Disclaimer

This assessment is made possible by the generous support of the American people through the United States Agency for International Development (USAID) under the terms of Cooperative Agreement No. FFP-A-00-08-00075-00. The contents are the responsibility of Mercy Corps and the Healthy Practices, Strong Communities (HPSC) Program and do not necessarily reflect the views of USAID or the United States Government.

Acknowledgements

The authors would like to thank the Mercy Corps Uganda team for their support during the research and development of this assessment. Particular thanks go to the Economic Development Team managed by Atifu Kilaga with support from Patrick Anywar, Francis Emol and Godfrey Otika. Their hard work to organize and to gather primary data is the heart of this work. We would also like to acknowledge all the organizations, entrepreneurs and individuals who assisted with research by sharing their knowledge, experience and opinions.

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Executive Summary

Energy poverty is a major driver of the developing world’s overall poverty cycle; it results in ill health, environmental degradation and limited economic growth where it is needed most. However, in recent years companies have begun to distribute innovative, consistent and affordable energy options like solar lanterns and fuel-efficient stoves that offer highly beneficial, cost-saving alternatives to traditional energy sources. Though these products reduce the energy burden and improve the quality of life and opportunity for the most marginalized members of the global community, they are also failing to rapidly and broadly reach their target markets.

This report details the results of a fuel efficient stove (FES) market assessment carried out across four districts in the Acholi sub-region of northern Uganda throughout April and May 2012. This assessment is part of a broader examination of the energy market within the sub-region carried out by Mercy Corps Uganda to inform its intervention strategy in this sector.

Report findings indicate demand for FES across the Acholi sub-region as well as opportunities for FES actors to meet this demand with products available on the Ugandan market.

Key findings are as follows:

**SUPPLY-SIDE:**

- FES investment within Uganda is increasing and evolving rapidly. There are multiple Ugandan mass-production facilities that are growing production and expanding distribution. Further, several international companies are beginning to import high quality FES units. Carbon financing supports both locally produced and imported FES.

- FES sector has not yet broadly reached the Acholi sub-region. Though FES do exist on the Acholi market, most are artisan models with a total combined production of fewer than 250 units a month. Mud and clay-based FES are more common, built for either wood or charcoal and based on models propagated by NGOs when most inhabitants were living in IDP camps. Neither Ugandan FES mass-producers nor imported FES have made substantive inroads into the Acholi market.

- All local manufactures are single person enterprises and most have not attempted to increase production capacity to serve a larger market. Challenges to up-scaling local stove manufacturing within Acholi include difficulty in commercializing mud and clay stoves, varying input costs, inefficient supply chains and low production capacity of FES makers.

- There are two notable Ugandan stove manufacturers that are able to produce stoves in larger quantities. Both manufacturers are able to access cursory funding to lower stove costs to the end user and to subsidize the costs of building distribution channels and raising awareness for their products. Barriers that inhibit these mass-producers to enter the Acholi market include high transportation costs, lack of efficient distribution systems, minimal sub-vendor liquidity to purchase inventory and low sub-vendor business skill and acumen to creatively adapt distribution mechanisms.
DEMAND-SIDE FINDINGS:

• Almost all households within Acholi (98%) identified a biomass-based cooking method as their primary cooking method. Of these, 76% use three-stone fires, 14% use wood burning stoves and 8% use charcoal burning stoves. Levels of satisfaction for current cooking methods amongst residents in the sub-region suggest a willingness to adopt new stove technologies.

• Consistent with primary cooking methods, firewood is the dominant fuel used in Acholi. The bulk of wood used is collected by members of the household itself – not purchased. Overall, 93% of households collect firewood, 11% purchase firewood and 18% purchase charcoal. Proximity to a trading center influences household fuel and thus stove preferences. Charcoal stoves are more widely used amongst the urban segment; charcoal use declines steadily as households become more rural, where wood use increases.

• Close proximity to an urban center and higher level of dissatisfaction with open fire cooking correlate to increased household willingness to purchase FES. Households that report less smoke emission from their FES are not more likely to be satisfied with their FES than people who do not report less smoke emission.

• The time investment required for a household to collect wood is directly correlated to a willingness to purchase fuel (either wood or charcoal) -- the likelihood that a household will purchase fuel increases as time to collect firewood increases. Sourcing fuel is a dynamic picture at the household level; households regularly supplement or substitute their preferred fuel with alternatives as either costs or available resources vary.

• Annual Acholi household fuel expenditures according to fuel preference are US$78 for charcoal and US$56 for firewood. For household collecting firewood, the average total weekly investment in collecting wood is 6 hours and 4 minutes. According to the shadow price calculation based on prevailing agricultural labor costs, collected firewood costs a household an average of US$94 per year.

• Average monthly household expenditures on charcoal total US$6 –US$7; the payback period for a metal-cased FES is between two and three months. Average monthly household expenditures on firewood total US$4.50; the payback period for a Lorena stove model is one month.

Key observations and recommendations are as follows:

• Key Market Segments: There are two distinct segments within the Acholi FES market. The first segment is comprised of urban and peri-urban households that purchase fuel, possess more income and are less satisfied with their current cooking technology. This segment is more likely to adopt FES technologies that are imported from Ugandan mass-producers or imported into the country than the second segment.

The second segment is comprised of rural households that cook on three stone fires and collect most firewood themselves. The second segment is particularly price-sensitive and unlikely to adopt FES imported into Acholi. However, this segment may be willing to adopt inexpensive mud FES. Propagation of high quality stoves has not resulted from Training of Trainer models implemented within Acholi. Moreover, commercial models for mud FES do not
yet exist within the sub-region. Commercialization of simple FES is possible, however. In order to commercialize low-cost mud stoves, experimentation with effective business models along with product innovations is required.

- **Awareness:** Conditions for market stimulation are promising due to a high general level of awareness about FES in the market, increasing difficulty sourcing firewood, increasing fuel costs, and significant dissatisfaction with cooking on an open fire. Current information on the economic advantages of FES adoption is required to help build the market. For charcoal FES, the opportunity to recoup fuel costs quickly by adopting FES is the likely entry point for FES sales. Designing marketing and sales strategies based on payback periods with respect to fuel cost savings is a potent strategy for targeting FES sales to charcoal users. For mud FES, as monetary benefits of FES are much less tangible for rural wood users, alternative messaging for boosting FES appreciation are required to penetrate the market. Recent efforts to test health messaging have been effective toward increasing FES adoption.

**Purpose of this Document**

This document is designed to inform energy actors of the potent market opportunity for new, innovative, cost-saving and energy-saving fuel efficient stoves within the Acholi sub-region. The report highlights opportunities and offers recommendations for energy actors to innovate on current business and distribution models to more broadly reach this market. It also outlines the weaknesses in the existing systems that Mercy Corps has identified as key points for future intervention. Lastly, the document offers transferable lessons for companies targeting similar rural, agriculturally-based and transitional markets across Africa for distribution and sale of cost-saving and beneficial products.
Market Analysis for Fuel Efficient Cook Stoves in the Acholi Sub-Region, Uganda

Introduction

Background on Acholi Sub-region

In 2006, the Ugandan government and the Lord’s Resistance Army ended over two-decades of armed conflict that displaced millions of people and destroyed economic productivity within the Acholi sub-region of northern Uganda. During the conflict, the humanitarian community stepped-in to provide material support where the market was failing to function. Working in concentrated locations for a prolonged period, aid drove the provision of products and services to meet population needs. Concurrently, financial institutions, government and businesses chose to invest in other, more accessible regions, leaving Acholi underdeveloped and disconnected. In recognition of the changing post-conflict context, humanitarian agencies have steadily cycled out of Acholi while a small amount of outside investment has trickled in. However, what was once a humanitarian challenge has now become a long-term, complex development challenge. The protracted conflict handicapped growth, inhibiting agricultural productivity, hampering trade and impeding investment. As humanitarian agencies have scaled-down their involvement in the region, a gaping hole in product and service provision has remained.

The Acholi economic environment is a complex and systemic challenge that has resulted in costly, inefficient and fragmented Acholi markets that are failing to spur inclusive economic expansion and more widespread competition. As a result, more readily available, high quality products and services that meet the needs of households and businesses alike are absent. This absence is significant. At its most basic level, this means that the quality of life and the opportunities it holds for the Acholi are poor. In other words, day-to-day activities are difficult, time-consuming and expensive for families across Acholi. This is particularly true for women. More often than not, Acholi women are solely responsible for the welfare of their families in addition to the economic productivity of their households.

Mercy Corps Uganda

Mercy Corps helps people in the world’s toughest places turn the crises of natural disaster, poverty and conflict into opportunities for progress and has worked in East Africa for more than 20 years. Mercy Corps is also a recognized global leader in the design and implementation of market development programming; our experts are skilled in improving core market relationships and transactions and supporting functions and rules of market systems to improve access, and the terms of that access, to the poor. When applying market-driven development, Mercy Corps is consistently facilitative, working behind local actors to improve performance sustainably. Mercy Corps employs five main principles throughout market-driven programming: systemic approach, evidence-based interventions, contextually driven, sustainability, and partnerships.

