Rashmi 6 Paradigm LIMITED

From Biomass to Brilliance

Shaping the Future with Solid Bio Fuel Energy Solutions

About the author

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AGM (Sales & Business Development)

- 26 years of service in the Indian Army (Artillery Division)
- Specializes in bio-energy operations
- Manages agro waste aggregation and biomass SCM
- FSSAI consultant for RUCO project in East India (Repurpose Used Cooking Oil (RUCO) project for bio-diesel manufacturing in the East)

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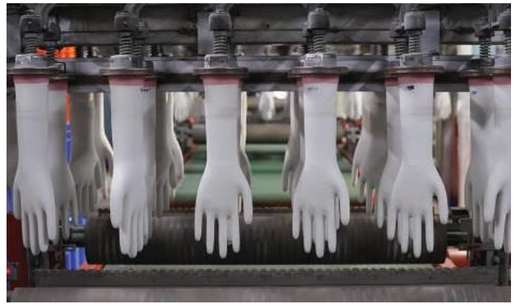
Introducing

Rashmi Group

A Diverse Business Conglomerate

Rashmi Group, a distinguished US$ 3.5 billion business conglomerate, commands extensive expertise across various sectors including integrated Iron & Steel Products, Cement, Power, Dredging, Ferro Alloys, Biomass/Wood Pellets, and Charcoal products.

Established in 1966 in West Bengal, India, Rashmi Group has accumulated over five decades of experience, notably excelling in the manufacturing of Ductile Iron Pipes for over 20 years. Proudly recognized as the leading manufacturer of Ductile Iron Pipes in India and globally, Rashmi Group boasts an impressive annual production capacity of 800,000 MT. Beyond Ductile Iron Pipes, the group offers a diverse portfolio encompassing Steel, Cement, Power, Electronics, Nitrile, and recently expanded into Biomass Pellets, Charcoal Products, and Seamless Pipes & Tubes, solidifying its position as a dynamic player in multiple industries.



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An Initiative by Rashmi Group

With a strong focus on carbon neutrality, we strive to provide high-quality, renewable energy alternatives to traditional fossil fuels. We cater to more than 200 direct market applications. Our state-of-the-art manufacturing facility at Kharagpur, West Bengal, India, is also capable of producing tailor-made products required for critical process applications with cost-effective solutions.

- Rashmi 6 Paradigm Limited emerges as the latest venture of the esteemed Rashmi Group, a rapidly expanding Business Conglomerate in India.
- Renowned as a premier producer of Biomass pellets and Charcoal products, Rashmi 6 Paradigm Limited is dedicated to fostering sustainable and eco-friendly solutions.
- The company specializes in transforming diverse organic agricultural waste into solid biofuel, offering a renewable energy source for the future.

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AGENDA

A ***Government Initiatives***

Promoting Biofuel Utilization in Thermal Power Plants in Cement Manufacturing

B ***Resource Assessment***

Potential Availability of Agricultural and Wood Waste for Biofuel Production

C ***Impact Analysis***

Liquid Biofuels (Ethanol and Compressed Bio Gas) on Agri-Residue for Solid Biofuel Production

D ***Innovative Approach***

Bamboo as a New Raw Material for Solid Biofuel Production

Biofuel Production in India

Current Landscape

- India, the second-largest producer of agricultural waste globally, generates approximately 730 million tons of agricultural waste annually, with two-thirds utilized for domestic purposes.
- An estimated 35%, roughly 220 million tons, of agricultural waste is available for biofuel production.
- Presently, India boasts a biomass pellet manufacturing capacity of 2.38 million metric tons per annum.
- Despite the potential for bioenergy generation from agricultural waste, effective utilization hinges on addressing environmental and economic considerations.
- The escalating production of municipal waste in India offers further opportunities for bioenergy generation, yet challenges such as decentralized collection and segregation require attention.

