BioreCyclio

You waste it, we transform it

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Executive Summary

The treatment and disposal of organic wastes has always been a major challenge for the waste industry. Anaerobic digestion is a superior alternative for dealing with these wastes. Biogas, which is a mixture of both methane and carbon dioxide is produced during anaerobic digestion and serves as a high-energy renewable fuel that can be used as a substitute for fossil fuels.

Products and Services

The company designs, develops and fabricates anaerobic biodigesters that convert organic wastes into clean usable biofuels that are used in all weather conditions.

Customers

The target market for our biodigesters are organic wastes producers specifically households, food processors, restaurants, grocery stores, schools, hospitals and agricultural farms looking for an efficient disposal method.

Future of the Company

Biogas is a renewable energy with huge market potential, we believe there is a demand for high-quality, attractive, durable and affordable smart biodigesters. Our goal is to build and market smart biodigesters to solve biological waste disposal issues.

Company Description

BioreCyclio is an aspiring start-up renewable energy company committed to manufacturing technologically based portable and/or prefabricated smart biogas digesters for urban, rural and far remote areas.

Mission Statement

To build and sell reliable smart biogas digesters where people can turn waste into taste.

Principal Members

Chukwuemeka Uzukwu – Founder/CEO

Legal Structure

BioreCyclio is a sole proprietorship.

1. Products and Services

The company plans to design and build affordable anaerobic biodigesters that will convert organic wastes into clean usable biofuels which can be deployed mostly in developing countries.

1.1. System Design

Biogas digesters are used to produce biomethane and BioreCyclio's concept represents core values of proposed business initiative. The smart system is an off-grid set-up consisting of the following features:

- **Substrate inlet**: This consists of a receptacle for feeding the raw fresh organic waste.
- **Digester:** This is the reservoir of organic wastes in which the substrate is acted on by anaerobic microorganisms to produce biogas.
- **Gas Storage /Reservoir:** Depending on the proposed design, this may be simply an empty but enclosed space. Our plan is to use an air tight polythene tube with an inlet - outlet outfit.
- **Gas Burner:** This may be a special lighting lamp or a modified burner for cooking.
- **Exhaust outlet:** This consists of a pipe of similar size to the inlet pipe connected to the digester at a slightly lower level than the inlet pipe to facilitate outflow of exhausted slurry (biofertilizer) as shown below.

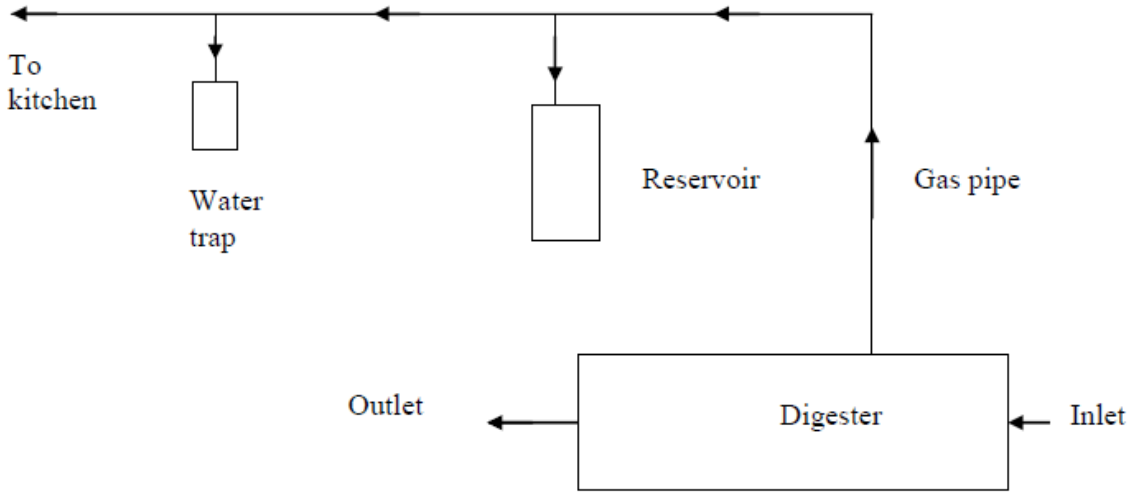


Figure 1: Biogas production process

This process generates clean energy without any electricity and allows you to properly treat your household waste.

