely that a bond issue will be feasible at the start of a project. However, once a project is running and generating positive cash flows, issuing a bond may become a viable option.

4.3 Development Finance Banks

Development finance banks (DFB) are a viable alternative to commercial banks for debt finance, but vary considerably in their lending criteria. The sections below provide some guidelines on development finance banks active in East Africa.

All the DFBs have lengthy appraisal processes. It will generally require six months or more after presentation of a detailed financing proposal to run through the appraisal process, obtain approvals for financing, completing documentation, and meet all the conditions precedent to disbursement.

4.3.1 Local Institutions

There are two active locally based development finance banks:

East African Development Bank

The East African Development Bank (EADB) was established in 1967 under the treaty of the then East African Cooperation. Following the break up of the community in 1977, the Bank was re-established under its own charter in 1980.

EADB is owned by the three member states of Kenya, Uganda and Tanzania. Other shareholders include the African Development Bank; FMO (Netherlands); DEG (Germany); Consortium of Yugoslav Institutions; SBIC-Africa Holdings; Commercial Bank of Africa, Nairobi; Norbanken AB, Stockholm; Standard Chartered Bank, London; and Barclays Bank International, London.

EADB has offices in Kampala, Nairobi and Dar-es-Salaam. With EADB's core objective being promotion of sustainable development in the Member States, the Bank has developed a range of products that are tailored to meet regional development requirements. Projects should demonstrate technical feasibility, financial and economic viability and management competence, and should take cognisance of environmental and gender issues.

The product range is offered to most productive sectors of the Member States' economies with emphasis on:

- Agriculture and Agro-Processing
- Infrastructure (Including Energy, Information and Communication Technology, Transport and Real Estate and Property Development)
- Industry and Mining
- Tourism
- Services (including education, health, finance)

PTA Bank

Based in Nairobi, and covering financing for all COMESA countries (Common Market for Eastern and Southern Africa - a preferential trading area with twenty member states), PTA finances projects in almost all sectors of the economy. The focus is on agro-industry, energy, infrastructure, transport, communications, manufacturing, mining, service industry and tourism.

Projects which may qualify for PTA facilities are those that are export oriented, foreign exchange earning and/or foreign exchange saving, local resource based and have a regional perspective. Additionally, the project has to be financially viable, technically feasible, economically sound and environmentally sustainable.

The following finance products are available:

- Loans - direct and sole lending, co-financed lending, and syndicated lending
- Lines of Credit to local financial institutions for on lending to small enterprises
- Guarantees to facilities obtained from other lenders or suppliers
- Technical assistance towards feasibility studies and project preparation where the complexity of the project so demands

Facilities offered for loans, lines of credit and guarantees range from a minimum of US$ 500,000 to a maximum of US$ 20 million. The normal term of facilities is up to 10 years including a maximum grace period of 2 years. However, actual tenure is determined on the cash flow capacity of the project.

The pricing of facilities is specific to the proposal and is determined on analysis of the project's and borrower's risk profile. Pricing includes interest rate and other fees and charges related to the mobilisation and implementation of the project. A fee is also payable for the appraisal of projects. All facilities have to be secured or have collateral that is commensurate to the project risk profile.

4.3.2 International Institutions

A number of international development finance banks are active in financing renewable energy projects. Some of the major investors in East Africa are listed below:

DEG

The German Investment and Development Company is member of the KfW banking group and a specialist in long-term project and corporate financing. It advises private companies, structures and finances their investments in Africa, Asia, and Latin America as well as in Central, Eastern and Southeast Europe.

DEG invests in profitable, ecologically and socially sustainable projects in all sectors of the economy open to private entrepreneurial initiative: in agriculture and in manufacturing, in services and in the infrastructure sector. As one of the largest European development finance institutions, DEG has thus far cooperated with more than 950 companies and by financing € 4.2 billion it has attained an investment volume of € 30 billion.

DEG promotes power generation favouring renewable energy or local resources. For example DEG has contributed to financing the Upper Bhote Koshi hydropower station in Nepal. The 36-megawatt run-of-river hydropower station will increase Nepal's generating capacity by about 10 per cent.

FMO

FMO -the Netherlands Development Finance Company- promotes sustainable development of the private sector in developing countries. Realizing sufficient returns on its risk capital is a prerequisite. Only then can FMO continue to act as an effective risk partner and ensure the continuity of the organization. These two aims (sustainable development and financial returns) are therefore inextricably linked.

