

## The South African Rural Bio-Energy Community Programme®

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### INTO SUMMARY

Agro Forest Bio Energy Association (AFBEA) together with various stakeholders and rural communities has embarked on a programme to create “renewable energy” in rural areas using a combination of:

- Emerging farmers
- Skills transfer
- Degraded and marginal land
- Agro-forestry
- Modern technology

The programme will focus on the production of oils extracted from oil-rich tree seeds. This will create a new source of renewable energy in Southern Africa.

The role of AFBEA will be to facilitate and implement the project. Once land has been identified, AFBEA will assist each “Community Trust” to implement the programme.

A 3,000 ha portion of land dedicated to “energy plantations” could, on an annual basis yield the following:

- Six million litres of vegetable oil, which can be used for electrical power
- Total grown biomass of approximately 15,000,000 kg.
- Biogas sufficient to generate 5.8 MW of electricity.
- 5.8 million litres of bio-diesel, if the oil is refined.
- 9 million kg of organic fertilizer, and 300,000 kg of glycerol, which are produced as by-products of the refining process.
- Packing, low-grade paper, and/or insulating materials.
- Captured heat for hot water, desalination of further developments.
- Biogas for home cooking in the communities.
- Soap and honey are by-products of the programme.

Once the training, nurseries, and energy-producing plantations are provided for the programme is cost effective.

Once the soils have been analysed and the correct type and variety of tree selected and seed purchased, for each 1,000-ha portion of land, 100 members of the community will be employed to set up the programme for the first 3 years. Thereafter for each 1000 ha of plantation approximately 300 full time jobs, many small businesses, and many part time jobs will be created.

- The Associates is negotiating for provisional orders for the vegetable oil from Europe, the U.S.A., and Tokyo.
- A signed off-take agreement from the E.U. has been negotiated for 500,000,000 litres per year.
- Electricity made from the biogas will be used by the communities and excess sold to nearby users.
- Organic fertilizer — a by-product, in great demand internationally.
- Honey can be sold to many countries; there is a world shortage.

- Glycerol — South Africa (SA) imports thousands of tons from the U.S.A.
- If the DME in SA creates policy, as in Europe, of blending of biodiesel with fossil diesel – even if a low a figure of 5 % [Europe advocates 8%] is selected, this will create an instant market of over 300,000,000 litres of biodiesel per year for SA and within this programme create about 50,000 jobs.

The project was selected for display at the World Summit on Sustainable Development in Johannesburg during Sept. 2002 and selected from programmes Globally by the “Forum on Sustainable Development” in Hanover, Germany, April 2002.

## INTRODUCTION

The Rural Bio-Energy Community Programme is a new business initiative for empowering Southern Africa's emerging farmers and rural poor, incorporating developing international technology and recent innovative solutions to renewable energy coupled with a reduction of green house gas (GHG) emissions.

The programme is planned to develop sustainable cost effective models for the introduction and production of renewable sources of bio-energy in Africa on margin-alized or degraded or wasted land.

Agro Forest Bio Energy Association is committed to initialing an implementing project that are socially, economically, and environmentally sustainable. The Bio-Energy Programme is primarily aimed at the upliftment and empowerment of historically disadvantaged rural communities thereby stimulating economic growth and effectively contributing to government's initiative on climatic change mitigation.

The Rural Bio-Energy Community Programme has the potential of becoming the most successful economic development programme in Southern Africa, which can provide renewable energy to rural areas and dramatically reducing GHG emissions.

The project is suitable for a Southern African post-land-settlement support programme.

Southern Africa imports annually approximately 3.75 billion litres of oil for diesel and has a total consumption of 6.5 billion litres. A majority of South Africa's electrical power is from coal-fired power stations. These fossil fuel sources together with the burning of paraffin and wood for heat, contribute to excessive climate changing emissions.

The Rural Bio-Energy Community Programme proposes that a percentage of the diesel and power demand is met by stimulating the growth of “carbon-absorbing-agri-forest-businesses” in rural communities, to produce down stream bio-energy products in Southern Africa.

Every 1000 ha of newly forested areas within the programme will create about 280 permanent farming jobs, temporary jobs, small business development and the opportunity for community shareholding in the newly formed business entities.

The model intends to provide small-scale, widespread, productive, labour-based agro-forestry communities, with the education, know-how, and means to produce economically viable forests, trees and seeds from which vegetable oil can be extracted and refined to produce renewable energy sources such as biodiesel, biogas, bio-mass, biopower and various environmentally byproducts that can easily be traded.