Key Biomass categories

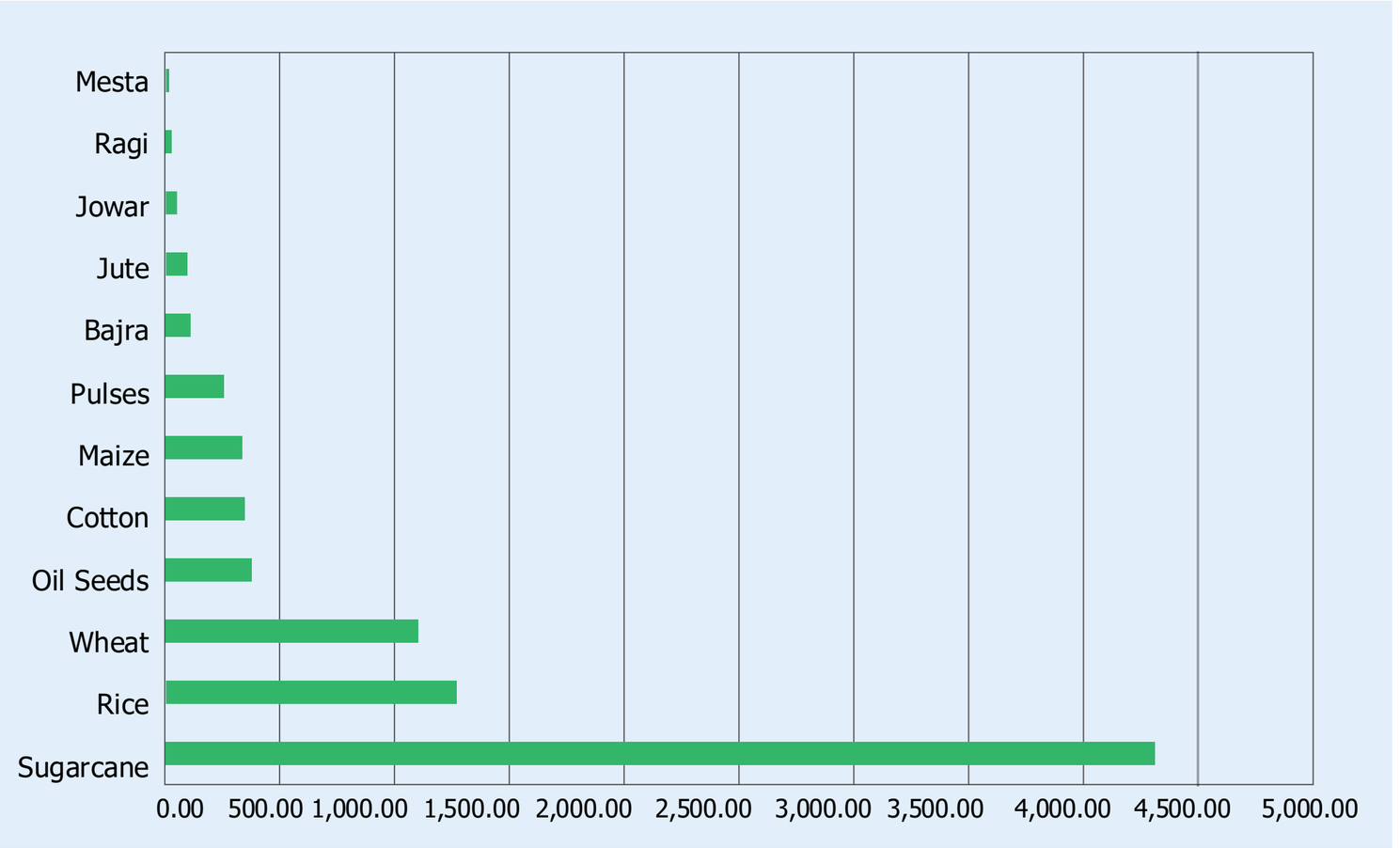
Bagasse
90 million tons per year

Mustard
15 million tons per year

Cotton Stalks
20 million tons per year

Paddy Stalks
166 million tons per year

Yields of Major crop residues in India (Avg. 2019 - 2024) (In Lack Tonnes)*



*Data for the year 2023-24 is of 2nd Advance Estimates # Cotton Production in Lakh Bales, 1Bale=170 Kg

