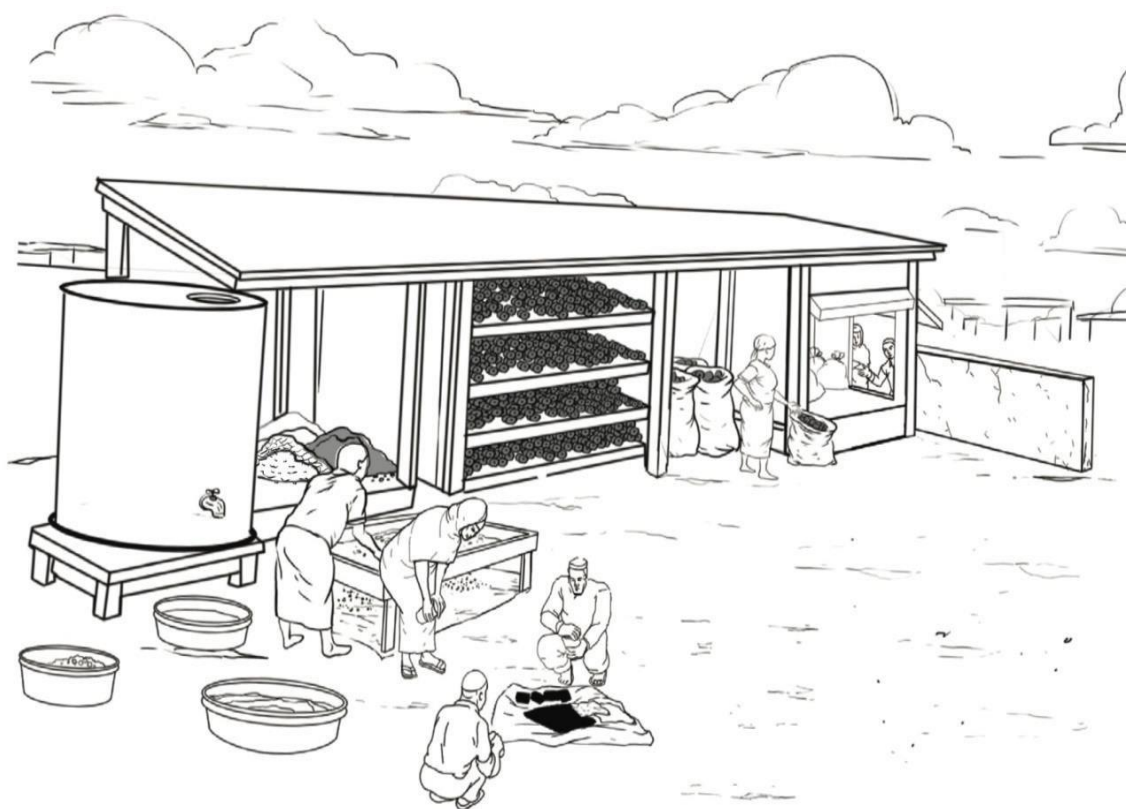


Major Project Report

On

Charcoal Briquette

Production



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ABSTRACT

This report explores the process of coal binding and its application in the production of charcoal briquettes. Charcoal briquettes have gained significant attention as an eco-friendly alternative to traditional charcoal production methods, offering numerous benefits in terms of reduced environmental impact and improved combustion efficiency.

The report provides an in-depth analysis of the various techniques and materials used for coal binding, highlighting the importance of binders and additives in achieving the desired briquette quality. Additionally, it examines the economic, environmental, and social aspects of charcoal briquette production, shedding light on its sustainability and potential for addressing energy and environmental challenges. Through a comprehensive review of existing literature and practical insights, this report aims to provide valuable information for researchers, industry professionals, and policymakers interested in the field of coal binding and charcoal briquette production.

