



## CHAPTER 3

## The Impact of Gendered Roles in the Briquette Production and Supply Chain: Lessons Learned from Green Heat Ltd, Uganda

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### 3.1 Introduction

#### 3.1.1 Background information

According to the Ministry of Energy and Mineral Development, 94% of Ugandans burn biomass to meet their basic energy needs, consuming roughly 20 million tons of wood each year (NEMA 2010; RoU MEMD 2014a). With only 10% of the rural population having access to electricity, an annual population growth of 3.2% (2017 est.) and annual growth in energy demand of 7.5%, pressure on biomass resources in Uganda and the associated negative health impacts on the population are expected to dramatically increase (CIA 2018; NEMA 2010). Such biomass consumption involves firewood and charcoal, referred to as woodfuel, and crop residues. This biomass provides all the basic needs for cooking and heating in rural areas and for most urban households. It is also the main source of energy for rural small- and medium-sized enterprises and contributes significantly to the rural economy. Biomass is traditionally

sourced from natural forests and unsustainable harvesting has led to the destruction of large swathes of forest cover across the country. Most woodfuel-harvesting technologies are wasteful and their use does not meet demand. For example, only about 10% of all households use efficient stoves (RoU MEMD 2014b) which contributes to excessive fuel consumption and land degradation.

The collection of firewood for household use is an activity performed mainly by women and girls (daughters). Women and/or their children collect small bundles of stems, branches or pieces of wood less than 10 kg (kilograms) in weight on their way home, usually after gardening work. Others usually select a day within the week when they go out to gather/harvest firewood. Firewood is usually collected from bushlands covered by scrub, thickets or densely interlaced woody vegetation (Department of Forestry 1992). Some people collect from plantation forests. A few households sometimes buy firewood or charcoal, especially during the wet season or if they have some disposable



income. Distances covered and time spent during firewood collection depend on how accessible the firewood is. Firewood is normally collected many times each month, with most people collecting daily, once a week or once every two to three weeks.

Firewood collection increases the burden on women and the biomass generates high concentrations of air pollutants if burned in efficient stoves that are inhaled during cooking activities. This also affects the productivity of schoolchildren as they are too tired to read or do any homework.

People in urban and peri-urban centers use more charcoal than firewood. Making charcoal is mainly performed by men and production usually increases during the dry season when there is less agricultural activity. Some men carry out charcoal production after clearing the land when a considerable amount of wood is available, or in the case of young boys, during the school holidays. The charcoal produced is usually sold to intermediaries who transport it to urban centers for sale. Most of the Ugandan population's main livelihood activity pertains to agriculture which generates various waste streams. The woody stems/branches are used as firewood or for making charcoal; organic waste, on the other hand, is utilized as either fodder or left to rot in the fields and provide mulch and nutrients for the soil.

The main objective of our enterprise is to effectively utilize organic waste by turning it into briquettes for energy supply, income generation and environmental management. The briquette enterprise contributes towards relieving Uganda's high unemployment rate among young people (15-24 years) which is at 83% (Rehfuess et al. 2006) the highest in the world. This rate is higher for those who have formal degrees and live in urban areas due to the disconnect between the degree achieved and the vocational skills needed for the jobs that are in demand for workers (The World Bank 2008). Those without a degree are also unable to obtain jobs because they lack the skills needed for the position or they lack resources such as land or capital. As a way to escape poverty, many young people in rural areas look for better opportunities by migrating to urban centers. Indeed, migration to urban areas is unavoidable and even desirable as a way to improve allocation of human resources, especially in land-scarce countries. This sequence is making it difficult for Uganda to break out of the poverty trap. Young women who conceive at an early age often have to stay at home in a maternal role from a very young age which limits their ability to work (Daumerie and Madsen 2010). To address poverty and unemployment, many people are venturing into the briquette business. For example, according to the Global Village Energy Partnership (GVEP) report of 2012, biomass briquettes emerged as one of the top three traded energy products within East Africa and Uganda with 705 energy enterprises currently in the Developing Energy Enterprises Programme (DEEP). From the 885 active businesses within the program, 169 were briquette businesses, 139 (82%)