Mercy Corps began work in Uganda in 2006, offering humanitarian assistance and peace-building support to internally displaced populations within the Acholi region. Mercy Corps has expanded programming within Acholi as well as into Karamoja, focusing on integrating well-targeted, short-term humanitarian assistance within a larger program of market-oriented development. By addressing a number of overlapping and associated needs within a wide range of activities
Market Analysis for Fuel Efficient Cook Stoves

in the Acholi Sub-Region, Uganda

Mercy Corps Market Facilitation Programming in Uganda

Within the Acholi sub-region, Mercy Corps has worked to spearhead the transition first to post-conflict recovery and now to market-driven and facilitative development. Throughout 2011, Mercy Corps implemented a pilot solar project with the goal to facilitate sustained access to affordable solar products for inhabitants of Pader District in northern Uganda. To realize the pilot project goal using a systemic and facilitative approach, Mercy Corps chose to mitigate barriers that prevented Kampala-based company entry into the Pader market while also incentivizing local actors to sell solar in the District. The project resulted in substantial, unsubsidized product sales that are continuing to grow exponentially in number and to move over sustained distribution channels over a year after the project has concluded. Moreover, the success of the pilot has illuminated a potentially robust market with high demand for products that are not currently available to consumers and are not likely to be available to consumers soon without outside intervention – like fuel efficient stoves.

Building on the success of the solar pilot model and to best meet needs arising from the changing Acholi development context, Mercy Corps has integrated a new Economic Development Team (EDT). The goal of the team is to speed the pace at which businesses adapt to meet the needs of the poor across our geographic area of programming and areas of technical focus, partnering with private sector actors to build local capacity for the provision of vital goods and services. To do this, the EDT demonstrates that Acholi is a viable market, offers tools to extend reach, crowds-in tailored products and services, and then documents and shares learning so that more businesses can enter this market and innovate on earlier models to better meet the needs of the poor.

Amongst EDT projects is a focus on initiatives to improve the Acholi energy markets’ performance, adapting and growing the solar pilot model to best incorporate fuel efficient stoves and other products and services that reduce energy poverty. Energy poverty is a major driver of the developing world’s overall poverty cycle; it results in ill health, environmental degradation and limited economic growth where it is needed most. Moreover, energy poverty negatively impacts women and girls disproportionately to their male counterparts. Females are almost exclusively responsible for household cooking, in-home chores, wood collection and nearly daily incremental fuel purchases. As a result, females are also disproportionately impacted by respiratory illness and eye diseases that result from indoor air pollution, risks of injury from open fires and kerosene lanterns and lost economic opportunities that result from time spent gathering energy sources rather than on productive livelihoods.

In recent years companies have begun to distribute innovative, consistent and affordable energy options like solar lanterns and fuel-efficient stoves that offer highly beneficial, cost-saving alternatives to traditional energy sources. Though these products improve the quality of life and opportunity for the most marginalized members of the global community, they are also failing to rapidly and broadly reach their target markets.
The following study outlines the Acholi cooking energy market and opportunities to innovate on business and distribution models to crowd-in new, innovative, energy-saving products to reach the market at scale.

Methodology

This assessment was carried out during April and May 2012 across four districts within the Acholi sub-region: Kitgum, Lamwo, Pader and Agago. The assessment can be divided into two sections: The first section delineates demand for FES according to consumer segment while the second section maps and analyzes stove supply-side market dynamics.

The consumer market research was conducted during April and May 2012 by an experienced group of Mercy Corps Economic Development Team members based in Kitgum. Households from each of the four districts in Acholiland were targeted in order to develop as broad an understanding of the region as possible. Reaching sufficient remote, rural communities was recognized as a challenge, and therefore two survey methods were employed to overcome this difficulty:

1). **In-person interviews** carried out in each district. These interviews were conducted in the local language in towns, trading centers and villages throughout the districts. Interviews were divided evenly among tiers to ensure a wide and representative coverage. Interviewees were selected with the help of local government officials to ensure that participants from nearby households only were selected. In as much as possible, officials also helped to identify participants across income and gender strata.

2). **Mobile-based surveys** carried out with support from 99 Community Knowledge Workers (CKWs) backed by the Grameen Foundation AppLab across Kitgum, Pader and Agago Districts. Currently, no CKWs operate in Lamwo District. CKWs, village-level agricultural extension agents charged with disseminating agricultural information to nearby farmers utilizing mobile technology, were asked to interview fellow farmers throughout their geographic areas. Most CKWs live in small and medium town centers or in rural locations; they do not live in urban settings. Surveys conducted by CKWs included questions to support consumer segmentation across geography. CKWs have operated for nearly one year under Mercy Corps programming and have received considerable training and support from the AppLab team in order to carry out regular data collection accurately. Mercy Corps utilizes this channel for data collection purposes often.

In total 252 in-person interviews and 237 CKW-interviews were conducted, giving a total sample of 489 respondents. Both questionnaires contained mostly forced-choice questions and mirrored each other as much as possible. Results from the in-person interviews were examined for accuracy and error at the end of each day and were then recorded in a pre-designed Excel document for ease of analysis. Data entry was also monitored for accuracy and error. CKW survey results were collected via mobile and uploaded to a central database in real-time. Results were also monitored and cleaned for accuracy.
Market Analysis for Fuel Efficient Cook Stoves in the Acholi Sub-Region, Uganda

Based in part on the results of a small-scale energy assessment in the Pader District of Acholi and in part from ongoing desk research, the Mercy Corps team hypothesized that geographic proximity to trading centers (TC), accounting for the variation in size of the TC, would be a key determinant for behavior around energy use. Typically, household location in urban or rural settings is an important determinant of fuel type and fuel type determines which stove a household will use. With this in mind, consumers were divided into four market segments based on geographic proximity of their household to the nearest TC. Survey respondents were asked to self-identify household distance from the nearest TC. These responses were used to segment the market as shown in the table. The terms used are relative and it should be noted that “urban” in the context of Acholiland simply means within a trading center and “peri-urban” means within 2km of a trading center. In reality both would be considered rural in the context of the country as a whole.

<table>
<thead>
<tr>
<th>Distance to TC</th>
<th>Segment</th>
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</thead>
<tbody>
<tr>
<td>0km</td>
<td>Urban</td>
</tr>
<tr>
<td>1 – 2km</td>
<td>Peri-urban</td>
</tr>
<tr>
<td>3 – 5km</td>
<td>Rural 1</td>
</tr>
<tr>
<td>5 – 10km</td>
<td>Rural 2</td>
</tr>
</tbody>
</table>

Moreover, both surveys were supplemented by a total of 33 focus group discussions conducted in TCs. Participants were selected according to the same methodology as in-person interviews. Local officials also helped to identify participants and, in as much as possible, careful attention was made to ensure gender balance and appropriate representation of varying income segments amongst each group. Again, Mercy Corps Economic Development Officers led each FGD according to a predetermined set of questions designed to add depth to survey results.

Concurrently, information on the supply side of the cook stove market was gathered. The Mercy Corps team mapped stove retailers, distributors and manufacturers across the region. A similar exercise was conducted at the national level, using the recent market assessment by the Global Alliance for Clean Cooking (GACC) as a guide. The purpose of both exercises was to outline the current stove supply chain, from producers to retailers, identifying actors that are either

1 GACC, Uganda Market Assessment - Sector Mapping, 2012
already active in the market or that have the capacity to become active in Acholiland over the coming year. This time frame ruled out inclusion of some newly imported stoves poised to enter the Kampala market with the influx of carbon revenue expected in 2013.

Once the mapping exercise was complete, structured interviews were conducted with each actor. These interviews were designed to gather as much information as possible about the products themselves, the functions of the existing supply and value chains, and major trends in supply and demand. Product testing was not a part of this assessment; however, results from efficiency tests were obtained when available.

Challenges

As with any information gathering exercise, a number of challenges were encountered by the Mercy Corps team. First, although the CKW tool provides an excellent way to reach many widespread rural households inexpensively, it was not possible to replicate exactly the questions contained in the consumer profile questionnaire. CKW survey questions are deliberately limited in number as CKWs are only obligated to complete a certain number of survey questions monthly. Moreover, shorter questionnaires result in more accurate responses; AppLab also limits surveys accordingly. However, as a result, analysis of the full sample was not always possible.

Second, gathering accurate information on key issues was a challenge, particularly for household income population data. Income is a key measurement in the energy assessment as it allows for the calculation of proportional expenditure on fuel. However, the geographic area is reliant on income derived from agriculture. Agricultural income is both seasonal and varied and most households record income over time. Consequently, households are often unaware of income levels and responses are likely estimates. Similar challenges are reflected in responses about distances traveled or time taken for fuel collection activities. Accurate, self-monitoring for these metrics is not a common occurrence and responses reflect subjective estimates.

Notable, reliable data on the size of the potential market in Kitgum, Lamwo, Pader and Agago Districts is difficult to obtain. However, a combination of data from recent and reliable sources, including the UN and UBOS are reasonably applied for market projections in this assessment.

A combination of data from a UN water study of the region and a government household survey in 2010 was used to develop an estimated population figure of 870,000 people and 144,800 households. This estimate goes not represent official government

<table>
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<tr>
<th>Market Size Estimates</th>
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<tbody>
<tr>
<td>Population Figures²:</td>
</tr>
<tr>
<td>Lamwo</td>
</tr>
<tr>
<td>Pader and Agago</td>
</tr>
<tr>
<td>Kitgum</td>
</tr>
<tr>
<td>Total Population</td>
</tr>
<tr>
<td>Average Household size³</td>
</tr>
<tr>
<td># of Households</td>
</tr>
<tr>
<td>% Urban / Peri-urban Population</td>
</tr>
<tr>
<td># Urban Households</td>
</tr>
<tr>
<td># Rural Households</td>
</tr>
</tbody>
</table>

² Water Sources, Accessibility, and Operation Status Report, OCHA 2010
³ Uganda Bureau of Statistics, National Household Survey 2009 / 10
figures. However since the last full census was almost 10 years ago and therefore out of date in a region that had undergone significant transition in recent years, it is considered that the water study figures provide a more accurate figure.

