Bio-Fueling Southern Africa:

A Sugarcane Bio-Ethanol Case Study in Malawi, Mozambique and Zambia

Enos Shumba, Allan Carlson, Harrison Kojwang and Mxolisi Sibanda

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BIO-FUELING SOUTHERN AFRICA: A SUGARCANE BIO-ETHANOL CASE STUDY IN MALAWI, MOZAMBIQUE AND ZAMBIA

Enos Shumba, Allan Carlson, Harrison Kojwang and Mxolisi Sibanda

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EXECUTIVE SUMMARY

European investors are actively seeking land for bio-fuel feedstock cultivation in Southern Africa. This is in response to a recent surge of interest in bio-fuels caused by high prices of imported fossil fuels, insecurity of supply and climate change concerns. The investments are seen as an emerging driver of habitat alternation and human displacement and might not yield the desired results of ensuring fuel security; promoting rural development and investment; reducing poverty; and creating employment if not properly guided and implemented. It is against this background that this case study was commissioned. Its objectives were to review bio-energy policies; assess bio-fuel production; and suggest ways for meaningful smallholder farmer participation in the bio-fuel business with emphasis on sugarcane based bio-ethanol production. The study was carried out in the Lower Shire in Malawi; Zambezi Delta in Mozambique; and Kafue Flats in Zambia.

Key findings and recommendations from the study are as follows:

Bio-fuel policies

Bio-fuel policies in the study countries have the following attributes:

- They are still evolving and their provisions are general statements on biomass energy, renewable energy or bio-fuels. They are not specific on strategies, institutional frameworks and supporting legislation for implementation; and,
- They are not harmonized with other sectoral policies that impact on bio-fuels development.

An enabling bio-fuels policy framework should have the following attributes:

- Articulate specific strategies that support various parts of the bio-fuels value chain. These include feedstock production; bio-fuels marketing; financing mechanisms; and incentives for the business;
- Ensure that related policies are complementary to and supportive of bio-fuel investments;
- Address issues of product quality and environmental/social standards;
- Ensure that local communities benefit from bio-fuel investments and that their land rights are recognized and respected; and,
- Prioritize capacity building of institutions involved in the bio-fuel business across the value chain.

Bio-fuel production

With the exception of sugarcane, there is limited technical information on the production of a variety of potential bio-fuel feedstocks. Only Malawi produces bio-ethanol and has developed national quality standards for the product.

The following recommendations are made on bio-fuel production:

- Relevant bodies should generate, collate and widely distribute technical information on the production and processing of various bio-fuel feedstocks. Some investment in agronomic research and development will be required for a number of potential feedstocks such as jatropha and sweet sorghum;
- Large sugar producing companies in Mozambique and Zambia should invest in bio-ethanol processing capacity for national level value addition and employment creation;
- In keeping with the emerging global nature of bio-fuels trade, study countries should adapt and adopt internationally recognized product quality and environmental/social standards; and,
- Developed countries should insist on bio-fuel products made from certified feedstock plantations and demand that their companies exercise responsible corporate social responsibility in the countries they operate.

Smallholder participation in the bio-ethanol business

For purposes of economies of scale and product quality monitoring, bio-ethanol production should be centralized within large companies. Smallholder farmers can then produce and provide feedstock to these companies through out-grower schemes as is currently the case in Malawi and Zambia. However, the out-growers face challenges such as limited land for expansion, lack of water rights and a monopolized market.

The following is recommended for out-grower schemes:

- A detailed study on the financial and economic viability of smallholder out-grower schemes should be carried out; and,
- Out-growers should be capacitated to negotiate favourable terms with large companies.

Way forward

A major limitation of the study was its focus on sugarcane based bio-ethanol production and little emphasis on other potential feedstocks. The following next steps are recommended on the basis of the study:

- Commission a comprehensive case study involving more countries and more potential feedstocks;
- Develop and implement a bio-fuels communication strategy;
- Facilitate the formulation of specific policies/strategies that support various components of the bio-fuels value chain; and,
- Establish a national core team consisting of key stakeholders in the bio-fuels value chain to spearhead the formulation of specific policies/strategies; and the implementation of the communication strategy.