Jute, Mesta & Sunn hemp Production in Lakh Bales, 1Bale=180 Kg

Government Initiatives in Biomass Usage

- The Ministry of Power updated the biomass policy on June 16, 2023, amending the original policy from October 8, 2021.
- Under the revised policy, Thermal Power Plants are obligated to integrate a minimum of 7% biomass co-firing by the financial year 2025-26.
- Currently, 50 Thermal Power Plants have commenced co-firing agro residue-based biomass pellets with coal, as announced by the Union Minister for Power and New & Renewable Energy.
- Data from https://samarth.powermin.gov.in/ reveals that as of Oct 17th, 2024, a cumulative biomass co-firing of 11.16 lakh metric tons has been achieved in Thermal Power Plants.

The Union Minister for Power and New & Renewable Energy unveiled the revised Biomass Policy, mandating Thermal Power Plants to adopt 5% biomass co-firing from the financial year 2024-25.

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Rising Green Liquid Fuel Demand

Government aims to achieve E20 blend by 2030 and for this they are offering alluring financial incentives to encourage manufacturers.

With a CAGR of 5.67%, the production of Ethanol is expected to reach 6.3 billion liters in 2035 from 3.2 billion liters in 2023.

Key Benefits of using Biofuel in Cement Manufacturing:

- **Alternative Fuel Source**
  Biofuels can replace traditional fossil fuels in cement kilns, reducing reliance on non-renewable energy.
- **Energy Efficiency**
  Biofuels contribute to more efficient energy use in cement production processes.
- **Waste Utilization**
  Organic waste materials, such as agricultural residues and wood waste, are repurposed as biofuels, reducing landfill waste.
- **Supports Circular Economy**
  Biofuel use promotes a circular economy by recycling organic materials into valuable energy sources
- **Carbon Neutral**
  Biofuels release only the carbon absorbed during the growth of organic materials, helping to lower carbon emissions.
- **Cost Reduction**
  Utilizing biofuels can lower fuel costs for cement manufacturers.
- **Sustainability**
  Biofuel usage aligns with global sustainability initiatives, promoting eco-friendly practices within the cement industry.

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Available Solid Bio Fuels

Torrefied Bio Pellets

Torrefied Biomass Pellets (TWP) are a renewable energy source made from biomass like waste wood, bamboo, or agricultural residues. The torrefaction process heats biomass in the absence of oxygen (250°C to 320°C), removing moisture and volatile compounds, resulting in a dry, energy-dense, carbon-rich product.

Properties

Gross Calorific Value	5500 kcal/kg
Ash	< 5%
Moisture	< 10%
Volatile Matter (VM)	60-70%
Fixed Carbon (FC)	35-45%

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Available Solid Bio Fuels

Non-Torrefied Bio Pellets

Non-torrefied Biomass Pellets, also known simply as Biomass Pellets, are a renewable energy source made from organic materials like waste wood, agricultural residues, or energy crops. The raw biomass is dried, ground into fine particles, and compressed under high pressure to form dense, cylindrical biomass pellets.

Properties

Gross Calorific Value	4500 kcal/kg
Ash	< 3%
Moisture	< 8%
Volatile Matter (VM)	65-70%
Fixed Carbon (FC)	95-98%

