

Financing Growth in the Clean Cookstoves and Fuels Market: An Analysis and Recommendations

Strengthening the Pipeline through Better Alignment of Financing with Enterprise Needs

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Section 1

Executive Summary

Executive Summary

It has been seven years since the Global Alliance for Clean Cookstoves (“the Alliance”) announced its goal of 100 million households adopting clean cookstoves and fuels by 2020. Since that announcement, a market-based approach has been pursued to increase investment in this crucial sector (1). In recent years, grants – and increasingly equity – have been the most common types of investment capital coming into the sector, but debt capital has largely been out of reach for enterprises, particularly the early stage or smaller businesses that lack sufficient financial history for a loan and access to investor networks (2).

The Clean Cooking Working Capital Fund, announced by the Clinton Global Initiative in 2013, was launched in 2015 to accelerate the development of the clean cooking supply chain by providing loans to creditworthy enterprises (3), many of which were facing difficulty in accessing traditional sources of debt capital from large domestic and international banks. Between forty and fifty enterprises were in the Fund’s target pipeline and it was originally envisaged that between ten and fifteen investments would be made. The Fund was intended to be a proof of concept and as such had a relatively short, five year life. Launched with great hope to continue the transformation of this nascent sector, the Fund stopped investing after two years, having reached advanced stages of negotiation with ten enterprises but only closing two investments.

This report looks to address:

1. The factors that directly contributed to the challenges of the Clean Cooking Working Capital Fund.
2. The challenges that persist in today’s market, impacting investment flows into the clean cookstoves and fuels pipeline.
3. Recommended solutions that should be considered to support growth and development of the market and how the sector could better align future financing initiatives.

In answering the above questions, this report heard the challenges faced by the Fund directly from the enterprises, donors and investors involved, including from the Fund Manager. To establish the broader market context and determine the challenges that persist today, other enterprises, investors, donors and

advisors not directly involved with the Fund were also interviewed.

What factors directly contributed to the challenges of the Clean Cooking Working Capital Fund?

The difficulties faced by the Clean Cooking Working Capital Fund were due to two primary factors. First, despite best efforts by engaged stakeholders, there was a mismatch between the perceived need for the Fund and the actual status of the market; many enterprises in the pipeline were simply not ready to absorb commercial debt. As the market matures, there will be a need for more debt financing, but at the time the Clean Cooking Working Capital Fund was launched, these needs were premature.

Second, a change in risk appetite amongst the impact investors could not be accommodated by the agreed framework. Following detailed discussions during the Fund’s development stage, there was agreement and alignment amongst the Fund’s members on the direction and development of the Fund; however, the Fund’s impact investors started to push for riskier investments to be made when it was realised that the Fund was not going to be accessible by many enterprises in the pipeline. If the Fund had continued, its core framework – including investment guidelines and the loan agreement with the Fund’s investors – would have needed rewriting to accommodate the changing wishes of the Fund’s investors who became more interested in meeting the market at its current stage of development, once market conditions became apparent. Without revisiting the agreed framework, transactions could not be consummated with “higher risk” enterprises in the pipeline.

What challenges persist in today’s market, impacting investment flows into the clean cookstoves and fuels pipeline?

The Impact Industry Acceleration Framework, a template of four interconnected stages designed by Ted London and Colm Fay of The William Davidson Institute at the University of Michigan in collaboration with the Alliance to help accelerate the development of the clean cookstoves and fuels industry, has informed the challenges and recommendations documented in this report (4). A principal challenge that surfaced during interviews is the role data needs

to play in driving sector growth. The absence of financial and consumer data is an impediment to investment and market growth. Furthermore, the lack of a standardised approach to organising and applying such data limits the ability to share relevant information, knowledge or best practices, within and across neighbouring markets (5).

Unpredictable demand complicates enterprises' ability to forecast, adding uncertainty (6) and further dissuading investment. This, coupled with the effort, patience and costs needed to lift customer demand for improved cookstoves, limits investment attractiveness. Interviews confirmed that generally, customers are yet to see clean cookstoves as aspirational products, which suppresses demand for them. Enterprises should gather and use consumer data from successive customer feedback cycles to inform their research and development (R&D) efforts, iterate their products and tighten the fit of their offerings with consumer desires. In addition, customer affordability and access to credit are also barriers to demand for clean cooking solutions. New business models have emerged, such as fuel-centric enterprises that make aspirational cooking fuels like LPG, ethanol and biogas available to customers. Recurrent fuel sales enable enterprises to increase the frequency of their interactions with customers; tightening feedback cycles and allowing enterprises to better understand their customers' local behaviours, tastes and purchasing power.

What recommended solutions should be considered to support growth of the market and what could the sector do to better align future financing efforts?

To bring more institutional debt and equity capital to the sector for early and mid-stage investments in promising businesses, visibility of financial and market data is crucial to showcase promising enterprises to investors and donors.

The capture and use of data at the customer level is critical in validating the alignment of enterprise strategies with customer needs.

An overarching recommendation of this report is the adoption of an established, **data-driven** market acceleration framework to assist stakeholders with the collection, collation and sharing of data; building deeper insights and assisting the collective acceleration of market growth.

The indicators requested by impact investors and donors do not always align with indicators relevant to increasing sales from customers. A two-pronged strategy to data collection and analysis should be adopted by the sector to enable the measurement of environmental and social impact indicators, while pre-emptively developing mechanisms through which to collect more commercial, financially-oriented performance data as the sector grows and matures. Data requests made of enterprises by investors and donors are not stored centrally, or generated automatically. Enterprises reported that they can end up investing a lot of their time in responding to similar information requests from investors and donors.

To address the financial difficulties many enterprises currently experience, this report recommends a funding vehicle that offers more patient capital than the Clean Cooking Working Capital Fund, specifically a subordinated debt/ quasi-equity instrument backed by grant funds, offering the prospect of return commensurate with market growth but without putting pressure on the enterprise prematurely. Technical assistance for enterprises' financing needs is also crucial during early stages of enterprise growth.

The price-point at which customers are willing to pay for clean cookstoves and fuels varies extensively within and between markets, with many customers finding it hard to pay upfront for clean cookstoves or household energy systems and require assistance to purchase clean cookstoves. Enterprises have an inventive array of financial packages to open up the accessibility of their services and offerings, such as microloans, pre-pay instalments and pay-as-you-go. This report sees potential for a debt vehicle to be made available to a select few enterprises with the requisite financial acumen to have access to a pool of funds that are ring-fenced to assist customer financing. A pool of banks could be identified with their balance sheets acting as guarantors. This impact capital could be made available to enterprises in the form of low yield debt, strengthening enterprise balance sheets such that they can lend directly to the customer to enable the purchase of the fuel and/or underlying clean cookstove product, with repayment facilitated by monthly instalments.