The success of The Southern African Rural Bio-Energy Programme will positively impact on Africa in the following ways:

- 1) It will deliver a sustainable rural economic development opportunity in communities and meet government's drive to create jobs and power in rural areas, encourage capacity building, which incorporate skills transfer, and in providing poverty relief it will embrace rural woman and the youth.
- 2) It will reduce the amount of foreign currency required in Southern Africa for the importation of crude oil and improve SA's competitive position in the global market.
- 3) The production of bio-energy will play a strategic role in enabling Governments to meet their initiative on Climatic Changes and confirm their commitment to environmental preservation.
- 4) It will provide by-products that will be suitable to export.

## THE PHASES OF THE PROGRAMME FOR A 45,000-HA PROGRAMME

### Phase One.

#### EIA & SEA

- Proper Environmental impact study has to be executed.
- Legislation in terms of:
  - Conservation of Agricultural Resources Act 43 of 1983
  - Environmental Consecration Act 21, 22, and 26 of 1989
  - National Forestry Act
  - National Water Act
- Pilot Study
- Recommendations: National and Provincial guidelines

### Phase Two.

- Select the suitable communities and the area for the project
- The land must be wasted land, marginal, overgrazed, or damaged
- Presentations and explanations of the process to all involved
- Select suitable trees for the types of soil and area with biodiversity in mind
- A specific "Environmental Impact Report" for the area must be completed
- Finalise the specific business plan and time-line for the programme
- The community is to select a team to represent the "Community Trust"
- Complete the legal documents regarding land ownership and community
- Together with the community choose the sites for nursery production
- Establishment of services on the nursery area for the first 15,000 ha
- Initial employment of nursery and land-care people
- Ordering the necessary farming equipment and materials
- Setting of objectives and targets, together with community
- Training programme set up training centre
- Evaluation procedures are set in place
- Planting in the nursery begins

- Establish of plantations and management
- Digging of holes for later planting in forest area is begun
- Planting of the first trees on the first 15,000 ha
- Management of the trees in the ground begins
- Cuttings taken of the initial trees for the second plantings
- Finalise funding for the Production phase
- Completion of the planting of cuttings and trees for the first 15,000 ha
- Setting up of the first oil expeller
- Training for the tree management and harvesting
- Establish trial production runs
- Begin preparation for the second 15,000 ha of land at the end of Year 1
- Once completed begin preparation of the third 15,000 ha of land at Year 3

#### **Phase Three.**

- In Year 3 — order the biodiesel refinery
- Ordering the biogas power generators
- Completion of the training for the bio-energy production phases
- Development of the by-products within the community
- Revisit and, if necessary, re-establish the objectives and set in place the business arrangements for future developments

#### **Phase Four.**

- Marketing of all by-products
- Develop the community with regard to market infrastructure and by-products
- Expansion of the programme where suitable
- Set in place the Community Management Team

### **EMPLOYMENT OPPORTUNITY**

The Rural Bio-Energy Community Programme will empower the following on a 15,000 ha project:

- Members of the community will be empowered to train other members of the programme.
- Close to 800 members of the community will be employed for a period of 3 years to set up the programme with regard to planting and managing the process.
- 2000 full-time members of the community will be empowered to manage the plantations in Phase Three.
- Approximately 160 more members will be employed and be self-employed in the down-stream processes and small business developments.
- The community nursery may be continued for other programmes in the area, thus creating further employment and opportunities.
- Technology exists for further processing of raw materials into other products during the programme.

## OWNERSHIP OF VARIOUS STAGES

- The Association will co-ordinate and facilitate donor funds, partnerships, farming communities, processes, and development and training of further projects in other communities.
- Land, trees, nursery, tools, and irrigation systems are owned by the Community trusts of the proposed land on which the project will be developed.
- The AFBEA provides technical training and expertise.
- The ownership of the production process, oil expelling and refinery and power generator depends on the source of funding and community involvement for these processes.

## FUNDING REQUIREMENTS

### Phase One.

- 100 ha isolated land for intensive EIA.
- Tissue culture labs and nursing facility to cultivate 150,000 trees.
- Further 900 ha to “roll out” plantations.

**Phase Two.** Minimum of 15,000 ha made up of agro-forests are needed to create a cost effective bio-energy systems and its co-products.

Grant funding is required for the initial community owned trees and planting and land preparation.

**Phase Three.** The second production phase will require an investment or a loan to the community for the production of biodiesel and biogas and organic fertilizer.

**Phase Four.** If required for the last phase — a gas-fired generator depending on the power requirements [or for desalination] to the local community and to sell the excess to major power user in the area.