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Available Solid Bio Fuels

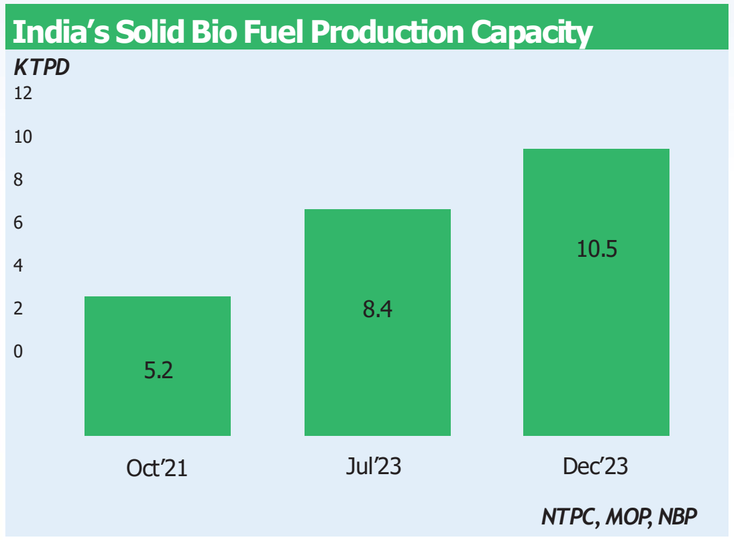
Biochar

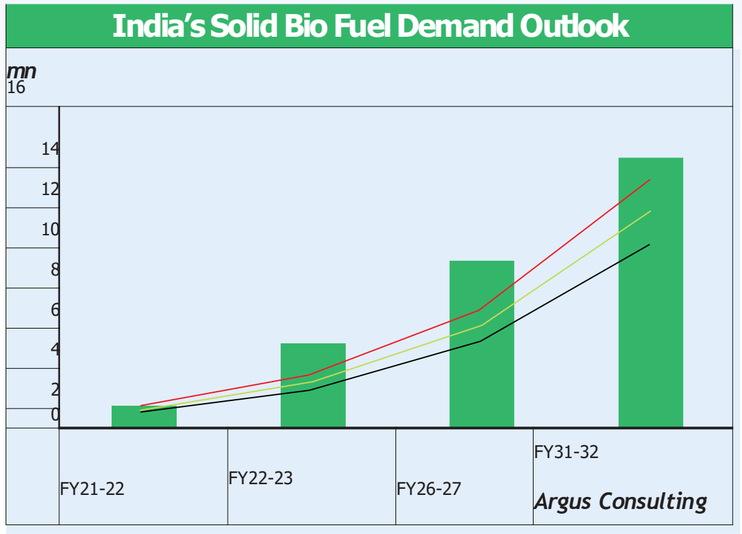
Biochar, traditionally known for its agricultural benefits, can also serve as a renewable fuel source. It is produced through the pyrolysis of biomass—heating organic materials like wood, bamboo, agricultural residues, or manure in an oxygen-limited environment at temperatures between 300°C and 700°C. This process leaves behind a carbon-rich, porous material called Biochar.

Properties

Gross Calorific Value	6500-7500 kcal/kg
Ash	< 5%
Moisture	< 10%
Volatile Matter (VM)	0.5-70%
Fixed Carbon (FC)	75-85%

Future of Solid Bio Fuel in India





- This suggests a biomass demand of around 8.6 million tons by 2026 and 13 million tons by 2031, representing just 5% to 7% of the surplus biomass potential.
- Consequently, it is anticipated that pellet production capacity will experience significant growth, aligning with increasing blending obligations and coal-fired capacities.

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Challenges to India's Solid Bio Fuel Supply

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Committed For A Greener Future

- The production capacity of our Complete Plant stands at 250 MT per day.
- We're aiming to boost our production capacity to 1250 MT in the next 6 months to meet the increased market demand.
- Our plant boasts 6 hammer mills, 12 pellet mills, and other Plant Engineering equipment.
- Our state-of-the-art manufacturing process adheres to stringent quality control measures.
- Our Complete Bamboo Plant operates with eco-friendly practices, minimizing environmental impact throughout the production process.

End Note

In closing, it's evident that the pursuit of sustainable energy demands collective action and inventive strategies. Rashmi 6 Paradigm Limited, at the forefront of the biomass sector, is dedicated to harnessing renewable resources for a more eco-friendly tomorrow. Our partnerships, including with the National Bamboo Mission, underscore our commitment to utilizing Beema bamboo as a sustainable resource and establishing green supply chains. This highlights the immense potential for innovation within the biomass industry as we work towards a greener future together.

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