



ASJEBAGROUP

SUSTAINABILITY. FAIRNESS. OPPORTUNITIES.

GLOBAL INITIATIVE FOR RESTORATION OF DEGRADED SOILS – UN DECADE OF RESTORATION

Asjeba (Ghana) Ltd.

TECHIMAN

Global Initiative for Restoration of Degraded Soils – UN Decade of Restoration



Asjeba Techiman 1 (Ghana) Ltd., Summary

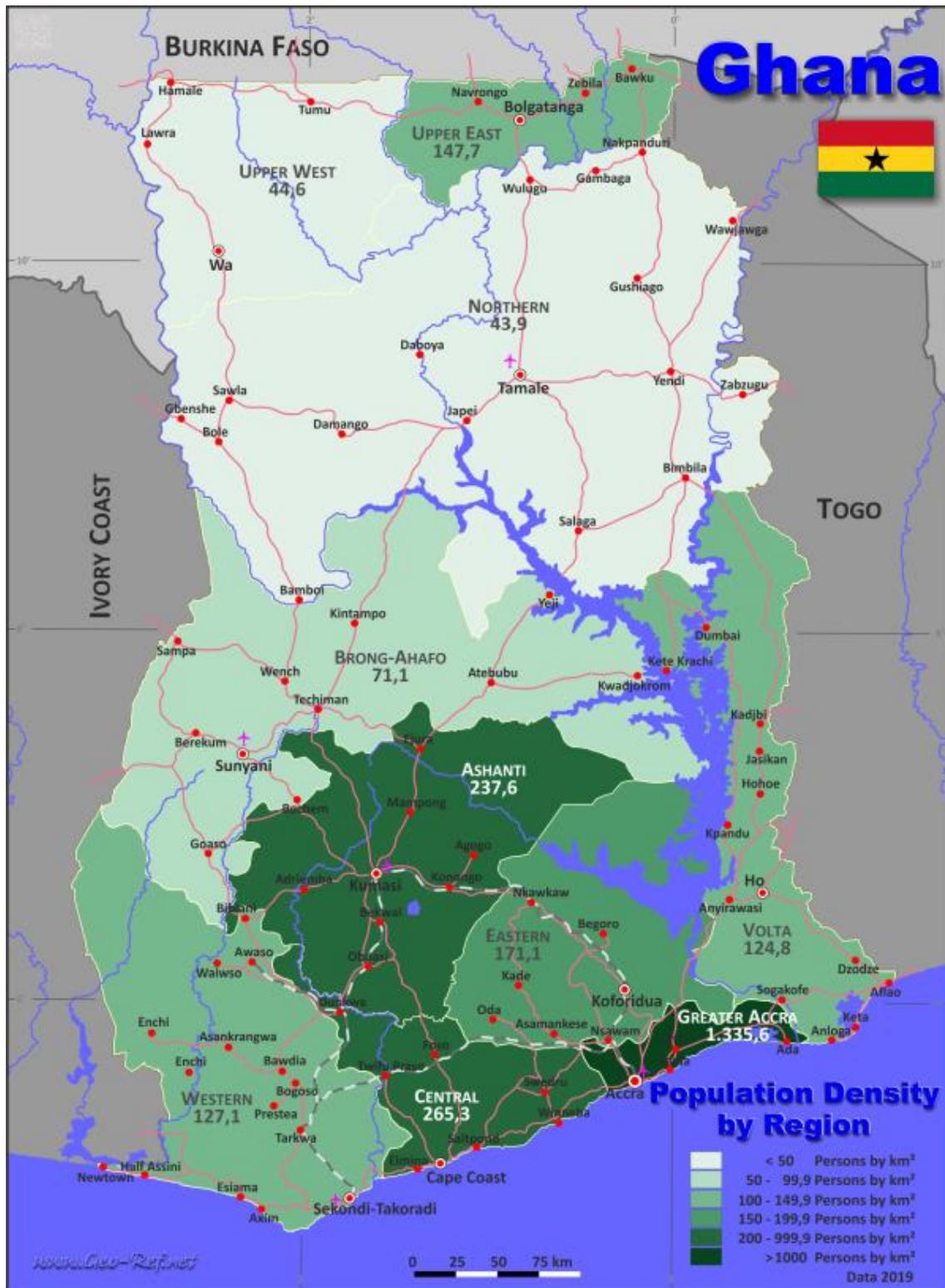


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Executive Summary

Degraded, unused and economically sub-optimal areas in African countries can be transformed into fully productive Agroforestry areas. The successful implementation of the syntrophic concept was achieved also by our partner **Clean Fuels and Energy las Americas SA (C-Fela)** in Costa Rica over the last 15 years. It includes optimal crop sequence; labour intensive farming on a large scale and the cooperation with smallholder farmers through an out-grower concept.

For Africa we will implement the Demonstration project in Ghana, in the region of Techiman.

Asjeba Techiman 1 (Ghana) Ltd., -SPV to be established- will become a subsidiary of the Swiss humanitarian foundation **Asjeba Planting Your Future** (www.asjeba.com) and has the ultimate goal to support a sustainable development for the living conditions in Africa by establishing Productive forests for food production and produce vegetable oil (non-edible) for commercial applications (e.g. bio fuel). Project management will be executed by **Asjeba Management AG**, Switzerland during the lifetime of the emphyteutic lease contract.

Benefits of the Asjeba conceptual approach:

- **Afforestation**
Asjeba Techiman 1 (Ghana) Ltd., will sign a long term emphyteutic lease agreement with the **Diocese of Techiman, Ghana** for 75 000 hectares of unused land for 20 years with the possible option of renewals for up to 99 years. In the first year **Ricinus** and one or more blocks of **Moringa** will be planted. **Ricinus** is a one-year plant with deep roots that break up the soil. **Ricinus** oil can be sold internationally in any quantity at stable prices. The **Moringa** tree will produce leaves that can either be eaten as fresh vegetable, dried for powder or extracted for the protein. Thereafter **Jatropha** and **Acrocomia** trees will be planted. **Jatropha** and **Acrocomia** will produce 30/40 resp. 60/70 year's vegetable oil. The syntrophic concept is totally organic, restricts the use of chemicals in the Agroforestry area and results in a positive ecology.
- **Promotion of renewable energies**
The production of vegetable oil is a significant contribution to the reduction of the dependence on imported fossil fuel. The oil can be used directly as fuel for tractors, engines, vehicles, generators, power plants, etc. for local use. In case market prices allow, the oil can be refined to bio-diesel or bio-kerosene for local use or for export.
- **Jatropha out-grower concept**
Smallholder farmers do employ in average less than 2 hectare. Unfortunately, this land has in most cases not been, , used economically or generated optimized results. The **Asjeba** concept is to support smallholder farmers in planting and harvesting trees and plants on their land. In addition, the Agroforestry area of **Asjeba Techiman 1 (Ghana) Ltd** will provide processing equipment, oil mills and the scientific bio-technical support in order to keep added value in the country for the farmers. Long term purchase contracts for the harvest can be signed with the smallholder farmers to ensure a durable stable income.
- **Intercropping**
The moment the soil becomes more fertile (after approx. 5 years) intercropping can start, meaning a complete shift from mechanical towards labour intensive farming. Research from the agricultural faculty of the **University of Hohenheim** (Germany) and a **local university** in cooperation with the expertise of our local partner **Ghana Permaculture Institute**, Techiman will provide analysis for the optimal combination of fruits/vegetables which can be planted with the Agroforestry area trees. With this add-on planting to the existing program a further stream of revenue will be created.

- **Employment creation**
Labour intensive planting of oil producing trees, combined with intercropping create sustainable employment and mitigation towards the causative factors of mass emigration. In this plan each 5 hectare of the project area will result in 1 job being created.
- **Capacity development / vocational training / dual professional education**
Every year millions of young people leave school without a realistic job perspective. **The Asjeba Group** is planning to create a dual educational system for participants in cooperation with Ghanaese authorities and Swiss organizations. The participants will work 4 days on the field (in case of an agricultural apprenticeship) under supervision of a “master” and attend school for 2 days. After 3 years they will receive a licentiate degree that certifies their proven capability and ability to execute the profession.
- **Infrastructure development**
The transformation of the agricultural areas requires the creation of local infrastructure. This includes, amongst others, housing (one village per 1 000 ha); primary healthcare; potable water supply; treatment of waste and waste water; energy supply; education and transportation as well as upgrading of infrastructure. These investments will be covered by the income generated on the Agroforestry area.

The **Asjeba** model is supported by experienced specialist’s world-wide, as well as agricultural universities and institutes. **Asjeba’s** objective in **Ghana** is to invest in the country’s resources, which in turn safeguards the yield on the capital investment.

We shall capitalize on the long-term lease of the land and aim to balance the investment within 6 to 8 years. As soon as this milestone of 6-8 years has been achieved, all profits will be reinvested in **the site of the lease and their inhabitants through a local foundation to be established on behalf of the local population**; an intention, **The Asjeba Group** has explicitly expressed as an obligation by a written statement with the OECD in Paris in 2016. **The Asjeba Group** will execute project management and worldwide distribution.

Initial capital investment is estimated at approx. US\$100 million for both the out-grower project and the Agroforestry area.

The project will be profitable – as follows:

- **It is planned to break-even within three (3) years.**
- **The trees will reach their maximum harvest volume approx. five (5) years after planting.**
- **Repayment of initial capital investment (for project 1) within seven (7) years.**

Furthermore, we will actively be seeking foreign aid programs to support the related projects of a dual education system, primary healthcare and social network support systems.

For both the **Asjeba** Agroforestry area and the out-grower project in **Ghana** we will seek certification to achieve carbon credits in accordance to The Gold Standard.

Project / Business Description

Introduction

The **Diocese of Techiman** has an abundance of unused land that they would like to make available for agricultural uses. In addition, there are many smallholder farmers that require (i) support for initial investment, (ii) guidance with technical know-how and (iii) a market that functions to be able to sell their products at acceptable fair prices.

Asjeba Management AG represents a group of private individuals and companies worldwide -**The Asjeba Group** - that have the objective to produce vegetable oil to be converted into biofuel by planting various species of plants on unoccupied / degraded land, at the same time converting this land into fully productive Agroforestry areas. As soon as the soil will be fertile again, intercropping could start for other products that can be sold locally or exported.

In addition, **The Asjeba Group** has worked out an out-grower concept, whereby smallholder farmers will prepare their land. Thereafter they will receive high quality seeds and organic fertilizers, including guidance for planting, growing and harvesting. **The Asjeba Group**, represented by its subsidiary "**Asjeba Techiman 1 (Ghana) Ltd.**" will buy the goods at fix prices in long term purchase contracts.

The Diocese of Techiman and The Asjeba Group therefore have agreed a roadmap as follows:

1. **The Asjeba Group** has made a proposal for a 75 000-hectare Agroforestry area in 2021 in Techiman. **The Dioceses of Techiman** has already provided topographic detailed plans in digital form.
2. **The Swiss humanitarian foundation "Asjeba Planting Your Future"** will establish "**Asjeba Techiman 1 (Ghana) Ltd.**"
3. **The Dioceses of Techiman** and **Asjeba Techiman 1 (Ghana) Ltd.** will sign a long term emphyteutic land lease contract agreement for a duration of 20 years, with possible renewals up to 99 years..
4. **Asjeba Techiman 1 (Ghana) Ltd.** will execute an ESIA.
5. The **various Ministries of Ghana** will review the presented documents and in case of acceptance will give their written approval for the realization of the Agroforestry area.
6. Based on aforementioned negotiations and agreed terms, **The Dioceses of Techiman** will then lease 75 000 hectares to **Asjeba Techiman 1 (Ghana) Ltd.**
7. **Asjeba Techiman 1 (Ghana) Ltd.** will immediately set up a nursery and a plant laboratory on approx. 100 hectares within 4 months after all relevant contracts have been signed and approvals received.
8. A processing plant should be ready to start operation in 2022.

Introduction to Ghana

Country Overview

After overcoming a history of slave trading, war and political and economic turmoil, the Republic of Ghana has become a stable constitutional democracy. In March of 1957, Ghana declared independence from British colonial rule, becoming the first sub-Saharan African country to gain independence.

Ghana has as per 2021 a population of roughly 31 million people (www.microtrends.net) spread across ten administrative regions and 170 districts. The people of Ghana are composed of numerous ethno-linguistic groups and religions creating a culturally diverse nation.

Geography

Ghana lies within latitude 4o 44'N and 11o 11'N and 3o 11'W and 1o 11'E longitude. Covering approximately 238,500 km², Ghana is bordered by Cote-d'Ivoire to the west, Togo to the east, and extends inland from the southern coast along the Gulf of Guinea to the border of Burkina Faso (Oppong-Anane 2006). The overall topography is low and gently undulating with slopes of less than one percent. Despite the gentle slopes, approximately 70% of the land is susceptible to significant erosion.

