



Friday, 1 December 2023

M/s Natural Gas India Pvt Ltd

36, Model Town West
Ghaziabad
Uttar Pradesh

We are delighted to submit our comprehensive proposal that includes the requested quotation for the biomass pellet manufacturing project utilizing the CPM Pellet Mill. Additionally, it provides essential information regarding the industry and market specifics. Our proposal effectively highlights the key features and advantages of our equipment, accompanied by detailed pricing information. Please note that the pricing outlined in the proposal is based on a 3-ton-per-hour pellet unit, which serves as a typical configuration.

Attached to this email, you will find the proposal document containing the quotation for the biomass pellet line using CPM Pellet mill. We have taken great care to ensure its accuracy and relevance to your project. Should you have any questions, require further clarification, or wish to discuss specific aspects of the proposal, please do not hesitate to contact us. We are available to address any concerns and provide additional information as needed.

We highly value the trust you have placed in our company and are fully committed to delivering exceptional products and services that meet and exceed your expectations. We firmly believe that our equipment will serve as a reliable and efficient solution for your biomass processing needs.

Once again, thank you for considering our proposal. We look forward to the opportunity of working together and contributing to your success. I am confident that our partnership will yield significant benefits for your organization.

Please feel free to contact me at a.gupta@cpmbiomass.in or +91 99711 44059 if you have any queries or if there is anything else I can assist you with. We would like to discuss the proposal and address any concerns you may have.

Yours truly,

Apurva Gupta
Equipment Sales Manager
Tel No: +91 99711 44059
Email: a.gupta@cpmbiomass.in



CPM PROJECT 3 TPH

RAW MATERIAL-BAGASSE

PROPOSAL

www.cpmbiomass.in

Tel No: +91 99711 44059

Email: a.gupta@cpmbiomass.in

91 Springboard | 6th Floor | Trifecta Adatto 21 | ITPL Main Rd.
Garudachar Palya | Mahadevapura | Bangalore , Karnataka
560048 | India



TABLE OF CONTENTS

Introduction.....	03
About CPM Biomass Group.....	04
Project Objective and Strategy.....	05
Concise History of the Product.....	06
BIS Provision & Specification.....	07
Uses & Applications.....	08
Current Indian Market Scenario.....	10
Present Market Demand and Supply.....	11
Future Market Demand and Forecast.....	12
Market Opportunity.....	13
List of Raw Materials.....	14
Properties of Raw Materials.....	15
Manpower Requirements.....	16
Components of the Pellet Plant.....	17
Plant Layout.....	19
Process of Manufacturing with Formulation.....	20
Pellet Packaging.....	21
Infrastructure and Utilities.....	22
Capital Costs.....	23
Total Capital Budget Estimates.....	24
CPM Pellet Mill on Lease.....	28
Commissioning.....	30
Seize the Moment: Take Action and Propel Your Business Forward.....	31



INTRODUCTION

Given the surging demand for renewable energy and the urgent requirement to curtail greenhouse gas emissions, biomass pellets have emerged as an eco-friendly substitute for conventional fossil fuels. India, endowed with a thriving agricultural sector and abundant biomass resources, is poised to leverage this immense opportunity for the production and utilization of biomass pellets.

The objective of this initiative is to establish a cutting-edge biomass pellet production facility in India that will harness regionally accessible biomass resources like agricultural waste and forestry residues. By employing state-of-the-art technology, the plant will manufacture top-notch pellets renowned for their superior quality. These pellets can serve as a versatile fuel source across diverse applications, including power generation, heating, and cooking.

India possesses ample biomass resources, making it highly capable of substantial biomass pellet production.

·India's vast agricultural sector yields a considerable amount of agricultural waste, making it the world's second-largest producer and an abundant source of feedstock for biomass pellets. India's forestry sector generates a significant quantity of biomass residues, encompassing materials like sawdust, woodchips, and bark, which serve as valuable resources for the production of pellets. Based on data from the Ministry of New and Renewable Energy, India has the potential to produce an annual surplus of 20 million tonnes of biomass pellets solely from agricultural residues.

·The Indian government has introduced multiple initiatives to encourage the utilization of biomass pellets, including schemes that offer financial support for the establishment of biomass pellet production plants.

·The demand for biomass pellets in India is experiencing rapid growth, driven by their adoption across diverse sectors such as power generation, heating, and cooking.

·Numerous companies in India are actively involved in the production and supply of biomass pellets, including prominent players in the energy sector.

Considering the abundant availability of biomass feedstock and the growing demand for biomass pellets, India presents a promising market for the establishment of pellet production plants.

This project will not only contribute to the country's environmental and energy security but also foster rural development by creating employment opportunities for the local community. Additionally, it will aid in reducing reliance on imported fossil fuels and mitigating the adverse effects of climate change.



ABOUT CPM BIOMASS GROUP

The origin of CPM can be traced back to California's Napa Valley, where, in 1883. Over more than 30 years, CPM has grown to become a global leader in high-end machines for pelleting and grinding a large variety of wood and agricultural products. Our machines handle agro waste, hard and soft woods, straw, grass, as well as fast-growing fuel crops.

CPM Global Biomass Group is a manufacturer of equipment that specializes in the manufacture of Agro waste and Biomass pellets. Our pellet mills are gear driven making them the most energy efficient in the industry. With the highest tip speed hammermills, we can process the toughest biomass products with ease. In cooperation with the customer, we can very often save considerable costs for you. These savings can be reached in energy, wearing parts, less rejected product and less return during the production.

Through CPM's dedicated, capable engineering and application knowledge, CPM products serve many non- traditional applications where customers find value in our lowest total operating cost solutions. CPM backs all this knowledge up with an extensive stock of genuine parts, at competitive prices.

CPM equipment is designed for the most demanding applications, CPM produces hammer mills, pellet mills, Conditioners that set the industry standard for operational efficiency and quality. CPM has a global network of representatives ready to support sales with world-class service, parts, and operating knowledge. CPM has established an impeccable reputation; we offer exceptional equipment, outstanding support, and deliver outstanding value to our customer applications.



