

# VIRIDIUM TANZANIA LTD

BUSINESS PLAN - 2021



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## Introduction

The Government of the United Republic of Tanzania has been implementing socioeconomic reforms aimed at stimulating economic growth for the achievement of poverty-reduction goals, resulting in substantial economic performance. The reforms include fiscal and monetary policies, trade liberalization, enabling a business environment and an investment climate as well as strengthening of public financial management.

Through the National Five Development Plan 2016/17-2020/21, the Government has put forward its commitment to creating a conducive business environment by addressing the obstacles to business, promoting investments and growth, as well as ensuring the development of the private sector by providing a wide range of incentives and support.

The Government of Tanzania recognizes the private sector as an engine for economic growth and a valued and dependable partner in the nation's endeavor to achieve the "8-8 agenda" of economic growth and jobs creation; whereby the economy is forecasted to grow at an annual rate of 8% and ensure that 8 million jobs are created in the formal and informal sectors.

Heavy dependence on fossil fuels for energy is among the major climate change related drivers to deterioration of the ecological systems in the country. The national energy balance in Tanzania is dominated by biomass which accounts for 85% of the total energy used in the country, and that among the factors contributing to deforestation include, unsustainable charcoal production for domestic and industrial use.

To fully utilize the existing potential of the land, knowledge, and assets to be purchased, Viridium now requests for registration with the Tanzania Investment Centre (TIC) to realize its plans for the benefit of the investors and the country at large.

Total investment for the project is estimated to be USD 4.7 million and the project is forecasted to create employment for more than 300 people, mostly indigenous Tanzanians.

## Executive Summary

Viridium Tanzania Limited (Viridium) is planning to engage in the production of biomass briquettes as an alternative fuel to wood and charcoal using Elephant grass (*Pennisetum Purpureum*). Moreover, the Company envisions to produce biodegradable fiber packaging-products, in line with the Government's initiatives of fighting environmental challenges.

This business will plant, grow, and harvest Elephant grass (*Pennisetum Purpureum*) or *Miscanthus* or both to produce biomass. With the biomass, produce briquettes as an alternative fuel to wood and charcoal and furthermore produce biodegradable products as a mass consumable product. The plan is to plant 1,000Ha of biomass (refers to Elephant grass, *Miscanthus* or both) at a dry yield of 15Mt per Ha. This will result in 15,000Mt of finished product available to market.

Viridium is currently focused on ensuring it sets up its operations efficiently and effectively to service the International briquette market and domestic requirements to meet the growing demand of an alternate and sustainable fuel that competes successfully against charcoal & wood.

## Business Description

### Introduction

VIRIDIUM is registered in Tanzania under the Companies Act as a company limited by shares with a Certificate of Incorporation Number 144595068, Taxpayer Identification Number (TIN) 144595068, Value Added Tax (VAT) number (TBA) and First Trading Business License No. 20000012819 issued on December 16th, 2020. The majority shareholder of the local Company is VIRIDIUM HOLDINGS LIMITED, holding 99% of the shares and 1% shares held by MR. PHILIPPOS MAINETTI.

Viridium Holdings Limited is a foreign registered company, founded in 2020 and incorporated in Mauritius.

Viridium is based in Lupa Chunya, Iringa and Morogoro with offices situated at the following addresses:

<p><b>Morogoro Office:</b>          Plot No. 1057          Road: Mazimbu Road          District: Morogoro Municipal          Postal Address: P.O. Box 1900          Region: Morogoro</p>	<p><b>Iringa Offices:</b>          Farm No. 603          Nzihi Village          District: Iringa Municipal          Region: Iringa</p>	<p><b>Lupa Chunya Offices:</b>          Lupatingatinga          Mamba Village          Ward: Kisalasi          District: Chunya Municipal          Region: Mbeya</p>
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### Current Operations

The Factory in Mbeya (Lupa) is currently not in production as the season will re-commence in May. The Company has not yet begun operations Iringa, however, it is currently setting up a production factory in Iringa and planting biomass.

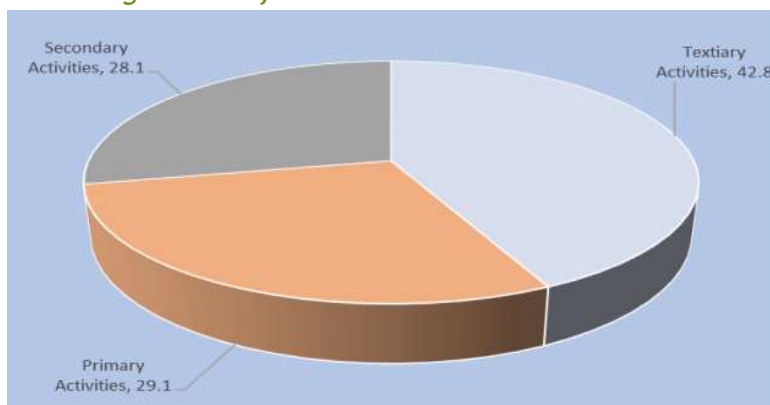
## Country's Economic Outlook

Reflecting a strong income growth over the past decade, on July 1, 2020 the World Bank announced that Tanzania's gross national income (GNI) per capita increased from \$1,020 in 2018 to \$1,080 in 2019, exceeding the threshold for lower-middle income status.

