

Transforming Agricultural Waste into Sustainable Energy: The Bagasse Drying Solution

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Introduction

In Kenya, the sugar industry is a key economic sector but faces environmental challenges, especially in managing bagasse, a byproduct of sugarcane processing. Improper disposal of bagasse near rural communities contaminates land and water, posing serious public health risks. Despite these issues, bagasse has potential as a biomass fuel, but its high moisture content makes it difficult to burn without drying. Conventional drying methods are costly and risky for rural areas. Our research aims to develop an affordable, sustainable bagasse drying technology using local materials, converting bagasse into a reliable fuel source while reducing environmental hazards.



Bagasse Dumpsite



Bagasse Drier Fan



Women Off-Loading Bagasse in the Processing Factory



Project Team

Objective

This project aims to develop a sustainable, low-cost bagasse drying technology to address the environmental, energy, and public health challenges in rural Kenya. The solution will convert bagasse into clean, affordable biomass fuel, reducing pollution and improving community health.

Goals

- 1. Environmental Restoration:** Reduce land and water pollution from improper bagasse disposal and reclaim land for sustainable use.
 - 2. Affordable Clean Energy:** Provide rural households with low-cost, sustainable energy by repurposing dried bagasse as biomass fuel.
 - 3. Improved Health and Wellbeing:** Enhance community health by reducing pollution and offering cleaner energy alternatives.
- This project supports Sustainable Development Goals (SDGs) for Clean Energy (SDG 7), Clean Water (SDG 6), and Good Health (SDG 3), promoting sustainable rural development.*



Quality briquettes for Clean Society

Innovation

We have developed an Eco-Dryer, an advanced bagasse drying solution, designed to reduce moisture content efficiently for high-quality briquette production. Over the last two years, the project has progressed from concept to a working prototype. Unlike traditional sun-drying methods or earlier mechanical designs that posed fire risks, Eco-Dryer now offers precise temperature control and optimized retention time, ensuring faster, safer, and more reliable operation.

The prototype is currently undergoing final testing, showing improvements in drying efficiency and safety. With consistent data validating its performance, our next steps include scaling production and conducting pilot tests with sugar processing companies. These partnerships will help us refine the dryer in real-world conditions and demonstrate its environmental and financial impact.

To ensure investor readiness, we have developed a detailed roadmap. By Quarter 1 of next financial year, we plan to initiate large-scale pilot programs and secure regulatory approvals. We are also finalizing a go-to-market strategy that outlines scalable production, targeted distribution channels, and key partnerships with sugar producers in East Africa. Full market launch is anticipated by Quarter 2-next year.

Eco-Dryer addresses two critical challenges for the sugar industry: safe disposal of bagasse and sustainable fuel production. By converting bagasse into briquettes, we reduce landfill waste and support clean energy initiatives. Our financial models project strong returns driven by increasing demand for sustainable energy solutions. With its environmental benefits and market potential, Eco-Dryer presents a compelling investment opportunity as we move towards commercialization.

Market Opportunity

Kenya and other sugar-producing regions in East Africa present a substantial market opportunity for off-grid bagasse drying technology. These regions produce over 20 million tons of sugarcane annually, generating an estimated 7 million tons of bagasse. With over 40 sugar mills across the region, the demand for efficient, locally sourced drying technology is critical to reduce reliance on expensive imported alternatives.

The total addressable market (TAM) for bagasse drying technology is estimated at 150-200 units across East African sugar mills, assuming an average of 3-5 dryers per mill. This provides a market potential of \$5 to \$7 million for the technology in the short term, with long-term expansion opportunities as more sugar mills adopt sustainable agricultural practices.

Our innovation is designed to meet the growing need for efficient processing of sugarcane waste (bagasse), critical to the agricultural economies of Kenya, Uganda, and Tanzania. We are targeting an initial sales volume of 3 units in the first year, expanding to 5 units by year two, and achieving a growth of 2-3 additional units annually, reaching a total of 10 units by year five. This conservative growth trajectory aligns with market capacity and operational scalability.

Priced at \$26,500 per unit, the projected revenue over five years is approximately \$1.2 million. The cost of manufacturing each dryer is \$16,500, providing a gross margin of \$10,000 per unit, which translates into an estimated total profit of \$500,000 over the same period.

The potential for profit is driven by strong demand for locally manufactured drying solutions, combined with favourable cost dynamics. With an initial investment of \$600,000 to scale production and cover operational costs, the return on investment (ROI) is projected at 83.3% over five years. This includes reinvestment in production efficiency and expansion into untapped markets.

We are seeking an investment of \$600,000 to meet increasing market demand and scale operations. This funding will enable us to produce and sell 3 units in the first year, ramping up production to meet the needs of 10 units annually by year five. The strong market fundamentals, combined with the projected profitability and ROI, make this an attractive investment opportunity in East Africa's growing agricultural waste management sector.



Bagasse Processed to Charcoal Briquettes



A Tractor Off-Loading Bagasse at One of the Dumpsite

Future Scaling

Investment capital is critical to developing the necessary infrastructure, scaling production capacity, and supporting ongoing research and development in Agri-Waste drying technologies. Recognizing the challenges of scaling, especially around collection costs, we have adopted a decentralized production model. This approach will minimize transportation and collection expenses by establishing smaller, localized production units near major sugar-producing regions.

To address scaling concerns, we have projected that an investment of \$1.2 million will allow us to build three regional production hubs, each capable of manufacturing and servicing 20-30 units annually. This distributed model will significantly reduce logistics costs by up to 35%, as dryers can be assembled and distributed locally, closer to sugar mills, thereby mitigating the expense of transporting raw materials and finished products.

Our detailed financial projections show a 5-year return on investment (ROI) of approximately 85%, based on the anticipated production and sale of 120 units across these hubs. The average manufacturing cost per dryer is \$16,500, and with a sales price of \$26,500, each unit generates a \$10,000 margin. With a breakeven point at around 50 units, we expect profitability within two years, as regional demand continues to rise due to increasing regulatory pressure on sustainable waste management practices.

Following the successful completion of the pilot phase, we will establish a dedicated company to manage the expansion and ensure efficient scaling, guided by lessons learned in cost control and localized production. This strategy ensures that our growth is both sustainable and financially viable, positioning us to meet the rising demand for Agri-Waste management solutions while delivering attractive returns for investors.

Team / Acknowledgements

Our global team combines expertise in sustainable engineering, agricultural technology, and clean energy to develop off-grid bagasse drying technology:

• **University of Huddersfield:** Contributes expertise in sustainable engineering and technology optimization, ensuring energy efficiency and global standards.

• **Kibabii University:** Provides local knowledge in agriculture, community engagement, and leads supply chain logistics and market distribution, enabling efficient regional scaling.

• **Carbon Footprint Co:** Offers infrastructure for producing bagasse briquettes and serves as the pilot project site for testing and validation.

Together, we aim to transform bagasse disposal and promote clean energy for rural communities.

What's Missing: While the team brings strong technical expertise and local engagement, We are seeking additional commercial partners to support scaling and market expansion.

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