of which were operating in Uganda (YLTPA 2011). From the 139 briquette entrepreneurs receiving mentoring from the GVEP in Uganda, 68 and 32% were women and men respectively. It was observed across the program that women were generally more involved in businesses that require a low capital start-up, are immobile in production at the micro scale and deal in products that they can sell to immediate markets, which could partly explain their greater number in briquette businesses (YLTPA 2011). The cumulative impact of DEEP briquette entrepreneurs in Uganda amounts to over 3,000 beneficiaries.

The number of beneficiaries was calculated based on factors such as the average number of people per household (who will benefit from the purchase of the briquettes) and the longevity of the briquettes. Much as the project assumed that briquettes were used exclusively by these households, it is worth noting that households often use a mixture/combination of different fuel types (for example briquettes, firewood and charcoal) so briquettes may provide partial fuel substitution for a much larger number of households.

### 3.1.2 About Green Heat Limited

Green Heat is a renewable energy company which produces pillow-shaped fuel briquettes (Figure 3.1), a form of alternative biomass energy, to tackle waste management. Green Heat was established in 2011. Green Heat applies the **reduce, reuse and recycle principle** commonly referred to as the 3Rs in managing the ever-increasing waste in the slums surrounding Kampala, Wakiso and Mpigi. Green Heat converts waste into energy to reduce the reliance on non-sustainable biomass energy among Ugandan consumers and contributes to reduction of deforestation around the Kyambogo area. Green Heat's production plant is at Matugga along Matugga- Kapeeka Road, in Wakiso, Uganda. The factory is surrounded by a rural slum.

FIGURE 3.1. PILLOW-SHAPED FUEL BRIQUETTES.



Source: Green Heat Ltd.

Green Heat objectives include:

- Being a provider of affordable clean energy cooking solutions of choice.
- Increasing usage of affordable clean energy solutions for low-income households and institutions in Uganda.
- Contributing to improvement of health for people in low-income households and institutions that rely on firewood and wood charcoal for cooking and heating in Uganda.

Green Heat's first complement of personnel included the directors and three officers whose roles were to spearhead production and marketing of briquettes and biogas. It is possible that the hiring of men for these roles was attributable to selection of personnel to work in the company based on friendship and referrals. However, this has now changed with the growth of the company and hiring is based on formal applications to fill available vacancies. Over time, Green Heat later recruited a woman to manage the recruited sales agents.

The idea for starting Green Heat was conceived by Gabriel Okello and Vianney Tumwesige together with a Cuban exchange professor, Perez Diaz, then based at Kyambogo University; the motivation was to address increasing solid waste generation, disposal challenges and widespread poverty. Further there was a critical need to address social and environmental problems associated with dependency on biomass energy.

Green Heat assets include a briquette factory, briquette press, crushing machine, mixer, drying beds, sewing machine and 30 kilns located on various farms. Funding to purchase the equipment was supported by the International Climate Initiative of the German Federal Ministry for Environment, Nature Conservation, Building and Nuclear Safety (BMUB) through SEED.

## 3.2 Gender and Organizational Management of Green Heat

### 3.2.1 Management structure and gender distribution

Senior management of the company consists of two male director positions: a managing director, Mr. Tumwesige Vianney and an operation director, Mr. Okello Gabriel. The directors manage the strategic plans, goals and policies for Green Heat, its suppliers and sales partners. They also plan and coordinate departmental work plans and budgets. They are responsible for recruiting and tracking the key performance indicators of the departmental managers. The organization departmental managers constitute middle-level management. They execute the plans of Green Heat in accordance with the policies and directives of the directors. They are also responsible for inspiring other employees towards better performance. They coordinate activities within their departments. The team includes four women aged