The estimation of the proportion of households of living in urban (within trading centers) and peri-urban (1-2 km from trading centers) settings was also based on the 2010 UN water survey which provided population density maps for each district. These maps were used to estimate the number of people in each urban area. This method does not provide a truly accurate figure, however it uses the most accurate figures available to date, and provides a usable picture of the market size and distribution.

Third, the approach to focus group discussions yielded limited findings. It was difficult for the team to set up focus groups according to distinct consumer segments. Namely, isolating focus groups to include women only could have resulted in more data regarding this particular segment. However, though not isolated, all focus groups did include a breadth of participants across consumer segments.

Finally, the informal nature of the local stove manufacturing industry combined with the remote nature of many communities created challenges in identifying all actors during the mapping exercise. This was particularly true for mud stove makers, many of whom worked on an occasional basis and did no real promotional activities, making them difficult to locate.
Supply Side Market Analysis

The following section summarizes the macro fuel efficient stove (FES) market as well as the specifications and position of the products expected to be relevant to the Acholi market. It also provides a SWOT analysis of the major product categories and then presents analysis of the existing supply chains in order to identify major market barriers where intervention is required.

Macro Context: Fuel Efficient Stove Market

Biomass accounts for 91% of total energy used in Uganda, where only 11% of the population has access to the grid. Unsustainable wood and charcoal use has resulted in massive deforestation and associated steep fuel price increases. Consequently, access to cooking energy sources and clean cooking options is an increasingly important challenge in Uganda.

According to a recent assessment by the Global Alliance on Clean Cooking (GACC), 3.8 million of Uganda’s 7 million households cook on open fires in an enclosed space. Nearly 1 million additional households cook on traditional charcoal stoves with high exposure to carbon monoxide. Awareness of indoor air pollution (IAP) amongst the general population is virtually non-existent despite the global attention being given to negative health implications of traditional cooking practices. Many urban households aspire to cook with kerosene, liquefied petroleum gas (LPG) or even electric stoves as they are cleaner and more convenient. However, only a small segment of the market can afford to do so. This leaves the vast majority of the population reliant on biomass for cooking fuel.

A commercial market for biomass fuel efficient stoves does exist in Uganda. Rising demand for biomass FES mirrors parallel rising fuel costs. Despite strong demand, supply-side constraints inhibit greater FES market penetration. Nearly all FES stove production and distribution is focused in Kampala where a densely populated market dominated by charcoal users with more disposable income drive sales. Few stove producers have reached scale and those that have are plagued by high costs associated with distribution beyond the capital city including costs required to build networks of retailers, to advertise a “push” product and to transport bulky stoves long distances over dilapidated roads.

Currently, there are two notable companies with distribution beyond the vicinity of the capital and with the capacity to expand to new markets: International Lifeline Fund (IFL), based in Lira, and Ugastove, based in Kampala. Approximately five other FES charcoal stove manufacturers are operational in Kampala, none of which currently produce more than 500 units a month. Additional constraints to FES supply-side growth include limited access to land or premises for manufacturing and product sourcing needs, inadequate access to investment required to grow businesses, rising raw material costs and high variability of stove quality. As a result of the many challenges to growth, the FES business is dominated by artisans who are only able to glean small profit margins for their products.
Carbon Finance

Carbon finance for fuel efficient stoves has been active in Uganda for several years and has proved it can play an important role in attracting investment and reducing the costs of better quality stoves. Uganda hosts the world's first Gold Standard voluntary market stove project, run by Impact Carbon and Ugastove, which has generated credits for three years. In addition to voluntary market activity, the development of new rules for projects in the UNFCCC Clean Development Mechanism (CDM) through Programme of Activity (PoA) projects has opened the door to carbon finance from the regulated market. This revenue potential has brought in outside donors and investors for a variety of cook stove projects that are currently in the process of registration. Once registered with the UN, these projects could funnel investment to local manufacturers to help improve the quality of stoves and the scale of stove market penetration. These projects might also ensure the arrival of high-quality, imported FES.

Carbon finance could represent a paradigm shift in the FES market and is therefore relevant to this analysis. In this model, manufacturers and importers would derive most profit from carbon returns that are expected to run well above the cost of stoves themselves over time. This provides a significant opportunity for local and foreign FES manufacturers to attract financing to increase their production and distribution capacity to reach previously unreachable market segments. It also provides an opportunity for consumers who may be able to access high quality stoves at significantly reduced cost. In this way, carbon financing can serve as an important subsidy. Carbon financing does come with a burden of proof challenge. According to the monitoring rules, all FESs must be in use in order to claim carbon credits. In practice this means that accurate consumer details must be taken at point of sale and detailed databases must be maintained over time. This encourages suppliers to maintain close control over distribution modes.

Carbon finance, though a potential boon to the FES sector, will not result in blanket adoption across all regions of Uganda alone. Research into consumer cooking and fuel use behaviour within key market segments is so far limited, particularly among rural communities which generally use firewood as their main cooking fuel. As 81% of the Ugandan population is currently classified as rural, innovative approaches to extend commercial FES availability and access for this population is also needed.

Acholi Market Analysis

As outlined, the Acholi sub-region is a relatively more rural and poor area of Uganda. These factors, combined with poor transportation infrastructure, lack of business services, and limited commercial development make the market context significantly different to other parts of the country, notably Kampala where most FES activity is focused. This section analyzes the market conditions specific to this region, looking at the size of the market, the range of products available, how well they are suited to the market, and the respective value chains.

The current range of FES available in Acholi can be divided into two categories, wood-burning and charcoal-burning. Multi-fuel stoves that can burn both fuels do exist but these were not found in the region. The various models on offer are outlined in the following tables.

4 Uganda Bureau of Statistics, National Household Survey 2009 / 10
<table>
<thead>
<tr>
<th>Producer / Model</th>
<th>Design and Specs</th>
<th>% reduction wood use (vs open fire)</th>
<th>Costs and price</th>
<th>Production Capacity</th>
<th>Market Segment and Penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Stone Fire</td>
<td>Traditional cooking method</td>
<td>N/A</td>
<td>Free</td>
<td>N/A</td>
<td>Used as primary cooking method by 75.9% of households</td>
</tr>
<tr>
<td>Mud Lorena Stove</td>
<td>Various designs are found in the region, mostly adapted from models introduced by NGOs in IDP camps. Most use a clay brick chamber surrounded by ant-hill mud, built indoors or outside against the wall. Chimneys and multiple burners are included in some models but are not common.</td>
<td>Estimated 40%</td>
<td>Free – 5,000</td>
<td>Unknown, number of trained people</td>
<td>The major wood burning stove in the region observed in many rural and urban locations. Identified by only 12% of FES owners, although 40% did not know the type of stove they have. The significantly lower price means Lorena-type stoves are likely to represent the majority of the 14% of all households using a FES. Many are built by the owners themselves.</td>
</tr>
<tr>
<td>Ugastove Rocket stove</td>
<td>Rocket-type design made from heavy clay. Stoves are high off the ground and distinctive in shape. Not part of the Ugastove carbon project and is therefore not subsidized by carbon revenue.</td>
<td>60% (claimed by Ugastove)</td>
<td>Retail 30,000</td>
<td>&lt; 50 / month Capacity to increase with demand</td>
<td>The rocket stove is currently available in Gulu but not yet distributed within the four study districts. High cost rules out most rural households who collect wood, therefore the target market segment is wood purchasing households in or near to TCs.</td>
</tr>
<tr>
<td>G-3300 Envirofit Rocket Stove</td>
<td>Imported model from Envirofit and designed by Colorado State University and made in China. The stove is a high-quality, widely-tested, portable rocket stove. Up-Energy is launching a CDM project and the stove is being sold at an initial subsidized rate based on future carbon return.</td>
<td>52%⁵</td>
<td>Wholesale - 45,000 Retail - 55,000</td>
<td>Imported in containers from China. Planned assembly plant in Kenya for 2013.</td>
<td>The G-3300 is being imported and distributed by Kampala based Up-Energy, a for-profit venture part owned by Impact Carbon. Up-Energy has recently toured Acholi, giving demonstrations, targeting both NGOs and retailers. Price is very high for the region so target market is middle-upper class wood buyers, or NGOs.</td>
</tr>
</tbody>
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⁵ USAID, 2010. Evaluation of Manufactured Wood Stoves in Dadaab Refugee Camps, Kenya

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## CHARCOAL BURNING STOVES

<table>
<thead>
<tr>
<th>Producer / Model</th>
<th>Design and Specs</th>
<th>% red. fuel use</th>
<th>Costs and price</th>
<th>Production Capacity</th>
<th>Market Segment and Penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mud Charcoal Stove</td>
<td>Widely referred to as a ‘GOAL’ stove as it was introduced by the INGO GOAL in the IDP camps in the region. The design uses clay bricks and mud to form a combustion chamber, with a metal racking inserted for the charcoal to sit on. The preferred material for the rack is a front cog from a bicycle. The stoves are generally built permanently against the wall on the outside of the house.</td>
<td>Unknown</td>
<td>Inputs:</td>
<td>Currently limited by supply of bike cogs.</td>
<td>Low cost and simplicity to make mean this is a popular stove among charcoal users, particularly in Kitgum, the largest TC and site of a major IDP camp where GOAL previously worked. Penetration difficult to measure but likely to make up a large proportion of the 8% of households using a charcoal FES.</td>
</tr>
<tr>
<td>Local FES -</td>
<td>Jiko style FES made by 10+ independent artisan stove makers across the four districts. Stoves are portable and metal-cased, with a purpose built clay liner. Designs are either copies of the typical Jiko shape or similar to the Ugastove model. Some makers replace the clay liner floor with iron bars to increase strength, but this decreases efficiency.</td>
<td>Unknown</td>
<td>Inputs:</td>
<td>10 – 40 per artisan. Total &lt; 250 / mth</td>
<td>Stoves are generally sold directly by the artesian. Low production and marketing capacities limit market penetration to households living in the close vicinity to the production site. The stoves enjoy a good reputation among their small customer base, which knows them and trusts the quality of the product. However, when sold next to mass produced models they appear inconsistent in quality.</td>
</tr>
<tr>
<td>ILF FES – Okello Kuc</td>
<td>ILF stove model used internationally based on 6 purpose-built clay bricks that form an efficient combustion chamber. Bricks are held together by concrete and sealed in a thin metal casing. The stoves are made in Lira in three sizes, with a consistent source of quality clay provided for the bricks. The stove has been independently tested and will soon be certified under the UCB CDM PoA.</td>
<td>(35% thermal efficiency)</td>
<td>Costs:</td>
<td>Currently up to 2000 / mth.</td>
<td>Enjoy wide recognition in and around the production center of Lira, an area many traders from Acholiland purchase product. Only mentioned by a single FES owner in the sample group but distribution in Acholiland has just started and stoves are currently visible 4 Kitgum retail stores but no other TC. Two local distributors brought in over 200 units each in April and plan widespread radio promotions during June and July 2012.</td>
</tr>
</tbody>
</table>
## CHARCOAL BURNING STOVES (cont.)