FMO has an investment portfolio of 1.79 billion €, making it one of the largest bilateral development banks. FMO has excellent access to capital markets, in part attributable to the Triple A status that was conferred in 2000.

FMO's core activity is to provide local businesses and financial institutions in developing countries with long-term financing, ranging from loans to equity investments in enterprises. FMO does this on market terms and only when financing by commercial financiers is either unavailable or inadequate. Its present portfolio covers over 40 countries.

IFC

IFC's (International Finance Corporation) Environment and Social Development Department assists IFC to develop successful and sustainable projects with low environmental and social impacts. Within this department, the Environmental Projects Unit (EPU) contributes to IFC's mission by accelerating market acceptance of technologies, products, and operating practices that benefit the environment. It supports sustainable energy projects and in recent years, has been actively seeking to finance a greater number of energy efficiency projects and to develop special initiatives to accelerate the market penetration of these technologies. The EPU welcomes proposals seeking IFC financing for private-sector projects with specific environmental benefits. In reviewing such proposals, IFC works closely with the relevant IFC Investment Departments.

The Power Department of the IFC is a team of professionals which provides a wide range of advisory and financial services to IFC's clients. IFC works with investors to refine and improve project structures, alleviate risk, and assure syndication of commercial debt on the best terms. The Power Department structures financial instruments to meet the needs of individual transactions. Beyond IFC's equity, A loan, B loan, mezzanine financing and risk management facilities, IFC and the World Bank collaborate on the deployment of the Bank's partial risk guarantee to underpin additional financing as circumstances require. IFC is also designing new credit enhancement mechanisms, intended to extend loan maturities and reduce costs.

E+Co

E+Co provides early stage risk capital, but will only work with projects that have a clear social and environmental benefit. Projects must also be commercially viable (i.e. competitive with conventional alternatives) and must have potential to be self sufficient in order to attract private investment in the next stages of the development cycle.

E+Co is a US based group focused on the provision of business development services and seed capital. Their interest is in supporting indigenous enterprises that are working to provide those in developing countries with a reliable and affordable source of clean energy. Typically, investment (debt or equity) is limited to US$250,000, but the company is different from other sources of funding because it is willing to take a higher (but measured) investment risk by providing a combination of business services and seed capital during the earliest stages of an enterprise's growth. E+Co believes that the combination of business services, seed capital and commitment to local entrepreneurs is the key to success. E+Co co-manages UNEP's Rural Energy Environment and Development programmes (see www.areed.com) in Africa, Brazil, and China.

4.4 Investment Funds

All of the development finance banks listed above can provide investments in the form of both debt and equity. However, there are also a few investment institutions which specialise in providing investment capital which ranks below senior bank debt. This kind of financing sits in between bank debt and shareholders equity, and is also referred to as 'quasi-equity' or 'mezzanine finance'. Some examples of finance terms are noted below in Tables 1 and 2.

Financial Instrument	Notes
Subordinated debt	All payments are subordinated to senior (usually bank) debt; Maybe secured by a second charge on company assets; Debt type instrument, i.e. fixed repayment schedule; Interest rate will be higher than senior debt and may include a profit related 'kicker' i.e. additional interest payment if the company makes a profit above an agreed level.
Preference shares	Closer to shareholders equity in form, but usually redeemable to make for an easier exit from the investment; Terms may include repayment of capital over time, but this will be subordinated to all debt repayments; Dividends may be set as equivalent to dividends paid out to ordinary shareholders, but may also be structured as a fixed coupon with profit share rights; Terms will usually include pre-emption rights for buy-out by ordinary shareholders, but may also include for the investor to force a sale of the company to an outside buyer if the ordinary shareholders are unable or unwilling to effect a buy-out;

