

BUSINESS MODEL PROFILES: ENERGY

SUMMARIZED FROM THE FORTHCOMING PUBLICATION
RESOURCE RECOVERY FROM WASTE



RESEARCH PROGRAM ON
Water, Land and
Ecosystems



Producing Briquettes from Agro-waste

Business characteristics

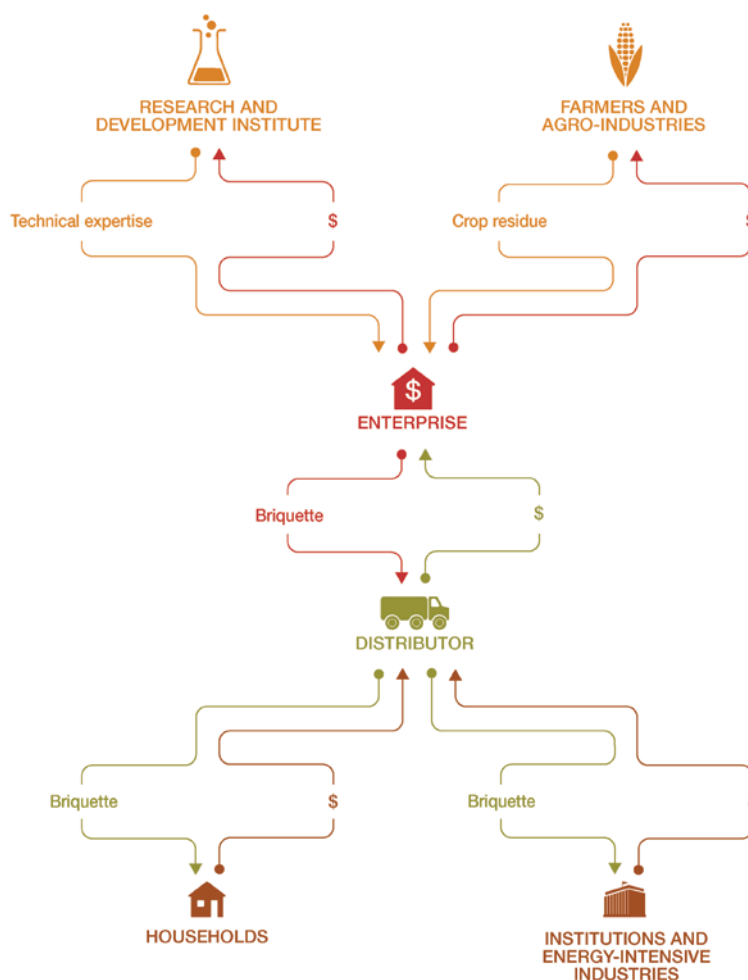
Geography	Regions with available crop residue
Scale of production	About 1,000-2,000 tons of briquettes per year
Type of organization	Private
Investment cost range	About USD 200,000 to 450,000
Key costs	Investment cost (land, building and machinery) and operational cost (transportation, labor, utilities, maintenance, marketing and packaging, training of farmers and distributors/micro-franchisees)
Revenue stream	Briquette sales and potential sale of carbon credits

Business model

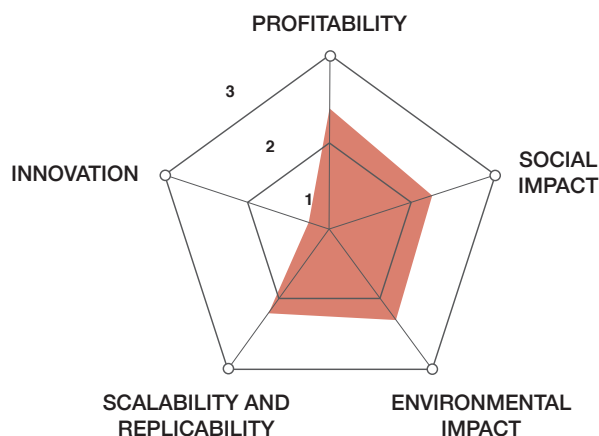
The business model converts crop residue (e.g., wheat bran, maize cobs and coffee husks) into briquettes to be sold as fuel for cooking and heating. Briquettes can be produced with limited skill through a simple technology using standard mechanical compression with a binding agent. Briquettes can replace natural firewood and raw biomass, providing customers with a low-cost fuel that emits less smoke and offers higher calorific (energy) value.