Section 2

Introduction

Introduction

In the past five years, significant strides have been made to advance the clean cookstove and fuels sector, witnessed by the development of international standards, maturation of local advocacy entities and advancement of several national government market development plans (7). Despite this, enterprises continue to experience challenges in attracting sufficient financing to achieve scale (2).

With broader commercial investor interest in the sector slow to take root and capital flows limited, the Alliance – along with a consortium of pioneering impact investors and donors – has been at the forefront of developing facilities that support innovative early-stage enterprises in need of capital to grow (7).

In addition to the Clean Cooking Working Capital Fund, the Alliance has also launched the following funds over the past five years:

The **Spark Fund**, to bridge the “pioneer gap” between start-up and investment with grant capital and capacity building support to enterprises working in unproven markets that have not yet achieved commercial viability at scale. Spark Fund grants of up to US \$500k were structured to target specific capital investment and capacity development needs of enterprises across the value chain that had passed the start-up or proof-of-concept stage and demonstrated scalable, and potentially transformational, approaches. Three rounds of funding have been deployed, financing a total of fifteen enterprises (2).

The **Catalytic Small Grant Fund**, developed in response to the need for country-specific mechanisms that fund capacity building and growth of start-up and venture-stage enterprises that were unlikely to be competitive for larger, global financing mechanisms such as the Spark Fund. Grants of up to US \$100k were awarded to strategically placed enterprises in the cookstoves and fuels sector in several of the Alliance’s focus countries, to fund growth initiatives that would enrich the value chain by enabling more efficient production, enhanced distribution and more strategic partnerships (2).

The **Pilot Innovation Fund (PIF)**, to stimulate technology and business model innovation by financing innovative Proofs of Concept with grant

capital. Given the critical role of R&D across an enterprise’s lifecycle, both in continuously evolving product offerings or in prototyping new innovations to fill market opportunities, PIF grants could be awarded at any stage of the enterprise’s development. Three rounds were deployed, financing a total of sixteen enterprises (2).

The **Women’s Empowerment Fund**, to drive greater inclusion of women across the cookstoves and fuels value chain by financing enterprises that prioritise gender inclusion, test innovative empowerment approaches and build the evidence for effective, gender-informed business models (2).

The **Capacity Building Facility**, to fund capacity building initiatives for businesses ready to scale and able to obtain investment capital. The Facility allocated grant funding to subsidise a portion of the initiatives’ costs for each accepted company, with the expectation that the remaining costs would be covered by the investor. The grant application process was accessible to both enterprises and pre-qualified investment funds and contingent on demonstrating committed financing, an ability to manage such capacity building initiatives and a commitment to cost-share at least 25% of the initiative’s total cost (2).

The **Fuels Capacity Building Program**, to provide capacity building support specifically to enterprises for which fuel is their primary focus. The capacity building support focused on enabling these businesses to develop tools such as supply curves, business model canvases, economic and lifecycle modeling and optimisation tools in order to move towards scaling or replicating their business models (2).

In addition to the funds described above, recognising the need to ultimately transition from grants to investment capital, the Alliance partnered with a US based asset manager to develop the Clean Cooking Working Capital Fund and facilitate greater enterprises’ access to loan finance (3). Prior to the inception of the Clean Cooking Working Capital Fund, many traditional sources of capital, such as loans or lines of credit from large domestic and international banks were out of reach for smaller enterprises, who either lacked sufficient collateral or financial history for a loan, or could not afford the prohibitively high

interest rates being offered. As such, the history of debt transactions in the sector prior to the Clean Cooking Working Capital Fund was almost non-existent (8).

In theory, easier access to debt would assist with enterprises' working capital needs and help catalyse other sources of commercial debt by leveraging first loss grant capital as a guarantor (9). However, the Clean Cooking Working Capital Fund found that investable assets were fewer than expected and companies that were investment worthy could raise larger loans than the US \$375k limit (at the Fund's launch). The Clean Cooking Working Capital Fund closed two deals before a strategic review of the Fund's concept was initiated, leading to this report.

Report Objectives

This report, commissioned by the Carbon Initiative for Community Impact ((CI)²), the entity that houses the Clean Cooking Working Capital Fund, and spearheaded by the Alliance with support from Accenture Development Partnerships, looks to understand what is needed to catalyse the future growth of clean cookstoves and fuels enterprises, by addressing:

1. The factors that directly contributed to the challenges of the Clean Cooking Working Capital Fund.
2. The challenges that persist in today's market, impacting investment flows into the clean cookstoves and fuels pipeline.
3. The recommended solutions that should be considered to support growth and development of the market and how the sector could better align future financing initiatives.

Given the complexity and nascency of the clean cookstove and fuels sector, the challenges and recommendations presented in this report have been considered using the Impact Industry Accelerator Framework, developed by London and Fay of the William Davidson Institute at the University of Michigan in their 2017 Working Paper "Accelerating Impact Industries" produced in collaboration with the Alliance, which describes four interconnected stages of industry acceleration: 'Mobilise Resources' to accelerate investment (broadly, including grants and non-financial resources), 'Orchestrate Collective Action', to accelerate legitimacy, 'Build Market' to

accelerate profitability and 'Scale Enterprises' to accelerate impact. The framework is applied in this report with two adaptations. Firstly, the framework is not intended to be followed sequentially, as the activities of each component of the model continue to evolve as the market matures. Secondly, an additional 'stage' has been added to the framework examining the paramount role of data in accelerating market growth – a principal challenge that surfaced during interviews for this report.

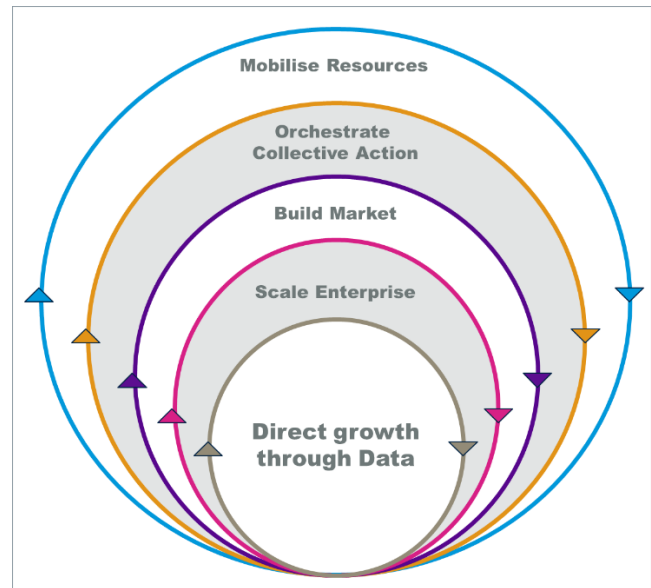


Figure 1: Impact Industry Acceleration Framework plus 'data' (based on (4))