INTRODUCTION

The miombo eco-region of Southern Africa covers eight countries namely: Botswana, Malawi, Mozambique, Namibia, South Africa, Tanzania, Zambia and Zimbabwe; stretches over 3.6 million km^2; and is home to 65 million people, the majority of whom are poor and depend on subsistence agriculture and natural resources for survival (WWF SARPO, 2001). Major sources of energy in the eco-region are wood fuel in the form of firewood and charcoal followed by electricity, petroleum and coal. The region is a net importer of energy in the form of fossil fuels. The introduction of bio-fuels is therefore seen as a way to reduce dependence on imported petroleum products; stabilize fuel prices; ensure fuel security; promote rural development and investment; reduce poverty and create employment (Chundama, 2008; Nhantumbo, 2008: Sibanda, 2008). In addition, bio-energy has assumed global significance as countries seek to meet their domestic energy needs from renewable fuels. With growing evidence of the impact of climate change and the demand for lesser emissions, some developed countries have committed to measurable levels of bio-fuel use by investing in bio-energy production in developing countries. The bulk of these investments will be in the production of liquid bio-fuels such as bio-ethanol and bio-diesel. Bio-ethanol is made from vegetable materials such as maize, sweet sorghum, sugarcane and cassava; and bio-diesel from oilseed crops like soyabean, groundnuts, sunflower and jatropha.

European investors are actively seeking land for bio-fuel crop cultivation in Southern Africa where agro-climatic conditions are suitable for the production of a wide range of feedstocks. Unfortunately, such investments are viewed as an emerging driver of habitat alteration and human displacement in the region. Mozambique has the highest number of projects planned for bio-fuel feedstock production largely because of a perceived availability of large tracts of idle land. Most of the projects focus on jatropha cultivation. For example, of the 60 000 ha of land allocated to Energem Resources Inc (a UK and Canadian company), 10 000 ha were to be put under a jatropha plantation by the end of 2008 and there were plans to establish a smallholder out-grower scheme adjacent to the plantation (Mughogho & Mafongoya, 2009). In addition, some existing sugar companies are expanding areas under sugarcane with a view to produce bio-ethanol from molasses currently used as livestock feed in Zambia and exported in Mozambique.

As is the case with any development initiative, the proposed bio-fuel investments might not yield the desired results if not properly guided and implemented. Of greater concern is the fact that bio-fuel policy and legal frameworks in the target countries are still evolving and weak. It is against this background that this case study was commissioned.

The study focused on bio-ethanol production from sugarcane, given the considerable experience that Southern Africa possesses in this area. Its objectives were to:

- Review current bio-energy policies;

- Assess bio-fuel production; and,
- Propose ways in which smallholder farmers can meaningfully participate in the bio-fuel business.

METHODOLOGY USED

The study was carried out in three sugar producing areas of Lower Shire in Malawi; Zambezi Delta in Mozambique; and Kafue Flats in Zambia. National consultants were engaged to undertake the study which consisted of literature reviews; key informant face to face or telephone interviews; and site visits. The World Wide Fund for Nature (WWF) Southern Africa Programme Office pulled together key findings and recommendations from the three national consultancy reports and produced this regional synthesis report. A regional meeting was convened to review and input into national consultancy and regional synthesis reports and to make recommendations on the way forward (Annex 1). The meeting was attended by relevant professionals and policy makers from the study countries.

The Swedish International Development Agency (SIDA), through WWF-Sweden, financially supported the study.

KEY FINDINGS

Bio-fuels policies

The role played by enabling government policies, legislation and regulations in developing a viable bio-fuels industry cannot be over-emphasized. This was vindicated by FAO who stated that "there is as yet no country in the world where a bio-fuels industry has grown to commercial scale without a clear policy or legislation in place to support the business" (FAO, 2008). The development of appropriate policies on bio-fuels in the study countries is still in its infancy as elaborated below.

Malawi

The Malawi government is committed to the production and utilization of cheap sources of fuel for transport. The National Energy policy of 2003 makes blending of petrol with bio-ethanol mandatory to the ratio of 80:20. A pilot project spearheaded by the Department of Science and Technology and Lilongwe Technical College is assessing the capacity of vehicles to accommodate a higher blend ratio or to be wholly powered by bio-ethanol (Mughogho & Mafongoya 2009 & Sibanda, 2008)

Figure1. A blend fuel truck at a station in Malawi

The country's Growth and Development Strategy of 2006-2011 and the Agriculture Development Programme of 2007-2011 have no provisions or strategies for the bio-fuels sector. However, a bio-fuels policy is now being developed (Mughogho & Mafongoya, 2009).

