



***International Workshop***

***'Bioenergy Policies  
for Sustainable Development in Africa'***

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

***25-27 November 2008, Bamako, Mali***

# **Proceedings**

***December 2008***



COMPETE is co-funded by the European Commission in the 6<sup>th</sup> Framework Programme – Specific Measures in Support of International Cooperation (INCO-CT-2006-032448).

### **Workshop Objectives**

The main objective of this workshop was to contribute to the development of sound and successful bioenergy policies in Africa. For this, it is necessary to share the findings of on-going policy initiatives in Africa and to discuss future developments with high-level decision-makers from Africa with the aim to promote the development of bioenergy policies in Africa.

This international workshop was organised by Mali-Folkecenter and WIP Renewable Energies, Germany, in cooperation with the Food Agriculture and Natural Resources Policy Analysis Network (FANRPAN), South Africa, in the framework of the project COMPETE, funded by the European Commission, DG Research.

Furthermore, this workshop was implemented in close cooperation with the United Nations Environment Programme (UNEP), and the Roundtable on Sustainable Biofuels (RSB), an initiative of the EPFL Energy Centre.

The presentations held at this workshop are available at the COMPETE project website: [http://www.compete-bioafrica.net/events/events2/mali/presentations\\_conference.html](http://www.compete-bioafrica.net/events/events2/mali/presentations_conference.html).

### **Conference Organisation**

Dr. Ibrahim Togola, Mali-Folkecenter ([ibrahim.togola@malifolkecenter.org](mailto:ibrahim.togola@malifolkecenter.org))

Dr. Rainer Janssen, WIP, Germany ([rainer.janssen@wip-munich.de](mailto:rainer.janssen@wip-munich.de))

Ms. Khamarunga Banda, FANRPAN, South Africa ([khamarunga@hotmail.com](mailto:khamarunga@hotmail.com))

Mr. Ousmane Ouattara, Mali-Folkecenter ([ousmane.ouattara@malifolkecenter.org](mailto:ousmane.ouattara@malifolkecenter.org))

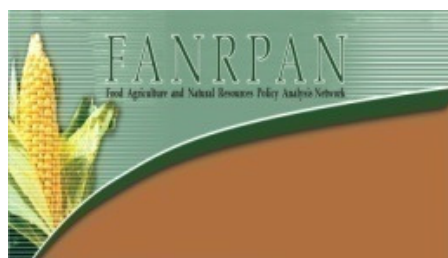
Mr. Pierre Dembele, Mali-Folkecenter ([pierre.dembele@malifolkecenter.org](mailto:pierre.dembele@malifolkecenter.org))

Ms. Fabienne Clombe, Mali-Folkecenter ([fabienne.clombe@malifolkecenter.org](mailto:fabienne.clombe@malifolkecenter.org))

### **Conference Proceedings - Editors**

Dr. Rainer Janssen, WIP, Germany ([rainer.janssen@wip-munich.de](mailto:rainer.janssen@wip-munich.de))

Mr. Dominik Rutz, WIP, Germany ([dominik.rutz@wip-munich.de](mailto:dominik.rutz@wip-munich.de))



## **Workshop Summary**

The COMPETE Workshop on 'Bioenergy Policies for Sustainable Development in Africa' took place in Bamako, Mali, on 25 – 27 November 2008. This international workshop was organised by Mali-Folkecenter and WIP Renewable Energies, Germany, in cooperation with the Food Agriculture and Natural Resources Policy Analysis Network (FANRPAN), South Africa.

The objective of the COMPETE Competence Platform on Energy Crop and Agroforestry Systems was to stimulate sustainable bioenergy implementation in Africa. In order to reach this aim, COMPETE has established a platform for policy dialogue and capacity building involving key stakeholders throughout the bioenergy provision and supply chains.

The main aim of this workshop was to contribute to the development of sound and successful bioenergy policies in Africa. Thereby, it is widely accepted that coherent bioenergy policies in Africa are urgently needed on national, regional and international level to:

- **Exploit the benefits of innovative bioenergy solutions** with respect to sustainable rural development and improved livelihoods, increased energy access and income generation, alternative markets for agricultural products, security of energy supply, and diversification of energy sources
- **Avoid the dangers of negative social and environmental implications**, with regards to land competition, land ownership, insufficient value creation for local farmers, and the 'fuel versus food' debate.

The COMPETE Workshop on 'Bioenergy Policies for Sustainable Development in Africa' on 25 – 27 November 2008 in Bamako, Mali, brought together more than 80 high-level participants including decision makers from several African countries, representatives from the Private Sector, NGOs, the donor community, FAO, UNEP, international initiatives (e.g. RSB) as well as national and international energy experts and stakeholders.

The importance of the COMPETE workshop in Mali was highlighted by the **official opening address by the Minister of Agriculture**. H.E. Prof. Tiemoko Sangare emphasised the opportunities provided by bioenergy and biofuels for economic development in Mali. The Government of Mali is supporting initiatives for planting and industrialisation of energy crops such as Jatropha since several decades to contribute to rural development, security of energy supply, and the reduction of GHG emissions. However, H.E. Prof. Sangare underlined the importance of ensuring the sustainable exploitation of biomass resources. Bioenergy production must not compromise the food supply of the population in Mali, and therefore it is currently discussed on Government level in Mali to only use such land for energy production which is not suitable for food production.

Furthermore, it was highly acknowledged that a **high-level delegation from Tchad** participated in the COMPETE workshop headed by Mme Khadidja Abdelkader, State Secretary in the Ministry of Agriculture responsible for Food Security. The delegation from Tchad included representatives from Government departments, research institutes, industry, farmer organisations, and NGOs. H.E. Mme Abdelkader emphasised the interest

of the Government of Tchad to support sustainable renewable energy resources to address the current challenges of poverty reduction, achievement of the MDG, and energy security in Tchad without creating conflicts with food supply.

On the occasion of the COMPETE Workshop on 'Bioenergy Policies for Sustainable Development in Africa' an informal **cooperation agreement between the Governments of Mali and Tchad** on the promotion of energy crops for rural economic development was launched.

On 27 November 2008 the COMPETE workshop included the **OFFICIAL OPENING CEREMONY** of the Garalo Bagani Yelen Jatropha-fuelled Rural Electrification Project for 10.000 People in the Municipality of Garalo. This successful rural electrification project was presented in detail in the COMPETE Newsletter Issue No. 3 (July 2008).

The opening ceremony which was attended by the majority of the inhabitants of Garalo presented addresses of the Mayor of Garalo, the President of Mali-Folkecenter, representatives of the Dutch foundations DOEN and FACT, the Ambassador of the Netherlands, and the **Minister of Energy from Mali, Honorable Mr. Mamadou Igor Diarra**. A guided tour through the installations of the electrification project was organised for the Malian Ministers of Energy and Agriculture.

Finally, H.E. Prof. Sangare, officially launched the renovation of a **Rural Training Centre** in the village of Garalo. Thereby, it was stated that capacity building for farmers is of utmost importance in rural areas of Mali in order to promote agricultural and technical expertise in the field of improved crop management systems.

In summary, the COMPETE Workshop on 'Bioenergy Policies for Sustainable Development in Africa' in Mali succeeded in mobilising high-level policymakers to promote the sustainable exploitation of bioenergy in Africa. It is thereby acknowledged that the development of coherent, harmonised and effective bioenergy policies and implementation strategies are urgently needed in African countries.



From left: Dr. Ibrahim Togola (MFC), Dr. Rainer Janssen (COMPETE Coordinator), Mme Khadidja Abdelkader (Tchad State Secretary in the Ministry of Agriculture), H.E. Prof. Tiemoko Sangare (Minister of Agriculture), Annie Sugrue (RSB)

## **Workshop Programme**

### **TUESDAY 25<sup>th</sup> NOVEMBER 2008**

08:00 – 09:00 Workshop Registration

#### **Opening Session**

09:00 – 09:10	Welcome Address by the Host Organisation Dr. Ibrahim Togola, Mali-Folkecenter	10
09:10 – 09:40	Official Opening Addresses Representative from Mali Government, Ministry of Energy, Representative from Mali Government, Ministry of Agriculture	11
09:50 – 10:00	The EC Project COMPETE – Activities and Results Dr. Rainer Janssen, COMPETE Project Co-ordinator, WIP, Germany	13
09:40 – 09:50	Welcome Address by the Round Table on Sustainable Biofuels Annie Sugrue, Round Table on Sustainable Biofuels (RSB)	15
10:00 – 10:30	Coffee Break	

#### **Session 1: Bioenergy Policies and Strategies in Africa**

Chairs: National Director of Energy and Stanford Mwakasonda, University of Cape Town - ERC

10:30 – 10:50	Bioenergy Policies in Mali – Issues of Energy Supply and Energy Security Mr. Sinalou Diwara, Direction of Energy	16
10:50 – 11:10	Bioenergy Policies in Mali – Agriculture and Land Use Issues Mr. Dalla Diarisso, Direction of Agriculture	23
11:10 – 11:30	Bioenergy Policies in Mali – Environmental Issues Mr. Kouloutan Coulibaly, Direction of Nature Conservation	24
11:30 – 11:50	COMESA Strategies in the field of Biomass and Bioenergy Dr. Angel Daka, COMESA Coordinator CAADP Pillar 3, Zambia	28
11:50 – 12:10	Bioenergy Policies in Tanzania Estomih Sawe, TaTEDO, Tanzania	33
Additional Paper	Bioenergy for Rural Development – Lessons from West Africa Mamadou Dianka, Coordinator PRBE-UEMOA, Burkina Faso	37
12:10 – 12:45	Discussion	
12:45 – 14:00	Lunch Break	

## **Session 2: Bioenergy Initiatives for Sustainable Rural Development in Africa**

Chairs: National Director of Agriculture and Dr. Rocio Diaz, Imperial College, UK

14:00 – 14:20	Jatropha-fuelled Rural Electrification Project in the Village of Garalo – Case Study implemented within the Mali World Bank Programme Ismaïl Touré, Chairman of AMADER (Malian Agency for the Development of Domestic Energy & Rural Electrification), Mali	41
14:20 – 14:40	Jatropha Network Activities in Mali Mr. Ousmane Ouattara, Mali-Folkecenter	45
14:40 – 15:00	Experiences of the Union of Jatropha Cooperatives in Koulikoro Dr. Mamadou Sangare, Union of Jatropha Cooperatives, Mali	48
Additional Paper	Case Study of Successful Commercial Jatropha Plantation in Ghana Ohene Akoto, Jatropha Africa, Ghana	51
15:00 – 15:20	Discussion Round on 'Financing Sustainable Biofuel Projects in Africa'	
15:20 – 15:50	Coffee Break	

## **Session 3: The Trade-offs of Bioenergy in Africa – Ensuring Sustainability**

Chairs: General Director of Mali Biocarburants and Touria Dafrallah, ENDA, Senegal

15:50 – 16:10	Biofuels in Africa – The Land Use Issue Dr. Helen Watson, University of KwaZulu-Natal, South Africa	56
16:10 – 16:30	Ensuring the Environmental Sustainability of Jatropha Production and Use Dr. Guido Reinhardt, IFEU Institute, Germany	63
16:30 – 16:50	Lessons learnt from Bioenergy Projects in Africa (Mali, Honduras, Mozambique) Winfried Rijssenbeek, FACT Foundation, The Netherlands	67
16:50 – 17:10	Bioenergy and Development in Sub-Saharan Africa: Are the Policies Conducive? Dr. Charles Jumbe, FANRPAN, South Africa	72
17:10 – 17:30	FAO 'State of Food and Agriculture Report 2008': Biofuels – Prospects, Risks and Opportunities Astrid Agostini, UN Food and Agriculture Organisation (FAO)	75
17:30 – 18:00	Discussion Round on 'Ensuring Sustainability'	

## **WEDNESDAY 26<sup>th</sup> NOVEMBER 2008**

### **Round Table 1 (08:30 – 10:00)**

#### **Bioenergy Policy Development for Africa – The COMPETE Declaration on Sustainable Bioenergy for Africa**

**79**

08:30 – 09:45      Round Table Discussion

Chair: Ismaïl Touré, Chairman of AMADER, Mali and Dr. Rainer Janssen, WIP, Germany

Rapporteur: Dr. Ibrahim Togola, Mali-Folkecenter

Panellists:

- Mr. Hamata Ag Hautafaye, Ministry of Energy, Mali
- Mr. Mamadou Sangare, Union of Jatropha Cooperatives, Mali
- Dr. Angel Daka, COMESA, Zambia
- Dr. Rocio Diaz, Imperial College, United Kingdom
- Dr. Veronika Dornburg, Utrecht University, The Netherlands

09:45 – 10:00      Conclusions Round Table 1

10:00 – 10:30      Coffee Break

**14:00 – 14:30      Address of the Minister of Agriculture, Mali**

## **Regional Consultation West Africa – Round Table on Sustainable Biofuels (10:30 – 18:00)**

81

**10:30 – 10:45**      **Welcome**

**10:45 – 11:30**      **The Need for an International Standard**

- Introduction to the Roundtable on Sustainable Biofuels and introduction of the principles and criteria as defined through the consultative process
- The Experience of multi-stakeholder standardization projects

**11:30 – 13:00**      **Break-out Session: Criteria for Environmental Performance**

In smaller groups, draft criteria related to environmental sustainability of biofuels will be discussed. Main topics include:

- Protection of High Conservation Value areas (biodiversity, ecosystem services...)
- Sustainable management of water and soil
- Greenhouse Gas balance
- Impacts of land use change (direct and indirect) on biodiversity and GHG balance
- Biotechnologies

**13:00 – 14:00**      **Lunch Break**

**14:30 – 15:30**      **Break-out Session: Criteria for Social Performance**

In smaller groups, draft criteria related to social impacts of biofuels will be discussed. Main topics include:

- Community consultation
- Labor and land rights
- Rural development
- Food security

**15:30 – 17:00**      **Break-out Session: Implementation**

In smaller groups, issues related to implementation will be discussed, e.g. barriers to implementing sustainability criteria, the roles of various actors in the supply chain, the way to implement sustainability on small scale production.

**17:00 – 17:30**      **Report back, discussion, summary**

**17:30 – 18:00**      **Perspectives and Outlook**

### **Closure of COMPETE Workshop and RSB Regional Consultation**

**18:00 – 18:30**      Dr. Ibrahim Togola, Mali Folkecenter  
Dr. Rainer Janssen, COMPETE Project Co-ordinator, WIP, Germany  
Sebastien Haye, Round Table on Sustainable Biofuels (EPFL)



## THURSDAY 27<sup>th</sup> NOVEMBER 2008

### OFFICIAL OPENING CEREMONY of the Garalo Bagani Yelen Jatropha-fuelled Rural Electrification Project for 10.000 People in the Municipality of Garalo

90

- 07:00 – 10:00      Transport of Participants from Bamako to Garalo
- 10:30                Official Arrival of Honorary Guests: Minister of Energy, Minister of Agriculture, Ambassador of The Netherlands
- 10:40 – 10:45      Welcome Address of the Mayor of Garalo
- 10:45 – 10:50      Welcome Address of Dr. Ibrahim Togola, President MFC Nyetaa
- 10:50 – 10:55      Welcome Address of Jeff Prins, DOEN Foundation, Netherlands
- 10:55 – 11:00      Welcome Address of Winfried Rijssenbeek, FACT Foundation, Netherlands
- 11:00 – 11:10      Welcome Address of the Ambassador of The Netherlands, HE Madam Ellen Van Der Laan
- 11:10 – 11:20      Welcome Address of the Minister of Energy of the Republic of Mali, HE Mr. Mamadou Igor Diarra
- 11:20 – 12:00      Guided Visit of the Installations of the Project Garalo Bagani Yelen  
Jatropha oil press and filtering system, presented by Tom Burrel, MFC  
Electricity production unit, presented by Aliou Tounkara  
Electricity tariff system and invoicing, presented by Anasa Maiga, ACCESS  
Research on Jatropha varieties, presented by Mory Konate, MFC
- 12:00 – 13:30      Official Launch of the Renovation of the Rural Training Centre (Centre d'Animation Rural – CAR) by the Minister of Agriculture of the Republic of Mali, HE Prof. Tiemoko Sangare
- Intervention by the Mayor of Garalo
- Intervention by Dr. Ibrahim Togola, President MFC Nyetaa
- Intervention by Dr. Rainer Janssen, COMPETE Coordinator
- Intervention by the Minister of Agriculture HE Prof. Tiemoko Sangare
- 13:30 – 15:30      Visit to Jatropha Plantations
- 15:30 – 16:30      Official Closing of the Ceremony
- Theatre play performed by the Youth of Garalo presenting "Garalo before and after the implementation of the rural electrification project"

**TUESDAY 25<sup>th</sup> November 2008**

**Opening Session**  
**Bioenergy Policies for Sustainable Developments in Africa**

***Welcome Address by the Host Organisation***

**Dr. Ibrahim Togola, Director Mali-Folkecenter**

Dr. Ibrahim Togola cordially welcomed all workshop participants on behalf of the organisers of the COMPETE Workshop on 'Bioenergy Policies for Sustainable Development in Africa' in Bamako, Mali, namely Mali-Folkecenter, WIP Renewable Energies, Germany, and the Food Agriculture and Natural Resources Policy Analysis Network (FANRPAN), South Africa.

He appreciated the close cooperation for the organisation of the workshop with the United Nations Environment Programme (UNEP) and the Roundtable on Sustainable Biofuels (RSB).

He highlighted that bioenergy today is the main source of energy for the population of Mali, and that the sustainable development of modern bioenergy systems may significantly contribute to the future economic development of the country.

Dr. Togola wished all participants fruitful discussions and a pleasant stay in Bamako.



Participants of the COMPETE Workshop on 'Bioenergy Policies for Sustainable Development in Africa' in Bamako

## **TUESDAY 25<sup>th</sup> November 2008**

### **Opening Session Bioenergy Policies for Sustainable Developments in Africa**

#### ***Opening Address***

**Hon. Prof. Lamissa Diabate, Secretary General, Ministry of Energy, Mines and Water**

**EXCELLENCE MONSIEUR LE MINISTRE DE L'AGRICULTURE;**

**EXCELLENCES MESSIEURS LES AMBASSADEURS;**

**MONSIEUR LE REPRESENTANT DE L'UNION EUROPEENNE;**

**HONORABLES INVITES.**

A tous ceux qui nous ont fait l'honneur de quitter leurs foyers pour prendre part au présent Atelier consacré aux Bioénergies, je souhaite la bienvenue cordiale et un bon séjour, chez vous à Bamako.

**MESDAMES ET MESSIEURS,**

Les fluctuations du prix du pétrole sur le marché international sont de nature à compromettre dangereusement les politiques de développement socio-économiques de nos Pays.

Dans ce contexte, il importe d'explorer la valorisation et l'utilisation des Bioénergies, notamment les Biocarburants et la transformation en énergie des déchets agricoles, industriels et domestiques.

Les résultats des différentes études menées dans le monde permettent d'espérer que la filière des Biocarburants peut alléger la facture pétrolière du monde. En effet, si dans un passé récent, les Biocarburants n'étaient pas compétitifs par rapport aux hydrocarbures, la situation mondiale vécue ces derniers temps, incite à prendre en considération le potentiel mondial en Bioénergies actuellement très insuffisamment mis en valeur.

Déjà, les nations occidentales, en dépit de leurs capacités financières confortables leur permettant d'avoir un approvisionnement sécurisé en hydrocarbures, mettent de plus en plus en place des politiques volontaristes de développement des Bioénergies.

A l'instar de l'Occident, de l'Amérique Latine et de l'Asie, l'Afrique aussi s'est lancée dans le développement tous azimuts des Bioénergies, particulièrement les biocarburants, pour stimuler son développement économique.

**MESDAMES ET MESSIEURS ,**

Comme vous le savez tous, les bioénergies sont aujourd'hui, au centre des débats, car ils sont au cœur d'enjeux écologiques et économiques fort complexes. Certains confèrent aux biocarburants une responsabilité dans la crise alimentaire mondiale, tandis que d'autres estiment qu'ils manquent encore de résultats probants en matière de durabilité.

C'est pour ces raisons, qu'il est nécessaire de chercher des solutions cohérentes et efficaces pour un développement plus durable de la filière dite de première génération, notamment au niveau des économies des gaz à effet de serre qu'elle est censée induire.

Le présent Atelier, organisé par COMPETE et financé par l'Union Européenne avec pour thème: « **LES POLITIQUES DES BIOENERGIES SUR LE DEVELOPPEMENT DURABLE** », traitera fort opportunément tous ces aspects importants de la question.

Je vous exhorte alors à un débat franc et de haut niveau pour qu'à l'issue de cet Atelier, des recommandations claires et fortes, soient mises à disposition des décideurs de nos pays, en vue de mieux orienter nos politiques vers un développement durable des Bioénergies.

Je ne saurais terminer mon allocution, sans remercier vivement l'Union Européenne, qui nous a permis d'organiser cet important Atelier d'échanges sur le créneau porteur des Bioénergies.

**Je vous remercie.**

## Opening Session

### ***Welcome Address – COMPETE Project***

**Dr. Rainer Janssen, COMPETE Coordinator, WIP Renewable Energies, Germany**

**Honourable representatives of the Government of Mali, Dear Ladies and Gentlemen**

On behalf of the COMPETE project I would like to welcome you to this International Workshop on 'Bioenergy Policies for Sustainable Development in Africa' in Bamako.

I would like to cordially thank the COMPETE partner Dr. Ibrahim Togola and his colleagues from Mali-Folkecenter for their efforts to set up this high level event.

I would like to briefly introduce to you the aims and objectives of the COMPETE project – Competence Platform on Energy Crops and Agro-forestry Systems in Africa.

This project has started in January 2007 and will run until end of 2009. It is co-funded by the European Commission within the 6<sup>th</sup> Framework Programme on Research and Technical Cooperation. The COMPETE network consists of 44 partners from 4 continents. African partners come from Botswana, Burkina Faso, Kenya, Mali, Senegal, South Africa, Tanzania and Zambia.

The main aim of COMPETE is to establish a **platform for policy dialogue and capacity building** and identify **pathways for the sustainable provision of bioenergy**

- to improve the quality of life and create alternative means of income for the rural population in Africa
- to aid the preservation of intact ecosystems in arid and semi-arid regions in Africa
- to enhance the equitable exchange of knowledge between EU and developing countries

Main activities of the COMPETE network are:

- to evaluate current and future potential for the **sustainable provision of bioenergy** in Africa in comparison to existing land use patterns and technologies
- to facilitate **South-South technology and information exchange**
- to develop **innovative tools for the provision of financing** for national bioenergy programmes and local bioenergy projects
- to develop **practical, targeted and efficient policy mechanisms** for the development of bioenergy systems that enhance local value-added, assist local communities and address gender inequalities

COMPETE work is structured along the following working groups addressing crucial issues in the fields of:

- Current land use
- Improved land use
- Sustainability analysis
- South-South and North-South cooperation
- Financing, and
- Policy Analysis

The following COMPETE events have been successfully implemented:

- COMPETE Workshop on 'Improved Energy Crop and Agroforestry Systems for Sustainable Development in Africa', 22 June 2007, Mauritius
- COMPETE Participation at The First High-level Biofuels Seminar in Africa, 30 July to 1 August 2007, Addis Ababa, Ethiopia
- COMPETE Roundtables in the framework of the International Conference 'Stakes and Perspectives of Biofuels for Africa', 26-29 November 2007 in Ouagadougou, Burkina Faso
- COMPETE Workshop on Financing of Alternative Land Use, 15 April 2008 in Dakar, Senegal, on the occasion of the UNIDO Int. Renewable Energy Conference

Furthermore, the COMPETE project organized the "**Conference and Policy Debate on "Bioenergy Sustainability Schemes – An African Perspective"**" in Arusha, Tanzania, in June 2008.

For this conference participation of high-level policymakers from several African countries (Kenya, Mozambique, Tanzania, Uganda, Zambia) and cooperation with international organisations and initiatives (RSB, FAO-BEFS, GTZ) was ensured.

The outcome of this COMPETE conference in Tanzania was the **COMPETE Policy Declaration on Sustainable Biofuels in Africa** which is included in the material of this workshop in Mali. It is one of the aims of this workshop to further refine the following topics of the COMPETE policy declaration:

- Visions guiding policies and bioenergy development
- Local, national and international markets for bioenergy development
- Development of land use strategies
- Ensure bioenergy development in accordance with prevailing land tenure systems to enhance benefits to local communities
- Capacity building and RTD

We are looking forward to fruitful discussions in the framework of this COMPETE Workshop on 'Bioenergy Policies for Sustainable Development in Africa' in Bamako, and we hope that together we can move towards a sustainable exploitation of the large bioenergy potential in Africa.

I would also like to invite you to join the COMPETE network as Associate Partner and to attend upcoming COMPETE events and to contribute to the success of this network.

Thank you very much

## Opening Session

### *Welcome Address – Roundtable on Sustainable Biofuels (RSB)*

#### **Annie Sugrue, Roundtable on Sustainable Biofuels (RSB)**

On behalf of the Roundtable on Sustainable Biofuels (RSB), Annie Sugrue welcomed the participants of the COMPETE Workshop on 'Bioenergy Policies for Sustainable Development in Africa' in Bamako.

The Roundtable on Sustainable Biofuels (RSB) is an international initiative bringing together farmers, corporations, non-governmental organizations, experts, governments, and inter-governmental agencies concerned with ensuring the sustainability of biofuels production and processing. In August, 2008, the RSB's multi-stakeholder Steering Board published 'Version Zero' of an international standard for sustainable biofuels, developed by hundreds of stakeholders from nearly 40 countries through online discussions, teleconferences, and regional meetings between June, 2007 and June, 2008.

The RSB is organized under the auspices of the Energy Center of the Ecole Polytechnique Fédérale de Lausanne, EPFL (Swiss Federal Institute of Technology in Lausanne). The RSB operates under its own budget, based on resources provided by EPFL and third party organizations.

The RSB is the leading international multi-stakeholder initiative creating sustainability standards for biofuels. RSB has followed the ISEAL Code of Good Practice for Standard-setting since its launch in April 2006, focusing on involving stakeholders from around the world in an open and transparent standards-setting process to ensure widespread support. The aim is to build on and recognize national and feedstock-specific standards to create a voluntary standard adopted by the majority of the global biofuels industry.

In June 2008, the RSB's Steering Board decided to open up its governance structure and invite any interested stakeholder to formally participate in decision-making about the RSB's strategy and core activities. Stakeholders are invited to join one of **eleven Chambers** to ensure balance among the different types of actors along the biofuels supply chain and stakeholder groups affected by biofuel production. Each Chamber will **elect two members** to a new **Standards Board**, who will approve final decisions based on consensus.

The Steering Board aims to hand over its work to the new Standards Board at a joint meeting in May 2009, and thus hopes that the new Chambers will be fully formed by the end of March 2009.

## Session 1

### Bioenergy Policies and Strategies in Africa

#### ***Bioenergy Policies in Mali – Issues of Energy Supply and Energy Security***

**Mr. Sinalou Diwara, Direction of Energy, Government of Mali**

#### **Introduction**

L'élaboration de la Politique Énergétique Nationale a été dictée par les constats majeurs ci-après:

- Le besoin de recentrage des objectifs et des orientations stratégiques du Gouvernement;
- La multiplicité des acteurs institutionnels publics et privés sans un cadre unique de référence; La sous exploitation des ressources énergétiques nationales;
- L'utilisation peu rationnelle des sources d'énergie disponibles;
- Le faible taux d'accès aux énergies modernes;
- L'insuffisance de l'offre par rapport à la demande;
- Le faible taux de couverture énergétique du pays.

Le document de politique énergétique est essentiellement destiné à:

**Préciser les relations entre la Politique Énergétique nationale et les Cadres et Orientations stratégiques** retenus par le Gouvernement pour les différents secteurs économiques et sociaux du Mali ;

- **Favoriser la synergie des activités des principaux intervenants du secteur de l'énergie.**
- **Orienter efficacement les interventions des acteurs publics, parapublics et privés du secteur de l'énergie** pour le développement rapide, équilibré et durable du pays.
- Établir une meilleure relation entre la disponibilité énergétique et le développement socio-économique national ;
- Favoriser la synergie des activités des principaux intervenants du secteur de l'énergie ;
- Assurer une meilleure adéquation entre l'offre et la demande énergétiques;
- Améliorer le taux de couverture énergétique;
- réduire les distorsions entre les zones couvertes.