between 24 and 35 who hold the positions of client relations manager, sales and marketing manager, accountant and financial advisor; and two men aged 20 and 33 who hold the positions of production manager and engineer. Having male directors is a coincidence but lessons from experience show that our female sales agents have performed beyond company expectations. Part of the reason is likely to be the trust among customers who assume that the women have better knowledge or are better placed to advise on cooking fuel because they are believed to have 'experience' in cooking fuels. Our main sales manager is currently being mentored to become a sales director. The education of the women in this team comprises diploma (2) and degree (2) level while that of the men is degree and master's level. The women face the challenges of other family responsibilities which affect their education. For example, the client relations manager dropped out of her degree program because she became pregnant in her first year at university and had to take maternal leave; she subsequently settled for a diploma course. The accountant was under pressure from her family to get married and as such opted for a diploma which was shorter in duration.

The production team consists of four men aged between 18 and 22 years who are responsible for the briquette production process, ensuring that quantities and quality standards are met. They are also entrusted with the responsibility of sourcing inputs (molasses, charcoal dust and domestic charcoal made from agricultural waste) from suppliers. They provide daily reports on briquette production outputs and inputs such as water and electricity. This team ensures that machines and tools are used properly, efficiently and kept in good working condition.

Green Heat products are sold through a network of sales partners. In total, there are 82 sales partners who own kiosks around Kampala including 73 women aged between 18 and 62 years and nine men aged between 22 and 50 years. The sales partners receive briquettes at no cost from Green Heat and after they sell them, the profit from each kilogram is shared at a 60: 40 ratio in favor of the agents. The sales partners already have kiosks and sell vegetables and other items. Green Heat helps in paying half of the rent for the kiosks and also teaches the agents general book-keeping techniques. The sales agents report directly to the sales/marketing manager and client relations manager. Some customers buy briquettes directly from the company. Green Heat plans to build wholesale points in order to lower the overheads of briquette distribution to various locations.

## 3.3 Briquette Production Procedure and Gender Participation

### 3.3.1 Day-to-day running of the business

This is governed by a strategic plan which has been compiled by the directors after examination of the various factors

contributing to the business and rigorous consultation with the partners (sales agents, charcoal dust suppliers, home-made charcoal suppliers, packaging material suppliers and so forth). The various departments also use standard operating procedures which are developed by those in charge in different sectors. The company has a code of conduct which every employee follows.

The production team has received basic production and maintenance training from the Uganda Industrial Research Institute. The sales agents have received basic book-keeping training from our accountant.

### 3.3.2 Sourcing of raw material

Currently Green Heat uses home-made **agricultural waste-based charcoal** plus **wood-based charcoal dust** mixed with **molasses** and **water** in the production of briquettes. The charcoal dust is sourced by leasing kilns to farmers. The agricultural waste is carbonized (burned under controlled oxygen) at farms using the leased kilns (Figure 3.2) and then Green Heat is contacted to collect the charcoal. Green Heat buys the on-farm produced charcoal at USD 0.02 per kilogram from clients who are not in the leased kilns' system and 40% of the product price for the leased kilns. The 60% is used to offset the price of the kilns. This activity is carried out by an almost equal number of men and women. There are 15 male farmers and 12 female farmers with average ages of 35 and 38 years respectively. The farmers have no formal education.

This kiln constitutes a 200-liter (l) oil drum with a top opening for depositing the biomass as well as a cover. The kiln is filled with biomass or agricultural waste. Agricultural waste usually includes maize cobs/stalks, ground nut husks, coffee husks and bean husks. Once the kiln is full, the biomass is lit at the top of the kiln. Once the fire has spread throughout the kiln, the kiln is covered leaving the chimney open. After about 15-20 minutes, the fire will move from the topmost layer of biomass to the bottommost layer. The kiln is then covered completely by closing the lid at the top of the chimney. The kiln is then left to cool for one to two hours until it is safe to touch the exterior. After the kiln has cooled, the charred biomass is emptied onto the ground and is ready for grinding.