The Low Plains consist largely of flat grassy scrub lands, undulating hills and valleys and the coastal river network. The Akwapim-Togo Mountain Range begins near the mouth of the Densu River, near Ghana's capital, Accra, and stretches approximately 320km northeast along the boundary of Togo. The average peak heights are around 460m, with the tallest peak being 880m. The Ashanti Uplands geographic region is comprised of the strongly rolling forested Southern Ashanti Uplands, and the Kwahu Plateau. This plateau separates the southwestern river network and the Volta river network. The southwestern river network originates from the plateau and drains south into the Gulf of Guinea. The Volta river network lies northeast of the plateau within the Volta Basin and High Plains geographic regions. The Volta Basin is Ghana's primary drainage system and includes the world's largest reservoir, Lake Volta. The general terrain of the High Plains in northern Ghana is defined by a dissected plateau with rivers draining into Lake Volta.

Agro-ecological Zones and Climate

Ghana is composed of six agro-ecological zones distinguished by natural vegetation and influenced by climate and soil characteristics. Variation in precipitation and temperature are controlled by the movement and interaction of continental and maritime winds. The evergreen rain forest, deciduous rain forest, transition and coastal savannah zones make up the southern half of the country. These agro-ecological zones have a bimodal equatorial rainfall pattern, allowing for two annual growing seasons (major and minor growing seasons). The Guinea and Sudan Savannah make up the northern half of Ghana. These agro-ecological zones have a unimodal tropical monsoon, allowing for only one growing season (major season). The single growing season in the north is bound by the harmattan period, which begins in December and ends in March. Harmattan refers to the hot, dry continental winds that blow from the northeast across the Sahara Desert and into Ghana causing extremely hot, dry days, and cool nights.

Annual precipitation in Ghana ranges from 600 to 2800 mm. Annual precipitation generally decreases from the hot and humid southwest coast, north, to the relatively hot and dry savannah (average of 1000 mm). However, the lowest annual precipitation typically occurs within the warm southeast coastal savannah zone (600 to 1200 mm). Relative humidity also tends to decrease from south to north, creating a general increase in evapotranspiration potential in the north relative to the south.

Temperatures do not have the same degree of variation across the country as precipitation. The mean monthly temperature across Ghana rarely falls below 25°C, a consequence of Ghana's proximity to the equator and absence of wide-spread high-altitude regions. Mean annual temperature is 27°C. Mean maximum annual temperature approaches 40°C, while mean minimum annual temperature is nearly 15 °C.

Soils

The soils of Ghana are developed from highly weathered parent material. Alluvial and eroded shallow soils are common to all agro-ecological zones. Most soils are inherently infertile, or infertile as a result of human activities. The southern half of the country is dominated by Acrisols, which are rich in clay, but have low fertility and toxic amounts of aluminium. Along with Acrisols, Ferralsols dominate the rainforest zone, and are characterized by high contents of kaolinitic clay, metal oxides, and low cation exchange capacity. The far southeast of the country contains a variety of soil types that are known to be largely unsuitable for cultivation and crop production. The northern half of Ghana is dominated by Luvisols. Luvisols are defined as having a mixed mineralogy, high nutrient content and good drainage. Percent organic matter and nitrogen are particularly low in the savannah and transition zones. Most of Ghana's soils have low fertility.

Economy

Ghana's economy has remained primarily agrarian; however, there is a shift towards the service sector. The agriculture sector makes up over 50% of Ghana's total employment and approximately 25% of the nation's Gross Domestic Product (GDP). The cocoa industry, in particular, is extremely important for Ghana, contributing around 30% of export revenue.

Furthermore, the industrial sector provides the greatest contributions to the country's foreign exchange earnings through exports of oil, gold, bauxite, aluminium, manganese ore, diamonds, natural gas and electricity.

Development

Recent Developments. Real GDP growth was 6.5% in 2019, up from 6.3% in 2018. The services sector contributed most to economic growth in 2019 (2.8 %), followed by industry (2.4 %) and agriculture (1.3 %). Growth in non-oil activities slowed to 5.8% from 6.5% in 2018. The robust services sector growth (7.6%) was driven by strong expansions in Real Estate (up 19.9%) and information and communication technology (ICT) (up 46.5%) activities, while growth in industry was mainly supported by mining and quarrying. Agriculture grew by 4.6%, supported by favorable weather conditions and the Government's flagship program Planting for Food and Jobs.

General Description of the project

The syntrophic concept of our partner **Clean Fuels and Energy las Americas SA (C-Fela)** has been successfully executed over the last 15 years in Costa Rica where 3 different species of plants have transformed degraded agricultural land into fully productive land as well as a biodiversity beauty at the same time producing vegetable oil that can be used as biofuel as well as many other high value products for food and other sectors.

The idea is to develop a Agroforestry area using the syntrophic system in marginal, degraded and unused lands and to maximize production through the appropriate combination of different oil producing species, with food and animal feed species, which produce good yields and are easily adapted to dry soils and climatic conditions. The strategy also includes the protection of existing forests. Deforestation to clean the land to establish the oil producing Agroforestry areas has no place in this project. Other positive effects of the project include reduction of CO₂ emission, control of erosion and better water management.

For the conditions found in West Africa, we have to modify and adapt the syntrophic system to meet the requirements of large-scale Agroforestry area and a high degree of mechanization. Therefore, we will develop a customised scheme to plant the different oil plants in rows. The planting in rows will allow us to mechanize most operations.

Before we can start planting trees, we shall execute an environmental, social impact assessment and begin our basic infrastructural master planning. Thereafter we start with planting **Ricinus Communis**, a **one-year plant**, with deep roots. First harvest is approx. after 6 to 9 months. **Ricinus** can be sold to the cosmetic and pharmaceutical industry in any quantity at a fix price. Ricinus was traded fob Rotterdam for US\$ 1505 per ton in February 2021 (P.S. Asjeba's budget price is US\$ 1200/t)

Read more at: <https://www.commodity3.com/physical/vegoilsbeneluxsoft/vegoils-eu-softs-vegoils>.

The Moringa tree grows...



...precisely where people need it most.



20% of the total 75 000 hectare will be used for infrastructural purposes. For planting therefore 60 000 hectares will be available. After the Ricinus planting, the first tree planted will be **Moringa oleifera**. Planting of **Moringa** trees will be extremely dense – 95 000 trees per ha – since we are aiming only for the fresh leaves. Production parameters will be: Fresh Matter 19.6 t/ha/cutting; Dry Matter 3.33 t/ha; Protein 566 kg/ha. For the **Moringa** trees we will select a separate area of 20 000 hectares. The fast-growing **Moringa** trees would disturb growing of the other species too much. Market price of **Moringa** powder varies from US\$ 5 to US\$ 30 per kg https://www.alibaba.com/showroom/moringa+powder.html?fsb=y&IndexArea=product_en&CatId=&SearchText=moringa+powder&isGalleryList=G An alternative would be to extract protein from the **Moringa** leaves and sell the protein.

The other two trees will be **Acrocomia Aculeata** and **Jatropha Curcas**. **Acrocomia** is similar to the African palm tree. **Acrocomia** is however very good for the soil, as is **Jatropha**. **Jatropha** and **Acrocomia** will produce 30/40 resp. 60/70 year's vegetable oil. The oil can be used directly as fuel for tractors, engines, vehicles, generators, etc. for local use or even to produce electricity with a **MAN** power plant. Another **Asjeba** partner, Dr. Georg Gruber is specialized on research of vegetable oil as fuel. In case market prices allow, the oil can be refined to bio-diesel or bio-kerosene for local use or for export.

The medium to long term perspective is to improve the soil fertility. This will allow a change to food production in selected areas of the Agroforestry areas.

Ricinus Communis

The first phase of the Agroforestry area will be planting of **Ricinus**, a one-year plant with deep roots, which have a short-term harvest potential (6-9 months), producing vegetable oil (castor oil) which is a common base in pharmaceutical and cosmetic industries.

Ricinus seed oil is a vegetable oil obtained from the seeds of the **Ricinus Communis** plant. A number of ingredients made from Castor Oil may also be used in cosmetic and personal care products, including lipstick, skin-care products, and bath soaps.

Applications in the pharmaceutical industry

Castor oil is viscous, pale yellow, non-volatile and non-drying oil with a bland taste. It has good shelf life as compared to other vegetable oils. The seeds contain 40 to 60% oil that is rich in triglycerides mainly Rici Nolin a toxic alkaloid Rici nine and very toxic albumen called ricin. The seed coat contains ricin, a poison which is present in lower concentrations throughout the plant. Ricinus communis has not only medicinal value but it also has great promises in the field of biodiesel production. It is inexpensive and environment friendly. There are different varieties of castor oil bean and on the average, they contain 46-55% oil by weight.

The **United States Food and Drug Administration (FDA)** has categorized castor oil as "generally recognized as safe and effective" (GRASE) for over-the-counter use as a laxative with its major site of action the small intestine where it is digested into ricin oleic acid. Despite castor oil being widely used to induce labour in pregnant women, to date there is not enough research to show whether it is effective to ripen the cervix or induce labour. Therapeutically, modern drugs are rarely given in a pure chemical state, so most active ingredients are combined with excipients or additives. Castor oil, or a castor oil derivative such as Kolliphor EL (polyethoxylated castor oil, a non-ionic surfactant), is added to many modern drugs, including:

Miconazole, an antifungal agent.

Paclitaxel, a mitotic inhibitor used in cancer chemotherapy.

Sandimmune (cyclosporine injection, USP), an immunosuppressant drug widely used in connection with organ transplant to reduce the activity of the patient's immune system.

Nelfinavir mesylate, an HIV protease inhibitor.

Tacrolimus, an immunosuppressive drug (contains HCO-60, polyoxyl 60 hydrogenated castor oil).

The Ricinus planting will later give way to other plant developments:

Moringa oleifera

Moringa is native to north India but is now found throughout the tropics. Moringa is also known as horseradish tree, drumstick tree and mother's best friend. It grows fast and reaches up to 12m. The bark is grey and thick and looks like cork, peeling in patches. It loses its leaves from December to January and new growth starts in February to March. Moringa produces cream-coloured flowers when it is 8 months old and the flowering season begins in January and continues through to March. The fruit ripens from April to June and the pods are triangular in cross section, 30 to 50cm long and contain oily, black, winged seeds.

Moringa requires an annual rainfall of between 250 and 3000mm. It is drought resistant, though in drought conditions it may lose its leaves. This does not mean it is dead and it should recover when the rain arrives. It grows best at altitudes up to 600m but it will grow at altitudes of 1 000m. It will survive in a temperature range of 25°C to 40°C but has been known to tolerate temperatures of 48°C and light frosts. Moringa prefers neutral to slightly acidic soils and grows best in well-drained loam to clay-loam. It tolerates clay soils but does not grow well if waterlogged. All of the parts of the tree can be used in a variety of ways. Moringa is full of nutrients, protein and vitamins and is good in your food as well as in the food of your animals. Moringa helps to clean dirty water and is a useful source of medicines. It provides lots of leafy material that is useful when using alley cropping systems.

- **Human food**

All Moringa food products have a very high nutritional value. You can eat the leaves, especially young shoots, young pods, flowers, roots, and in some species even the bark. Leaves are low in fats and carbohydrates and rich in minerals, iron and Vitamin B. It is particularly useful as a human food because the leaves appear towards the end of the dry season when few other sources of green leafy vegetables are available.

Of all the products of the tree the leaves are used the most. They become tougher as they get older so it is best to pick the growing tips and young leaves. Remove the leaves from the woody stem, as this will not soften during cooking. The leaves can be used in the same way as spinach. An easy way of cooking them is to steam 2 cups of freshly picked leaves for a few minutes in one cup of water, seasoned with an onion, butter and salt or other seasonings according to taste. A leaf powder can be produced by drying the

leaves and crushing or pounding them. You can sift the powder to remove leaf stems. This powder can then be added to sauces as other condiments or vegetables are added.

- **Animal fodder**

Cattle, sheep, pigs, goats and poultry browse the bark, leaves and young shoots of Moringa. The best diet for pigs is 70% Moringa, 10% Leucaena and 20% other leaves. It is possible for their diet to be 100% Moringa but it should be no more than 30% Leucaena. The pork from pigs fed on this diet is lean. If trees are intended for animal fodder it is useful to prune them to 4m high, but if they are not, they should be pruned to 6m so harvesting for human consumption can be easily carried out.

- **Water purification**

Seed powder can be used as a quick and simple method for cleaning dirty river water. The powder joins with the solids in the water and sinks to the bottom. This treatment also removes 90-99% of bacteria contained in water. Using Moringa to purify water replaces chemicals such as aluminium sulphate, which are dangerous to people and the environment and are expensive.