L'Objectif Global, les Objectifs Spécifiques, les Axes Stratégiques et les mesures sous sectorielles de la PEN ont été définis sur la base d'une analyse des potentialités énergétiques nationales, des politiques et stratégies antérieurement mises en œuvre dans le secteur de l'énergie.

**La Politique Énergétique du Mali a été adoptée par le Gouvernement en mars 2006.** Elle sert de référence à tous les projets et programmes mis en œuvre au Mali dans le domaine de l'énergie.



## Contexte Socio-economique

**Principaux axes du développement socioéconomique: la lutte contre la pauvreté, le développement humain, le développement économique durable et le renforcement financier.**

La mise en valeur des ressources naturelles et la transformation des potentialités en opportunités de développement constituent les défis majeurs à relever pour l'amorce d'un véritable développement durable au Mali.

La mise en œuvre d'un **vaste programme de reformes économiques basé sur:**

- i) le désengagement de l'État des activités productives et la privatisation des entreprises publiques;
- ii) l'amélioration de l'environnement pour les affaires;
- iii) la modernisation des procédures administratives du secteur public;
- iv) la mise en place de nouveaux cadres législatifs et réglementaires dans les secteurs.

**La Lettre de Cadrage du 23 octobre 2003**, adressée par le Président de la République au Premier Ministre, **souligne l'importance accordée à « la valorisation du secteur rural »** qui doit être **« le moteur de l'économie du Mali en participant au décollage de l'agro-industrie »**. Cette lettre précise également que la mise en valeur du monde rural passe par le renforcement des infrastructures dont **« l'élargissement du parc énergétique, sa diversification et son extension aux zones rurales »**.

## Potentialites Nationales en Ressources Energetiques

**Hydroélectrique:** 20 sites d'hydroélectriques identifiés à travers le territoire national pour une puissance totale d'équipement d'environ 1050 MW ; 4 sites sont aménagés (représentant environ 25% du potentiel national), à savoir : Félou (0,6 MW, env. 3 GWh/an), Sotuba (5,2 MW, env. 40 GWh/an), Sélingué (44 MW, env. 200 GWh/an) et Manantali (200 MW, env. 800 GWh/an).

**Solaire:** l'irradiation solaire est de l'ordre de 5 à 7 kWh/m<sup>2</sup>/jour

**Éolienne:** la vitesse du vent dans les zones sahéliennes et sahariennes du pays varie de 3 à 7 m/s en moyenne annuelle.

**Biomasse:** Les surfaces totales des formations ligneuses sont estimées à près de 33 millions d'hectares

**Résidus agro-industriels:** le pays dispose chaque année d'importantes quantités de résidus agricoles et agro-industriels; d'un potentiel énorme de production **d'huile végétale de substitution et d'alcool carburant.**

Toute sa consommation d'hydrocarbures est importée à un coût d'approvisionnement prohibitif se répercutant négativement sur la balance nationale des paiements.

**En dehors des formations forestières sur lesquelles pèsent grandement la pression de la demande et l'utilisation peu rationnelle du bois énergie, toutes les autres potentialités énergétiques du Mali sont à présent largement sous exploitées.**

La consommation énergétique globale du Mali était de 3.212.559 Tonne Équivalent Pétrole (tep) en 2002. Cette énergie provient principalement de la biomasse, des produits pétroliers et de l'électricité.

1. La biomasse : 81%
2. Les produits pétroliers :16%
3. L'électricité : 3%.

Les Énergies Renouvelables (solaire, éolienne, micro/mini hydroélectricité etc.) sont actuellement utilisées à un niveau insignifiant.

Les secteurs d'utilisation de l'énergie:

- Ménages, environ 86%, dont 23% et 77% respectivement pour les ménages urbains et ruraux ;
- Transport, près de 10%, dont 88% et 9% respectivement pour les transports routiers et aériens ;
- Industries, environ 3%, dont la moitié est constituée de la consommation des industries extractives ;
- Agriculture, moins de 1%.

## **Evaluation des Politiques et Strategies**

### ***Cadre institutionnelle***

Un secteur de l'énergie géré sous 4 tutelles (Primature, MMEE, MEF, MEA), trois (3) services techniques centraux (DNE, DNGM, DNCN), un (1) service rattaché à la DNE (CNESOLER), quatre (4) services personnalisés (ONAP, AMARAP, AMADER, AUREP) et un (1) organe de régulation (CREE).

On relève notamment:

- Dispersion institutionnelle de la gestion publique de l'énergie
- Création très récente de certaines structures techniques (AMARAP, AMADER, AUREP),

Quelques opérateurs du secteur privé assurent le service public de l'électricité, (EDM-SA, SSD).

Organisations Inter-Gouvernementales (OIG) africaines intervenant dans le secteur de l'énergie dont le Mali est membre :OMVS, ALG, UEMOA, CILSS, CEDEAO, UA.

De nombreux textes législatifs et réglementaires régissent le secteur de l'Energie au Mali.

- le sous secteur des Hydrocarbures;
- le sous secteur de l'Électricité;
- le sous secteur des Énergies Traditionnelles;
- le sous secteur de l'Energie Nucléaire;
- le sous secteur des Énergies Renouvelables.

### ***Energies traditionnelles***

**Les acquis des projets et programmes mis en œuvre dans le sous secteur des Énergies Traditionnelles bien que probants, restent fragiles** et les rapports entre les acteurs et les partenaires stratégiques ne sont pas équilibrés.

Ce sous-secteur demeure si sensible et stratégique que le pilotage et la coordination des interventions doivent encore obéir à l'approche de service public.

**Des contraintes restent à lever à court et moyen termes pour assurer un développement équilibré et durable du Sous secteur :**

1. l'inadéquation de la fiscalité et des prix du bois avec les coûts réels de la ressource ligneuse
2. la faiblesse du contrôle forestier;
3. le fait que le bois énergie demeure défavorisé par rapport aux autres combustibles;
4. la répartition inégale des ressources ligneuses sur le territoire national;
5. l'Atteinte du capital forestier de certaines régions du pays;
6. le rythme de consommation de bois énergie supérieur à la capacité de régénération naturelle des massifs forestiers.

**Les perspectives de la consolidation des acquis des projets et programmes mis en oeuvre et de leur extension à l'ensemble du territoire national sont bonnes**

### ***Energies renouvelables***

L'approche développée par le Gouvernement du Mali dans le domaine énergétique met l'accent sur l'équipement des points d'eau, la réfrigération, la cuisine et le transport et l'électrification du monde rural.

- plus d'un demi millier de pompes solaires Photo Voltaïque (PV)
- des dizaines de fours solaires, une dizaine d'éoliennes de pompage et quelques centaines de séchoirs sont installés
- une vingtaine de milliers de systèmes d'éclairage individuels sont en fonctionnement
- Les télécommunications utilisent de façon intensive les équipements ENR

Les projets et programmes exécutés (publics & privés) ont permis l'installation de beaucoup d'équipements d'ENR et d'assurer d'appréciables formations. Ils ont été fortement handicapés par les facteurs suivants :

- le manque d'approche participative efficiente
- le manque d'approche pour la vente de service au profit de la vente des équipements
- l'absence de cadre de cohérence (stratégie et plan directeur)
- l'insuffisance du service après vente
- l'absence de mécanismes de financement appropriés.

*Atouts du Sous secteur des Énergies Renouvelables:*

- **l'existence d'un énorme potentiel (solaire, mini/micro électrique etc.)**
- Les efforts du Mali pour le développement des technologies ENR
- le rapprochement de l'évolution technologique des équipements ENR des préoccupations des utilisateurs
- l'Installation de plusieurs milliers d'équipements ENR sur le territoire national
- **l'existence d'un régime fiscal et douanier favorable au développement des ENR**

*Barrières à utilisation à grande échelle des technologies ENR:*

- l'insuffisance de ressources humaines qualifiées
- la faible implication de la population dans le montage des projets
- **l'absence d'unités locales de production et de montage de composants des technologies d'énergie renouvelable**
- l'insuffisance des ressources financières de la population et de l'État
- **les difficultés d'accès aux crédits des promoteurs des technologies d'énergie renouvelable**
- le sous équipement des opérateurs du sous secteur des énergies renouvelables
- la taille réduite du marché national.

## **Politique Energetique Nationale**

Le secteur de l'énergie revêt un caractère hautement transversal. Il a été pris en compte dans l'établissement de la présente Politique Énergétique, les politiques et stratégies, définies par le Gouvernement:

1. Les réformes économiques
2. Stratégique Nationale de Réduction de la Pauvreté
3. La Politique Nationale de Protection de l'Environnement
4. La Décentralisation
5. Le Programme Décennal de Développement de l'Éducation
6. Le Programme de Développement Sanitaire et Social
7. La politique Nationale d'industrialisation

### **Objectif Global**

**Contribuer au développement durable du pays, à travers la fourniture des services énergétiques accessibles au plus grand nombre de la population et favorisant la promotion des activités socioéconomiques.**

### **Objectifs Spécifiques**

Les quatre (4) Objectifs Spécifiques (OS) de la Politique Énergétique nationale :

**OS n°1 : Satisfaire les besoins énergétiques du pays en qualité, en quantité et au moindre coût.**

**OS n°2 : Assurer la protection des personnes, des biens et de l'environnement contre les risques inhérents aux services énergétiques.**

**OS n°3 : Renforcer les capacités d'orientation, de gestion, de contrôle et de pilotage stratégique du secteur de l'énergie ;**

**OS n°4 : Renforcer pour le pays, les avantages de la coopération internationale dans le domaine de l'énergie.**

### **Objectifs et Mesures sous Sectoriels – Energies Traditionnelles**

Les quatre (4) objectifs suivants sont retenus pour le Sous secteur des Énergies Traditionnelles :

1. Gérer durablement l'offre d'énergie traditionnelle par la mise sous gestion communautaire de 1,5 millions d'hectares en 2010 et 3 millions en 2015;
2. Maîtriser la demande d'énergie traditionnelle ;
3. Réduire la contribution des combustibles ligneux dans la consommation énergétique globale du pays de 10% en 2010 et de 20% en 2015;
4. Améliorer le pilotage du sous-secteur.

### **Objectifs et Mesures sous Sectoriels – Energies Renouvelables**

Trois (3) Objectifs sont retenus pour le Sous secteur des Énergies Renouvelables ainsi qu'il suit :

1. Promouvoir une large utilisation des technologies et équipements d'Énergie Renouvelable (ENR) pour accroître la part des ENR dans la production nationale d'électricité de moins de 1% en 2004 à 6% en 2010 et 10 % en 2015
2. Créer les meilleures conditions de pérennisation des services d'Énergies Renouvelables
3. Rechercher des mécanismes de financement durables et adaptés aux Énergies Renouvelables.

### **Moyens de mise en œuvre**

#### *Structures exécutives*

Les principales actions recommandées sont :

1. Recentrer et renforcer les structures publiques et privées existantes peu performantes;
2. Créer des structures adéquates pour prendre en charge les domaines du secteur non gérés ou mal gérés notamment la vérification et le contrôle des installations électriques intérieures et des compteurs électriques ;
3. Établir des normes adaptées aux réalités nationales dans les différents sous secteurs de l'énergie.

### *Structures consultatives*

Les structures consultatives existant dans le secteur énergétique malien, se limitent aux suivantes:

- **le Comité National malien de la Commission Mondiale de l'Énergie**
- **la Commission des Énergies Renouvelables**
- **le Comité de suivi du cadre stratégique du secteur de l'énergie**

Il est recommandé de créer une **Commission Nationale de l'Énergie** ainsi que des **Comités Techniques de Coordination et de Planification**. La Commission Nationale de l'Énergie est une commission interministérielle placée sous la Présidence du Ministre en charge de l'Énergie.

### *Moyens financiers et matériels*

Les investissements requis étant énormes, la stratégie de financement s'articule autour de la mobilisation des ressources aussi bien nationales que de l'aide extérieure.

Dans cette optique, les mesures ci-après contribueront fortement à une prise en charge adéquate de la problématique du financement de la Politique Énergétique nationale :

1. Appel à l'aide extérieure bilatérale et multilatérale sous forme de subvention ou de prêts concessionnels;
2. Appel aux capitaux privés étrangers
3. Mobilisation et/ou réorientation vers le secteur énergétique de capitaux privés maliens actuellement tournés en majorité vers d'autres secteurs ;
4. Implication accrue des systèmes bancaires et financiers dans le financement de projets et programmes énergétiques
5. Création d'un Fonds National de l'Énergie

**Pour l'atteinte des objectifs de la Politique Énergétique nationale, les projets et programmes prioritaires retenus ou envisagés sont les suivants :**

- Le renforcement du cadre institutionnel et réglementaire du secteur de l'Énergie ;
- La mise en place d'un système de planification énergétique performant ;
- Le développement de l'énergie domestique et l'électrification rurale ;
- La rationalisation de la production et de l'utilisation de l'énergie ;
- La promotion des Énergies alternatives aux combustibles traditionnels ;
- La constitution d'un stock national de sécurité pour les hydrocarbures ;
- L'amélioration du contrôle et du suivi des opérateurs ;
- Le développement du Réseau National Interconnecté ;
- Le développement de la desserte électrique des Centres Isolés ;
- L'interconnexion électrique avec les pays de la sous région ;
- Le développement des énergies renouvelables ;
- Le renforcement de l'infrastructure nationale de radioprotection ;
- La promotion de la recherche des hydrocarbures et des combustibles solides et gazeux.

## **Session 1**

### **Bioenergy Policies and Strategies in Africa**

#### ***Bioenergy Policies in Mali – Agriculture and Land Use Issues***

**Mr. Dalla Diarisso, Direction of Agriculture, Government of Mali**

#### **Introduction**

The Republic of Mali has 3 million ha of arable land. 70% of the population of 12 million inhabitants are engaged in agricultural activities. The country is highly dependent on the import of energy resources.

In order to contribute to the energy security of the country and to promote rural development, the President of the Republic of Mali has inaugurated an electrification initiative based on Jatropha oil. Thereby, significant efforts are still needed to improve the productivity of Jatropha plantations in Mali, as the plant was until today mainly used to re-establish degraded soils.

#### **PADFP Programme for the Promotion of Jatropha in Mali**

The Government of Mali has launched the programme PADFP with the following main objectives:

- Improvement of the energetic balance of commercial Jatropha cultivation
- Increasing food security through the improvement of soil fertility
- Increasing employment

Expected results of the PADFP programme include the cultivation of 100.000 ha of Jatropha plantations, and the production of 500.000 tons of Jatropha seeds.

The following regions in Mali have been selected for Jatropha cultivation under PADFP: Kayes, Koulikoro, Sikasso, Ségou and Mopti. Thereby, non-used former rice cultures will be converted to Jatropha cultivation.

The strategy of the PADFP programme will be based on a participatory, multidisciplinary approach with the active involvement of stakeholders from the sectors of production, conversion and trade. Bodies involved in the implementation of the PADFP programme will be the Assemblée Permanente des Chambres d'Agriculture du Mali (APCAM), the department of energy and several NGOs.

In the field of Jatropha production the important role of research is highlighted, as well as the strengthening of farmers' organisations. For conversion and commercialisation of Jatropha oil the involvement of private operators is encouraged. Furthermore, the working conditions of women shall be improved.

For the realisation of the PADFP programme an information workshop has been held at national level. On regional level, information events are under preparation in order to inform stakeholders about the objectives of PADFP as well as about improved cultivation techniques for Jatropha.

## Session 1

### Bioenergy Policies and Strategies in Africa

#### ***Political Strategies for the Sustainable Development of Bioenergies in Africa***

**Mr. Kouloutan Coulibaly, Division Head Forest Management, Direction of Nature Conservation, Ministry of Environment Mali**

#### **I. INTRODUCTION**

Le Mali est un pays sahélien confronté depuis plusieurs décennies à de nombreux problèmes environnementaux liés d’une part à la dégradation des ressources naturelles suite aux sécheresses consécutives et d’autre part à la détérioration progressive du cadre de vie en milieu urbain due à l’action anthropique.

Les effets cumulés de la croissance démographique et la pauvreté ont contribué à amplifier ces problèmes à travers la forte pression exercée sur les ressources naturelles.

Le bilan de la problématique de l’environnement et l’état des ressources naturelles au Mali ont mis en exergue la nécessité de répondre à un certain nombre de défis environnementaux non seulement en milieu rural, mais aussi en milieu urbain et périurbain.

En plus de la Politique Forestière Nationale, la Direction Nationale de la Conservation de la Nature (DNCN) a élaboré en 2003, une stratégie nationale de reboisement qui s’inscrit dans le cadre de la mise en œuvre des plans d’action de la Politique Nationale de Protection de l’Environnement (PNPE).

**La stratégie de reboisement s’inscrit dans le cadre de la mise en œuvre des plans d’action de la politique nationale de la protection de l’environnement et de la politique forestière nationale.**

*Il s’agira notamment de contribuer à la lutte contre la désertification et la pauvreté avec comme toile de fond la satisfaction des besoins en bois des populations, la création d’emplois tout en accordant une attention particulière aux groupes vulnérables les femmes et les jeunes.*

Dans la mise en œuvre de cette stratégie il faut tendre lors du choix des espèces vers l’adoption d’essences à usages multiples.

#### **II. ETAT DES LIEUX**

De nombreuses plantes oléagineuses poussent à l’état naturel au Mali ou sont cultivées. Les huiles pouvant être extraites des graines de telles plantes peuvent fournir des combustibles ou carburants. En particulier la plante pourghère (*Jatropha curcas*), qui existe dans plusieurs zones (1<sup>ère</sup>, 2<sup>ème</sup>, 3<sup>ème</sup>, 4<sup>ème</sup> et 5<sup>ème</sup> régions administratives du Mali) présente un très haut potentiel de biocarburant.

En plus du *Jatropha curcas*, il existe également au Mali le *Jatropha gossypifolia* (Médecinier rouge) qui est souvent planté ecomme espèce ornementale et en haie vive très appréciée des abeilles (utile pour l’apiculture).



Cette seconde espèce aussi pourrait faire l'objet d'étude en vue de sa vulgarisation et sa conservation.

Depuis une trentaine d'années, le contexte énergétique international se caractérisant par une hausse continue du prix du pétrole et de ses dérivés. De plus en plus la conviction se précise sur le fait que les changements climatiques résultent de la consommation effrénée de produits pétroliers. D'où la nécessité de développer d'autres sources d'énergie à faible voire sans contenu carbone.

Au Mali, les politiques énergétiques intègrent d'ores et déjà, à des degrés divers, cette réalité. Le Gouvernement a approuvé en 2006, un document de politique énergétique unifié qui retient au nombre des objectifs assignés au sous-secteur des Energies Renouvelables, celui de « développer la filière du Biocarburant notamment le pourghère, pour divers usages (production d'électricité, transport, motorisation agricole etc...)

Le point de convergence entre la stratégie Nationale de reboisement et la stratégie nationale pour le développement des biocarburants se trouve dans les axes de la stratégie nationale de reboisement qui sont :

- a) l'appui aux pépiniéristes privés pour la production d'essences locales et la création d'une pépinière de service ;
- b) l'incitation des jeunes scolaires et autres groupes cibles à travers l'Education Environnementale et d'autres programmes à participer activement aux actions de reboisement. Les élèves seront placés au centre de toutes les activités de reboisement de leur environnement immédiat (parcs d'attraction, bosquets, plantation d'ombrage et espaces verts) ; l'organisation des vacances citoyennes autour des activités de pépinières et de reboisement initiées en 2008 a vu le jour
- c) la reforestation des collines, des bassins versants autour des grandes villes du pays. Ceci doit permettre de reconstituer le couvert végétal autour des grandes villes, de lutter contre les inondations et de créer un environnement où il fait bon vivre :
- d) le développement d'un partenariat entre la DNCN et les autres Services Techniques, Communes, ONG, GIE, et Associations (notamment féminines) dans le but de leur meilleure implication dans les actions de reboisement :
- e) la mobilisation des ressources communales en faveur des actions de reboisement. Cette mobilisation se fera avec la participation effective des élus communaux qui en seront les premiers responsables. Ils doivent veiller à ce que les plans de développement communaux prennent en compte les actions de protection de l'environnement.
- f) la promotion de la foresterie rurale à travers l'incitation aux plantations de production de bois et l'agroforesterie. Les plantations agro-forestières seront vulgarisées surtout dans les zones à climat sahélo saharien où l'Acacia albida et les autres légumineuses ligneuses seront revalorisés. Les plantations de production pourraient être une des solutions durables aux déboisements excessifs et à la surexploitation des formations naturelles
- g) l'instauration d'un système d'incitation au reboisement à travers la motivation (lettre de félicitation, prix, décoration, etc...

Chacun de ces axes de la stratégie peut concourir à l'atteinte des objectifs de la politique énergétique tout en préservant l'environnement.

Dans le cadre de la Mali, le Jatropha pourrait être vulgarisé : il s'agit de la Convention de lutte contre la désertification (UNCCD), la Convention pour la conservation de la biodiversité (CDB) et la Convention sur les Changements Climatiques (UNCCC).

Par exemple l'espèce peut être utilisée dans le cadre du Mécanisme de Développement Propre (MDP) dans les projets REDD (Reducing Emission from Deforestation and Degradation).

Selon les premières expériences la production serait de 1 à 2 tonnes par km de pourghère, d'autres donnent les chiffres de 2 à 3 tonnes de graines par hectare, un pied peut donner environ 2kgs de graines (en fonction des écotypes).

Pour obtenir un litre d'huile il faudrait 4kgs de graines. La recherche se poursuit sur l'espèce et des données précises seront fournies par les chercheurs avec le temps.

### **III. IMPACTS DU DEVELOPPEMENT DU POURGHÈRE SUR L'ENVIRONNEMENT**

#### **3.1 Impacts positifs**

- La valorisation des sous-produits de la graine de pourghère dans l'agriculture pour la fertilisation des terres avec du « compost naturel » notamment dans la culture des céréales à l'IPR/ISFRA de Katibougou (Koulikoro) (1992 à 1993) ;
- Reboisement des zones dégradées : fixation biologique des sols, des berges des cours d'eau ;
- La marge de développement de la plante reste considérable pour la récupération des terres dégradées
- le développement des biocarburants contribuera à réduire la pression sur les formations forestières ;
- la création d'emplois en milieu rural et urbain ;
- la séquestration de carbone et la substitution aux produits à haute consommation d'énergie fossile.
- l'utilisation du pourghère lors de l'élaboration et la mise en œuvre des plans d'aménagement

#### **3.2 Impacts négatifs**

- la compétition entre l'agriculture et la plantation de pourghère pour la production de biocarburant dans le cadre de l'utilisation des terres
- le comportement du pourghère en association avec les autres cultures reste à découvrir
- le développement de plantations pures de pourghère serait un danger (monoculture)

### **IV. RECOMMANDATIONS :**

- ne pas compromettre la sécurité alimentaire à travers une occupation anarchique des terres productives du pays ;
- Rechercher des variétés de plantes adaptées aux conditions des zones semis-arides (sols pauvres et dégradés, faible pluviométrie température élevée etc...)
- conduire des essais de provenances afin d'identifier les écotypes les plus performants en matière de production de graines et / ou la qualité de l'huile

## **V. CONCLUSION**

La mise œuvre de la stratégie nationale pour le développement des biocarburants peut se baser sur les axes de la stratégie nationale reboisement (pour le choix des terres) et également en rapport avec la recherche pour un bon choix du matériel végétal et des meilleurs écotypes.

Le Mali est entrain d'élaborer un Cadre Stratégique d'Investissement (CSI) dans le cadre d'une approche programmatique de Gestion Durable des Terres (GDT) et la valorisation de la plante pourghère trouvera sa place comme une option c'est-à-dire comme une bonne pratique lors de la mise en œuvre de ce cadre stratégique.

## Session 1

### Bioenergy Policies and Strategies in Africa

#### ***COMESA Strategies in the field of Biomass and Bioenergy***

**Dr. Angel Elias Daka, COMESA- Coordinator CAADP Pillar 3/Food Security Advisor,  
Zambia**

P.O. Box 30051, Ben Bella Road, Lusaka, Zambia. Email: [adaka@comesa.int](mailto:adaka@comesa.int)

#### **1.0 INTRODUCTION**

Despite the numerous potential availability of bio-energy sources in form of Electric power, Petroleum, Gas, Coal, and biomass and other renewable Sources of energy, COMESA still experiences energy poverty. Energy poverty can be defined as the absence of sufficient choice in accessing ***adequate, affordable, reliable, quality, safe, and environmentally benign energy services*** to support ***human and economic development***.

It is therefore, apparent that energy poverty exists in many COMESA member States at all levels, particularly in the rural areas. The lack of adequate, affordable and quality energy services directly affects the food production systems which in turn affects the prices of available food as the latter has to be produced at very high prices. This affects the 400 million people of the region who face widespread food insecurity. Most vulnerable to hunger and poverty are smallholder farmers and pastoralists. Apart from high production costs of food, climate change due to deforestation, soil fertility loss resulting from heavy erosion and poor farming practices have been cited as being major causative factor of food insecurity in the COMESA Region. Food insecurity which is an over-arching regional problem is believed to undermine the region's economic growth and integration agenda.

Thus COMESA has identified agricultural and natural resources development as an engine for economic growth and integration agenda. This paper discusses issues related to forestry and bio-energy policy initiatives which directly affects agricultural development and would help contribute to the region's attainment of the Millennium Development Goal # 1 – halving poverty and hunger by half by 2015.

#### **1.1 REGIONAL ECONOMIC GROWTH AND INTEGRATION:**

In efforts to attain the COMESA topic agenda of Regional integration through economic growth driven by agriculture and forestry development, COMESA has developed the following strategies;

- a) Increasing food production, supply and responses to food crises through the development of agriculture using the Comprehensive Africa Agricultural Development Programme (CAADP). CAADP aims at accelerating agricultural growth rate to 6% annually against the present dismal average annual growth rate of 2.5% for most African countries.
- b) Promoting trade of food staple crops products in the whole region so as to increase access of quality and affordable food by all the people and

- c) Developing agricultural supporting policies in; Sustainable forestry resources utilization and management and Bio-energy services provision to support social and economic development while protecting the natural resources bio-diversity and environment.

## **2.0 OBJECTIVES OF THE POLICIES**

### **2.1 THE FORESTRY STRATEGY/POLICY**

The strategy's/policy's main aim is to **maximize the contribution of forests and trees** to the economic, social and environmental well-being of African people taking into account the multiplicity of **forest functions**. In order to achieve this main goal, the policy will address the following specific objectives

1. Improving policy, legislative and planning frameworks,
2. Strengthening institutions and capacity in the strategic design and implementation of policies and legislation;
3. Increasing investment in sustainable forest management and enhance availability of forest goods and services; and
4. Complementary investment into the development of value-adding industries and supporting infrastructure.

#### **2.1.1 COMESA STRATEGIC ACTIONS IN SUPPORT OF THE FORESTRY POLICY**

*COMESA's initiative to enact the forestry strategy/policy is in line with its overall policy as depicted in its treaty which includes; Investment and development in agriculture, Natural Resources and environment, crop, livestock production, fisheries and forestry. Consistent with the treaty, COMESA secretariat has pursued the following actions;*

- COMESA member States have agreed to Conserve and manage forests through joint promotion of joint forest practices, management of water catchment areas,
- Member States will have joint utilization of forest training and research facilities, establish uniform regulation for utilization of forestry resources in order to reduce the depletion of natural resources and avoid desertification.
- Trade in a range of forest products from the COMESA region was already globally significant and COMESA will continue to promote this in a sustainable manner. For example, Member countries are among the leading exporters of timber and non-timber forest products. The Democratic Republic of Congo is the fifth largest exporter of tropical logs.
- Sudan provides 40-50% of global supplies of gum Arabic, while; Ethiopia, Eritrea, Sudan and Kenya are leading exporters in a number of valuable flavours and fragrances (frankincense, opopanax, myrrh).
- Recognizing that natural resources provide an important opportunity for forest-driven economic development, COMESA is completing the FORESTRY POLICY DEVELOPMENT PROCESS.

