



PKLS INDUSTRIES PVT LTD

(Renewable Energy & Waste to Energy)

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EXECUTIVE SUMMARY



Brief Executive Summary of the Bio Coal Project

The 150 MTPD Bio Coal plant is designed to run on 170 MTPD feedstocks like **Paddy Straw, Agriculture Residue, Saw Dust, stalk of rice, maize/corn, sorghum, millet, cassava stalk/peelings and process residues (wastes after processing) such as corn cob, corn husk, coconut shell and husk, rice husk, oilseed cakes, sugar cane bagasse** etc. The plant will be able to run throughout the year with these inputs since one or the other input is available all over the year.

Background

Bio Coal Briquetting is the process of converting agricultural waste into high density and energy concentrated fuel briquettes. Bio Coal Briquetting plants are of various sizes which converts agricultural waste into solid fuels. Briquettes are ready substitute of coal/wood in The use of renewable and non-renewable energy sources is increasing all around the world. Each country needs an alternative energy source in order to reduce fossil fuel usage that is ecologically friendly and ready for long-term use. Renewable energy sources such as solar, biomass, wind, and geothermal are abundant in nature. Solar energy comes from

the sun, which supplies our entire planet with the energy we need to survive. Using solar panels, we can harvest energy directly from sunlight and convert it to electricity that powers our homes and businesses. Wind turbines capture the wind's power as they spin and convert it to electricity. Geothermal energy within the earth can be harnessed to generate electricity. It is a renewable energy source that has the potential to enhance our environment, economy, and energy security dramatically.

On the other hand, non-renewable resources such as coal, oil, fossil fuels, and natural gas, have been depleted. These constraints will lead to fuel scarcity and an increase in price. There are various forms of renewable energy sources. Biomass is one of the important sources of renewable energy. Bio-briquettes provide a solution that is mostly made of green waste and other organic materials, and is commonly used for electricity generation, heat, and cooking fuel.

The advantages of using bio-briquettes are as follows:

- Easy handling, packing and transportation of briquettes can be made in any conventional length and diameter
- Low ash content below 10% in comparison to coal 25 to 40% resulting in less ash disposal problems
- There will be no corrosion effect on boiler equipment resulting in lower maintenance cost. Coal on the other hand produces sulphur dioxide, which on mixing with moisture produces sulphuric acid, a corrosive acid
- It has low ignition point, when compared to coal.
- It gives sustained combustion and more efficient combustion than loose agro wastes
- No gas and effluents like coal. Therefore, no health hazards
- Easy Handling compared to loose husk and fire wood. Can be mixed with coal and fire wood of inferior quality which improves burning
- Briquettes are cheaper than coal

Product & its Uses

Bio coal briquettes can be used for any thermal application i.e. steam generation in boilers, heating purpose, hotels, restaurants and homes etc. Briquettes can replace following conventional fuels that are used in mass quantities:

- Diesel
- Kerosene
- Furnace Oil
- Coal
- Firewood

Characteristics of different biomass fuels

FUEL TYPE	CALORIFIC VALUE (MJ/KG)	ASH CONTENT %	OTHER FACTORS
BIO COAL BRIQUETTES	17.58 – 20.10	0.5 - 8	No sulphur and smoke
COAL	15.07 – 18.84	30-50	Chemicals and smoke
FIRE WOOD	9.21 – 12.98	20-25	High smoke