The report is supported by insights captured in interviews with ten sector enterprises, eleven financiers (including one donor, seven impact investors and three commercial investors) and four advisors. Recommendations presented in the report are informed by interview insights and a review of more than 200 pieces of sector intelligence literature. The evidence for this report is primarily, though not exclusively, based on evidence from enterprises and investments in East Africa, with evidence also coming from other geographic locations, including India, South East Asia and Latin America. Contributions have been aggregated and anonymised; however, this report attempts to animate key findings – as well as give a feel for local variation – by calling out case studies in support of the text. These cases are mostly local snapshots. The reader should not necessarily interpret the case studies as being globally applicable, due to the fragmentation and heterogeneity that the interviews confirmed to still exist within – and between – markets today.

Throughout the report, the terms ‘enterprise’ and ‘investor’ are used. In this report, ‘enterprise’ generally means a company that meets at least one of the financial requirements of the Clean Cooking Working Capital Fund, for example they have already successfully raised investment capital or have a capital ratio (equity to assets) of at least 25%. ‘Investors’ covers commercial investors and impact investors. Where possible, an attempt has been made to clarify the type of investor in the text. ‘Donors’ are called out separately.



Section 3

The Clean Cooking Working Capital Fund

The Clean Cooking Working Capital Fund

Introduction to the Fund

The Clean Cooking Working Capital Fund was launched in 2015 to accelerate the development of the cookstoves and fuels supply chain by providing loan financing to enterprises facing difficulty accessing sources of debt capital (3). Many traditional sources of capital, such as loans or lines of credit from large domestic and international banks, are out of reach for early stage or smaller entrepreneurs who lack sufficient collateral or financial history for a loan (11). Even if these enterprises secure a commercial loan, interest rates or collateral requirements are often prohibitive and therefore restrictive to the organisation’s growth (12).

Limited access to working capital was, and is, a key challenge for many cookstoves and fuels enterprises (8). Interviewees shared that they have large working capital needs in order to finance large inventories of raw materials or finished products against a backdrop of irregular customer demand, slow stock turnover and border import issues. Working capital can also help buffer the enterprise against late payments made by third parties, which interviews revealed as a common occurrence when working alongside financial intermediaries.

The Fund was managed by a US based asset manager (the “Fund Manager”). Other partners in the Fund were the Netherlands Enterprise Agency (Rijksdienst voor Ondernemend or RVO), Osprey Foundation, Hampshire Foundation and Montpelier Foundation. The Fund was closed with a US \$1M Junior tranche, structured such that RVO would take the first loss, with a mezzanine tranche provided by the Fund Manager at 0% interest rate. The Senior tranche, provided by Osprey Foundation, Montpelier Foundation and Hampshire Foundation, was closed at US \$1M and had a target interest rate of 2%. These funds were ultimately not deployed.

The Fund targeted enterprises that had:

- Clear ability to scale, as evidenced by at least US \$350k in gross annual revenues;
- At least one year of operating history;
- A viable business plan and formal legal structures;
- Positive net equity;
- Positive cash flow from operations, or could show a clear path to it;
- Minimum Tier 2 performance standards for efficiency and for indoor emissions, per the ISO IWA framework;
- Intentions to use the Fund’s financing for working capital, or other purposes intended to grow the reach and scale of the company.

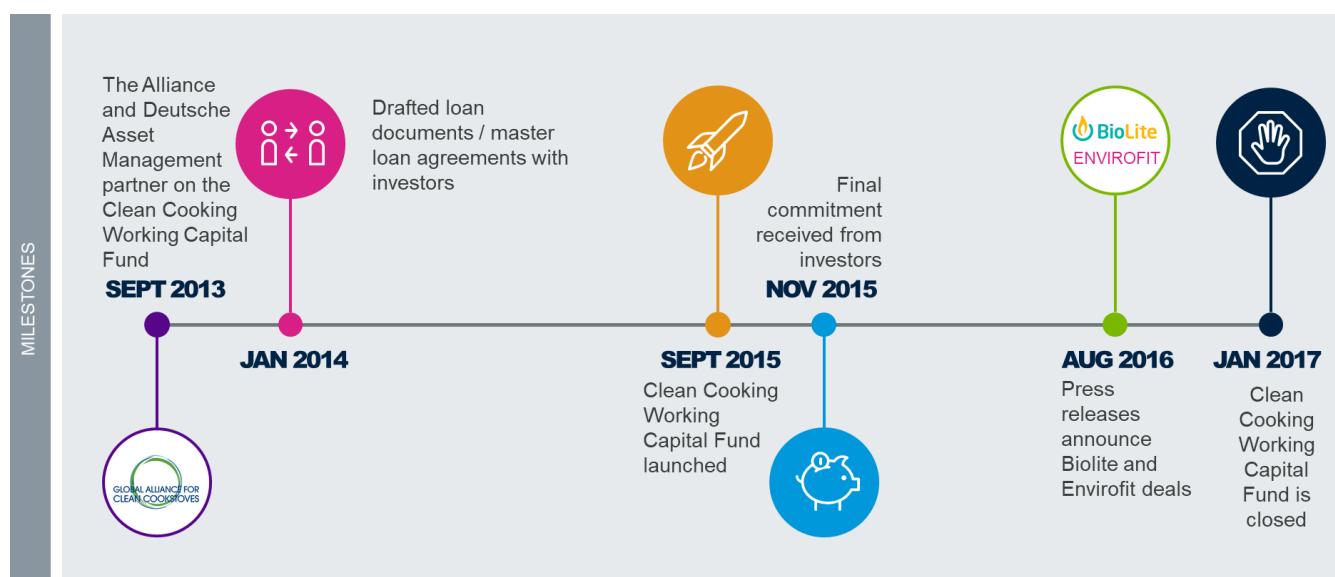


Figure 2: Clean Cooking Working Capital Fund timeline: from inception to close, (3)

Two enterprises, BioLite and Envirofit, successfully closed deals with the Clean Cooking Working Capital Fund. In addition to meeting the above requirements, both enterprises shared similar strengths that were important in building and articulating their projected growth plans.

According to the Fund Manager's own analysis, both enterprises had:

- Top of the range technologies, based on extensive pilot studies and product design testing;
- High calibre management teams that had proven abilities in successfully launching new products into new markets;
- Strong relationships with investors and with their manufacturers and distributors, having invested in management systems to help organise their supply chain procurement and manage partner relationships.