1.1.1. Why is it smart?

We are introducing both an automatic mixing system that will be powered by a solar panel and a manual agitation design. Compared to conventional biodigesters, our introduced mixing system will enhance biogas production up to 40%. The smart biogas digester will help reduce GHG emissions, improves living standard, processes waste and convert it into combustible gas and biofertilizer.

From the technical point of view, BioreCyclio smart system will be an efficient, robust with minimal maintenance and affordable product.

1.1.2. Smart biogas System Feed Stock

The organic waste generated in households, restaurants, vegetable markets and from agricultural and live-stock farms will serve as a continuous source of organic waste to feed in BioreCyclio's smart biogas systems. More specifically, kitchen waste is very important source of feed for digester. According to our research, 1 kg of kitchen waste can generate on average, up to 0.45m^3 of biogas.

1.2. Research and Development

We have conducted series of research in Nigeria by designing a biodigester made from local materials as shown in Figure 2. The feeding of the biodigester was from kitchen wastes and after being operational for several cycles and we obtained some very encouraging results. There was biogas production.

Figure 2: First biodigester designed by BioreCyclio (Before and after anaerobic digestion of kitchen waste).

In the next stages of research, we want to use the innovative technology of a developed nation like the Netherlands to conduct further experiments on our proposed mixing system and ultimately produce our first smart biodigester prototype.

2. Business Introduction

By taking part in the domestic and semi-commercial biogas market, BioreCyclio would provide an extended and on-demand solutions. BioreCyclio, based on its market and research experience will create the smart biogas system with the largest possible added value contents. So far in the emerging

markets, only conventional models are available without having unique features like what BioreCyclio is providing in its smart biogas systems.

2.1. Idea Development

Waste management is one of the major problems for the sustainable urban and rural environment in Nigeria and Africa as a whole. Due to large population number, tons of municipal waste are produced everyday which is left on streets or thrown to landfill or slum areas. These wastes produce bad smell and damage the environment. There are several slum sights in Nigeria, which are not only ironic but heart-breaking, and this is reality.

Figure 3: A typical waste dump site in Nigera

And in most of these cases especially in developing countries, the waste stream is 50 %

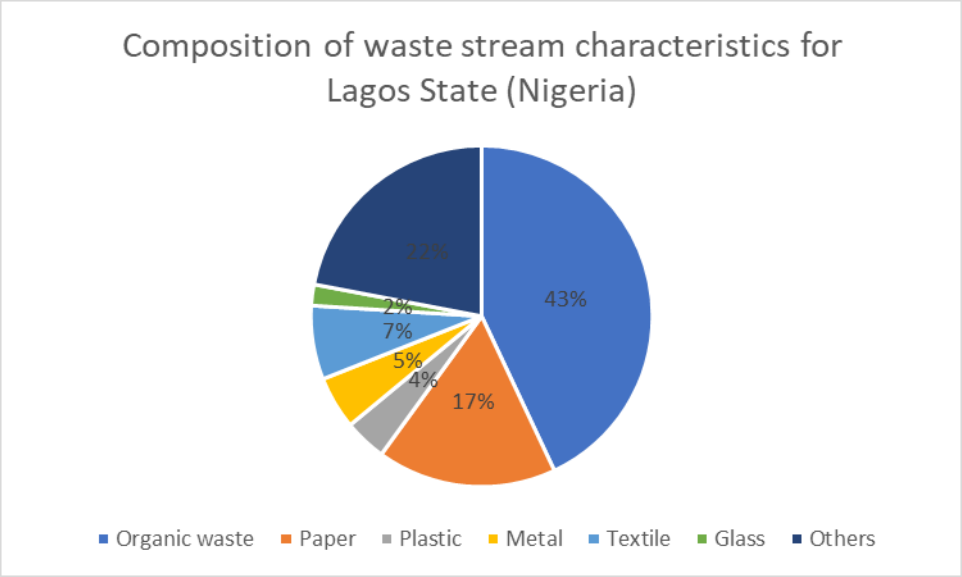


Figure 4: 2018 Waste stream composition for Lagos State, Nigeria

it is also necessary to understand the present practice of household energy consumption and its devastating impact on the environment and health of rural and urban poor population. In Nigeria, a significant population especially in the rural and poor urban areas is dependent on kerosene fuelled stoves and traditional biomass (e.g. firewood, charcoal and crop residues), to meet their household energy needs. Cooking with dirty-burning fuels is associated with health risk from household indoor air pollution especially for women and children.