- **Natural medicines**

Around the world every part of the Moringa tree has been used effectively against varying ailments. Some of the remedies are described here but there is no guarantee they will work for every case! ·*Leaves rubbed against the temple can relieve headaches. ·*To stop bleeding from a shallow cut apply a poultice of fresh leaves. *There is an anti-bacterial and anti-inflammatory effect when applied to wounds or insect bites. * Extracts can be used against bacterial or fungal skin complaints. *Leaf tea treats gastric ulcers and diarrhoea. *Eating Moringa food products is good for those suffering from malnutrition due to the high protein and fibre content.

- **Living fence**

Planted as a living fence, Moringa provides wind protection and shade. It grows very quickly and if cuttings are planted close together, they will form a fence that livestock cannot get through in just 3 months.

- **Alley cropping**

Moringa has a large tap root and few lateral roots so it will not compete for nutrients with the crops. It will also add to the nutrients available as it produces many protein rich leaves. They grow very quickly but do not provide too much shade due to the structure of their leaves. They are also very good at reclaiming marginal land.

- **Natural pesticide**

By digging Moringa leaves into the soil before planting, damping off disease (*Pythium debaryanum*) can be prevented among seedlings.

- **Domestic cleaning agent**

Crushed leaves are used to clean cooking utensils or even walls.

- **Fuelwood and other uses**

The wood is light and is a good fuel for cooking. However, it is not suitable for building. The bark can be beaten into a fibre that can be used to make rope or mats and the wood produces a blue dye. Chippings of wood can be used to make a good quality paper. The tree also produces viscose resin that is used in the textile industry.

Jatropha Curcas

An extract from: www.fao.org/docrep/012/i1219e/i1219e.pdf

“A Smallholder Bioenergy Crop The Potential for Pro-Poor Development”

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS”

As developing countries face increasing local demand for energy in rural areas, they also must deal with both economic and environmental pressure on agricultural lands in general. The possibility of growing energy crops such as *Jatropha curcas* L. has the potential to enable some smallholder farmers, producers and processors to cope with these pressures.

Jatropha oil is a moderately unsaturated oil and liquid at room temperature.

Depending on different factors including contamination with particles, CJO should be fluid at around 10 degrees Celsius. Its structure comprises a triglyceride containing mostly linoleic and oleic fatty acids and under correct circumstances *Jatropha* oil will make high quality biodiesel. The high triglyceride content of the oil is highly suitable for transesterification so that *Jatropha* oil lends itself well to conversion into biodiesel and aviation fuel. Like rapeseed oil it has a low solidifying temperature and has lower levels of gum & resin than many of the vegetable oils, which means that it can be used as straight vegetable oil (SVO) in simple agricultural equipment.

However, many of the actual investments and policy decisions on developing *Jatropha* as an oil crop have been made without the backing of sufficient science-based knowledge. Realizing the true potential of *Jatropha* requires separating facts from the claims and half-truths.

To avoid making these mistakes we have asked the world most experienced scientist on *Jatropha*, Dr. George Francis from the agricultural university of Hohenheim and we will ask the local agricultural university to partner with us in our Agroforestry area set up. (Francis, G., Edinger, R. & Becker, K. 2005. A concept for simultaneous wasteland reclamation, fuel production, and socio-economic development in degraded areas in India: need, potential and perspectives of *Jatropha* Agroforestry areas. *Natural Resources Forum*. 29: 12–24.)

Advantages over mineral-oil derived diesel include:

1. lower particulates
2. very low sulphur levels
3. lower smoke emissions
 - 3.1. an important requirement for coastal shipping
4. a high cetane rating as biodiesel
 - 4.1. a measurement of the combustion quality of diesel fuel during compression ignition
5. 4% more efficient than conventional aviation fuel [Boeing 2009].

Table: General properties of *Jatropha* oil

Specifications	Value
Triglyceride (%)	80-95
FFA (%)	3-19
Moisture (%)	0.5-3
Diglyceride (%)	2-5

Source: Biocube Corporation

Interest in *Jatropha Curcas* as a source of oil for producing biodiesel has arisen as a consequence of its perceived ability to grow in semi-arid regions with low nutrient requirements and little care. The seed typically contains up to 35 percent oil which has properties highly suited to making biofuel.

The rooting nature of *Jatropha* allows it to reach water from deep in the soil and to extract leached mineral nutrients that are unavailable to many other plants. The surface roots assist in binding the soil and can reduce soil erosion.

Jatropha has a number of strengths: the oil is highly suitable for producing biofuel but can also be used directly to power suitably adapted diesel engines and to provide light and heat for cooking, it is fast growing and quick to start bearing fruit, and the seed is storable making it suited to cultivation in remote areas.

Jatropha could eventually evolve into a high yielding oil crop and may well be productive on degraded and saline soils in low rainfall areas. Its by-products may possibly be valuable as fertilizer, livestock feed, or as a biogas feedstock, its oil can have other markets such as for soap, pesticides and medicines, and *Jatropha* can help reverse land degradation.

Jatropha's chief weaknesses relate to the fact that it is an essentially wild plant that has undergone little crop improvement. Its seed yields, oil quality and oil content are all highly variable. **To combat this weakness Asjeba has selected high quality non-toxic hybrid seeds for its Agroforestry area cultivated in India by our partner Jatropower AG, Switzerland.** These seeds achieve a 3 times higher yield as usual seeds!

Jatropha production systems can be characterized in terms of their direct or indirect potential contribution to pro-poor development. It is expected that large Agroforestry areas developed by the private sector will predominate in the future and that smallholders may be contract farmers for such commercial enterprises.

Jatropha biofuel production could be especially beneficial to poor producers, particularly in semi-arid, remote areas that have little opportunity for alternative farming strategies, few alternative livelihood options and increasing environmental degradation.

Local utilization of *Jatropha* oil is one of a number of strategies that may be used to address energy poverty in remote areas and could be part of production systems or part of a "living fence" to control livestock grazing.

Extracted and filtered vegetable oil can be used directly as a fuel in suitable diesel engines without undergoing the trans-esterification process (Achtenet al., 2008). There is now considerable experience with using straight vegetable oil in suitably modified diesel engines. Our partner from VWP has the patents enabling us to do so.

Growth of the biofuel industry is being driven by government policies in three main areas. This includes policies aimed at mitigating climate change, improving energy security and using biofuel production as a strategy to support rural development.

Transportation is responsible for some 30 percent of current global energy usage, practically all in the form of diesel or petrol. Using current technology, biofuels offer the most convenient renewable alternative to fossil transport fuels since they require the fewest changes to the distribution infrastructure.

The link between poverty alleviation and energy provision makes it critical to consider both when looking toward rural development. Availability of local energy and farm power is fundamental to intensifying agriculture, and agricultural development is essential to poverty alleviation.

Jatropha grows readily from seed which germinate in around 10 days, or from stem cuttings. Growth is rapid. The plant may reach one metre and flower within five months under good conditions (Heller, 1996). The growth is sympodial, with terminal flower inflorescences and lateral branching, eventually reaching a height of 3 to 5 metres under good conditions. It generally takes four to five years to reach maturity (Henning, 2008a).

Vegetative growth occurs during the rainy season. During the dry season, there is little growth and the plant will drop its leaves. Flowering is triggered by rainfall and seed will be produced following the end of the rainy season. Seeds are produced in the first or second year of growth. *Jatropha* trees are believed to have a lifespan of 30 to 50 years or more.

Jatropha has proven effective in reducing the erosion of soil by rainwater. The taproot anchors the plant in the ground while the profusion of lateral and adventitious roots near the surface binds the soil and keeps it from being washed out by heavy rains. *Jatropha* also improves rainwater infiltration when planted in lines to form contour bunds.

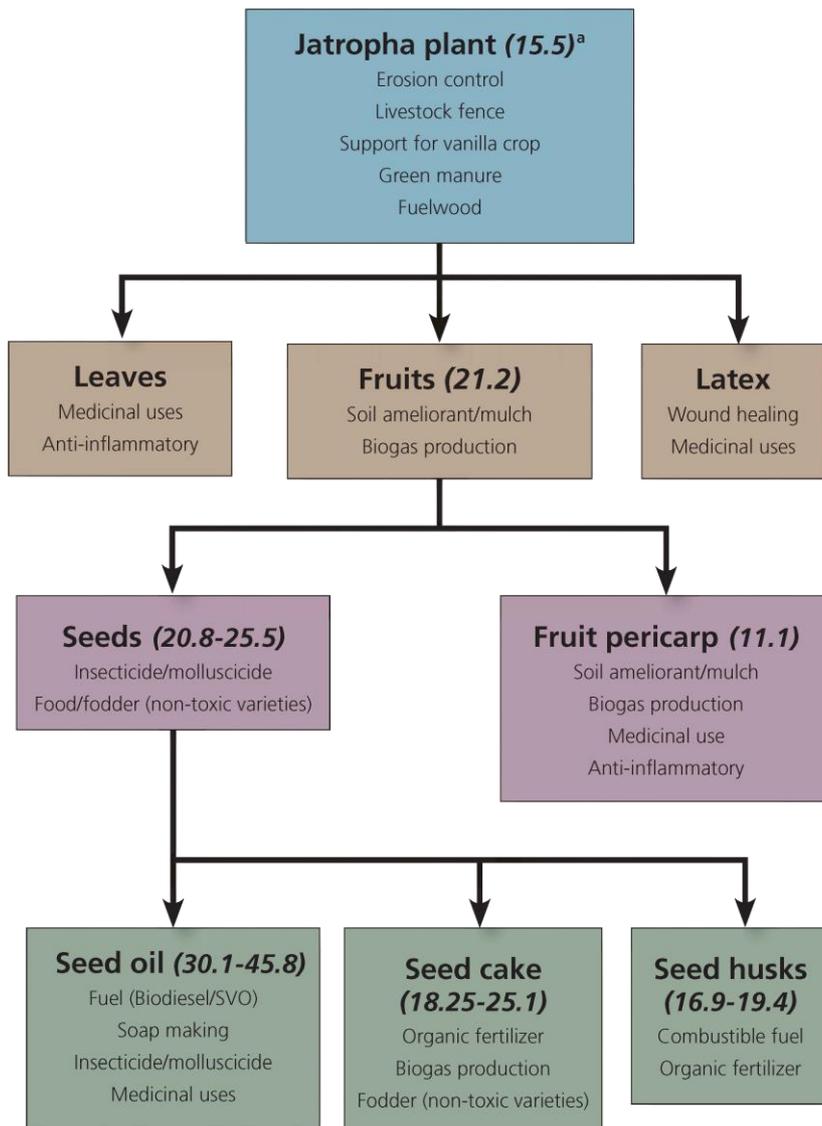
Jatropha – Strengths

- Jatropha has the potential, through varietal improvement and good farming practices, for a high level of oil production per unit area in the subhumid tropical and subtropical environments.
- Jatropha grows and is potentially productive in semi-arid areas on degraded and saline soils.
- Jatropha can be used for halting and reversing land degradation.
- Jatropha grows fast, as compared to many other tree-borne oilseeds.
- Jatropha trees remain small, enabling ease of management.
- Jatropha has periodic leaf shedding which facilitates nutrient recycling and dry season irrigated intercropping with short-term crops.
- Jatropha leaves are unpalatable to grazing livestock, making it a good barrier hedge to protect crops.
- Jatropha oil has physical and chemical properties that make it highly suitable for processing into biodiesel.
- Jatropha oil can be used directly in suitable diesel engines, lamps and cooking stoves.
- Jatropha by-products have potential value, such as using seed cake as fertilizer, animal feed (non-toxic varieties) or biogas, and using fruit shells and seed husks for biogas and combustion.
- Jatropha oil has markets other than for fuel, such as the production of soap, medicines and pesticides.
- Jatropha seeds are storable and processing can be delayed, which makes production suited to remote areas.
- Jatropha has attracted investment, mainly from the private sector, into plant breeding, which increases the likelihood of developing jatropha varieties with improved and stable oil yields.

See http://www.eppo.org/QUARANTINE/Pest_Risk_Analysis/PRA_intro.htm.

Jatropha trees grow from seed develop taproots. Thus, they are able to extract minerals that have leached down through the soil profile and return them to the surface through leaf fall, fruit debris and other organic remains. In this way, Jatropha acts as a nutrient pump which helps rehabilitate degraded land.

Jatropha plant extracts have many uses in traditional societies (Heller, 1996). The dried latex resembles shellac and is used as a marking ink. The leaves and bark are used for dyeing cloth. Jatropha has medicinal qualities, including a blood coagulating agent and antimicrobial properties that are widely used in traditional medicine and for veterinary use. All parts of the plant are used.



