



Briquetting Process

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Introduction

- Briquetting, as a technology was invented in early 19th century, specially in 1923.
- Biomass is very important for providing energy to developing countries.
- Briquettes can be made from loose agro residues and have a density of 1.2 to 1.4 grams per cubic centimeter, while the original residues have a bulk density of 0.1 to 0.2 grams per cubic centimeter.
- Briquetting is a process of compressing biomass materials into solid blocks, and it's also known as briquettes.
- The raw materials for briquetting can be agricultural waste, wood waste, or other biomass materials.

Raw Material for Briquette

- Almost all agro residues use in briquetted.
- Agro residues such as saw dust, rice husk, tapioca waste, groundnut shell, cotton stalks, pigeon pea stalks, soybean stalks, coir pith, mustard stalks, sugar cane bagasse, wood chips, tamarind pod, castor husk, coffee husk dried tapioca stick, coconut shell powder are the commonly used raw materials for briquetting process in India.
- Minimum moisture required for raw material is 10-15%, because high moisture content, cause problems in grinding of raw materials, and required more energy for drying raw materials.

Briquetting Process

There are steps involved in the briquetting process are –

1. Collection of raw materials
 2. Preparation of raw materials
 3. Compaction
 4. Cooling and Storage.
1. Collection of raw material: Any material that can burn but isn't in a handy shape, size, or form for easy use as fuel is suitable for briquetting.
 2. Preparation of raw material: The preparation of raw materials includes
 - Drying– The raw materials have more moisture than needed for briquetting. They can be dried in the open air (sun), in



Raw Materials for Briquetting process

solar dryers, using a heater, or with hot air.

- Size reduction – First, the raw material is made smaller and uniform (1 to 10 mm) by methods like shredding, chopping, crushing, and more. Some materials that are already in the 1 to 10 mm size range don't need further size reduction. The size reduction process uses a lot of energy, so it should be kept as short as possible.
 - Raw material mixing – We should make briquettes using more than one raw material. We'll mix them in the right proportions to ensure the final product is well compacted and has a high calorific value.
3. Compaction: Compaction process takes place inside the briquetting machine. The process depends on the briquetting technology adopted.

Briquetting technology : Briquetting Technologies used in the Briquetting of the agro residues are divided into three categories.

- i. High compaction technology - In high pressure briquetting machines, the pressure reaches 100 megapascals (MPa).

This type of machine is suitable for residues with a high lignin content. The high pressure in the machine raises the temperature to about 200-250 degrees Celsius, enough to fuse the lignin in the residue. The fused lignin acts as a binder, eliminating the need for any additional binding material

- ii. Medium pressure technology – In medium pressure machines, the pressure ranges from 5 to 100 megapascals (MPa), resulting in less heat being generated.

This type of machine requires additional heating to melt the lignin content of the agro residues, which eliminates the need for an extra binder material.

- iii. Low pressure technology – Low-pressure machines operate at a pressure lower than 5 megapascals (MPa) and at room temperature.

This type of machine requires the addition of binding materials.

This type of machine is suitable for carbonized materials because they lack lignin material.

4. Cooling and Storage of briquettes: The briquettes coming out of the machines are very hot, with temperatures over 1000°C.

They need to be cooled and stored in a dry place.

Advantages of agro residual briquettes:

- The process makes the material produce more energy per unit volume.
- It helps reduce deforestation by offering an alternative to fuel wood.
- The process prevents spontaneous combustion.
- It helps solve the problem of getting rid of residue.
- The final product is easy to transport and store.
- The fuel produced is consistent in size and quality.

Necessary requirements to start a briquette production unit

1. Land requirement: You need at least 1 acre of land to start a briquette production unit for storing raw materials and the produced briquettes.
2. Raw materials: Having a constant supply of raw materials is crucial for making profitable briquettes.



Briquetting Machine

3. Drying facility to dry raw material: The raw materials commonly available have high moisture content. To reduce the moisture to an appropriate level for briquetting, drying technologies like solar dryers, heaters, or hot air generator systems are needed.
4. Shredding machine: To turn agro residues into powder for briquetting, you need a shredding machine with a minimum of 5 hp motor.
5. Briquetting machine: You need a high-pressure hydraulic piston press type briquetting machine, powered by a minimum of 50 hp motor, to produce binderless briquettes from agro residues.