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INTRODUCTION

Coal, a fundamental source of energy for centuries, has played a pivotal role in powering industries and homes worldwide. However, its extraction, processing, and utilization have raised numerous environmental and safety concerns. One of the significant issues associated with coal is the generation of coal dust, a fine particulate matter produced during mining, transportation, and handling. This coal dust poses a range of problems, including health hazards, environmental pollution, and economic losses.

In this report, we delve into the techniques and materials involved in coal binding and charcoal briquette production. We also explore the economic, environmental, and social dimensions of this solution. Through an in-depth analysis, we aim to shed light on the potential of coal binding and briquette production as a sustainable approach to mitigate the problems associated with coal dust while promoting cleaner and more efficient energy utilization.

Charcoal Briquette Making in India: **Market and Technology**

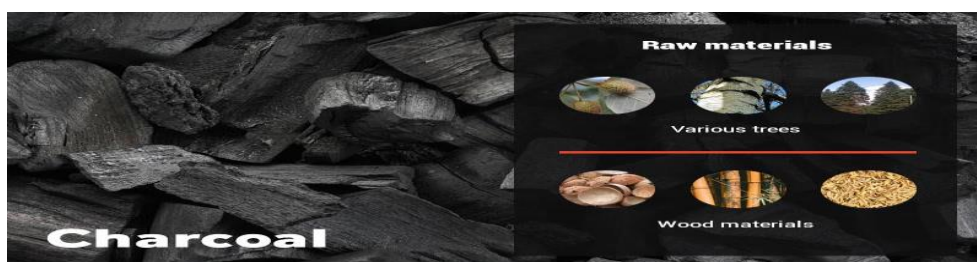
India, as a great agricultural country, 80% of its population depends on agriculture for a living, so a large number of agricultural residues are generated.

However, these fuels are not fully utilized, not only cannot meet people's needs, but also cause serious environmental pollution.

Therefore, it is imminent to replace fossil fuels with charcoal briquettes. Charcoal briquettes are made by charcoal powder with a briquette making machine, which can be widely used in households, commerce, industry, agriculture and other fields.

What is Charcoal

Charcoal is a dark brown or black porous solid fuel that remains after incomplete combustion of wood or wood materials or pyrolysis in the absence of air.



Common raw materials for making charcoal:

- Various trees: beech, birch, oak, Castanopsis sclerophylla, elm, maple, poplar, linden, willow, masson pine, red pine, spruce, etc.
- Wood materials: coconut shell, sawdust, rice husk, bamboo chips, corn stalk, chestnut shell, walnuts, straw, sorghum residue, and other agricultural wastes.

Note that the carbonization of the biomass materials must be done by yourself. Then you can turn to us for crushing, grinding and briquetting.

What are Charcoal Briquettes?

Charcoal briquettes are made from charcoal powder mixed with adhesives (starch, lime, etc.). They are pressed by a charcoal briquette machine into various shapes, such as round, square, pillow, and oval.

Common Shapes:

Round, Square, Pillow, Oval.

(In addition, customers can customize the shapes if they have special needs)



Round



Square



Pillow



Oval

What conventional fuels can charcoal briquettes replace?

- Diesel oil
- Kerosene
- Furnace oil
- Lignite
- Coal
- Firewood

What is the price of charcoal briquettes in India?

Types	Price (USD/Kg)
Charcoal	0.57-0.7
Firewood	0.24
Charcoal briquettes	0.2-0.4

The Dheeraj family from India originally used firewood as a household fuel. On the recommendation of their neighbors, they tried to use charcoal briquettes instead of firewood.

After a while, they were satisfied, "Charcoal briquettes can burn for a longer time, and the price is cheaper," Dheeraj said.

The following is a comparison of the weekly expenses of the Dheeraj family using firewood and charcoal briquettes:

Types	Usage/ Weekly	Costs
Firewood	4 bundles	\$3.42
Charcoal briquettes	3 Kg	\$0.64

His wife Nandana said, "When I cook with wood, a lot of smoke will irritate my eyes and give me a headache. This is not the case with charcoal briquettes."