- The COMESA member States have adopted the Environmental Action Plan (EAP) and the Comprehensive Africa Agricultural Development Plan (CAADP). The EAP stresses the need for the region to adopt common policies and strategies on sustainable utilization of natural resources whilst CAADP stresses on attainment of 6% annual Agricultural growth rate from current annual average of 2.5%.
- COMESA Ministers of Agriculture Meeting, held in Seychelles in March 2008, adopted the Fifth Ministerial Declaration to re-affirm the major role that Natural Resources and Agriculture plays in economic development of the COMESA region.
- Meeting urged COMESA Secretariat to expedite the formulating of the regional strategy on forestry management, including strategies for climate change and carbon trading.

## **2.2 COMESA BIO-ENERGY POLICY FRAMEWORK**

Energy plays a critical role in the development process and COMESA has recognized that energy will play a pivotal role in achieving all the Millennium Development Goals. The importance of energy is seen in; Domestic use, Industrial and Agricultural production. Energy as a factor of production has costs that directly affect prices of other goods and services and the competitiveness of enterprises. It is in this light that COMESA has developed an Energy Model Policy Framework for its nineteen member states. The overall goal of this policy framework is; **'To provide the COMESA member States with harmonized guidelines that would facilitate energy policy harmonization in the COMESA region in efforts to improve efficiency and increased investment.'**

### **2.2.1 OBJECTIVES OF THE ENERGY POLICY**

The specific objectives to be achieved by this policy framework can be summarized as follows;

- 1) Provide an outline of contents expected in National Energy Policy,
- 2) Member states to adopt and/or customize for harmonizing policies in the spirit of regional integration.
- 3) Improving the effectiveness and efficiency of the modern energy supply industries;
- 4) Improving the security and reliability of energy supply systems;
- 5) Increasing access to affordable and modern energy services as a contribution to poverty reduction;
- 6) Establishing the availability, potential and demand of the various energy resources;
- 7) Stimulating economic development;
- 8) Improving energy sector governance and administration and
- 9) Managing environmentally, safe, and health impacts of energy production and utilization and
- 10) Mitigating the impacts of high energy prices on vulnerable consumers.

## **2.2.2 ENERGY AVAILABILITY AND CONSUMPTION**

It has been established that the majority of the people in COMESA have not much access to adequate, affordable, reliable, quality, safe, and environmentally benign energy services to support their human and economic development. It is therefore, apparent that energy poverty exists in many COMESA member States at all levels, particularly in the rural areas. Energy poverty manifests in many forms such as; (a) Low levels of consumption of modern energy forms in terms of electricity and petroleum products in most COMESA member States, (b) heavily reliance of most COMESA member States on the consumption of traditional energy which is primarily biomass in terms of wood-fuels (fuel-wood and charcoal and (c) Inadequacy and poor quality of electricity services.

## **2.2.3 ENERGY STATUS IN COMESA**

It is worth mentioning, that the energy sector in almost all COMESA member States includes the following sub-sectors; Electric power; petroleum; Gas; Coal; and Biomass and other Renewable Sources of Energy.

### **2.2.3.1 PETROLEUM**

COMESA Model energy Policy urges sustainable regional petroleum exploration, efficient use of petroleum particularly in transport sector through diversion of traffic to petroleum saving transport systems and harmonization of: laws, rules, standards, regulations, specifications, safety procedures of petroleum products, etc. These are key issues of concern to the COMESA region and they are attainable through harmonization of member states energy policies. COMESA region's crude reserves as of 2004 were about 12.3 billion barrels (12.2 % of Africa and about 1.0 % of the world crude reserves). The region produced about 1.9 million barrels per day (bb/d) of oil in 2004. It was about 22.1 % of Africa's and about 2.4 % of the world's production. The region's top oil producers, in descending order of magnitude, were Angola, Egypt, Sudan and Congo DR.

### **2.2.3.2 GAS**

Given limited exploration and feasibility studies in the region, only six COMESA member States had proven gas reserves by 2004. Angola and Egypt are gas producing countries whereas Congo DR, Ethiopia, Rwanda and Sudan had not started any exploitation. Most COMESA member States lack appropriate gas infrastructure for production, distribution and processing.

### **2.2.3.3 COAL**

The COMESA region has no abundant recoverable coal reserves. The reserves are only 1.7 % of Africa's potential reserves. Of the available coal reserves in COMESA, Zimbabwe POSSESSES 60 % and Swaziland has 25 % with the remaining scattered in small quantities in various member states. The total coal consumption of the COMESA region, in 2004, was about 6 million short tonnes, representing about 3.0 % of Africa's consumption. Coal is used mainly in mining, manufacturing industries and also for domestic purposes.

#### **2.2.3.4 BIOMASS AND OTHER RENEWABLE ENERGY SOURCES:**

Renewable energy resources include biomass in terms of; wood-fuels (fuel-wood and charcoal), agricultural residues and animal waste; solar; wind; small hydropower; geothermal; bio-fuels (E.g. Jatropha, maize, cotton seed, soya)etc.

One of the disadvantages of using biomass is that, the consumption of wood-fuels could essentially contribute in the depletion of forest resources, which, in turn, has a negative environmental impact in terms of accelerating climate change, threatening biodiversity and increasing erosion, it has been argued that the smoke generated in the use of fuel-wood has negative health impact on women and children. And the efficiency of the end use of non-commercial fuel is very low. However, supply of biomass could be increased by increasing the productivity of the existing forest resources, establishing new forests and encouraging the alternatives like solar energy by increasing their supply, in addition to improving the technology and raising the efficiency of wood-fuels production and consumption. The COMESA Forestry strategy could re-enforce this through reforestation programmes and watershed management programmes involving local communities.

#### **2.2.3.5 NUCLEAR ENERGY**

Some Uranium deposits have been identified in the COMESA region in countries such as Malawi, Congo DR and Zambia (started mining). This discovery could lead to working out a nuclear long-term energy programme for the future and thereby providing sufficient supply of electricity in the long-ran. Prospecting and exploring for uranium are to be promoted because of its strategic importance and potential future economic impact. South Africa is the only African country that produces nuclear energy.

### **3.0 CONCLUSIONS & RECOMMENDATIONS**

1. The COMESA Energy Policy and Forestry Strategy/policy could lend themselves useful as models for developing similar policies for other African countries,
2. Energy and forestry resource development are closely related to Food Security attainment and thus sustainable development of the sectors will help the COMESA Region achieve its Regional Integration goal and the attainment of Food and Nutrition Security.
3. In pursuing its overall model energy policy, COMESA should guard against energy exploitation that will undermine agriculture food production by pursuing the following issues; energy efficiency and conservation, secondary stage (Energy conversion, transmission and distribution), end use of energy (productive and non-productive activities), Improving effectiveness and efficiency of the Commercial Energy Supply Industries; Improve the Security and Reliability of Energy Supply Systems and increasing access to Affordable and Modern Energy Services as a Contribution to Poverty Reduction.
4. There is need to establish the Availability, Potential and Demand of the various energy resources and manage environmental, Safety, and Health Impacts and utilization on vulnerable consumers.



## Session 1

### Bioenergy Policies and Strategies in Africa

#### Bioenergy Policies in Tanzania

Estomih Sawe, Director TaTEDO, Tanzania

#### The Role of Bioenergy in the Tanzanian Energy Consumption Pattern

In Tanzania solid bioenergy (woodfuels, agro/forest residues) still accounts for 90% of the total energy consumed, while modern commercial energy sources account for the remaining 10% (petroleum: 7%, electricity: 1.4% others: 1.6%).

Furthermore, solid bio-energy provides process heat for most rural industries, i.e. pottery, crops processing, brick and lime burning, fish smoking, local beer brewing, etc. Some industries (i.e. sugar, pulp and paper mills) use solid bio-energy for cogeneration of electricity and heat.

The use of gaseous (biogas/producer gas) and liquid (ethanol gel) bioenergy is still very limited in Tanzania.

#### Bioenergy Policy in Tanzania

Tanzania has no specific bioenergy policy. However there are statements within the energy, agriculture, forest, land and environment policies aimed at improving supply and demand of solid bioenergy.

Only recently Tanzania has initiated efforts towards a liquid bioenergy policy, regulatory framework and guidelines for sustainable liquid biofuels development through a National Biofuels Task Force.

The following policies address issues related to bioenergy in Tanzania:

- **Forest Policy (1998):** Ensure sustainable supply and use of forest products including bioenergy, firewood and charcoal through participation of key stakeholders in joint forest management.
- **Energy Policy (2003):** Promote efficient conversion and use of bioenergy to reduce land degradation, deforestation and mitigate climate change.
- **Environmental Policy (1997):** Investment in biomass development vital for environmental protection and poverty reduction.
- **Land Policy (1997):** Land belonging to the government may be leased for an agreed period of years.
- **Agriculture Policy (1997):** Promote sustainable food security, income generation, employment and export enhancement through use of environmentally friendly practices and technologies.

Presently, the main driver of liquid biofuels development in Tanzania is still unfortunately external rather than internal and national in a situation without adequate policies, regulations and a poorly informed public.

## Liquid Biofuels in Tanzania

The following main drivers for the development of biofuels in Tanzania are acknowledged at Governmental level:

- Contribution to improve energy security at all levels.
- Creating new bio-energy industries at different levels.
- Introduction of alternative or additional cash crops to farmers (small and large scale),
- Creating new jobs and income opportunities through biofuels production,
- Reduction of volumes of oil imports and hence foreign exchange savings.

Tanzania has very favourable framework conditions for the development of a biofuels sector:

- Land availability: more than 88 million ha (most of which are arable). However, multiple uses of land have to be carefully assessed.
- Water availability: precipitation, surface and underground resources, lakes
- Demonstrated interest of various actors/developers (local and foreign),
- Potential market for biofuels (domestic and international).
- Availability of labour force and small scale farmers.

The biofuel industry in Tanzania is still in the infancy stage with only about 650.000 ha allocated. Key actors include several Government Ministries and institutions, civil society organizations, village governments, private investors and development/diplomatic partners. The following actors (mainly foreign investors) have already engaged in the biofuels sector in Tanzania:

- Sekab Biofuels Ltd: sugarcane based bioethanol
- Prokon, Germany: Jatropha (Mpanda and Rukwa)
- WILMA, United States (Biharamulo, Kagera)
- Mitsubishi Corporation, Japan (Arusha and Dar es Salaam),
- Farming for Energy Livelihood in Southern Africa (FELISA), Tanzania: Oil palm (Kigoma)
- KAKUTE, Tanzania: Jatropha (Arusha)
- Diligent, The Netherlands: Jatropha Oil (Arusha)
- TaTEDO, Tanzania: Jatropha local awareness, extension services
- SunBiofuels, Tanzania: Jatropha (Kisarawe)

## National Biofuels Task Force

The Government of Tanzania recognizes the importance and need to develop alternative and strategic fuels such as biofuels. Therefore, the development of a biofuels industry is high on Tanzania's sustainable development agenda.

Following the increased interests and enquiries from local and international actors/investors on biofuels development the National Biofuels Task Force was established in 2006. The main aim of the National Biofuels Task Force is to prepare an enabling policy and regulatory environment for the sustainable development (production and utilization) of biofuels in Tanzania.

#### *Activities of the National Biofuels Task Force*

- Facilitate ongoing and potential biofuel initiatives in Tanzania;
- Review and develop Policy and Regulatory framework;
- Develop guidelines for dealing with biofuels as an interim arrangement in Tanzania;
- Prepare a coordinated and integrated programme for the development of biofuels in Tanzania;
- Identify and map-out/zones of suitable areas/land for Biofuels Development in Tanzania.

#### *Achievements of the National Biofuels Task Force*

- SWOT of biofuels development assessed and Prioritized Strategic Actions identified
- Draft guidelines for biofuels developed
- Preliminary review of relevant policies and legalization performed
- Project Document with action plan on “Strengthening the policy, legal, regulatory and institutional framework to support the development of a sustainable biofuels industry in Tanzania” prepared

#### *Draft Biofuel Guidelines*

The following main recommendations for the development of the biofuels sector in Tanzania have been elaborated by the National Biofuels Task Force:

- **Legal framework:** Biofuels producers should adhere to all laws (Tanzania), international treaties and agreements made.
- **Compensation:** Land acquisition for biofuels production should not displace people but rather should incorporate land owners, land should be their collateral.
- **Consultation:** Biofuels project should be transparent, consultative and participatory to involve most key stakeholders.
- **Food security:** Biofuels production should not impair food security.
- **Production:** Biofuel producers should acquire efficient and modern processing facilities to realize final products (biodiesel, ethanol and other by-products)
- **Marketing strategy:** Biofuels producers should ensure that local market is of priority followed by export.
- **Energy crops:** Selection should be made on the appropriate crops and land for biofuels production.
- **Soil:** Biofuels production should not directly or indirectly damage soils.
- **Conservation:** Biofuels production should not be allowed to directly or indirectly endanger areas of high conservation value.
- **Human and livelihoods:** Biofuels production should adhere to human/labor rights and gender equity.

### *Cooperation with development partners*

In Tanzania, Government cooperation with development partners is considered crucial with each partner having the following roles:

- Government of Tanzania:
  - Have in place clear goals, policy, strategy and inter-ministerial and institutional coordination.
  - Clear regulatory mechanism for guiding biofuels development.
  - Supportive mechanism for investments and local actors, including small scale farmers empowerment based on sustainability criteria.
- Development partners:
  - Support capacity building for the policy, regulatory and strategy process.
  - Facilitate investment based on sustainability criteria.
  - Support efforts to empower local actors
  - Support integrated socioeconomic infrastructure and programmes.

### *Challenges for biofuels development*

The following main challenges for biofuels development have been identified:

- **Food Security** – ensure availability, reliability & better markets for farmers.
- **Energy security** – ensure accessibility, reliability, affordability and availability.
- **Poverty reduction** – Vision 2025, PRSP targets and MDGs, income generation.
- **Social consideration** – Empowerment and Participation of Tanzanians in the biofuels industry, improved livelihoods.
- **Environment conservation** – biodiversity, reduced GHG, soil protection, water conservation, reduced deforestation
- Well thought Land ownership and management arrangements
- Agronomy/track record of bioenergy crops.

### *Way Forward*

Government, civil society, communities and private sector will have to work together to come up with realistic and effective policies, regulations and strategies necessary for sustainable biofuel development in Tanzania.

Policy drivers for biofuel development in Tanzania include: poverty reduction, creation of economic opportunities, rural livelihoods improvement, enhance alternative energy supply and industrial development.

Key stakeholders need to fully participate in the preparation and implementation of the national integrated biofuels development programme.

## Session 1

### Bioenergy Policies and Strategies in Africa

#### *Bioenergy for Rural Development – Lessons from West Africa*

Mamadou Dianka, Coordinator PRBE-UEMOA, Burkina Faso

#### **1. INTRODUCTION SUR LA PROBLEMATIQUE DE LA BIOMASSE ENERGIE**

En Afrique de l'ouest la biomasse est utilisée essentiellement sous forme de bois de feu, de charbon de bois et de déchets organiques (excréments d'animaux, résidus agricoles ou agro-industriels etc.) pour des besoins domestiques et très rarement à des fins d'usage moderne génératrice d'une plus grande valeur ajoutée. Elle est menacée par la forte croissance démographique (3% par an en moyenne) et le caractère non durable de la gestion de la ressource.

Ainsi, la problématique de la biomasse énergie s'y situe à tous les niveaux du développement : environnemental, socio-économique, technologique et institutionnel.

#### **2. REVUE DES POLITIQUES, STRATEGIES ET ACTIONS PASSEES**

Depuis ces quinze dernières années, la prédominance des énergies issues de la biomasse (surtout le bois de feu et ses dérivés) dans les consommations finales des ménages a nécessité de nombreuses études et initiatives en Afrique et particulièrement en Afrique subsaharienne. On pourrait citer celles menées par les programmes ESMAP (Energy Sector Management Assistance Programme (ESMAP), RPTES (Regional Program for the Traditional Energy) de la Banque mondiale et les programmes spéciaux GTZ à travers toute l'Afrique.

Ces différentes études sur la biomasse et les nombreux ateliers régionaux organisés par les experts ont permis de mettre en relief les principales contraintes qui freinent la valorisation de la biomasse.

En termes d'actions c'est à partir de la grande sécheresse des années 70 qu'ont débuté les premiers projets de reboisement, de plantations villageoises et industrielles. Très vite, ces expériences de forêts organisées avec plantation d'arbres et autres investissements ont montré leur limite car très coûteux (300 000 à 600 000 FCFA/hectare suivant les zones) et moins accessibles pour les pays.

A la fin des années 80, la tendance était à l'organisation et à la protection des forêts naturelles en lieu et place des grands projets d'aménagement à grand frais. C'est au cours de cette même période que les acteurs du secteur ont reconnu que la question renfermait une dimension énergétique, d'où l'implication de plusieurs spécialistes (énergéticiens, forestiers, économistes, sociologues ...) nationaux et internationaux travaillant dans le sous-secteur des combustibles ligneux.

Malgré quelques acquis en termes de gestion durable et participatives des forêts traditionnelles les activités de gestion de la biomasse modernes ne sont pas encore visibles du fait d'une faible prise de conscience de la question énergétique en général, de la biomasse en particulier et de l'inexistence d'un cadre adéquat pour un plan d'action national ou régional. Avec l'avènement des biocarburants la situation se complique davantage en raison de la polémique et des enjeux sur

l'approvisionnement en énergie moderne tirée de la biomasse dans un contexte de sécurité alimentaire précaire (cf actes de la Conférence de la FAO sur les biocarburants - juin 2008).

### **TRANSITION VERS LES USAGES MODERNES DE LA BIOMASSE** **QUELQUES PISTES EN GESTATION**

Les tendances actuelles de consommations de bois énergie au niveau des ménages ne devraient pas être maintenues en raison de leur impact à long terme avec des répercussions négatives sur le couvert végétal. Il est donc indispensable voire urgent d'entamer la transition énergétique à partir de produits locaux comme les résidus de biomasse substituables au bois énergie. Les procédés de transformation des sous produits agricoles comme les boulets de charbon de tiges de cotonnier, les briquettes de coques d'arachides, la densification de la bagasse de canne à sucre etc., permettent d'obtenir à des prix compétitifs des combustibles qui conviennent à de nombreux usages domestiques et concourent à la préservation du couvert végétal. Le cas d'une pme/pmi malienne évoluant dans le briquetage des tiges de cotonnier carbonisées avec l'appui de l'UEMOA en est un exemple à suivre. Ici, comme avec le projet Bioterre Sénégal de briquetage de la balle de riz en coopération avec la région wallonne de Belgique, on arrive à des prix de 75 cfa/kg, compétitifs par rapport au charbon de bois combustible le plus utilisé dans les villes africaines.

En Guinée Bissau, le gouvernement en s'appuyant sur la filière cajou (plus de 120 000 tonnes/an) a adopté un « Programme Intégré d'Industrialisation Accélérée et de Production d'Energie Electrique 2005-2010 » soutenu par l'UEMOA grâce à un projet de cogénération pour la préélectrification villageoise en cours d'exécution.

Le Sénégal vient de faire un grand pas avec la mise en service au niveau de la Compagnie sucrière depuis fin décembre 2007 d'une unité de production d'éthanol même si les débouchés et les segments de marché restent encore à définir.

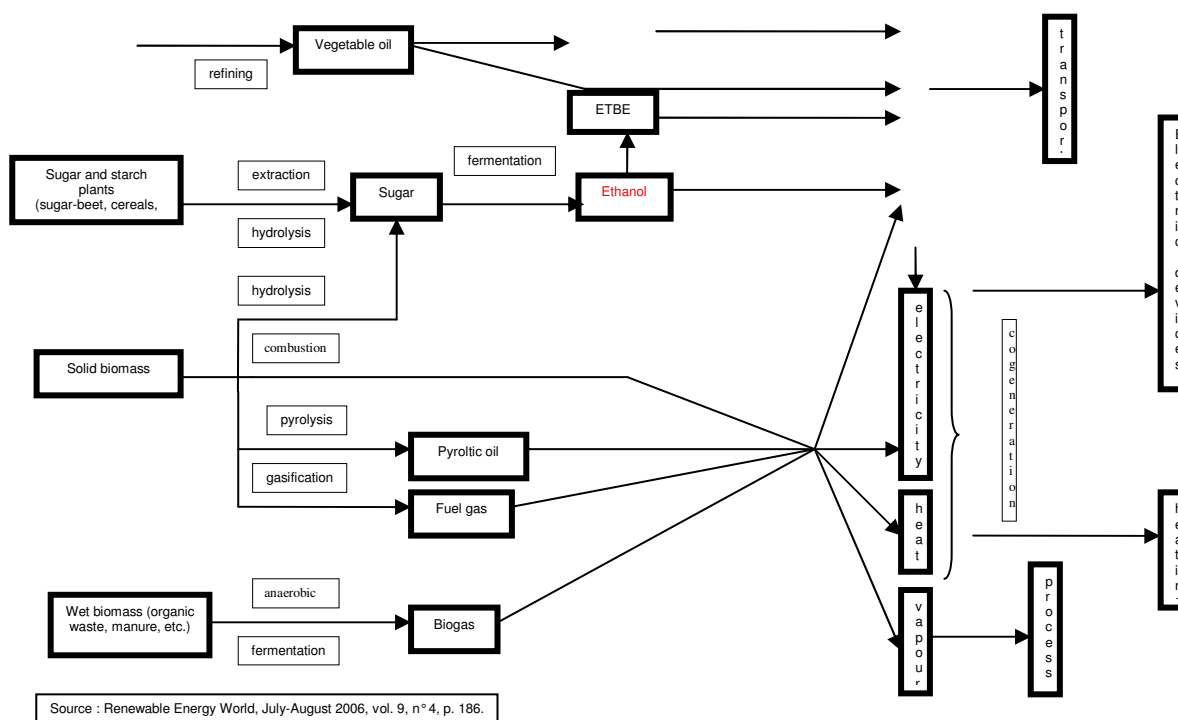
Quant au Mali, il maintient son leadership dans la zone UEMOA dans la filière huile de pourghère (jathropha curcas).

Au regard de ces cas pratiques en gestation, on peut dire que la biomasse peut être convertie en « vecteurs énergétiques » tels que le gaz, le carburant et l'électricité et contribuer ainsi à satisfaire les besoins en énergie des populations et jouer ainsi un véritable levier de développement rural intégré. Ces vecteurs énergétiques sont produits dans de nombreuses circonstances à des coûts compétitifs. Il faut reconnaître aussi que la biomasse est la seule source d'énergie renouvelable permettant de produire des carburants gazeux, liquides et solides à même de remplacer les combustibles d'origine fossiles.

Le schéma ci-dessous donnent une idée sur les principaux procédés de transformation de la biomasse ainsi que la chaîne de valeurs qui les sous tendent.

C'est dire qu'avec les possibilités de production propre et durable de biocarburants (bioéthanol et biodiesel biogaz etc. ), de bioélectricité, de chaleur et de vapeur à partir de la transformation des bioénergies on dispose d'atout certain pour assurer un développement rural mieux intégré et porteur plus de croissance.

## Synthèse de la chaîne de valeurs des cultures énergétiques et de la biomasse sèche/humide



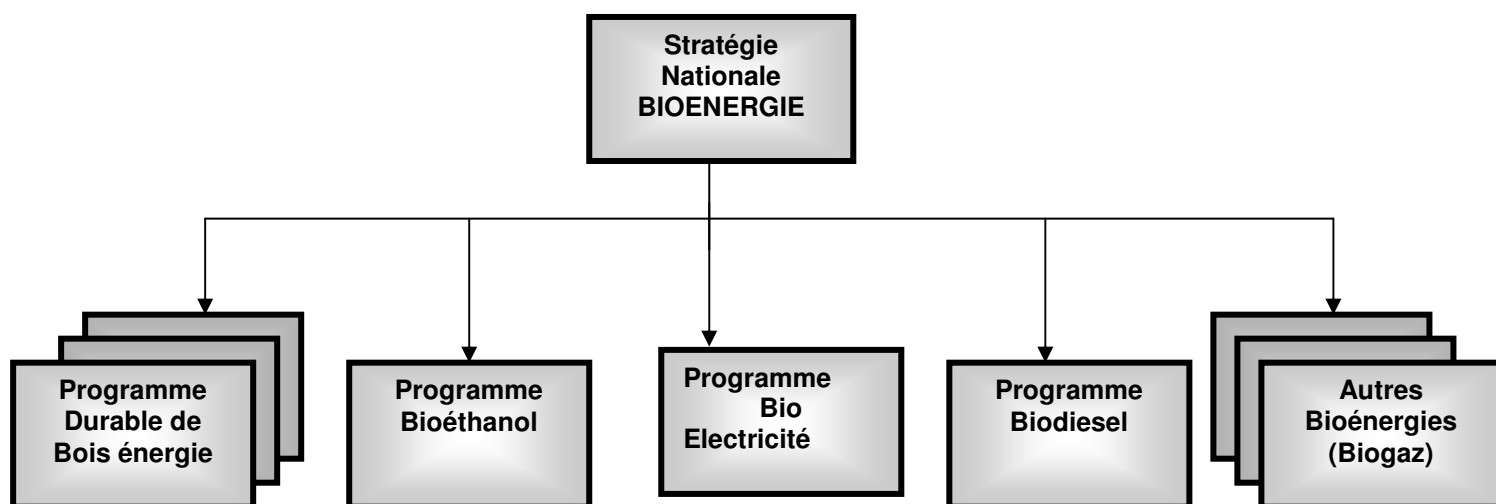
#### 4. NOUVEAU PARADIGME NECESSITANT UNE NOUVELLE STRATEGIE DES BIOENERGIES COMME LEVIER DU DEVELOPPEMENT RURAL INTEGRE

Depuis le Sommet de Johannesburg de 2002, des questionnements se posent quant aux atteintes des Objectifs du Millénaire pour le Développement (OMD) sans apport suffisant d'énergie dans le monde rural des pays en développement. Avec les grands défis à relever dans le cadre des OMD et ce dans un contexte de renchérissement des produits pétroliers, il est évident qu'on doit changer de stratégie énergétique en faisant plus de recours aux énergies renouvelables surtout les bioénergies. D'ailleurs selon la FAO, le présent siècle pourrait être marqué par un net recul de l'économie fondée sur l'usage des combustibles fossiles au profit d'une économie fondée sur les bioénergies, avec l'agriculture et la foresterie comme principales sources de biomasse pour les combustibles biologiques tels que le bois de feu, le charbon de bois, les granules de bois, le bioéthanol, le biodiesel et la bioélectricité. Cela constitue le nouveau paradigme de l'énergie qui interpelle les décideurs politiques avec tendances à s'ajuster davantage vers ce que la FAO appelle l'agro énergie d'autant que les biocombustibles liquides ont pris de l'importance au cours des dernières décennies au Brésil et plus récemment en Europe, aux États-Unis, au Japon et dans d'autres pays de l'OCDE, notamment dans le secteur des transports. On note également des cas intéressants et des prémices en Afrique subsaharienne. C'est le cas l'industrie sucrière mauricienne qui, après avoir assuré l'exportation annuelle de 500 000 tonnes de sucres couvre plus de 40% de la production d'électricité de l'île par cogénération de la bagasse et permet la production de 33 000 tonnes d'éthanol (Autrey, 2007) ; ainsi c'est l'équivalent de 500 000 tonnes de CO<sub>2</sub> qui sont évitées annuellement. On note aussi le démarrage dans certain pays de la production d'éthanol et de biodiesel en Zambie, au Malawi, en Ethiopie et dans quelques pays de l'Afrique de l'ouest à partir de la canne à sucre et d'huiles de jathropa curcas.