Most recently, the economy has been significantly challenged by the ongoing pandemic, especially in sectors reliant on global demand. Inflation has however been low and stable at 3.2 percent as of December 2020.

According to the National Bureau of Statistics (NBS), during the third quarter of 2020, the value of Quarterly Gross Domestic Product (QGDP) in absolute terms at current prices was TZS 35.3 trillion compared to TZS 32.6 trillion in the similar quarter of 2019. Further, the value of QGDP at constant prices increased to TZS 30.3 trillion in the third quarter of 2020 from TZS 29.0 trillion in the corresponding quarter of 2019 equivalent to a growth of 4.5 percent.

### *Percentage Share of Broad Economic Activities at Current Prices*



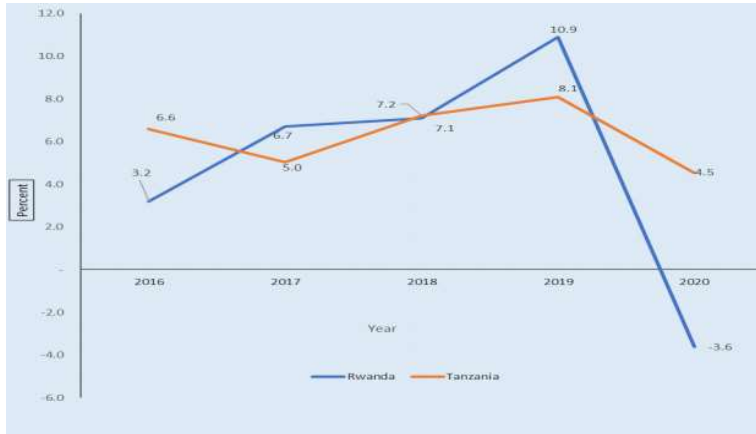
Analysis of share to GDP by broad economic activity in the third quarter of 2020 shows that: the largest share was from Tertiary activity which accounted to 42.8 percent, followed by Primary activity by 29.1 percent and Secondary activity had the least share of 28.1 percent. The calculation is done before adjustment for taxes.

During the period under review, construction activity recorded the highest growth rate of 17.4 percent, followed by Transport and Storage (8.8 percent); Information and Communication (8.7 percent); Professional Scientific and Technical Services (8.6 percent); Water Supply (7.9 percent), Administrative Support Services (7.7 percent), Agriculture activity (6.7 percent), Public Administration (6.6 percent) and Human Health and Social Services (6.4 percent).

## Economic Growth in the East Africa Region

The economic performance in the East Africa Region during the reference period in 2020 showed that: Rwanda's economy recorded a negative growth of 3.6 percent compared to 10.9 percent recorded in the corresponding quarter in 2019. Tanzania economy recorded a growth rate of 4.5 percent compared to a growth rate of 8.1 percent in the similar quarter of 2019. Reports for Uganda, Kenya, Burundi, and South Sudan were not yet released.

*Economic Growth in the EAC Region, 2016 - 2020*



## Market Analysis

Fuel is the primary need for any country whose backbone lies in the industrial sector. More and more exhaustible sources of energy are diminishing each day, as a result, there is an immediate need to adopt new sources of energy which can help sustain the economic growth without any negative repercussions.

World charcoal and wood demands have doubled in the past 8 years. The rising worldwide demand is mainly fueled by a continuous population increase and price-hikes in alternative energy sources for cooking and heating. Global charcoal production is estimated at 52 million MT, with Africa producing 62%.

In Tanzania, figures on dependence on wood fuel for cooking range from more than 73% to 90%. More than 90% of biomass demand is for household consumption (firewood, charcoal, crop residues). The rest of biomass demand is for commercial, institutional, and industrial sectors (10%). Annual consumption of charcoal in Tanzania stands at one million tons per year and is growing fast, contributing to more than nine million tons of CO<sub>2</sub> and depletion of more than 300 hectares of natural forest per day. Change of land use and deforestation also accounts for 58% of the country's total greenhouse gas emissions. Growing demand is driven by rapid urbanization and high relative prices or scarcity of energy substitutes, particularly kerosene, electricity, biogas, biomass briquettes and liquefied petroleum gas.

Through the National Biodiversity Strategy and Action Plan (NBSAP) 2015-2020, Tanzania aimed to increase investments in systems of production and consumption of energy based on sustainable eco-friendly practices.

The country has put efforts in making systems for sustainable consumption and production of energy. Focus has also been given to strengthen enforcement of legislation related to investments and utilization of biodiversity resources. Promote enterprises using eco-friendly production and consumption methods, efficient charcoal production, and alternative energy sources such as solar, natural gas and wind, etc.