What are the Advantages of Charcoal Briquettes?

- Charcoal briquettes are cheaper than petroleum, coal or lignite and are renewable resources.
- There is no sulphur in charcoal briquettes and no fly ash when burned, so it will not pollute the environment.
- Charcoal briquettes have a high calorific value (about 6592.52 Kcal/Kg).
- Charcoal pellets have a much lower ash content (2-10% compared to 20-40% of coal).
- Unified size and mass and more uniform combustion, without odor.
- Easy to handle, store and transport.

- Due to low moisture and high density, the boiler efficiency of charcoal briquettes is much higher.
- Charcoal briquettes ignite easily.

How to produce Charcoal Briquettes?

Step 1: Charcoal crushing

Crush the charcoal by [a crusher](#) to about 5 mm of charcoal powder. The smaller the particle size, the easier it is to be pressed into charcoal briquettes, and the higher the quality of charcoal briquettes.



Step 2: Add binders

It is often necessary to add binders before briquetting the charcoal powder to ensure the density, strength, hardness, and integrity of the charcoal briquettes during transportation.

There are three types of binders used in the production of charcoal pellets, namely inorganic binders, organic binders and composite binders.

Inorganic binders

clay, lime, cement, gypsum, water glass, etc.

Advantages: The process of making charcoal briquettes with the inorganic binder is relatively simple and the produced charcoal briquettes have higher compressive strength, compaction ratio and hydrophobicity.

Disadvantages: But due to the high ash content of inorganic raw materials, the ash content of the briquettes is slightly higher.

Organic binders

biomass binders (such as starch, cassava pulp, waste paper pulp, molasses, cow dung), tar, bitumen, lignosulfonate binders and polymer binders.

Advantages: The briquettes made by the organic binder have low ash content.

Disadvantages: poor thermal strength.

Composite binder

The composite binder is composed of two or more kinds of organic and inorganic binders.

Advantages: The briquettes have low temperature, hot strength and low ash content.

Disadvantages: The preparation process is more complicated, and the cost is relatively high.

Step 3: Stir and mix

The charcoal can be sent to the briquetting machine for molding after being mixed [in the mixer](#). The more fully stirred, the higher the quality of briquettes produced.

Step 4: Dry in the dryer

The materials should generally be fed into the [dryer](#) evenly and continuously before the briquette is pressed. The main body of the dryer is a slightly inclined and rotatable cylinder.

The hot air generated by the hot blast stove or steam boiler is passed into the dryer to contact the wet charcoal.



Fote rotary drum dryer for drying charcoal

The cleaning device inside the dryer, crushing and dispersing device, etc., turns over, pushes and strengthens the heat exchange of wet charcoal. Finally, it can be dried into a loose product with the moisture of less than 12%.

Step 5: Briquette making

The mixed materials are fed into the [briquetting machine](#). It has a pair of cylindrical wheels with axes parallel to each other, the same diameter, that rotates at the same speed and in opposite directions.

There are many hemispherical sockets of the same shape and size regularly arranged on the wheels.



Fote briquettes making machine with favorable price

The material falls between the two wheels. Driven by the motor, the sockets are gradually closed. Under the action of high temperature and high pressure, the material in sockets is pressed into briquettes.