Au niveau de la Commission de l'UEMOA, on peut noter dans le cadre de la Politique Énergétique Commune (PEC) des actions et initiatives en cours (mentionnées ci-dessus). Concomitamment des investigations sont en cours pour donner aux décideurs politiques les éléments d'appréciation pour l'émergence d'un marché régional des biocarburants avec à la clef l'évaluation du potentiel existant, l'identification et la faisabilité de projets porteurs et l'élaboration d'un cadre juridique et réglementaire du secteur des biocarburants.

Fort de ces actions la Commission, en référence au « Document de vision et de stratégie régionale de valorisation énergétique de la biomasse pour un développement durable » adopté en avril 2006 à Cotonou (Bénin) invite les Etats à faire un saut qualitatif avec l'adoption d'un agenda bioénergie basée sur une vision et une stratégie dans un souci d'assurer un développement rural mieux intégré. Dans cette optique, la vision et la stratégie proposées aux différents pays s'illustrent comme suit :

**VISION:** Contribuer à la réduction de la pauvreté et au développement durable en Afrique de l'Ouest à travers une approche de développement rural intégré et soutenu par le sous secteur de la biomasse énergie avec des politiques, des stratégies et des programmes d'investissement cohérents.



Pour que cette vision prennent corps, il y'a lieu de lever certaines contraintes liées à l'usage des terres, à la mise en place d'un cadre réglementaire incitatif mais aussi à la prise en compte de la sécurité alimentaire de l'aspect genre. Sur ce dernier point, une récente étude de la FAO (cf FAO News –avril 2008) montre que les projets de production de biocarburants à grande échelle augmentent la marginalisation des femmes en termes d'activités et de revenus. Un récent rapport parrainé par l'UN Foundation et le Hub rural pour l'Afrique de l'Ouest, intitulé «..... ». Pour « booster » les bioénergies de façon durable, le rapport recommande des politiques et stratégies basées sur les cinq piliers suivants :

- ✓ Renforcement de capacités des différents acteurs
- ✓ Appui politique
- ✓ Finance
- ✓ Développement des marchés
- ✓ Technologie et Recherche/Développement

L'UEMOA, en concertation avec les partenaires techniques et financiers et en synergie avec les autres institutions régionales, entend s'approprier des recommandations de ce rapport pour l'émergence d'un marché durables des bioénergies.



## Session 2

### Bioenergy Initiatives for Sustainable Rural Development in Africa

#### *Jatropha Fuelled Rural Electrification Project in the Village of Garalo*

**Mr. Alassane Agalssou, AMADER (Malian Agency for the Development of Domestic Energy & Rural Electrification)**

#### **Reformes du Secteur Institutionnel**

Les grands principes à la base des reformes sectorielles de l'électricité au Mali visent:

- Le recentrage du rôle de l'Etat sur les fonctions de définition de politiques sectorielles;
- La création d'organes de régulation ;
- Le transfert des activités opérationnelles au secteur privé, en créant les conditions pour que ce transfert soit possible et attractif
- La mise en œuvre d'un Programme d'accès aux services énergétiques notamment à l'Électrification Rurale et à l'énergie domestique

Pour ce faire:

- Prise en 2000 de l'ordonnance 00 19/P-RM du 15 mars 2000 portant organisation du secteur de l'électricité qui ouvre le secteur de l'électricité à la concurrence;
- Création de la Commission de Régulation de l'Électricité et de l'Eau (CREE) qui assure la régulation des deux secteurs dans les centres urbains
- Poursuite en 2003 des reformes avec la création de l'AMADER: Agence Malienne pour le développement de l'Énergie Domestique et de l'Électrification Rurale, chargée également de la, régulation dans les zones rurales et périurbaines.

La particularité de la réforme au Mali dans le domaine de l'accès à l'Énergie est que:

- La stratégie de développement de l'électrification rurale a été doublée d'une stratégie de développement de l'énergie domestique
- La préoccupation primordiale de la protection de l'environnement par la promotion des équipements de cuisson à faible consommation de bois énergie et de charbon a été pris en compte
- La promotion du gaz butane et du pétrole comme substituts au bois énergie et au charbon; et la gestion communautaire des forêts sont au centre de la stratégie.

#### **Développement des Services Énergétiques**

Pour conduire la politique d'accès aux services énergétiques en milieu rural et périurbain, le Gouvernement du Mali a créé en mai 2003 l'AMADER avec pour missions:

- La maîtrise de la consommation d'énergie domestique
- Le développement de l'accès à l'électricité en milieu rural et périurbain.

L'Agence Malienne pour le Développement de l'Énergie Domestique et de l'Électrification Rurale (AMADER) est l'agence spécialisée créée par le Gouvernement du Mali pour rattraper le retard cumulé dans l'électrification du milieu rural et péri urbain.

Elle est un Établissement Public à caractère Administratif doté de l'autonomie financière.

Elle gère tous les aspects administratif, juridique, technique, financier et réglementaire dans le sous secteur de l'électrification rurale au Mali.

Pour développer cette activité, elle s'appuie sur les principes directeurs prescrits dans le Cadre de Référence de l'Électrification rurale à savoir:

***La nécessité pour tous les acteurs intervenant sur le terrain d'obtenir au préalable une autorisation d'électrification rurale à la suite d'une concurrence,***

- (i) Le principe de l'octroi de subvention aux acteurs détenteurs d'autorisation,
- (ii) La complémentarité avec EDM-SA etc.

### **AMADER Objectifs**

- Entreprendre une gestion durable des ressources ligneuses et une maîtrise de la demande d'énergie domestique afin d'assurer à travers les populations la gestion de 4 millions d'hectares de forêts d'ici 2020.
- Augmenter le taux d'électrification dans les zones rurales à hauteur de 12% en 2010 et de 55 % à l'horizon 2015 avec un taux de 7% en fin 2007 en milieu rural.

### **Les outils pour l'atteinte des objectifs**

- Cadre de référence pour le développement de l'électrification rurale et de l'énergie domestique;
  - Inventaire des grands principes qui guident la mise en place de la réglementation des secteurs de l'Électrification Rurale et de l'Énergie Domestique;
- Fonds de l'Électrification Rurale-/FER
  - Attribution de subvention d'investissements pour la réalisation des infrastructures pour le développement de l'Électrification Rurale ;
  - Attribution de subvention pour le montage des projets d'électrification rurale
- Arrêté, fixant le régime fiscal et douanier applicable aux marchés et contrats de l'AMADER pour le développement de l'ER et l'ED
- Normes techniques d'électrification rurale: minimas techniques adaptés en milieu rural pour optimiser les coûts d'accès;

### **Rappel de la Politique Énergétiques**

La politique Énergétique Nationale fixe les objectifs de développement des Énergies Renouvelables notamment en matière des biocarburants à savoir:

- Promouvoir une large utilisation des technologies et équipements d'Énergie Renouvelable (ENR) pour accroître la part des ENR dans la production nationale d'électricité de moins de 1% en 2004 à 6% en 2010 et 10 % en 2015 ;
- Développer la filière du biocarburant notamment le pourghère, pour divers usages (production d'électricité, transport, motorisation agricole etc.) ;

- Créer les meilleures conditions de pérennisation des services d'Énergies Renouvelables ;
- Rechercher des mécanismes de financement durables et adaptés aux Énergies Renouvelables.

### **Projet d'Électrification Rurale de Garalo**

La commune de Garalo est située dans le cercle de Bougouni, dans la région de Sikasso, à environ 215 Km de la ville de Bamako.

L'accès se fait par voie routière avec 160 km de route goudronnée et 55 km de piste qui est souvent difficile à rouler pendant la saison des pluies. La population de la commune est environ 19.800 habitants (selon le recensement administratif de 2001). Elle se trouve dans une zone soudanienne avec une saison de pluie abondante

La zone est riche en flore et faune, avec une grande variété végétale et d'espèce animale.

Le Sud de la commune est traversée par une rivière qui se jette dans le Bani (un affluent du fleuve Niger) à Bougouni.

La commune est constituée de trente (30) villages dont le village de Garalo est le chef lieu de la commune. Elle dispose d'une potentialité énorme de Pourghère, qui est la matière première utilisée pour servir de carburant. Les graines sont récoltées deux fois dans l'année.

### **Le Porteur du Projet**

ACCESS, une Entreprise de droit malien de fourniture de services énergétiques, appuyé par:

- **MFC Nyeta**
- DOEN/ FACT FOUNDATION; Une fondation hollandaise dont l'objectif est la valorisation, et la promotion des biocarburants pour les communautés rurales dans les pays en voie de développement;
- AREED (African Rural Energy Enterprise Development) une initiative du Programme des Nations Unis pour l'Environnement (PNUE) en vue d'appuyer les PME/PMI en fourniture de bien et service énergétique;

pour installer et faire fonctionner une centrale de 300 kW avec l'huile de Pourghère pour fournir des services énergétiques

Le projet permet d'alimenter des clients productifs, socio-communautaires et des clients domestiques avec un système de tarification adaptée à la capacité de paiement des clients ( trois tarifs au forfait et un tarif au compteur)

### **Présentation Generale du Projet**

- Promoteur: **ACCESS**
- Objectif: desserte en électricité de **647** clients
- Coût global du projet : **255,7** millions de francs CFA, dont :
  - Subvention AMADER : **191,8** millions de francs Cfa
  - Apport Promoteur : **63,9** millions de francs Cfa
- Source de production : Centrale à Huile de Pourghère
- Nature du projet :
  - Projet de Candidature Spontanée d'Électrification Rurale ;.

### **Historique du Projet**

- Date de levée du Permis Préliminaire: 09/06/2005
- Date de signature de la convention : 21/07/2006
- Date de mise en place de la contrepartie: 05/01/2007
- Date de mise en service: 01/01/2008

### **Principales Caractéristiques de l'Electrification de Garalo**

- Puissance de la centrale: 3 x 100 KVA
- Longueur du réseau basse tension: 18 km
- Nombre de clients réseau Connecté: 238
- Durée du service: 16 h
- Tarif moyen du kilowattheure: 190 FCFA

### ***Coût de production de l'huile***

Système décentralisé disposant d'une presse type mécanique

- Prix des graines récoltées sur site: 50 FCFA/kg
- Pas de décorticage, broyage et préchauffage
- Après pressage: filtrage de type traditionnel

Prix : 230 – 240 FCFA/litre pour une production annuelle de  $\approx$  25.000 l

Prix plus élevé avec (transport, autre presse, prétraitement, raffinage, autres traitements)

### ***Plusieurs autres projets***

Dans le cadre du programme national de valorisation de la plante pourghère divers projets d'électrification rurale ont été réalisés:

- Kéleya
- Dialakorobougou
- Niomsombougou

Plusieurs plateformes multifonctionnelles pouvant fonctionner à l'huile de pourghère ont été installées avec des réseaux d'électrification dans les localités rurales du Mali.

Des recherches actions de reconversion des groupes diesel installées dans le cadre d'autres projets d'électrification sont menées dans la zone d'électrification multisectorielle de Koutiala.

## Session 2

### Bioenergy Initiatives for Sustainable Rural Development in Africa

#### *Jatropha Network Activities in Mali*

**Mr. Ousmane Ouattara, Mali-Folkecenter NYETAA**

#### **Développement de la Filière Pourghere**

##### *Objectif*

Promouvoir des sources locales d'énergies renouvelables afin de:

- Contribuer à la réduction d'importation d'hydrocarbure,
- Contribuer à la réduction de la pauvreté,
- Créer des richesses et des emplois,
- Contribuer à la réduction d'émission de CO<sub>2</sub>

##### *Objectifs Immédiat*

1. Consolider les informations disponibles sur le Pourghère viabilisées par des analyses financières, économiques et socioculturelles,
2. Assurer une diffusion large (Hommes, femmes, jeunes) via une stratégie de communication clairement définie,
3. Augmenter la production et la productivité du Pourghère,
4. Renforcer les connaissances sur sa culture et son exploitation,
5. Faciliter la professionnalisation des acteurs et favoriser l'émergence d'un marché national,
6. Élaborer une stratégie nationale de développement de biocarburant.

##### *Résultats*

1. Analyses financières, économiques et socio - culturelles fiables,
2. Stratégie de communication élaborée et opérationnelle,
3. Instauration du principe d'égalité des sexes
4. Augmentation du nombre de formations sur les techniques de plantation et de production,
5. Amélioration de la productivité grâce à la réalisation de recherches appliquées et renforcées ainsi qu'à la diffusion des résultats,
6. Soutien à la professionnalisation des acteurs de la filière grâce à l'accompagnement d'opérateurs: Création d'entreprises privées,
7. Stratégie de développement des biocarburants établie.

### *Le Poughere*

- Plante locale à croissance rapide,
- Adaptée à l'environnement du Mali,
- Très connu en zones rurales,
- S'adapte à des isohyètes de 500mm,
- Résistant aux insectes nuisibles,
- Non consommés par les animaux,
- Peut être replanté dans les sols dégradés,
- Peut jouer un rôle dans la lutte contre la sécheresse et la désertification
- Très répandu et utilisé comme haie vive pour la délimitation des parcelles.
- Utilisé pour la confection du savon, par pressage de l'huile et un tourteau (fertilisant organique)

### *Un Réseau Pourghère*

Pour contribuer au développement durable de la filière Pourghère par:

- La création des groupes thématiques
- La recherche sur les variétés résistantes,
- L'appui au développement de model économique sur la filière
- L'appui à l'élaboration de projets et de stratégies nationales,
- L'information et la sensibilisation :
  - ♦ La création de base de données,
  - ♦ La communication sur les différentes expériences,
  - ♦ La vulgarisation des informations et des technologies, disponibles sur l'essence,
- Faire un lobbying en faveur de la filière Pourghère à travers les critères jugées durable.

### *Les groupes Thématiques*

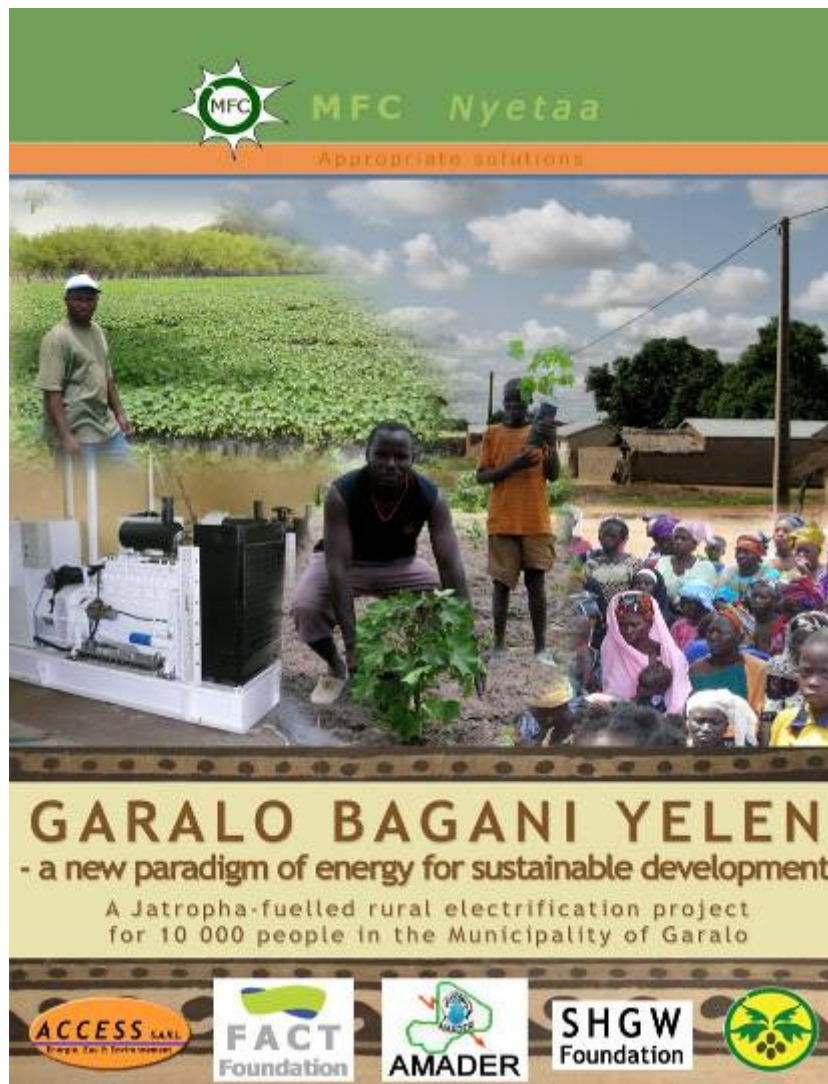
<b>Groupes Thématiques</b>	<b>Objectives</b>
<b>Agronomie</b>	Valoriser le Pourghère a travers la recherche sur le matériel génétique
<b>Valorisation Energétique</b>	Identifier les possibilité de valorisation des produits du Pourghère
<b>Valorisation des sous produits</b>	Prospecter la valorisations sous forme de fertilisant et d'aliment de bétail
<b>Critères de durabilité</b>	Mettre en place un système de veille pour la durabilité de la filière
<b>Commercialisation</b>	Comprendre le marché
<b>Communication</b>	Diffuser l'ensembles des informations disponible sur la filière
<b>Lobbying et Plaidoyer</b>	Entreprendre des démarches citoyennes auprès des autorités en faveur de la filière

### ***Modèle Communautaire Décentralisé***

Systèmes d'énergie à base de Pourghère installés dans des zones rurales comme outils afin de stimuler l'économie locale par l'apport de services d'énergie modernes décentralisés (PTF) :

- Des productions locales à hautes valeurs ajoutées,
- Rôle important de la photosynthèse: Puit de carbone

### **Garalo Bagani Yelen: Nouvel exemple énergétique pour le DEVELOPPEMENT DURABLE**



## Session 2

### Bioenergy Initiatives for Sustainable Rural Development in Africa

#### *Experiences of the Union of Jatropha Cooperatives in Koulikoro*

**Dr. Mamadou Sangare, Union Locale des Sociétés Coopératives de Producteurs de Pourghère (Jatropha) de Koulikoro (ULSPP)**

#### **Union Locale des Sociétés Coopératives de Producteurs de Pourghère (Jatropha) de Koulikoro (ULSPP)**

##### *Contexte*

- Mise en place à Koulikoro du programme de Développement Économique de la Région de Koulikoro (DERK).
- Création des filières porteuses dans les cercles de Dioila, Banamba et Koulikoro Dont la filière POURGHÈRE à Koulikoro.
- Construction de l'usine Malibiocarburant à Koulikoro.

##### *L'ULSPP*

- L'ULSPP regroupe 12 sociétés coopératives des producteurs et productrices de Jatropha (pourghère).
- L'ULSPP est co-actionnaire de Mali biocarburant S.A. Cette société dispose d'une usine à Koulikoro.
- Créée en 2006 reconnue légalement de nos jours 1017 paysans sont membres de ULSPP dont 207 femmes et 810 hommes possédant 2112 ha de Jatropha.

##### *Organes de Gestion*

- L'assemblée générale des membres (3 délégués par société coopérative).
- Le conseil d'administration composé de 14 membres (dont 2 femmes et 12 hommes).
- Le comité de surveillance composé de 3 membres.
- Direction technique: Elle est composée de 10 salariés (un directeur technique, un comptable, des animateurs, et le personnel d'appui).

##### *ULSPP Vision*

#### ***Contribuer à la promotion socioéconomique des producteurs et productrices de Jatropha (Pourghère) de la région de Koulikoro à travers:***

1. Procurer des revenus supplémentaires au paysans qui sont motivés
2. Produire du biodiesel en remplacement du gasoil classique (fossile)
3. Compenser les émissions de CO<sub>2</sub>.



### *ULSPP Mission*

- Vulgariser et augmenter la production et la productivité du Jatropha (Pourghère) au niveau des sociétés coopératives par l'introduction d'innovation technique.
- Défendre et sauvegarder les intérêts de nos membres auprès des pouvoirs publics.
- Offrir à nos membres des services de formation et d'innovation.
- Acquisition d'infrastructures/équipements pour l'ULSPP une unité de fabrique de savon spécifiquement pour les femmes de ULSPP grâce au partenariat avec la CRA de Koulikoro.
- Offrir à nos membres des services de recherche de partenaires techniques et financiers
- L'appui à l'acquisition d'équipements/ d'infrastructures.
- Des noix de Jatropha achetés aux producteurs locaux sont transformés en l'huile.
- Cette huile de Jatropha achetée aux producteurs est transformée en biodiesel.
- Assurer de façon satisfaisante la commercialisation au Mali à travers une bonne négociation des prix aux producteurs avec Mali Biocarburant et d'autres partenaires.

### *Les Principales Activites de l'ULSPP*

- L'achat des graines de pourghères aux producteurs et productrices membres de l'ULSPP.
- La commercialisation de l'huile de Pourghère à son principal partenaire Mali Biocarburant pour production de Biocarburant

### *Commercialisation de l'Huile de Pourghère au Niveau de ULSPP*

- Recherche de marché (achat de graines, pressage des graines et négociation de meilleurs prix avec Mali Biocarburant)
- Élaboration de plan de campagne d'achat de graines de Pourghère à l'intérieur du pays
- Approvisionnement des sociétés coopératives membres de l'ULSPP en semences, en équipements /matériels de stockage et conservation des graines et de l'huile de Pourghère
- Achat de graines de Pourghère;
- Contrôle de qualité de graines de Pourghère;
- Groupage des stocks de graines de Pourghère;
- Conservation dans les magasins.
- Vente de l'huile à Mali Biocarburant S.A dont l'ULSPP est actionnaire avec 20% des parts

### *Production de Graines de Qualité*

- Élaboration d'un plan de campagne de production/commercialisation;
- Approvisionnement des membres de l'ULSPP en semences et en équipements/matériels (brouette, charrue, puits, citerne, bœufs de labour).
- Préparation de champs de la campagne de culture (nettoyage des champs et défrichage).
- Culture proprement dite: le labour; les semis; désherbage et les entretiens divers.
- Suivi, Appui et conseil des membres de l'ULSPP dans application des techniques culturales.
- Récolte, Préparation des graines, emballage/stockage.

- Préparation de la phase de récolte des champs: Cueillette; Séchage; nettoyage et ensachage.
- Contrôle de qualité des graines.
- Groupage des stocks dans les sacs labellisés et dans les magasins.
- Vente des graines à l'ULSPP.
- Pressage des graines pour extraire huile stockée dans les citernes.
- Vente d'huile de ULSPP à Mali Biocarburant SA.
- Transformation de l'huile de Pourghère par Mali Biocarburant S.A en Biodiesel.

#### *ULSPP Partenaires*

- La chambre régionale d'Agriculture de Koulikoro
- L'ambassade royale des pays Bas
- La SNV
- Mali Biocarburant S.A
- L'AOPP; CRU; IFDC/OPV(GIPD)
- Le KIT
- Les institutions de micro finances décentralisées
- Le PASAOP
- Trees for travel, Boerenunie ULSPP, Tropeninstituut, l'université de Wageningen et **KIA**

Ces partenaires sont impliqués dans ce projet et s'occupent de son accompagnement et de son développement.

## Session 2

### Bioenergy Initiatives for Sustainable Rural Development in Africa

#### *Case Study of Successful Commercial Jatropha Plantation in Ghana*

**Ohene Akoto, Director Jatropha Africa, Ghana**

#### **Overview of biodiesel in Ghana**

Even though biodiesel, in the form of shea butter oil, has been used for a long time in northern Ghana for lighting in lanterns, interest in its production, at the national level, can be traced back to only the period after the oil shocks of the late 1970s and early 1980s.

In response to the crisis, the Government of Ghana established a National Energy Committee to develop a strategy towards mitigating the impacts of the spiralling crude oil prices. One of the key recommendations of the Committee was the need for Ghana to develop alternative fuels to petroleum products. The focus, at that time was, on the production of gasoline.

Unfortunately, the efforts and recommendations of the Committee were not followed through, owing to two reasons. First, the recommendations of the Committee were not transformed into a comprehensive implementation programme. Secondly, crude oil prices in the world market declined from the high levels of US\$40/barrel to US\$20/barrel making the gasohol intervention financially unattractive.

In recent times however, the interest in biofuels in Ghana has been rekindled. The focus, this time around, is mainly on the production of biodiesel from the Jatropha plant. The Jatropha plant is reported to grow almost everywhere in Ghana. It grows on sandy and loamy and thrives in hot weather. Jatropha requires very little water to thrive and can withstand long periods of drought. Ghana is primarily an agricultural country with most of the population engaged in it and has the appropriate climate and soils all over the country that can support the large-scale cultivation of the Jatropha plant. Indeed, at present Jatropha is cultivated in several parts of the country from the northern savannah region to the tropical forests areas in the south and is reported to be doing well as it grows wildly through out the country. It is anticipated that, under proper agronomical practices, Jatropha plantations in Ghana could yield between 2.0 tonnes and 5.0 tonnes per hectare depending on quality of the soils. With appropriate technical assistance and investment support, large scale cultivation of Jatropha and other energy crops could be developed in Ghana.

Growing Demand For Energy:

The International Energy Agency has projected that global crude oil production capacity needs to be increased by a margin of 37.5 million barrels per day by the year 2015. This projected increase in global daily output is needed to satisfy the increase in demand and the replacement of loss of output from old wells. The same agency's estimates from all the 230 major oil exploration projects which will come on stream by 2015 will yield only 25 million barrels per day capacity. This creates a shortage of 12.5 million barrels per day production capacity is what will be largely responsible for keeping the price of crude oil near or above the \$100 per barrel in the short to medium term. A gyrating crude oil price within the range of \$80 to \$100 per barrel makes the price of biodiesel production more competitive without the need for government subsidies to make biodiesel projects viable.

In order for biodiesel producers to take advantage of the projected high price of crude oil in the short to medium term, however, there is the need for these producers to find low cost feedstock to feed their biorefineries. This is because the level of profitability biodiesel refinery or even its viability largely depends on the ability of biodiesel operator to control the supply and the price of the refinery's feedstock. This is the direct consequence of the economics of biodiesel production. The production cost distribution of a biodiesel facility is given as follows. The price of feedstock represents about 75% of the operating cost. The remaining 25% of cost in order of importance are transportation (11%), process chemicals (7%), depreciation (3%), and maintenance (2%) with electricity and labour taking about 1% each. From the above figures, it is imperative that any biodiesel producer must devote most of its energy in developing a sustainable source of feedstock whose price is stable and if possible has no alternative uses.

## **Problems and Issues for Biofuel Industry**

The major problem with the price and the supply of biodiesel feedstocks such as palm, soya bean and rape seed oil is that these feedstocks also serve inputs in the food industry. The implication is that food processors and cosmetic producers usually bid up the price of these feedstocks beyond the point at which biodiesel producers cannot make marginal profits on their biodiesel refineries. The European Union, for instance, has approximately six million tonnes of installed biodiesel refining capacity. However, only fifty percent of this installed capacity is currently being utilized. This is mainly due to inadequate supply reasonable priced feedstock resulting in the scaling down of biodiesel production plans within the Union. This strengthens the thesis that the search for profit in biodiesel begins with the development of a viable feedstock and that brings the discussion to *Jatropha*.

*Jatropha* is a tropical plant whose seed contains thirty percent (30%) vegetable weight by weight. The chemical profile of *Jatropha* vegetable oil is even better than the traditional feedstocks such as rapeseed oil, soya bean oil and palm oil. The advantage of *Jatropha* over these traditional feedstocks is that it is more versatile plant which can be planted in tropical countries which have advantage of large tracks of land and relatively low labour cost.

## **The Critical factors to consider setting up large Scale *Jatropha* plantation**

### ***Land***

The quest to secure large tract of land for *Jatropha* plantation come with huge cost. This cost can be itemised as, cost of payment of the land, cost of payment to surveyor who will demarcate the propose site to set up boundaries, payment to government bureaucracies such as processing and stamp duties prior to the registration of land title as well as the payment of fees to local planning authorities for planning permissions. The cost and time consuming nature of the land acquisition exercise may derail most business plans and make your investment not worthwhile. The business model of *Jatropha* Africa involves acquiring land without making upfront payment by converting the value of the land into equity for the land owner. In Ghana, land owners are mostly chiefs. In this case the landowner becomes partner to our company .This has two advantages namely:

- (i) The money which we will have used to buy huge tracts of land will now be used to bring more hectares under plantation. The landlord being equity holder will stand the chance to enjoy return on Investment as the business expands.
- (ii) Since the land owner is equity holder, he will serve as security in the area of operation and also serve as link to his people or subjects.

