

# Feasibility Study Report

## Clean Cooking for All - Uganda

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By Truvalu Uganda

### Country Context

Uganda boasts a market-based economy rich in natural resources and one of the fastest growing and youngest populations in the world. With comparative advantages in agriculture and estimated recoverable oil reserves of over 1.4 billion barrels, with first oil expected in 2025, Uganda is seeing increasing interest among foreign investors. Uganda only fully reopened its economy in January 2022 after almost two years of partial and full COVID-19 related lockdowns. In the fiscal year (FY) 2021/22 (July 1- June 30), Uganda's economy grew by 3.8%. Prior to the pandemic, Uganda's growth for the previous five years (FY 2013/14 to 2018/19) averaged 5.3%, according to The Uganda Bureau of Statistics (UBOS). The slight economic recovery from 3.5% in FY 2020/21 was in part due to the reopening of the economy but also lower than the 4.3% earlier projected. The rise in commodity and fuel prices and depreciation of the Uganda Shilling against the dollar contributed to 6.3% annual headline inflation and 13% food inflation as of May 2022, according to UBOS.

With a total GDP of \$45.7 billion in FY 2021/22, the industrial sector, which comprised 26.8% of the economy, was a primary driver of growth (5.3%). The agriculture sector, which employs 68% of the workforce and represents 24.1% of GDP, grew by 4.3% in FY 2021/22. The agriculture sector is primarily based on subsistence or smallholder production. According to the World Bank, about 41.1% or 16.9 million of Uganda's population live below the poverty line of \$1.90 per day. Uganda plans to spend a total of \$12.8 billion in FY 2022/2023, an estimated 7.6% higher than the FY 2021/2022 budget. The increase is primarily due to increased spending in education, petroleum development, and a flagship poverty reduction program, called the Parish Development Model (PDM).

Uganda's debt-to-GDP ratio increased to 49.7% in December 2021 (latest data available) as the Ugandan government increasingly turned to domestic borrowing and experienced lower than projected tax collection. In June 2022, the International Monetary Fund (IMF) estimated that Uganda's debt to GDP would peak at 53.2% in FY 2021/22, exceeding the Ugandan government's generally accepted risk threshold of 50%.

Uganda maintains a liberal trade and foreign exchange regime. In 2021, the IMF approved a \$1 billion Extended Credit Facility (ECF) to the government to enable the country to deal with the COVID-19 crisis and spur economic recovery. As the economy recovers, Uganda's energy, agricultural, construction, infrastructure, technology, and healthcare sectors present attractive potential opportunities for business and investment.

### Executive Summary

This report is a detailed feasibility study on the production of improved cookstoves in Uganda conducted to assess the viability of the establishment of an Ignite cookstove manufacturing plant. The cookstove adoption targets set by the Government of Uganda are 2.45 million households but the limitations in technology and resources have prevented the successful achievement of the set target<sup>1</sup>. The country still struggles to maintain a commercial improved cookstove market.

The study was commissioned by the former Dutch company Ignite Now BV. This company has transferred its duties to Ignite a Better Future. In this summary, we talk about Ignite.

One of Uganda's priority issues is to reduce the burden on biomass. Although forest coverage is higher than neighboring countries, its depletion rate is alarming (at 2.2% per year). The fuel situation has already led to a drastic increase in charcoal. In 2004, a kg of charcoal cost 200 Ushs, compared to 1500 Ushs per kg in 2011. Between 2009 and 2011 the price rose 140% from \$10 - 243. Currently only 36% of firewood consumers interviewed as part of Shell's Breathing Space research in rural segments actually pay for their fuel. Although cost is therefore not an issue currently, with over 80% of the population using firewood to cook, resources are diminishing and rural communities are finding it more difficult to collect wood. This is especially prominent in humanitarian settings e.g., Nakivale refugee camp.