<table>
<thead>
<tr>
<th>Producer / Model</th>
<th>Design and Specs</th>
<th>% red. fuel use (vs tin stove)</th>
<th>Costs and price</th>
<th>Production Capacity</th>
<th>Market Segment and Penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ugastove FES</td>
<td>Ugastove charcoal stove is a portable metal shell with a thick clay lining. The clay is sourced in Kampala and the stove has been certified for carbon credits under a Gold Standard voluntary scheme. Stove produced in three sizes.</td>
<td>(38% thermal efficiency)</td>
<td>Costs: Wholesale: 14/16/20,000 Retail: 17/23/27,000</td>
<td>Currently 5000 / mth. Increasing to 10,000</td>
<td>The most widely recognized FES across Uganda, with relatively high volume sales in Kampala and other regions. New focus on north with a storage facility in Gulu that will become an assembly plant. Not currently distributing in four study districts but well-placed to supply from Gulu if a model is found.</td>
</tr>
</tbody>
</table>

## SWOT ANALYSIS

<table>
<thead>
<tr>
<th>Model</th>
<th>Key Actors</th>
<th>Product Strengths</th>
<th>Product Weaknesses</th>
<th>Market Opportunities</th>
<th>Market Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mud Wood Stoves</td>
<td>- CBT</td>
<td>- Simple to make, repair</td>
<td>- Frequent repair required</td>
<td>- Uses wood: fuel of choice</td>
<td>- NGOs crowding out</td>
</tr>
<tr>
<td></td>
<td>- NGOs</td>
<td>- Low cost (3-5k)</td>
<td>- Slow to start</td>
<td>- Trained resources in communities</td>
<td>- Perception of being free</td>
</tr>
<tr>
<td></td>
<td>- Individuals</td>
<td>- Good efficiency gains</td>
<td>- Labor-intensive</td>
<td>- Familiar model</td>
<td>- Limited value-add as a commercial product</td>
</tr>
<tr>
<td></td>
<td>- Brick makers</td>
<td>- Local materials</td>
<td>- Long drying time</td>
<td>- No affordable competition</td>
<td>- Difficult to standardize</td>
</tr>
<tr>
<td>'Imported' Wood FES (National stoves Imported into the region)</td>
<td>- Manufacturers</td>
<td>- High, proven efficiency</td>
<td>- Expensive, luxury product</td>
<td>- Uses wood: fuel of choice</td>
<td>- Low cost of wood = long pay-back period</td>
</tr>
<tr>
<td></td>
<td>- Importers / Distributors</td>
<td>- Standardized product</td>
<td>- Limited market penetration</td>
<td>- High desirability factor as a foreign product</td>
<td>- Target market is rural and dispersed</td>
</tr>
<tr>
<td></td>
<td>- Sub-Vendors</td>
<td>- Warranty (year 1)</td>
<td>- Long supply chain and repair turnaround</td>
<td>- Highest quality product on the market</td>
<td>- Lack of consumer financing</td>
</tr>
<tr>
<td></td>
<td>- Carbon finance groups</td>
<td>- Subsidized (reduced cost)</td>
<td>- Can be heavy, high transport costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Imbedded services (training, marketing)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- High production / import capacity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Producers willing to invest</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### SWOT ANALYSIS (cont.)

<table>
<thead>
<tr>
<th>Model</th>
<th>Key Actors</th>
<th>Product Strengths</th>
<th>Product Weaknesses</th>
<th>Market Opportunities</th>
<th>Market Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locally Made FES</td>
<td>- Manufacturers / Assemblers</td>
<td>- Potential high efficiency</td>
<td>- Low production capacity</td>
<td>- Customer accessibility</td>
<td>- No brand / recognition</td>
</tr>
<tr>
<td></td>
<td>- Retailers/ maintenance</td>
<td>- Custom design options</td>
<td>- Lack of standardization</td>
<td>- Perception of quality</td>
<td>- Subsidized imported competition</td>
</tr>
<tr>
<td></td>
<td>- Clay molders</td>
<td>- Portable</td>
<td>- Relatively expensive</td>
<td>- Market knowledge of FE increasing (cursory benefits)</td>
<td>- Fractured assembly and bottlenecks</td>
</tr>
<tr>
<td></td>
<td>- Black/tin smiths</td>
<td>- Local maintenance</td>
<td>- Inefficient supply chain</td>
<td>- Custom design potential</td>
<td>- No capital availability</td>
</tr>
<tr>
<td></td>
<td>- Retailers</td>
<td></td>
<td>- No distribution system</td>
<td>- High cost of charcoal</td>
<td>- Limited market knowledge</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Retailers report many complaints about weak combustion chambers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>'Imported' Charcoal FES</td>
<td>- ILF/Ugastove</td>
<td>- High, proven efficiency</td>
<td>- Limited market penetration in north</td>
<td>- Affordable price point</td>
<td>- Transportation costs</td>
</tr>
<tr>
<td>(nb: imported into region)</td>
<td>- Distributors</td>
<td>- Standardized product</td>
<td>- Long supply chain and repair turnaround</td>
<td></td>
<td>- Limited distribution networks</td>
</tr>
<tr>
<td></td>
<td>- Sub-vendors</td>
<td>- Warranty (year 1+)</td>
<td></td>
<td></td>
<td>- Low capacity sub-vendors</td>
</tr>
<tr>
<td></td>
<td>- Carbon Credit Owners</td>
<td>- Subsidized (reduced cost)</td>
<td></td>
<td></td>
<td>- Difficulties in completion of warranty / carbon cards</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Imbedded services (training, marketing)</td>
<td></td>
<td></td>
<td>- Limited market knowledge</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- High production/ distribution capacity &amp; willing to invest</td>
<td></td>
<td></td>
<td>- Lack of consumer financing</td>
</tr>
</tbody>
</table>
Value Chain Analysis: Charcoal Stoves

1. Lorena / Mud Charcoal Stoves

*Production and Distribution*

These stoves are made and sold by a dispersed and informal network of individuals throughout the region. Most were either trained directly by various NGOs in the IDP camps during the past decade, or were subsequently trained through the trainer of trainer models introduced by the WFP and various other organizations. It is impossible to estimate the number of trained people in the region, particularly since it appears that most engage in stove building on an occasional basis.

The Mercy Corps team did not find any examples of formalized commercial operations offering a stove building service. However, informal services where individuals build stoves on an ad hoc basis are fairly widespread. These informal stove builders barely cover costs and often have little knowledge of stove efficiency. This effectively impedes the potential for a commercial market by spreading low cost products with no quality control and no guarantees of efficiency, thus minimizing the consumer gains for investing in a FES.

*Key Bottlenecks and Challenges*

- Commercializing mud stoves is a major challenge. The perceived simplicity of the design and availability of materials means people are reluctant to pay more than a nominal service fee on top of the material cost.

- The charcoal mud stoves found in several of the larger TCs are built with a bicycle part as the charcoal tray; reliance on this particular part is a clear bottleneck to increased production. This part could be easily replaced with a clay liner but the supply of liners is also limited, creating a further bottleneck.

2. Local FES

*Production*

Local FES are manufactured by a web of metal workshops, dedicated manufacturers and assembler / retailers. A total of ten artisan manufacturers were interviewed across the four districts - in Kitgum (6), in Padibe East (3), and Agago (1). The manufacturers can be disaggregated according to the following production models:

- Retailers with hardware or general household goods stores that contract metal and clay molder to make the components and then assemble the stoves themselves (3)

- Metal workshops that purchase clay molds but make other components and assemble themselves (3)

- Dedicated stove makers working from home that make their own clay and either contract metal workshops or make their own casings (4)
Total production across the 10 identified producers in the region is up to 250 a month and a maximum of 3000 a year, although production slows considerably during the wet seasons when it is hard to fire and dry the clay. Assuming each unit has a lifespan of 2 years (as estimated by producers), these figures suggest a maximum of 6000 households have a locally-manufactured FES, a market penetration of less than 4% of the households.

Local FES Value Chain:

The major inputs for the stoves are metal sheeting and clay. Metal sheeting is sourced from Lira or Kampala by hardware stores or directly by the artisan. Some manufacturers use local scrap metal when available. Metal sheeting costs have grown dramatically over the last year, leading to increased local FES costs. Clay is locally-sourced and the molds are obtained from a small number of clay molders who have a reputation for quality clay and work. Clay molds for the Kitgum area, the largest town with the most active FES market in the region, are almost entirely sourced from a single clay molder in town. Though the molder does not change prices, she often runs out of stock and is a major bottleneck for local stove production.