In the model, a private enterprise buys crop residue from farmers and agro-industries to process this into briquettes. These are then sold for profit to households and businesses through direct sales, distributors or micro-franchising. The company can invest in research and development (R&D) to improve production efficiency and to produce higher quality briquettes from different combinations of agro-waste. The enterprise can expand its business to produce low-cost compost, and manufacture and sell improved cook stoves and ovens which use briquettes.

BUSINESS MODEL VALUE CHAIN



Business performance



The business model scores highly on profitability – with a strong revenue source, a diverse customer base and the potential for additional profit – and socio-environmental impact – with reduced air pollution and additional revenue for farmers. It scores low on innovation as it does not require any sophisticated technology or financing.

Main risks

Market risks: In rural areas in developing countries, the market risks for households as customers is high due to free availability of firewood picked up from forest/plantation on community land.

Competition risks: Briquettes have to compete with alternative products such as charcoal, wood and kerosene, which can be more easily available.

Political and regulatory risks: In most developing countries, cooking is a social issue, with governments providing subsidies for fuels such as kerosene. This results in these products being priced lower than briquettes, thereby posing a significant risk to the business model.

Safety, environmental and health risks: Waste processing technologies pose a number of environmental and health risks if appropriate measures are not taken. These include the emission of methane from decaying organic waste, and health and safety risk for workers.

Case study: Kampala, Uganda

Kampala Jellitone Suppliers (KJS) is a company located in Kampala, Uganda, that produces briquettes from agricultural residues. Set up in 1981, it started as a coffee roasting enterprise using diesel burners followed by a bakery that used firewood ovens. However, due to high energy costs, the company was propelled to look for an alternative fuel source, giving rise to the production of briquettes.

KJS is now the first large-scale briquette producer in Uganda, and its customers include institutional and

commercial users who previously used fuelwood and charcoal for cooking and heating. The company provides briquettes which have high heating value, consistent properties and burn longer than alternative cooking fuel, resulting in cost savings for the users. KJS also contributes to gender equality by hiring a majority of women in its enterprise. In order to improve operation efficiency and product quality, the company conducts innovative research and development in the suitability of agricultural waste for briquetting, briquette making, and briquette burning stoves.

Key performance indicators (as of 2012)

Capital investment:	USD 698,964		
Labor:	100 full-time workers (70% women) and 400 external laborers		
Operation and maintenance cost:	USD 0.242/kg of briquette		
Output:	1,680 tons of briquettes/year		
Social and environmental impact:	Savings to users of USD 0.08-0.32/kg of briquettes, carbon emission savings of about 6.1 tons of carbon dioxide (CO ₂) per ton of briquettes, and additional income to farmers of USD 3-14 per ton of input		
Financial viability:	Payback period: 14.5 years	Rate of return: 7%	Gross margin: 10%

For more information on the business model and related cases, see Chapter 3 of **Otoo, M.; Drechsel, P. (Eds.). 2017. Resource recovery from waste: Business models for energy, nutrient and water reuse in low- and middle-income countries. London: Earthscan/Routledge. In press.** The book has been produced by the Resource Recovery and Reuse subprogram of the International Water Management Institute (IWMI), under the CGIAR Research Program on Water, Land and Ecosystems (WLE) and its Rural-Urban Linkages Research Theme. The support of the Swiss Agency for Development and Cooperation (SDC), the International Fund for Agricultural Development (IFAD), and CGIAR Fund Donors (www.cgiar.org/about-us/our-funders/) is gratefully acknowledged.