PROJECT OBJECTIVE AND STRATEGY

The project's primary goal is to produce high-quality biomass pellets in India as a renewable energy source. To achieve this objective, the following strategies can be outlined:

- **Establish dependable biomass supply chains:** One of the most important factors for the success of a biomass pellet plant is having a consistent supply of high-quality biomass feedstock. To achieve this, it is crucial to establish dependable supply chains through partnerships with local farmers, waste management companies, and forestry companies. This will ensure a steady stream of feedstock and enable the plant to operate efficiently.
- **Optimize pellet production processes:** Another important factor is implementing efficient pellet production processes, utilizing state-of-the-art equipment and quality control systems to optimize efficiency and minimize waste.
- **Build robust distribution network:** In addition, developing a strong distribution network to reach various customers, such as power plants, industrial boilers, and residential heating systems, is crucial. The distribution network should be both reliable and cost-effective.
- **Ensure regulatory compliance and sustainability standards:** The biomass pellet plant should also operate in compliance with all relevant environmental and labour regulations and adopt sustainable practices to ensure long-term viability.
- **Forge strong partnerships and collaborations:** Furthermore, building strong partnerships and collaborations with key stakeholders, such as local communities, government agencies, and industry associations, can enhance the plant's effectiveness in achieving its objectives.
- **The main goal of a biomass pellet plant in India is to produce superior quality pellets for renewable energy.** This requires establishing dependable feedstock supply chains, optimizing production processes, building a strong distribution network, complying with regulations and sustainability standards, and forming strategic partnerships and collaborations.



CONCISE HISTORY OF THE PRODUCT

Biomass pellet units in India have experienced a gradual but significant development over the years. The history of biomass pellet units in the country can be traced back to the early 2000s when the concept of using biomass as a renewable energy source gained traction.

During this period, India witnessed a growing interest in utilizing biomass as an alternative to fossil fuels due to its abundant availability, potential for rural development, and environmental benefits. The government and various organizations recognized the importance of biomass as a sustainable energy option and initiated programs and policies to promote its usage.

In the initial stages, biomass utilization predominantly focused on traditional biomass fuels like firewood and agricultural residues for cooking and heating purposes. However, as the demand for modern and efficient energy solutions increased, biomass pellets emerged as a viable alternative.

Around the mid-2000s, the first biomass pellet units began to emerge in India. These units were equipped with pelletizing machines that transformed biomass residues, such as agricultural crop residues, forest waste, and agro-industrial by-products, into standardized pellets. The pellets offered several advantages over raw biomass, including higher energy density, easier storage and transportation, and improved combustion efficiency.

The government's support through policies and financial incentives played a crucial role in the growth of biomass pellet units. Various schemes, such as the National Biomass Cookstoves Initiative and the Biomass Power and Bagasse Cogeneration Program, were launched to promote biomass-based energy solutions.

Over time, the number of biomass pellet units in India increased, driven by a combination of government support, technological advancements, and growing awareness of biomass as a clean energy source. The units expanded their operations to cater to diverse sectors, including power generation, industrial heating, cooking, and commercial applications.

In recent years, biomass pellets gained recognition as a sustainable and carbon-neutral fuel option. This led to partnerships and collaborations between biomass pellet manufacturers, research institutions, and energy companies to further enhance the production, quality, and utilization of biomass pellets.

Today, biomass pellet units in India continue to evolve and contribute to the country's renewable energy goals. Efforts are being made to improve feedstock availability, optimize pellet production processes, and establish robust supply chains. The industry is also exploring innovative technologies and exploring international markets for biomass pellet exports.

In conclusion, the history of biomass pellet units in India showcases a progressive journey from traditional biomass fuels to modern pelletized biomass as a sustainable energy solution. With ongoing support and advancements, biomass pellets are expected to play a crucial role in India's transition towards a greener and more sustainable energy future.



BIS PROVISION & SPECIFICATION

The Bureau of Indian Standards (BIS) has set out certain provisions and specifications for biomass pelletplants in India as stated in the draft document no. PCD 07 (20027) WC August 2022. Here are some of the key provisions and specifications:

- **Raw Material Requirements:** The raw material used for biomass pellet production must be of consistent quality, free from contaminants, and have a moisture content of less than 15%.
- Pellets must meet certain quality standards in terms of size, shape, density, and durability, with dimensions of 6-12 mm in diameter and <35 mm in length, Ash content <20%, and a bulk density of at least 600 kg/m³.
- The pellet production process must be controlled to ensure consistent quality, including grinding, drying, pelletizing, cooling, and packaging.
- Equipment used for pellet production must meet safety, performance, and energy efficiency standards and must be maintained regularly for optimal performance.
- The pellet production plant must comply with emission standards set by the CPCB, controlling emissions of particulate matter, sulfur dioxide, nitrogen oxides, and carbon monoxide.
- Pellets must be stored in dry, well-ventilated places and transported in covered vehicles to prevent moisture absorption and protect them from exposure to rain and moisture. Adherence to these standards is crucial to maintain environmental sustainability and produce high-quality pellets.



USES & APPLICATIONS

Biomass pellets are compressed forms of organic materials like agricultural residues, forestry waste, sawdust, and other biomass materials. These pellets are an important source of renewable energy and are being widely used in India for various applications. Here are some of the uses and applications of biomass pellets in India:

- **Power Generation:** Biomass pellets are used as a fuel source in biomass power plants. These plants generate electricity by combusting biomass pellets in boilers to produce steam, which drives turbines connected to power generators.
- **Industrial Heating:** Industries such as food processing, textiles, pharmaceuticals, and ceramics use biomass pellets as a cost-effective and environmentally friendly alternative for heating purposes. Biomass pellet stoves, boilers, and furnaces are employed to provide heat for various industrial processes.
- **Commercial Heating:** Hotels, resorts, restaurants, and commercial buildings use biomass pellets for heating and hot water generation. Biomass boilers are employed to meet the heating requirements of large commercial establishments.
- **Co-firing with Coal:** In some cases, biomass pellets are co-fired with coal in thermal power plants. This approach helps reduce the carbon emissions associated with coal-based power generation and promotes the use of renewable energy sources.

As for current usage details, the exact statistics may vary, but biomass pellets have gained significant traction in India's renewable energy sector. The government has implemented various policies and initiatives to promote the production and utilization of biomass pellets, including financial incentives and subsidies. Biomass power plants and industrial boilers have been established across the country, and there has been an increasing adoption of biomass pellets for heating purposes in urban industrial areas. Additionally, co-firing with biomass is being explored as a means to reduce coal consumption and decrease greenhouse gas emissions. In conclusion, biomass pellets have a wide range of applications in India, and their use is expected to grow in the coming years. They offer a sustainable and renewable source of energy and can help to reduce carbon emissions and improve the environment.



CURRENT INDIAN MARKET SCENARIO

The Indian market for biomass pellets has been growing steadily in recent years due to various factors such as the increasing demand for renewable energy, government policies supporting the use of biomass pellets, and the rising prices of traditional fossil fuels.

According to a report by the Ministry of New and Renewable Energy (MNRE), India has been actively implementing the biomass power and co-generation program since the mid-nineties. This initiative has resulted in the installation of over 800 projects, including biomass power and bagasse/non-bagasse co-generation facilities, with a total capacity of 10,205.61 MW, contributing power to the national grid.