Malawi's land policy clarifies and strengthens customary land rights and formalizes the role of traditional authorities in the administration of customary land that covers 80% of the country. The policy provides for customary land to be registered and protected against arbitrary conversion to public land; and encourages customary landholders to register their holdings as private customary estates. In practice, government can still lease out the land to private investors regarded as strategic and good for the country (Ikdahl et al, 2005). In addition, the country's high population density of about 136 people per km^2 makes it difficult to exercise land rights enshrined in the policy as most of the land is highly contested and there is little to share (Sibanda, 2008).

Mozambique

The Energy policy of 1998 and the National Strategy on Energy of 2000 have no specific objectives on bio-fuel development although this is implied in the objective "to promote sources of renewable energy products" in the National Strategy on Energy (Nhantumbo, 2008). In addition, government has published a sectoral policy document on "Mozambique position and experience on bio-fuels". The document describes approaches, policies and strategies for the development of a bio-fuels industry. Two main provisions in the document are the cultivation of bio-fuel feedstocks on currently idle land and a gradual introduction of the blending of petrol with bio-ethanol and of fossil diesel with bio-diesel at 5-10%.

The huge push for bio-fuel investments in Mozambique has been partly due to the preferential treatment enjoyed by the country in some international markets. This has led to conflicts over land use between local communities and large scale bi-fuel investors as government transfers land from communities to the latter in contravention of existing land, forestry, wildlife, water and environmental policies and legislation. The absence of a national land use planning policy and a comprehensive zoning strategy led to "situation driven actions'-such as zoning of land for reforestation or for bio-fuel feedstock production or coastal tourism-that are not comprehensive; do not take into account the long term interests of the country; and threaten community land rights and livelihoods. These dilemmas and conflicts between existing community land rights and "superior" rights of investors for bio-fuel production and other economic activities reflect some of the inefficiencies and gaps in policy formulation (Nhantumbo, 2008). It is against this background that government has adopted a cautionary approach to bio-fuel investment. In this regard, land allocation for feedstock production was suspended pending the finalization and approval of a bio-fuels policy and a land zoning exercise.

The Ministry of Agriculture is carrying out a zoning plan that defines areas available for bio-fuel feedstock cultivation. A recently completed national land zoning study (at a very small scale of 1:1 000 000) showed that the country only has 7 million ha of land available for bio-fuel feedstock production and other economic activities. This implies that most of Mozambique's land has owners although it might not be currently utilized. This opens opportunities for land speculation by those who own it (Nhantumbo, 2008).

Zambia

The Zambian government is keen to establish a bio-fuels industry to: reduce dependence on imported petroleum products and ensure fuel security; promote rural development; and reduce poverty (GRZ, 2007). This will be partly achieved by blending bio-ethanol with petrol to 10% and bio-diesel with fossil diesel to 5% by 2011 (Chundama, 2008).

The revised National Energy Policy recognizes the potential role of renewable energy sources in the energy balance of Zambia. It also identifies sugarcane, sweet sorghum and jatropha as priority crops for bio-fuel production and the need to support smallholder farmers to cultivate them. The contribution of bio-fuels will, however, largely depend on what happens to the agricultural sector whose policy emphasizes food security, poverty reduction and the promotion of cash crops.

The Bio-fuels Association of Zambia (that includes private sector representatives) was established in 2006 to promote a bio-fuels industry. The Association played a key role in drafting a Bio-fuels Development Framework that contributed to the incorporation of bio-fuels into the revised National Energy Policy. The Association participated in the development of the revised National Energy Policy and the formulation of a Bio-fuels development framework.

Bio-fuel production

This section focuses on sugarcane based bio-ethanol production although reference is made to other bio-fuels.

Figure2. Bio-fuel plantation

Malawi

Illovo Sugar Malawi Ltd owns two sugarcane estates and produces 76% of Malawi's sugar (Sibanda, 2008). It subscribes to principles of sustainable development and environmental sustainability and prioritizes the welfare of its employees and neighbouring communities. The company supports Kasinthula Cane Growers Ltd (KCGL), a company owned by smallholder sugarcane out-growers. These efforts qualified the company for inclusion in the Johannesburg Stock Exchange's (JSE) Socially Responsible Investment (SRI) Index.