### ***Selection of Plantation site***

There are a lot of features on internet which states that *Jatropha* plant can grow well on marginal lands and that it can survive under adverse climatic conditions and that it needs no irrigation or fertiliser to grow well. However, marginal land yields marginal harvests. Therefore, to retain good returns to share holders, the best land possible is acquired. A matrix of factors is taken into consideration among which are the rainfall patterns, accessibility to infrastructural facilities, nearness to transportation routes to access our target markets. In all these intercropping of staple crops is encouraged.

### ***Rainfall Pattern***

The *Jatropha* plant grows well in low rainfall conditions needing a minimum of 600mm in hot climatic conditions. It can barely survive in climatic conditions where it is exposed to frost. The *Jatropha* Africa plantation site in the Brong Ahafo region of Ghana is located in an area with an approximate rainfall of 1000mm per annum. This is 70% more than the required minimum rainfall for the cultivation of the *Jatropha* crop. *Jatropha* Africa would have preferred a location where the rainfall pattern is 1200mm per annum and well distributed throughout the year but those locations in Ghana are used to cultivate cocoa which is Ghana's main cash crop for export. One tonne of cocoa is being quoted at Chicago and London Future exchanges at nearly US\$2,000 per tonne. The highest price that dry *Jatropha* seeds can fetch under current economic conditions is US\$200 per tonne. There would therefore be no economic sense in using such lands to cultivate a crop (*Jatropha*) which has ten times less economic value. However, in the attempt to maximise profit, a site with a good rainfall pattern should be selected.

### **Planning for nursery and transplantation**

Ghana is a tropical country with hot humid climate. As such there is abundance of pests, insects and diseases that attacks young plants. This increases the cost of most agricultural operations and will ultimately affect profits. This increased cost arises out of the cost of and applications of chemicals to control pesticides, insects and diseases. The company will be unable to derive sub-optimal growth of plants due to insect attacks and possibly plant loss. Fortunately, the *Jatropha* is naturally toxic which enables it to resist attacks. However, the plants develop its poison only after six months of growth. The implication is that the plant should be 'nursed' for at least six months before transplanting to ensure that it is adequately poisonous to protect itself. Besides, the seedlings should be timed such that the six months maturation period of the seedlings will coincide with the onset of the major raining season. Thus, each batch of seedlings will be timed to 'graduate' just when the major raining season is about to set in. The advantage of this method is that the plants get adequate moisture in order to mine soil nutrients they need for the survival and growth. Unless an irrigation system is in place, the failure to time the plan the six month maturity period of the seedlings to coincide with the onset of the major raining season will result in losses of plants to drought. The plants that are able to survive the droughts will not be in a physiological state to produce optimal yields in the future.

### **Transportation and Storage**

In large scale plantation access roads to project sites and the location to store machinery and output needs to be taken into consideration. Since the country has not developed there are still places without access. *Jatropha* Africa used its tractor and front load to make an access road to its farm. Now the road is accessible to the farm site, and *Jatropha* seed can be transported to the farm. As the distance from the plantation to residential areas is not far, it serves as temporary storage for all machinery and equipment. The seeds are stored in bags at a well ventilated area in order to prevent self ignition. A storage facility in the farm will be set-up by 2010. Transporting *Jatropha* seeds/oil from the storage facility to the main port of Ghana will be done via a subcontract with a River transport Company at moderate costs.

## **Supervision, Monitoring and Evaluation**

Jatropha Africa has developed the following model to manage its labour force. This organization structure includes managers, supervisors and team leaders. A team leader is responsible for 11 workers, a supervisor for 23 workers. 4 teams are supervised by a manager. Meetings among the teams occur once every month with the Operation Director to address issues about the progress of the farm and workers welfare.

## **Fertilizer**

The Jatropha plant yields higher output if it is fertilised. However, the cost of mineral fertilizer is very expensive compared to the return expected from a hectare of plantation. This does not mean that efforts should be abandoned in seeking for solutions to increase soil fertility and organic matter content. Jatropha Africa uses the waste products from the pod to create organic manure which will be used to fertilise the land in order to yield higher returns.

## **Irrigation**

The Jatropha crop is a biological plant. As such, it grows best and yields maximum quantity of fruit per hectare if it gets adequate and well distributed rainfall. However, in practice the rainfall pattern is often not well distributed throughout the year, it is also not predictable. The ideal solution is to locate a plantation near the forest belt where the rainfall is more reliable. However, the rent on land attracts the highest premium near the forest zone, because such lands can be used to cultivate high value cash crops such as cocoa or oil palm. It will be very difficult to get huge tracts of land in such places to develop Jatropha plantation. Ideally, the solution will be to irrigate the plantation to yield the highest returns in terms of the seeds per tree harvested. A well irrigated Jatropha plantation can yield 3 harvests per year, but the cost of irrigation equipment (diesel pumps, pipes, tubes and canal) is prohibitively expensive. Jatropha Africa chose to irrigate the seedlings and nurse them with adequate nutrition until the seedling graduate at 6 months old. By then, the plants would have developed the natural toxins to prevent their leaves being browsed by animals or being attacked by pest and disease.

## **Governmental Relations**

Presently, Jatropha Africa is providing input for the formulation of the district assembly (local Authority) development plan so as to influence the plan to get the road leading to the plantation to a state road.

The Ghana Standards Board has tasked a committee to come out with Ghana Biofuels Standards. Jatropha Africa is represented on this committee. The importance of this representation is that the completed form of these standards will be friendlier to business plans and technologies. Building strong relationship with those in power will help facilitate operations.

## **Employing Local Expertise**

It is very important to employ local experts who are very knowledgeable, experienced and trustworthy about African labour, elites and culture. This person will be the vehicle to remove local cultural barriers and pave the way to gaining the acceptance of a project.

## **Fire Risk Management**

The main source of income to the people in the area of plantation is 'Charcoal burning' and peasant farming. Thereby, often fires threaten to destroy plantation. Jatropha Africa has set up fire

belts at the edges of the farm, wells with water pumps and hoses; and it performs informal education on fire hazard and safety measure for the local farmers.

## **Problems Encountered**

### ***Funding Problem***

As no one has done this business to be profitable, accessing funds was a big challenge. Jatropha Africa developed a model with zero government subsidies and good cost reduction strategies. Since Jatropha Africa Limited is a profit making company its main goal is to return good value to shareholders. Therefore, the two main overriding concerns before setting up the plantation are to control all costs as much as possible, risks within reasonable limits. The reduction of cost entails reducing most of the real or perceived risks to the barest minimum.

### ***Regulation Framework***

The Government of Ghana does not have standards for biofuels. Just recently the Ghana Standard Board has tasked a committee to develop Ghana Biofuels Standards. So far, the committee focused on the approaches of developed countries involving too high costs (e.g. of tests) for investors.

### ***Low level of Education on the use of Biofuels***

There is low level of information or no awareness on the use of biofuel in Ghana. In the past Jatropha was used for fences and the economic importance of the plant is not known. As a consequence it is even difficult to mobilise work force for Jatropha plantations.

### ***No scientific data***

There are inadequate data on Jatropha farming. For instance, there are limited data on water and fertiliser requirements as well as on pest control.

## **Pitfalls Investor should avoid**

Large investment in ventures involving high risks such as agriculture is difficult. The following recommendations for investors are stated:

- (i) Investors shall acquire lands by involving the chiefs or land owners as equity holders rather than buying lands. Lack of care for social responsibility will create problems.
- (ii) Investors shall employ local experts with knowledge and experience to deal with African labour force and to serve as a vehicle to solve cultural difficulties.
- (iii) Investors shall carefully consider the regulation framework.

## Session 3

### The Trade-offs of Bioenergy in Africa – Ensuring Sustainability

#### *Biofuels in Africa – The Land Use Issue*

**Dr. Helen Watson, University of KwaZulu-Natal, South Africa**

#### **Introduction**

Africa appears capable of sustaining a very substantial increase in biofuels feedstocks production. The availability of suitable land for such production does not appear to be a constraint. In their comparative assessment of all the world's major regions, Smeets et al. (2004) concluded that sub-Saharan Africa has the greatest bioenergy potential due to its large areas of suitable cropland and unused pasture land, as well as the low productivity of land under agriculture. According to Ravindranath et al. (2009), less than a fifth of sub-Sahara's non forested land suitable for agriculture was under crop production in 2005, and only about 2% of this land would be needed to meet biofuels feedstocks production for a 10% import substitution. The production of biofuels in Africa promises many opportunities such as creating rural employment, improving transport infrastructure, saving and earning foreign exchange, arresting deforestation, rehabilitating degraded lands and improving marginal lands. However, there are increasing concerns about the risks of doing so on biodiversity, food security, and poor people's access to natural resources and land.

Sugarcane is the most promising biofuels feedstock in southern Africa. As part of the European Commission INCO project "Cane Resources Network for Southern Africa" (CARENESA)<sup>1</sup>, land available and suitable for sugarcane in the region was identified using Geographic Information Systems (GIS) to interrogate 1km<sup>2</sup> resolution protected area, land cover, climate, elevation and soil data sets. To avoid detrimental impacts on biodiversity, all categories of protected areas, closed canopy forests and wetlands were excluded. To safeguard food security, all areas under food and/or cash crop production were excluded. Also excluded were areas unsuitable because of climate, terrain and soil constraints.

The assessment found that nearly 6 million hectares of suitable land is available, clearly suggesting that 'land' is unlikely to be a limiting factor in harnessing the region's bioenergy potential<sup>2</sup>. As part of the European Commission INCO project "Competence Platform on Energy Crop & Agroforestry Systems for Arid and Semi-arid Ecosystems – Africa" (COMPETE)<sup>3</sup>, the same methodology was used to identify 1 840 044 km<sup>2</sup> of land available and suitable for biofuels feedstocks production in the arid and semi-arid regions of eight sub-Saharan countries<sup>4</sup> - findings again supporting the perception of Africa's enormous biofuels potential. However, Watson (2008b, 2009a, b and c) urges caution in embracing this perception and calls for further GIS analysis using better resolution data and ground verification. She concluded that while the estimates of available and suitable areas for biofuels feedstocks production obtained in these projects are useful in terms

---

<sup>1</sup> [www.CARENESA.net](http://www.CARENESA.net)

<sup>2</sup> Baijnath (2005) and Watson *et al.* (2007) give a detailed description of the work in Malawi, Mozambique, Tanzania, Zambia. Johnson *et al.* (2007) and Watson (2007) discuss the implications of the findings in Malawi, Mozambique and Zambia. Ackbar (2007) and Sibanda (2008) give detailed descriptions of the work in Angola and Zimbabwe, respectively. Watson (2009a and b) discusses the internal and external implications of the findings in all six countries, respectively.

<sup>3</sup> [www.compete-bioafrica.net](http://www.compete-bioafrica.net)

<sup>4</sup> Detailed descriptions of the methodology and findings of this work are given in Watson (2008a) and Watson (2009c), respectively.



of ranking the comparative potential of different countries or of different parts of a country, they are generous on account of three factors. The influence of each of these factors on the potential accuracy of the estimates is described below.

### **Safeguarding Biodiversity**

While it is theoretically sound to designate protected areas as unavailable for bioenergy crop production and to filter them out, the UNEP et al. (2006) dataset is not sufficient to safeguard biodiversity, particularly in Africa. Historically the motivation for most protected areas on the continent being accorded their status was on account of either their being unsuitable for commercial agricultural activities because the land was marginal, too steep, infested with malaria and/or sleeping sickness etc, or their being needed to serve as a buffer between land claimed by the white colonists and land allocated for African use. For a substantial period, management practices within them such as veld burning and culling, were not driven by conserving biodiversity considerations but were rather focused on large mammals, trophy species and improving game viewing. They therefore only contain a limited, biased sample of biodiversity. With the exception of South Africa, most the continent's protected areas remain unfenced. Consequently, surrounding communities exploit natural resources within their periphery, and animals move into surrounding areas and even across to other protected areas. Rather than designating all categories of protected areas as unavailable for bioenergy crop production, their contemporary status should be assessed. In many countries in civil turmoil such as Zimbabwe and the Democratic Republic of Congo, they are protected in name only, and may no longer merit being filtered out.

Watson (2009a, b and c) asserts that the location and spatial extent of biodiversity hotspots, the habitats of keystone species and of ecosystems not adequately represented in protected areas, buffers within and around protected areas, and corridors between them need to be integrated into analyses of this type. The six maps compiled by Hennenberg et al. (2008) in Figure 1 showing areas of Tanzania that should be considered unavailable for bioenergy crop production on account of their biodiversity status, clearly support her assertion. By using the UNEP et al. (2006) protected area dataset to filter out the areas shown in the World Heritage and Ramsar Sites, and National Protected Areas maps, as well as the EC JRC's (2003) 2000 GLC dataset to filter out forests and wetlands, most of the areas shown on the combination of the Biodiversity Hotspot, the Key Biodiversity Areas and the Wetlands maps, would be considered unavailable for bioenergy crop production. However, several critically endangered ecoregions e.g. the area in the north-west corner of the country between Lake Victoria and the border with Rwanda, would be missed out. The linear distributions of the fragments in the National Protected Areas map lend themselves to inclusion in corridors between the larger protected areas. Hennenberg et al. (2008) combined the six maps shown in Figure 1 to produce Figure 2. This map challenges the perception of Africa's enormous biofuels potential on account of its vast expanses of suitable land. Using a combination of different criteria to delimit areas with biodiversity which should be safeguarded against conversion to biofuels feedstocks production, most of Tanzania is evidently unavailable.

### **Safeguarding Food Security**

Food Security considerations played a large role in motivating the COMPETE project's focus on arid and semi-arid regions. The land identified by Watson (2008a) as available and suitable for biofuels crops in these regions in the project's eight study countries is currently not used for food crops. Biofuels feedstocks production is not viable on this land without irrigation. The assessment of this land is currently being refined to identify strips in close proximity to rivers with irrigation potential. The irony of using suitable soils and terrain, and access to water as qualifying criteria for land to be identified as viable for biofuels crops, means that this land is also potentially viable for food crops.

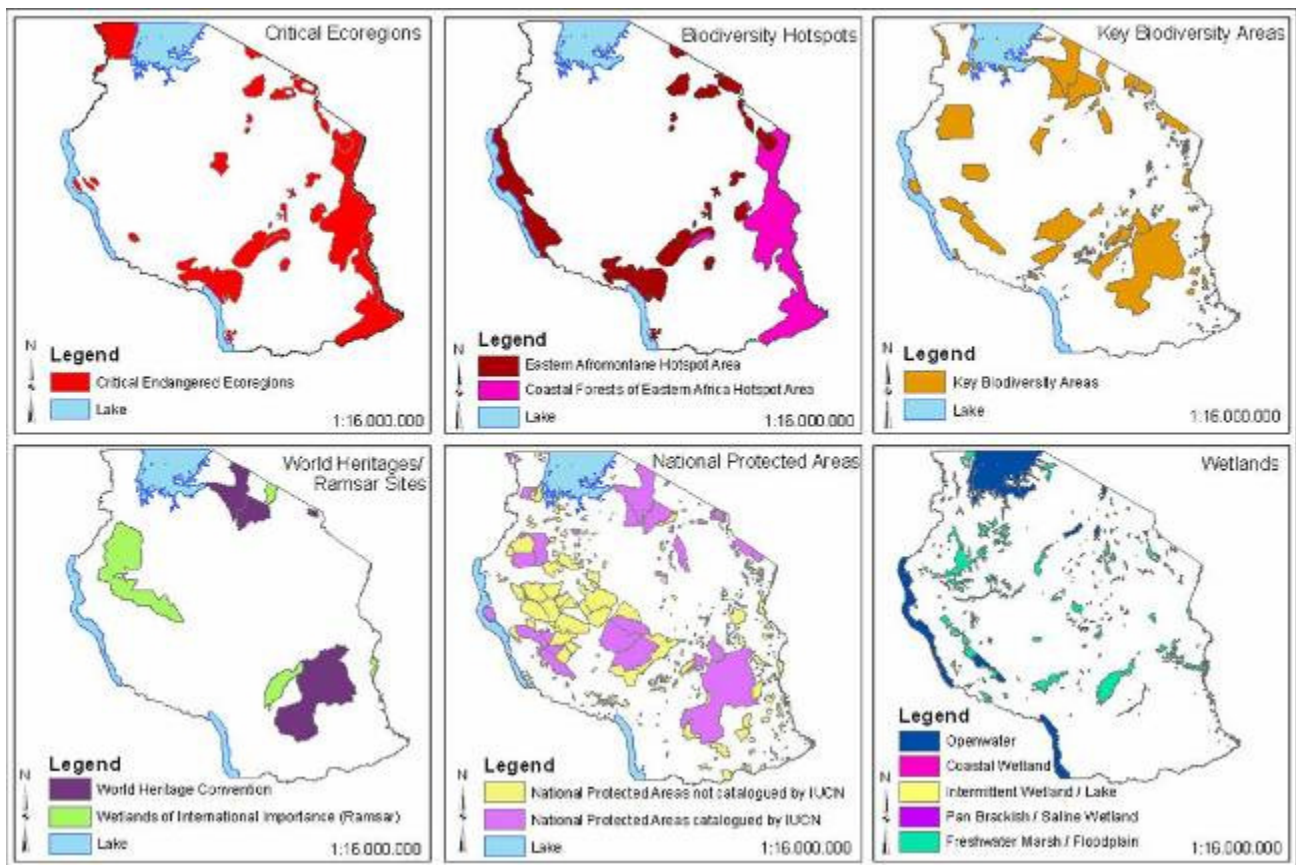


Figure 1: Biodiversity of Tanzania (Hennenberg *et al.*, 2008)

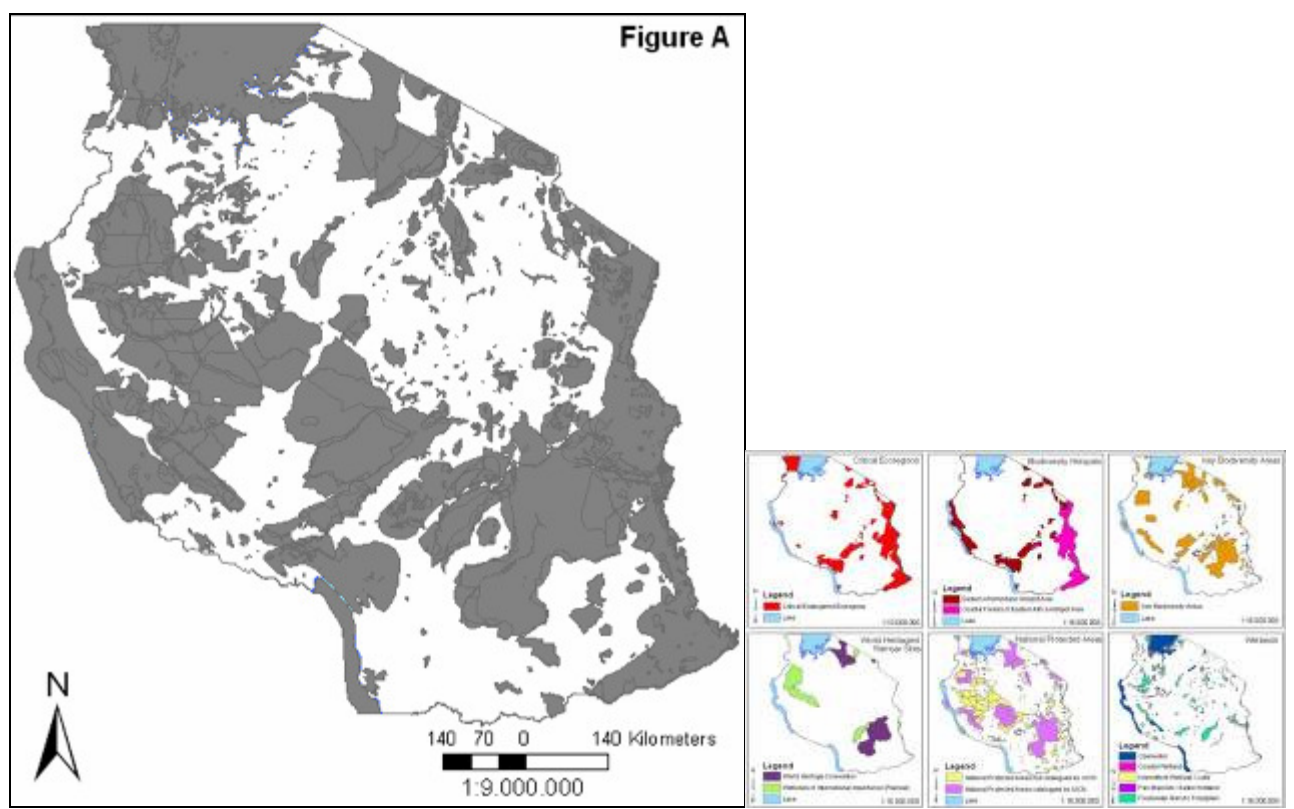


Figure 2: Biodiversity relevant areas in Tanzania (Hennenberg *et al.*, 2008)

While restricting biofuels feedstock production to arid and semi-arid regions may alleviate competition with food crops in moister regions where rainfed food production is possible, it is unlikely to safeguard biodiversity. Watson (2008b and 2009b) shows that most the land identified by Watson (2008a) as available and suitable for biofuels feedstocks production in the arid region of South Africa falls within two biomes with an extremely rich diversity of plants and a rich diversity of birds, mammals and reptiles. About two fifths of the plants in the one biome, and the same proportion of mammals and birds in both biomes, are endemic. She asserts that in order to be confident that the conversion to biofuel crops is not going to have detrimental impacts on biodiversity in the continent's arid and semi-arid regions, a lot more research needs to be carried out on the status of biodiversity both inside and outside protected areas.

When comparing the results obtained using different global land cover (GLC) datasets, Jung et al (2006) and McCallum et al (2006) and others, found limited agreement on the spatial distribution of the individual land classes, particularly at a continental or regional level. Inherent weaknesses in the 1km<sup>2</sup> EC JRC's (2003) 2000 GLC dataset used by Watson (2008a) and consequently, in the selection of categories filtered out may have resulted in some land covers that play a very significant role in environmental services and rural livelihoods, being incorrectly considered available for conversion to biofuels feedstocks production. The areas categorized as under food and/or cash crop production were mostly under large scale commercial production. This dataset has "croplands within a matrix of open woody vegetation" and "forest with a crop component possible" categories. But, the application of the definition of forest at very low thresholds of woody cover disadvantages the woody savannas, wooded grassland/shrub forest categories. It consequently misses the typical, traditional African communal landuse, where cultivated fields are scattered in a matrix of land used for grazing (refer Figure 3). As Watson (2002) notes, such land is a catena of savanna woodland with great temporal and spatial variation dependent on how recently cultivated plots were abandoned, veld was burned, grazing pressure etc.

### **Safeguarding Rural Livelihoods**

The resolution of GLC datasets is simply not good enough to determine "landuse" as opposed to "land cover". Watson (2008a, 2009a) examined localities identified as available and suitable for biofuels feedstocks production on the ground and using Google Earth. Most localities were inhabited, and/or used for cultivation and grazing, and/or had their non-timber forest or 'veld' products harvested (e.g. Figure 3). In general "landuse" can only be reliably ascertained using a combination of high resolution remotely sensed data, a wide range of local information sources, and ground verification. In some areas dependence of rural livelihoods on natural resources can only be established by long term field research. One such example is in south-east Botswana where the caterpillars of the emperor moth (*Imbrasia belina*) hatch in November to feed on the leaves of mopane (*Colophospermum mopane*) trees before pupating. Several studies have found that the "mopane worms" (or phane as they are known locally) are picked, smoked and sold by most inhabitants. They are sold at prices equivalent to prime cuts of beef as far away as Johannesburg and Harare. Botswana's Central Statistics Office (2000) claimed that trade in mopane worms is second to agriculture as a source of livelihood and that the cash income it provides is particularly important to women – "a poor harvest means a poor Christmas".



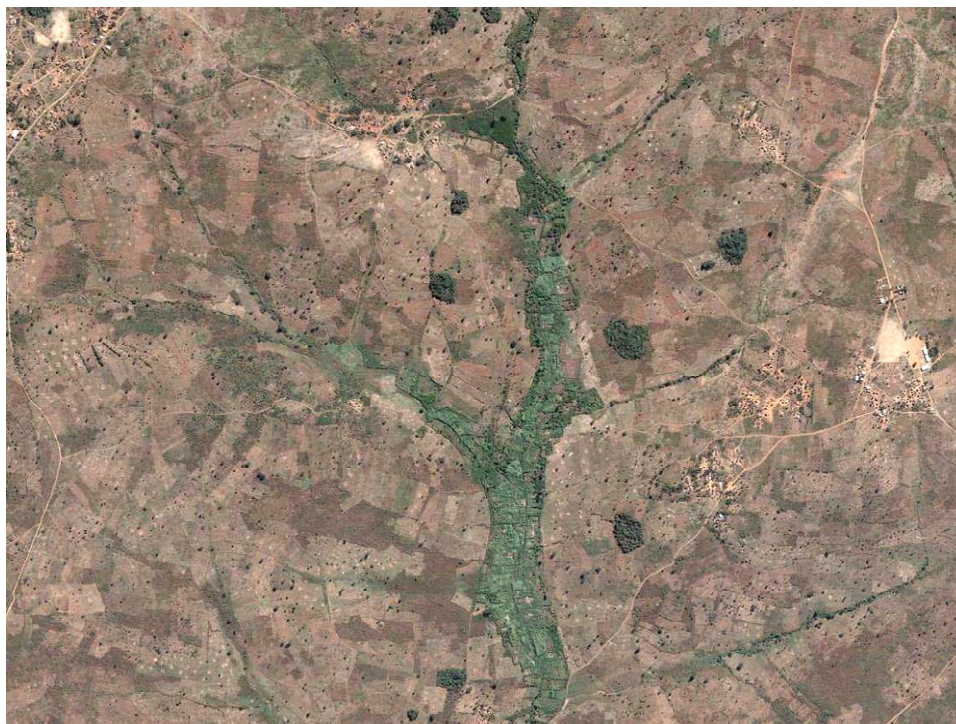


Figure 3: A locality in Mozambique identified as available and suitable based on the interrogation of 1km<sup>2</sup> satellite databases, evidently extensively utilised and inhabited when viewed at the better resolution provided by Google Earth.

## Conclusion

Africa appears to be capable of sustaining a very substantial increase in biofuels feedstocks production on account of its vast tracks of under and un-utilized land. Harnessing the continent's biofuels potential promises many poverty alleviation and development opportunities. However, African heads of state need to know where the best (a) areas are to grow different biofuels feedstocks at different scales, and (b) localities are to construct processing plants, before enticing biofuels investors to their countries.

Work described in this paper involved interrogating biophysical data sets only. Primarily on account of insufficient information on the status of biodiversity in and outside protected areas, and the poor resolution of land cover data, it was unable to conclude with absolute certainty that biofuels feedstocks production in areas identified as potentially available and suitable for such production, would not have detrimental impacts on biodiversity, food security and rural livelihoods. GIS is a valuable tool for advising African governments where best to encourage biofuels development. However, a standardized methodology for identifying land available and suitable for biofuels crops needs to be developed at a high level workshop including representatives of all stakeholders. In addition to biophysical factors, the methodology needs to consider constraints posed by legal, cultural, political, and rural livelihood considerations, water resources, labour markets, road and railroad infrastructure, etc. for different bioenergy crops and different models of large scale production. It needs to employ the Global Vegetation Monitoring Unit (2006) recently released global land cover data with a 300m<sup>2</sup> resolution based on 2003 satellite imagery, and a combination of high resolution remotely sensed data, a wide range of local information sources, and ground verification. It also needs to address the concern that categorization of land cover classes may miss a lot of land under traditional African communal landuse.