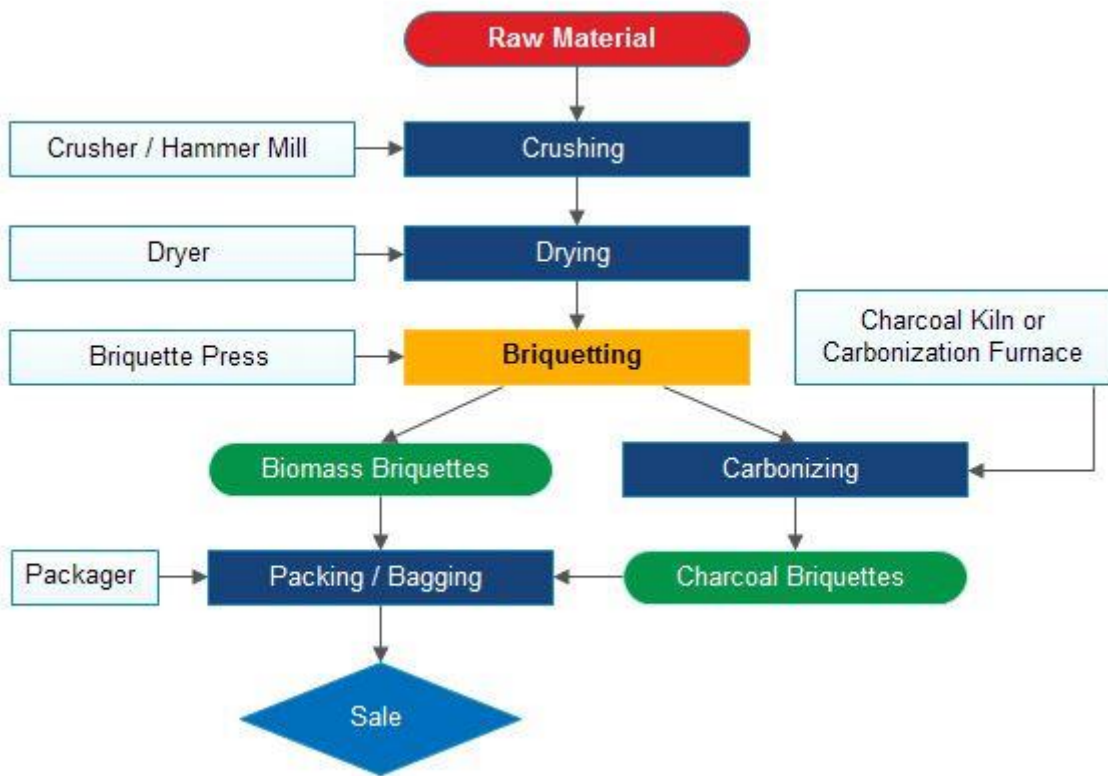
Market Potential

Bio coal is a natural product which is produced by drying and compressing bio mass. It can be used as a fuel in order to supply energy. Bio coal can replace the current usage of fossil fuels specially coal and fire wood. India is expected to be one of the largest contributors to non –OECD petroleum consumption growth globally. India's oil demand is expected to grow at a CAGR of 3.6% by 2040 while the demand for energy will more than double by 2040 as the economy will grow to more than 5 times its current size. This scenario presents a huge opportunity for bio fuels sector.

Statutory Clearances Required for The Proposed CBG Plant

Same statutory clearances as are applicable to CBG plant are also applicable to this project. Accordingly, all such approvals will be obtained from the concerned authorities.

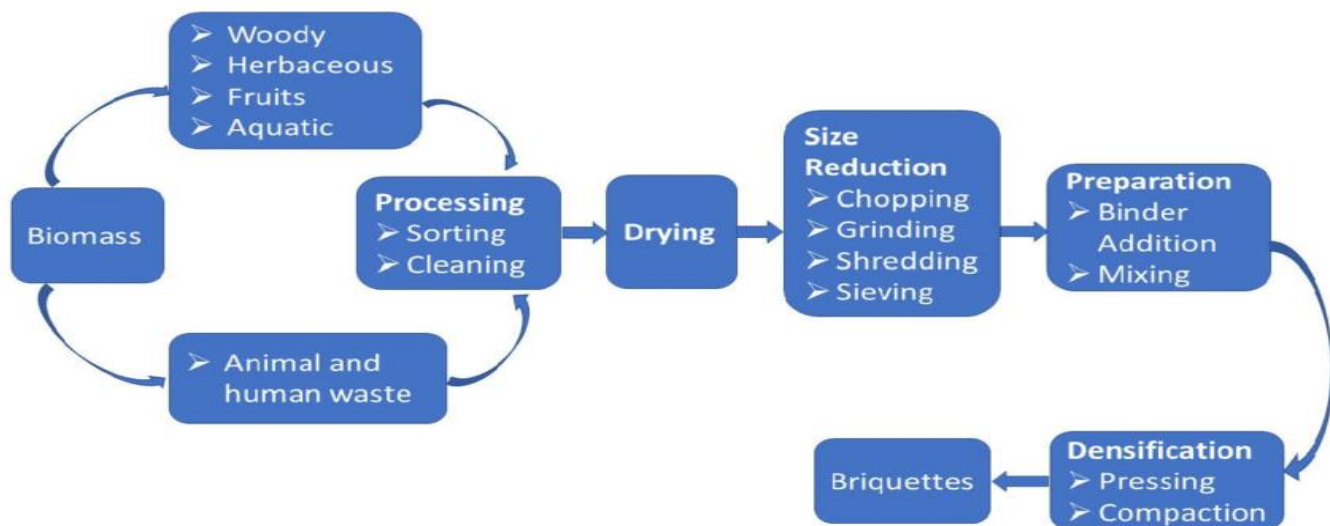
TECHNOLOGY SELECTION FOR THE PROJECT



Technology Selection

The Proposed Project is designed to treat 150 Tons/day of feedstock to produce 90% of Bio Coal.