Distribution and Sales

Most artisan FES makers sell the products directly to customers by setting up stalls in front of their houses or at their own shops. At least one local FES make used to sell through additional retailers as well; however, difficulties in collecting money forced the maker to stop distributing. Some retailers of traditional metal sheet stoves are now making their own FES. None of the dedicated stove makers or metal workshops engages in any form of branding or consistent
marketing activities, the result is a very niche market that could not satisfy any significant increase in demand for their product.

**Key Bottlenecks and Challenges**

- The price of metal sheeting varies and has recently increased significantly. Metal is the most expensive single component; the cost uncertainty and the lack of bulk purchasing discounts make it difficult to compete with the carbon subsidized Okello Kuc and Ugastove stoves.

- The large distance and high transport costs associated with sheet metal providers mean supply occasionally dries up.

- Access to quality clay molds is a major bottleneck in the value chain, production capacity of clay liners is very low and manufacturers often have to wait several weeks to receive an order.

- There is a lack of trust between retailers and producers. This means producers are reluctant to supply without up-front payment, inhibiting wider product availability.

- Manufacturers do not have sufficient capital to expand production and widely report this to be a major barrier to increasing sales of FES.

- All local manufactures are single person enterprises and most have not made any real attempt to increase production capacity to serve a larger market. Often, stove production is a supplementary income option for manufacturers.

3. Ugandan Mass-Produced FES

There are two notable Ugandan stove manufacturers that are able to produce stoves in larger quantities. Both manufacturers are able to access cursory funding to lower stove costs to the end user and to subsidize the costs of building distribution channels and raising awareness for their products.

**International Lifeline Fund (ILF) – Okello Kuc Stove:** ILF is an international non-profit active in four countries in East Africa as well as Haiti. ILF has been active in Uganda since 2006, dedicated to providing water and sanitation services and, chiefly, to stimulating the FES market. ILF designed the Okello Kuc stove, its main product.

**Ugastove:** Ugastove is a privately owned Ugandan company based in Kampala that has been manufacturing cook stoves for over a decade. In 2009, in partnership with Impact Carbon, Ugastove registered the first Gold Standard carbon credit cook stoves project on the voluntary carbon market. This has injected significant investment into the company, allowing it to expand production and to invest to build a wider retail presence and to market more extensively to pull demand for their product.
Production

ILF: The ILF production facility and sales base is on the edge of Lira, the major city to the south of Acholi. The manufacturing process includes: forming specially-shaped bricks from locally-sourced clay, cutting and shaping metal sheeting purchased from Kampala by hand, setting stove components with cement, and painting and branding stove. Production is completed on premises. Three different sizes of household stoves are produced, of which a consistent stock is maintained. Additionally, institutional stoves are made to order. Production capacity is 72 stoves per day (around 2000 a month); although at the time of this assessment demand dictated an average production of 45 per day – a result of recent increased stove prices. Notably, ILF produces clay bricks for mud stove lining as well. At times, orders for this project (funded by the World Food Programme) do slow production for Okello Kuc.

Ugastove: The Ugastove production facility and sales base is located on a single site close to central Kampala. The manufacturing process including: sourcing and transporting clay from a single location north of Kampala, mixing the clay with a formula of wood chips and other inputs that fortify the liner, forming the liners using standard molds and blasting liners in a single large furnace. Further, metal casings are cut, shaped, painted and branded by hand at the same facility. Three sizes of the household charcoal stove are made and kept in stock on the premises along with a smaller stock of the wood-burning rocket stoves. Institutional stoves are also made to order.

Distribution and Sales

ILF: ILF acts as its own distributor for the Okello Kuc stove, transporting the products by truck directly to retailers around the country. The majority of sales occur within the Lira region; although teams regularly visit other districts to recruit new vendors. Stoves are priced at UGX$ 18,500 (US$7.55), 22,000 (US$8.98) and 25,000 (US$10.20) for the three available sizes. Prices are painted on the stove to ensure that the price is maintained. The wholesale price provides a mark-up of 19-25% for the retailer, with all transport costs covered by ILF. A purchase of 10 stoves is all that is needed for a vendor to receive wholesale price and delivery, although generally no credit is provided.

ILF recently signed agreements with two vendors in Kitgum, both of which purchased 200 units. One of these vendors is building a network of sub-vendors across the four study districts and is well placed to become a distributor for the region.

The stoves are currently sold at below total production cost to make them more accessible to the market, subsidized by donor funding. The stove has been certified for entry into a CDM PoA being developed by the Uganda Carbon Bureau which will provide carbon finance to support the stove subsidization and potentially allow for a further price reduction. The registration process for this PoA has been underway for several years and it is expected to be registered during 2012 and to start receiving carbon revenue in 2013. Revenue is expected to be at least UGX 15,000 (US$6.12) per stove per year, sufficient to cover the price subsidy and transport costs, and to make profit on stoves that remain in the system for multiple years. The products come with a warranty for two free repairs as long as the warranty card is filled out at the point

6 All exchange rates based on UGX2450 to $US1.
of purchase. Gathering customer details in this fashion is vital to the monitoring of sales for the carbon project and must be tightly controlled to maximize revenue.

**Ugastove:** Much like ILF, Ugastove essentially acts as its own distributor with no wholesalers or distribution agents in the supply chain. Stoves are sold directly to vendors in Kampala and an increasing number of districts throughout Uganda. The stoves offer a set retail price of UGX 17,000 (US$6.94), 21,000 (US$8.57), and 25,000 (US$10.20). The wholesale price provides a mark-up of 19-25% for the retailer, with all transport costs covered. Ugastove hires sales agents directly to travel to new locations to recruit new retailers, to sell directly to consumers and to advertise the Ugastove product.

The company has been investigating ways to expand further into northern Uganda and recently opened stores in Gulu and Lira. Currently, the stores act as a distribution base for retailers in Gulu and Lira as well as a factory outlet for customers. The company plans to open an assembly plant in Gulu in the near future which will enable the company to cut transport costs by carrying only the clay liners – which need to be consistent for the carbon project – with metal casings made either at the new site or transported in for assembly only. From Gulu, assembled products can be transported onto retailers across the north more efficiently. At present, a truck carrying around 500 stoves travels to Gulu every two months; the truck capacity will increase to 800 where implements are flat-packed and to 2,000 where just clay liners are transported. Ugastove currently does not presently supply further into the Acholi sub-region. However, a base in Gulu makes Acholi market penetration significantly more feasible and cost-effective.

Revenue from the carbon credit generation is split between Impact Carbon and Ugastove. Ugastove receives around UGX 10,000 (US$4.08) per stove per year, this allows the company to subsidize the cost of the product in the first year, and represents profit in subsequent years with which to fund marketing and increasing distribution.

**Ugandan Mass-Produced FES Value Chain:**
**Key Bottlenecks and Challenges**

- Transportation costs are exceptionally high and represent a major challenge to reaching a wider market. Poor road quality makes journeys long, slow and heavy on fuel while also resulting in high vehicle repair costs and frequent down time. Additionally, both the current ILF and Ugastove distribution model is inefficient with special trips being made to individual retailers with only a small number of stoves. This adds cost to each unit and keeps the price relatively high despite the subsidies and carbon credit revenue. Ugastove’s current Kampala-based production facility is notably farther from the four study districts than ILF’s Lira-based production center. Transport to Acholi will be a greater burden for Ugastove relative to its major competitor.

- The data collection requirements to comply with the carbon finance rules – in this case accurate completion of warranty cards – encourages participants to keep tight control over distribution and work directly with retailers. This creates a barrier to the introduction of a more efficient supply chain with streamlined transport and distribution. It also inhibits risk-taking to open new channels utilizing new business models and sales schemes.

- Building networks of vendors with the financial capacity to purchase stock upfront and the diligence to ensure warranty cards are completed correctly is a major challenge. Problems with reclaiming payment in the past means that credit is given on a limited basis and only once a relationship has been developed over time. This limits the number of potential retailers considerably.

- Vendors are rarely able to access outside financing to support the buildup of stock on any scale. This further inhibits access to bulk purchasing discounts for nearly all vendors. Purchases are therefore fragmented; additional inefficiencies result with regard to distribution here as well.

- Once sourced, vendors often require extensive training on technical product specs plus a range of business skills that are important for increasing product sales. Though ILF does offer some skills development for its vendors, neither ILF nor Ugastove have the capacity or resources to deliver skills training on a broad scale. However, creative business models that embedded business management and sales and technical training could be effective.
Consumer Energy Use Analysis

Household Wealth

The main sources of household income are dominated by farming across the four districts. The combined results from both surveys found that 87% of respondents derive most of their income from farming. Commercial activity plays a larger role as a main income source for those living in larger trading centers. The proportion of shop owners and casual laborers increases in urban areas. There is also a significant increase in the ‘other’ category, with the majority of responses here indicating service industry income derived from restaurants, carpentry and motorcycle taxis. However, even in the TCs farming remains the dominant source with three quarters of the population directly reliant on seasonal crop sales for income. This in turn impacts traders and all other small businesses in the region, which rely on increased purchasing around agricultural income influxes as well.

Since seasonal farming is the overwhelmingly dominant source of income, monthly income is a very difficult concept for people to measure. The average reported income is UGX 67,000 (US$27.35), with the average around 20% higher among the urban market segment than the peri-urban or rural 2 group. The rural 1 sample group of responders for the income question was very small and the result was skewed by a single

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7 Median is more commonly used when looking at income figures, however the large number of households reporting zero or very little income at this point of the year made the median figure very low (UGX30,000). Because of this the mean is considered to be a better reflection of likely household income in this case.
large outlier. The income figure found by this survey is very low compared to other studies of rural regions of similar make-up, which may in part be due to the survey being conducted in April which is the planting season and therefore a period of little income for farmers.

