Investment Factsheet:

Promoting the use of rice straw in Kilombero

Rice is the most important food and commercial crop in the Kilombero Valley, and its commercialization is linked to agricultural intensification and poverty reduction among local farmers. The production system for rice in Kilombero typically involves smallholder farmers growing rice using a range of **traditional and modern techniques**, including flood irrigation and chemical fertilizers resulting in a productivity of rice over 1.32 tons per acre. On average, 80-90% of the population in these areas is involved in rice production. The median farmer in the Kilombero landscape cultivates small plots averaging 2 acres and al**most the 50% rice production is sold in raw form, with little value added.**

Problem statement

The lack of markets to sell rice residues leads farmers to believe that rice husks are waste and not a productive resource. This perception limits the **use of rice straw for productive purposes**, so farmers often pile it up and leave it to rot, burn it or dump it in forests, causing environmentally damaging, carbon emissions and respiratory problems in rice-growing areas.

Proposed action

Rice straw can be processed and used in agriculture for purposes such as soil improvement through carbonization and composting, and in bioenergy production since it is a good additive that can be processed to increase the energy supply.

The approach focuses on implementing a systematic process of collection and aggregation of rice straw, managing and **processing the rice straw** to produce bio-coal (briquettes), and developing a distribution network to deliver and sell it to end users.

Investments needed

- **Estimated initial investment:** about USD 50,000 (costs include purchase of briquette processing machine; raw material chopper; min-truck; installation of machines; supportive and safety equipments, etc).
- **Average operating costs:** USD 65,000 per year (costs include maintenance costs; wages for permanent employees and temporary workers; and paddy production costs).

Potential areas to be implemented

- Ifakara Town Council – Makula Village
- Mlimba District Council – Njage Village

Beneficiaries:

- Farmers and farmer groups from the villages would benefit by increasing their income through the sale of briquettes.
- Transporters would have the opportunity and employment to transport rice straw from farmers' fields to the processing area.
- Buyers and end-users would have access to quality briquettes that are more affordable and efficient than traditional coal.

Partnerships for success: Mazingira Association (awareness), TIRDO (training and capacity building), National Microfinance Bank (financing), Local and Village Governments and District Councils (support), Kuja na Kushoka (training and capacity building), GEF Small Grants Programme (financing).

Expected benefits

Farmers' income coming from rice sales (assumptions: 4,500 kg of rice harvested per acre/year, selling price of 0.27 USD/kg, 90 acres) **(110,000 USD/year).** This represents 85% of expected benefits.

Avoided costs related to rice waste in case farmers don't take advantage of it, because now it has an economic value (assumptions: 75 bags of rice straw by month at a price of 1USD/bag) **(900 USD/year).**

New incomes from the sale of briquettes (assumptions: production of 7,400 kg per month, selling price of USD 0.2 per kg **(18,000 USD/year).**

Financial:

	2026-2030	2026-2035	2026-2050
Total present Costs (USD)	347,285	633,189	1,412,514
Total present Benefits (USD)	494,014	1,278,047	5,497,763
Financial Net present value (FNPV) - (USD)	146,729	644,858	4,085,249
Financial Rate of Return (FRR) - %	49%	66%	68%
Benefit-Cost Ratio (BCR)	1.4	2.0	3.9

Break-even point: in **Year 3** the initial investment is overpassed, and revenues start to be higher than costs, being the net cash flow of that year: **USD 15,331**.

Environmental:

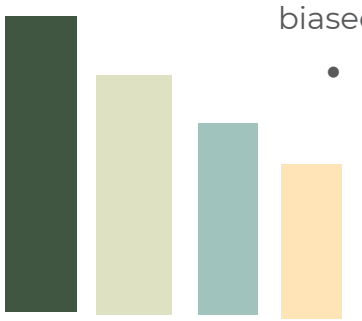
It solves the problem of pollution caused by burning rice straw and provides farmers with a sustainable source of energy.

Social:

Creation of partnerships between farmers groups (looking for an equitable number of participants in terms of gender and youth); training in rice residue management and bio-coal production.

Profitability of rice value chain increases from the initial years if accompanied by activities to utilize rice straw for the production and sale of briquettes.

Potential for success



- The strategy will be open to all rice producers without any barriers that could lead to a biased participation, mitigating any possible gender and youth disparity
  - Address the problem of pollution caused by burning rice straw.
    - Enable participants with a sustainable source of energy and provide them with a source of income to improve their livelihoods.
      - The briquette business is a new initiative, but already, the Environmental Association in Mlimba District has started implementing it and has observed positive results.

Opportunities for enabling NbS investments

- A **System of Rice Intensification (SRI)** could improve water efficiency and productivity through optimized spacing, reduced seed use, and soil-nutrient management.
- The application of **organic Inputs** such as compost and green manure (e.g., *Sesbania*) improves soil health by enhancing microbial activity and structure, contributing to long-term agricultural sustainability.
- **Habitat enrichment** through the creation of refuges and hedgerows within rice landscapes promotes natural pest control by attracting beneficial insects, thereby reducing pesticide reliance and increasing biodiversity.
- **Wetland conservation and the establishment of buffer zones**, could help maintain hydrological balance, filter pollutants, and mitigate flood risks—further reinforcing the ecological stability of rice-growing areas.