- **Production:** The GOI estimates this action could save 38 million tonnes of carbon dioxide emissions, however, to achieve these goals approximately 96,000 tonnes per day of biomass pellets would be needed. The current capacity in India is approximately 7,000 tonnes per day. Annually, this demand could reach upwards of 35 million tonnes of biomass pellets.
- **Consumption and demand:** In India, the power and residential sectors are the main consumers of biomass pellets. NTPC has demonstrated successful co-firing of 7% biomass pellets with coal at its Dadri power plant, which could be replicated in other coal-fired power plants using various mills. A 1000 MW capacity thermal power plant would require about 2.5 to 3.0 lakh tonnes of biomass pellets for a 7% blending ratio.
- **Export:** India is emerging as a significant exporter of biomass pellets. According to the data from the Directorate General of Foreign Trade, India exported 415,000 tons of biomass pellets worth Rs 239 crore in the financial year 2020-21. According to the recent updates Agri Residue Based Biomass and Briquettes/Pellets under ITC-HS heading 1213 will be under 'Free' category.
- **Incentives:** The government of India provides incentives such as subsidies, tax benefits, and favourable tariffs to promote biomass pellet production and use. Additionally, the government supports research and development initiatives and conducts awareness programs to enhance the understanding and adoption of biomass pellets.
- **Challenges:** Indian biomass pellet manufacturers confront a range of challenges, including inadequate biomass feedstock availability, infrastructure and logistics limitations, and obstacles in securing capital and financing. Technological constraints and regulatory complexities further impede progress, while competition from alternative energy sources and the necessity to enhance awareness and acceptance of biomass pellets add to the difficulties.
- The Indian biomass pellet market is still in the nascent stage, but it has shown significant growth potential in recent years. The demand for biomass pellets has been growing, especially in the industrial and commercial sectors.
- The Indian biomass pellet market is highly fragmented, with many small-scale players operating in the market. However, there is a need for more organized and professional players to enter the market and improve the quality and consistency of the pellets produced. The government has also taken initiatives to promote the production and use of high-quality pellets by providing subsidies and financial incentives to pellet manufacturers.

In conclusion, the Indian market for biomass pellets is expected to grow in the coming years, driven by the increasing demand for renewable energy and government support. However, there are challenges that need to be addressed to ensure the sustainable growth of the industry.



PRESENT MARKET DEMAND AND SUPPLY

The demand for biomass pellets in India is increasing due to the government's focus on renewable energy and the need to reduce carbon emissions. The supply of biomass pellets in India is also growing, but there are some challenges that need to be addressed. Here are some key points about the present market demand and supply of biomass pellets in India:

Demand: The major demand for biomass pellets in India is from the power sector and the industrial sector. A study supported by MNRE reveals that India's current biomass availability stands at around 750 million metric tonnes per year. The study further indicates a surplus biomass availability of approximately 230 million metric tonnes annually, primarily consisting of agricultural residues, which has the potential to generate about 28 GW of power. Moreover, if the 550 sugar mills in the country were to adopt technically and economically optimal levels of cogeneration, an additional 14 GW of power could be generated through bagasse-based cogeneration, utilizing the bagasse produced by these mills.

Supply: The supply of biomass pellets in India is growing, and there are around 150 pellet manufacturers in the country. The total production capacity of biomass pellets in India was 9 MMTPA in 2021, and it is expected to increase to 19 MMTPA by 2025. The major raw materials used for pellet production are agricultural residues, forestry waste, sawdust, and other biomass materials.

Market price: The market price of biomass pellets in India varies depending on the quality and source of the pellets. The price range is typically between Rs 9-11 per kg, but it can go up to Rs 14 per kg for high-quality pellets.

Challenges: Biomass pellet manufacturers in India face several challenges. Firstly, the inconsistent and unreliable supply of biomass feedstock poses a challenge, impacting production capacity and quality control. Secondly, the lack of proper infrastructure and logistics, including storage facilities and transportation networks, hinders efficient operations. Lastly, financial constraints and difficulties in accessing capital and financing impede the expansion and modernization of biomass pellet manufacturing facilities.

In conclusion, the demand for biomass pellets in India is increasing, and the supply is growing to meet the demand. However, there are challenges that need to be addressed to ensure the sustainable growth of the industry.



FUTURE MARKET DEMAND AND FORECAST

Biomass pellets are a type of renewable energy derived from plant and animal waste products such as wood, sawdust, agricultural residues, and food waste. In India, biomass pellets are primarily used as a fuel source in industrial boilers and power plants.

According to a report by the International Energy Agency (IEA) from 2020, India is the third-largest consumer of renewable energy in the world, after China and the United States. The report also noted that India's biomass energy consumption has grown significantly over the past decade, driven by government policies promoting the use of renewable energy and the increasing demand for energy in the country.

In 2019, the Indian government announced the launch of the National Bioenergy Mission, which aims to promote the sustainable use of biomass resources for energy production. The mission includes initiatives to promote the use of biomass pellets in industries such as power generation, thermal applications.

Based on these initiatives and the growing demand for renewable energy in India, it is possible that the demand for biomass pellets will continue to increase in the coming years. However, several factors could impact the future market demand and forecast for biomass pellets in India, including:

Government policies and incentives: The Indian government has implemented policies and incentives to drive the market demand for biomass pellets. These measures include subsidies, tax benefits, and favourable tariffs, aiming to promote the production and utilization of biomass pellets. The National Bioenergy Mission and other initiatives enhance affordability, stimulate investment in biomass technology, and increase renewable energy in India's energy mix. Financial assistance of up to Rs. 45 lakhs per plant is available for briquette/pellet manufacturing plants, with a subsidy of Rs. 9 lakhs per MTPH manufacturing capacity. Under this program, a 3TPH pellet plant can avail a subsidy of Rs. 27 lakhs.

Competition from other renewable energy sources: As the demand for renewable energy grows, biomass pellets may face competition from other renewable energy sources such as solar and wind.

Availability of biomass resources: The availability of biomass resources such as wood and agricultural waste will impact the supply and cost of biomass pellets.

Technological advancements: Advances in technology for biomass pellet production and combustion could impact the cost and efficiency of biomass energy, making it more or less competitive with other energy sources.

Overall, while there is potential for continued growth in the Indian biomass pellet market, the future demand and forecast will depend on a range of factors, including government policies, competition from other renewable energy sources, and technological advancements.



MARKET OPPORTUNITY

The market opportunity for biomass pellets in India is significant. The Indian government has set a target of achieving 500 GW of renewable energy by 2030. This presents a significant opportunity for the biomass pellet industry. The annual electricity generation potential from biomass pellets is estimated to be 244 twh in 2030/31 out of a total 4,000 twh of electricity production in India in 2030/31.