Envirofit is a market leader in the design and manufacturing of high-quality biomass cookstoves, having sold over 1.5 million clean cookstoves in its target markets. It has a wide range of products catering to a diverse customer set and a network of over 40 distribution partners and over 300 retailers in over 20 countries. The company also distributes lighting products, which are sold to existing cookstove customers through the same distribution channels. To ensure scale over time, Envirofit continues to grow through three distinct distribution channels: standard retail, commercial "social network" retail (e.g. microfinance institutes and savings and credit cooperatives) and development aid (13).

BioLite develops, manufactures and markets distributed energy solutions for off-grid communities around the world. Their HomeStove provides ≥90% smoke reduction compared with a three-stone fire and also co-generates electricity from the heat of the flame to charge mobile phones and LED lighting. BioLite iterated the design of this product based on extensive pilot studies, manufacturer consultations and user testing; enhancing performance and usability while reducing manufacturing costs. In 2017, BioLite expanded its product line by offering a solar home lighting system that includes a motion sensor security light, an integrated radio/mp3 player and pay-as-you-go functionality (14).

Challenges encountered by the Fund

The intention of the Fund was to invest in companies demonstrating that the sector is ready to absorb debt financing and "crowd in" more capital from commercial investors (9). There was also an expectation that by 2019, the Fund would be closer to US \$30M as attention from outside investors grew. Between forty to fifty enterprises were in the Fund's target pipeline and it was originally envisaged that between ten and fifteen initial investments would be made by the Fund. These goals proved to be challenging. The Fund stopped investing after two years and closed after four years, having reached advanced stages of negotiation with ten enterprises but only closing on two investments, a lower than expected conversion rate for such a fund.

Why was this the case? Insight from the Fund's investors, advisors, Fund Manager and enterprises (including the two companies who reached financial close with the Fund, as well as a selection of enterprises who did not) point to two primary contributors to the Fund's limited success:

There was a mismatch between the perceived need of the Fund and the actual status of the market

The majority of enterprises in the pipeline were simply not ready to absorb commercial debt. At the time the Fund was launched, very few enterprises in the pipeline were reliably demonstrating consistent quarterly revenue growth. The high amount of uncertainty in growth projections made providing realistic debt terms difficult. Some enterprises claimed that the terms of the debt being offered to them were unattractive or unrealistic; smaller enterprises borrowing in local currency would be stretched to meet interest rate repayments of up to 13% (in hard currency equivalent); potentially putting themselves under financial duress when repayments became due. With a handful of exceptions, the Clean Cooking Working Capital Fund demonstrated that enterprises in the sector are not ready to take on large, traditional, debt investments.

The Fund was designed on a small sample size of enterprises. In the absence of reliable and available market data, early analysis used to design the Fund involved studying a subset of enterprises and extrapolating this analysis to inform assumptions about the broader pipeline of enterprises and their

capacity for debt-readiness and the future performance, especially growth of the companies. Unfortunately, the enterprises used to inform the Fund design was not reflective of enterprises more broadly, nor was the most recent growth of the companies reflective of their growth trajectories in the short to medium term. Growth, in general, was lower. Most companies vetted after the launch did not meet the Fund Manager's minimum requirements; the Fund had set financial targets that the majority of enterprises could not meet. Enterprises had received notification of the minimum requirements to be eligible for funding, but many did not identify themselves as falling short of the acceptance requirements. Part of the issue was the lack of information from enterprises – most companies were unwilling to share their financial or sales data without a non-disclosure agreement or until they were confirmed as being under consideration for a loan.

Interviews indicated that **the size of the loans being offered were not well suited to the pipeline's needs**. Anticipating a total of US \$4M capital raised at fund close, the maximum loan amount was set to be US \$400k, with a maximum ticket size at the initial launch of US \$375k (15% of the US \$2.5M raised). For many of the larger enterprises, the size of the maximum loan available through the Fund (US \$375k) was small compared with the US \$1-2M size of financing they were seeking. Enterprises noted that "it takes a lot of capital to build and scale a products company in places like Sub-Saharan Africa. The loan sizes were generally small compared to the overall need for most companies, even those at an early stage of development. Interviews also revealed that many enterprises were looking for grants or for equity funding, rather than debt at their life-cycle stage. Many companies for whom this amount of debt financing would have been theoretically appropriate based on their cash flow, did not meet the Fund's minimum requirements.

The Alliance was responsible for raising capital for the Fund, but it **took a long time to find a willing combination of investors**. One reputable government fund had been involved in early but extensive negotiations as a potential donor, before ultimately declining to participate in an instrument looking for *some* return of capital – as they were not prepared to deploy capital in a way that could be interpreted as having used government money to subsidise private profit. The difficulty in finding investors to support the

Fund meant that it did not close as per the expected timeline. The initial tranche of US \$2M was scheduled to close by December 2014, but it was another nine months before the Clean Cooking Working Capital Fund was launched. The delayed timeline contributed towards an increased workload for the Fund Manager and for the Alliance, a sense of fatigue amongst some enterprises and a strain on expectations of the Fund's investors who had committed capital but could not see progress being made towards the first investment.

A change in risk appetite amongst the Fund's investors could not be accommodated by the agreed framework

There was a recognition amongst the Fund's investors that the pursuit was high-risk and that the Fund needed to be prepared to accept high default rates. The expected default rate was quite substantial at 5% per annum; a much higher risk than the Fund Manager would typically take, even in the case of microfinance or philanthropic funds. A staggered approach was taken to building the portfolio up to help manage the risk, with the first set of investments intended to be as stable as possible; assigning preference to internationally known companies seeking US dollar investments. The second set of investments was to be comprised of a larger number of local companies, funded in local currencies. The guidelines for the Fund were agreed in conjunction with the investors and the Alliance and were bespoke to the Fund; recognising the realities of the maturity of the market as understood by the Fund's investors at that time. However, the pipeline of enterprises was not as ready to take on debt financing as was anticipated at the outset. This resulted in calls amongst several investors for the Fund to pivot towards taking more risks at the deal level. However, this increased risk could not be reconciled with requests amongst the Senior tranche to have less risk at the portfolio level by increasing the proportion of subordinated debt from 50% to at least 62.5%

Green Energy Biofuels (GEB) is a Nigeria-based enterprise that has sold more than 400,000 cookstoves and supplements with ongoing fuel sales. During advanced stages of negotiation with the Clean Cooking Working Capital Fund, Nigeria's Central Bank de-pegged the Naira from the US dollar, resulting in a 30 percent fall in the Naira. Any loan from the Fund would either be in US dollar or unhedged Naira as foreign exchange swaps were unavailable at the time. It was deemed to be too risky and the loan was cancelled.