Improved cook stoves typically use a combination of design features to achieve better fuel efficiency. One of the key design features is improved combustion efficiency. This is achieved by using the smoke-stack effect to create an updraft

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<sup>1</sup> Uganda: Draft Market Assessment Executive Summary:  
<https://cleancooking.org/wp-content/uploads/2021/07/187-1.pdf>

that pulls fresh air into the stove, which raises the combustion temperature and allows for quicker and cleaner burning of fuel. This feedback cycle continues until a stable, higher level of combustion temperature is achieved. In addition to improved combustion efficiency, better stove insulation is used to boost this effect and improve general heat retention. This helps to minimize the loss of unused heat. The heat transfer between the stove and the pot is also optimized to reduce heat loss further. This is typically achieved by using rocket stove technology, which raises the cooking pot to the hottest point above the flame. Institutional rocket stoves further increase heat transfer by having the cooking pot rest within a skirt. By combining these design features, improved cook stoves can achieve much higher levels of fuel efficiency compared to traditional stoves. This has a number of benefits, including reducing fuel consumption, improving indoor air quality, and reducing the negative environmental impact of cooking.

The key recommendations for Ignite from the feasibility study include:

- Ignite needs to carefully evaluate the pros and cons of carbon finance for meeting their cookstove targets and subsidizing the purchase prices. The company needs to comply with the technical performance standards for clean cooking and strengthen their capacity in designing, authorizing, registering, and coordinating carbon-financed activities. Caution needs to be exercised as some of the carbon-credit certification agencies are not transparent and the company needs to establish a traceability system of its carbon credits to ensure long term sustainability.
- Ignite should engage in dialogue and build synergies between clean cooking and closely related sectors and disciplines to accelerate the transition to cooking decency for all. To ensure that clean cooking solutions reach the poor and most vulnerable populations, the company teams can collaborate with cash transfer and social safety net programs. Awareness can be created in partnership with public health, environment and gender practitioners on the adverse effects of IAP and deforestation as well as promote advanced cookstove technologies and fuels.
- To optimize delivery models, the company can leverage the networks and innovative approaches of adjacent sector models serving the same consumer base. For example, microfinance institutions, solar home system companies, and other last-mile distributors can be utilized to distribute clean cookstoves and fuels. This can help reduce costs and increase efficiency in delivering clean cooking solutions.
- Ignite needs to adapt its model and approach to fit within the Uganda context since environments vary. For the targeted communities, a gap analysis should be conducted to identify key barriers and opportunities for overcoming them. The strategy used should be designed to close the existing gaps especially technical assistance, and capacity building.
- Ignite should consider the whole system of food preparation when implementing its model in Uganda. This includes understanding who cooks, what is cooked, how it is cooked, with what fuel, in which vessel, for how long, and how frequently. To gather this contextual information, household surveys and national Multi-Tier Framework (MTF) surveys, as well as social-science investigations, can be used during the initial market assessment phase. It is also essential to prioritize the cooking needs and behaviors of stove users, including women and girls who bear the most responsibility for meeting the household's cooking-energy needs and are most affected by cooking poverty.

The report presents in detail the background and objectives of the feasibility study; the methodology used to undertake it; the country context detailing the environment of doing business in Uganda; the cookstove technology and the actors within the sector; an analysis of the market with a case study of research on willingness to pay and willingness to accept cookstoves in the country; the cookstove production in Uganda including the value chain, the products, raw materials availability, scale of production, as well as the cookstove marketing and distribution; the proposed implementation schedule and strategy; and recommendations for Ignite Now to establish its business model in Uganda.

### Background and objectives:

World-over more than 3 billion people still use solid fuel i.e., charcoal and firewood for cooking. This is often in open fire places which have an extremely inefficient combustion and produce a lot of smoke, resulting in significant health complications especially for women who spent a lot of their cooking. An estimated 2.6% of Ugandan forests are cut down annually for charcoal, firewood and agriculture to support the country's growing population. If this trend continues, the National Environment Management Authority (NEMA) estimates that Uganda's forest cover will be depleted in the next 25 years.

The Uganda National Household Survey summary from 2016-2017 highlights the country's heavy dependence on forest-derived fuels such as charcoal and dry wood, with 90% of households relying on these sources of fuel for cooking. The use of charcoal in urban areas increased by 12.4% between 2012-13 and 2016-17, which is believed to be continuing presently, thus putting pressure on rural forests. The per capita wood and charcoal consumption is estimated at 240kgs and 680 kgs per annum respectively with the demand for charcoal estimated at 1.5 million tonnes<sup>2</sup>. This demand for charcoal has resulted in unlicensed charcoal makers and dealers rapidly depleting the forests to keep up with the profitable industry.