## References

Ackbar, L.S., 2007: A land suitability assessment for sugar cane cultivation in Angola – Bioenergy Implications, Unpubl. MSc thesis, University of KwaZulu-Natal, Durban.1-122 pp.

Baijnath, S., 2005: Identification of areas suitable for sugarcane cultivation in southern Africa – ethanol production implications, Unpubl. MSc thesis, University of KwaZulu-Natal, Durban.1-173 pp.

Central Statistics Office, 2000: Botswana Environmental Statistics, Environment Statistics Unit, Gaborone.

European Commission's Joint Research Centre (EUJRC), 2003: 2000 Global Land Cover (GLC) database, <http://www-gem.jrc.it/glc2000>.

Johnson, F.X., Seebaluck, V., Watson, H.K., Woods, J., Mapako, M., Yamba, F., Rosillo-Calle, F., Leal, M.R.L.V., Brown, G., Sobhanbabu, P.R.K., and Farioli, F., 2007. Cane Energy for Sustainable Development and Economic competitiveness in Southern Africa, Proceedings International Society of Sugar Cane Technologists Congress, Durban, 26, 1246-1255.

Jung, M., Henkel, K., Herold, M. and Churkina, G., 2006: Synergies of global land cover products for carbon cycling modeling, *Remote Sensing of Environment*, 101, 534-553.

Le Roux, J., 2002: The Biodiversity of South Africa – Indicators, Trends and Human Impacts, Struik Publishers, Cape Town.

McCallum, F., Obersteiner, M., Nilsson, S. And Shvidenko, A. 2006: A spatial comparison of four satellite derived 1 km global land cover datasets, *International Journal of Applied Earth Observation and Geoinformation*, 8, 246-255.

Hennenberg, K.J., Haye, S., Fritsche, U.R., Wiegmann, K., Dragisic, Ch. and Hewson, J., 2008: Criteria and Risk Mitigation for Biodiversity – Key Issues to be discussed Bioenergy and Biodiversity, Joint International Workshop on High Nature Value Criteria and Potential for Sustainable Use of Degraded Lands, Paris, June 30 - July1, ppt presentation, [www.oeko.de](http://www.oeko.de).

Ravindranath, N.H., Manuvie, J., Fargione, J., Canadell, P., Berndes, G., Woods, J., Watson, H.K. and Sathaye, J., 2008: GHG Implications of Land Use and Land Conversion to Biofuel Crops, In Howarth, R., Bringezu, S., Martinelli, L. and Messer, D. (eds.) 2008: Biofuels - Environmental Consequences and Interactions with Changing Land Use, SCOPE Biofuels Rapid Assessment Project, in press.

Smeets, E., Faaij, A. and Lewandowski, I., 2004: A Quickscan of the Global Bioenergy Potentials of 2050, Copernicus Institute, Netherlands, 1-121 pp.

Sibanda, D.P., 2008. A land suitability assessment of Zimbabwe for sugarcane and sweet sorghum as bioenergy crops, Unpubl. MSc Thesis University of KwaZulu-Natal, Durban. 1-152 pp.

United Nations Environment Programme (UNEP), International Union for the Conservation of Nature's (IUCN) World Commission on Protected Areas (WCPA), and the World Dataset on Protected Areas Consortium, 2006: World Dataset on Protected Areas, [http://www.unep-wcmc.org/wdpa/index.htm?http://www.unep-wcmc.org/wdpa/toplevelindex\\_new.cfm~summary\\_tab](http://www.unep-wcmc.org/wdpa/index.htm?http://www.unep-wcmc.org/wdpa/toplevelindex_new.cfm~summary_tab)

Watson, H.K., 2002: The Sustainability of Southern Africa's Savanna Resources, In Baijnath, H., and Y. Singh, (eds.) 2002: A Rebirth of Science in Africa: A Vision for Life and Environmental Sciences, UMDAS Press, Pretoria, 160-174.

Watson, H.K., 2007: Potential to Expand Sugarcane Cultivation in Southern Africa: an assessment of available and/or suitable land, Proceedings of COMPETE Workshop 22 June 2007, Mauritius Sugar Industry Research Institute, [www.compete-bioafrica.net](http://www.compete-bioafrica.net).

Watson, H.K., Garland, G.G., Dercas, N., Griffee, P., Johnson, F.X., and Purchase, B. 2007: Agronomy and Land Resources, Harvesting and Delivery, Cane Resources Network of Southern Africa (CARENSA) Thematic Report 01 prepared for European Commission DG-Research contract ICA4-CT-2001-10103. [www.CARENSA.net](http://www.CARENSA.net)

Watson, H.K., 2008a: Annex 1-3: Task Report on COMPETE WP1 Activities - Current Land Use Patterns and Impacts, 1-23 pp., Appendices 1-10, [www.compete-bioafrica.net](http://www.compete-bioafrica.net)

Watson, H.K., 2008b: Constraints to identifying areas available and suitable for biofuel crop production – dependence on scale, Report prepared for QUEST VW Biofuels Project, 1-18 pp.

Watson, H.K., 2009a: Potential to expand sustainable bioenergy from sugarcane in southern Africa, accepted for Energy Policy Journal special issue on "Sustainability of Biofuels.

Watson, H.K., 2009b: External impacts of European Union biofuels policies on sustainable development in the Southern African Development Community, Proceedings of IEEP and EGMONT conference on "External Dimension of the EU Sustainable Development Strategy", held on 28th January 2009 in Brussels, accepted for publication Studia Diplomatica special issue.

Watson, H.K., 2009c: Annex 1-3: Task Report on COMPETE WP1 Activities - Current Land Use Patterns and Impacts, 1-30 pp., Appendices 1-4, [www.compete-bioafrica.net](http://www.compete-bioafrica.net)

### Session 3

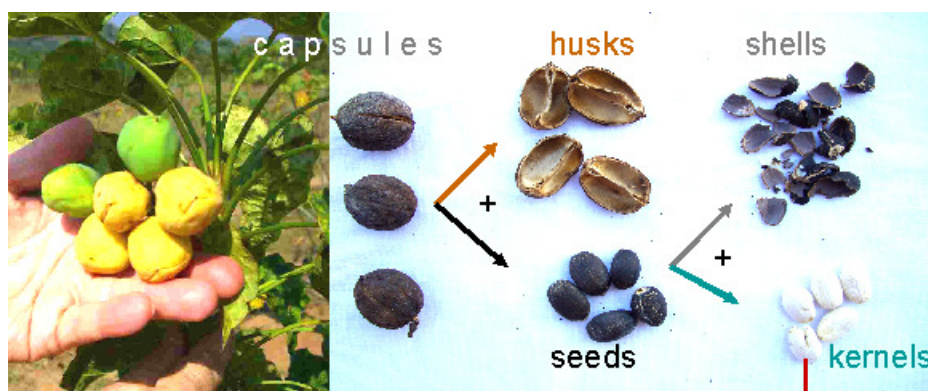
## The Trade-offs of Bioenergy in Africa – Ensuring Sustainability

### *Ensuring the Environmental Sustainability of Jatropha Production and Use*

Dr. Guido Reinhardt, IFEU Institute, Germany

#### Introduction – Jatropha Curcas: A Miracle Plant?

The following viewgraphs provide information on yields of Jatropha under different cultivation scenarios (today, optimised, best). Currently, the vision of Jatropha development in Africa is to provide a low-input biofuel from the “green desert” for the benefit of the rural population.



Cultivation scenario	Yield fruits [kg / (ha*yr)]	Yield seeds [kg / (ha*yr)]	Yield oil [kg / (ha*yr)]
<b>Today</b>	2,270	1,418	402
<b>Optimised</b>	3,811	2,382	676
<b>Best</b>	6,572	4,436	1381

Reinhardt et al. 2007

Traditional uses of Jatropha include:

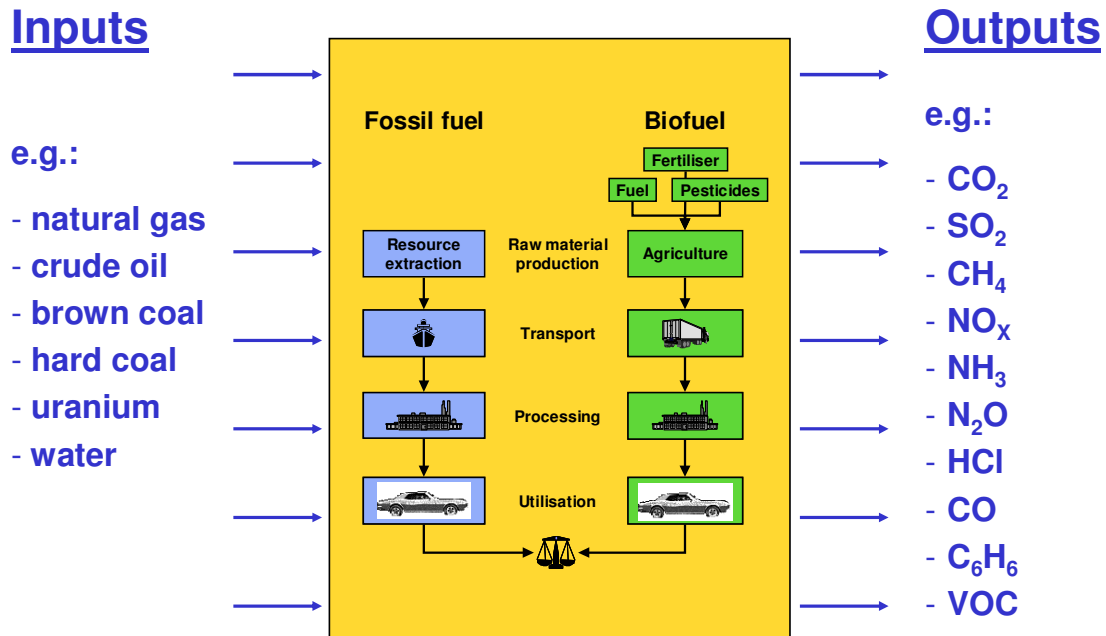
- Whole plant: enclosure fences, medicine (seeds, leaves, bark, latex)
- Husks (and shells): fertiliser
- Oil (toxic): soap, purgative
- Press cake (toxic): fertiliser

Future uses:

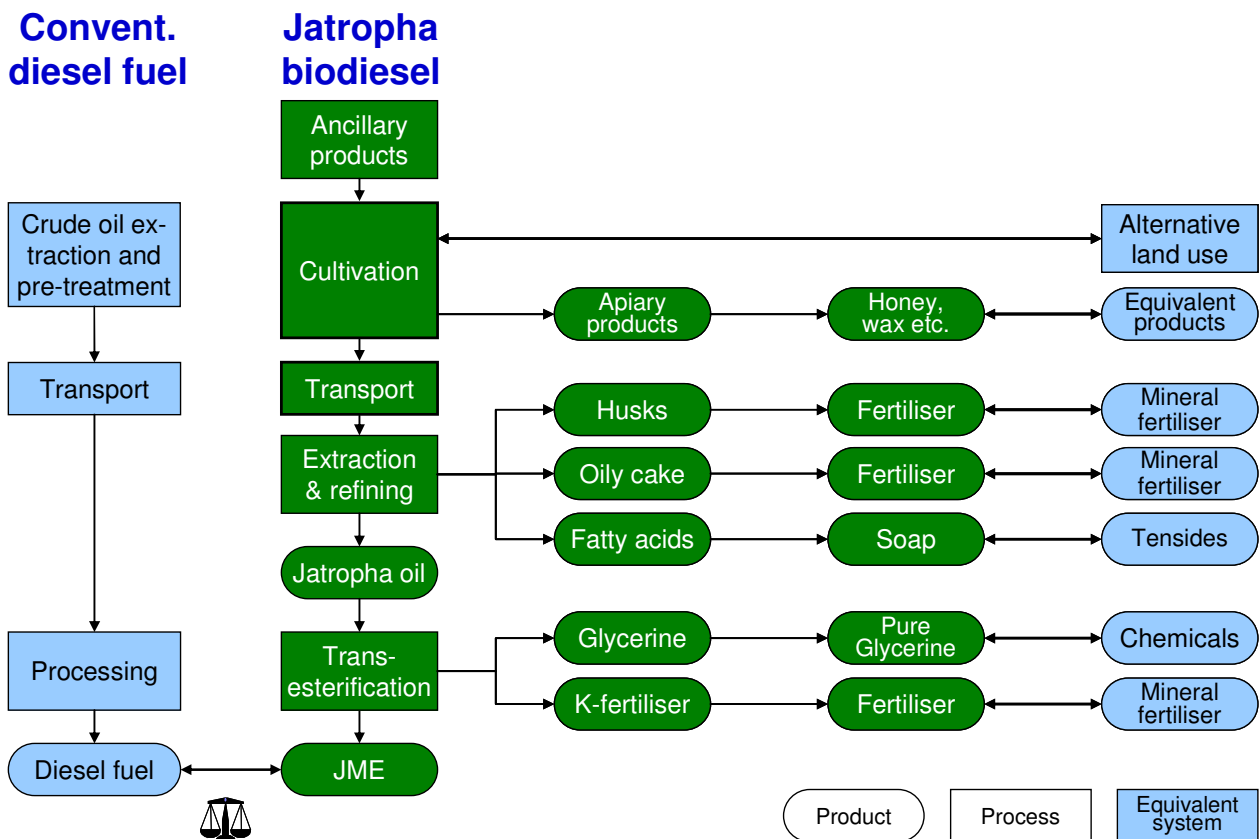
- Whole plant: erosion control, carbon sequestration
- Husks (and shells): fuel
- Oil (toxic): biofuel (pure plant oil or biodiesel)
- Press cake (toxic): fuel or animal feed (detoxified!)

## Life Cycle Analysis (LCA) – Inventory Analysis

The following viewgraph presents the inputs and outputs to be investigated in the framework of an LCA inventory analysis for a comparison of fossil fuels with biofuels.

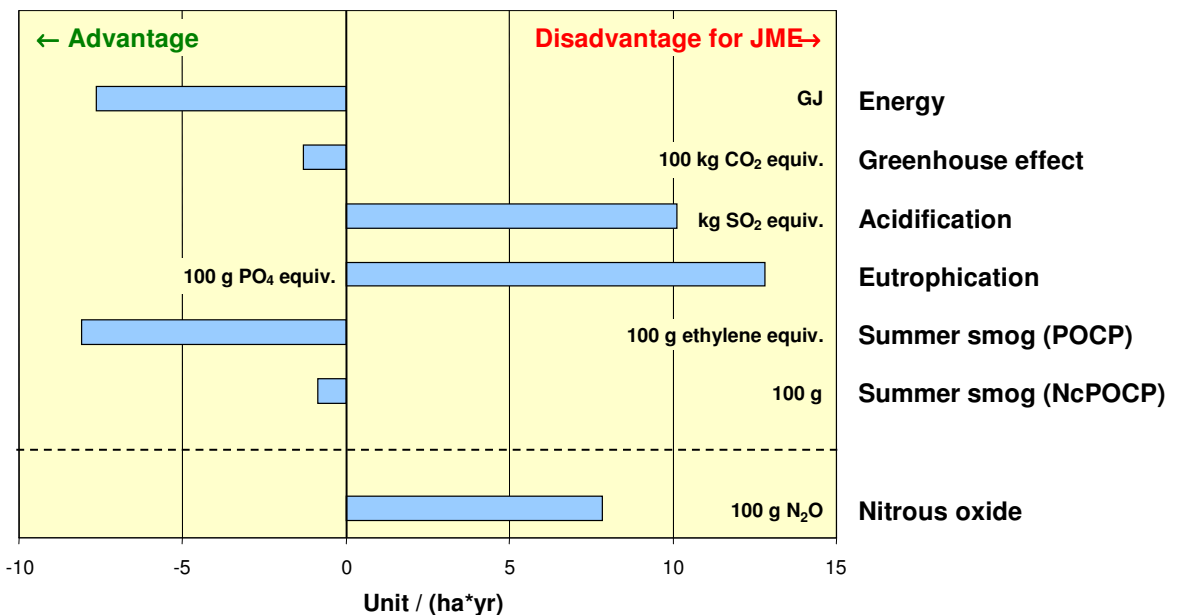
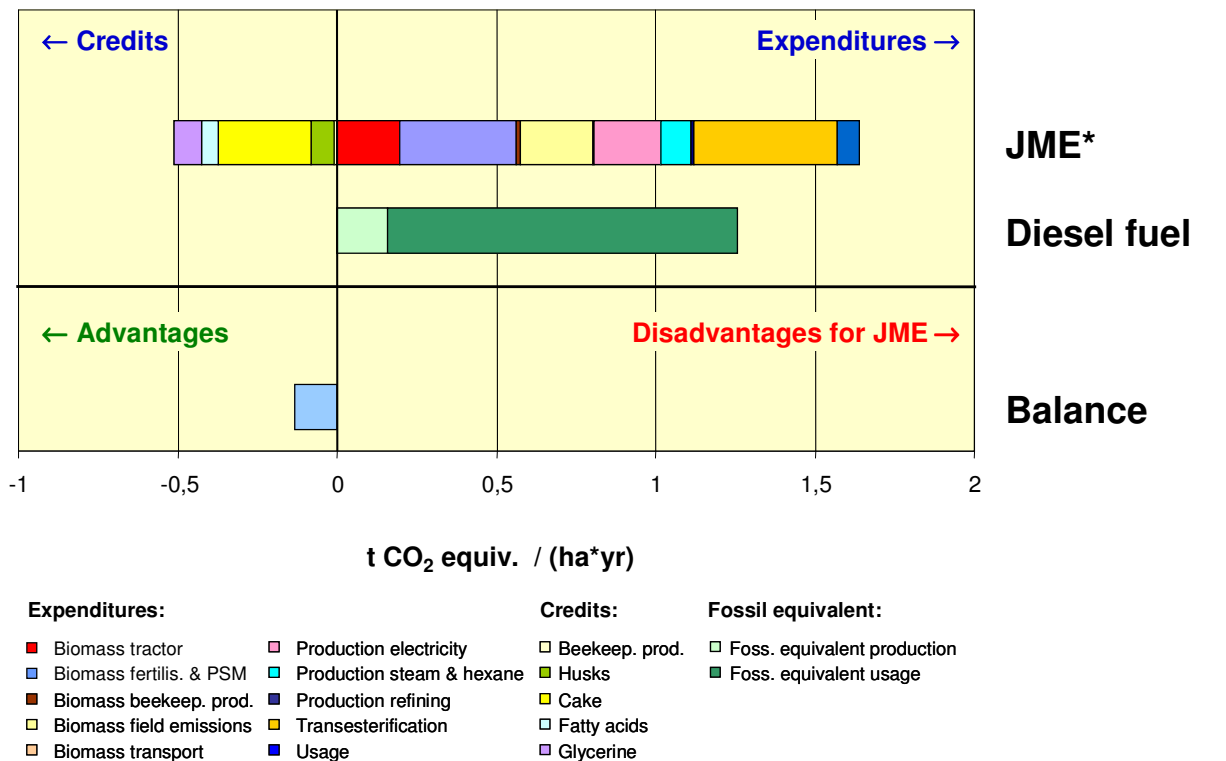


For Jatropha oil methyl ester (JME) the following process steps and by-products need to be taken into account for a LCA comparison with fossil fuels.





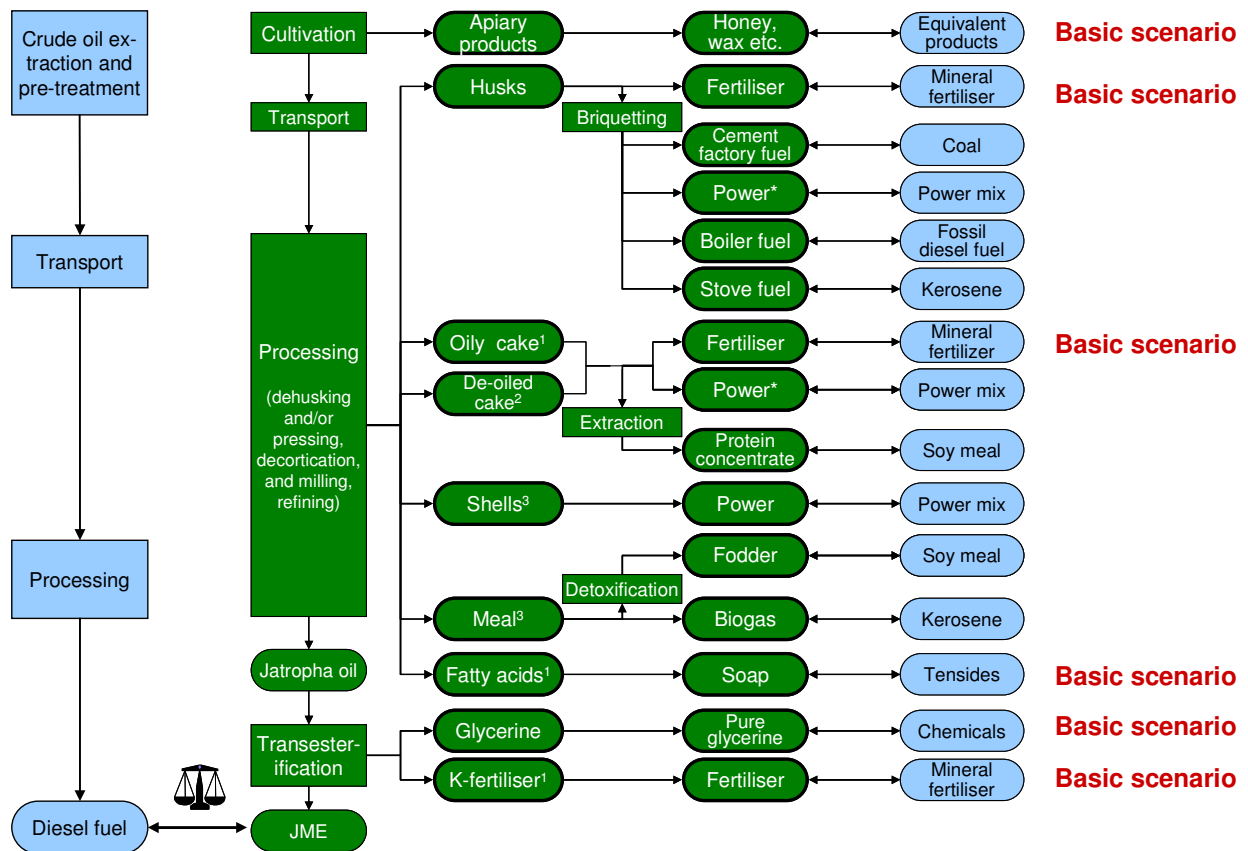
In the following results from a life cycle comparison of JME with diesel fuel are presented with respect to GHG emission savings (detailed comparison) and in an overview for the environmental impact categories energy, greenhouse effect, acidification, eutrophication, and summer smog.



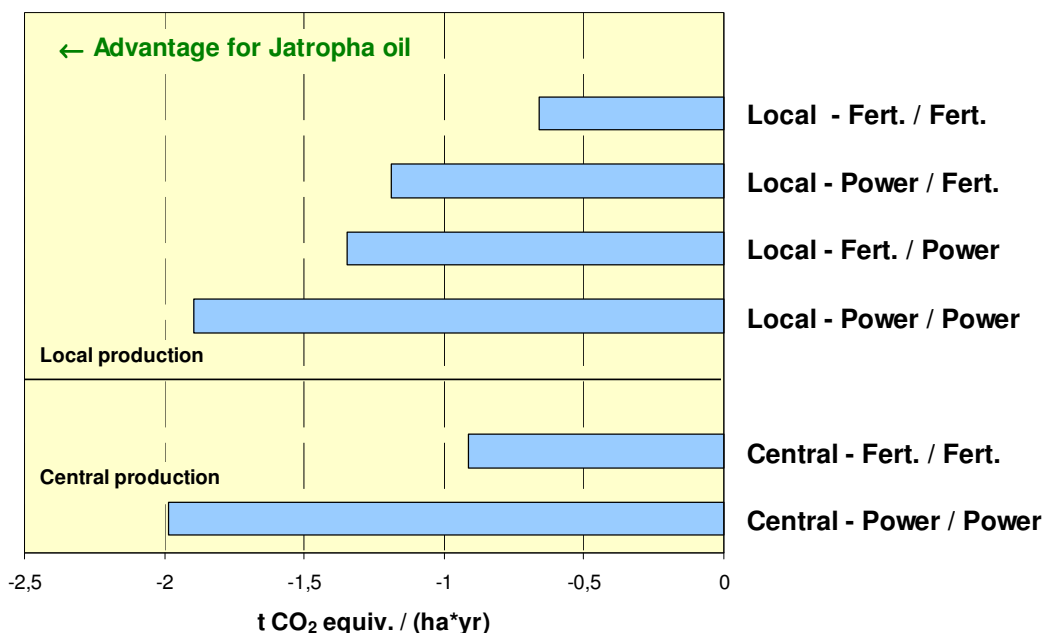
Jatropha biodiesel shows both environmental advantages (e.g. saving of non-renewable energy carriers) and disadvantages (e.g. acidification and eutrophication) compared to fossil diesel fuel.

Therefore, an objective decision for or against a particular fuel cannot be taken. However, based on a subjective value system a decision is possible. If, for example, saving of non-renewable energy carriers and greenhouse gases is given the highest priority, Jatropha biodiesel performs better than fossil diesel fuel.

An improvement of the impacts of JME can be achieved by the optimisation of the by-product utilisation.



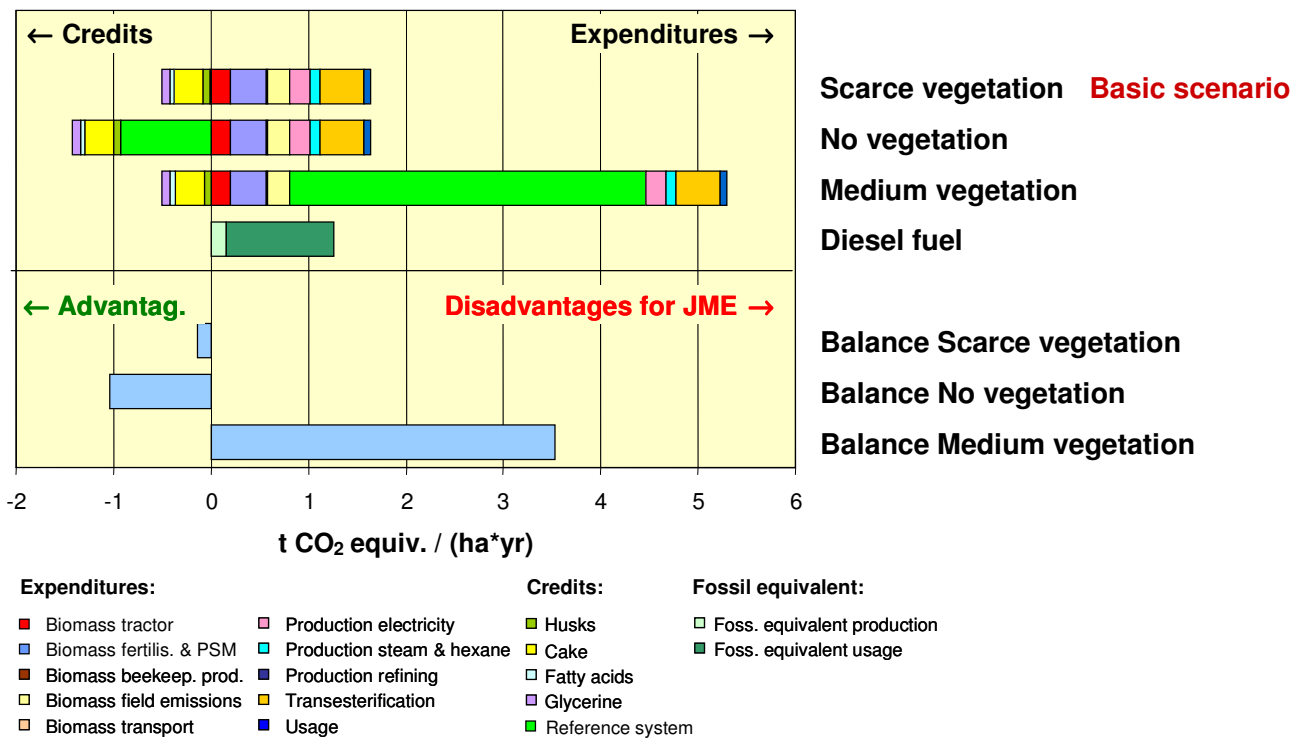
The following viewgraph shows that with respect to the reduction of GHG emissions there is a large optimisation potential and best results are achieved if the by-products are used for bioenergy. Thereby, local production is not as effective as central production of JME.