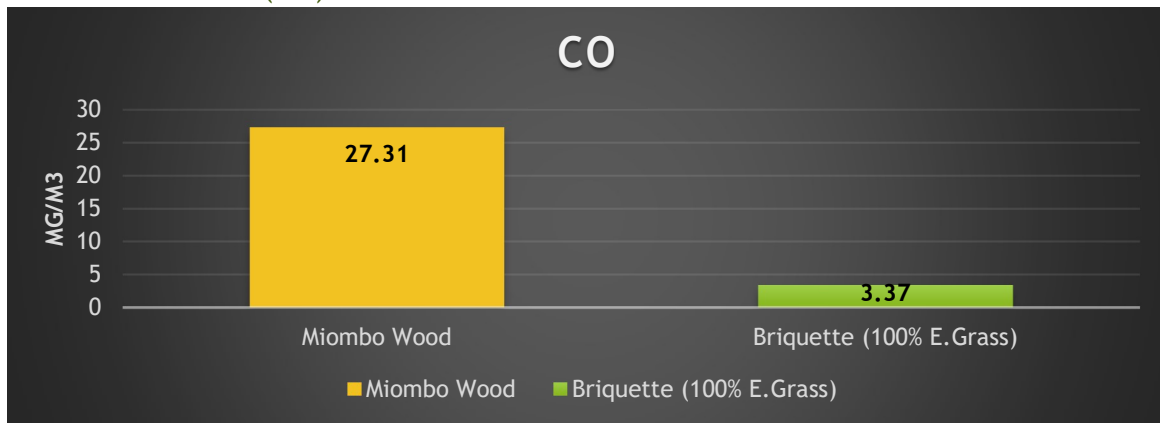
Due to the above statistics coupled with a clear National strategy on the need for sustainable production of energy, there is a long-term market for the production, sales and use of an alternative fuel to wood, charcoal and fossil fuels.

## The Project

### Phase 1 - Overview

The idea to produce briquettes from Elephant Grass Biomass was born from the need to be more sustainable and find an alternative fuel source to wood for curing of tobacco. Afforestation and other fuels were also looked at but found this concept to be the best due to the low environmental impact (less carbon emissions) and great heat source from less mass (higher Calorific Value than wood due to its consistency). Furthermore, the carbon monoxide emissions at ambient atmosphere are far less when burning Elephant Grass Briquettes compared to wood.

### Carbon Monoxide (CO) at Ambient



**\*\*Tanzania Bureau of Standards - <10 (TWA:1hr)**

**- CO Testing conducted onsite by TIRDO (Tanzanian Industrial Research and Development Organization)**

**- CO Testing of Miombo wood conducted onsite during tobacco curing by TIRDO (Tanzanian Industrial Research and Development Organization)**

After successful trials to cure tobacco, we looked at other possible uses. Europe has embarked on an ambitious program to become carbon free by 2050 and there is a substantial need to replace fossil fuels with alternative fuel sources like briquettes for multiple uses to generate power for boilers, heating and many other utilities. Tanzania and its eight neighboring countries (Kenya, Uganda, Ruanda, Burundi, Congo, Zambia, Malawi & Mozambique) are large consumers of charcoal and wood for cooking and heating which is causing mass deforestation and the respective Governments are looking to either ban the use of charcoal or for the charcoal business to be more highly regulated. This has opened a massive market for the briquettes to be used to replace charcoal and wood.

The use of Elephant Grass (*Pennisetum Purpureum*) to produce briquettes is unique and the first in the World. Elephant Grass was chosen due to its high fiber, lignin and sugar content resulting in high calorific value and ease of growing the perennial grass in Tanzania, including regeneration, low operational cost with a high yield per hectare (15MT/Ha dry product); this perennial grass is indigenous to Tanzania.

Elephant grass also has the ability to absorb carbon from the atmosphere and place it in the ground, replenishing and enriching soils for future use.





## The Necessity an Alternative Fuel Comparable to Wood, Charcoal and Fossil Fuels

- World charcoal and wood demand have doubled in the last 8 years.
- Demand of charcoal and wood is on the rise Worldwide including Sub-Saharan Africa, with a continuous population increase and price hikes in alternative energy sources for cooking & heating
- Charcoal Global production est. at 52 million MT, with Africa producing 62%
- Tanzania loses an est. 100,000 - 125,000 Ha of forest per annum due to charcoal (*The World Bank*)

- It is est. that 2.8 million Ha of forest will be lost by 2030 in Tanzania, due to charcoal demand
- 73-90 % of households in Tanzania and neighboring Countries use firewood & charcoal as the main source of energy for cooking
- Total annual revenue generated in Tanzania by the charcoal sector, est. at USD \$350 million.

Due to the above statistics, it is clear there is a long-term market for the production, sales and use of an alternative fuel to wood, charcoal and fossil fuels.

### Briquette Production Plan

For the first year, the plan is to harvest 125Ha of elephant grass in May 2021. This will be achieved through planting and harvesting the existing 75Ha of elephant grass at Lupa (Mbeya Region) and 25Ha in the Viridium Farm in Iringa. The remaining 25Ha will be grown via contracted farming from farmers in Iringa.

Both sites expect a dry yield of 15,000MT / Ha which will result in 1,875MT of finished product available to market.

Viridium Tanzania will plant and harvest a further 100Ha in year 2 in Iringa bringing total volume of briquettes produced to 3,375MT. The aim is to increase this volume to 1,000Ha, producing 15,000MT per year in the next five Years.

### Project Site

The project infrastructure to produce briquettes already exists in Lupatingatinga, Mamba Village in Mbeya City. Further infrastructure is being built at Nzihi village in Iringa Municipality.

### Investment to the Project

Viridium has already invested US\$ 200,000 for the acquisition of the project sites in Iringa and Lupa (Mbeya). Construction of the factory building in Iringa and installation of electricity systems are still in progress, while the Lupa factory is already set-up waiting for production to begin in May.