Section 4

Persistent market challenges hindering deal flow

Persistent market challenges hindering deal flow

To complete the picture of why the Clean Cooking Working Capital Fund did not deliver on its intended outcomes, the Fund’s performance must be reviewed in the context of prevailing market conditions.

Interviews for this report highlighted the progression of the market over the past three to five years, but also indicated the presence of challenges that limited the viability of the pipeline for debt financing. The Impact Industry Acceleration Framework (shown in Figure 3), is an actionable roadmap to accelerate development within an impact industry. It has four interconnected stages, each of which emphasises a specific acceleration goal – investment, legitimacy, profitability and impact. All four must be achieved to ensure

development of a thriving impact industry (4). The framework provided a sound baseline, but interviews highlighted data as the critical – and not yet reflected – element to driving acceleration of the framework itself. It is recommended that another ‘stage’ be added to the Impact Industry Acceleration Framework on data.

Two overarching data challenges, which deter investment and limit market growth, are the low visibility of market, financial and customer data and the typically unpredictable nature of customer demand. These challenges are considered in more detail.

Create Wide Investment Proposition

- EPA’s Administrator sought greater financial and organizational support for clean cooking across multiple U.S. Government agencies

Activate Financial and Non-Financial Commitments

- Alliance’s launch at the Clinton Global Initiative helped facilitate support from, for example: WHO, EPA, Royal Dutch Shell, and the UN Foundation
- Alliance continues to attract champions, including actress Julia Roberts and Chef Jose Andres

Develop Implementing Platform

- UN Foundation was identified to provide governance structure and reputational capital to facilitate investment from diverse stakeholders
- Clean Cookstove Association of Kenya (CCAK) formed to increase use of clean cooking & fuels through advocacy, awareness, & capacity building

Maintain Momentum

- Alliance needed to anticipate and manage how transitioning to SDGs might shift donor priorities and funding streams

Develop Coalition of Advocates

- Alliance aligned its global strategy to create a common vision & goals for the sector, and through individual CAPs in focus countries
- Bangladesh CAP process resulted in formation of the Household Energy Platform
- The Partnership for Clean Indoor Air was announced by the U.S. EPA at the World Summit for Sustainable Development
- China added clean cookstove provisions to its 12th & 13th 5-Year Plan

Build Social Value Proposition

- Alliance is investing in further research to better understand and gather better evidence for what the effects of clean cooking are on health outcomes

Ensure Quality and Consistency

- A group of experts are working through the ISO process to develop a tiered system characterizing different levels of efficiency, emissions, safety, and durability
- IWA 11:2012 Guidelines for evaluating cookstove performance was unanimously approved by over 90 participants from 22 countries
- Kenya & Bangladesh are developing local standards for labeling cookstoves

Balance Global Standardization and Local Customisation

- In Kenya, stakeholders are prioritizing complementing existing global data with research on the local impact of clean cookstoves, & making this info publicly available

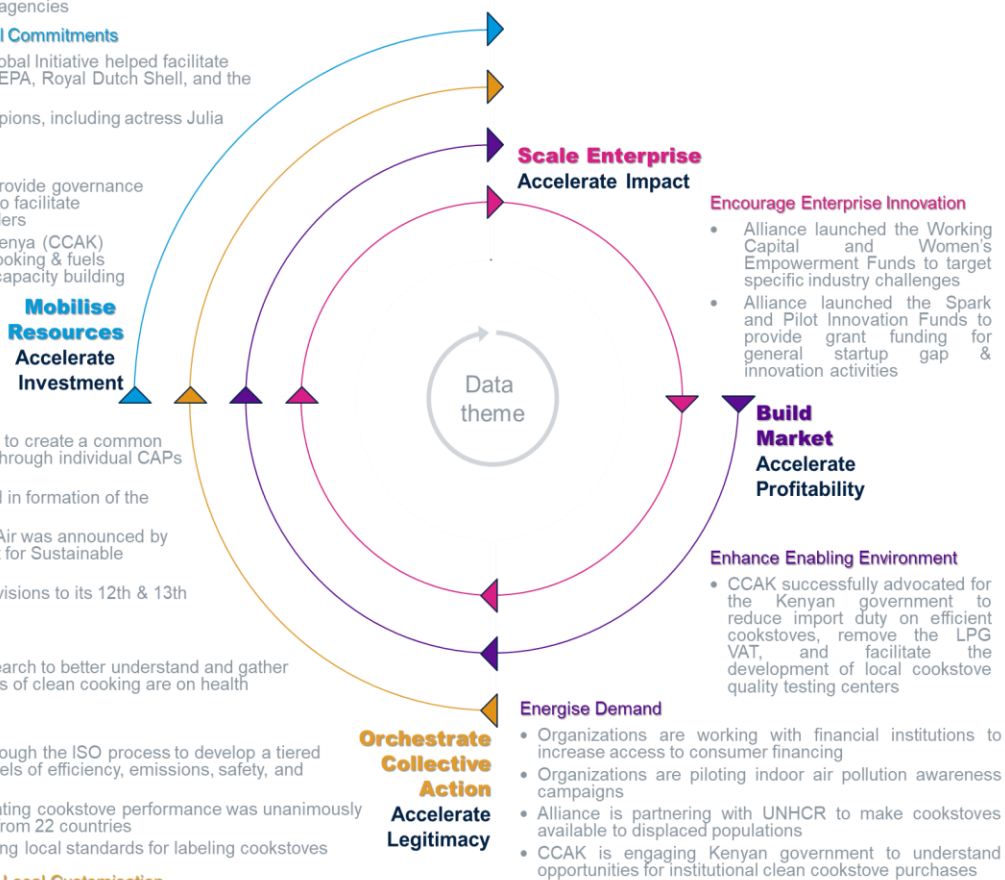


Figure 3 Contributors to market evolution mapped across the Impact Industry Accelerator Framework, based on (4)

Challenge 1: Low visibility of market, financial and customer data is hindering investment and market growth

Challenge

Low visibility of market, financial and customer data is hindering investment and market growth

Enterprise Issues

- The lack of available market data limits investments made in enterprises
- The lack of a standard approach to organise and apply data limits knowledge transfer within and across markets
- Misalignment between impact investors and customers on reportable indicators affects allocation of funds and enterprise resources and adds onerous reporting requirements to enterprises

The lack of available market data limits investment made in enterprises

Access to up-to-date financial data helps investors and donors to screen enterprises, design financial instruments and inform their investment strategies – such as whether to enter a market or disrupt a specific segment of the value chain. However, **investors and donors are frustrated by the lack of data covering enterprises' financial and operating performance**; market data is scattered across a multitude of markets, offering outside investors and donors little objective evidence to expediently assess market prospects. There is limited visibility into the types and amounts of capital raised by enterprises to date. By limiting the collation of enterprise data, enterprises are not able to adequately articulate the “bigger picture” of the market to the investors they are looking to for financing. Furthermore, data requests made of enterprises by investors and donors are not stored centrally, or generated automatically by enterprises, increasing enterprise workloads in responding to similar information requests from different investors and donors.