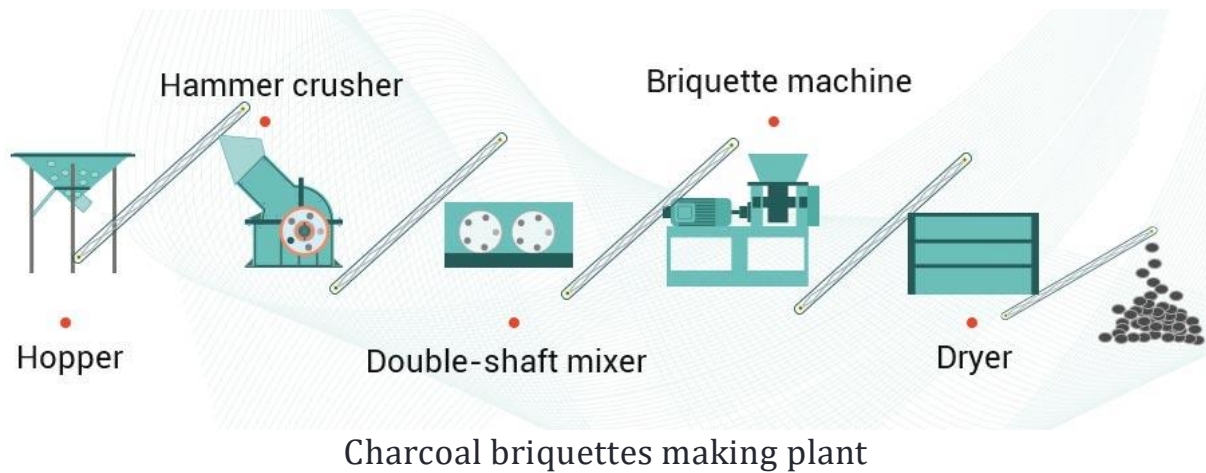
Then the sockets are gradually separated, and the compressed charcoal briquettes fall off smoothly.

The information of charcoal briquetting machine is shown in the following table:

Raw material size (mm)	≤5
Moisture content of raw materials	<12%
Size of briquettes	Adjustable
Capacity (TPH)	1-50
Capacity of charcoal briquettes production line (TPH)	≤100
Shapes of briquettes	Square, oval, pillow, etc.
Working environment	Dust-free

Step 6: Packaging

Pack and sell the compressed charcoal briquettes in sealed plastic bags.



What are the uses of charcoal briquettes?

Household

Charcoal briquettes can be used not only for boiling water, cooking, [family barbecue](#), heating, but also for deodorization, dehumidification, garden composting and so on.

Business

Catering institutions such as restaurants, canteens, bakeries, wineries, etc. can use charcoal briquettes to boil water, cook and grill.

Charcoal briquettes can also be used for baking tobacco, tea, oil and so on.

Industry

- Used for making tiles, firing pots and ceramics, etc.
- Used as a special filler for construction concrete, insulating material, refractory material, etc.
- Used as fuel for industrial boilers, gasifiers, etc., to generate heat and steam.
- Used as a carburizing agent for smelting high quality nonferrous metals, cast iron and machinery parts.

Agriculture

Charcoal briquettes can improve soil temperature, pH value, maintain soil moisture, and absorb harmful metals, or be used as a slow-release agent for organic fertilizers.

Animal husbandry

Charcoal briquettes can be used as fuel for hatching chicks, as well as feed additives and deodorants.

Is it profitable to invest in charcoal briquettes projects?

The main costs of investing in a charcoal briquettes project are as follows:

Fixed costs	Equipment investment
	Venue rental
	Labor cost
Variable costs	Raw material investment
	Electric charge
	Maintenance and repair costs
	Transportation cost

An Indian charcoal briquettes producer produces 960 tons of charcoal briquettes per year. The following table shows his costs and benefits

Items	Value (USD/Yr.)
Fixed costs	6000
Variable costs	17000
Total investment	25000
Gross annual income	40000
Payback period	Within 8 months

Conclusion

Agricultural by-products not only cause waste of resources, but also cause serious environmental pollution.



Charcoal briquettes with both economic benefits as well as social benefits

Using these agricultural by-products to make charcoal and then make charcoal briquettes is an economically viable and environmentally friendly solution for an agricultural country like India, which produces a large number of agricultural wastes every year.

Investing in the production line of charcoal briquettes can bring economic benefits as well as social benefits.