^aEnergy values of the components are given in MJ kg⁻¹.

FIGURE: The uses of *Jatropha curcas* and the energy values of its components.

Source: Adapted from Gubitza et al. (1999).

Energy values are ranges taken from various sources cited in Jongschaap (2007) and Achten (2008).

Inter-cropping in *Jatropha* cultivation.

Most shade loving and short duration crops are suitable for inter-cropping in a *Jatropha* Agroforestry area. Short duration grain and vegetable crops like: green gram, black gram, pumpkin, ash gourd, cucumber, tomato, green chili, bitter melon can be grown during initial 2 years. Thereafter shade loving herbal/aroma plants like Patchouli, Cocoa, Vanilla and Pitaya (dragon fruit) can be grown as inter-crops.

Acrocomia aculeata Mart

Acrocomia is a native palm tree of Latin America. It is growing in Mexico, Central America, Colombia and Venezuela, but also in Brazil, Bolivia and Paraguay and in the North of Argentina.

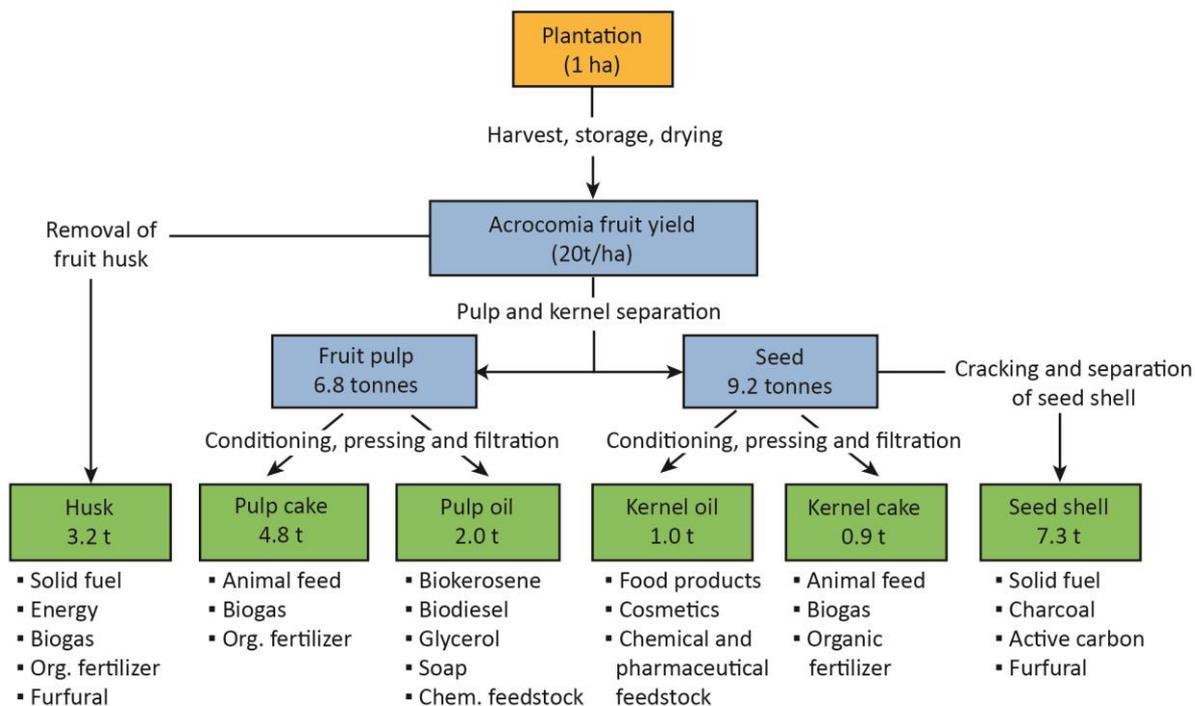
The fruits of the palm-tree can be processed to fuel, food and fodder. At the moment only Paraguay has a tradition in processing its fruits, whereas Brazil nowadays recognized the bio-economic potentials of the fruits and starts to build up processing facilities. This means, that the know-how of processing is available and first markets for **Acrocomia** products have been successfully established.

The **Acrocomia** palm is robust on poor soils and needs only about 800 mm rainfall per year. Compared to other oil-plants **Acrocomia** has one of the highest oil-yields per hectare and further multiple use of the by-products of its non-poisonous fruits.

So a one hectare Agroforestry area (\approx 500 palms) accounts for about 20 t of fruit per year (after 6/7 years of growing). This means 3 tons of oil; which is derived from 1 t of kernel-oil and 2 t of pulp-oil.

The fruit includes 6 sub-products: Besides the kernel- and pulp-oil, this is the press cake, kernel- and outside-shell. The kernel-oil is mainly used as food and in the cosmetic and chemical industry. It contains mainly lauric acid (40%). Market conditions refer to a price of about US\$ 1 000/ t. The pulp-oil is used rather for soaps or bio-energy in terms of fuel. It contains oleic acid (57%) and palmitic acid (29%). The price of this oil is oscillating between US\$ 700 and US\$ 900/ t.

To achieve sufficient experience with this palm it is planned to start planting rows right in the beginning of the project under close supervision of the agricultural universities in the nursery. With this operational experience, **Asjeba** will be well prepared, to plant the intended quantities.



Acrocomia Plant yield flow chart showing produce from 1 hectare

The Diocese of Techiman:

- is mindful of the text of the Encyclical Letter *Laudato Si'* of **The Holy Father, Pope Francis**, “on care for our common home” (dated 24th May 2015), the document that preceded the SDG’s together with the Social Teaching of the Church and having listened to the voices of youth asking for climate and social justice seek to provide alternatives to a life with limited opportunity in the cities without hope for a better future.
- In July 2018, **Caritas Ghana** and **Right Now! Foundation** entered into an agreement to jointly plan and design programs and projects that are aligned with the encyclical *Laudato Si*, on Care for Our Common Home, in the domain of the social impact economy, including establishing social enterprises.
- **The Diocese of Techiman** has determined that **Caritas Ghana** and **Right Now! Foundation** are its sole representatives in this project in every sense, as well as the only facilitators.

- **Caritas Ghana** is a Charity Organisation of the Ghana Catholic Bishop’s Conference (GCBC) and member of the global Caritas Confederation. It operates under the National Catholic Secretariat.

Mr. Samuel Zan Akologo is Executive Secretary of Caritas Ghana and Head of the Department of Human Development of the Ghana Catholic Bishops’ Conference at the National Catholic Secretariat. In this position, he is Head of Development and Policy Advocacy. He has over 25 years of Civil Society activism locally and internationally. He previously held Country Director Positions in SEND-Ghana – a National Public Policy Advocacy NGO and Amnesty International.

Mr.

Zan Akologo is an expert in Public Policy with both academic and practical experience. Academically, he holds Master of Arts Degree in Economic and Government Reform from the University of Westminster (UK) and post graduate studies in Public Administration at the Ghana Institute of Management and Public Administration (GIMPA). He gained practical experience in public policy from his earlier Professional Teaching background and membership in many Public Institutions including Senior High Schools, the Council for Technical and Vocational Education and Training (COTVET) and the Public Interest and Accountability Committee (PIAC) of Ghana’s Oil revenue management. He has served on several International Committees and Governing Bodies, including Amnesty International, International Human Rights Education Centre in Norway and Caritas International. Mr Zan Akologo is a Fellow of the Institute of Directors (FIoD), Ghana, Member of the Community of Practitioners (CoP) of Gestalt psychology and Organizational Development (OD) certified by the University of Cleveland (USA) and the OD Centre in Ghana.

Mr. Zan Akologo understands citizens’ agency in governance and has led several participatory research and citizens dialogue sessions with governments at International, Regional, National and sub-national levels since 2001. He has authored and edited several participatory monitoring reports on Agriculture, School Feeding programme, National Budget, National Health Insurance, Multilateral Debt Relief Initiative, Aid Effectiveness, Integral Human Development and Diaspora Development Initiatives. He has several online publications on Social Accountability, Inclusive Development, Results-based Monitoring, Budget Tracking and Migration and Development. Mr. Zan Akologo also understands negotiations in public policies having led many civil society and interfaith platform negotiations with Parliament, National Constitution Review Implementation Committee, Third High-Level meeting on Aid Effectiveness, Third International Financing for Development (FfD3) and the Intergovernmental Negotiations on the Post 2015 Development Agenda in New York. He currently serves on and advises the Bishops of Africa and Madagascar (Symposium for Episcopal Conferences of Africa and Madagascar – SECAM) on governance and public policy matters since 2016. The Vatican Dicastery for Promoting Integral Human Development (DPIHD) also appointed Zan Akologo as Member of the *Laudato Si* Action Group in 2019 to assist the Dicastery in partnerships and programmes development to realize Pope Francis’ call for Action on Environment.

Mr. Zan

Akologo has good management and staff mentoring experience from his over twenty years of holding senior management positions with supervisory responsibilities. He has exercised overall financial management and oversight in senior executive position and understands board and staff relations in organizational management.

Mr. Zan Akologo has supported the global Caritas Confederation in Institutional Development, Organizational Risk Management and strategic policy advocacy. Locally, he facilitated the reorganization and institutional setup of Caritas Ghana in 2016 as a legal entity of the Ghana Catholic Bishops’ Conference. He has facilitated interfaith cooperation in Ghana and remains Coordinator of the Interfaith Alliance of Catholic, Mainstream Christian and Muslim Groups

under the Forum for Actions on Inclusion, Transparency and Harmony (FAITH) in Ghana All. **Zan** has followed several courses on Church Management as Mission (Programme on Church Management – PCM)

- The aim of **Right Now!** (founded in 2016) is to revolutionise and accelerate the global impact economy and markets to make them work for the common good and to foster solidarity with future generations. Right Now! seeks to create a new marketplace for environmental, social and impact-oriented ventures that align with the inspiration and mission of Pope Francis' encyclical letter *Laudato si'*: On Care For Our Common Home.

Paul van Engen is the current Chairman of **the Right Now! Foundation**. One of the Board Members is **Samuel Zan Akologo**, Executive Secretary at **Caritas Ghana**.

Legal Entities of the Asjeba Group

- The humanitarian foundation “Asjeba Planting Your Future”, Switzerland
- Asjeba Management AG, Switzerland
- Techiman 1, (Ghana) Ltd.
- Techiman 1 (Ghana) foundation

I. Overall Design of the Asjeba Concept and Participants

“Why aid is not working and how there is a better way for Africa” Dambisa Moyo. We totally agree with Dambisa Moyo and therefore have worked out an alternative: “The Asjeba Concept.”

Hisko H. Baas is Mentor and Coordinator of a group of private individuals and international companies, acting with the legal entities for the purpose of this concept as partner in the ASJEBA Group.

HISKO H. BAAS, lic.oec. HSG, holds a master's degree in Economy from the University of St. Gall, Switzerland, and is a company director and entrepreneur with more than 40 years' experience in banking, investment banking, merger & acquisition transactions and project planning and execution. He is the initiator and manager of the ASJEBA GROUP, a partnership of private individuals and companies dedicated to improving the living conditions of people living in rural regions in developing countries. The ASJEBA GROUP aims to do this through the sustainable development of Agroforestry areas - designed as a commercially viable project - producing food supplements and vegetable oil for commercial applications such as bio fuel, cosmetics, and pharmaceuticals.

Hisko Sr. will act as chairman of the Board of Directors thus shaping future vision and control the sustainable process of the concept. As long as the designated CEO has not yet come aboard Hisko Sr. will hold the position of CEO.

JEANNETTE A. BAAS, economist, has 40 years' experience in HR (Tagesanzeiger), sparring partner for investment decisions and legal issues, trade marks (Metro Group) and Head of trade marks for the Schindler Group.

Jeannette will jointly with Hisko Sr. shape the future of the Asjeba concept and be interims-wise responsible for HR, oversee trade mark development and legal issues.

Clean Fuels and Energy las Americas SA (C-Fela), Costa Rica

HANS HÄBERER, Geologist (MS), University of Tübingen, Germany, and University of Oregon, USA) with more than 25 years' experience in the area of resources management in Europe, Latin America and Africa. Project manager with UNDP, GIZ/CIM, ABB, Geological Survey of Germany and various consulting companies, co-founder of C-Fela SA, Costa Rica where syntrophic farming has been done for more than 15 years.

Unfortunately, our partner Hans died in June 2020

C-Fela is a Costa Rican company with over fifteen years of experience in the selection of plant materials and planting / intercropping of different oil producing species.