Malawi has a long history of investment in bio-fuel production. Ethanol Company Ltd was established in 1982 to produce ethanol from molasses for blending with petrol at 10%. Another company, Prescane, was formed for the same purpose in 2004. The two entities have a combined bio-ethanol capacity of 17.8 million litres per annum (Masina, 2008). The country consumes 9 million litres of bio-ethanol annually and exports the surplus to Tanzania, Mozambique, Uganda, Kenya, South Africa and Europe.

The Malawi Bureau of Standards developed national technical product standards for bio-ethanol based on the Brazilian ones. It has also published a draft proposal for bio-diesel product quality standards for review by stakeholders (Mughogho & Mafongoya, 2009).

Mozambique

Some 28 companies have expressed interest in producing bio-fuels. They include sugar companies that intend to diversify their product range and explore opportunities offered by the bio-fuels market. The country is not producing bio-ethanol at the moment. Molasses and bagasse from sugar production is exported.

There has been some investment in jatropha feedstock production in the country. This is leading to land clearing, changes in land use and biodiversity loss. The footprints will become more significant as more land is planted (e.g. Procana requested 30 000ha and SEKAB 150 000ha).

Figure 3 Jatropha curcas fruit

There is limited technical information on the production and processing of bio-fuel feedstocks other than sugarcane in the country. However, a number of institutions are working on feedstock production technologies (e.g. cassava improvement; and jatropha pest and disease management); and processing research (e.g. blending bio-ethanol with fossil fuels; and testing small scale processing equipment). In addition, the country is running a coconut oil based bio-diesel project (Mughogho & Mafongoya, 2009)

Zambia

Only 14% of the country's 42 million ha of suitable arable land is cultivated. This offers an opportunity to produce bio-fuel feedstock without adversely competing with existing cropping systems. The University of Zambia is carrying out research on sweet sorghum and the National Institute of Scientific and Industrial Research is doing the same on jatropha. Private sector entities such as D1 Oils and Oval Oils are testing various feed stocks and vegetable oils and setting up feedstock plantations through various arrangements (Chundama, 2008).

Zambia produces sugar in excess of domestic requirements. All the molasses is used for livestock feed. Over 17 000 ha is under sugarcane in the Kafue Flats where Zambia Sugar Plc and Consolidated Farms are the largest producers. Plans are underway to increase production by 70% (Chundama, 2008). The country has developed product quality standards for bio-ethanol.

Smallholder participation in the bio-ethanol business

The involvement of smallholder farmers in bio-ethanol production in the three study countries is confined to sugarcane feedstock production through out-grower schemes. Under this arrangement, farmers enter into a formal relationship with a large private sugar producer. The latter provides key inputs such as planting stock, fertilizer, chemicals, quality control, technical advice and a market for the feedstock as elaborated below.

Malawi

Kasinthula Cane Growers Ltd (KCGL) represents a model for smallholder farmer participation in sugarcane production in Malawi. It was established as a smallholder out-grower scheme to Illovo Sugar Malawi Ltd in 1997. Its membership has increased from 103 to 282. The company was started by government and utilizes customary land given to members by the Chief. It operates as a private limited company on behalf of out-growers. Each out-grower cultivates 3 ha of land (2.5 ha sugarcane and 0.5 ha other crops including a staple food). Illovo provides technical advise and inputs such as fertilizer, chemicals and irrigation water to KCGL. Costs for the services are deducted when farmers sell their sugarcane. In 2002 KCGL was certified to Fair Trade as a natural sugar producer. This helps it to sell sugar to Belgium, Germany, Norway, USA and UK at a premium. Out-growers receive an average annual income of $489. However, the scheme is struggling to repay money borrowed to set it up.

Mozambique

The involvement of smallholder farmers in bio-energy feedstock production and processing is not yet evident in Mozambique. Studies commissioned by government recommend that smallholder farmers be supported to participate in this important area. In addition, an analysis of smallholder farmer involvement in sugarcane production showed that out-grower schemes can deliver socio-economic benefits to local people when linked to product buyers and if out-growers are able to negotiate favourable terms for their feedstock (Nhantumbo, 2008).