### Project Cost

The overall required investment for the proposed project is currently estimated at US\$ 4.7 million to cover for the purchase of property, plant and machinery. In addition, as working capital as detailed in Financial Plan.

96% of the project cost (US\$ 4.5 million) will be externally financed at an annual interest of 8%.

### Viridium Participation in the Market - Briquettes

The business will mainly target the export market and slowly introduce the product domestically.

The business will supply multiple customers ranging from home users to schools, hotels, and agricultural businesses. It will target the following types of customers:

- Home Users - (heat generation in homes during winter & home cooking)
- Military Bases
- Schools, Academies & Universities
- Hotels
- Large Kitchens/Restaurants
- Poultry Farms
- Industry utilizing boilers & burners.

The business will have one uniform approach with all customers and that will be to create awareness of the effectiveness and applicability of the product. Furthermore, how beneficial it is for the environment.

The environmental aspect carries a lot of momentum with Governments Worldwide, which will assist in raising awareness of our product amongst the end users.

Customer feedback and surveys are important in identifying consumer requirements and issues.

The product will be exported directly from our warehouses in Iringa and Morogoro via Dar Port or transported to neighboring Countries. Our marketing and sales team will coordinate exports and travel to neighboring countries to conduct demonstrations and product awareness.

Local customers and agents will also have access to our products as we are currently conducting trials in different Regions of the Country.

### Production Cycle - Briquettes

#### Land preparation and planting

Initially, a further 50 Ha will be planted in year 1 followed by a further 100 Ha in year 2 to reach a total 225 Ha - as mentioned prior, the aim is to produce 15,000 MT on 1,000 Ha of elephant grass.

## Growing

The elephant grass will regenerate for 15 seasons and thus no annual planting is required. The first harvest will be 8 months after planting and will be performed by a tractor drawn mechanical harvester, harvesting at least 5 Ha per day. The mechanical harvester will cut, thresh, and crush the elephant grass. The next step will be to put it into windrows to dry and bale it ready from transport to the production plant.

## Briquette Production

Processing of Elephant Grass (*Pennisetum Purpureum*) or *Miscanthus*, will take place in two production facilities: Lupa Mbeya and Iringa (Iringa being the main production unit).

The briquette plant will consist of 3 briquette machines and a shredder.

Dry bales will be fed into the shredder. The shredded dried product is then fed into a mechanical briquette machine that will produce approximately 1MT per hour per machine - (3,125MT/Hr. total).

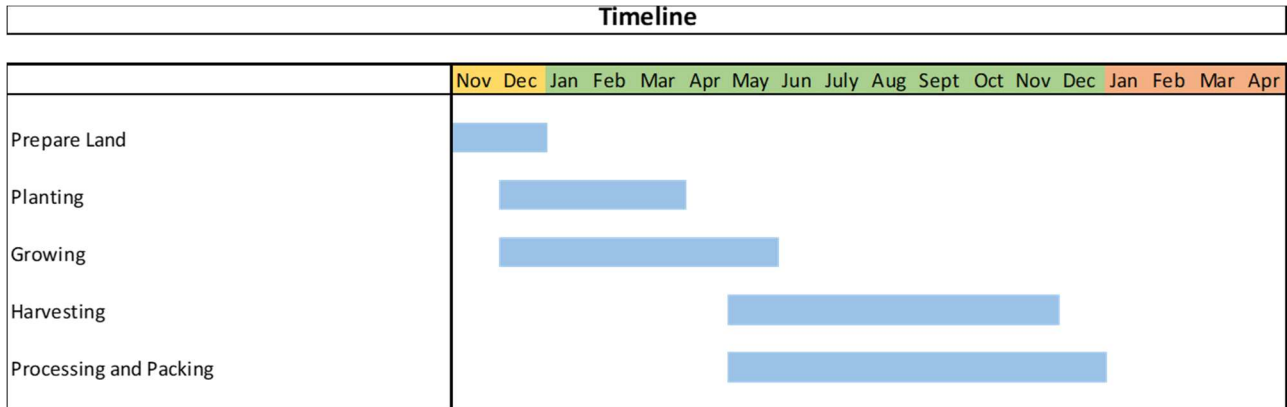
The briquettes are packed into either 3kg, 5kg or 20kg units. Damaged and unusable briquettes (instead of recycling) can be utilized to fire the furnace.

## Production Capacity

In the first year, both sites expect a dry yield of 15,000MT/Ha which will result in 1,875MT of finished product available to market. Viridium Tanzania will plant and harvest a further 100Ha in year 2 in Iringa bringing the total volume of briquettes produced to 3,375MT. Production is expected to increase annually in line with the increase in planted area, as shown in the table below:

Production Capacity Yr 1- 5	Year 1	Year 2	Year 3	Year 4	Year 5
Cumulated Planted Area in Ha	125	225	550	780	1000
Total kgs Produced - Briquettes	1,875,000	3,375,000	8,250,000	11,700,000	15,000,000

## Project Implementation Schedule



## Product Description - Briquettes

### Small Briquettes 3 - 5kg package - Anticipate 20% Sales Trend

This product is packaged in small PP woven bags consisting of 20-50 briquettes per bag respectively, designed more for home users.

### Large Briquette 20kg package - Anticipate 80% Sales Trend

This product is packed in a PP woven bags for large scale commercial users.