With this research and development, **C-Fela** is now:

- Promoting the massive planting of these oilseed crops
- Using degraded, marginal or hilly lands (with very limited economic use)
- Using an innovative strategy developed for this purpose

The syntrophic program aims at implementing – in a technical and economically sustainable way – the production and use of biodiesel, focusing on social inclusion and regional sustainable development through the generation of employment and income. **C-Fela** was awarded the Winner as one of the most promising clean energy opportunities by the Central American Forum for Clean Energy Financing 2014.

As of 2006 **IQ Systemhaus AG, Udligenswil, Switzerland** – a sister company of **Asjeba Management AG** has been responsible for the worldwide marketing and sales of the FireWatch System (FW) (www.iq-firewatch.com). This early detection system against forest fires was developed by the German Aerospace Centre (www.dlr.de). So far more than 300 FW have been installed worldwide and resulted in a reduction of damage (and of course a reduction of CO² emission) by more than 30%, resp. 90% when there was surveillance before or not!

Governments today have restricted funds available, so we decided to change strategy and offer the service of early detection including the first firefighting attack instead of selling the system. With this change in strategy, we needed knowledge about forest, firefighting and a lot of other qualifications. As from that moment we started to group companies around us that have the expertise and long-term track records to fulfil these tasks imbedded in a commercial Agroforestry area to gain sustainable coverage of all costs involved.

To enable countries to benefit from our experience without the obligation to make heavy investments, we designed the concept as follows:

“Lease unutilized/degraded land for a symbolic price for a certain period, capitalize on the land-lease and use the proceeds to build syntrophic Agroforestry areas, integrate all the goals: create jobs, improve education, health and infrastructure and use our experience and “applying (space) technology for the betterment of life on Earth”(Cit.: Space Foundation, Colorado Springs) and hand over the Agroforestry areas including everything build on those Agroforestry areas to the original landowner(s) at the end of the lease”,

In conformity to our motto:

Give local people a chance to become independent by giving them tools necessary to execute the job, teaching them how to do it, giving them proper education, access to healthcare and retreat, when they are ready to do it all by themselves.

II. Social – Ecological Footprint

DALE ANNE BOURJAILY, worked as programme director economic development for the sustainable development agreements between the Netherlands, Benin, Bhutan and Costa Rica at Eco-operation and later as Senior Advisor sustainable economic development at the Royal Tropical Institute in the Netherlands. Ms.

Bourjaily's innovations in sustainable chain management was described in papers presented at the OESO, UNEP and UNCTAD and at Greening of Industry Network conferences. She started a venture capital fund in Amazonia managed by Banco Axial and raised 50 million euros from the pharma industry for investment in Phyto pharmaceutical research and development by local laboratories resulting in 21 patents on active ingredients. Since 2005 she has been engaged in clean tech venture capital and DLT.

Dale Anne's contribution to Asjeba will be the development of a corporate social responsibility (CSR) strategy and plan, including the development and management of relevant partnerships.

Dr. GEORGES TIENDREBEOGO, is a MD and specialised in social and preventive paediatrics, applied tropical medicine, public health and medical anthropology (University of Dakar, Maastricht University, University of Amsterdam). Mr. Tiendrebeogo has over 30 years' experience in health systems strengthening, nutrition, maternal and child health, multi stakeholder/country research and evaluation, knowledge generation and sharing, and networking across Africa and Europe. In addition to his professional engagement on the medical side, 3 years ago, he started Laafi Services SARL, a transport company in Burkina Faso aiming at generating funds to support social enterprises on ageing and on youth-related projects. He has strong negotiation and facilitation skills and can analyse complex situations, align people to innovation and new ideas and get groups to work towards a common goal.

Together with Dale Anne Georges will shape the CSR portfolio.

III. Agricultural Footprint

Jatropower AG, Baar, Switzerland / University Hohenheim, Germany

GEORGE FRANCIS, PhD, CEO of JATROPOWER Group. After obtaining his PhD from the University of Hohenheim, Stuttgart, he conducted 6 years of fundamental research on Jatropha. He also has extensive experience of managing intercultural projects. Dr. Francis played a key role in the DaimlerChrysler-DEG Jatropha project titled "Biofuels from Eroded Soils in India", during his time at Hohenheim. This was the first comprehensive project to investigate the many aspects of Jatropha cultivation on wasteland, extraction of oil from its seeds, biodiesel production and the potential uses of the by-products remaining after oil extraction. He has acted as a consultant on Jatropha and other bio-energy projects to national governments, multinational financial institutions and private companies world-wide. He has several articles on the potential of Jatropha to his credit and has delivered keynote lectures on this and related topics at international fora.

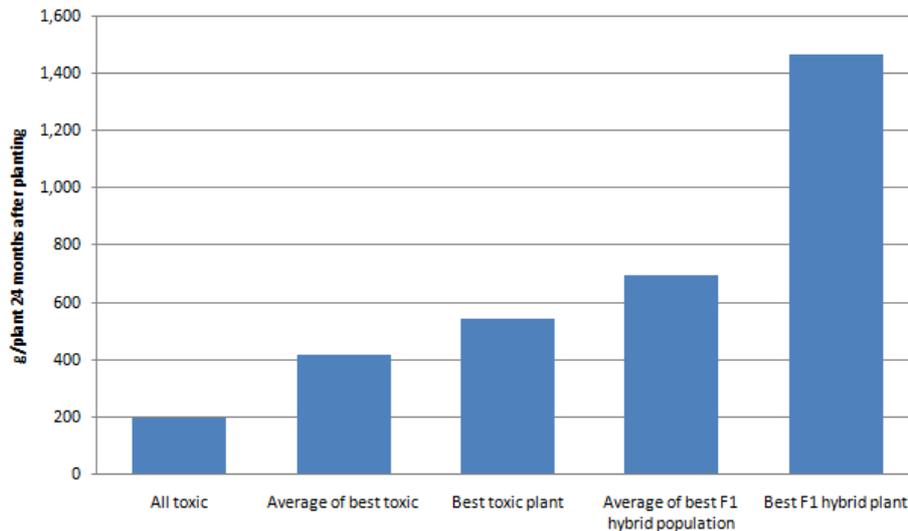
(www.jatropower.ch) is a leading developer of **Jatropha Curcas**, an oil seed plant allowing production of sustainable fuels on degraded soils in an economically viable way. **Jatropower** owns a unique selection of proven elite accessions of **Jatropha Curcas**, selected from a global germplasm collection of 650 provenances, representing all major global Jatropha hot-spots. **Jatropower** is the only seed development company that sells improved **Jatropha** cultivar seeds to a wide customer base currently.

Jatropower bases its evaluation program on about 650 different accessions. It could be shown over five years that its best performing plants sustainably achieve a 3 to 4 times higher yield than average plants in semi-arid climate and on degraded soil. A further step was taken when producing F1 hybrids of the elite plants. First results indicate that a further yield increase by a factor 2 could be achieved with such hybrids, which needs to be confirmed with multi-location trials. The following graph shows the high yielding character of the best F1 hybrid in relation to the elite toxic cultivars:

Seed yield pattern of elite cultivars compared to F1 hybrids

Jatropower has supplied commercial quantities of seeds to clients in Mali (smallholder farmer model), Mozambique (industrial farm) and Madagascar (centrally managed farm). From each of these places **Jatropower** has got positive feedback and repeat orders. The yields that they got were in accordance with the forecasts, i.e. the type of data that **Asjeba** uses in its business plan.

George will be responsible, in cooperation with the agricultural university of Hohenheim, Germany and the local agricultural university, for the agricultural footprint of the Agroforestry areas. What is going to be planted, in which sequence, where and how much? Once the soil is fertile again: what kind of vegetables, fruits or other plants can be planted between the rows of trees as the intercropping modus.



Ghana Permaculture Institute

Paul Yeboah is the founder of **Ghana Permaculture Institute** /Eco –Village, Techiman, Ghana and has actively and consistently been in development work for the past 10 years. He has extensive knowledge in community participation and development, coordination and management of Permaculture projects/programmes and organizational development in Ghana. He has worked extensively in building the capacities/job creation of civil society organizations.

Community-based training skills

Participatory Learning and Action (PLA) skills in engaging communities identify, analyze and plan activities and interventions of community-improvement efforts. Uses PLA methodology to facilitate community problem solving, decision making and action. Cultivated Ecology to design sustainable agriculture. Designing productive landscape for sustainable land management in rural and urban centers. Increasing sustainability and productivity.

Social Permaculture and self-sufficiency

Business Management Skills

Ability to train small and medium-scale businesses and enterprises on effective business management skills such as leadership, team building, communication, time management, marketing skills etc.

Capacity-building/Facilitation

Ability to build the capacities of identified groups within communities and effectively facilitates community-led activities and interventions.

Project Management

The ability to plan, implement and evaluate projects in a timely and efficient manner. The skill to lead and manage people, with strong interpersonal and communication abilities.

Paul is our local partner in Techiman with close ties to the local people, but even more important, Paul will support Asjeba to further develop today's permaculture concept.

HISKO BAAS, jr. bachelor's in information management, University of Zürich as well as bachelor's in environmental engineering with specialization in horticulture, University of applied science, ZHAW Wädenswil, Switzerland. He has working experience in organic seed production and life cycle assessments in the agricultural

sector, as well as broad IT support and data processing knowledge as scientific employee of Agroscope, a governmental organisation in Switzerland.

Hisko jr. will coordinate R & D and execute research in the agricultural field, be the contact for our agricultural experts and oversee the IT integration.

IV. Energy Footprint

The Vereinigte Werkstätten für Pflanzenöltechnologie

Dr. Gruber/Gruber GbR (VWP), Allersberg-Göggelsbuch, Germany

GEORG GRUBER, PhD, studied Economics and Natural Resource Management in Erlangen/Nurnberg, Germany, and Santa Barbara, California, U.S.A. For 30 years he does R&D on pure plant oil as fuel for cars, trucks, tractors, generators and 100% Renewable Energy Hybrid Systems in Latin-American, Asia and Africa. Dr. Gruber is co-owner of Vereinigte Werkstätten für Pflanzenöltechnologie, keeps 10 patents on engine technology, fuel production and fuel quality, grants licenses on it and sells know-how.

(www.vwp-europe.com) **VWP's "CO²-recycling Concept for Food and Fuel"** promotes the sustainable cultivation of oil seed plants for use in VWP's specially adapted pure plant oil diesel engines. These plant oil engines can operate cars, trucks, tractors or power generators in remote areas in Africa, Asia and South America. The co-product oil/protein cake is regionally and directly used as human/animal food. By producing fuel out of oil seeds, you cannot avoid also producing food while the straw serves the humus balance.

VWP's adaption of high-end diesel engines for the use with pure plant oil as a fuel improves emissions and latches the combustion engine into earth's closed materials and CO²-energy cycles. So, the decentralized and sustainable production of oil seeds can balance the demand for food and fuel of a growing population and substitute finite fossil fuels with a water and soil protecting and renewable CO²-recycling fuel.

VWP does research and development for using pure vegetable oil as fuel in cars, trucks, tractors, generators and combined heat and power plants (CHP). **VWP** applied for, and claims 10 patents on pure vegetable oil combustion engines and fuel quality and has a unique selling position in this market. **VWP** sells know-how and licenses and also converts vehicles for private customers.

Within the last ten years, a few thousand cars, trucks, tractors and generators have been converted to pure vegetable oil. More than 500 vehicles and gen sets have successfully been subject to long-time monitoring within European and governmental research and demonstration programs.

State of the art today is an innovative decentralise production method for 2nd generation plant oil complying with DIN 51623 fuel quality and an engine technology for pure plant oil, biodiesel and diesel. Such innovative flex-fuel engines can be used for electricity production in stand-alone gen-sets or within a hybrid system of different renewable energies like wind power, photovoltaic, hydro power. Such a flex-fuel engine technology John Deere Europe has assigned for their tractors as future transportation concept for agriculture. Both, the new fuel quality and production method and the innovative flex-fuel engines can provide agriculture and remote areas with 100 % renewable energy for electricity and a wide range of sustainable plant oil fuels for tractors and rural machinery. The 100% Renewable Energy Off-Grid Hybrid systems and the 2nd generation vegetable oil production developed by **VWP** were designed to be economically viable while operating to the needs of closed regional CO², energy, resource and value-added cycles for local populations in Africa, Asia and Latin America.

In 2004 **VWP** received the poster award at the 2nd World Biomass Conference in Rome and the German Solar Prize 2004 of EUROSOLAR. In 2007 **VWP** was granted for its "Sustainable CO²-Fuel Recycling Concept" with the "Moppert-Prize" of the Swiss Sarasin Bank. In November 2008 **VWP** was honored with a Tech Award in the Environment category of the Tech Museum of Innovation in San Jose, California. In 2012 John Deere was awarded with the SIMA Gold medal for its Multi-fuel Tractor and Flex Fuel Technology which was developed by **VWP**. In 2017 **GIZ** and **VWP** as operational partner received from Alliance for Rural Electrification (ARE) the first prize in the

category “Best International Off-Grid Project” for the 100% Renewable Energy Hybrid System on Galapagos Island and the complementary sustainable, decentralized Jatropa oil production on the Ecuadorian mainland.