The dependence of households on biomass fuel has exposed over 2.25 million Uganda households to indoor air pollution emitted from burning charcoal and firewood. Indoor air pollution (IAP) is a significant environmental and public health

concern in low- and middle-income countries (LMICs) such as Uganda. Solid fuels such as charcoal and firewood used for cooking and heating are responsible for approximately 2 million premature deaths annually due to illnesses caused by IAP. The use of biomass and coal in simple stoves for heating and cooking, especially in LMICs, is of particular concern due to inefficient and poorly ventilated cooking spaces. Inefficient stoves result in poor combustion efficiency and high levels of emissions of air pollutants that are detrimental to health, including fine and coarse particulate matter (PM), carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), Sulphur dioxide (SO<sub>2</sub>), and various volatile organic air pollutants (VOCs).

One way to address the challenges of Indoor air pollution and reduce its adverse impact especially to the women is recourse to energy efficient improved cooking stoves. Women especially in rural and peri-urban areas are the most affected by IAP because they spend most of their time in the kitchen preparing foods. Improved cookstove technology helps reduce firewood consumption and produce less smoke which improves women's health. Studies such Kumar et al., 2021 - Do improved biomass cookstove interventions improve indoor air quality and blood pressure? A systematic review and meta-analysis - have shown that advanced cookstoves provide the greatest reductions in IAP and high blood pressure.

Regarding particulate matter, a randomized trial study on the effects of fuel-efficient cookstoves on fuel use, particulate matter, and cooking practices in Uganda, it was discovered that the introduction of fuel-efficient cookstoves reduced wood use by 26.7% and particulate matter by 10%. According to the World Health organization, the average particulate matter in Uganda is more than 16 times the recommended standard of 25 µg/m<sup>3</sup>.

The government is cognizant of the challenges associated with the use of biomass, and significant funding from the European Union and other partners has been injected to address this issue. There is a great deal of technical expertise and institutional support in the country, which could be leveraged to develop a coordinated program to bolster the sector. However, stakeholders, such as the government and communities, do not yet view indoor air pollution (IAP) as a top priority, given the urgency of other concerns.

Both local and international interventions have been introduced to avail Ugandans with better cookstoves and fuels including private manufacture for-profit business models as well as non-government and government initiatives. These initiatives have mainly been focused on rural, peri-urban, urban and refugee households. According to the World Bank, there is a need to increase advanced cookstove market penetration to address indoor pollution and particulate matter challenges. The use of advanced cookstoves in Uganda can result in significant cost savings for families. By reducing charcoal usage by 300 kilograms annually, families can save approximately 110 USD, which is a substantial amount considering the country's per capita income is estimated at 600 USD.

Based on World Bank estimates, Uganda's potential market for advanced cookstoves is more than 4.5 million households in rural areas plus another 1.5 million in the urban centers - this excluding refugee populations. Therefore, it is essential to address supply-side constraints to increase the supply of competitively priced, high-quality advanced cookstoves in the market. Given the high cost of advanced cookstoves, carbon finance is a feasible means of subsidizing costs to support market penetration. To further support market penetration, it is important to understand behaviors of individuals within different communities geared towards innovative, effective and practical marketing approaches to communicate the value of advanced cookstoves.

In view of expanding its operations to Uganda, Ignite through a feasibility study seeks to understand the available clean cooking solutions and how well its model can be implemented to ignite economically viable clean cooking business with a mission to accelerate a structural transition towards clean, smokeless cooking.

### Objectives of the feasibility study:

The objectives of the feasibility study include:

- Analyzing the market for the product or service, the industry, competition, consumer demand sales forecasts, and growth projections.
- Mapping stakeholder of already existing cook stove initiatives in Uganda and the available business models.
- Laying the foundation for project design focusing on technological considerations and organization structuring.
- Making recommendations about the viability of the project and business venture identifying critical success factors and key risks.