The Clean Cooking Working Capital Fund was interested in enterprises that were ready to scale, with positive cash flow from operations and positive net equity, or a business plan showing a viable path towards these metrics (3). Quantitative financial data on enterprises' revenues, EBITDA, capital expenditures and operating costs would have flagged enterprises more suitable for debt capital and could also have better informed the early design of the Fund, had such a data facility existed.

Early internal market analysis on behalf of the Clean Cooking Working Capital Fund showed an expectation that the market would grow significantly

during the life of the Fund – a forecast that ultimately did not come true.

During the screening stage of the Clean Cooking Working Capital Fund, the Fund Manager contacted 50 pipeline companies, which was a resource-intensive process that ultimately needed to be repeated shortly after launch, due to the delayed start to launching the Fund.

Commercial investors expect a high degree of financial acumen from enterprises, which over the life of the Clean Cooking Working Capital Fund, was “frequently found to be lacking,” deterring investment. One enterprise made it to an advanced stage of screening, before it was discovered that they were in default to a separate lender. The Fund Manager noted that several enterprises had elevated expectations of their chances of securing debt financing based on the sizeable valuations they received from third parties. In turn, several enterprises with these valuations were surprised to find that they were not considered eligible for large debt-based loans as they had negative equity, a difference in accounting versus financial valuation.

In the absence of detailed market data, **investor and donor expectations of enterprises' customer adoption targets and timelines were unrealistic**. Enterprises reflected that many potential commercial investors' expectations of financial returns and repayment timeframes seemed more attune to Silicon Valley technology companies than for those servicing Base of Pyramid-oriented cookstove and fuel markets; a nascent impact industry. Some enterprises may have encouraged these expectations by the unit sales projections shared with prospective investors and donors.

The lack of a standard approach to organise and apply data limits knowledge transfer within and across markets

In the absence of detailed market data, **grant funding is typically channeled according to donors' geographic preferences** (15). Even if large sums are invested in one market, the 'right' enterprises must be present in that market for the deployed funds to achieve the biggest possible impact. A general concern around allocating funds based on geography is that it can be detrimental to pipeline development because it limits financing opportunities available for viable, promising enterprises in less prioritised geographies, or forces the party allocating the funds to invest in businesses that, in the wider context, are less likely to scale (16).

Outside of Country Action Plans, ISO IWA framework and the Alliance-maintained database for carbon-financed projects, the clean cookstoves and fuels market is not equipped with market frameworks, databases, or collaboration platforms that provide greater visibility across the activities, initiatives and actors engaged across markets. **The lack of a standard approach to organise and apply data within and across markets limits visibility of best practices and critical product and service gaps**, complicating the competitor landscape and stunting growth in new markets (17).

Fragmented markets present enterprises with numerous barriers to scaling within the markets in which they operate. Market fragmentation contributes to a higher prevalence of vertical integration of previously specialised enterprises, as enterprises take other segments of the value chain "in house" due to the lack of local alternatives for marketing, production and distribution (18). This approach can create a significant working capital burden due to in-house financing of products or long production cycles; stressing operational cash flow metrics, detracting attention from their unique value proposition, potentially limiting investability and increasing their exposure to operational risks.

Misalignment between impact investors and customers on reportable indicators affects allocation of funds and adds onerous reporting requirements to enterprises

Impact investors and donors care about the environmental and health impacts of clean cookstoves. Interviews suggested that for customers, environment and health impacts of clean cookstoves

are not a primary driver of purchasing behaviour. As a result, enterprises looking to attract impact investors' capital must emphasise their health and environmental outcomes, compared to focusing exclusively on what is most compelling to commercial investors and customers. The impact of this divergence runs deep as it affects many key parts of an enterprise's business, including how a product is designed (to enable it to monitor certain outputs over others), how the business model is setup (to capture specific data) and how much time and effort is needed to report specific indicators over others (12).

This misalignment between customers' and impact investors' demands has led to a **divergence between commercially-oriented companies and the donors and impact investors that direct the flow of impact capital** (12). All enterprises interviewed gave feedback confirming that the majority of their customers' purchasing decisions are not driven by the long-term health benefits of their products, with one noting that: "consumers don't care about the health benefits – we have never sold a cookstove because of the health benefits!" The Clean Cooking Working Capital Fund was not unusual in that it required a minimum cookstove performance level for enterprises to qualify for it (3). Whilst the performance requirements existed when the Clean Cooking Working Capital Fund was being developed, the calculation of the standards was tightened ahead of the launch of the Fund, which resulted in many of the clean cookstove products scoring lower than originally projected.

Generally, if enterprises want to be considered for impact capital, they must meet the minimum health and environmental requirements sought by donors and impact investors offering the funds, as well as catering to the tastes and preferences of customers. This can result in enterprises diluting their research efforts and managerial focus from being wholly trained on their customers' wants. Some donor and impact investor demands can be very exacting. If enterprises do not get this balance right, they risk losing out on the allocation of funds.

Once an enterprise has successfully attained impact funding, they are obliged to periodically report metrics back to their impact investors which, in turn, quantify the social impact of their funds. Enterprises may need to gather two sets of indicators to fully satisfy their impact investors/ donors and serve their customers. The first set of indicators fulfil the impact investors'/

donors' needs, rather than representing the voice of the customer. Reporting these metrics to impact investors fulfils enterprise reporting obligations, but are of limited strategic interest to the enterprise. One of the investors interviewed articulated the challenge posed to enterprises by the lack of alignment on performance indicator reporting, stating: "one impact investor [had] one methodology or set of indicators, but their co-investors [proposed] another set; meanwhile the enterprise is in the middle of all the slightly different demands, trying to provide the data being required of them, which is quite time consuming and not easy." Enterprises noted that donors can add reportable indicators to conditions relatively late in the process, with enterprises "having to acquiesce" to the

additional reporting requirements to complete the terms and secure the funds.

Some of the enterprises interviewed see grant funding as a "double-edged sword" due to the distracting and burdensome reporting requirements they exact. Some interviewees have adjusted their approaches accordingly and intentionally overlook grants, unless they are already closely aligned with their strategies. This self-selection amongst enterprises has a material influence on where in the pipeline funds are allocated. Enterprises should look for grants that align with their needs, but the lack of a holistic overview of the current grant landscape and the inability to quickly sift through grant programmes is an impediment.