The demand for biomass pellets in India is driven by a combination of factors, including rising energy demand, the need for cleaner energy sources, and the government's initiatives to promote renewable energy. The use of biomass pellets has several advantages, including reducing dependence on fossil fuels, mitigating greenhouse gas emissions, and providing a livelihood to farmers by using agricultural waste.

The market for biomass pellets in India is expected to grow significantly over the coming years, with estimates suggesting that the market could reach \$4 billion by 2025. However, the industry faces several challenges, including the availability of raw materials, the lack of infrastructure for storage and transportation, and the need for more efficient and cost-effective production technologies.

Overall, the market opportunity for biomass pellets in India is significant, and the industry has the potential to play a critical role in India's transition to a more sustainable energy future.



LIST OF RAW MATERIALS

There are several types of raw materials that can be used for producing biomass pellets in India. The availability of these raw materials may vary depending on the region and season. Some common raw materials for biomass pellets production in India include:

Agricultural crop residues: Agriculture remains as the pillar industry in many areas. The crop residues in agriculture production are immense, including rice husk, rice bran, peanut husk, maize straw, canola straw, pineapple peel, etc. To make full use of these crop residues, we can use biomass equipment to process them into biomass pellets or briquettes for combustion and feeding use.



Non Forest residues: Non forest woods have always been the resource for fuels. They can be made from forestry wastes such as leaves, branches, bark, fresh grass and turf grass, bamboo, alfalfa, etc. Usually, they need crushing and drying procedure before pelleting.



Industrial waste: This includes sawdust, wood shavings, and other wood residues generated from wood processing industries.

Non Forest residues: Non forest woods have always been the resource for fuels. They can be made from forestry wastes such as leaves, branches, bark, fresh grass and turf grass, bamboo, alfalfa, etc. Usually, they need crushing and drying procedure before pelleting.

It's important to note that the availability and quality of these raw materials can vary depending on several factors, such as location, climate, and agricultural practices. It's essential to ensure that the raw materials are sustainably sourced and processed to produce high-quality biomass pellets that meet the required standards.



PROPERTIES OF RAW MATERIALS

India is a country with a diverse range of agro-climatic conditions and a rich biodiversity. The availability and properties of raw materials for biomass pellets in India vary depending on the region and the season. Some common raw materials as stated in preceding section includes Agricultural residues, non forest wood residues, Energy crops etc.

The properties of raw materials for biomass pellets in India can vary widely depending on the source. However, some general properties of biomass pellets include:

- **Moisture content:** The moisture content of biomass pellets should be less than 15% to ensure optimal combustion efficiency.
- **Ash content:** The ash content of biomass pellets should be less than 20% to avoid the build up of ash in the pellet stove or boiler.
- **Calorific value:** The calorific value of biomass pellets varies depending on the source material but is typically in the range of 3,000-5,000 kcal/kg.
- **Bulk density:** The bulk density of biomass pellets should be high enough to ensure efficient storage and transport.
- **Particle size:** The particle size of biomass pellets should be 25 mm consistent to ensure uniform combustion and minimize emissions for non torrefied biomass pellets.

Overall, the properties of raw materials for biomass pellets in India are important considerations in the production of high-quality pellets that can be used for heating and electricity generation.

Bagasse, the residual fibrous material left after sugarcane stalks are crushed for juice extraction in the sugar industry, has a typical moisture content of 40% to 50%. In contrast, bagasse pellets, which are the densified form of bagasse, undergo a drying process that reduces their moisture content to around 8% to 12%. This lower moisture content in bagasse pellets improves their combustion efficiency and eliminates the need for additional drying procedures. The ash content in bagasse is generally low, ranging from 2% to 5%. However, during the pelletization process, the ash content in bagasse pellets may slightly increase to approximately 5% to 10% due to the concentration effect. Bagasse pellets offer a higher gross calorific value (GCV) or gross heating value (GHV) compared to raw bagasse, typically ranging from 3,500 to 4,000 kilocalories per kilogram (kcal/kg). These characteristics make bagasse pellets a more convenient and efficient fuel option for various applications such as power generation and heating, with improved moisture content, slightly higher ash content, and enhanced energy content compared to raw bagasse.

Please note that the values provided are approximate and may vary depending on specific circumstances and processing techniques.



SPECIFICATIONS RAW MATERIAL:

The specified equipment and/ or system performance is based upon a continuous uninterrupted flow of incoming material meeting the following specifications:

Product name	Bagasse
Chemical composition	NA
Product form	Powder
Dimensions	NA
Particle size distribution	85%<4mm
Bulk density	130kg/m ³ – 160kg/m ³
Moisture content	12%
Temperature	Ambient
Others	Free of stones, smolders, metal and oversized material
Dust explosion characteristics (based on above mentioned psd)	

SPECIFICATIONS RAW MATERIAL/IN FEED OF PELLET MILL:

Particle size distribution	85% < 4 mm
Moisture content	10 -12% (after dryer)
Dust explosion characteristics	Data not available



SPECIFICATIONS PELLETS:

Diameter	Ø6 ~ Ø8
Length (main flow)	Between 15 mm – 35 mm Maximal 50 mm
Bulk density	630kg / m3 approx.
Pellet durability	96% approx.
Moisture content	9-12%
Temperature after cooler	5 -10 °C above ambient temperature



MANPOWER REQUIREMENTS

The personnel or manpower requirements for biomass pellets in India depend on various factors such as the size of the pellet plant, the type of raw materials used, and the production capacity. However, some of the key personnel required in the production of biomass pellets in India include:

- **Plant manager:** A plant manager is responsible for overseeing the operations of the pellet plant, including managing the production process, ensuring safety regulations are followed, and managing the plant's resources.
- **Engineers:** Engineers are required to design, install, and maintain the various machines and equipment used in the pellet production process.
- **Technicians:** Technicians are required to operate and maintain the machines and equipment used in the pellet production process.
- **Quality control personnel:** Quality control personnel are responsible for ensuring that the final product meets the required quality standards, including monitoring the moisture content, particle size, and ash content of the pellets.
- **Logistics and supply chain personnel:** These personnel are responsible for managing the transportation, storage, and distribution of the pellets.
- **Administrative personnel:** Administrative personnel are required to manage the paperwork, accounting, and other administrative tasks associated with the pellet plant's operations.

The number of personnel required for a biomass pellet plant in India can vary depending on the size of the plant and the level of automation. For a small-scale plant, a team of 5-10 personnel may be sufficient, while larger plants may require a team of 30 or more personnel. Additionally, specialized personnel may be required for specific tasks such as research and development, marketing, and sales.