## Influence of Land Use Change on GHG Emissions

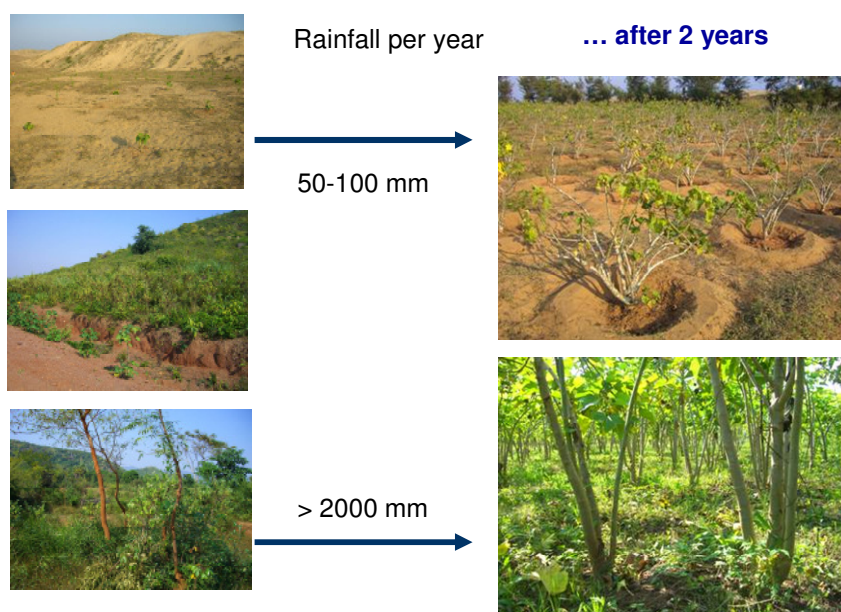
The following viewgraph shows that the level of GHG emission of JME production crucially depends of land use changes (i.e. carbon stock changes) involved in the cultivation of Jatropha.

Cultivation of Jatropha on land with no vegetation gives a positive GHG balance from land use change whereas cultivation on land with medium vegetation gives a negative GHG balance from land use change. Thereby, JME may even have a worse GHG balance than diesel fuel.



## Jatropha and Water Demand

Jatropha cultivation shows high yields if sufficient water is available. This fact, however, may lead to competition on land use especially when big investors are involved and large plantations are planned.



## Conclusions

### *Main results*

- Jatropha biodiesel shows both environmental advantages and disadvantages compared to fossil diesel
- If saving of fossil energy carriers and greenhouse gases is given the highest priority, the use of JME is advantageous
- Results point at a great optimisation potential

### *Detailed results*

- Land use change: large influence on carbon loss / gain
- By-products / credits for bioenergy: bioenergy leads to higher savings depending on energy carrier replaced
- Conversion: centralised production more beneficial than decentralised
- Primary products: Jatropha oil and JME from centralised production comparable.

## Recommendations

### *Establishment of new plantations*

- Reduction of carbon stock must be prevented: plantations on poor, sparsely vegetated soils, e.g. degraded land, is best solution
- This also avoids land use competition with food production and minimizes risk connected to water availability

### *System optimisation*

- Full potential of optimisation measures should be used: e.g. use of by-products for bioenergy generation.

### *Jatropha production & use can be sustainable*

- High potential for a sustainable low-input production and use of Jatropha oil especially for rural population.

## Session 3

### The Trade-offs of Bioenergy in Africa – Ensuring Sustainability

#### *Lessons learnt from Bioenergy Projects in Africa (Mali, Honduras, Mozambique)*

Winfried Rijssenbeek, FACT Foundation, The Netherlands

#### **MFC/FACT Project in Mali**

- Jatropha nursery established producing seedlings for 440 ha
- 470 ha Jatropha planted (target total: 1000 ha)
- 3 100 kW diesel generator sets installed
- Electricity company established
- Local electricity grid established and households (230) and enterprises (10) and social services (9) connected, serving some 3000 people
- Training in agriculture of Jatropha (intercropping), and operational aspects
- R&D in Jatropha and intercropping, mycorrhizae

#### **ADPP/FACT Project in Mozambique**

- 100,000 seeds were planted at the beginning of the project with an approximate germination rate of 30 per cent
- 24 of the planned 25 Farmers Clubs have been established
- 7 steel hand rope pumps have been installed, 16 newly dug wells lined out and 3 old wells rehabilitated
- 21 nurseries were established with 1,000-2,000 plants each
- Household survey of approximately 200 families has been held
- Practical study on pests in Jatropha, experiments with three accessions
- Baseline survey including 250 households
- Seeding and planting practices study
- Trainings held on different levels

#### **STRO/FACT Project in Honduras**

The aim of the Gota Verde” (“Green Drop”) project is to demonstrate the technical and economic feasibility of an approach focusing on small-scale biofuel production for the local market.

Specifically, the project addresses the following fields:

- Agricultural: improve know-how on biofuel crops
- Technical: improve know-how and local experience on biofuel processing and engine adaptation technologies
- Enabling environment: create a favourable socio-economic and financial environment for successful introduction of small-scale biofuel production and use

## Lessons Learnt

The following lessons were learnt during the implementation of the FACT projects in Mali, Mozambique and Honduras.

### *Garalo Project in Mali*

- **High quality seeds** are **important** when starting Jatropha plantations: clonal and seed gardens are key tools for the local production of high quality seeds.
- **Direct seeding is giving good results** under conditions of a 3 to 4 month rainy season. Nursery efforts and costs can thus be avoided.
- Good yielding Jatropha requires **good nutrient levels** and **climate conditions**.
- **Food and Fuels** can be **combined** with good nutrient levels and produce more than food alone under current practices.
- Generator technology: **marine** generator sets do better than automotive based generator sets. This is a key to the success of the Garalo project.
- Electricity distribution: **new methods of payment** as a result of discussions in the project: in a first test the regular monthly payment might be replaced by the payment in kind (e.g. with livestock) for a longer period.
- The **prescribed minimum local electricity tariff** is key factor in economics of the project: Jatropha based generation is more expensive than current electricity tariff, but cheaper than diesel based generation.
- The Garalo project is highly replicable: in neighbouring villages replication was studied using participatory village discussions: a program was prepared **for 10 villages**.

### *Project Mozambique*

- Introducing bio-fuels requires careful imbedding in the local situation. **Farmers Clubs**, proved to be **most important actors** in the project.
- The **combination of food crops and Jatropha** is a "conditio sine qua non" for smallholder farmers. Placing Jatropha fences around vegetable fields, animals are kept out, while the food crops ensure maintenance of Jatropha.
- **Project duration** of three years is generally too short. **Best 5 years** in order to obtain sufficient yield of the Jatropha plant.
- **Long time controlled endurance** tests (Netherlands) for PPO fed diesel engines are required before introduction in the field.
- The **quality of oil** is to be **controlled during in whole production chain**, from plant production to distribution. For example: harvesting green unripe seeds results in too high phosphor contents, bad for diesel engines.
- Comprehensive **identification of pests and diseases** in *Jatropha curcas* was needed. Jatropha contrary to the myth can be affected by numerous pests. Involving the local R&D institutions (the Eduardo Mondlane University), has proved to be effective.
- *Jatropha curcas* **does not need** shaded nurseries when sufficient water is available.

### ***Gota Verde Project in Honduras***

- Apart from Jatropha, **many other oil crops** were tested in Honduras and **found attractive** as producer of oil for energy purposes and for other uses.
- **Biodiesel production was tested** and best practice information on the process on semi industrial scale available as open source.
- The feasibility of Jatropha cake for biogas for electricity generation was studied and **found highly attractive**: a factor 3 less costly as with PPO.
- **Replication biogas from cake**: use of press cake is pursued in 3 other projects in Tanzania, Kenya and Indonesia, power plants of 150, 150 and 200 kWe capacity.
- An innovative system **using energy pastures** in the tropical humid zones for energy was developed and will be tested in the Gota Verde project.

### ***General Lessons Learned***

- Projects to be based on **realistic (lower) estimates of yield potential** of the selected crops.
- Good **genetic starting** material (seeds) of the biofuel crops is crucial and comes at a price.
- **Intercropping of food and fuel crops** is useful for fuel crops that take several years to mature, such as Jatropha. Intercropping ensures income for the farmers from the start of the project and helps to suppress weeds.
- Maximum value should be obtained from the agricultural production chain. **A bio-refinery approach** should be practised where feasible, aiming to bring maximum value of all components of the plant.
- The project area is best to avail over **basic development needs** (schools, medical care, markets, demand for energy), with agriculture beyond subsistence level, and farmers are eager to experiment with new cash crops.
- **Presses**: thanks to R&D at TU Eindhoven and at Wageningen University **much new knowledge** is generated about the technology for pressing seeds.

## Session 3

### The Trade-offs of Bioenergy in Africa – Ensuring Sustainability

#### *Bioenergy and Development in Sub-Saharan Africa: Are the Policies Conducive?*

Dr. Charles Jumbe, FANRPAN, South Africa

#### Introduction

Fossil fuels continue to be the pivot of economic and social development of all countries around the world. However, there are on-going concerns over supply & use of fossil fuels around 3 main aspects:

- Soaring fuel prices that reached >US\$130 per barrel
- Instability of energy supply as much of fossil fuels are imported fuels from politically fragile states
- Environmental contamination thru GHG emission and air pollution from burning of biomass & fossil fuels.

Therefore, biofuels are considered as an alternative to fossil fuels. Global production of biofuels doubled over the last 5 years and is likely to double again in the next 4 years. FAO (2007) predicts that demand for biofuels will grow by 170% by 2010. Biofuels are expected to contribute 25% of the world energy needs in the next 15 to 20 years.

Several developed countries (EU, US, Japan, China) have set ambitious targets for biofuel development which will create a strong demand for biofuels. This may lead to a “Gold Rush” for land in Africa, as most countries in Africa have adequate land, cheap labour force and favourable climate for growing energy crops, and biofuels can easily be integrated with traditional farming practices.

Today, investors are coming to Africa to acquire land and set up plants and machinery for commercial biofuels production. About 4 million km<sup>2</sup> of land will be used to grow energy crops (e.g., Jatropha) in the Southern Africa region over the next 5 years.

The objective of the current paper is to explore the extent to which national policies in African countries incorporate strategies for mainstreaming or supporting the development of the biofuel sector. Thereby, the following key questions are addressed:

1. What do the policies state regarding bioenergy or biomass energy development?
2. What are the notable gaps in the policies across countries with regard to bioenergy and energy crops development?

#### National and Regional Development and Energy Policies

Only the PRSP (Poverty Reduction Strategy Paper) for **Ghana** contains specific strategies for biogas development, with a target of substituting 20% of national gas and oil consumption with biodiesel and 30% of paraffin to be replaced with Jatropha oil by 2015.

**Mozambique** has adopted a policy for large-scale production of biofuels, including the gradual introduction of blending of fossil fuels with biofuels initially at 5 – 10%.



**South Africa** has a specific biofuels strategy aims at achieving market penetration of 2% in biofuels by 2013.

**Malawi**, despite having more than 20 years experience producing, **has no specific biofuel strategy**.

Unlike in the **ECOWAS region**, there is no clear **coherent policy and strategy** on biofuels in the SADC or COMESA region.

In the absence of effective policies to guide and promote the development of biofuels in African countries, the African biofuel sector is unlikely to be competitive on international markets due to

- **Subsidies** and **tax** incentives provided to producers and consumers of biofuels in developed countries
- **Law state of art** in biofuel production and processing
- High international **standard specifications** for biofuels

This absence of policies may lead to negative impacts of biofuels development in Africa, such as:

- **Food insecurity** as more land will be taken away from mainstream agriculture for growing of energy crops
- **Damage to environment & loss of biodiversity** through clearing of forests and/or encroachment of protected areas for biofuels
- Missing out on **opportunities** of biofuels development (**Employment opportunities, Relief on the fuel import bill, Rural development**)

## Way Forward

As biofuels are expanding rapidly in Africa, there is urgent need to reinforce 3 key areas:

- **RESEARCH** - Rigorous research and analysis is urgently needed in Africa to:
  - Better understand the direct and indirect impacts of biofuels development on agricultural production systems
  - Assess technical and policy options for both reducing the negative impacts of biofuels on food security and the environment
  - Harnessing the potential of biofuels for rural transformation and development
- **POLICY DEVELOPMENT**- There is need to help African governments develop biofuels policy and guidelines that safeguards rural communities and the environment
- **ADVOCACY**-There is need to sensitize politicians and civil society on the urgency for African governments to develop policies and strategies:
  - To exploit the potential benefits from biofuels
  - To mitigate the negative effects of biofuels expansion

## Conclusions

### *Human well-being & Right to Food*

- To be the centre of biofuels policies, strategies and programs development.
- It is **politically and socially immoral** to transform all food into fuel for cars, when many people go to bed hungry.
- Taking food off of the table and use it to produce fuel for cars will make the poor in Africa worse-off.

### *Policies & Regulatory Frameworks*

- To protect the rural dwellers from being evicted off their land for biofuels production.
- To prevent rural people from falling deep into food poverty by replacing food crops with energy crops for biofuels.
- To prohibit biofuels expansion into protected areas.

### *Development Path*

- Biofuels may be sustainable in some instances while destructive in others. Each country therefore needs to define its own biofuels development path.
- For most countries, biofuels development should have a rural development focus, not a commercial focus.
- Biofuels expansion beyond meeting rural development objectives should be carefully monitored and regulated.
- **If left unregulated**, biofuels development will put a heavy burden on the poor.

Finally, as we now live in a **global village**, any significant shift in agriculture landscape in the industrialized world will heavily impact Africa. Therefore:

***“Now is not the time for any country in Africa to hesitate, delay, derail or block development, but an opportune time to develop or adapt policies in order to survive in the fast changing world.”***

## Session 3

### The Trade-offs of Bioenergy in Africa – Ensuring Sustainability

#### ***FAO 'State of Food and Agriculture Report 2008': Biofuels – Prospects, Risks and Opportunities***

**Astrid Agostini, UN Food and Agriculture Organisation (FAO)**

#### **Introduction**

This paper provides an overview of the following key questions:

- Do biofuels contribute to energy security?
- Do biofuels reduce greenhouse gas emissions?
- Do biofuels increase agricultural commodity prices?
- Are rising prices a problem?
- Are biofuels an opportunity for agriculture and for poverty alleviation?
- What is the role of policies?

#### **Do biofuels contribute to energy security?**

The combination of rising oil prices and a variety of policy support measures have led to a rapid increase in the production of ethanol and biodiesel from maize, sugar, vegetable oil and other agricultural commodities. Ethanol production has tripled since 2000, while biodiesel production has increased more than ten-fold, and both are projected to double again over the next decade. Most biofuels are produced by the United States, Brazil, and the European Union, but many other countries are beginning or expanding production as well. This rapid growth in biofuel production, occurring at a time when food prices are high and pressure on natural resources is increasing, has generated concerns about impacts on food security and the environment.

Most energy used today is from oil, coal and gas, and this pattern is projected to continue (and even increase slightly) to 2030. Biomass and waste account for 10% of the total, mostly in the form of fuelwood, charcoal and animal dung for heating and cooking in developing countries. Liquid biofuels represent only 2% of energy from biomass.

Biofuels account for 20% of Brazil's transport fuel (and 40% of petrol), but only 2% of energy used in the transport sector worldwide. The International Energy Agency projects that this share will increase to 3-10% by 2030. The contribution of biofuels will remain modest because of the size of the energy sector relative to agriculture. For example, researchers at the University of California-Berkeley (Rajagopal et al. 2007) estimate that converting all cereals and sugar crops (grown on 42% of global cropland) to biofuels would replace 57% of global petrol use. Currently only about 2% of global cropland is devoted to the production of biofuels.

IEA's World Energy Outlook 2007 suggests that in 2030 biomass will account for between 9% and 11% of total primary energy demand.

### **Do biofuels reduce greenhouse gas emissions?**

Greenhouse gas emissions vary widely across biofuels, feedstocks, and production technologies. Relative to fossil fuels, ethanol from maize in the United States is estimated to reduce greenhouse gas emissions by 10-30%, biodiesel from rapeseed in the European Union is estimated to reduce greenhouse gas emissions by 40-60%, and ethanol from sugarcane in Brazil is estimated to reduce greenhouse gas emissions by 80-90%. Second-generation biofuels from cellulosic and other sources are also estimated to reduce greenhouse gas emissions by 80-90%, but they are not yet commercially viable. These reductions reflect differences in production of the feedstock crops and in their conversion to biofuels. If expanded production of biofuels occurs on newly cleared land, or if it triggers land-use change elsewhere by displacing other crops, resulting emissions of greenhouse gases could offset part or all of the reductions achieved by biofuels, and even make the overall GHG balance negative.

### **Do biofuels increase agricultural commodity prices?**

While impacts on energy security will be modest and impacts on climate change will be mixed, impacts on agriculture and food security are significant. Large shares of selected crops are used to produce biofuels in Brazil, the United States and the European Union. Worldwide, only about 5% of cereals (mostly maize) are used to produce ethanol, and about 9% of vegetable oils are used to produce biodiesel, but over half of the increase in the total use of these commodities during 2005-2007 was for the production of biofuels.

As the largest source of new demand for agricultural commodities in recent years, biofuels have contributed to increases in the prices of maize and other crops.

But because feedstock commodities represent the largest share of biofuel production costs, the OECD and FAO find that profits remain elusive for most biofuels, even with high oil prices (with the exception of ethanol from sugarcane in Brazil). In fact, for most of the past several years, prices of oil have been below the break-even levels that researchers at Purdue University (Tyner and Taheripour 2007) estimate are needed to make production of ethanol from maize profitable. Prices remain sufficient to make ethanol production profitable when subsidies are included.

### **Are rising prices a problem?**

Prices of major agricultural commodities rose significantly in 2007-2008 and then fell dramatically in late 2008. Even after this dramatic fall, prices in late 2008 exceeded average prices over the last few decades.

According to FAO's Food Outlook (Nov 2008) production increases in response to rising food prices in early 2008 concentrated in developed countries, and there was little supply response in developing countries. Excluding Brazil, China and India, production in developing countries actually reduced. This can be explained by the fact that at the same time as commodity prices rose, the price of energy intensive agricultural inputs (not least fertiliser) and transport costs rose as well, in many cases in greater proportion than commodity prices. Most producers in developing countries face international market prices for fertiliser and oil as these are imported commodities. On the other hand many developing country producers are not fully exposed to international commodity prices when selling their products, and hence in many cases the rise in input costs was not compensated by a sufficient increase in the farmgate price for their outputs.

According to Food Outlook 2008, the global import bill 2008 was poised to break the USD 1 trillion barrier, up 23% against 2007 and 64% in 2006. The import bill increased despite the fall in commodity prices since mid 2008 and reduction in freight rates. Volumes traded remained

relatively constant, but prices rose, with vegetable oils responsible for about one third and coarse grains about one quarter of the price gains

Some LDCs and LIFDCs reduce import procurement in view of increased costs, despite limited domestic supply response, leading to shortages.

Food security depends not just on the availability of food, but also on who has access to it. Access depends not only on food prices, but also on incomes, and incomes in turn depend not just on production, but also on employment and wages. Impacts of high prices will thus be different for farmers with good access to inputs and markets than they are for farmers with poor access; different for urban households than for rural households; different for the wealthy than for the poor; and different in the short term than they are in the longer term, when producers and consumers have time to adjust.

Most poor households are net buyers of food — that is, they consume more food than they produce. These households are adversely affected by higher food prices. Households with access to land and other resources have the potential to increase their production to take advantage of higher prices. Households that spend only a small share of their income on food can adjust their consumption patterns. But poor households that spend a large share of their incomes on staple foods are particularly hard-hit, as they have few options for adjustment.

### **Are biofuels an opportunity for agriculture and for poverty alleviation?**

Biofuel production can be an interesting opportunity for economic development in developing countries. Many of the poorest countries well placed in agro-ecological terms to produce biofuels feedstocks – some of the feedstocks with greatest energy yields per hectare, for instance sugar cane and oil palm, grow in tropical conditions.

Rural growth driven by agriculture reduces poverty more than other sectors, and a revival of investment in agriculture can therefore have important positive effects on rural development and poverty alleviation, not least because 75% of the world's poor live in rural areas and most of these depend upon agriculture for their livelihoods.

In order to take advantage of the opportunities related to the increased demand for biofuels, however, further investments are needed. The same constraints that have hampered the participation of developing countries in other commercial growth sectors will also hold back progress on biofuels. Investment is needed in the development and of appropriate technologies, including seeds and irrigation, infrastructure, access for finance and institutions. Safety nets must also be in place to protect vulnerable groups against shocks.

### **OECD policies**

Current OECD policies are costly and have been driving artificially high growth rates in biofuels that are not in line with economic fundamentals. OECD policies favour OECD over developing country producers, and have achieved stated objectives only to a limited extent. Impacts on energy security are modest. Impacts on climate change diverse. Yet impacts on agriculture and food security are significant.

## **The impact of trade policies**

Trade policies have a significant impact on prices and trade in biofuels. If domestic subsidies (direct support, tax concessions and credits) were removed, but blending and use requirements kept as indicated in policy commitments made by December 2007, overall ethanol demand (2013-2017 average) would be down by 10-15%. Ethanol prices would rise by approximately 10% as demand growth in industrialised countries outstrips supply growth and there is greater competition for imports. Demand for biodiesel would fall by 15-20% and prices would fall slightly in response to steeply reduced demand growth in EU.

Vegetable oil and maize prices would fall by approximately 5 percent. Sugar prices would increase slightly.

## **Policy Action is urgently needed**

In conclusion, policy action is urgently needed to

- Review current biofuel policies, to make them more performance based and create a level playing field between different technologies and suppliers (reducing subsidies, mandates and tariffs would slow production growth to better match yield growth and improved understanding of impacts);
- Protect the poor and food insecure (targeted safety nets, land tenure security);
- Invest in agriculture and rural development (strengthen and protect property rights, R&D and innovation, infrastructure, institutions to accelerate yield growth);
- Ensure environmental sustainability (harmonized methods for life-cycle analysis, sustainability criteria, good practices, payments for environmental services);
- Promote international policy coordination across food, agriculture, energy, transport, trade and the environment, so that the risks associated with biofuels can be reduced and the opportunities shared more widely.

## **WEDNESDAY 26<sup>th</sup> November 2008**

### **Round Table**

### **Bioenergy Policy Development for Africa – The COMPETE Declaration on Sustainable Bioenergy for Africa**

*The Round Table was chaired by*

**Ismail Touré, Chairman of AMADER, Mali and Dr. Rainer Janssen, WIP, Germany**

The COMPETE Round Table included statements from the following panellists:

***Hamata Ag Hautafaye, Ministry of Energy, Mali***

The Ministry of Energy in Mali has supported bioenergy initiatives on ethanol and Jatropha since more than 20 years. Thereby, the focus of programmes was on rural electrification, the development of the agricultural sector, and capacity building and information for farmers.

The national strategy on bioenergy places emphasis on local markets to create benefits for the rural population. However, export of processed biomass (e.g. biofuels) is not excluded. The Government of Mali has set-up a framework to stimulate private sector involvement including financial incentives such as tax exemption of equipment used for the production of biofuels.

With respect to land, leasing of Government owned land for private national and international operators is possible for 50 or 99 years.

In its strategy the Government of Mali has established a target of 20% biofuels in the year 2022. An agency will be set-up in 2009 to support the implementation of the strategy addressing issues of regulation, standards, as well as increased research on bioenergy crops.

***Mamadou Sangare, Union of Jatropha Cooperatives, Mali***

The main objective of the Union of Jatropha Cooperatives in Mali is to ensure economic sustainability of Jatropha cultivation and to provide farmers with hands-on experience on agricultural activities for Jatropha production. This includes provision of the seeds, set-up of nurseries, and support for water management systems. Furthermore, a centralised processing of Jatropha oil into biodiesel has been established.

For the development of a successful biofuel sector the trust and loyalty of the farmers has to be achieved. Due to the lack of regulation currently the price of Jatropha oil shows a large variability. This creates uncertainties for farmers which need to be leviated. For this the Union purchases the seeds from all farmers and manages the marketing of the product.

***Dr. Rocio Diaz, Imperial College, United Kingdom***

The importance of ensuring environmental, social, economic, and political sustainability was highlighted for bioenergy development in Africa.

Thereby, internationally harmonised certification schemes play a key role as guideline to ensure sustainability for the benefit of the African population.

***Dr. Veronika Dornburg, Utrecht University, The Netherlands***

In order to ensure the benefits of biofuels (e.g. rural development) and to avoid negative environmental and social impacts certification schemes are urgently needed. For African countries it is recommended to start with a local and national approach to biofuels and then investigate options on international markets. Here it was noted that African countries are not part of the IEA Agreements on bioenergy dealing with markets and international trade. Both, small and large scale biofuel systems will be required for the future development of biofuels in Africa

In the field of land use, zoning initiatives to identify land suitable for biofuel production without compromising food production (which are being implemented in several African countries) are recommended.

***Dr. Angel Daka, COMESA, Zambia***

Within COMESA the Comprehensive Africa Agriculture Development Programme (CAADP) focuses on the following 4 pillars:

1. Extending the area Under Sustainable Land Management and Reliable Water Control Systems
2. Improving rural infrastructure and trade-related capacities for market access
3. Increasing Food Supply and Reducing Hunger
4. Agricultural Research, Technology Dissemination and Adoption

It was highlighted that research is required also on crops other than *Jatropha* which may show a better performance with respect to ensuring food security.

Furthermore, farming practices need to be developed which are in conformity with climate change, and which exhibit a good fixation of carbon. For this, financial support for small-scale farmers is urgently needed.

In the plenary discussion after the statements of the panellists the following issues were raised with respect to the potential refinement of the COMPETE Declaration on Sustainable Bioenergy for Africa:

- The Declaration needs to reinforce the importance of investment for research, especially in the field of crop management improvements
- More emphasis shall be placed on gender issues in all statements of the Declaration
- More detail shall be presented on implementation options involving institutional support and international cooperation
- The Declaration shall recommended to “change” existing land tenure systems, but to ensure bioenergy development in accordance with prevailing land tenure systems to enhance benefits to local communities.
- Water issues shall be addressed in more detail in the declaration.
- In the field of sustainability certification African stakeholders need assistance and further information. It is feared that sustainability certification may impose unjust constraints on stakeholders in African countries.



## WEDNESDAY 26<sup>th</sup> November 2008

### West-African Consultation on Version Zero of a Global Standard for Sustainable Biofuels

*The consultation was coordinated by*

**Annie Sugrue and Sebastien Haye, Roundtable on Sustainable Biofuels (RSB)**

#### 1. Executive summary

In the course of its international multi-stakeholder consultation on the first draft (Version Zero) of a global standard for sustainable biofuel production, the **Roundtable on Sustainable Biofuels (RSB)** undertook a one-day consultation in Bamako, Mali to collect feedback, opinions and suggestions from participants in the COMPETE Workshop on Bioenergy Policies in West Africa.