As part of our feasibility study, we conducted a survey to determine choice of household cooking fuel as shown in Table 1.

Fuel Type Use in Households	Primary Fuel (%)	Secondary Fuel (%)
Kerosene	70.1	21.4
Charcoal	17	13.7
LPG	12.1	4.4
Electricity	0.4	3.9
Wood	0.4	10

Table 1: Choice of primary and secondary household cooking fuels. Survey conducted in 511 households in Lagos, Nigeria

BioreCyclio sees an enormous opportunity within these situations and our portable smart biogas digesters are the solution that will link these two problems in such a way that it will be beneficial for both, the energy needed to cook with or generate power and heat; and for clean urban and rural environment through on site or decentralized processing of urban organic waste. The digester model is carefully designed to provide the intelligent solution for processing the organic waste from smaller to larger scale.

3. Business Model

3.1. Value Proposition

The value of this business plan falls into two segments, customer value and social value. Although in the beginning, our proposal is just a small step for solving one of the major problems of providing

clean and affordable energy, we believe our plan is replicable and upon proving that our model works, we can begin to play a greater role by extending our services.

3.1.1. Customer Value

The population of Nigeria has an increasing trend with around 45 – 55% of the total population living in cities or small towns. Lower to middle class people (3-5-member family) in Nigeria spend around 300 - 400 US dollars per year on cooking fuel needs. This becomes a trade-off for them between buying food and buying fuel to cook it with. Smart Biogas Digesters are the solution for such customers, communities and institutions.

BioreCyclio's plan is to target urban and rural market by providing end users (households, food processors, restaurants, grocery stores, schools, hospitals and agricultural farms etc) the smart biogas systems and services in a cost effective and quality manner. The value for our customers is the quality and trusted product built on a high technology.

At the same time, BioreCyclio Ltd will be providing on-demand decentralized waste processing systems and management services for community and commercial purposes.

Other value propositions of BioreCyclio Ltd are:

- Continuous revenue inflow in form of lighting, heat energy (biogas) and biofertilizer production without any operating costs – Smart biogas units run on solar power and freely available kitchen or other organic waste and consequently generate revenue.
- Alleviating poverty – Considering the economic situation in Nigeria, this is a considerable source of revenue, which will help the owner to financially support his family better.
- Sustainable and highly scalable – This is a highly scalable product and business. Many additional features can be added to the system by making minor modifications.

3.1.2. Social Value

Our solution proposes customers benefits in simple but potential way. The waste that is being generated every day by each household, restaurant or any other sources is currently going to a landfill where it decomposes and emits methane into the atmosphere. Methane is one of the most potent greenhouse gases (GHG) and a major contributor to global climate change. Our solution is to captures this methane produced from the kitchen waste. When methane is then burned as fuel, the gas released into the atmosphere is in the form of carbon dioxide which is over 20 times less potent than CH_4.

The byproduct of anaerobic digestion is a high nutrient rich biofertilizer which can be used in place of chemical fertilizers.

The value proposition through smart biogas systems and services provided by BioreCyclio will create definite positive impact on the social, economic and environmental circles of our valuable customers.

3.2. Growth Strategy

There are different business models that can be deployed by BioreCyclio such as:

- Partnering with existing network engaged in green energy business and selling through them.
- Direct sales to end users/customers.
- Leases to customers.

- Arranging microfinance facilities for customers by collaborating with microfinance banks and organizations.

Our research, however, shows that the most effective and profitable business model for BioreCyclio to deploy is the “Direct sales to the individuals given that they are easily accessible for logistics” and “Partnering with existing network engaged in green energy business and selling through them.