Wood-based charcoal dust is sourced from charcoal traders. The production manager contacts them and they pack the dust into sacks. A vehicle is hired to collect both the home-made agricultural waste-based charcoal and wood-based charcoal dust. Charcoal dust dealers are ordinarily charcoal traders who preserve the charcoal dust which comprises small pieces of charcoal resulting from breakages during handling that are not useful in this form. After the charcoal traders collect it in sacks they sell to Green Heat at USD 0.02 per kilogram (kg). Thirty men with an average age of 28 and 26 women with an average age of 25 are supplying Green Heat with charcoal dust. Most of the men are primary school

dropouts whereas most of the women did not attend school. Men often have more control over their income and hence they have more money which they spend on buying charcoal for resale. Women on the other hand spend their income on family expenses and as such have little income at their disposal for restocking, thus limiting the amount of charcoal dust generated and consequent income from it. Through basic financial literacy training and book-keeping, the women sales agents in three different peri-urban areas have recently formed a Savings and Credit Cooperative Organization. Possibly such a service should be extended to the women charcoal traders to enable them to increase the volume of the trade and consequently income from both charcoal and the charcoal dust.

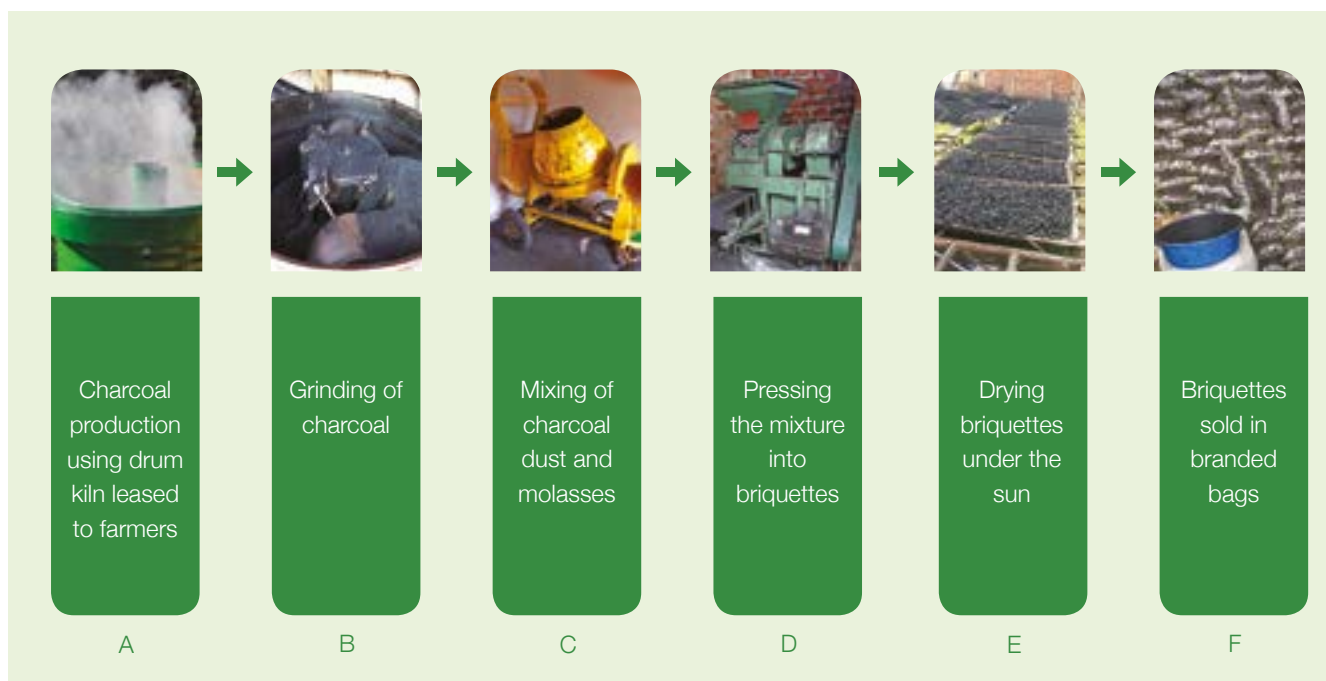
**Molasses**, which is used as binding agent, is sourced at USD 0.8 l<sup>-1</sup> from Lugazi sugar factory using a hired vehicle. The re-order level for molasses in the Green Heat factory is two drums (equivalent to 400 l), to ensure continued availability of the molasses at the factory. About 380 l of molasses are used per month.