## Developmental Linkages/Benefits:

The benefits that Viridium' s projects will bring include:

**Foreign Exchange Earnings Potential:** Foreign exchange earnings are one of the main benefits expected from this project. Earnings will be derived through export of produced items. This will allow the country to improve its foreign exchange constraints and provide the government with funds for development activities.

**Providing Employment Opportunities:** One of the important objectives is to reduce unemployment by creating employment opportunities. Viridium will contribute to the government's efforts of creating employment by making available 92 permanent employment opportunities and 210 seasonal opportunities.

**Complementing Government's initiative of conserving the environment** through the reduction in CO2 and minimizing the depletion of Tanzania's natural forests.

**Developing Infrastructural Facilities:** These are all the facilities needed for project operations and include factories and social amenities like roads, buildings, sewerage and influent treatment facilities, solid waste management facilities etc. The project will develop infrastructure and utility services keeping all possible requirements of all stakeholders.

**Technology up-grading and technology transfer:** Most technological improvements in developing countries are dependent on the diffusion of technology from advanced countries. This project will attract export oriented FDIs and promote other forms of collaborations between the Company and foreign companies. This will simulate learning and innovation which are crucial aspects of human development and it will eventually be transmitted to other domestic firms supplying Viridium through backward linkages when it buys inputs from local suppliers. Most of the raw materials and labor will be sourced locally thus promoting innovation systems in the economy.

## Layout and Master Plan

The project is conceptualized based on several planning principles which include infrastructure development. The master plan addresses adequate infrastructure and other utilities needed for smooth operations of the Company. It also addresses the issue of warehousing of products.

## Infrastructure

The infrastructure development plays a paramount role in determining the success of the project. The infrastructure planning process has been conducted in line with the Master Plan. Key focus has been given on the basic planning parameters i.e., production and sourcing of raw materials, general factory operations and utility services on the farm and factory, keeping all possible requirements for production and distribution.

The key components of infrastructure are:

### *Roads*

Arterial road, 120m wide is aligned into the project site as the primary access road to the farm and factory.

### *Power*

Infrastructure of electrical work for the factory includes positioning of 3-phase electrical meter and distribution network.

The factory and its surrounding will be provided with lighting according to the desired lighting standards.

### *Water*

There are two main sources of water supply for the farm and the factory.

The source of potable water will be from the already drilled boreholes. The potable water will be stored in the surface water reservoirs which will have 24 hours storage capacity and subsequently pumped to respective catchments, each of which is served by its own elevated water tank.

The source for recycled water shall be from the wastewater treatment plant. The recycled water can be used for non-potable purposes such as farm uses. The recycled water will be stored in the respective catchments, each of which will be served by its own elevated water tank.

Alternate water sources through rainwater harvesting and perennial sources are also being planned to meet the desired water requirements.

### *Sewerage*

The sewerage system comprises the collection system of pipe network from the factory. The objectives of the sewerage system are to cater for the anticipated peak discharge requirements and to treat the wastewater to the required discharge standards. Environmental and social impact analysis (ESIA) will be conducted based on IFC/WB standards.

## Institutional Structure

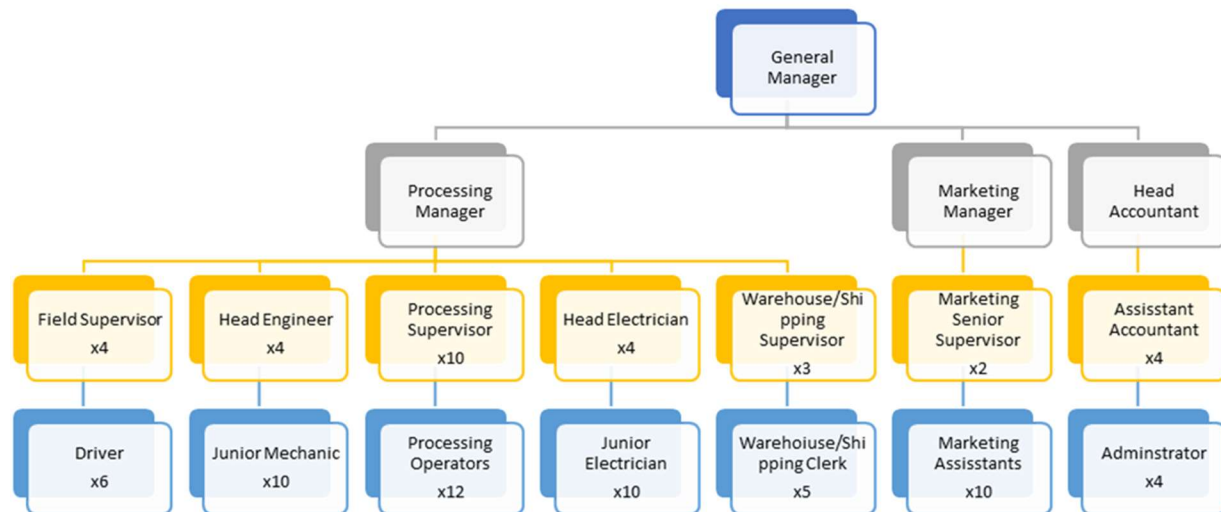
### Governance

The Company has a very skilled board of directors, bringing together expertise from various fields and disciplines. They are charged with the responsibility of putting in place a mechanism for monitoring the actions, policies, and decisions of the Company.