COMPONENTS OF THE PELLET PLANT

Following are the Main components of the pellet plant. However, all other components required to meet the functional requirement.

1. SHREDDER

Suitable shredding machine shall be provided for processing biomass in bale form. Agro-residue shall be pulverized using this machine and conveyed through separate conveyer for further processing. The shredder shall preferably be of Single, Twin Shaft Type with overload protection & cut off feature in case of material clogging.



2. FLASH DRYER

Flash dryers offer an effective method of removing surface or unbound moisture from a feed product. The technology behind flash drying employs a low residence removing the unbound moisture instantaneously removed from the feed. Flash dryers are essentially pneumatic dryers.

3. CYCLONE DUST COLLECTOR

Cyclone dust collectors are also sometimes referred to as cyclone separators. They are primarily used to remove heavier density particles. Cyclone dust collector system creates a dual air flow to separate coarse from fine dust. The main air flow goes downward and carries most of the coarser dust. The inner air flow created around the bottom of the cyclone, goes upward and carries the finer dust particles. The fine dust is captured by the filter attached to the outlet via a centrifugal fan, followed by filter bags, a collection tank may be provided to collect the fine dust.



4. INTEGRATED GRINDINGSYSTEM (IGS):

Most of the biomass is not available in the form that can be directly fed to the pelletizer press, therefore the integrated grinding system shall be designed to convert materials such as tree branches, grass, leaves, garden waste, horticulture waste, Ground Nut Shell, Wood Waste, and Bagasse, paddy Straw, Soya Husk, Cotton Stalks, Rice Husk, Groundnut Shells, Wood Chips, Mustard Stalk, Sugarcane leaves and press mud cake, Horticultural and non Forest woody residues into a form that is compatible with pelletizing press.

The Integrated system shall be designed to separate the non-palletizable material and make the raw material more homogeneous and break it into a size which is acceptable for making the pellets suitable for co-firing in boiler as well as for domestic use.



5. PELLETING MACHINE:

Conditioned/processed material shall be fed to pellet press by gravity feed. The Roller/Piston presses the material in die holes and extrudes the material. Length of pellet can be adjusted by knife provided below the die. Pellets so formed are cooled on cooling conveyor and sent for storage/use.



6. COOLER

A cooler is used to cool down the pellets after they are produced to prevent them from breaking apart during storage and transportation.

7. SCREENER

A screener is used to separate the pellets of the desired size from the fines or dust generated during the pellet production process.



8. PACKING MACHINE

A packing machine is used to pack the pellets into bags of the desired weight and size.



9. CONVEYOR SYSTEMS

Conveyor systems are used to transport the raw materials and finished pellets between different stages of the pellet production process.



9. STORAGE SILOS

Storage silos are used to store the raw materials and finished pellets before they are transported to the market.

10. DUST COLLECTOR

A dust collector is used to collect the dust generated during the pellet production process to maintain a clean working environment.



The specific plant and machinery required for biomass pellet production in India can vary depending on the production capacity and the type of raw materials used. However, the above-listed equipment is commonly used in biomass pellet production.



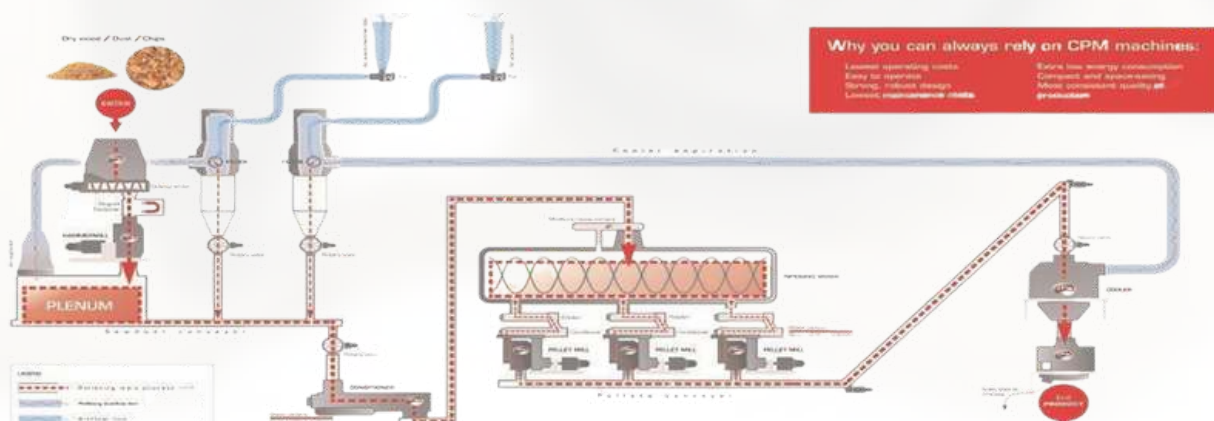
PLANT LAYOUT

Designing a plant layout for biomass pellet manufacturing involves careful consideration of several factors, such as the type of feedstock, production capacity, storage capacity, and processing equipment. Here are some steps to consider when designing a plant layout for biomass pellet manufacturing:

- 1) Determine the feedstock: The first step is to identify the type of feedstock to be used in the pellet production process. This could be wood waste, agricultural residues, or other types of biomass.
- 2) Identify the production capacity: Determine the desired production capacity of the plant, which will help in determining the size of the plant and the number of processing equipment required.
- 3) Determine the storage capacity: Identify the amount of storage space required for both raw materials and finished products. This will depend on the production capacity and the frequency of raw material deliveries.
- 4) Identify the processing equipment: The next step is to determine the type and number of processing equipment needed, such as hammer mills, pellet mills, coolers, and packaging equipment.
- 5) Determine the layout: Once the processing equipment has been identified, design the layout of the plant. The layout should be designed to maximize production efficiency, minimize material handling, and ensure worker safety.
- 6) Identify utility requirements: Identify the utility requirements for the plant, such as electricity, water, and fuel.
- 7) Plan for waste disposal: Plan for the disposal of waste generated during the pellet production process, such as sawdust and wood chips.
- 8) Consider environmental and regulatory requirements: Consider environmental and regulatory requirements, such as emissions limits and permits required for operating a biomass pellet manufacturing plant.
- 9) Optimize for maintenance and repair: Ensure the plant layout is designed to facilitate maintenance and repair of equipment.
- 10) Evaluate costs: Evaluate the costs associated with building and operating the plant, including construction, equipment, labour, and ongoing maintenance costs.

On similar note, electrical controls, transformer side details, machine side electrical details, Weigh bridge, water supply system can be designed and furnished for the plant. Also Fire hydrant system can be designed and installed based on the biomass storage estimates.