Challenge 2: Unpredictable customer demand complicates enterprise demand forecasting; deterring investment

Challenge

Unpredictable customer demand complicates enterprise demand forecasting; deterring investment

Enterprise Issues

- Cookstove manufacturers have challenges in maintaining regular contact with customers and generating user data
- Inherently low customer desirability, coupled with the high costs and effort required to ignite demand, limits investment
- Customer affordability and access to credit inhibits demand for clean cookstove products

The Clean Cooking Working Capital Fund targeted enterprises that were perceived to be ready to scale, as evidenced by a viable business plan showing positive cash flow from operations, or demonstrating a clear path to that end (3). Reliable and positive growth projections attract investment, but smaller enterprises often see a high degree of volatility in their sales numbers from month to month (8). Customer demand fluctuations can be buffered by large stock inventories, but this adds to the enterprise's working capital issues. The variability in monthly sales adds noise, making it difficult for enterprises to accurately forecast upcoming sales, riskier for commercial investors to partner with them and trickier to tailor financial instruments to meet their needs (19). A challenge identified by interviewees is for enterprises to generate a more reliable 'pull' of demand from customers. Market and customer data can be used to inform decisions that increase adoption by customers, increase retention of existing customers and inform other strategic decisions, such as when and how to enter new markets, or provide new offerings.

Cookstove manufacturers have challenges in maintaining contact with customers and generating user data

Many enterprises must continually expand their customer base to grow and to attract investment. The challenge of **limited recurrent demand from a household that already has a clean cookstove** is acute for business models structured around the sale of cookstove appliances. Unlike mobile phones, incremental technological improvements to cookstoves do not tend to make customers want to return for upgraded units. Unlike mobile phone contracts that are up for renewal, new deals are not offered to customers as standard, once the usage guarantee of the cookstove has expired.

One growth driver is through positive referrals from current users. Enterprises therefore have an incentive to ensure customers are using their clean cookstoves effectively. However, with limited opportunities for frequent touchpoints with the customer, it can be **challenging to maintain regular contact with**

customers and capture usage data past the initial point of sale. This report asserts that enterprises fall into one of three categories regarding how they collect data on their customers:

- **Reactive:** a customer services department handles incoming communications from customers (e.g. there is a fault).
- **Proactive:** people are employed to directly engage with their customers.
- **Digital:** data is collected on product usage and used to proactively interact with the customer through a digital platform.

Enterprises with slower customer feedback loops have limited insights on which to base troubleshooting support or improve their customers' user experience. 'Reactive' and 'Proactive' enterprises do not have easy-to-access, real-time data on customer adoption, but this can be overcome by hiring staff to survey and interact with customers by reaching out to customers through personal visits or by phone calls and SMS to generate insights on usage behaviours.

Enterprises with a business-to-business operating model rely on agents as their intermediaries. BURN Manufacturing deploys a business-to-business model where the customer purchases a cookstove from a supermarket, or other retailer. The model allows BURN to reach more customers, more quickly, but at the expense of relying on an intermediary to represent their brand and ceding control of financing terms offered to its end customers. BioLite also has a business-to-business distribution model, currently to 13 partners. BioLite has a 20-person field team of Sales Agents that work alongside their partners to demonstrate their products and provide customer support. BioLite's call centre in Kenya follows up directly with customers, assisted by extra layers of SMS contact to ensure they are happy with the product and that the correct training was given at the point of sale. Envirofit has multiple customer call centres in Kenya, Ghana and Honduras that reach out to each customer a couple of times a year. These calls generate data that are used to increase customer satisfaction, drive marketing and sales and inform R&D on future product improvements. Envirofit's learnings in managing a call centre in Latin America have even been directly applicable to setting up new call centres in African markets.

One innovative business model with much better accuracy in projecting customer demand is the “tool

and fuel” model, where revenues come from fuel sales, rather than from the one-off sale of a cookstove unit, which can effectively be provided to the customer for free. The model is analogous to recurrent purchases found for replacement water filters and razorblade heads. Recurrent fuel purchases introduce more regular revenues and increases customer contact with the enterprise, reducing the variability of sales projections.

Inyenyeri generates large volumes of data on each of its customers. Every week, as customers buy their fuel pellets, Inyenyeri can use the data created to accurately project the demand for its fuel in the coming weeks and months and respond appropriately on the supply-side. Furthermore, the database can be used to assess how frequently the customer is using their clean cookstoves, based on the size and demographics of the household. Deviation from expectations could indicate a customer's misuse or lack of use. Having identified a signal, an agent can then proactively be dispatched to the household to see if further education or training is required. Inyenyeri's weekly purchasing data can also be used to adjust local prices by location, with pellets priced at a premium in urban and peri-urban areas to subsidise pellets and support demand in rural areas.

Selling fuels to customers offers innovative payment models, which lend themselves well to gathering customer data; pay-as-you-go is readily applicable to the sale of fuels. PayGo Energy is running a pilot study with 300 customers, where for US \$30, the user gets an aspirational cooking solution, including a stove, a smart meter and a 6kg gas cylinder. After the fifth refill, the customer then owns the cookstove. If the customer does not pay, the flow of fuel into the cookstove can be remotely blocked. The study will generate market data based on the roll-up of daily customer interactions.

Commercial investors have been more interested in enterprises with a higher unit price point or fuels offering the potential for continuous cash flows. Enterprises offering low cost cookstoves (on the order of US \$15) are typically less attractive to commercial investors because they need to sell millions of cookstoves to break even. This requires the enterprise to reach a much wider geographic spread of customers, which emphasises challenges around distribution and customer contact, compared with enterprises offering a more expensive product that

can achieve break even at an exponentially lower unit sales number. Several enterprises are partnering more closely with fuel enterprises; adding the sale of aspirational fuels into their portfolio of offerings. For instance, Envirofit has expanded their product offering through their SmartGas LPG - Pay-as-you-Cook™ business in Kenya and Ghana. This will enable customers from across the energy ladder, using wood and charcoal, to transition to LPG; a more efficient cooking solution. The program provides the stove and fuel on credit and enables customers to use their phone to pay for fuel on demand, generating recurring revenues for the venture.

Inherently low customer desirability, coupled with the high costs and effort required to ignite demand, limits investment

To help drive demand, enterprises need to instill a sense of advocacy amongst their existing customers and ignite a sense of demand amongst their potential customers. According to interviews, customer awareness of clean cookstove and fuel solutions remains low in many markets and clean cookstoves still suffer from the perception of being undesirable “push products”. This can result in enterprises simultaneously trying to raise awareness of their market as well as to invigorate demand for their products, a challenge made tougher in markets where literacy rates are low.