### Management

Successful operations of the Company call for high-class expertise and experience of managers. Viridium will be headed by a General Manager who will be assisted by a Processing Manager, Marketing Manager and Head Accountant.

Several employees will be recruited under these managers as detailed in the staff structure on the next page. Additional employees will be recruited to meet the planned expansion.



Permanent Employees: 92

Seasonal Employees: 210

## Financial Plan

### Financing

To implement this plan, Viridium will invest more than US\$ 4.7 million (See Profit & Loss). Funding will be borrowed at an interest of 8% for a tenure of 6 years. 32% of these funds will go to land purchase and construction works; 11% will be utilized in administrative activities and the remaining 57% will finance purchase of tools and equipment (see Capital Plan).

### Financial Projections

#### Assumptions

The project will start generating revenues in Year 1 (2021) due to the commencement of production activities. The impact will be felt in Year 3 when revenues are projected to grow due to increased sales.

- Cost of sales to be between 17% and 25% of the revenues. This will be achievable due to improved technology.
- Employment and administration costs to grow in line with increased production, operations and need for more labor.
- Sales and marketing budget will be 5% of the revenues.
- Investment funds will be borrowed in Year 0 at annual interest of 8%; 2 years' grace period and repayment of 6 years.

#### Projected Profitability and Cash Flows for the 5-year Period

Based on the assumptions, 5-years' projected profitability and cash flows of the Company have been worked out and are presented in Annex II. It is projected that the Company's revenues will increase annually due to increased production.

The Company is in a loss for the first two years of operations mainly due to low production levels, however the profitability will improve in the third year of projection with a profit of US\$ 567,136 and continue to increase thereafter.

Cash flow projections show that cash generated by the Company will be sufficient to finance any re-investment that would be deemed necessary. The business operations will enable financing of working capital needs and maintenance costs and leave enough cash to cushion against future risks.

It is projected that the Company will generate average cash surplus of US\$ 469,782 over the five-years projection period.

## Capital Plan

Below sets out is the capital requirements for Viridium.

Capital Requirements	\$/Units	Units	Total Capital Required	Life of Asset
			\$	Years
<b>Briquette Line</b>				
Used Equipment (RUF)	63,783	1	63,783	2
New Mechanical Press - Brazil	160,000	2	320,000	10
Tomcat Chipper	51,000	6	306,000	5
New RUF	90,000	3	270,000	5
Spares	50,000	1	50,000	5
Fork Lift	27,000	1	27,000	5
Power Supply & other auxiliary structure / utilities	120,000	1	120,000	5
Wooden Pallets (1MT - Capacity)	18	5000	90,000	5
Contingency	80,000	1	80,000	5
<b>Total Briquette Line</b>			<b>1,326,783</b>	
<b>Bio Degradable Products Line</b>				
Full Turn Key Production Plant	548,000	1	548,000	10
<b>Total Degradable Products Line</b>			<b>548,000</b>	
<b>Field</b>				
Balers	27,018	3	81,053	3
Harvesters	57,021	3	171,064	3
Rakes	1,694	3	5,081	3
Tractors 110 HP	51,935	3	155,806	7
Tractor	9,000	1	9,000	5
Trailer	1,250	4	5,000	5
Agricultural Implements	30,000	1	30,000	3
<b>Total Field</b>			<b>457,004</b>	
<b>Land &amp; Buildings</b>				
Existing Buildings	313,909	1	313,909	17
Processing and Storage Buildings (New - 1200 sqm)	75	1500	112,500	20
Baling Sheds (New - 600sqm per Shed x 6)	40	3600	144,000	20
Farm infrastructure Rehabilitation	50,000	1	50,000	20
Purchase of Iringa Farm 420Ha	250,000	1	250,000	20
Purchase of Iringa Farm 292Ha	220,000	1	220,000	20
Purchase of Iringa Farm 405Ha	150,000	1	150,000	20
Borehole	25,000	1	25,000	20
Contingency	65,000	1	65,000	20
<b>Total Land &amp; Buildings</b>			<b>1,330,409</b>	
<b>Administration</b>				
Used Vehicles (3 vehicles, 1 tractor, 1 motorbike)	36,759	1	36,759	2
Used Computers	1,717	1	1,717	1
New Vehicles Management	45,700	4	182,800	5
New Pick Ups Marketing	32,000	6	192,000	5
Computers and Software	30,000	1	30,000	3
Office Furniture	15,000	1	15,000	10
<b>Total Administration</b>			<b>458,276</b>	
<b>Total Capital Requirement</b>			<b>4,120,472</b>	