<table>
<thead>
<tr>
<th></th>
<th>Per Month</th>
<th>Per Year</th>
<th>Per Year (seasonally adjusted)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>67,449</td>
<td>809,388</td>
<td>337,245</td>
</tr>
<tr>
<td>Urban</td>
<td>72,991</td>
<td>875,890</td>
<td>364,955</td>
</tr>
<tr>
<td>Peri-urban</td>
<td>60,000</td>
<td>720,000</td>
<td>300,000</td>
</tr>
<tr>
<td>Rural 1</td>
<td>88,300</td>
<td>1,059,600</td>
<td>441,500</td>
</tr>
<tr>
<td>Rural 2</td>
<td>60,684</td>
<td>728,213</td>
<td>303,420</td>
</tr>
<tr>
<td>(Ave HH expenditure)</td>
<td>136,850</td>
<td>1,642,200</td>
<td>-</td>
</tr>
</tbody>
</table>

According to the Ugandan Bureau of Statistics household study in 2010, the average monthly expenditure for rural households in the northern regions is UGX 136,850 (US$55.86), around twice the income reported in this survey. A recent examination of seasonal variations in cash influx for rural households by Grameen Foundation AppLab concluded that households typically brought in income 5 months out of the year, which makes annual income much lower once adjusted for seasons as shown in the table. Since true income measures were not possible through the survey, this combination of estimates provides a useful frame of reference.

### Cooking Methods

In line with the low and seasonal income, and the lack of grid access that characterizes the Acholi region, almost all households rely on biomass for cooking and heating water. Of the 489 respondents across both surveys, 98% identified a biomass-based cooking method as the primary method in their household. An open, or “three stone”, fire is the traditional cooking method which is still practiced by 76% of the sample. Wood stoves and charcoal stoves are the other prominent cooking methods, combined accounting for 22% of households. Only the face to face interviews asked if respondents specifically owned a FES and 23% claimed they did own either a wood or charcoal burning FES. However, the primary cooking data indicates not all of them are used as the primary cooking method.

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8 Grameen Foundation AppLab: Annual Presentation to Partners, presented to Mercy Corps in May 2012.
It was hypothesized by the Mercy Corps team that primary cooking methods would vary with market segment. The graphs below show the results of the market segment analysis for fuel use. As can be seen, the proportion of people cooking on a three stone fire does not change significantly across each segment; however, a clear pattern can be seen among 20-25% of stove users. Charcoal stoves are more widely used in the urban segment and charcoal use declines steadily as households become more rural, with an inverse relationship in evidence for wood stove use.

Satisfaction with open fire cooking is a key measurement as it can help estimate the willingness of the market to pay for an improved cooking method. Satisfaction levels among residents in the region suggest a willingness to adopt new techniques does exist. In total, 39% stated they are very or somewhat satisfied with open fire use, leaving 24% of those that use an open fire dissatisfied. This population segment is also likely to be willing to invest in a change to adopt new, improved techniques. A further 22% demonstrate no commitment to open fire cooking and represent the second potential target group. Satisfaction levels were analyzed by market segment but the results remained consistent across each group.

**Households:** 93% collect firewood 11% purchase firewood 18% purchase charcoal
Consistent with the primary cooking methods, firewood is the dominant fuel used in the region, and the bulk of this wood is collected by members of the household itself— not purchased. Proximity to a TC has a clear impact on fuel collection decisions. Charcoal and firewood is much more widely purchased by households in or close to TCs; 34% of households in TCs purchase charcoal and between 18% and 19% of households located in or within 2km of TCs purchase firewood. The number of households buying charcoal is double that of households using charcoal stoves as the primary cooking method, indicating many TC households vary their cooking methods.

![Fuel Sources](image)

The average time taken to collect firewood among respondents for both survey tools is 2 hours and 14 minutes. Dividing by segment, it takes people in the urban segment over an hour longer to collect firewood (2 hours 46 minutes) than it does for those living in more remote rural areas (1 hour 43 minutes) -- a difference of 64%. Time investment needed to collect wood and the likelihood of purchasing fuel (either wood or charcoal) appears correlated, as illustrated in the graph. As can be seen, the proportion of households purchasing fuel increases as time to collect firewood increases (the graph assumes straight line progression between data points). This does not prove a causal relationship and, the rapid decline in fuel purchasing against time taken suggests other factors are involved. However, a correlation between effort needed to collect firewood and willingness to purchase fuel is in line with the expected results when considering opportunity costs.
Results from Mercy Corps’ Pader energy assessment\(^9\) demonstrated that the time needed to collect firewood has increased dramatically in recent years due to diminishing wood supplies. Although adequate data on this point was not achieved in this survey to quantify this point, the increasing difficulty in collecting wood around urban centers is a common issue faced by countries throughout Sub-Saharan Africa. Rising populations place growing pressure on forestry resources for use as fuel, timber and agricultural land. As populations continue to rise across Acholi and urban settings grow, the time and effort required for households to collect firewood will only increase. Ultimately, alternative fuel sources as well as technologies that reduce fuel consumption will continue to grow in importance.

Of the households claiming to purchase firewood, 88% also collect firewood. At the same time, 66% of households that purchase charcoal also collect firewood. These facts, combined with the fact that a large number of households purchase charcoal as a secondary fuel, indicate that sourcing fuel is a dynamic picture at the household level, with households supplementing their regular fuel with alternatives as either costs or available resources vary from day to day.

Across the four study districts, charcoal is made in rural zones and sold wholesale to small retailers in large sacks. Charcoal is also a supplementary source of income for many small farmers who sell multiple bags to travelling traders. For consumption, charcoal is typically sold to individuals in “basins” around TCs. The average cost of a basin is UGX 3,063 (US$1.25), with a mode of UGX

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\(^9\) Mercy Corps Uganda, Catalyzing the Solar Market, Pader Pilot Assessment, 2011
3,000 and the highest price reported at UGX 5,000 (US$2.04). Firewood is sold in bundles, that appear to vary somewhat in size and weight, at an average cost of UGX 2,265 (US$0.92) and a mode of UGX 2,000.

<table>
<thead>
<tr>
<th>Fuel</th>
<th>% Purchasing</th>
<th>Ave units /mth</th>
<th>Cost /unit (UGX)</th>
<th>Cost /yr (UGX)</th>
<th>Cost /yr (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firewood (Bundle)</td>
<td>11.0%</td>
<td>5.2</td>
<td>2265</td>
<td>141,336</td>
<td>$55.86</td>
</tr>
<tr>
<td>Charcoal (Basin)</td>
<td>18.4%</td>
<td>5.35</td>
<td>3063</td>
<td>196,645</td>
<td>$77.73</td>
</tr>
</tbody>
</table>

At an annualized rate based on the average number of units purchased per month, the average cost for the households purchasing charcoal is US$77.73, and US$55.86 for those purchasing firewood. The exact proportion of annual income this investment represents is difficult to calculate due to the challenges with measuring income as discussed earlier. However, it is clear that costs associated with fuel purchase are significant for households.

Most households collect wood and therefore perceive it to be free. However, investment in fuel is not only measured in direct monetary terms, but by the opportunity cost of time invested in fuel collection. Since 92.8% of households stated that they collected firewood, this opportunity cost is a major impediment to overall local economic productivity and growth. Sample wide, the average time needed to collect firewood was 134 minutes (2 hours 14 minutes), with an average of 2.72 collections per week making it 364 minutes (6 hours 4 minutes) invested every week per household in firewood collection. As shown in the table, the collection responsibilities fall heavily on the female members of the household, limiting their opportunity to engage in alternative income generating activities.

Quantifying this opportunity cost in terms of its monetary value in a region such as Acholi is difficult. A practice found in some recent literature on this topic, including fuel wood use studies in Ethiopia and Nepal, is to determine the average daily rate for manual labor in the area, and to apply this value to the time dedicated to firewood collection. This is referred to as the ‘shadow price’ of collected firewood. According to informal data collected by the Mercy Corps team in the Kitgum region, the prevailing day rate for agricultural labor is UGX 6,500 (US$2.65), including food costs. The rate for construction work is higher, however since the vast majority of wood collection is done by women, and women are far more likely to engage in agricultural labor than construction, the agricultural figure is applied as a more conservative estimate of the shadow price. The following table shows the calculations for the shadow price of collected fuel by market segment.