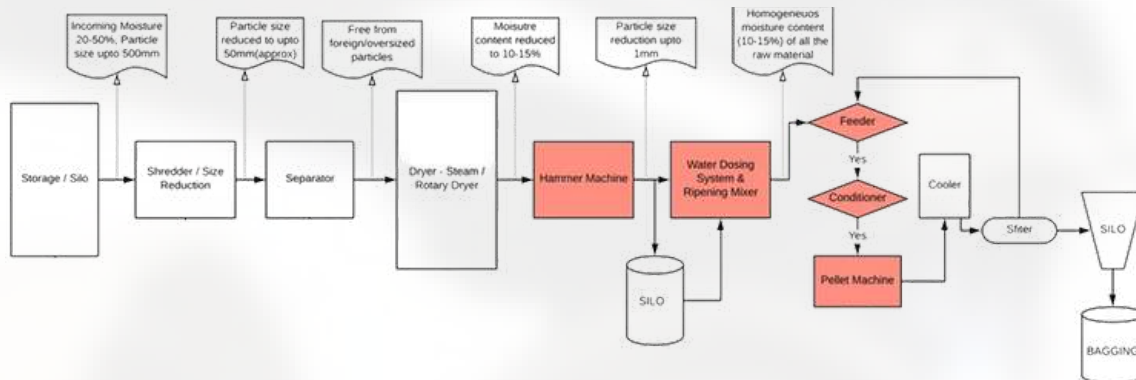
Overall, the plant layout should be designed to maximize efficiency, minimize waste and cost, and ensure worker safety and regulatory compliance. A typical biomass pellet automatic plant schematic layout is shown hereunder.





PROCESS OF MANUFACTURING WITH FORMULATION

Biomass pellet manufacturing is a process of compressing organic material into pellets that can be used as fuel in boilers, Stoves, and Power plants. The following is a detailed process of manufacturing with formulation for biomass pellet manufacturing:



Formulation:

The formulation of biomass pellets varies depending on the type of biomass used, the moisture content, and the desired properties of the pellets. It's important to note that the specific formulation and process parameters for biomass pellet production can vary depending on the equipment used, regional practices, and intended applications. Therefore, it's recommended to consult industry experts for more detailed information regarding paddy straw pellet formulation in a specific context.

PROCESS:

Raw Material Preparation

The first step is to gather the raw materials, which can be various types of biomass such as sawdust, wood chips, straw, corn or agricultural waste. The raw material is then screened to remove any impurities such as rocks, metal, or oversized particles. The moisture content of the raw material is also measured and adjusted to meet the desired level for pelletizing.

Grinding and Drying

The raw material is then ground into smaller particles using a hammer mill or a chipping machine. The ground material is then dried to reduce the moisture content to the desired level. The drying can be done using a rotary dryer or a belt dryer.

Pelletizing

The dried material is then fed into a pellet mill, which compresses the material into small pellets using a die and rollers. The die has holes of a specific size and shape, which determine the final size and density of the pellets. The heat generated during the pelletizing process activates the binder, which binds the particles together.

Cooling and Screening

The hot pellets are then cooled using a pellet cooler, which reduces the moisture content and prevents the pellets from cracking. The cooled pellets are then screened to remove any fines or oversized particles.

Packaging and Storage

The final step is to package the pellets into bags or bulk containers and store them in a dry place. The pellets can then be transported and used as fuel.



PELLET PACKAGING

Packaging is an important aspect of biomass pellet manufacturing, as it helps to protect the pellets during transportation and storage, and also makes them easier to handle and distribute. Here are some of the packaging requirements for biomass pellet manufacturing:

- 1) Type of Packaging Material:** The most commonly used packaging materials for biomass pellets are plastic bags, jumbo bags, and paper bags. Plastic bags are the most popular choice as they are durable, waterproof and provide good protection against moisture. Jumbo bags are used for bulk storage and transport, while paper bags are used for small quantities of pellets.
- 2) Size and Weight:** The size and weight of the packaging material should be chosen based on the quantity of pellets being packaged. For instance, small paper bags can be used for packaging smaller quantities of pellets, while jumbo bags are used for bulk storage and transport. The weight of the bags should be such that they can be easily lifted and transported without causing any strain.
- 3) Moisture Content:** The packaging material should have a low moisture content to prevent the pellets from absorbing moisture during storage and transportation. Moisture can cause the pellets to deteriorate, reducing their quality and energy content.
- 4) Quality of Packaging:** The packaging material should be of high quality and durable to prevent damage to the pellets during transportation and storage. The bags should be able to withstand rough handling, tearing, and puncturing.
- 5) Labelling:** Proper labelling is essential to ensure that the pellets are handled and transported correctly. The bags should be labelled with information such as the type of biomass used, the manufacturing date, the weight and volume of the pellets, and any other relevant information.

Overall, it is important to select appropriate packaging materials and ensure that they meet the necessary requirements for biomass pellet manufacturing. Proper packaging will help to ensure the quality and value of the pellets, and make them easier to transport and distribute.



INFRASTRUCTURE AND UTILITIES

Biomass pellet manufacturing requires various infrastructure and utilities to operate effectively. Some of the key infrastructure and utilities required for biomass pellet manufacturing include:

- 1) Production facility:** The first and foremost requirement is a leveled production facility (typically industrial prefab shed) that is large enough to accommodate the equipment required for biomass pellet manufacturing. For example, In order to accommodate a 150 TPD line, which consists of multiple installations of 5 TPH each, the typical plant area requirement is around 50,000 square meters of ground space. This area allocation covers various essential components, including storage sheds, office buildings, the plant area itself, a water facility for fire and safety measures, a small labor camp, and the movement of different material handling equipment.
- 2) Raw material handling equipment:** Raw material handling equipment is required to transport the raw material to the pellet mill. This equipment includes tractor with loader and trolley, conveyors, loaders, and other types of material handling equipment.
- 3) Pellet mills:** Pellet mills are the primary equipment used for biomass pellet manufacturing. These mills convert the raw material into pellets by compressing and extruding the material through a die.
- 4) Cooling and drying equipment:** After the pellets are produced, they must be cooled and dried to prevent moisture from damaging the pellets during storage and transportation. Cooling and drying equipment can include fans, coolers, and dryers.
- 5) Packaging and storage equipment:** Once the pellets are cooled and dried, they must be packaged and stored. Packaging equipment can include bagging machines, palletizers, and stretch wrappers.
- 6) Utilities:** Utilities required for biomass pellet manufacturing include electricity, water etc. Additionally, a backup power generator may be necessary to ensure uninterrupted operations.