## Profit & Loss

### Sources and Uses of Funds (Cashflow)

Cash Flow Projection	Description	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
	Sale Of Briquettes		552,690	994,842	2,431,835	3,448,784	4,421,518
<b>Total Inflow</b>			<b>552,690</b>	<b>994,842</b>	<b>2,431,835</b>	<b>3,448,784</b>	<b>4,421,518</b>
<b>Cash Outflow</b>							
	Capital Requirements	4,120,472					
	Growing and Harvesting		41,375	43,975	127,150	123,980	140,680
	Factory Running Costs		51,163	89,632	214,656	303,134	387,766
	Packing and Storing		35,842	59,647	137,011	191,761	244,130
	Personnel		181,694	189,937	262,073	343,936	360,421
	Other Costs (Incl Interest)		587,319	579,319	502,919	428,919	365,219
	Transport to Market		28,125	50,625	123,750	175,500	225,000
<b>Total Outflow</b>		<b>4,120,472</b>	<b>925,518</b>	<b>1,013,134</b>	<b>1,367,558</b>	<b>1,567,230</b>	<b>1,723,216</b>
<b>Net Cash Flow</b>		<b>(4,120,472)</b>	<b>(372,828)</b>	<b>(18,292)</b>	<b>1,064,277</b>	<b>1,881,554</b>	<b>2,698,302</b>
<b>Loan &amp; Repayment</b>		<b>4,700,000</b>	<b>(100,000)</b>	<b>(100,000)</b>	<b>(1,000,000)</b>	<b>(1,000,000)</b>	<b>(1,000,000)</b>
<b>Tax Payable</b>			<b>-</b>	<b>-</b>	<b>-</b>	<b>(415,324)</b>	<b>(644,752)</b>
<b>Cumulated Cash Flow</b>		<b>579,528</b>	<b>106,700</b>	<b>(11,593)</b>	<b>52,684</b>	<b>518,914</b>	<b>1,572,464</b>

		Year 1	Year 2	Year 3	Year 4	Year 5
<b>Profit Per Annum</b>		<b>\$ -921,957</b>	<b>\$ -565,704</b>	<b>\$ 567,136</b>	<b>1,384,413</b>	<b>2,149,173</b>
<b>Cumulated Profit</b>		<b>(921,957)</b>	<b>(1,487,661)</b>	<b>(920,526)</b>	<b>463,888</b>	<b>2,613,060</b>
<b>Tax</b>		<b>-</b>	<b>-</b>	<b>-</b>	<b>415,324</b>	<b>644,752</b>

## Phase 2 - Biodegradable Fiber Packaging

Viridium Tanzania Limited has identified biodegradable fiber packaging as a product that can be produced from Elephant Grass (*Pennisetum Purpureum*). Globally, the demand for sustainable and eco-friendly packaging is growing due to consumer demand and legislation.

The global biodegradable fiber packaging market is expected to witness substantial growth during the forecasted period. Factors such as a growing demand in end-use industries and the use of sustainable, environment-friendly protective packaging solutions are driving the market. However, insufficient raw material production, sourcing and management might hamper the market.

Moreover, research and development (R&D) investments can be a futuristic opportunity driving this market. In 2018, North America held the second-largest market share in the biodegradable fiber packaging market. The region has witnessed significant growth in the packaging sector, owing to the rapid demand for food and beverages application, mainly for packaged food prompting increased investments in the R&D and product innovation in terms of packaging. Furthermore, stringent food safety policies in the US and Canada fuels the demand for biodegradable fiber packaging in the food & beverage industry.

Five Good Reasons for Molded fiber packaging

- **Recyclable**

Biodegradable fiber is 100% recyclable; Plastic is not.

- **Renewable**

Produced from renewable resources, biodegradable fiber helps to protect limited resources; Plastic is derived from non-renewable sources.

- **Carbon Neutral**

The raw material of biodegradable fiber packaging is carbon neutral; Plastic has a significant carbon footprint.

- **Biodegradable**

This mean the packaging material returns to the ecological cycle. It takes a long time for plastic to disintegrate, otherwise it is incinerated along with other non-recyclable waste.

- **Sustainability**

Environmental friendliness is a key differentiator for biodegradable fiber over plastics.

## Viridium Participation in the Market - Biodegradable products

The business will mainly target the export market and slowly introduce the product domestically.

The business will supply multiple customers in the food industry:

- Food Processors
- Supermarkets
- Cafes, Restaurants
- Military Bases
- Government Institutions
- Schools, Academies & Universities
- Hotels

The business will create awareness to its customers of the positive environmental impact and immense reduction of pollution by eliminating plastic products.

The environmental aspect carries a lot of momentum with Governments Worldwide, which will assist in raising awareness of our product amongst the end users.

Customer feedback and surveys are important in identifying consumer requirements and issues.

Biodegradable products like cups, bowls, plates, trays and others are very high in demand, as they replace polystyrene and plastic product that highly contaminate our environment Worldwide. These products are used extensively in the food Industry, restaurants and Super Markets to store and serve food products to the public.

These products are in very high demand especially in developed Countries and consumption is extremely rampant especially with the high volume of packaged food products that cater for a big percentage of the population.

The global biodegradable fiber packaging market has been segmented based on type, source, product, and end-use industry. Based on type, the global market is divided into thick wall, transfer molded (biodegradable packaging), thermoformed fiber, and processed pulp.

The transfer molded segment is dominating the market, owing to innovative packaging products such as egg cartons and trays, fruit and vegetable trays, slipper pans, wine shippers, plates, cups, trays and others.

### Market Segmentation

- By Type - Thick-Wall, Transfer Molded (biodegradable packaging), Thermoformed Fiber, and Processed Pulp
- By Source - Wood Pulp and Non-Wood Pulp
- By Product - Trays, Clamshell Containers, Boxes, End Cap, and Others

- By End-Use - Food & Beverage, Electronics, Personal Care, Healthcare, and Others

There are four distinct markets for biodegradable fiber packaging.