Bio-Coal Briquetting Process



Preparation

Cleaning: Collection of the wastes followed by cleaning and sorting is done to remove impurities from the biomass such as metal, plastic strings, dirt, soil, etc. through sieving or by the use of screening equipment and magnetic conveyors. Foreign materials affect the performance of machines during processing as well as the quality produced.

Storage: Proper storing of biomass is essential to allow natural drying to minimize the need of drying the material for a long time just to achieve the required MC for the densification process. The piled raw material can be stored in building sheds or can be covered with geotextile to avoid mixing with sand, stone and other impurities.

Drying: The process of reducing moisture content (MC) of biomass to the minimum required is essential to initiate the densification process. The acceptable moisture content should be between 5-15%. Drying can be done through natural drying or forced drying. The waste can be dried in the sun up to 20-25% moisture and later by thermal process up to 5%. Drying the biomass before the briquetting process is done to decrease its moisture content (MC) to 5-15%, which is the acceptable MC for densification.

Size Reduction

For easy handling, transportation and combustion, agricultural wastes are cut into smaller sizes. Size reduction depends on the biomass, but it can be classified as chopped (50-250 mm); chipped (8-50 mm) or ground (<8mm). Straw and Stalk types are chopped by chaff cutters into granular and sticks are shredded; bulky biomass are chopped into small pieces to improve their

workability and compactness such as groundnut waste, bagasse wheat straws, barley, maize straws and cobs.

Pyrolysis

pyrolysis is defined as the thermal decomposition of biomass in the absence of oxygen at medium (300-800°C) to high temperature (800-1300°C) that produces solid, liquid and gaseous. Moreover, pyrolysis can be classified into (a) conventional or slow pyrolysis in where carbonization and torrefaction processes belong. This is used for briquette production because it produces a higher percentage of solid than liquid and gas; and (b) the fast and flash pyrolysis which produces liquids and gaseous products. Torrefaction and Carbonization just differ in temperature. The former has a temperature range from 220-300°C while the latter starts from 400°C. Accordingly, torrefaction is slow pyrolysis ranging from 200-300 °C in where feed material is heated with 50 °C/min (hours to days) to release the volatiles and remain carbon rigid structure; and loss of water removal, water that inhibits the caloric value of biomass and carbon monoxide, hydrogen and methane. The material produced retains 70% of its mass and 90% in energy content. The torrefaction process changes the physical and chemical properties of biomass thus improving the quality of briquette produced.

Binder Addition

Binding is a process of sticking together the biomass material using a specified binder which is essential for uniform briquetting formation to ease transportation and storage; to minimize mould wear during compaction, improve cohesion characteristics and mechanical strength of briquettes, and aid agglomeration when the particles have weak cohesive forces. The effect of the binder on the briquette's quality depends also on the characteristic of biomass used.

Densification

Densification or briquetting is a process of compacting material by the application of pressure and is used to convert the biomass into higher density, uniform in shape, low moisture content, and increase in energy content. Density after compaction determines the total energy content of briquette leading to a more improved burning rate.

Shaping and Sizing

During the production process, bio-briquettes are moulded into different sizes and shapes depending on the manufacturer and the type of moulder used. Briquettes can be formed into solid cylindrical, cylindrical with holes, cubic, or prismatic. According to numerous studies, briquettes are made with holes to provide better combustion characteristics due to its larger specific area. In addition, smaller dimensions provide better and faster combustion because of having larger specific surface area for reaction.

There are 3 types of biomass pellets fuel: pellet shape, block shape and briquette shape. The briquette and block shape biomass fuel is usually used in large scale power plant or boiler factory, while small pellet shape biomass fuel is used for home, small or medium scale power plant and boiler.