4. Business Development

The business plan has/had different implementation phases.

4.1. Phase I

Phase I of the business model includes the idea/concept, inception, development and testing of experiments to the first prototype. We are looking for an enabling environment to build our first prototype which will be integrated with a solar heating and mixing system.

4.2. Phase II

In phase II, BioreCyclio will follow its expansion through replication. Keeping in view the current orders and demand from interested and prospective customers. Later stages of Phase II will include the assembly lines in designated parts of the country. This will bring down the marginal costs of production and meet the demand more quickly.

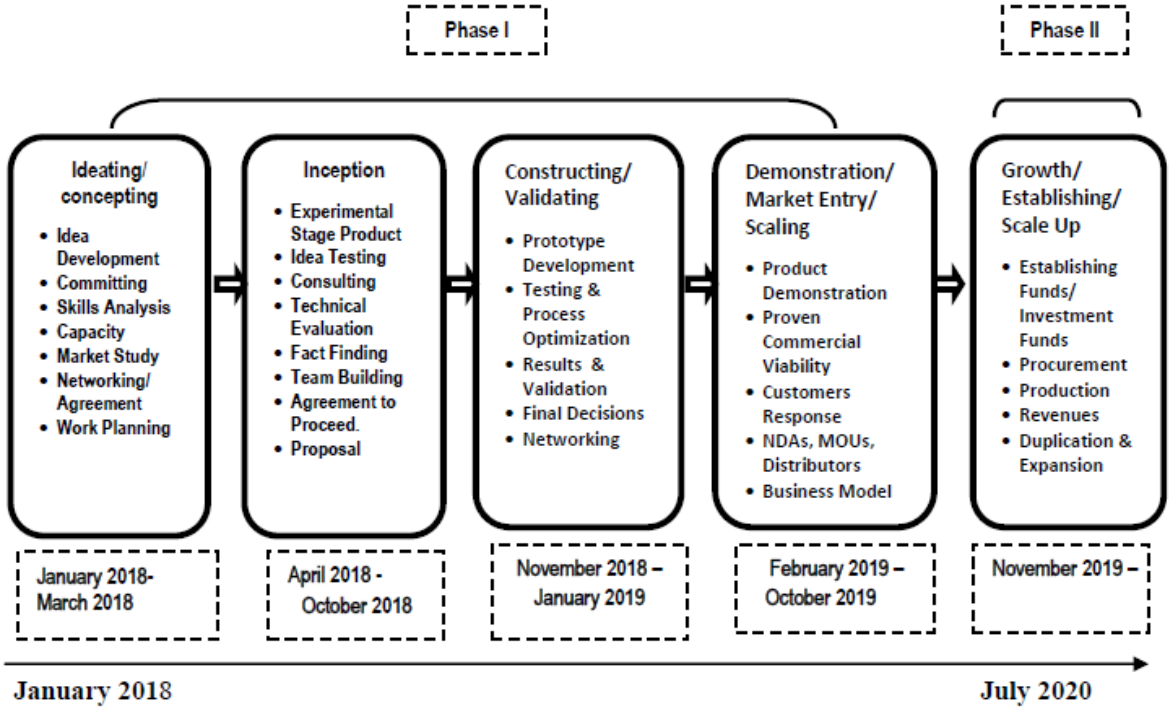
Hence to start with stage II, the company will need financial/development funds to build the production facility plus the investment for pre-orders manufacturing of at least 20 units to ship across the nation.

Moreover, it has been also planned that in the first three years of operation, company will be able to afford the production of several hundred more digesters as we believe that “the idea of decentralized smart biogas plants for urban & rural organic waste management is the most feasible solution, that is viable and replica for many other markets in developing countries.

5. Key Activities

The business plan entered in its implementation stage since January 2018 and has successfully completed series of successful experiments. The company is now ready to move to prototype development phase.

5.1. Time Line



6. Business Environment in Target Markets

6.1. Environmental Conditions

Nigeria has a stable climate, which is almost every day sunny, it is always 30 - 35 ^{o}C while in the Northern part, it is even hotter, where temperature reaches up to 48 in plain areas. This is very suitable for biogas production as no additional heat is needed for the anaerobic digestion process.