#### **Food related:**

- Clam-shell and carryout food containers
- Cups, Bowls, plates, food and serving trays
- Egg, trays and cartons.
- Fruit, veg, berry, mushroom etc. pans & trays
- Including those that require top sealing, refrigeration, lamination
- Locator trays for Bottled products, wine, Jellies etc.
- Extended liquid retention etc. Molded Fiber products can meet every International food safety regulation and be supplied with specific food safe certification.

#### **Industrial or engineered packaging:**

- Electronics, cell phones, TV, modems, DVD etc.
- Household items, toasters, coffee makers, furniture etc.
- Vehicle parts, gears, panels, headlights, wheels etc.
- Industrial products, electrical, plumbing, tools etc.
- Product drop testing is an integral part of the design criteria

#### **Single Use Medical**

- Bedpans
- Urine Bottles
- Kidney Dishes
- Bowls etc.

#### **Horticultural Trays & Pots**

Biodegradable fiber packaging will also be launched by Viridium to cater for a greater demand in environmentally friendly packaging globally.

Renewable Molded Fiber Packaging (MFP) (Biodegradable fiber packaging) products are currently used in handling and packaging thousands of manufactured products. They provide product protection in shipments, customer convenience, and other economic packaging and environmental benefits.

## Product Description

Molded fiber products, manufactured with natural fibers (which are essentially cellulose) and are recyclable along with other wastepaper are biodegradable, and compostable where facilities are available. They can also be incinerated without damaging incinerators.

- Clam-shell and carryout food containers
- Cups, Bowls, plates, food and serving trays
- Egg, trays and cartons.
- Fruit, veg, berry, mushroom etc. pans & trays
- Including those that require top sealing, refrigeration, lamination
- Locator trays for Bottled products, wine, Jellies etc.
- Extended liquid retention etc. Molded Fiber products can meet every International food safety regulation and be supplied with specific food safe certification.



## Scope of Operation

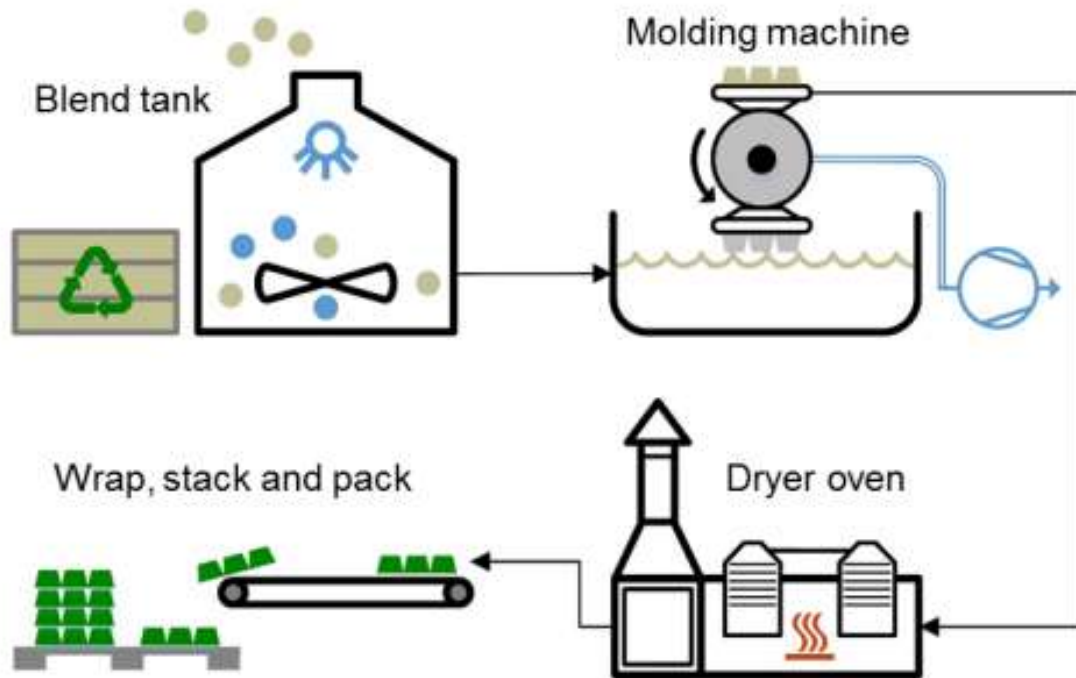
Production of molded pulp involves a series of manufacturing steps. There are two main steps involved in the manufacturing process: vacuum-forming of the pulp into the desired shape and drying the product to remove the remains of the water.

During the forming process, water is removed by the vacuum, the solid content in the formed product is in the range of about 40% to 55%. The remaining water content is removed in the drying step.

The finished product thus has a moisture content of about 4% to 8%, roughly corresponding to the equilibrium moisture content of the paper under the humidity conditions at which it will be stored or used.

One half of the mold is dipped in the fiber suspension; the two halves are then matched, and the pulp is pressed. Excess water is drained out by vacuum-assisted compaction. Once the molded product is formed between the two halves of the tool, it is then transferred to an oven and dried.

## Process Chain of the Molding Process



## Conclusion

As Viridium has a vision to protect the environment and provide sustainable products, it is looking forward to working closely with all Organizations and Government Institutions of Tanzania for a improved and more sustainable environment for future generations.