Green Heat is facing a challenge in increases in prices of the wood-based charcoal dust due to competition from companies treating electrical poles. These companies buy charcoal dust at higher prices and buy in large quantities making it difficult for Green Heat to access the charcoal dust. To address this challenge, the company supplies more kilns to farmers to reduce dependence on charcoal dust sourced from charcoal traders. There is a need for studies to understand the trade off if the agricultural residues could be used as manure or livestock feed.

### 3.3.3 Processing raw materials into briquettes

On reaching the factory, the home-made agricultural charcoal, the wood-based charcoal dust and molasses are weighed to verify the amounts sourced and recording is carried out. Both types of charcoal are sieved to obtain fine particles. The coarse particles are then crushed using an electric grinder. The fine particles are weighed and placed in an electric mixing machine. Weighed warm water and molasses are added into the mixing machine. The mixing process is carried out for 25 to 30 minutes. The paste is then transferred to the electric briquette machine where the pillow-shaped briquettes are made (Figure 3.2). The briquettes are then placed on drying beds. The briquettes are dried for two to three days during the dry season and four to five days during the wet season. The briquettes are weighed and packed into 10-, 20-, 35- and 50-kg sacks for the various clients and the amounts produced are recorded. The selling prices of the 10, 20, 35 and 50 kg bags are USD 2.70, 5.14, 8.11 and 10.81 respectively. This is approximately USD 0.2/kg of briquettes compared to USD 0.3/kg of charcoal although the price of the latter fluctuates a lot, with higher prices common during the rainy season. The factory produces 25,000 kg of briquettes per month and processing takes place six days per week.

FIGURE 3.2. BRIQUETTE PRODUCTION FLOW CHART.



Source: Green Heat Ltd.

The briquettes in 10-, 20- and 35-kg bags are transported to the kiosks that already have agreements with Green Heat. The 50-kg package is delivered to the clients who the company has contracts with.

### 3.3.4 Marketing and promotion

Briquettes are delivered to the kiosks. The sales agents sell the briquettes and the proceeds are shared between them and Green Heat at a ratio of 60: 40. As part of the promotion and marketing, sales agents only remit the money for the product they have sold. The company provides the sales agents with note books for record keeping, pens, t-shirts and aprons. The agents also sell other items like vegetables, tomatoes and pens in their kiosks. The company trains the agents on basic book-keeping techniques to help with financial accountability because more than one product is being sold in the kiosks.

Green Heat also provides small buckets to sales agents that can hold 1 kg of briquettes. This is because most clients buy small quantities, ranging from 1 to 5 kg daily. The role of bringing new sales agents/kiosks to partner with Green Heat is handled by two women staff.

Sales agents comprise 73 women and nine men. Men are not so keen on being agents as most of them are involved as motor-cycle taxi drivers (*boda bodas*) to earn income. Thus women are more comfortable with the selling of the briquettes at kiosks. The biggest challenge is that as women do not have total control of the income in the family, then there is always a risk of diversion of funds by their husbands. Some of the women who sell briquettes in kiosks face the risk of theft of their money and to address this problem

Green Heat collects money from the sales agents twice a week and the supply of briquettes does not exceed specified quantities. Sales agents are also encouraged to send money daily, less their commission, using a mobile money platform to avoid keeping too much cash at hand.