Zambia

Commercial sugarcane production in Zambia's Mazabuka district in the Kafue Flats is carried out by large scale commercial growers and smallholder out-growers. District bye-laws prohibit smallholder farmers from growing and marketing the crop outside established out-grower schemes. The Kaleya Smallholder Company Limited (KASCOL) is an example of such schemes. It was established as a smallholder out-grower scheme for Zambia Sugar Company Ltd in 1985. It has 300 smallholder farmers with an average of 6.5 ha of land dedicated to sugarcane production. The land is leased by KASCOL and farmers have no ownership claims over it. The company purchases sugarcane in bulk and provides credit, business services, technical advice and cost sharing for machinery. The Mazabuka Sugarcane Growers Trust owns 25% of shares in KASCOL and the out-growers receive $2 500-$3 500/ha/year.

CONCLUSIONS AND RECOMMENDATIONS

Bio-fuel policies

The following observations can be made from the policy review:

- Bio-fuels policies are still evolving and their provisions are general statements on biomass energy, renewable energy or bio-fuels. They are not specific on strategies, institutional frameworks and supporting legislation for policy implementation; and,
- The policies are not harmonized with other sectoral policies that impact on bio-fuel development.

An enabling bio-fuels policy should have the following attributes:

- Articulate specific strategies that support various parts of the bio-fuels value chain. They include feedstock production; bio-fuels marketing; financing mechanisms; and incentives for the bio-fuel business;
- Ensure that related policies are complementary to and supportive of bio-fuels in order to attract new investment and provide guidance on where it should take place. This entails the involvement of all key

stakeholders in bio-fuel policy/strategy formulation and implementation. They include the energy, agriculture, engineering and community development sectors;

- Address issues of product quality and environmental/social standards;
- Ensure that local communities benefit from bio-fuel investments and that their land rights are recognized and respected; and,
- Prioritize capacity building of institutions involved in bio-fuel initiatives across the value chain.

Bio-fuel production

With the exception of sugarcane, there is limited technical information on the production and processing of potential bio-fuel feedstocks. Some of the available technical and technological information is not easily shared among investors and other stakeholders due to fears of releasing information to the competition.

Of the three study countries, only Malawi and Zambia have national product quality standards for bio-ethanol.

The following recommendations are made on bio-fuel production:

- Relevant bodies should generate, collate and widely distribute technical information on: areas available for the production of feedstocks; and feedstock production and processing. Substantial investments in agronomic research and development will be required for feedstocks such as jatropha and sweet sorghum that have not been extensively researched within the region. On the other hand, information on bio-fuel processing technologies and equipment can be accessed from international and regional trade or business journals and the internet;
- Large sugar companies in Mozambique and Zambia should invest in bio-ethanol processing capacity for purposes of national level value addition and employment creation;
- In keeping with an emerging global trend in bio-fuel trade, study countries should adapt and adopt internationally recognized product quality and environmental standards in consultation with relevant stakeholders such as product markets and the Roundtable on Sustainable Bio-fuels; and,
- Market links that promote responsible bio-fuel production should be developed. In this regard, producer countries and companies should recognize market opportunities that will develop if they are able to export bio-fuels produced in an environmentally and socially sound manner. This will have to be complimented by strategies on how to encourage consumers in developed countries to insist on buying bio-fuel products made from certified feedstock plantations and demand that their companies exercise responsible corporate social responsibility in the countries they operate.

Smallholder participation in the bio-ethanol business

For purposes of economies of scale and product quality monitoring, bio-fuel production should be centralized within large sugar producing companies. This makes out-grower schemes an effective model for producing

feedstock for such companies. However, some out-grower schemes face a number of challenges that include limited land for expansion; lack of water rights; and a monopolized market.

The following recommendations are made on out-grower schemes:

- A detailed study on the financial and economic viability of smallholder out-grower schemes should be undertaken. Apart from providing guidelines on improving the effectiveness of such schemes, the study will inform policy/strategy development on bio-fuel investment and smallholder farmer participation; and;
- Out-growers should be capacitated to negotiate favourable terms with large companies.

LIMITATIONS OF THE STUDY AND WAY FORWARD

A major limitation of the study is that it only focused on sugarcane based bio-ethanol production. Among the implications of this are that:

- The bio-fuel versus food production versus environment debate could not be substantiated. This is because sugarcane cultivation has been part and parcel of cropping systems of the countries for a long time. It has also been used a raw material for sugar with molasses and bio-ethanol being bye-products; and,
- Production technologies and minimum production areas for various bio-fuel feedstocks could not be established as they fell outside the terms of reference of the study.