Georg will be responsible for the energy concept as well as to create a concept to transform local industry around the Agroforestry area (remote areas) from fossil oil dependence towards vegetable oil use.

MAN, Power Plants, Augsburg, Germany

TILMAN TÜTKEN, PhD, Vice President MAN Energy Solutions. Dr. Tütken is responsible **within MAN Energy Solutions** for the sales of energy solutions including engines, turbines, storage and power plants for power generation customers in the region Europe. He has been working since 2006 for MAN Energy Solutions and previously over 12 years for ABB in the power generation sector. In his career, he was active in all regions of the world. His background is PhD in physics with a background in photovoltaic components.

MAN Energy Solutions, based in Augsburg, Germany and part of the **VOLKSWAGEN Group**, is the world’s leading provider of large-bore diesel and gas engines and turbomachinery. The company employs around 15,000 staff at more than 100 international sites, primarily in Germany, Denmark, France, Switzerland, the Czech Republic, India and China. The company’s product portfolio includes two-stroke and four-stroke engines for marine and stationary applications, turbochargers and propellers as well as gas and steam turbines, compressors and chemical reactors. The range of services and supplies is rounded off by complete solutions like ship propulsion systems, engine-based power plants and turbomachinery trains for the oil & gas as well as the process industries. Customers receive worldwide after-sales services marketed under the **MAN PrimeServ** brand.

MAN will cooperate in the design and construction of power plants using the organic oils produced by the **Jatropa** and **Acrocomia** trees. The company has a hundred-year experience in the area of power plants and has also developed technology for the usage of biofuels for energy generation. **MAN** operates worldwide and is active in most regions of Africa

Tilman and MAN Energy Solutions will provide invaluable input on the development of sustainable energy solution strategy and implementation plan which uses the crop and other resources of the project.
(www.man-es.com)

v. **Product Development, Marketing and Distribution**

Sarepta Production and Sarepta Mini Market

Dr. Aline Flaure TIENDREBEOGO Specialties: Pharmacy, Para pharmacy, Dermocosmetics – Tips, "Health" line Training Engineering Vocational training.

Creation and management of SAREPTA PRODUCTION SARL and SAREPTA MINI MARKET, structures that have resumed the processing and marketing of VITRINES St JOSEPH products by expanding the product range and developing new growth prospects as demand for natural products from st Joseph's Showcases persisted after its closure. The fundamental concepts of SAREPTA, in the current context of poverty and globalization, are based on the belief that the food security of people, whether rich or poor, depends on nutrition education and the availability of food supplements and foods selected for their nutritional and socio-economic interest. SAREPTA is putting in place the scientific, human, logistical and financial resources to meet the challenge of marketing processed products of recognized quality, which can feed people, help them prevent disease or recover health.

Aline will be responsible to create all kind of products from the goods produced on the Agroforestry area. Special focus lies on Moringa.

CLAUS BARTA

Claus studied business administration and has been working for more than 30 years on the connections between food quality, environmental protection, sustainable agriculture and the special healing power of plants.

About 25 years ago he read about **Moringa oleifera** for the first time and since then he has devoted much of his time to this plant.

For him, the quote from the charity Trees for Life, "These tiny leaves could save millions of lives," is entirely true.

Moringa oleifera has a unique range of positive properties. No other plant can simultaneously improve health, combat hunger and economic hardship, protect the environment, clean water and produce fertilizers, pesticides, animal feed, biomass and energy. If you look at the vitality and nutrient density of the leaves, you can immediately see why Moringa is called "green diamonds". It is therefore actually green footprints that are left behind when eating, disseminating information and growing.

NBI International, - National Branding and Investment –

Chris Aelberts, founder and CEO started in 2011 and specializes in the MICE industry. NBI International maintains the global network with around 50 countries from which the company analyses the detailed demands to make purchases and investments. The purpose of these analyses is to realize the demand-driven sales processes, from macro to micro scales. In order to realize these specific processes, NBI International organizes the international matching programs as well as network meetings. The company also stimulates the networks with worldwide governmental agencies as well as enterprises from countries.

Founder of the Map expo: The Global marketplace for Medicinal & Aromatic Plants. Connecting Farmers, Producers and Buyers.

MAP-Expo is the international platform for the industry of Medicinal & Aromatic plants. It's about creating links in the supply chain and spreading knowledge about MAPs.

chris@nbi-international.com

Chris Aelberts | LinkedIn

MS. ANNABELLA AYELEY ADADE

MS. Annabella A. Adade is a medical herbalist by profession with over seven (7) years clinical practice experience in Ghana. Her passion for the development and promotion of Traditional African Medicine (TAM) made her take up employment with the public service. She played key role in public policy formulation and implementation by serving on National and local committees in Ghana. She has a Master of Public Sector Management degree from the Ghana Institute of Management and Public Administration (GIMPA).

Currently, she manages a network of Practitioners involved in the cultivation of medicinal plants and she offers technical advice to these farmers specially on Good Agricultural and Collection Practices (GACP). In partnership with NBI International, The Netherlands, they identify and enable farmers supply the local and international market of traditional medicine.

She is currently the Deputy General Secretary of the Ghana Federation of Traditional Medicine Practitioners Associations (GHAFTRAM) which is the mouthpiece of all Traditional medicine practitioners in Ghana.

Email: anbelliano@gmail.com

VI. Technical execution

VI.I. Infrastructure and landscaping

GI Grupa, Zagreb, Croatia

ANDREW YEOMAN, RIBA. BA hon.Dip.Arch. DipAA (USSR). Andrew Yeoman is the director of Tower 151, the Architects wing of GI Grupa and heads up Strategic Planning, and Development Analysis. With over 30 years in the business, he brings a wide range of experience to the group as both a designer and project manager. Mr. Yeoman has been responsible for the Project Management of the largest development in Croatia, HAAC and main designer in several large-scale developments both in Croatia and Europe namely, the Orestaden programme in Copenhagen (won originally in an international competition) and the Adidas headquarters in Germany, and the ELT – the enclosure of the European Largest telescope. Andrew Yeoman's key skills include design leadership, Urban planning, Constraint planning (incl. logistic and strategic frameworks), Design management, and Project, procurement and cost planning for large and multi-task projects (industrial and commercial sectors).

GI (www.gin.hr) was founded in 1989 and today is made up of three companies and provides services of Project Management, Contract Management, Design and Strategic planning.

The client base ranges from Government agencies in Croatia, worldwide funding institutions such as IBRD, EBRG, EU and EIB, and a range of international corporations from China (BCEG, CCEC), Germany (Adidas) and UK (Carillon).

Project experience also stems from large infrastructure programme in South-east Europe, Port of Rijeka, Dubrovnik and Ploce and highway and viaduct projects throughout Croatia), strategic planning in Denmark (Orestaden - largest urban development in Europe in 1995), Russia (consultant to the government of Moscow for redevelopment strategy of south-East district of Moscow) and UK as well a collection of development programmes for Chinese corporations worldwide. Andrew Yeoman, one of the directors has experience in Africa through projects with Philip Morris in Malawi and Tanzania and the petrochemical industry in Nigeria.

GI's capability ranges from high level strategic planning down to micro level assessments of particular development sites or planning issues. These services can be summarised as follows:

- **strategic & urban development planning**
- **master planning and urban design**
- **public consultation**

PROJECT MONITORING AND PATHWAY SERVICES

GI can provide an independent project monitoring service as a Lenders Consultant to review a project development to ensure the commercial objectives of a project are in line with the lending Institutions mandate. They check

- Compliance and quality of documentation
- Confirm project completion in accordance with the project requirements
- Identify issues of concern and potential financial and operational risks throughout the
- Project's operational phase.
- Provide operational audits with a comprehensive review, which include services focussing on the General state of the building/asset.

GI also provides a **Pathway Assessment service** of new projects either on behalf of sources of finance or potential partners in new joint venture developments. Part of this service can be in the actual preparation of documentation required for introducing new projects to potential partners and source of finance to taking a project owner through the process of contracting with banking or other financial institutions.

DEVELOPMENT ANALYSIS

To assist clients with shaping strategy, planning investment, exploring feasibility, assessing impact or addressing certain specific technical needs, **GI** provides independent professional consultation to deliver analysis that carries value to bringing a project forward. This can include

- feasibility reports
- business planning
- strategic policy making
- technical assessment
- operational planning
- environmental and sustainable assessment
- optimisation
- risk, reliability and safety management

Andrew and his team will be responsible for planning of all infrastructural elements of the Agroforestry area and the surrounding area.

VI.II. Health

Swiss Tropical and Public Health Institute, Basel Switzerland

MANFRED ZAHORKA, MD, MPH, QM Auditor is a Senior Public Health Expert, family physician, epidemiologist and project manager currently working at the Swiss Tropical and Public Health Institute (Swiss TPH) in Basel, Switzerland. Dr. Zahorka has worked for more than 30 years in development cooperation's in Sub-Saharan Africa, Central & Eastern Europe and Central Asia managing and evaluating health systems support projects in the area of maternal and child health with a focus on family health and community health systems, sexual and reproductive health as well as organizational development with a focus on quality assurance and quality management in health. He continues to provide managerial and implementation support, training, supports operations research activities, conducts and supports quality assurance and quality management processes at a systemic and institutional level. He lived and worked for 10 years in West-Africa, mainly Benin and Gambia, and continues to manage and support public health programs in the East African Community (Rwanda, Burundi, Tanzania, East RDC since 2007), and Eastern Europe (since 2002). His present focus is on family health and integrated people centred care to address non-communicable diseases in Eastern European countries and the Balkans.

With its service department, **Swiss TPH** acts as a health advisory, support and implementation agency for a variety of local, national and international funding bodies and clients. Further, **Swiss TPH** features a contract research organization that plans, assists and conducts clinical research trials for academic and non-academic clients, in particular, in low-resource countries.

For two decades, the **Swiss TPH** has been acting as an implementing agency for large-scale health sector support projects, for example in Tanzania, Burundi, **Rwanda**, Chad, Albania, Kosovo, Moldova, Tajikistan and Kyrgyzstan. In each country, these programs target several 100'000 people and contribute to substantial gains in life expectancy and a reduction of child mortality.

The idea of the cooperation with **The Asjeba Group** is to aim at the implementation of universal health coverage. This means that the entire population should have access to affordable, preventive and curative health services as well as health promotion according to their needs, and in sufficient quality. The second priority is to assess the impact of Agroforestry area work on the health of the workers (occupational health) and the communities around the Agroforestry area sites, as well as the specific needs of the Agroforestry area's workers regarding service delivery.

Manfred and his team will analyse the health system situation in and around the planned Agroforestry area and will implement a sustainable health system for the employees of the Agroforestry area as well as the local population.

VI.III. Finance

Arthur Adams

Arthur (1967) is a collaborative financial professional focusing, through Twinfields McLaren (Netherlands) BV (TML) as part of AIC Group ((AIC) www.aic-sf.com), on finance of strategic corporate targets. These targets are purpose-driven in combination with profit-driven and often aimed to contribute to matters within the spectrum of global relevance to local relevance such as climate change, housing shortage and other UN's Sustainable Development Goals.

This focus on finance, is both on: Internal finance: related to the (projected) operations, managing working capital and other assets and equity; External finance: related to external sources such as: specialized funds, mergers and acquisitions, EU-subsidies, and debt financing. In these activities, he functions as a partner.

He is an investment partner in tech at Great Stuff Ventures. As an investor, he also has a special interest in trading on capital markets, value investing and real estate. He is a Latin American and Caribbean Initiative Advisory Board Member of University of Miami Herbert Business School and a Member of the Board of Supervisory Directors of South American International Bank (SAIB) in Curaçao.

He is one of 1,700 senior experts of PUM voluntarily sharing their knowledge with fellow entrepreneurs to strengthen SME businesses and improve lives in emerging markets to create positive impact on the economy, environment and society and contribute to the UN's Sustainable Development Goals. He is a member, through TML, of Holland Fintech in Amsterdam. He is also a member of the Koninklijke Industriële Groote Club (KIGC) in Amsterdam, where he is a member of the Cityborrel Committee.

SUMMARIZED TRACK RECORD

Arthur studied business economics and post graduate accountancy at the Vrije Universiteit (1985 – 1989) and started his career in the international audit practice in Amsterdam (1989 – 1992).

Hereafter, he moved to Curacao and continued his career in local and international audit and advisory practices. Activities that brought him in several countries across the Americas. Meanwhile, he maintained ties with the Netherlands in particular and Europe in general. In June 2018, he returned to Amsterdam.