**General remarks** on the RSB standard were:

- The standard cannot be efficiently implemented in Africa in absence of a **coherent and adapted framework, ensuring that the legislation, governmental policies, information and technologies at disposal converge** toward a sustainable biofuel production.
- The standard can in no case contradict existing laws, but it can go beyond.
- The standard is generic; it needs to be **interpreted in specific regional contexts**, and adapted to the reality of small farmers.
- Local authorities and communities can be relied upon for the implementation and consultation in Africa.
- Since Africa suffers much from **erosion, water scarcity, biodiversity losses, land rights dispute and food insecurity**, such a standard could bring much benefit, in addition to the opportunities to respond to the demand for certified products or gain carbon credits through the CDM.

**Greenhouse gas emissions** are a burning topic in Africa. Whereas some consider that **Africans are not responsible for the current climatic issues** and must be allowed to pursue economic development without obstacles related to GHG emissions, other participants consider that **GHGs will become an increasingly important issue** if economic development is enhanced, so it would be wiser to start optimizing carbon cycles now to avoid future problems.

Discussions of **environmental aspects in the RSB standard** included:

- The need to **involve local communities in the identification of HCV areas and ecosystem services**.
- The issue of requesting wastewater treatment in countries where no infrastructure or governmental incentives exist for sustainable water treatment.

- The need to prevent the use of GMOs that increase the dependency of developing countries toward developed countries and big companies.
- Discussions of **social aspects** included:
  - The actual problem related to food security is not the availability of land, but the availability of manpower. **Biofuel production is likely to displace jobs, rather than create new ones**, due to a lack of available labor.
  - The need to consider small farmers as the priority and help them becoming more competitive.
  - Through decentralized systems, the consultation of local authorities is sufficient for understanding the context.

The overarching discussions about **Jatropha curcas** can be summarized as the dilemma between growing jatropha in **arid regions in order to prevent desertification, soil erosion or cattle stampedes**, and producing **biofuels in sufficient amounts for national or international trade**, which requires arable land and inputs, and for which several plants would give a better yield than Jatropha. As agreed by many participants, both benefits cannot be reconciled and **the argument of a low-input crop growing on arid land cannot be used to justify large-scale biodiesel production out of jatropha**.

## 2. Background

In August 2008, the Roundtable on Sustainable Biofuels (RSB) released the first draft of an international standard for sustainable biofuel production. This document, called "Version Zero" is based on a multi-stakeholder and international consultation, which was started in April 2007 and involved nearly 400 participants from 40 countries. The process was overseen by the RSB Steering Board, composed of experts from companies, producers, NGOs, governments and the academic sector.

Through March 2009, the RSB is organizing a new round of consultation on the Version Zero, in order to gather as much feedback as possible and refine the document accordingly to create a Version One. This feedback is particularly important in producing regions, where much economic development and potential social and environmental impacts are at stake. This is the reason why West Africa was chosen as a key region in which to hold a stakeholder consultation.

Since the RSB had the great honor to participate in COMPETE's "International Workshop on Bioenergy Policies for Sustainable Development in Africa" (Bamako, Mali. 25-27 November 2008), it took this occasion to organize a full day of consultation with participants, where general questions, remarks, and specific points on environment or social aspects were thoroughly discussed.

The following questions/remarks and tentative answers try to reflect the main points that were discussed during this intense day of consultation. We invite readers to contact the RSB ([rsb@epfl.ch](mailto:rsb@epfl.ch)) wherever some points are still missing or need clarification.

### 3. General questions/remarks on Version Zero and implementation of the standard

#### 3.1 General

- Is the standard to be adopted by producing countries or incorporated into legal procedures?

**RSB answer:** The first users of the standard will most likely be producers and blenders through voluntary certification schemes, but country governments may also be interested in using the standard as a framework for policy development, or even in using the criteria in legislation.

- While all countries have their own regulation, what is the legitimacy of the RSB to impose procedures?

**RSB answer:** The RSB cannot impose anything on countries or individuals. Whenever a producer voluntarily decides to get certified, be it because the country imposes certified biofuels or in order to export, it remains his own choice; certification can require more efforts than what legislation imposes, but in case of conflict with existing laws, these prevail above the standard.

- Is the RSB standard of the same type as FSC, or organic products?

**RSB answer:** Yes, in the sense that projects will be verified against the criteria to determine the level of compliance, but several criteria are really specific to biofuels.

- How do the standards relate to national laws?

**RSB answer:** The standard may go beyond laws, in terms of sustainability requirements, but in no case against any existing laws. The law must always prevail.

- Did the RSB take into account past experience? In the past, standards failed to be correctly implemented. The bad experience of cotton should also be used to learn.

**RSB answer:** Because of the fantastic work already achieved by other certification schemes (FSC, RSPO, 4C's, etc.), we couldn't but build on these past experiences and try to learn from these. This also includes recent problems faced by some of these initiatives in the implementation of the standard and the setting of a reliable verification chain.

- Does the RSB standard apply to wood or charcoal?

**RSB answer:** The first scope of the RSB standard is liquid biofuel for transports, but ultimately, there might not be restriction to broaden the standard to other forms of bioenergy, since most of the criteria are relevant to biomass production in general.

#### 3.2 Biofuel Standards in Africa

- Is the standard oriented toward exports?

**RSB answer:** Generally yes, because, unless the government decides to set a policy for sustainable biofuel development under a legal form or through financial incentives, there are no reasons for producers to try to comply with the standard, since it involves additional costs, which are unbearable unless they are compensated by the demand for certified products or premiums. However, there might be a market for locally produced sustainable biofuels, for instance in Europe or the US.

- Is the standard suitable for Africa?

**RSB answer:** As the standard aims to be generic and applicable worldwide, it is not necessarily ready to be implemented as such. An intermediary step will necessarily be the interpretation of these criteria within a given context (country, region). This might allow being much more specific and focusing on the main impacts.

- What are the benefits for Africa of using the standards?

**RSB answer:** Desertification, erosion, problems of water availability and quality, land rights, and food security are African realities, which the standards try to address. Certified biofuels may also offer opportunities for entering US or European markets, as well as perspectives for Clean Development Mechanism and carbon credits.

### 3.3 Other comments

- Several countries have a decentralized structure, where local authorities are key players to involve at all steps of the process, e.g. setting maps of important ecosystems or supporting social surveys. The implementation should be delegated to national committees.
- Some participants doubted that significant biofuel production/consumption targets could be achieved by small scale farmers alone.
- In national policies, economic liberalism has considerably modified the patterns of agricultural exploitation and rural development. Before that, villages were really central, with their own production-transformation-consumption local chain. Now, global influence is increasing and foreigners can buy land and take all benefits from cultivation out of the country. As this situation tends to be promoted by financial partners, farmers and authorities have no choice but to play that game. In the end, international policies have become more influential than national policies for farmers and rural areas.

### 3.4 Implementation

- How can we move from uncertified to certified production?

**RSB answer:** Through a voluntary scheme, the RSB wishes to encourage continuous improvement instead of immediately requiring that best practices are adopted. Hence, once minimum requirements are met, producers would likely have to commit to continuous improvement, what would help them to progressively adapt their production chain. Governments or relevant institutions should also be involved, as it is the case, for example, to perform a national identification and mapping of HCV areas. More generally, the effect of such a voluntary standard will be limited if the national or regional framework and policies are not coherent.

- How to overcome possible trade-offs between national priorities and the standard?

**RSB answer:** In no case should the RSB standard be in contradiction with existing legislation. Yet, some conflicts might exist. As an international and participatory initiative, the RSB tries to set a standard which is equally fair to all countries and stakeholders. The current criteria received the consensus of many experts from different countries and sectors, which gives them a certain legitimacy to carry the aspects that are fair and beneficial for the biggest number of people. If a country should decide to go against this international consensus, in spite of its scientific and rational basis toward genuine sustainability, the consequence might be an inability to export toward the US or the EU, or

to get the voluntary certification stamp. There are aspects on which the RSB can leave some flexibility, but not all of them, for instance, clearing primary forest or child labor.

- What is the timeline to consider the standard effective?

**RSB answer:** Version One of the standard will be released in June 2009, and will constitute the basis for the development of indicators. Certification schemes usually take a long time to make operational; it took about five years of work in the Roundtable for Sustainable Palm Oil before the first certified palm oil was traded.

- How do the standards apply to small farmers?

**RSB answer:** The distinction between small and large farmers is a permanent concern in the development of this standard. So far, the RSB Working Groups agreed that the high level of requirements currently included tend to rather orient it toward large-scale producers. An adapted version is hence to be developed for small producers.

- The Environmental and Social Impact Assessment (ESIA) described in 2a includes many parameters. Who will bear the cost for such an evaluation?

**RSB answer:** A simplified ESIA will be proposed for small producers, with appropriate requirements.

### 3.5 Other comments

- The language should be simplified and the requirements be made more operational.
- The content of the ESIA (Principle two) should be detailed through a synoptic table including the types of impacts for different classes of ecosystems and with reference to standardized procedures.
- The criteria should be translated for local people to understand these clearly and participate in the consultation.
- Overall, some participants feel that the standard should rather follow a bottom-up approach; there are too many restrictions from the beginning here, which can be discouraging.
- Local planning of biofuel production is needed to identify ecosystem services or social impacts.
- It is important to give farmers sufficient information and time to make decisions, as they might not have an immediate opinion on the risks and opportunities of particular crops and production systems.
- Suggestion to create a type of fund fed by producers, processors, traders and other stakeholders to help small producers comply with the standard or use premiums or subsidies as an incentive. In Zambia, 0.1 cent/L of fuel bought is used for road rehabilitation, as an example.
- Similarly to the first principle, all the data and documents used in the evaluation should also be certified, because of the high degree of data uncertainty.

## 4. Questions/remarks on Environment/GHG principles and criteria

### 4.1 Greenhouse gases

- Principle 3. "Climate change mitigation" involves broader aspects of climate change, such as radiative forcing to be taken into consideration (albedo, energy absorption...), in addition to GHG accounting.
- The GHG principle and criteria are considered "too scientific" for an easy application. Incentives should be in place to encourage GHG reductions. The idea of limiting GHG emissions does not meet consensus, since many consider it as an obstacle to economic development whereas Africa is only responsible for a very limited share of global GHG emissions. However, GHG issues are likely to progressively emerge as countries develop, especially because the majority of electrification projects in Africa plan to build coal-fired plants.
- 3e (indirect land use change) is beyond the producer's reach
- The promotion of wastes should be made more general in the standard.
- Promoting the use of idle/degraded land is more important in certain regions than others. For instance, some countries might have idle arable land and do not need to use degraded lands.
- One suggestion is made that "mitigation" should be replaced by "adaptation", to highlight the fact that plants like jatropha are also planted to respond to climate change in certain places.

### 4.2 Conservation/Biodiversity

- HCV must be identified with the help of local people, who also know about ecosystem values. Awareness-raising about the HCV concept is useful.
- How do international standards on biodiversity relate to national policies?  
**RSB answer:** In general, the standard cannot contradict existing laws, but unless national laws already cover all aspects of concern, the RSB can incentivize producers to go beyond existing laws on biodiversity.
- Criterion 7a: maps and toolkits are identified, but who will provide support to small producers?
- Criterion 7b should be strengthened so that "where possible, the continuity of Ecosystem Services must be preserved in biofuel production."

**RSB answer:** the production standard on its own will not achieve the maximal success if it is not integrated in a broader framework, which involves the participation of governmental and non-governmental institutions. The contribution of these institutions could include technical support in terms of scientific and ecologic information, e.g. by conducting the identification of the HCV areas at the national level, as several countries have already done.

- Principle 7. Connections among ecosystems should be considered, since several ecosystems might be interconnected and indirectly affected by the impacts occurring in one.

**RSB answer:** Similarly to the principle on water, the criterion might indeed refer to the entire watershed to ensure that interconnected ecosystems are covered.

#### 4.3 Soil/Water management

- Does soil health refer to pollution? What is the degree of soil pollution expected from biofuels?

**RSB answer:** Health does indeed involve the absence of significant soil pollution; this term was chosen because of its positive tone. Biofuels have exactly the same pollution potential as any other agricultural product, which means that they could be intensively cultivated at the expense of ecosystems, soil and water resources, or cultivated in a sustainable way. There is no specific pollution that is created by biofuels compared to the rest of agriculture, it is only a question of choice of production methods.

- 9d. Wastewater treatment is an important issue in Africa, where no framework exists to facilitate proper wastewater management. One important preliminary step is to push state governments to set a coherent legal structure and sensitize farmers about water issues and solutions to improve practices.

- Do the criteria on soil management refer to organic practices?

**RSB answer:** Organic soil management is one type of practice that could make production comply with these criteria. The RSB is keen to promote alternative practices to show that large-scale sustainable production can also remain economically viable.

#### 4.4 Technologies and GMOs

- GMO analysis requires much scientific skills and infrastructures, which might not always be available in a given production region. Consequently, the analysis may hence depend on foreign institutions with a limited knowledge of the context.
- The most important requirement is that the use of GMOs doesn't create dependency from developing countries toward developed countries.
- Legislation on GMOs is progressively being set in several developing countries and the compliance with these laws must be the priority.

**RSB answer:** For the entire standard, no criterion can contradict existing laws. Criteria can go beyond existing legislation but not against.

- Informing producers about technologies and seeds in order for them to make the right choice is crucial.
- In the African context, the use of "economic efficiency" might be interpreted as favoring big scale production, whereas the term "equity efficiency" might be more appropriate, i.e. maximizing the development and distribution of benefits.

- How will the RSB concretely deal with degraded lands?

**RSB answer:** The RSB expects to refer to the ongoing work held by the WWF and other initiatives on the definition of marginal lands in order to incorporate this into the standard. More generally, the RSB is keen to include references to existing credible sources or initiatives.

## 5. Questions/remarks on Social Principles and Criteria

### 5.1 Rural Development

- In Mali, any new large-scale project must fit into the annual socio-economic development plan established by local authorities, in order to receive authorization.
- The development of new projects may be motivated by other purposes than local development, such as personal profit or electoral benefit. Political will is an important factor to develop projects in the right way.
- Whereas small farmers used to represent the majority in Africa, the boom in bioenergy tends to give more recognition to large farmers; small ones have become secondary and do not receive support. Small farmers should be the priority of action, especially because, in many countries, they have been achieving the green revolution.
- In spite of this situation, the current economic system cannot be modified and people have to become more competitive, for example by gathering into cooperatives and unions. Policies established by governments must look for empowering local populations through competitive arrangements.
- In principle 5, something should be said to reduce the producer's dependency on investors, be it financial or technical dependency.

**RSB answer:** This aspect is partially treated under Principle 11, but certainly needs more emphasis. The "Groupe Energies Renouvelables, Environnement et Solidarités (GERES)" is currently working on these aspects.

- The word "indigenous" might be considered pejorative when translated into French.

### 5.2 Community Consultation

- The RSB should undertake more consultation in various countries and under various conditions.
- In African countries, decentralization allows companies and possible certifying agencies to interact directly with local authorities, which can be considered as legitimate for represent people's opinions. However, if time and means allow it, it is recommended to try to consult individuals (e.g. women's groups), but always after legal authorities in order to avoid shortcutting the normal hierarchy. The mayor is the first level of authority to talk to, carrying both legal and traditional legitimacy. Small farmers must also be consulted to understand their traditional framework and reality.
- In the case of private big-scale projects, it is hard to have an influence on community consultation and benefit-sharing. Since the project's site is up to the owner, financial incentives and the business case could help orienting the production the right way.



### 5.3 Food security

- Whereas 6a strengthens the principle, 6b is considered to make it weaker, because it requires the instantaneous picture of food security, but does not require an assessment over the long term. In reality, the food situation may be very good one year, but within a few years, poor harvests or climatic events may rapidly give way to food shortage. The increase in population should also be integrated while evaluating land availability to anticipate the growing demand for food over decades.
- The main issue related to food security in Africa is not land, but manpower! A large consensus among participants from all countries represented is that the main threat to food security is the lack of manpower at different steps of food production. Overall, biofuel production is unlikely to create new jobs, but rather displace the existing agricultural labors. This aspect should also be included in the criteria on food security. One option to mitigate this issue is to practice intercropping and crop rotation. It is also pointed out that mechanization will free much working time.
- The non-use of food crops for biofuels should be mentioned in the guidance under principle 6.

### 5.4 Human rights

- Criterion 4c seems very much similar to the UN Convention on Children Rights; this reference would perhaps make more sense than the ILO's.

### 6. Specific Questions/Remarks on Jatropha

- Some participants consider that jatropha is not always developed for the best reasons and in the most appropriate sites. When grown on semi-arid land, the plant yields little oil and a limited number of seeds, which contradicts the perspective of commercial biofuel production but prevents desertification and soil erosion; if biofuels are to be produced on fertile land with inputs, jatropha is far from being the best option, compared to palm for example. A choice is hence needed at some point.

**RSB answer:** A specific working group on jatropha is to be shortly set under the auspices of the RSB. Much discussion on jatropha was held in New Delhi during the RSB's South-Asian outreach in June 2008; details available at <http://cgse.epfl.ch/page71636.html>

- More research should also be undertaken to study the possible toxicity from jatropha through the water that is drained into the soil. The use of all jatropha byproducts would reduce this risk.

**The RSB would like to warmly thank COMPETE, Mali Folkecenter, WIP and all the organizers for the opportunity to organize this consultation and the very useful logistical support.**

## THURSDAY 27<sup>th</sup> NOVEMBER 2008

### **OFFICIAL OPENING CEREMONY of the Garalo Bagani Yelen Jatropha-fuelled Rural Electrification Project for 10.000 People in the Municipality of Garalo**

The OFFICIAL OPENING CEREMONY of the Garalo Bagani Yelen Jatropha-fuelled Rural Electrification Project was organised in the framework of the COMPETE Workshop on 'Bioenergy Policies for Sustainable Development in Africa' on 27 November 2008.

More than 50 participants of the COMPETE workshop from several African and European countries travelled by bus from Bamako to Garalo to celebrate the official opening of the electrification project together with the inhabitants of Garalo.

Furthermore, a high-level delegation of policymakers from Mali was present at the opening ceremony including the Minister of Energy of the Republic of Mali, HE Mr. Mamadou Igor Diarra, the Minister of Agriculture HE Prof. Tiemoko Sangare.



Opening Ceremony in Garalo

The opening ceremony included addresses by the Mayor of Garalo, Dr. Ibrahim Togola (President of Mali-Folkecenter), Jeff Prins (DOEN Foundation), Winfried Rijssenbeek (FACT Foundation), HE Madam Ellen Van Der Laan (Ambassador of the Netherlands), and HE Mr. Mamadou Igor Diarra, Minister of Energy from Mali.



High-level participants of the official opening ceremony, from left: Dr. Ibrahim Togola (Director MFC), HE Madam Ellen Van Der Laan (the Ambassador of The Netherlands), HE Prof. Tiemoko Sangare (Minister of Agriculture), HE Mr. Mamadou Igor Diarra (the Minister of Energy of the Republic of Mali), Mme Khadidja Abdelkader, (Tchad State Secretary in the Ministry of Agriculture responsible for Food Security).

A guided tour through the installations of the electrification project was organised for the Malian Ministers of Energy and Agriculture and the other high-level participants of the opening ceremony. This tour included information on the *Jatropha* oil press and filtering system, presented by Tom Burrell (MFC), the electricity production unit, presented by Aliou Tounkara, the electricity tariff system and invoicing, presented by Anasa Maiga (ACCESS), as well as on research on *Jatropha* varieties, presented by Mory Konate (MFC).



Inauguration of the *Jatropha*-based Rural Electrification Project in Garalo by the Ministers of Energy and Agriculture from Mali

In the afternoon H.E. Prof. Sangare, officially launched the renovation of a **Rural Training Centre** (Centre d'Animation Rural – CAR) in the village of Garalo. Thereby, it was stated that capacity building for farmers is of utmost importance in rural areas of Mali in order to promote agricultural and technical expertise in the field of improved crop management systems.

This ceremony included addresses by the Mayor of Garalo, Dr. Ibrahim Togola (President MFC Nyetaa), Dr. Rainer Janssen (COMPETE Coordinator), and HE Prof. Tiemoko Sangare.



Official Launch of the Renovation of the Rural Training Centre in Garalo, from right: FAO representative, Ambassador of the Netherlands, State Secretary Tchad, Minister of Agriculture Mali, Minister of Energy Mali.

The opening ceremony in Garalo was concluded by an impressive theatre play performed by the Youth of Garalo presenting “Garalo before and after the implementation of the rural electrification project”. The COMPETE group would like to thank all inhabitants of Garalo for their great hospitality.



Theatre play performed by the Youth of Garalo



**THURSDAY 27<sup>th</sup> NOVEMBER 2008**

**OFFICIAL OPENING CEREMONY of the Garalo Bagani Yelen Jatropha-fuelled Rural Electrification Project for 10.000 People in the Municipality of Garalo**



**Garalo Bagani Yelen –  
A New Paradigm of Energy for Sustainable Development**



In the context of climate change and ever more expensive and insecure fossil fuel supplies, MFC Nyetaa has been working for 7 years to develop pilot projects to demonstrate that pure Jatropha oil can fuel Mali's future development in a sustainable way, to the benefit of local people. These projects, focusing on pure Jatropha oil (*see photo, woman collecting Jatropha seeds*) as a diesel substitute for multi-functional platforms, transportation and rural electrification, are acting as a model for future electrification projects in Mali, West Africa, and internationally.

The Garalo Bagani Yelen Project represents a major part of these efforts. The objective is to reduce poverty of the village population and improve in greening the planet by concretely setting up and operating village electricity with Jatropha fuelled generator systems for 10 000 people in the Commune of Garalo, Mali. The project has been developed by MFC and has two main axes which are executed by different partner organisations:

**A. Rural electrification of the village of Garalo.**

ACCESS, an innovative Malian rural energy service company, is supported by MFC and FACT Foundation to install and run a 300kW power plant which can run on diesel or on pure Jatropha oil to provide energy services to the population, with a mixture of domestic and productive customers. The productive customers are all important to the wider local economic development of the village and the commune. This part of the project is funded by AMADER (the Malian Agency for the Development of Domestic Energy & Rural Electrification) and SHGW (Green Forest Foundation, the Netherlands).

### **B. Sustainable production of pure Jatropha Oil for local use.**

MFC is executing this part of the project in partnership with the local population and is supported by FACT Foundation with funding from SHGW. The population of the commune of Garalo is setting up 1 000 ha of Jatropha plantations (of which around 600 hectares have already been achieved) to provide the oil needed for the power plant that will provide clean electricity. The total area is made up of many small plantations of between 0.5 and 5 hectares, belonging to and managed by local farmers who use intercropping and sustainable agriculture techniques. This production provides new diversified incomes for local people. MFC is organising the project activities and provides technical support.

This pilot project is ambitious wide reaching, and is based on the long-standing request of the population to have access to modern energy services. This innovative project will provide electricity and other modern energy services to more than 10 000 people of Garalo commune, transforming the local economy. It does so by providing power for productive use in small industries and businesses, generating employment, and by supplying power for social uses in schools, the maternity clinic and community buildings as well as for domestic use. It will achieve all this while still protecting the local environment and supporting local community integrity and the social fabric of the commune. Crucially the project works very closely with the local population and the municipality. As such this kind of project represents the new paradigm for sustainable development in Africa.



The three Garalo gensets in position (left). The power house at night producing power for the village (right).



#### **Focus on livelihoods in Garalo.**

Masara Kané (on the right of this picture) runs a bustling restaurant on the main road through Garalo. With the arrival of electricity she says she can stay open longer and has increased revenues. She uses electricity for lighting and for charging mobile phones. She is now thinking about investing in a refrigerator, which would allow her to sell cold water and soft drinks.



## The COMPETE Project

### **COMPETE Objectives**

The Competence Platform on Energy Crop and Agroforestry Systems for Arid and Semi-arid Ecosystems – Africa (COMPETE) will establish a **platform for policy dialogue and capacity building** and identify **pathways for the sustainable provision of bioenergy**

- to improve the quality of life and create alternative means of income for the rural population in Africa
- to aid the preservation of intact ecosystems in arid and semi-arid regions in Africa
- to enhance the equitable exchange of knowledge between EU and developing countries

### **COMPETE Activities**

COMPETE will deliver a matrix of multi-disciplinary and cross-sectoral work-packages

- to evaluate current and future potential for the **sustainable provision of bioenergy** in Africa in comparison to existing land use patterns and technologies
- to facilitate **South-South technology and information exchange** capitalising the world-leading RD&D in bioenergy in the key countries Brazil, Mexico, India, China and Thailand
- to develop **innovative tools for the provision of financing** for national bioenergy programmes and local bioenergy projects, including: carbon credits, bilateral and multi-lateral funding instruments, and the role of international trade
- to develop **practical, targeted and efficient policy mechanisms** for the development of bioenergy systems that enhance local value-added, assist local communities and address gender inequalities
- to establish the **Competence Platform** to ensure effective dissemination and knowledge exchange inside and outside the network

### **COMPETE Partnership**

The COMPETE partnership comprises 20 European and 23 non-European partners - 11 partners from 7 African countries, 3 regional African policy and financing bodies (African Development Bank; Food, Agriculture and Natural Resources Policy Analysis Network of Southern Africa; UEMOA - Biomass Energy Regional Program), 9 partners from Latin America and Asia - and the Food and Agriculture Organisation of the United Nations (FAO).

COMPETE Website: [www.compete-bioafrica.net](http://www.compete-bioafrica.net)

### **COMPETE Project Coordination WP7 Coordination - Dissemination**

WIP Renewable Energies  
Sylvensteinstr. 2  
81369 Munich  
Germany

Contact: **Dr. Rainer Janssen**  
**Dominik Rutz**

Phone: +49 89 720 12743  
Fax: +49 89 720 12791

**E-mail:** rainer.janssen@wip-munich.de  
dominik.rutz@wip-munich.de

**Web:** www.wip-munich.de

### **COMPETE Project Coordination WP3 Coordination - Sustainability**

Imperial College London  
Centre for Energy Policy and Technology  
South Kensington Campus, London, SW7 2AZ  
United Kingdom

Contact: **Dr. Jeremy Woods**  
**Dr. Rocio Diaz-Chavez**

Phone: +44 20 7594 7315  
Fax: +44 20 7594 9334

**E-mail:** jeremy.woods@imperial.ac.uk  
r.diaz-chavez@imperial.ac.uk

**Web:** www.imperial.ac.uk

### **WP1 Coordination – Current Land Use**

University of KwaZulu-Natal  
School of Environmental Sciences  
South Africa

Contact: **Dr. Helen Watson**

**E-mail:** watsonh@ukzn.ac.za

**Web:** www.ukzn.ac.za

### **WP4 Coordination – International Cooperation**

Winrock International India

Contact: **Sobhanbabu Patragadda**

**E-mail:** sobhan@winrockindia.org

**Web:** www.winrockindia.org

Stockholm Environment Institute

Contact: **Francis Johnson**

**E-mail:** francis.johnson@sei.se

**Web:** www.sei.se

### **WP2 Coordination – Improved Land Use**

Utrecht University  
Dept. Science, Technology and Society  
The Netherlands

Contact: **Dr. Andre Faaij**

**Dr. Edward Smeets**

**E-mail:** A.P.C.Faaij@uu.nl  
E.M.W.Smeets@uu.nl

**Web:** www.chem.uu.nl/nws

European Biomass Industry Association

Contact: **Stephane Senechal**

**E-mail:** eubia@eubia.org

**Web:** www.eubia.org

### **WP5 Coordination – Financing**

Energy for Sustainable Development  
United Kingdom

Contact: **Michael Hofmann**

**Stephen Mutimba**

**E-mail:** michael.hofmann@esd.co.uk  
smutimba@esda.co.ke

**Web:** www.esd.co.uk

### **WP6 Coordination – Policies**

Food, Agriculture and Natural Resources Policy  
Analysis Network of Southern Africa  
South Africa

Contact: **Khamarunga Banda**

**Dr. Charles Jumbe**

**E-mail:** khamarunga@hotmail.com  
charlesjumbe@bunda.unima.mw

**Web:** www.fanrpan.org



COMPETE is co-funded by the European Commission in the 6<sup>th</sup> Framework Programme – Specific Measures in Support of International Cooperation (INCO-CT-2006-032448).