Table 1: Mezzanine Finance Instruments

Investment funds that are active in East Africa

Inv. Fund	Description
Grofin	GroFin is a multi-country business development and finance company focused on providing business support and risk capital to small and medium sized enterprises in emerging markets underserved by traditional sources of capital. GroFin tries to integrate business development assistance, usually with subordinated debt investments to support locally owned start-up and growth enterprises to reach sustainability. GroFin invests in South Africa, Kenya, Uganda, Tanzania, Rwanda, Nigeria and Oman. Its funders include several international finance institutions, banks and multi-national companies. Assistance from the Shell Foundation allows for expansion into new markets and replication of the GroFin business model. GroFin Funds provide direct financing to locally established enterprises with growth and profit potential in amounts ranging from US$ 50,000 to approximately US$ 1 million. Finance facilities are structured using mainly medium-term loans (three to six years) and performance based incentive payments. Interest and/or capital moratoriums are possible depending on the projected cash flow of a particular business.
BPI	Business Partners Limited is a South African investment company for small and medium enterprises. In Kenya BPI has set up a US$ 14.1 million quasi-equity risk capital fund to invest in Kenyan small and medium enterprises (SMEs) and also provides post-investment technical assistance funding through interest free loans. BPI uses primarily quasi-equity and debt instruments when structuring its deals, and makes individual investments of between US$ 50,000 and US$ 500,000.
Aureos	Aureos Capital Limited (Aureos) was established in July 2001 as a joint venture between CDC Group plc, a UK government-owned fund and Norfund, the Norwegian investment fund for Developing Countries. Once established, Aureos assumed the management responsibility for 139 portfolio companies with a book value of US$ 72 million originally invested and managed by CDC between 1989 and 2001. As at the end of April 2007 Aureos had effected 116 exits. The remaining 23 portfolio companies are valued at around US$ 26.3 million. The expected realised and unrealised cash multiple will be around 1.7 times book value. In parallel over the same period, Aureos sponsored and raised 10 new regional SME funds for the emerging markets with total capital commitments of US$468 million. So, including the Legacy Portfolio, Aureos had raised and managed approximately US$600 million. Aureos typically looks at MBOs, expansions, pre-IPO and acquisition type of transactions in the US$ 2 million to US$ 10 million investment range. Most businesses in which Aureos invests have an operating history of between three and seven years. Aureos generally will not invest in new businesses.
Actis	A leading private equity investor in emerging markets, Actis has US$ 3.5 billion of funds under management. Since emerging from CDC Group plc in 2004, Actis has raised US$ 1.6 billion in new funds from institutional investors in North America, Europe, Africa, the Middle East and Asia. Actis has been investing in emerging markets for 60 years. Since 1998 has invested US$ 2.5 billion in 137 companies and is currently investing c. US$ 500 million in 15-20 transactions a year. Actis makes minority and majority investments ranging from US$ 10 million to US$ 100 million.

Table 2: Investment Funds

There has been a growth in interest in investing in Africa over the last 1-2 years. As a result, there are a number of other funds in the process of being set up, and there may therefore be additional sources of financing available in the near future.

4.5 Political Risk Insurance

- Currency transfer restrictions - coverage protects against losses arising from an investor's inability to convert local currency (capital, interest, principal, profits, royalties, or other monetary benefits) into foreign exchange for transfer outside the host country. The coverage also insures against excessive delays in acquiring foreign exchange caused by the host government's actions or failure to act. Currency devaluation is not covered.
- Expropriation - coverage offers protection against loss of the insured investment as a result of acts by the host government that may reduce or eliminate ownership of, control over, or rights to the insured investment. This policy also covers partial losses, as well as "creeping expropriation," a series of acts that over time have an expropriatory effect. Bona fide, non-discriminatory measures taken by the host government in the exercise of its legitimate regulatory authority are not considered expropriatory.
- War and civil disturbance - coverage protects against loss due to the destruction, disappearance, or physical damage to tangible assets caused by politically motivated acts of war or civil disturbance, including revolution, insurrection, and coups d'état. Terrorism and sabotage are also covered. War and civil disturbance coverage also extends to events that result in the total inability of the project enterprise to conduct operations essential to its overall financial viability.
- Breach of contract - coverage protects against losses arising from the host government's breach or repudiation of a contractual agreement with the investor. In the event of such an alleged breach or repudiation, the investor must be able to invoke a dispute resolution mechanism (e.g. arbitration) set out in the underlying contract and obtain an award for damages. The investor may file for a claim if, after a specified period of time, payment is not received.

There are two main sources of political risk cover available for projects in East Africa:

- **Africa Trade Indemnity (ATI)** - is a multilateral political risk and credit insurer, established at the initiative of COMESA and owned by African member states supported by the World Bank. ATI partners with Lloyd’s of London and other major private insurance companies to facilitate private led trade flows, and investment through the provision of insurance, coinsurance & reinsurance, financial instruments and related services. Based in Nairobi, ATI is reasonably accessible.
- **Multilateral Investment Guarantee Agency (MIGA)** - as a member of the World Bank Group, MIGA's mission is to promote foreign direct investment (FDI) into developing countries. Types of foreign investments that can be covered include equity, shareholder loans, and shareholder loan guarantees, provided the loans have a minimum maturity of three years. Loans to unrelated borrowers can be insured, provided a shareholder investment in the project is insured concurrently or has already been insured. Other forms of investment, such as technical assistance and management contracts, and franchising and licensing agreements, may also be eligible for coverage.