He brings on board, years of experience. He has worked for and in collaboration with big four audit firms, issuing banks, processing companies, digital solution providers, specialists in commercial foreign exchange, startup accelerators, financial markets regulators.

In that perspective, he is experienced, professional and in line with prevailing times. He is surely capable of combining the demands of entrepreneurship and growth with client needs, regulatory requirements and risk management.

He also has a track record of a number of positions, such as board memberships, supervisory directorships and committee memberships, including: A member of the Board of Trustees of Caribbean, Central American Action in Washington DC (CCAA).

The chairman of the Association of International Bankers of Curaçao and St. Maarten (IBA).

He also been a freelance speaker at business education institutions and as a participant in round tables and panels mainly on finance topics.

Arthur has the responsibility to line up the funding opportunities with the Agroforestry area expansion scheme of the Asjeba Group.

VI.IV. FireWatch and Communication

IQ Wireless GmbH, Berlin, Germany

(www.iq-wireless.com) **IQ Wireless** GmbH develops and markets procedures, equipment and systems for radio communication, video system technology and the Internet, such as web TV products. These solutions and products comprise many years of experience and innovative technologies, so that customers are able to benefit directly, comprehensively and sustainably from technological progress.

IQ Wireless is focused on new and economical radio network solutions for telecom providers: Wireless Local Loop, wireless internet access, long range wireless LAN.

IQ Wireless develops and markets video and monitoring systems for environmental protection and for guaranteeing civil security. State of the art procedures for image processing, sensor technology and telecommunication / telematics are combined to form complex system solutions.

IQ Wireless cooperates with companies in Germany and around the world. This collaboration ranges from the scientific cooperation with institutes and research facilities such as the German Aerospace Center (DLR), to the industrialization for national component manufacturing as well as including international service and support.

(www.iq-firewatch.com) **The FireWatch System** has been developed specifically for the early detection of forest and bush fires by the **German Aerospace Centre** (www.dlr.de). Since its implementation in 2002 by **IQ Wireless** more than 300 systems worldwide cover millions of hectares of forest 24 hours a day reducing damages and emissions from forest fires by 30% up to 90%.



VI.V. Business development

Africa

RICARDO LUMENGO Born in Angola, Mr. Lumengo has lived in Switzerland since 1982 and acquired the Swiss Nationality in 1997. Mr. Lumengo studied law at the University of Fribourg, Switzerland and worked as lawyer in the field of international law and integration of foreigners and migrants. In 2004 he was elected as Member of the Council of the City of Biel / Bienne (Member of the Municipal Parliament), in 2006 he made his entry to the Grand-Conseil of the Canton of Bern (Member of the Regional Parliament) and in 2007 he was elected as Member of the National Council (Member of the National Parliament of Switzerland). Since 2014, Mr. Lumengo has been involved in and as of 2015 become a member of the Board of Directors of the Asjeba Group, that has the ultimate goal to establish agricultural projects in Africa to support sustainable development of rural areas.

Ricardo has been and will be responsible for future expansion in African countries.

South America

Georg Paulos studied the big propulsion engines within marine vessels serving merchant marine. With this knowledge he was able to deeply understand the science of transforming biomass into energy. These mass and energy flow-diagrams led the way towards sustainable waste treatment that Paulos got involved with more and more. After his journey around the world, he realized that mankind is suffocated through garbage and toxic waste. He then came in contact with certain renewable energy production systems, as well as installations for sustainable waste management with advanced carbon neutral footprint.

The solution that Paulos and his group found, after years of due diligence, was the C6 technological concept, providing the utmost clean waste treatment process without by-products like tar or char. Paulos has specialized into sustainable infrastructure development regarding innovative waste management (without incineration), the production of renewable energy and synthetic fuels production.

Together with his friend Hans Haeberer he analysed the waste composition in Costa Rica and developed a concept for sustainable waste management and treatment in 2013. Today the technological concepts for waste management of C & S SOLUTIONS are present in several Latin-American countries. The C & S group consists of specialized political consultants and environmental specialists.

VI.VI. Sustainability, Quality & Control; Investor Relations

Joachim Ganse

Joachim Ganse was Director of Sustainability Services for KPMG from October 2010 to May 2017. He has also been Managing Director of KPMG Cert GmbH since 2011. Prior to joining KPMG, Mr. Ganse worked at Deloitte & Touche as Director of the Service Line "Extra Financial Issues"/"Corporate Responsibility & Sustainability", Country Leader Climate Change & Sustainability Services as well as Managing Director of Deloitte Cert Umweltgutachter GmbH. Previously, Mr. Ganse worked as Managing Director of Gerling Cert Umweltgutachter GmbH and as Managing Director of Gerling Sustainable Development Project GmbH, a venture capital company. Joachim Ganse has extensive experience in setting up and certifying Integrated Management Systems (IMS). Joachim Ganse is an active member of various bodies such as the Environmental Committee of the Chamber of Commerce, the Emissions Trading Group at the BMU, the DIN Advisory Board on Standardization Issues "Fundamentals of Environmental Protection" as well as the Working Group on Energy and Environment and Green Economy of the International Chamber of Commerce (ICC). Joachim Ganse is the author and co-author of numerous publications on the topics of eco-audit, environmental risks and environmental liability, occupational safety, certifications, etc. Qualifications

Diploma engineer, University of Krefeld; Accredited auditor according to EMAS, ISO 9001, ISO 14001, ISO 45001, ISO 50001

Professional strengths

Set up and certify integrated management systems

Development of RM systems as well as monetization and KPI development in the SD area (Coaching C-area)

Development and testing of international performance management systems (Environment, Safety, Quality and Health)

Evaluation of companies based on performance indicators in e.g., due diligence projects (risks/opportunities)

Selected projects

Development of an integrated quality, environmental, occupational safety management system for an energy supply company.

- Accompanying a chemical park operator in the definition of core business processes including quality management and KPI's

Testing of an integrated management system (quality, environment, energy and occupational safety) at a chemical company as part of the Global Risk Controlling system.

- Examination of various emission inventories on a statutory (EU-ETS) basis and voluntary

Joachim stands for transparency and communication of Asjeba's values and projects with investors in different sectors of the economy and civil society to make sustainable development and economics a global success story

VI.VII. Africa Continent

Philippus Karel Breytenbach (Flip), Pietermaritzburg, South Africa

Flip established Afrequip in 2006 and created a forward-thinking company that aims to provide role players in the African Forestry Industry with modern mobile equipment that out performs all other equipment! They are the leader in the Southern African region for Forestry Mechanization - offering both Consultancy and System Solutions backed by the World's Leading Brand Names such as Tigercat, Log Max, Morbark and CSI.

They provide equipment ranging from Feller Bunchers, Skidders, Harvesting Heads, Harvesters, Loaders, Forwarders, Biomass Grinders and Chippers to the African Market. Their Services include Sales, Maintenance, Product Support and all relevant training courses designed and proven to enhance operator productivity. They are constantly increasing their base of Loyal Customers through Excellent Sales and Service Support.

Flip has visited over 100 Agroforestry areas in African countries over the last decade, know their management and quality of work and had to work out business plans for every piece of equipment offered. A lot of these Agroforestry area managers would like to become part of the **Asjeba Group** assisting in “**building**” Africa, because they believe in the **Asjeba** concept.

Flip is advisor for African related questions.

VI.VIII. Ghana

Lucy Akua Kyeredede Quainoo

Ms. Quainoo is a Global Goals Advocate and Consultant with over 18 years' experience in the Development Sector specifically in the areas of Management, Entrepreneurship and Innovation, Investment Finance, Trade and International Business. She currently holds an MBA in International Business and Management from the Hanze University, Groningen, The Netherlands and an MA in International Business from the Anglia Ruskin University, UK. She also has a Bachelor in Entrepreneurship (First Class Honor's) from the Greenhill College, GIMPA, Accra.

She is a Management Consultant for Shinkaafa Buni rice Farmers' Association and played a pivotal role in its formation in 2016. As the Focal Person for the USAID FinGAP project at MEL Consulting Ltd between 2015 and 2018, she facilitated financing for a number of women Aggregators and Farmers which led MEL to become a top Business Advisory Services Provider under the Project.

She is a member of FAO's Global Forum on Nutrition and Food Security and contributes to the Global dialogue on topical issues under the theme. She is also a Leading member of EBAFOSA (Ecosystem based Adaptation for Food Security Assembly, Ghana a UNEP Voluntary organization aimed at tackling Climate Change and Food Security issues).

She is the Director for External Relations and International Trade at MEL Consulting Ltd. A Co-founder of Agribusiness Value Chain Federation, Ghana, MEL Business Solution Center and Shea Naturals, Ghana. She is currently a member of the Advisory Board of the West African Chamber of Agribusiness as well as the Chamber of Agribusiness, Ghana and also a Board Member at Agripool, Farmhaus Production Ltd., Digiext, Business Advisory Services Providers (BASPAG) and Young Visionary Leaders Ghana and a Patron of Peace for Progress Alliance. She is also an Independent Business Development Consultant for MNC Capital Advisors Africa an Investment Advisory firm based in South Africa facilitating finance for SMES and Financial Institutions in Sub Saharan Africa.

She won the Country (Ghana) and West African Award for CEO Global Magazine South Africa's Pan African Awards for the Most Influential Woman in Business and Government 2019/2020 in SMEs and Agriculture.

Lucy will represent Asjeba on the Board of the local foundation on behalf of the local population and design future's strategy of the foundation.

VI.IX. Nigeria

Georgios Radoglou "Clean Energy Transition advocate – Circularity fanatic – Sustainability Pioneer – Mentor". Senior Managing Executive with entrepreneurial spirit. Versatile in P&L / overall financial management. Pioneer & public speaker / lector in Sustainable Development, Energy, Environmental Sustainability, Supply Chain Management, Project Management, Environmental – Social – Health & Safety Governance, Security, Capacity development. Experience in multi-national organisations, integrating sustainability into planning & strategic positioning.

Over 25 years' experience, having worked for organisations across a wide range of industrial sectors including oil & gas, energy, chemical, power plant construction, mining, metal & general manufacturing. Working experience including sustainable projects in Tunisia, South France, Greece, Romania & West Africa. German chartered expert on Occupational Health & Safety for all industry branches (FASI BMAS accreditation). Ten years' experience in Greenfield project development from design to scale up phase of Renewable Energy projects (Photovoltaic, Geothermal Biomass & Heat pump technology, stand-alone on&off grid and/or building integrated). Fund & grants management, Investor relationship, public stakeholders, policy creation, licensing, O&M.

Creation of HSE & sustainable development policies at organisational, operational & product levels, Design, creation & implementation of HSE & sustainability management systems, Design & creation of KPI systems for HSE performance evaluation, monitoring & Integrated annual reporting - IR; Creation & delivery of Sustainability & HSE Training Courses, Assurance of performance reports, Renewable Energy project development, Crisis management, Emergency planning, Industrial Risk management, Energy resources management, Energy efficiency, Safety & Environmental due diligence & compliance auditing under all international standards (ISO 14001, 18001, 26001, 45001, 50001). Sector Team leader Covenant of Mayors Sub Saharan Africa – CoMSSA Clean energy transition initiative (September 2020)

Georgios will work out a franchise contract of the Asjeba concept for Nigeria

Description of an Agroforestry cluster and Industrial Development

Project Development

All relevant data of the project sites will have to be surveyed and detailed topographic maps elaborated as base for the exact project planning.

Development of Nurseries

The first step to implement the project will be the establishment of the first nursery and storage for seeds for the production of vegetative material for the start of the first planting in 2022/23. The location of the first nursery should be close to an existing agricultural institute due to the better infrastructure and the option to integrate the nursery into the University complex. This will make access to trained people easier and also will give us the opportunity to cooperate with the university in research and development. It is also planned to sell plant material in a garden centre at the same location.



Acrocomia plants in nursery

The nursery plays a crucial role especially for the introduction of **Acrocomia** and its adaption to the native environment after the propagation cycle in the lab.

Construction of Laboratories

As we will need very large quantities of planting material, we must rely on the option of in-vitro propagation. **C-Fela** has developed a method of in-vitro propagation for *Acrocomia aculeata* in Costa Rica. This is very important to the project as the natural cycle of *Acrocomia* may last up to 3 years. Of course, we can apply this method also to the other plants according to necessity and capacity.

Development of Intercropping Scheme

The original intercropping scheme developed by C-Fela in Costa Rica referred to hilly terrain and smaller Agroforestry areas using a large amount of manual labour. As the project in Ghana will have to manage a large Agroforestry area, we will have the intercropping scheme adapted to a more mechanized system. This means that the different biofuel plants will be planted in lines with distances between the lines that will allow the operation of machines.