The infrastructure and utilities required for biomass pellet manufacturing are similar to those required for other types of manufacturing. However, the specific equipment and facilities needed may vary depending on the raw material being used and the size and scope of the production operation.



CAPITAL COSTS

The capital costs for biomass pellet manufacturing in India can vary depending on various factors such as the size of the plant, equipment and technology used, location, labour costs, etc. However, I can provide you with some general estimates based on industry reports and research.

A small-scale biomass pellet manufacturing plant with a production capacity of 1-2 tons per hour can require an initial capital investment of around INR 2.5-5 crores (approximately USD 300,000-600,000). This can include the cost of land, building construction, machinery and equipment, raw material storage, and other related expenses.

For a medium-scale biomass pellet plant with a production capacity of 5-10 tons per hour, the capital investment can range from INR 9-10 crores (approximately USD 4million). This can include the cost of land, building construction, machinery and equipment, raw material storage, and other related expenses.

For a large-scale biomass pellet plant with a production capacity of more than 10 tons per hour, the capital investment can be upwards of INR20 crores (approximately USD 5 million).This can include the cost of land, building construction, machinery and equipment, raw material storage, and other related expenses.

While there are industrial techniques available for torrefaction, it is still mostly in the conceptual stage globally. To budget for torrefaction projects, it is advisable to estimate around 10 crore investment per hour of torrefaction.

It is important to note that these are rough estimates and the actual capital costs can vary depending on various factors. Additionally, there may be ongoing operational expenses such as labour costs, energy costs, maintenance costs, etc. that will need to be factored in as well.



ATEX& FIRE:

The products which are processed in this installation might be dust explosive and/or combustible. In this scope of supply, we have not included any measures or equipment to prevent dust explosions or measures to reduce the impact of such explosions or fire other than noted in the scope of supply. Therefore, CPM does not accept any responsibility in case of damage or injury as a result of fire or explosion and the customer will indemnify and keep CPM harmless of and from any and all claims, demands, losses, causes of action, damage, lawsuits, judgments, including attorneys' fees and costs, arising out of or relating to fire or explosions.

The zoning and product characteristics which are mentioned are based on our experience with similar products. Our equipment selection is based on these figures. The zoning and characteristics must be proved and confirmed by the customer. Change of these figures can influence the scope of supply and investment. In case you are not familiar with this aspect we advise you to contact an explosion and fire safety consultant.

Not included are bursting panels, fire extinguish systems etc. On special request we can integrate this. When safety measures are taken, the design pressure of the CPM equipment should be considered.

The equipment from CPM is supplied under the clear advice and direction that they are installed and operated in compliance with all local safety and fire and explosion regulations. CPM cannot be held responsible for failure by the operator / management of such installations to comply with such regulations.



TOTAL CAPITAL BUDGET ESTIMATES

The total capital budget for a biomass pellet manufacturing plant in India can vary depending on several factors, such as the size of the plant, location, infrastructure, and equipment requirements. However, based on industry estimates and recent projects, the capital budget for a biomass pellet manufacturing plant in India can range from INR 10 crore to INR 100 crore, which is approximately USD 1.5 million to USD 14million.

The lower end of this range may apply to small-scale plants with a production capacity of around 1-2 tons per hour, while the higher end of the range may apply to larger plants with a capacity of 10-15 tons per hour or more. It is essential to conduct a thorough feasibility study and cost analysis to determine the actual capital budget required for a specific plant. Other factors that can affect the capital budget include the availability and cost of raw materials, labor costs, and government regulations and incentives.

Below mentioned quote include total equipment cost of the pelleting line. In the recommendation column some parts are mentioned as CPM, EPC.

CPM* - We recommend you purchase from CPM

EPC ** - Parts can be sourced through our approved EPC Partner

BUDGETRY COST OF 3TPH LINE PELLET MILL					
Bagasse . Raw Material Moisture <15%					
LINE	PROCESS	DESCRIPTION	SCOPE OF SUPPLY	QTY	TOTAL
PRE PROCESSING	Pre processing	Dryer	EPC	1	₹ 98,00,000
		Sieving		1	
		Conveyor		1	
		Silo (Raw Material Storage) - 3m3		1	
STORAGE	Storage	Chain flight and conveyor with Drive & Accessories	EPC	1	₹ 19,50,000
		Chute from Silo to Hammer Mill		1	
		Air flow control manual valve 2 nos		1	
GRINDING	Grinding	Ducting from Air base to Outlet	EPC	1	₹ 27,00,000
		Cyclone with Rotary Valves		1	
		Blower with bag filter		1	
		Chain and flight Conveyor		1	
HAMMERING	Hammer Mill	Grinder	EPC	1	₹ 40,00,000
		Screw Feeder		1	
		Motor		1	
		Magnet adapter		1	
SUBTOTAL A:					₹ 1,84,50,000



PELLETING	Feeding & Conditioning	Ripening mixer	EPC	1	₹ 5,00,000
		Feeder and conditioner	CPM	1	₹ 35,00,000
		Transition piece from Pellet Mill to Chain Conveyor		1	
	Pellet Machine	Pellet mill	CPM	1	₹ 2,15,00,000
		Manualy operated Die and Roller Hoist		1	
		Pneumatic cylinder		1	
		Auto Grease system		1	
		Die		1	
Motor - 132kw	EPC	1	₹ 5,50,000		
SUBTOTAL B:					₹ 2,60,50,000
COOLING	Pellet Transition & Ducting	Chain and flight Conveyor	EPC	1	₹ 78,00,000
		Silo for Pellet Storage with outlet slide gate		1	
		Filter for Counter Flow Cooler		1	
		Cooler & Sifter		1	
		Fines returning conveyor		1	
		Air compressor		1	
SUBTOTAL C:					₹ 78,00,000
ELECTRICAL	Electrical	MCC Panel + cables & accessories (approx)	EPC	1	₹ 32,00,000
SUBTOTAL D: ₹					₹ 32,00,000
PROJECT	Steel Structure	Fabrication Cost (approx)	EPC	1	₹ 40,00,000
SUBTOTAL E:					₹ 40,00,000
SUMMARY	A	Grinding	₹ 1,84,50,000		
	B	Pelleting	₹ 2,60,50,000		
	C	Cooling	₹ 78,00,000		
	D	Electrical	₹ 32,00,000		
	E	Fabrication	₹ 40,00,000		
TOTAL COST INR:					₹ 5,95,00,000

FIVE CRORE NINETY FIVE LAKH RUPEES AND ZERO PAISA ONLY

Note: The prices offered are exclusive of taxes



CPM PELLET MILL ON LEASE

- Exclusive feature in the industry
- CPM Pellet Mill on lease: 2TPH (Model No: 3022) and 3TPH (Model No:7730)
- Access to top-of-the-line equipment without the upfront costs
- Flexible leasing options tailored to customer needs
- High-quality machinery for efficient and consistent pellet production
- Reduced risk for customers trying out new equipment
- Expert guidance and support throughout the leasing process
- A cost-effective solution for small-scale and large-scale pellet production alike.