Green Heat profit from the briquette enterprise is about 20% of its overall turnover. This has enabled the company to provide continuous salary increments and a staff bonus scheme in which employees are rewarded for targets achieved. The employees who initially joined with diploma qualifications have decided to upgrade their education.

## 3.4 Gendered Occupational Health Risks and How They are Addressed

Home-made agricultural waste-based charcoal and wood-based charcoal dust dealers are exposed to fine particles from the charcoal dust. The company addresses this by supplying dust masks to the suppliers. Some of the women who sell briquettes in kiosks run the risk of fire outbreak. The briquette sales agents have been trained on basic fire precaution techniques such as ensuring that candles, wick lamps and any cooking fires are turned off before they leave the kiosk. Green Heat trains the sales agents not to cook in the kiosks. Labels on safety precautions and warnings have been developed and supplied to the sales agents. The marketing and client relations managers, who are women, travel on very bad roads to the various kiosks twice a week on motorbike (*boda bodas*), who ask for a low fee. Thus physical injuries from accidents are possible. To address this problem the company has bought protective gear, such as helmets, which must be worn at all times when an employee is using a motorcycle. The company also pays for a worker's



compensatory insurance policy for all employees from NOVA insurance company.

### 3.5 Gender Differential Patterns in Access and Control to Resources

The directors have access to all information. The staff have access to information that is applicable to their departments. This includes information on raw materials, equipment, training and bonuses from meeting targets. The sales agents have access to their benefits depending on the sales they make. Women contribute to approximately 91% of the total briquette sales.

Formerly, there was disagreement when agents did not keep sales records. This raised the issue of the amount of money supposed to be shared. The issue was addressed by training the sales agents in record keeping which enables the company and agents to reconcile the stock going out and the remaining stock. Currently the agents keep the records and the Green Heat customer relations manager carries out a bi-weekly reconciliation.

### 3.6 Conclusions and Recommendations to Enhance Gender Equality in Briquette Enterprises

Briquette making has the potential for incorporating both men and women in the supply chain, however differential challenges that affect both sexes need to be assessed at each stage of the supply chain. Household responsibilities in the home are mostly a burden on women and this reduces the time they have available to participate in training offered by sales agents. In some cases, cultural and religious patterns inhibit women from having direct contact with men outside the family so this also prevents women from becoming involved in ventures such as briquette selling. Culture and inadequate resources often limit women's potential in income generation activities. For example, some men feel insecure if their wives make more income, thus undermining their machismo. Understanding gender roles is important along the briquette value chain to take advantage of the opportunities, resources and strengths of both men and women. Having a gender-inclusive value chain promotes efficiency and competitiveness by promoting access to the best talent regardless of gender.

The company has made efforts to address the cultural and gender issues that affect women's contributions to the briquette enterprise. For instance, because the husbands of the female sales agents have started attending the basic financial training events, incidents of extravagance or spending of business capital outside of the business have been reduced. This is reflected by the timely payment of the proportion of the profit that belongs to Green Heat.

The husbands also understand the importance of business sustainability. During one of the feedback discussions that Green Heat holds with its sales partners, the most frequent feedback was that the money from sales was being used by the husbands of the sales agents. We decided to organize another meeting with the husbands and the feedback from them was that the money was being used to invest in other family ventures. Green Heat had to explain the business model and why it is important for both sides to meet their obligations in order to achieve sustainable growth.

Making use of the different strengths of men and women improves the effectiveness of the whole value chain. For example, hiring a female marketing manager increased our sales in briquettes as she managed to relate well with the sales agents. The feedback we received from the agents was that our female sales manager was more patient in dealing with their challenges than the former male sales manager.

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