Planting Program

As the project will start, a detailed topographic, geological and meteorological survey of the assigned block will be executed. Based on this data an exact planting plan will be developed.

HECTARES TO PLANT												
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10		
accumulated	accum	accum	accum	accum	accum	accum	accum	accum	accum	accum	accum	accum
Ricinus	3'000	3'000	12'000	12'000	12'000	12'000	12'000	12'000	12'000	12'000	12'000	12'000
Moringa	5'000	5'000	10'000	5'000	15'000	5'000	20'000	5'000	20'000	0	20'000	0
Jatropha	0	0	0	0	2'500	2'500	5'000	2'500	7'500	2'500	10'000	2'500
Acrocomia	0	0	0	0	2'500	2'500	5'000	2'500	7'500	2'500	10'000	2'500
Annual Planting	8'000	8'000	17'000	17'000	22'000	22'000	27'000	27'000	32'000	32'000	37'000	37'000
Accumulated planting	8'000	22'000	32'000	42'000	47'000	52'000	57'000	60'000	60'000	60'000	60'000	60'000
Notes:	Ricinus is planted for 9 years on 12 000 hectares maximum	Ricinus is a one year plant, replanted every year	Ricinus can be harvested after 6 month 2 times p.a.	Moringa is planted on 5 000 ha during 4 y total 20 000	Moringa leaves can be harvested every 4 months = quick return	Jatropha and Acrocomia are planted together on 40 000 ha.	Full return from Jatropha fruits in 5 years.	Full return from Acrocomia fruits after 6 years.	Ricinus, Jatropha and Acrocomia produce vegetable oil	Moringa leaves produce powder or protein		

Typical soil conditions.

- **Ricinus**: Suitable for: light (sandy), medium (loamy) and heavy (clay) soils, prefers well-drained soil and can grow in heavy clay soil. Suitable pH: acid, neutral and basic (alkaline) soils. It cannot grow in the shade. It prefers moist soil.
- **Moringa** tree like sandy, not clayey well drained soil. Never allow water to sit around the roots. This could kill the tree.
- The best soils for **Jatropha** are aerated sands and loams of at least 45 cm depth (Gour, 2006). Heavy clay soils are less suitable and should be avoided, particularly where drainage is impaired, as Jatropha is intolerant of waterlogged conditions. Ability to grow in alkaline soils has been widely reported, but the soil pH should be within 6.0 to 8.0/8.5 (FACT, 2007).
- Soil requirements of **Acrocomia**: It has a fibrous root system and benefits from deep organic, soils that are fertile and well drained, but it adapts, in fact, to various types of tropical soil soils, like coastal marine alluvial clays, sand, soils of volcanic origin both slightly acid to slightly alkaline.

Technical Aspects and Products

The quality and specifications of the produced oils allow a variety of products to be developed.

A detailed production plan will be elaborated after a decision can be made on actual production and development of local, regional and international markets. In many aspects new technological solutions will be designed according to the experience made by C-Fela in Costa Rica. This will also mean the construction of buildings for the processing and refining facilities.

- **Crop processing**
the fruits of the different biofuel crops will be pressed and filtered. This will be executed by stationary processing centres.



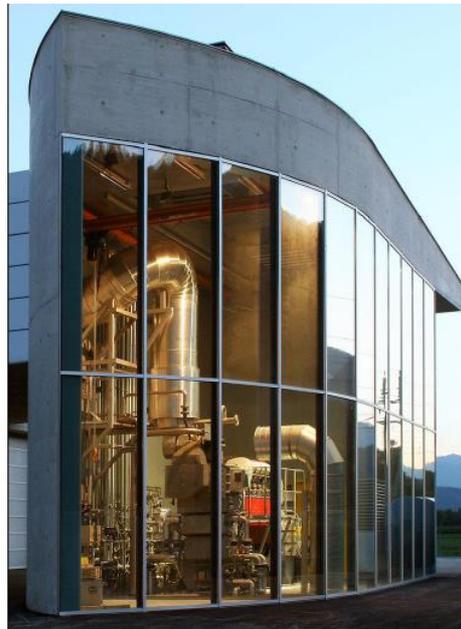
Oil extraction facility for Acrocomia fruits

Energy Generation

the filtered vegetable oil can be used directly in power plants or ship engines to replace bunker oil. We are cooperating with **MAN** of Germany in the development of power generation projects. The production of renewable energy should also include wind, solar and geothermal energy, if available, to keep production cost low. The oil driven power plants should more or less be used as backup facilities.

A 17 MW installation can produce 17 000 kW per hour. The consumption of such an engine is approx. 195 gr/KWh or 3 315 litre fuel to produce 17 000 kWh electricity per hour. At full production of 8 446 hours per year the installation needs 28 million litres of vegetable oil. The MAN installation produces from 1 litre of vegetable oil with 9.2 KWh energy content at 45% efficiency 4.14 KWh electricity. The remaining is waste heat.

- Engine type 6L21/31
- Power output: 1,160 kW
- Fuel: recycled frying fat
- Commissioning date: May 2004
- about 54,000 h
- Availability: > 90 % (8,000 h/a)



*MAN
Cogeneration
for Pure
Plant Oil and
Used Grease*

- **Biofuel**

production

There are three possible fuel solutions based on vegetable oil:

- Use the vegetable oil **directly as fuel** for tractors, vehicles, machines, generators, etc.
- **Bio-diesel** As for the chemical composition of the oil we will produce, the refining of bio-diesel is comparatively simple. We plan refining plants as many as are needed, dictated by the local market and export opportunities.
- **Bio-kerosene** There are various technologies available and under development. Should there be sufficient demand at acceptable prices, guaranteed by long term purchase contracts, production of bio-kerosene would definitively be an option to consider.



*Decentralized Oil Mill
for Jatropha as Fuel*

- **Secondary Products**

Besides the production of oil, there are various by-products. The most important by-product is charcoal

produced from the shells of the **Acrocomia** fruit. This can be marketed to the local population as fuel or used for power generation.



Acrocomia charcoal

Food Production

One of the basic objectives of the project is the rehabilitation and improvement of soil fertility. This will give us the option to use some of the land for food production should demand be economically and socially interesting.

Social Aspects and Housing Development

- **Settlements and Infrastructure**

As the operation of the Agroforestry area will require the employment of approximately 15 000 people plus their families, about 75 villages spread over the whole area will be constructed. This will also require the providing of water supply systems, electricity, waste and water waste management, schools, health care, markets, supermarkets and other facilities.

- **Human Resources**

The different jobs offered by the project need trained people. Therefore, a plan to develop the professional level of the employees will be needed.

- **On the Job Training.**

For the first phases of the project, we will have to rely on the cooperation of external experts and an on-the-job-training program.

- **Dual apprenticeship.**

To increase the level of education a structured education system will be introduced modelled after the Swiss dual apprenticeships system.

The Asjeba Out-Grower Concept

Smallholder farmers do employ in average 2 hectares in Ghana. Unfortunately, this land, in most cases has not been economically or optimally used. The **Asjeba** concept includes supporting smallholder farmers for planting and harvesting various trees on part of their land. The farmer has to prepare the land. **Asjeba Techiman 1 (Ghana) Ltd** will organize high quality seeds, organic fertilizer, supervise planting and growing of the trees. To spread the costs of certification for carbon credits minimum 5 000 smallholder farmers should participate in such a program.

Asjeba Techiman 1 (Ghana) Ltd will sign long term fix purchase contracts for the harvest ensuring the smallholder farmer a fix income. In the first 3 years intercropping with beans, vegetables or whatever the market requires can be done. Plants that prefer shadow, like vanilla, will replace these species thereafter. This means additional income.

Asjeba Techiman 1 (Ghana) Ltd will process the harvest and market the goods locally or if economically viable export the products. The seedcake will be transformed to compost. The smallholder farmer will receive for every 10 kg of organic waste 1 kg of compost, to be used on his farm!

Legal Situation

According to the information obtained from the ministries in Ghana, the anticipated activities of oil production, production of refined products and exporting of these products are in accordance with national legislation.

Financing

At the beginning we have to execute an environmental and social impact assessment and carry out basic planning for the future infrastructure, so we will just start planting **Ricinus** and **Moringa** on released areas. The moment all basic studies have been executed and the impact assessment fulfilled, we can start planting the total hectares with all species.

The whole set up will take some time:

1. The partners in the group are committed to a joint effort in this project;
2. The design of this Agroforestry area will be developed, as a specific project;
3. Training of the employees on all levels will take time;

Out of experience we know that **Ricinus** has a positive cash-flow after approx. 6 months; **Moringa** after approx. 9 months, whereby **Jatropha** takes 4 years to come to full production and **Acrocomia** needs even 6 years before optimal results start coming. Thereafter however **Acrocomia** is a real winner over a longer period, approx. 60/70 years long.

Essential for good planting material are high quality seeds, the nursery and the labs. The construction of these two elements should start immediately, the moment the project has been approved and funds are available.

Planting of **Ricinus and Moringa** seeds preferably should start in beginning of the rainy season middle of February until the end of November 2022!

Project Idee

Most bio-fuel projects failed so far to achieve positive financial results. Selection of high yield seeds is one of the reasons, why we are convinced that our project will be profitable and therefore sustainable. We do plan to use the vegetable oil directly as fuel with the know-how and patents of our partner Dr. Georg Gruber. Our production cost of approx. US\$ 0.70 per litre, ensure a sound competition with the gas station prices of diesel in Ghana! From Moringa we only take the fresh leaves. Should we be able to convince the population to eat these fresh leaves as vegetable, the population would get all the required nutrition's to combat malnutrition at a price of US\$ 0.60 per kg.

This project will provide an important option for a long term sustainable economic, social and ecological development for rural areas. **Asjeba** and its cooperation partners are willing to establish this project and become a partner in the development strategy of Ghana. We are convinced to have all means to implement our project with the close cooperation with our Ghanese partners.

Conclusion

Our Objectives are to:

- create productive Agroforestry areas on unused/degraded agricultural land;
- produce biofuels and electricity;
- create jobs;
- upgrade education, health care and infrastructure;
- provide guidance to local people to continue with similar agriculture programs.

We are in the process of raising capital to finance the demonstration project based on the available resources of unused land and a huge labour force. We bring in our skills, experience and a wide range of worldwide connections. To realize the projected Agroforestry area and the out-grower concept, financing will be in the range of US\$ 100 million. It should be noted that these two activities, the Agroforest and the out-grower program, are combined operations with the productive Agroforest being essential to the success of the out-grower program.

The provision of housing, education and healthcare facilities and infrastructure are important both to the success of the Agroforestry program which will be financed supporting those goals on a broader range in our sixth years of operation. From a moral point of view this is not acceptable. We will have to discuss these items with the government (tax exempt for the first 10 years amongst others!).

The intention of the Group is to invest surplus total free cash-flow in the purchase of the leased land on behalf of a local foundation for the benefit of the local population. In addition, infrastructure will be upgraded and social engagement enforced.

In summary our development program considers the following:

1. The level of the funding will be based on the assignment of the land and associated debt finance, as well as equity placement from **Asjeba Planting Your Future**, Switzerland. Housing, education and healthcare facilities and infrastructure will be developed in parallel and necessary to each section of the Agroforestry program. Therefore, this will be based initially on the \$100 million start-up program of nursery planting of **Ricinus** and **Moringa** trees.
2. Our core business will be the production of vegetable oil. Uses for the vegetable oil can vary from production of electricity with the assistance of our partner **MAN**, Augsburg to selling the oil to gas stations. That way processing of the oil is only marginal with smallest electricity plant using that kind of technology, producing 1 MW up to 17 MW and multiple. Should we consider producing bio-kerosene, we will have to negotiate long term fix contracts with major airlines. If successful we should consider the construction a refinery close to the international airport. It should be noted at this stage these are pathway objectives.

3. After approximately 5 years the roots of the trees will have had such a positive effect on the soil that we can consider starting with intercropping and as described earlier.
4. We will also assist local farmers to grow trees/plants on part of their land. This could be Jatropha for instance. 1 Hectare of **Jatropha** trees can produce approximately 580 litres of vegetable oil, thus making the farmers totally independent for their energy needs. We shall nonetheless supply all the equipment that can run on vegetable oil and in this mode employ more people.

Our primary mission is to set up and manage productive Agroforests in general and thereafter determine in more detail programs for further activities based on the market status in **Ghana**.

Facts and Figures on Jatropha www.nuglobalnrg.com/jatropha_facts_and_figures.html

**GLOBAL INITIATIVE FOR RESTORATION OF DEGRADED SOILS –
UN DECADE OF RESTORATION
ASJEBAGROUP PROJECT SUMMARY
APRIL 2021**



ASJEBAGROUP

SUSTAINABILITY. FAIRNESS. OPPORTUNITIES.

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