AUTHORIZATION OF TECHNOLOGY PROVIDER

Authorization of Technology Provider

Not Applicable

Structure of Total Works to Be Done

1. To fix the site boundaries for construction of 170 TPD input Bio Coal Plant
2. Preparation of Civil designs and drawings for machinery and equipment installation.
3. Preparation of the plans to submit the local authority to get the necessary permissions
4. Preparation of the structural designs as per Site soil testing report.
5. Preparation of Civil cost estimations as per the local available materials.
6. Preparation of Plant cost estimation as per the quotations of mechanical machinery and equipment.
7. Preparation of technical process flow chart and description of process.
8. Preparation of specifications of Civil, Machinery and equipment's.
9. Financial statements of the project cost for submission of Bank for loan

ENVIRONMENTAL MANAGEMENT PLAN (EMP) & SAFETY MEASURES

Environment management plan and safety measures as applicable to CBG project will be applicable to this project also.

SALIENT FEATURES OF THE PROJECT

Salient Features of The Project

- **Raw Material:** -The Bio coal plant will be designed for 170 TPD input of **Bio mass, Paddy Straw, Agri residues, Saw dust, agri stalks etc.** as the potential feedstock.
- **Products:** Bio coal of 150 TPD at full capacity
- **Grid Connectivity Captive/ Of-grid:** Of-grid
- **Plant area (private land):** 15 acres - will be co located with our CBG plant at the same site.
- **Feedstock Availability:** - Ample availability of feedstock in the nearby villages.
- **Bio coal:** - Bio coal recovery from the proposed feedstock will be approx 90% of the total dry input. Bio coal production from Agri residues and other bio-mass is commercially proven technology.
- **Likely date Of Commission:** 6 months from date of commencement and government approvals, issue of PO & 30% Advance Money
- **Whether Bio coal plant is new/old:** New

- **Sales:** The Bio coal will be sold to hotels, restaurants, industries like glass industry and others at Firozabad and nearby cities of Tundla and Agra. Expected selling price Is Rs 10,000/- per MT. Same has been taken In financial projections also.
- **Average Purchase price of raw material Per ton with Transportation:** Rs 1,400 Per Ton
- **Promoters: PKLS INDUSTRIES PRIVATE LIMITED** is promoted by a group of businessmen including Dr. L S Singh / Dr PK Singh as MD / Director.
- **Name of Consultant:** UZZALA BIO ENERGY SOLUTIONS
305, Royal Square, Science City Road, Sola, Ahmedabad
380060, Gujarat (INDIA)

Implementation Schedule

Sr. No.	Particulars	Proposed Month
1	Civil Work of Foundations & Shed, Control Panel Room etc	1 st Month
2	Order of plant machinery	1 st (Parallel to Civil Works)
3	Arrival of plant machinery	3 rd to 5 th Month
4	Installation of plant machinery	4 th to 5 th Month
5	Trial run	6 th Month
6	Commercial Commissioning	7 th Month

13. ESTIMATED COST OF BIO COAL PROJECT

Sr. No.	Particular	Amount (Rs.)
1	Land	-
2	Buildings	75,00,000
3	Machinery and Equipment	2,40,00,000
4	Furniture and Fixture	2,00,000
5	IT & It Infrastructure	1,00,000
6	Transport vehicals	95,00,000
7	Preliminary Expenses	15,71,313
8	Working Capital	2,37,53,602
Total		6,66,24,915

13.1 Funding Details

Promoters of the project are looking at following sources for financing the project

- Loan from bank/financial Institution
- Venture capital/Strategic Investor
- Government Subsidies (will be available only after commissioning of project)

Promoters are open to joint ventures and equity participation by the investors

A debit equity ratio of 3:1 has been used for financial projections.

FINANCIALS

A separate PDF file giving details of financial projections has been attached.

NOTE: 1) Conservative prices for inputs and outputs have been adopted while preparing the financials. We are confident that actual financial results will be much better.

2) Financial do not Include Incentives and subsidies available to such projects.

CONCLUSION AND RECOMMENDATION

Conclusion and Recommendation:

Financial Analysis clearly indicates that setting up of Bio Coal plant of 170 Tons of feedstock is Environmentally friendly as well as techno economically a viable and profitable project. Keeping in mind the environmental impact and self-sustainability of the project, it is strongly recommended that the project should be executed in the right earnest at the earliest.

The internal rate of return of the project is very high with a payback period of 15 months make It highly viable project. Hence it is essential to execute the project as soon as possible.

CONTRACTOR DETAILS & EXPERIENCES

UZZALA Bio Energy Solutions is a leader in India in the field of Design Engineering, Manufacturing Supply erection, testing and commissioning of bio energy plants. They hold 30% renewable energy market in India and have installed maximum numbers of projects than any other supplier. ***They have completed 5 bio gas/coal projects and are Implementing 15 more at the moment. They have more than 15 years' experience in this field.***