5 REVIEW OF SELECTED FINANCIAL INSTITUTIONS' STRATEGIES FOR ENERGY CROPS AND AGROFORESTRY ACTIVITIES IN AFRICA

This section offers a review of strategies for energy crops and agroforestry activities of three selected financial institutions, i.e. the KfW, VPBG and the GEF.

5.1 Review of KfW's (German Development Bank) Strategy on RE and Bioenergy

The need for a special financial mix for bioenergy is the consequence of particular conditions on the supply side, sometimes constraints on the demand side and - most numerous - of limitations in the framework conditions.

The practical relevance of the many financial instruments is rather limited in the commercial financial markets of the developing countries for bioenergy financing. KfW can identify some kind of development sequence of financial instruments:

- Credits are used already at the earliest stages, and as an instrument are available for bioenergy finance, although there may be (severe) limitations to the conditions and amounts depending on the stage of development of the local financial market.
- Leasing as an instrument can seldom be found in LDCs, but is already in use in emerging financial markets, offering some chances for bioenergy finance.
- Equity and Mezzanine Finance becomes more common only in the more advanced emerging financial markets. In poorer countries the market will rarely offer these instruments and the corresponding funds.
- Although Bonds are in use in many emerging financial markets, there seems little chance to use this instrument on pure market base for RE finance due to the risk aversion of the public as well and the high transaction cost.

The local commercial financial and capital markets are at least offering some interesting basic elements for a partial solution to the financing problems for RET, which however need the completion by smart promotional instruments to make them a viable path for RET finance. And as ODA and promotional finance of DFIs with lower expectations for return and their higher risk disposition can potentially use each and every of the described financial instruments, the described instruments can serve as something like a toolbox for adequate bioenergy financing within promotional schemes.

As bioenergy projects are more complex and risky, also because most of these technologies rely on the supply of fuel from nature without a chance of substitution by another source, risk management and risk allocation are extremely important. The proper planning of a bioenergy project with carefulness, attention and accuracy exercising the due diligence of a businessman is the most important risk management factor.

The capital and insurance markets have developed a series of financial instruments to support the structuring of the risk of projects and to make financial deals viable at all. The most important and relevant risk instruments at the present stage of development are:

- Political Risk Insurance
- Swaps, and
- Contingent Finance

Due to the limited experience, the early stage development of the relevant markets and the risk aversion of the players such instrument will only seldom be available for bioenergy in LDCs per se. Thus, some of these instruments presented offer an interesting starting point for policy makers and donors to support the structuring of risk in RE by assisting the players in the financial and insurance markets to develop their skills and instruments. Furthermore some of them could be used directly by donors to assist bioenergy projects and programs.

Promotional schemes could play an important role to improve the financial viability of bioenergy projects by an approach to increase funding availability, aiming at leverage of private finance, with a risk-sharing approach, and the facilitation of the bundling of (small) projects to help absorb their higher proportional level of transaction costs.

5.2 Review of World Bank Strategy on RE and Bioenergy

Leveraging World Bank Group (WBG) Resources:

The response of markets and the private sector will be critical for successfully increasing energy access and mitigating and adapting to climate change. The continuing focus of WBG efforts will be to support the engagement of the private sector and other partners in this effort, through diverse measures, including investment support, barrier removal, and competitive markets as sources of investment and solutions. The role of governments remains important for establishing the required policy and regulatory environment and other efforts at barrier removal. The many lessons learned are being applied regionally, from country to country and from one sector to another.

Lessons from our renewable energy and bioenergy-related experiences include:

- Improve the policy and regulatory environment to reduce energy price distortions, mitigate regulatory risks, streamline approval processes, and increase transparency in decision making.
- Although economic viability may be compelling, financial viability, as well as market and consumer confidence, are sine qua non for bioenergy project success and scale-up. Pay heed to quality and meet consumer expectations in service and value.
- Increase access to pre-investment and investment financing, and introduce risk management and credit enhancement instruments. Benefit from new instruments, such as those offered by the carbon markets.