The following steps should be taken in order to move the bio-fuels agenda forward:

- Commission a comprehensive case study that covers more countries and potential feedstocks;
- Develop a bio-fuels Communication Strategy that targets member states; regional bodies such as the Southern African Development Community (SADC) and the Common Market for Eastern and Southern Africa (COMESA); and export markets based on Case Study results;
- Implement the bio-fuels Communication Strategy at various levels. For example, targeted awareness and educational programmes could be undertaken in specific areas where bio-fuel investments are expected;
- Facilitate the completion/development of detailed national and regional bio-fuel policies and strategies as a joint effort by all key stakeholders in the value chain; and,
- Establish a core national team of 3-4 technical/policy experts from key sectors such as energy, agriculture, engineering and social science to spearhead bio-fuel policy/strategy formulation; implementation of a national communication strategy; and information exchange with other countries within the region.

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ANNEXURE 1: Outcomes of Regional Meeting on the Sugarcane-Ethanol Case Study

Introduction

The World Wide Fund for Nature (WWF) Southern Africa Regional Programme Office is working on bio-fuels in a number of Southern African countries. In 2008, it commissioned a study on sugarcane-ethanol production in Malawi, Mozambique and Zambia. The study came up with interesting results in areas of policy; feedstock production and supply; technology and processing equipment and capacity; product quality and environmental/social standards; and the impact of bio-fuels on the landscape, food availability and the wellbeing of smallholder farmers. The findings are captured in national consultancy and regional synthesis reports currently being finalized.

A regional workshop consisting of 13 participants from the three study countries and WWF was convened in January 2009 (Appendix 1). Its objectives were to:

- Review and input into the national consultancy and regional synthesis reports before their finalization; and,
- Make recommendations on the way forward.

Outcomes

Outcomes of the meeting were grouped into immediate follow up actions; and specific recommendations at various levels.

Immediate follow up actions

Information dissemination

The following actions were proposed:

- Final versions of the national consultancy and regional synthesis reports should be sent to participants electronically and be posted on the WWF website;
- Glossy hard copies of the regional synthesis report should be produced and widely distributed;
- A communication strategy should be produced based on the national consultancy and regional synthesis reports; and,
- A communication strategy should be implemented at country level.

Networking/information sharing on bio-fuels

The following was proposed:

- Three contact persons on bio-fuels should be identified from relevant sectors such as energy, agriculture, environment and community development in each country. The individuals should form the nucleus for networking at national and regional levels;
- Regional workshops and "look and learn " tours on topical issues should be facilitated for the contact persons; and,
- A regional bio-fuels newsletter should be established.

Specific recommendations

The following recommendations were made at national, regional and international partner levels.

National governments

National governments should:

- Not lose sight of the justification for bio-fuel investment. This includes energy security; rural development; job creation; poverty alleviation; and climate change mitigation;
- Recognize that bio-fuel production entails substantial investment in research and development in some cases;
- Recognize the cross cutting nature of bio-fuels and champion the participation of relevant actors (including the private sector) in the formulation and implementation of relevant policies and initiatives;
- Recognize the importance of establishing national product and environmental/social standards on bio-fuels; and,
- Encourage and facilitate the establishment of local level bio-fuel processing.

Regional bodies

Regional bodies such as SADC and COMESA should:

- Facilitate the establishment and population of a regional database on bio-fuels;
- Encourage and actively champion the creation of a conducive environment for bio-fuel investments by regional and international partners; and,
- Encourage the establishment of regional product and environmental/social standards on bio-fuels.

International partners/markets

International partners/markets should:

- Insist on buying bio-fuels produced from certified feedstock plantations; and,
- Insist that their companies practice good and fair corporate social responsibility in the countries they operate.

Appendix 1: Participants to the Regional Sugarcane Ethanol Meeting

Country/participant	Organization	Position	E-mail address
Malawi			
Freeman Kalilani	Lilongwe Technical College	Deputy Principal	fgkalilani@gmail.com
Stella Gama	Dept. of Forestry	Assistant Director	stellagama@ifmslp.org
Mozambique			
Luis Dinis	LUPA-NGO	Executive Director	dinis.lupa@tvcabo.co.mz
Ines Chalufo	Min. of Energy	Officer	iec@me.gov.mz
Carla Cuambe	Min. of Agriculture	Head of Dept	carlacuambe@hotmail.com
Zambia			
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