<table>
<thead>
<tr>
<th>Who Collects Firewood</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult female</td>
<td>87.3%</td>
</tr>
<tr>
<td>Adult male</td>
<td>7.8%</td>
</tr>
<tr>
<td>Female child</td>
<td>26.2%</td>
</tr>
<tr>
<td>Male Child</td>
<td>6.8%</td>
</tr>
</tbody>
</table>


Market Analysis for Fuel Efficient Cook Stoves in the Acholi Sub-Region, Uganda

### Hours Spent Collecting

<table>
<thead>
<tr>
<th></th>
<th>Per Trip</th>
<th>Per week</th>
<th>Per month</th>
<th>UGX / month</th>
<th>UGX / month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>2.77</td>
<td>7.53</td>
<td>30.10</td>
<td>24,457</td>
<td>12,229</td>
</tr>
<tr>
<td>Per-urban</td>
<td>2.07</td>
<td>5.62</td>
<td>22.49</td>
<td>18,269</td>
<td>9,135</td>
</tr>
<tr>
<td>Rural 1</td>
<td>1.88</td>
<td>5.12</td>
<td>20.49</td>
<td>16,649</td>
<td>8,324</td>
</tr>
<tr>
<td>Rural 2</td>
<td>1.72</td>
<td>4.67</td>
<td>18.68</td>
<td>15,175</td>
<td>7,588</td>
</tr>
<tr>
<td>Average</td>
<td>2.23</td>
<td>6.07</td>
<td>24.30</td>
<td>19,743</td>
<td>9,871</td>
</tr>
</tbody>
</table>

According to the shadow price calculation displayed in the table above (based on an average of 8 hours’ work a day), the average household spends the equivalent of almost UGX 20,000 (US$8.16) on collected firewood each month, which is US$93.64 per year. Due to the difference in time requirements for fuel wood collection for different segments, this cost is UGX 24,500 (US$10) for urban households and UGX 15,000 (US$6.12) for the most rural households. The potential savings of adopting a FES are based on a fuel wood reduction of 50% and show the income that could be made during the time saved on wood collection. Although this is a generalized picture, it demonstrates that the opportunity cost of using an open fire to burn firewood rather than a FES is significant compared with average household income. Additionally, the savings available per month are less than the cost of a Lorena or equivalent mud or clay FES.

### Current FES Use

The consumer profile survey contained an extra set of questions specifically for households that currently own a FES. Of the 252 respondents, 23% claimed to own a FES, with 17% identifying it as the primary cooking method. As the pie chart shows, the majority of stoves were either made by the owner themselves or a community member was paid to help them, suggesting they are the simpler-to-make mud or clay brick models. Close to a quarter were bought from a retailer; more likely to be the metal based charcoal stoves, with only a small number built by an NGO. Most NGO stove activity was during the IDP camps, with people bringing the skills to build but not the actual stoves with them as they left the camps. The

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12 This is based on a HH that previously used an open fire switching to using the FES for every meal and no longer using an open fire.
A proportion of FES users whose primary source of income comes from farming is 63%, lower than the overall average for households in TCs of 79%, indicating FES owners are more likely to have regularly paying income sources.

The main drivers of the decisions to adopt a FES are spread across the range of options provided. When asked to select all that applied, 40% of respondents identified fuel saving and 30% identified reduced time collecting fuel as their motivation for adopting fuel efficient cooking technology. However, only 12% of respondents made the link from reduced fuel use to saving money as a motivation for purchasing. The fact that reduced wood collection time is a significant factor supports the relationship uncovered above between purchasing fuels and time taken to collect firewood by demonstrating that reducing the time investment in firewood collection is a desirable outcome and one that a significant proportion of households are willing to invest money into.

Those able to recall fuel use under their previous cooking method largely confirmed reductions in fuel use. The average estimated reduction of fuel use among the 24 FES charcoal stove owners that were able to quantify change in fuel use was 19%. For FES wood stove owners, the change in fuel use was quantified as 27%. The reduction of smoke was highlighted as a reason for purchase by 21% of respondents, however 85% of FES owners stated that their FES stove produces either “less” or “much less” smoke than their previous cooking method.

While the sample size of FES owners is small, it was possible to run some basic statistical analysis to help identify several determinants of the likelihood of households purchase and satisfaction with FESs. Most relationships cannot be measured with the data available, but the conclusions that can be drawn from this analysis are:

- The factors that make a difference to the likelihood that a household will purchase a FES are close proximity to an urban center and a higher level of dissatisfaction with open fire cooking.
- People who report less smoke emissions from FESs are not more likely to be satisfied with their FES than people who do not report less smoke emissions.

The second of these results is particularly significant as it supports the previous suggestion that despite reduced smoke being a recognized benefit of stoves, health considerations do not appear to be a major factor in the decision to purchase a FES. This is in line with studies and research in various parts of the world indicating that the negative health impacts of indoor air pollution are not well understood in most communities that cook on open fires. Without this understanding, smoke is not seen as a major problem for those accustomed to it, and therefore its presence is not a driver of change.
Observations and Recommendations

Based on the analysis of both the supply and demand side of the FES market, this section presents general observations on the market for FES as well as recommendations for stove manufacturers, distributors and retailers planning to enter the market across the study area. It also looks at the major challenges and provides recommendations for how Mercy Corps could intervene to help facilitate the development of the FES market across Kitgum, Lamwo, Pader and Agago Districts.

General Observations

Gleaned from the study, the following observations are relevant to FES adoption within the Acholi sub-region:

Awareness

Conditions for market stimulation are good thanks to a high general level of awareness about FES in the market, increasing difficulty sourcing firewood, increasing fuel costs, and significant dissatisfaction with cooking on an open fire.

There have been no broad public messaging around the concepts of FES since the IDP camps. Up to date information on the economic advantages is required to help build the market.

Financing

Access to capital for retailers and distributors is a major challenge that needs to be addressed. The inability of vendors to purchase large stocks and act as distributors to sub-vendors is a major bottleneck in the supply chain.

Conservative payback period calculations show a return on investment that is likely to be attractive to customers if the information is well presented. Creative sales and customer financing models are required to give access to higher quality FESs to a greater proportion of the population.

Flexibility in fuel use suggests high fuel price sensitivity. Households are aware of the relative costs of both types of fuel (charcoal and wood) and they are willing to substitute usage depending on changes in cost or their own access to cash.

Distribution/Transport

Supply chain efficiency can be increased significantly for imported FES through the development of distribution hubs. These could minimize the cost of transporting products from Lira, Gulu and Kampala into the area. Lowering these costs in turn will bring down the total production costs and support price reductions or greater profitability.
Competition
Entry of carbon finance-subsidized stoves into nearby markets will make it harder for local artisan manufacturers to compete. However, local manufacturers will have an opportunity to create a niche for custom stoves as awareness of FES increases.

Commercialization of mud stoves has not been attempted in the region. An opportunity exists to exploit some value added mud stove models, focused initially at areas within 2 km of TCs where firewood purchasing is more common. Rural households do have access to cash at least some of the year and this suggests a commercial model can be attempted. It was not possible, though, to get an accurate picture of rural incomes and access to cash.

Recommendations for Stove Actors
The information presented proves that a genuine market for FES exists within the region. However, demand is currently suppressed and a targeted approach is required in order to unlock it. The consumer market segmentation table below shows that cooking habits can be delineated by geography and that geographic segmentation is relevant for any FES manufacturers or suppliers who intend to enter the study area market:

<table>
<thead>
<tr>
<th>MARKET SEGMENT COMPARISON</th>
<th>Urban</th>
<th>Peri-Urban</th>
<th>Rural 1</th>
<th>Rural 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income (month)</td>
<td>72,991</td>
<td>60,000</td>
<td>-</td>
<td>60,684</td>
</tr>
<tr>
<td>% Farmers</td>
<td>78</td>
<td>90</td>
<td>94</td>
<td>94</td>
</tr>
<tr>
<td>Primary Cooking Method</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Open Fire</td>
<td>75%</td>
<td>77%</td>
<td>83%</td>
<td>74%</td>
</tr>
<tr>
<td>- Wood Stove</td>
<td>8%</td>
<td>15%</td>
<td>9%</td>
<td>18%</td>
</tr>
<tr>
<td>- Charcoal Stove</td>
<td>16%</td>
<td>6%</td>
<td>5%</td>
<td>3%</td>
</tr>
<tr>
<td>Satisfied with Open Fire</td>
<td>33%</td>
<td>11%</td>
<td>47%</td>
<td>31%</td>
</tr>
<tr>
<td>Fuel Sources</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Collect Firewood</td>
<td>87%</td>
<td>95%</td>
<td>98%</td>
<td>100%</td>
</tr>
<tr>
<td>- Purchase Firewood</td>
<td>18%</td>
<td>19%</td>
<td>6%</td>
<td>0%</td>
</tr>
<tr>
<td>- Purchase Charcoal</td>
<td>34%</td>
<td>15%</td>
<td>7%</td>
<td>5%</td>
</tr>
<tr>
<td>Ave Time to Collect Firewood (minutes)</td>
<td>166</td>
<td>124</td>
<td>113</td>
<td>103</td>
</tr>
<tr>
<td>Shadow Cost of Collected Firewood (UGX per month)</td>
<td>24,457</td>
<td>18,269</td>
<td>16,649</td>
<td>15,175</td>
</tr>
<tr>
<td>Heard of FES</td>
<td>71%</td>
<td>73%</td>
<td>69%</td>
<td>63%</td>
</tr>
</tbody>
</table>
Although many patterns are consistent across the market segments, this analysis highlights two distinct target markets:

**TARGET MARKET 1: Fuel Purchasing Households**

This target market group is comprised of largely urban and peri-urban households which regularly purchase fuel, face a higher shadow cost for collected firewood, have a slightly higher income level, and are less satisfied with open fire cooking.

Economic benefits and financial returns create a relatively straight forward and potentially compelling argument for the adoption of a FES. This makes this first identified group the key market segment for actors looking to access FES demand. There is an estimated 50,000 urban and peri-urban households in the region, at least half of which are regularly purchasing fuel; two thirds are unsatisfied with open fire cooking; and all face high shadow costs for firewood collection.

A clear opportunity exists within this segment as market penetration is currently very low for both charcoal and wood burning stoves among this target group. Only 16% of the urban market owns a charcoal stove, with most of these being the traditional, non-efficient model. Penetration of charcoal FES is estimated to be only 4% of this market, although the proportion using charcoal burning mud stoves is unknown. The penetration of wood burning FES is less.