LEASE APPROXIMATE CALCULATIONS

Down payment as % of cost of machine: 15%:
Amount: ₹ 37,50,000

CPM LEASE MODEL FOR PELLET MACHINE ALONG WITH FEEDER CONDITIONER		
MACHINE	PELLET MACHINE	FEEDER & CONDITIONER
Make	CPM	CPM
Capacity	3TPH	3TPH
Model	7730	
Cost of Machine	₹ 2,15,00,000	₹ 35,00,000
Total Cost of Pellet Mill with Feeder & Conditioner	₹ 2,50,00,000	
LEASE CALCULATION		
	Tenure 4 years	Tenure 5 Years
Down Payment @ 15% of the cost of Machine	₹ 37,50,000	₹ 37,50,000
Lease Sanctioned Amount	₹ 2,12,50,000	₹ 2,12,50,000
PTPM Rate (Per Thousand Per Month)	₹ 27.00	₹ 22.00
EMI	₹ 5,73,750	₹ 4,67,500
EMI Paid for the lease duration	₹ 2,75,40,000	₹ 2,80,50,000
Total Interest Paid	₹ 62,90,000	₹ 68,00,000
After Completion of Lease Tenure, Residual value of machine @ 3% needs to be paid and the machine can be transferred in your name	₹ 7,50,000	₹ 7,50,000

NOTE:

This is an approximate calculation, and may vary based on your actual requirement and financial documents.

In case, you would want to foreclose the lease, then the balance remaining principal amount along with 5% penalty and 18% GST needs to be paid immediately and the machine will be transferred in your name

The lease sanctioned amount may increase or decrease depending upon your last 3 years financial documents submitted.



CONDITIONS

PRICE

Strictly net, excluding GST

Delivery term

DDP production site

NOT INCLUDED

- Mechanical and electrical installation
- Civil works
- Engineering and or project management.
- Cabling, cable glands and controls
- Fire extinguishing system / explosion relief valves etc.
- Support frames, connection pieces, flanges, ducting, valves etc.
- Motor and Starter for the pellet mill not included.
- Everything not specifically mentioned in this document.

COMMISSIONING

Commissioning is included. In order to claim warranty, the commissioning must be executed by NXT/CPM. For this scope we expect 3 days of commissioning (excluding travelling), exceeding 3 due to unpreparedness of site, will be chargeable and cost needs to be borne by the client.

DELIVERY TIME

18-22 Weeks after receipt of our order confirmation, legally signed by you, and the down payment. In case of missing technical data, the delivery time starts after reception of the missing information.

PAYMENT

- 30% at order
- 65% before shipment
- 5% after commissioning

VALIDITY

Quotation is valid for 30 days after quotation date

CONDITIONS OF SALE

See attached terms TOG, AI, CI, AS, AG and TFS. For those item's which are not specifically described in this document or in the attached terms and conditions, the general conditions of sale for the supply of mechanical, electrical and electronic products, ORGALIME S2012 apply



COMMISSIONING

In this estimate, cost of commissioning is included.

In order to receive manufacturer, guarantee on the equipment and to assure an adequate and safe installation of the equipment we strongly recommend having the equipment commissioned by NXT/CPM authorized personnel.

During commissioning NXT/CPM will provide the following services:

After the mechanical installation and initial I/O checks (done by customer / supplier control system), NXT/CPM will come to site and start with “Cold” commissioning to check and verify mechanical and electrical operation of the supplied equipment. This includes automated start-stop sequences and safety devices.

After the initial check NXT/CPM will assist by starting the installation and run with product (hot commissioning) and verify functional operation of the supplied equipment.

During the cold & hot start up the NXT/CPM commissioning engineer needs the assistance of an electrical, a mechanical engineer and the operator(s) (to be arranged by the customer). This provides the possibility of “training on the job” for the responsible operators.

The scheduled commissioning time is based on the possibility to work continuously and the availability of sufficient and continuous flow of test material on request. If the commissioning takes longer, beyond our fault, extra days will be charged according our standard rates.

After the commissioning we will hand over a commissioning protocol, this document will be signed by both parties. From this moment the equipment can be taken into production and the CPM guarantee period starts.

For further information see also the GENERAL TERMS AND CONDITIONS OF CPM EUROPE B.V., ZAANDAM



SEIZE THE MOMENT: TAKE ACTION AND PROPEL YOUR BUSINESS FORWARD

The CPM 3022 series, equipped with a robust 132 KW motor, stands as one of the largest-capacity pelleting machines available in the global market. It boasts an impressive output of around 2 tons per hour. If there is a need to further augment the capacity, it can be accomplished by multiplying the number of pellet mills and appropriately resizing the pre-processing line. It's worth noting that other equipment in the production line is also available at higher capacities. Therefore, expanding to multiple pellet machines does not necessitate a straightforward duplication of all equipment, but rather a resizing and upscaling of select components. As a general guideline, a realistic budget increase of approximately 80% should be anticipated for doubling the capacity by 100%.

There are no limitations to the modular multiplying of the line. We have CPM plants in the world that run on >10 pellet machines.

Globally, torrefaction is still largely in the conceptual stage, although there are industrial techniques available for torrefaction of materials. For budgeting purposes, it is recommended to estimate around 10 crore investment for every 1 ton per hour of torrefaction.

In conclusion, this sales proposal outlines the exceptional value and benefits that our product/service brings to your organization. We firmly believe that by choosing us, you will not only gain a reliable and innovative solution but also forge a long-lasting partnership that drives your success.

We highly value the trust you have placed in our company and are fully committed to delivering exceptional products and services that meet and exceed your expectations. We firmly believe that our equipment will serve as a reliable and efficient solution for your biomass processing needs.

Now is the time to take action and make a decision that will propel your business forward. Don't let this opportunity slip away. Contact us today to discuss the implementation process, address any concerns, and finalize the details. Our team is ready to answer your questions and provide the support you need to make an informed choice.

Please feel free to contact me at a.gupta@cpmbiomass.in or **+91 99711 44059** if you have any queries or if there is anything else I can assist you with. I am eager to discuss the proposal and address any concerns you may have.

Yours truly,

Apurva Gupta
Equipment Sales Manager
Tel No: +91 99711 44059
Email: a.gupta@cpmbiomass.in