- Build capacity and increase knowledge among the domestic financial sector, industry, utilities, engineering, policy makers, and consumers. Support South/South knowledge exchanges.

The WBG brings to bear a wide range of financial and nonfinancial instruments to support the development of bioenergy developments. Among them are conventional lending instruments; equity and quasi-equity; partial risk guarantees; currency, commodity, and inter estate risk management; and carbon finance; as well as capacity building and policy, legal, and regulatory support.

The World Bank's Carbon Finance Unit has been an important contributor to World Bank projects -its impact is even greater than the GEF's, since every dollar of carbon financing is estimated to leverage five to six dollars in investment funds. In fiscal 2007, the WBG supported 63 RE projects in 32 countries with more than half the financing going to Africa.

The WBG will continue to expand its support for renewable energy, including bioenergy in the coming years. Priority attention will include integrating support for alternative energy development with initiatives to increase energy access in Sub-Saharan Africa. The WBG will continue to assist its partner countries in integrating renewable energy into their development strategies, supporting renewable energy investment projects, building capacity, and improving its partner countries' policy environment.

5.3 Review of GEF Strategy on Bioenergy

GEF's Strategic Focus in GEF-4 (2007 - 2010)

In the case of biomass energy, the GEF has supported past efforts in this field. However, most of these projects have focused on utilized by-products of the forestry or agricultural industries and have not required the planting or harvesting of dedicated biomass-fuel supply streams. As the price of petroleum fuels rises, pressure will increasingly be put on countries to increase energy production from biomass. But as recent STAP (Scientific and Technical Advisory Panel) work has argued (GEF/C.31/Inf.2), the production of biomass and biofuels poses considerable sustainabilitye risks.

This new strategic program is designed to pay particular attention to these sustainability needs, ensuring that biomass supplies for GEF climate change mitigation projects do not threaten indigenous biodiversity, or contribute to further land deterioration or water misallocation. The global benefits from this program are expected to come mainly from the energy value of the biomass, not the value of the residual carbon sequestered.

GEF-4 Support to Mitigation Programming

Strategic Program 4: Promoting Sustainable Energy Production from Biomass

This strategic program will promote sustainable energy production from biomass. A successful outcome will be the adoption of modern and sustainable practices in biomass production, conversion and use as energy. Indicators of success will be tons of CO_2 avoided; the adoption of modern biomass conversion technologies, improved efficiency of biomass energy use, kWh of electricity and heat generated from biomass sources, and energy services produced on the basis of biomass.

Given the emphasis placed upon sustainable forest management in the remainder of the GEF portfolio, it was considered necessary to create a separate strategic program for biomass in order to highlight its importance and ensure consistency with other focal areas. GEF support will only go to biomass projects that ensure that biomass energy use is sustainable and does not, therefore, contribute to deforestation, reduced soil fertility, or increased GHG emissions beyond project boundaries. Projects will support the use of biomass for the production of energy services (electricity, heat, etc.) in modern efficient technologies. Support may be given to investigate the suitability and sustainability of producing biofuels to substitute petroleum fuels used. In all instances, sustainability criteria will have to be observed to ensure that GEF support to modernization of biomass does not undermine food security, exacerbate existing availability problems, or violate GEF's sustainability principles relating to biodiversity conservation or sustainable land and water management, in keeping with the recommendations of STAP.

In the past, GEF support to biomass energy has focused largely on the utilization of biomass wastes and residues. During GEF-4, additional support will be given to modern biomass projects using biomass planted for dedicated energy purposes, provided that such support is consistent with sustainability criteria. GEF will develop an approach for certifying the sustainability of biomass that will be used for energy under its biomass program. This will be expected to be a priority for countries with plentiful biomass or where biomass waste products go underutilized or where biomass continues to be used in inefficient, traditional wood stoves. Typical projects will provide a mixture of technical assistance, capacity building, and investment. Countries will undertake different projects, depending on their technological advancements in the area of bioenergy conversion, their pre-existing infrastructure, and the structure of energy demand. As the conversion of cellulosic biomass to liquid fuels becomes more feasible in technical and economic terms, GEF support to these newer approaches is expected to grow. Some targeted research may be proposed relating to these "next generation" biofuels, in keeping with STAP processes and recommendations.

