

CIRF CASE STUDY 1

Circular Solutions Drive New Energy Pathways

KIGASALI COFFEE COMPANY is a Rwandan coffee producer and processor that primarily serves international markets, with a small but growing presence among domestic as well. Through its coffee roasting operations, Kigasali identified an opportunity disguised as a waste stream: they produced 360 MT to 500 MT of coffee husks annually that were sometimes sold but were mostly burned inefficiently during other parts of coffee processing (see box). Recognizing the potential to turn this byproduct into a renewable energy source, Kigasali joined CIRF to diversify its products, integrate circularity into its business model, and strengthen its competitiveness for export markets.

SCOPING

CIRF began by conducting an initial assessment of Kigasali's operations, identifying opportunities to add value and better utilize the waste generated during processing. The assessment highlighted potential to create new products, utilize new technologies, and reduce operational costs. From their coffee residues, two main options emerged: producing compost (traditional and vermicompost) and transforming husks into biomass fuel pellets. Real Bridge Limited, the technical assistance provider (TAP) from the CIRF program, conducted a market study to assess the profitability and market demand of pellets in Rwanda and regionally.

Building on these insights, Kigasali Coffee Company worked with the TAP to develop a business plan and roadmap to pilot new technology and products. CIRF facilitated site visits to pellet making experts, Biomasster, for observation and hands-on experience in biomass pellet production, improving compost quality, and exploring waste-water efficiency in their coffee washing stations. Kigasali launched a trial of the pellet technology. The company rented a pellet machine, hired a technician to provide one month of operational support, and repurposed space in its facility to run the pilot.

SCALING

By the end of the trial, Kigasali confirmed the pellet technology was well-suited to their operations and decided to move forward with replacing their current energy source. Scaling up production, however, required additional investment—both to acquire their own pellet-making equipment and to establish a dedicated facility for production. While the pilot relied on rented machinery, Kigasali is currently exploring financing options to purchase their own equipment and secure more long-term sustainability for the initiative.

While they complete their transition to the new systems, Kigasali currently produces more pellets from their coffee residues than what they need internally, allowing them to sell surplus pellets within their community. The use of the pellets within the community also requires a change in cooking stove technology. Kigasali is also expanding their product offerings to include compatible cooking stoves for household use of the pellets. To bring the product to market, however, the Rwandan government requires a certification assessment for both innovations: pellets and cookstoves, a process slowed by long lead times (reportedly there are at least 80 companies ahead of them).

IMPACT

Kigasali's business journey demonstrates how circular innovation can unlock new market opportunities, diversify product lines, and increase revenue streams. This inclusive growth drove creation of seven new jobs and established a customer base of 29 clients for their pellets, as of 2025. The company now transforms an estimated 15,000 kgs of annual waste annually that were sometimes sold for 30 to 50 RWF/kg into a value-added product sold at 300 RWF/kg, generating roughly $834 USD per month in revenue.

Circular Clean Energy Solutions in Coffee Processing

Kigasali used to sell coffee husks to brick manufacturers and also burned them to dry coffee beans before final milling. While coffee husks are a renewable biomass fuel, their combustion is inefficient and produces high emissions. Efficiency can be measured by the volume of biomass required for a given drying output, and effectiveness by the quality and consistency of the drying process. Overall performance is evaluated based on the volume of CO_2 and other emissions produced.

Converting coffee husks into pellets can improve all three aspects. Pellets provide a more consistent heat output due to their uniform size, density, and moisture content, allowing better control of the combustion rate. This results in more stable drying temperatures and easier fuel handling. Pellets also have lower moisture content and higher energy density, meaning less biomass is needed to produce the same heat. Their uniformity enables optimized air-to-fuel ratios, leading to more complete combustion and lower CO_2 and particulate emissions.

In short, turning loose coffee husks into pellets makes them burn hotter, cleaner, and more predictably, enhancing both the sustainability and productivity of the process.