## AGREEMENTS NEEDED

- 1) Phase One — funding implementation contract with AFBEA
- 2) Acceptance of the business plan and sequence of rollout
- 3) Co-operative or community trust agreement with farmers with respect to land ownership and the bio-energy programme and off-take agreements
- 4) Draft memorandum and articles of production company
- 5) Draft investment agreement for the production company
- 6) Excess power — sales agreement with a major user or ESKOM

## OFF-TAKE AND SUPPLY COMPANY

A supply agreement will be negotiated at an agreed-upon price with the production company, which will undertake its conversion, production, and marketing.

## ADDITIONAL BUSINESS OPPORTUNITIES

Opportunities for the following additional businesses:

- Apiary and honey by-products
- Soap making and the selling of soap in the community

- Glycerol refining and the sale of the by-products
- Biomass into a biogas to create electrical power
- Organic fertilizer for use locally and for export
- Packaging materials made from the husks and pods using the heat to dry them

## BUSINESS PLAN

An approximate funding requirement, business plan, and investment plan is available. Its finalization is subject to:

- The type of land: slope, degradation, clearing, size
- The type of soil
- The other uses of the land such as grazing
- End use of the products
- Donor, sponsorship, and/or loan funding

A finalized business plan for the project area can be completed once the programme and detailed capital requirements, expenses, and income for each phase are ascertained after the project details are researched, gathered, and formulated.

For Namibia the water requirements are a major hurdle and need to be addressed initially (Salination Plants).

## AGRO FOREST BIO ENERGY ASSOCIATION

**The Project Vision.** To simulate economic development through the upliftment and empowerment of historically disadvantaged Southern African rural communities by introducing a sustainable business model to produce renewable sources of bio-energy for national and international consumption.

**The Project Mission.** Is to initiate, co-ordinate, and facilitate all processes leading to the successful implementation of an integrated plan of economic development through the production of a renewable source of biodiesel by:

- Communicating with all stakeholders at all levels from the community, emerging farmers to the highest levels in government and the private sector
- Bringing together experts and specialists to ensure the highest quality of service to all parts of the programme
- Establishing a centre of management to co-ordinate and manage the implementation of the integrated project
- Managing and being accountable for the use and distribution of all funds received
- Innovating and growing an African renewable energy sector by engaging a wide range of stakeholders and drawing in the co-operation of local authorities, local development frameworks, and service providers to deliver a viable and sustainable agro-forestry and down-stream processing bio-energy industry to the targeted beneficiaries.

The Associates sees its role to **Empower Communities to Trade Themselves Out of Poverty** through joint ventures, working, and collaborative agreements.

It is a non-profit; Section 21 NGO, with links to various universities and influential business and institutions.

The associates are committed to the training, upliftment, and the empowering of rural communities through a “trade-not-aid” policy with emphasis on ensuring that environmental awareness and protection is foremost in all the foundation projects.

Agro Forest Bio Energy Association is spearheading development into training rural communities in sustainable development especially with regard to renewables and conservation. It is currently involved with various research and development projects.

The team will work closely with all relative Government departments such as Minerals and Energy, Agriculture, and Forestry to empower rural developing farmers.

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## Essential Oils: Are They Worth Considering as an Alternative Crop?®

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The South Africa (SA) essential oil industry, in 2004, is poised to become a significant player in the international essential oil market.

Its beginnings can be traced back to the 1950 when the CSIR archives show numerous requests for assistance and some early research. The citrus and eucalyptus essential-oil productions developed first, largely due to various pioneers but it was not until the 1990s that the SA farming community showed significant interest in essential-oil farming. This revival can be attributed to many political, economic, market, and technical factors. The intensive research programme of the CSIR into the scientific and market development needs of a SA essential-oil industry played a major role, supported by Biosys Ltd., United Kingdom, now the major share holder of Biosys Plant Extracts (Pty) Ltd.

Well established commercial farmers can, in 2004, annually produce and sell about R10 million worth of essential oils and the potential for growth is exciting.

To establish a successful essential oil industry, be it a single farm production or on a nation level, requires investment into developing three areas:

- Chemical and engineering technologies.
- International market development.
- Research into agronomic practices.

This presentation will focus mainly on the latter two, although various parties have paid considerable attention to all three while developing the SA industry.

Focusing on the market issues firstly.

The market can be segmented into at least five cost categories of increasing value and concomitant increasing difficulty for a new producer to achieve market penetration.

To define the world market for essential oils is very difficult for numerous reasons. However, reliable sources value the world market for products using essential oil at U.S.A. \$300 billion p.a. and for essential oils themselves at \$10–20 billion. A further distinction for “fine” essential oils (annual production world wide of 100 tons to 50 kg) is quantified at \$3–5 billion. Even further refinement identifies the highest quality market niche, including organically certified oils, at about \$250 million.