Interlinkages with other GEF Focal Areas

The relationship of the climate change focal area to the cross cutting issue of chemicals management is multi-faceted. First, there are the incidental health and environmental benefits resulting from GEF interventions whether energy efficiency, renewable energy, or sustainable transportation that displace or reduce the combustion of fossil fuels. These incidental benefits may stem from significant reductions in mercury, SO_2, NOx, polycyclic aromatic hydrocarbons, etc., that would otherwise have been emitted. Second, a number of energy efficiency interventions address sectors that potentially release relatively large amounts of chemicals into the environment, e.g., steel, chemicals manufacturing, cement, pulp and paper, and textiles. Not only are these GEF-supported interventions designed to increase energy efficiency in these sectors, they also typically accompany a cleaner production approach that leads to reducing inputs including water, and reducing releases of toxic chemicals in emissions and effluents. Finally, there will be cases where there might be trade-offs between reducing greenhouse gas emissions and releases of chemicals in the environment. These trade-offs will be considered and assessed as part of project preparation (e.g. in deciding whether or not to support biofuels, the GEF will take into account the risks of environmental degradation resulting from possible increased use of agrochemicals).

GEF'S Strategic Objectives in Sustainable Forest Management

During GEF-4, the GEF will continue to support the elements of sustainable forest management that are eligible for GEF financing through the existing focal area strategic programs. The GEF framework strategy identifies how GEF's focal area strategic programs contribute to the sustainable management of forests to primarily achieve global environmental benefits but also local livelihood benefits. The framework strategy also identifies one potential new strategic program that is cross-cutting in nature (biodiversity-climate change-land degradation) entitled "Forest Conservation as a Means to Protect Carbon Stocks and Avoid CO_2 Emissions". In order to ensure that projects in the climate change focal area promoting the production of biofuels from biomass feedstocks do not negatively impact on the goals of the other GEF focal areas, a targeted research project is also proposed to identify and develop sustainability criteria for sustainable biomass production.

6 CONCLUSIONS AND RECOMMENDATIONS

This study aims at giving an overview on the needs and approaches for energy crops/agroforestry financing in arid and semi-arid Africa. Taking into consideration the great range and variety of problem situations of the different energy crops/agroforestry-based technologies in the various context frameworks, it is quite clear that such a study cannot produce a standard set of reproducible recipes for energy crops/agroforestry finance. Each situation requires a specific diagnostic and a tailor-made approach for financial closure. However, trying to summarize the quintessence of this study, we like to finish this study with some general conclusions giving an outline of the rationale of an energy crop and agroforestry-based financing strategy calling for a well-targeted support by relevant promoters:

1) Countries with even low levels of science and technology can get a start in biofuels, and they can create thereby a 'development bloc' that can drive industrial development.
2) Biofuels production is a rural industry and can fight rural poverty in LDCs and promote social inclusion.
3) Policy decisions about energy crops/agroforestry -in particular, however, about biofuels- involve difficult trade-offs: carbon benefits versus other environmental benefits; food security versus export development; efficient large-scale production versus smaller-scale or mixed production systems that deliver more equitable rural development.
4) Creation of a market expanding regulatory framework, which reduces risks, keeps down the costs of projects transactions, and gives supply from energy crops/agroforestry priority access to the power/heat/transport fuel market.
5) The limited financial viability and the elevated risk profile of energy crops/agroforestry projects require special efforts in financing and structuring.
6) The financial approach has to determine the distance of the energy crops/agroforestry project to commercial financial viability, and define a set of cost reducing and income increasing measures on three levels (project, framework, outside support) to create conditions of financial viability ex ante as a key factor for investment decision.
7) Risk allocation between project sponsor, contract partners, the (financial) market and promoting institutions is the other key determinant for successful project financing of energy crops/agroforestry-based developments.
8) This risk structuring and financial engineering of energy crops/agroforestry projects is a complex and time-consuming process, demanding staying power and corresponding resources itself.
9) For projects with a perspective of viability, the financial world has a well equipped toolbox with adequate instruments to finance the specific needs of energy crops/agroforestry projects and to structure its risks.
10) A proper risk allocation with view on the markets perception of energy crops/agroforestry can make a generally viable energy crops/agroforestry project creditworthy at all, thus helping to attract more funds and reduce the cost of financing in the market.

11) In practice, local capital markets are not the magic solution due to their limitations on the different levels of financial deepening in the various markets, although even in LDCs they can offer some contribution to financial closure.