If the reductions in fuel cost are to be a convincing argument for FES adoption then an important figure to calculate is the estimated payback period. The high household fuel expenditure demonstrated in this assessment creates an opportunity for FES suppliers through low payback periods for the investment in a FES. The average household monthly expenditure on charcoal of US$6 – US$7 produces a payback period for a metal cased FES of between two and three months, assuming a 40% - 50% reduction in charcoal consumption. At the same time, the average monthly expenditure on firewood of US$4.50 means that the payback period for a Lorena stove would be just one month, and around four to five months for a rocket stove. These figures present a solid marketing case and should form the center of marketing messages for this first target group.

It is important for suppliers to understand the difficulty in drawing overarching generalizations about the cooking behavior for households in the urban and peri-urban target group. Many households use fuels inter-changeably depending on access and around half of all these households still use open fires and do not purchase any fuel. This is a reflection of the fact that “urban” areas in Acholi are small and with rural-based economies (78% of income derives from farming). Therefore, households in the study area do not follow patterns of larger urban areas in Uganda where FES suppliers like Ugastove and ILF currently operate.
Even among this market segment, which has a slightly higher income level, the issue of price and access to finance comes through strongly. Awareness of FES is quite high but they are widely perceived as being too expensive, creating a major obstacle. The average price paid by current FES owners indicates that at the current time people are only willing to pay roughly the cost of 2 weeks’ worth of charcoal or firewood for a FES. The higher likelihood of current FES users to derive income from non-farming sources suggests a more regular income is a factor. This means suppliers and retailers need to investigate methods for consumer financing in order to stimulate the suppressed demand. The fact that no respondent owns a FES purchased on credit or in installments indicates that at this point there is no consumer financing available, confirming the findings from discussions with retailers.

**Recommendations**

- **Flexible financing schemes:**
  Income, regardless of geographic dispersion, fluctuates according to the agricultural seasonal calendar. Spending is also rigid. Accordingly, market penetration is reliant on flexible financing mechanisms that most closely reflect current cooking and fuel expenditures. Companies that are able to experiment with incremental payment plans, credit mechanisms, partnerships with local financial institutions or VSLA channels and even with barter mechanisms (produce for stoves, for example) will sell the most products.

- **Targeted marketing:**
  The opportunity to recoup fuel costs quickly by adopting FES is the likely entry point for FES sales. Designing marketing and sales strategies based on payback periods with respect to fuel cost savings is a potent strategy for targeting FES sales to charcoal users.

**TARGET MARKET 2: Firewood Collecting Households**

The rural population is a more congruous market segment, with the vast majority cooking on three stone fires and almost all collecting firewood themselves. This population is largely comprised of farmers who derive some cash income from crop sales. This segment also includes around half of all urban and peri-urban households which do not currently purchase fuel, making it a larger but more challenging market segment to reach.

The major challenge in targeting this segment lies in the incentive structure. The collection rather than purchasing of fuel means the financial incentive is not as clear to consumers. Placing a monetary value on time or presenting the shadow price of collected wood is not easily or well understood. In addition, the pressure on forestry resources is lower the further away from TCs you travel. This lowers the time burden felt by more rural communities. The reduction in time collecting wood is a significant factor behind the purchasing decisions of the current FES owners; however, all FES owners identified are urban based for whom the shadow cost of collected wood is substantially greater.

Since economic arguments are less potent for this group actors need to promote other incentives in order to promote FESs, and an alternative is the health benefits. Current awareness of health
problems from indoor smoke pollution is low and the survey fails to identify health factors as major determinants of cooking behavior.

The second major barrier to building a commercial market for FES among communities that collect firewood and cook on open fire is the limited commercial value of the wood-burning mud stoves, such as the Lofrena stove. Many people are familiar with how to make basic wood burning FESs with mud and local materials, and the simplicity of the model and access to materials makes commercialization difficult.

**Recommendations**

- **Targeted Messaging:**
  As monetary benefits of FES are much less tangible for rural wood users, alternative messaging for boosting FES appreciation is required to penetrate the market. Recent efforts to test health messaging have been effective toward increasing FES adoption. Research in Uganda under the USAID-funded Traction Project has shown that once knowledge of health impacts is spread, health concerns become a major driver of decisions to purchase FES.

- **Product Innovation:**
  The simplicity of FES mud stoves has inhibited its value as a commercial product, resulting in less efficient models and limited propagation. Commercialization of simple FES is possible, however. Adding value to a product such as utilizing bricks that add efficiency or applying a metal top to boost ease of use could stimulate commercial demand while maintaining a low enough cost.

- **Business Model Innovation:**
  To commercialize low-cost mud stoves, experimentation with effective business models along with product innovations is required. Propagation of high quality stoves has not resulted from Training of Trainer models implemented in the region. However, the opportunity exists to test innovative business models, including the following: group training classes; experienced and skilled stove technicians that offer stove-building services, shops that offer a range of FES products targeted to specific market segments. Commercial efforts should be focused initially within 2 km of TCs where firewood purchasing is more common and alternative, fuel-saving stoves have more tangible value for potential customers.

**Facilitation Role for Mercy Corps**

Following the assessment, Mercy Corps believes that there is tremendous merit in FES adoption as well as a potent FES market opportunity within Acholi. Across the sub-region, Mercy Corps can play a valuable role in helping to accelerate access by reducing barriers to product availability while concurrently catalyzing consumer demand for FES.

Mercy Corps is dedicated to a market-based approach to facilitate energy poverty reduction. Rather than serving as a direct actor, Mercy Corps works to target key leverage points. We place our resources both where the market is failing to function effectively and, at the same time, where
the resources will result in the greatest possible and lasting impact. Mercy Corps may lead the following interventions within Acholi:

**Improve distribution strategy**

There are inefficiencies within the current distribution models employed by ILF and Ugastove. Such inefficiencies will limit FES market penetration in Acholi where poor infrastructure adds significant costs to transportation and coordination. Mercy Corps may work with these partners, as well as other competing partners, to identify and to model improved distribution strategies. One strategy will be to partner with the companies to help them to identify viable and active distribution partners; entering markets through active distributors with large networks of sub-vendors rather than entering markets through dispersed and individual retailers will likely reduce costs and improve efficiency.

Stringent monitoring requirements for carbon financing impinge on increasingly decentralizing distribution strategies to reach an ever-growing market. However, distribution channels do offer opportunities to embed information within the channel. It will be important to maintain monitoring requirements while concurrently expanding distribution efficiently. One way to do this will be to enhance the capacity of actors in the supply chain and particularly retailers who are responsible for the data collection. Mercy Corps could play an effective role in helping to design new models for embedding training for retailers within distribution channels. Mercy Corps could also partner with other organizations that already provide effective training services to retailers to transfer this training.

**Identify commercial models for mud FES**

Distribution schemes are also important when considering mud stoves for the rural market. Commercial models for these stoves are not currently in existence in the region and commercial actors do not now few this product as a viable commercial opportunity. With this said, the study proves that the opportunity is there with appropriate product and business model adaptation. Mercy Corps could play a valuable role to identify and to innovate on mud FES products. Further, Mercy Corps could develop and test competing commercial business models, identifying which components lead to highest access and adoption. In this role, Mercy Corps could bring together community members that are involved in making these FES and help to design potential business models that can be tested for commercial feasibility. This would include looking at the product design itself and identifying ways to add value to facilitate commercialization.

**Build awareness through social marketing**

Though a potent market for FES does exist within Acholi, consumers not only lack access to the product but are unaware of the many benefits of adoption. Working to crowd-in FES supply is only one part of the equation; it will also be important to stimulate demand for FES as well. One role that Mercy Corps could play to help to catalyze demand would be to disseminate information about the benefits of adopting this technology as well as advertising new, local FES availability.

A nuanced approach to demand-pull is required. Some market segments will respond to messaging that targets the monetary benefits of fuel-saving as quantified within the study. Other market segments, however, will require messaging targeted to the health benefits of FES adoption. This
type of marketing should be pursued by stove makers and suppliers themselves. However, the actors relevant to this market do not have the resources or capacity to reach sufficient proportions of the market. Mercy Corps can play a valuable role in producing and disseminating general social messaging as well as pulling together private actors and facilitating coordinated action in order to maximize the impact of the limited marketing each actor is capable of investing in.

**Facilitate access to finance**

Limited financial resources inhibit access to FES for all actors within the value chain. Though credit does exist within the value chain itself, it is only available for a small minority of actors. Manufacturers are unable to access the capital they need to grow their businesses to scale. Distributors and retailers are unable to access the capital required to build inventory and to expand their consumer base. Consumers are unable to pay for products in a single purchase. Limited access to finance within the FES value chain creates significant inefficiencies that severely inhibit market growth and product access.

Mercy Corps may be able to facilitate access to finance along the value chain. Mercy Corps could leverage existing relationships with banks and SACCOs to generate flexible financial products for businesses. Mercy Corps could also work to design and to facilitate alternative business financing schemes such as micro-consignment models. With respect to consumer finance, Mercy Corps could help to design loan products in partnership with financial institutions for FES themselves. Institutions could connect with distributors or suppliers and provide loans specifically for cook stoves, loans that are bundled with other products such as solar lighting, or even loans that are folded into other offerings.

Mercy Corps could also help to identify micro-lenders with the capacity to take on the distributor role and connect them with product suppliers – both local and from elsewhere in Uganda – to help to promote the product among members. Mercy Corps could also work with suppliers and distributors to help them to design and to experiment with flexible financing options.

**Strengthen business acumen**

Developing retailer, distributor and supplier capacity to design innovative models and to manage successful businesses will improve access and adoption of FES. Rather than working with each group directly, Mercy Corps would be more effective by working with business support services in the region. Several private sector entities already exist that provide business planning and management consulting services. By working to strengthen these groups and the quality of their product as well as to connect them to retailers, distributors and suppliers, Mercy Corps can have a wide and longer-lasting impact on business skills within the region.