6.2. Political Environment

Presently, the political scenario in Nigeria is quite favourable for using renewable energy resource in order to eliminate the energy crisis. Energy and environment are the most intense, costly and multidimensional problems currently faced by the Nigerian government. The epileptic electricity supply and soaring fuel prices has necessitated the government to invest heavily in renewable energy in order to tackle the existing energy crisis and ensure a prosperous energy future.

6.3. Economic Conditions

Energy sector is one of the most important sectors driving the economy in developing countries. Nigeria has a deficit of refined petroleum products and to cover up the deficit, it depends upon importing these products at an enormous cost from its meagre forex reserves. The need for refined petroleum is on the increase because of an improved lifestyle. In view of Nigeria, the dependence on imported petroleum is expected to increase, therefore putting the economy under great strain. In this way, an alternate source like solar, wind and biofuel energy would have to be explored.

6.4. Social Environment

As mentioned previously, in Nigeria has a large rural society where biomass or firewood is the major source for cooking. In Villages and remote areas, women are primarily involved in biomass collection and use. Urban households usually use LPG, Kerosene as well as firewood for cooking which cause an increase in indoor air pollution level compared to rural household. The reason is adjacent homes with

narrow streets. BioreCyclio decided to take initiative in this sector by providing portable smart biogas plants which will reduce the indoor pollution as well as household garbage. It saves women a lot of time and energy which can be used for other productive activities that enable them to be socially, psychologically and politically empowered.

6.5. Business Environment

The overall impact of the biogas technology in terms of environmental conservation is considerably beneficial as the process provides an environmentally sound means of managing urban and rural organic wastes. Biogas leads to some benefits as stated below:

- BioreCyclio digesters would not only be another way to dispose of wasted food without having to pay for disposal, but it would also be a supply of natural gas.
- By using an BioreCyclio digesters, biogas is produced that would reduce the amount of natural gas that would have to be purchased from an outside source.
- Additionally, the leftover digestate could be used for fertilizer, which, if implemented on a wide scale, would displace industrially produced chemical fertilizers.
- The gas produced is smoke-free and ash-free, so women and children are no longer prone to respiratory infections, and can look forward to longer, healthier lives.
- Women are spared the burden of gathering firewood especially in the rural communities

7. Competitors Analysis

The main competition comes from other alternative energy resources including natural gas, firewood, wind energy, solar energy, and coal and petroleum products. But due to its cost-effective and environment friendly nature, biogas is going to have a firm standing in the presence of this competition

8. Marketing

BioreCyclio Ltd is in a unique and innovative marketing position because it is bringing a very new and attractive product with social and economic benefits. This will create a motive for customers to want to know more about our product and its added values. We believe that our product purely satisfies the customer's demands. In addition, BioreCyclio will be engaging in social media promotions, educational campaigns and civil society seminars for the know-how and publicity of smart biogas systems and their importance and necessity for the urban and rural areas.

8.1. Promotional Mix

BioreCyclio will use the following tools of promotional mix. It is our goal to spread information "You waste it, we transform it" in depth of customer's mind. And we will use different methods:

- Personal Selling – Direct Marketing
- Public Relations and Networking (Words of Mouth)
- Internet Marketing/ Mobile Marketing/ Social Media

8.2. Marketing Objectives

- Customer value and satisfaction
- Creating strong position
- Creating strong distribution channel
- To achieve better market share

- Try to increase growth rate

9. Investment Requirements

From the business plan, it's evident that this business has tremendous potential. The potential market includes the urban and rural areas in all parts of Nigeria and emerging markets where waste management is one of the main issues because of population and economic growth. BioreCyclio Ltd seeks $10,000.00 investment to cover operational expenditure including the fixed and the variable costs. With the planned investment, company will be able to build its first prototype and lay the foundation to manufacture 10 units of smart biogas plants. The production of the proposed prototype together with the planned smart biodigester units will set the company on a healthy financial path and FastTrack the growth of the company and its workforce.