12) The 3-dimensional energy crops/agroforestry financing gap (funds / terms / instruments) can be bridged with the assistance of institutions with higher risk-absorptive capacity, and which by themselves can potentially offer each professional financial instrument to complete the market. However, as the resources of promoting institutions are not unlimited, their approach has to be selective and targeted.

13) To maximize results donors should offer assistance to pick the low hanging fruits of energy crops/agroforestry-based developments, i.e. projects, which are close to market competitiveness. Smart subsidies can be a valuable instrument in such a context, especially if their use needs to be only transitory.

14) Donors could help create creditworthiness (training for project sponsors and interested financial institutions, risk structuring and coverage) and look for leverage, offering assistance (financial guarantee, subordinated debt) to bring down the risk of energy crops/agroforestry to a market-attractive level.

15) Donor finance should shift from conventional project finance to underwriting risk management instruments that enable local finance institutions to engage in active project lending. This could for instance be undertaken by the donor community catalyzing the utilization of innovative risk management schemes to facilitate commercial investment flow to energy crops/agroforestry sectors, especially with respect to energy crop-based projects. When governments with assistance from donors introduce risk management products for energy crops/agroforestry projects on the market, the market price of private project finance for energy crops/agroforestry decreases while the availability of domestic debt and equity capital for energy crops/agroforestry projects increases. Therefore, the use of modalities for providing financial assistance to energy crops/agroforestry investments, which strengthen the local capital markets -even if they offer few short-term advantages for energy crops/agroforestry-investments compared with conventional donor-assisted project finance- is recommended.

16) “Smart subsidies” should be implemented. Their characteristics include:

    a. Well-targeted with respect to the subsidy receiver (to prevent “free riders”)

    b. Supporting least cost options for service, i.e. no link to particular technologies

    c. Encouraging commercial participation by the private sector

    d. These should be applied to the front-end cost (similar to the government's construction of roads and bridges). Sustainability problems only arise when subsidies are given to consumption.

17) Different stages of the respective technology introduction cycle are needed in a different package of subsidy instruments:
    a. A “tax payer pays” based strategy is useful in the short term to get a development process started.
    b. The “electricity/heat/transport fuel consumer pays” strategy is the solution in the mid term, as tax based financing would become too expensive.
    c. However, each of these instruments need some built-in element of phasing out, to give an incentive that only long-run viable RE/energy crop/agroforestry is supported.
18) Based on a carbon price, use of a target subsidy to speed up the adoption of new clean technologies.
19) The “ideal” subsidy package depends on its political expediency, the scope and scale of potential energy crop/agroforestry supply in the country, and the power, heat and transport fuel market philosophy of the Government.

The following summary aims at giving an overall conclusion of this paper:

On a global basis, energy crop/agroforestry, especially, however, biofuels projects are financed through a number of sources including corporations, private equity, commodity traders, the stock market, investment banks, venture capitalists, plantation owners and agricultural processors. Alternative methods available to those who seek funding without relinquishing control can be derived from government grants, joint venture partnerships and R&D funds.

In the tight financial context (i.e. lacking funds / financial sector infrastructure) that prevails in most African countries and in particular in the arid and semi-arid areas of Africa, however, financing energy crop/agroforestry projects is much more challenging.

This paper concludes that the most relevant financing sources for energy crops- and agroforestry-based developments in arid and semi-arid areas in Africa are smart subsidies, corporate financing (FDI), R&D funds, joint venture partnerships, carbon credit financing and -if packaging the projects to international standards is possible- funding from mechanisms such as the GEF, the African Rural Enterprise Development (AREED, which operates in Mali, Ghana, Tanzania, Senegal and Zambia) or the Community Development Carbon Fund (CDCF, which can consider purchasing carbon from a variety of land use and forestry projects).

Furthermore, it is crucial to integrate financial risk management instruments into any holistic financing strategy for energy crops- and agroforestry-based developments in arid and semi-arid Africa. Getting political approval for using soft credits from donors to co-finance energy crop/agroforestry projects seems a realistic option. The effect of using soft credits to finance energy crop/agroforestry projects is that these may reduce their availability for other sectors in the country, but more often than not, the effect is that more soft credits are attracted to the host country, and less to others, thereby possibly contributing to the overall sustainable development of LDCs in arid and semi-arid regions in Africa. Wherever possible, local farmers in rural areas of arid and semi-arid Africa should be included in the process, however, these very often do not even have capabilities to irrigate or fertilise – an aspect that can be changed by introducing holistic financing strategies for energy crop/agroforestry developments.

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