BURN Manufacturing has achieved a deep brand awareness and penetration of its Jikokoa cookstove across its markets. This was achieved by using a popular Kenyan brand ambassador and extensive marketing; advertisements covered billboards and TV commercials. Some 95% of customers recommend the Jikokoa to their friends and 75% of customers use their stove every day.

Lifting demand levels is a difficult, expensive and time-consuming feat to achieve (7). The risks are considerable, the timelines are long and the upside is often uncertain. Taken together, the prospect of very low returns for very high risk deters most commercial investors; several of which noted that “to be in this market, you must hope to accept the rewards of debt-level returns for taking the same risks as equity companies.”

Some enterprises interviewed reported how they have had success in turning their cookstoves into “pull products”, having invested time and funds to put the customer at the centre of their marketing pilots and

R&D projects. Other enterprises have raised the desirability of their offerings through successful above and below the line advertising and marketing campaigns, also resulting in higher customer demand.

Without regular behavioural monitoring and training, stoves and fuels can be misused and the benefits might not be realised; impacting advocacy and lowering contagion within the local market. Given the importance of proximity and ‘word of mouth’ referrals to driving adoption within local markets (20), enterprises need to ensure existing customers are satisfied with the services being provided. SimGas, providers of biogas digesters for households across seven Kenyan counties, have many micro-offices where they have customers. This regular visibility and interaction helps co-op members to build trust with SimGas, in addition to the fact that SimGas makes sure to hire local (as in from that county) Sales Representatives into their teams.

NewLight Africa uses a particularly innovative community-based approach to sales in market recruiting savings groups, known as “chamas” in Kenya to comprise their agent network. In Kakamega, where NewLight is based, more than 3,000 chamas exist, asserting enormous influence on the dynamics of consumer product adoption and spend. Through NewLight’s approach, each chama elects one representative to assume the role of the NewLight sales agent. The elected agent is then tasked with selling NewLight products to community-based consumers. NewLight collect data on each Agent and have sufficient data to predict which Agents are at the highest risk of default; those that are identified are not given any new products to sell, until their credit score improves. If the agent defaults on repaying the cost of products, the repayment terms extend to the chama. Following repayment to NewLight, remaining margin from product sales is paid out to both the sales agent and the chama itself, as a return for underwriting the agent. Refinements to Newlight’s business model have seen repayment rates rise to 85%. NewLight continues to research, adapt and refine its model to increase repayments.

Culinary styles and familiarity with fuels are deeply anchored to local community contexts and cultures. Many enterprises have found that users show a high degree of resistance to adapting their traditional cooking methods. Changing consumers’ cooking behaviours is a difficult barrier to overcome; cooking

methods are part of the social fabric and are handed down over generations. In markets where previous clean cookstove ventures or interventions have failed in the past, training users can be more difficult still, as potential customers may be suspicious of newer technologies supplanting their traditional cooking methods.

EcoZoom won a Pilot Innovation Fund grant from the Alliance and used it to consider the viability of establishing factories to produce pellets from the waste of the sugar industry. Cooking with pellets (or gas) is a very different method of cooking compared to traditional charcoal as it produces a higher heat output, requiring users to shorten cooking times, a switch that is not needed when cooking with charcoal.

The study found that training people to get the optimal use out of the pellets was difficult; users were not adapting their practices and so were cooking with a higher heat but for the same period of time; preventing them from achieving the promised cost savings by switching fuels. Ultimately, EcoZoom concluded that the move into producing and selling their own pellets was not viable because of the behavioural changes required.

However, customer demand for “aspirational” high energy density fuels, such as biogas, ethanol and LPG, is strong. Fuel proximity, fuel bundle size and fuel pricing are important determinants in fuel and cookstove selection by the customer. KOKO Networks observed that CleanStar’s ethanol cooking “proof of concept” venture in Maputo, Mozambique, more than 35,000 households bought an ethanol stove – some 10% of the city’s total population – when ethanol and charcoal were priced at parity and so delivered zero fuel cost savings to the customer. This demonstrates that quality, not just cost saving, is a meaningful component determining customer fuel choice. KOKO then developed and launched a suite of customised fuel distribution and dispensing technologies that have cut the retail price of fuel by 50% compared to the Maputo pilot, such that KOKO now commercially offers customers in Nairobi ethanol cooking fuel at a major discount to charcoal, locally available and in the daily purchase bundle sizes that charcoal customers demand; demonstrating that fuel proximity, fuel price and fuel bundle size are the critical factors that enable customers to adopt ethanol cooking fuel at scale.

Customer affordability and access to credit inhibits demand for clean cookstove products

The price-point at which customers are willing to pay for clean cookstoves and fuels varies extensively within and between markets. Data on local customers’ elasticity of demand is crucial to informing local pricing and tailoring customer credit strategies, with pilot studies fundamental to generating these insights. EcoZoom noted that in Kampala, customers are typically prepared to pay US \$11 for a clean cookstove, whereas customers in Nairobi have been found to pay retail prices of US \$45, provided the payback period is less than six months.

Many customers find it hard to pay upfront for clean cookstoves or household energy systems and require assistance to purchase clean cookstoves. Loan repayments require that the borrower wants to pay the lender. In cases where the customer owns the product first and repays later, relationships are crucial; a sales agent must educate potential borrowers about their new cookstove and fuel, their loan terms, and in some cases, the digital finance channel they will use to make payments. In such a rapid and dense encounter, items inevitably get missed, skimmed or forgotten and agents – who tend to be paid on a commission basis – may not always be incentivised to fully explain loan terms. Making the terms and conditions as simple as possible is a challenge for enterprises; they must be simple enough to be easily explained by an agent and understood by customers. If customers do not fully understand their loan agreements, or perceive that they have been deceived by an Agent, data show that customer payment behaviour is negatively affected (21).

An alternative approach to customer credit is to offer a savings-based approach, where customers overcome the barrier of a single, high, upfront cost by electing to spread the cost of the appliance over a longer period; with the appliance only being dispatched to the customer on completion of payments. KOKO Networks offers this payment method and found that approximately half of their new customers buy their appliances in this way, taking an average of six weeks to pay their instalments and acquire the stove. The customer overcomes the “lumpiness” of the upfront purchase and the enterprise experiences no credit risk. EcoZoom is another enterprise to diversify their business model – and unlock better access to customers – by introducing a business-to-customer element whereby the customer

chooses their own pay-as-you-go plan; paying off their debts in under three months and receiving the product once 70% of the costs have been recovered up front. To offer this pay-as-you-go solution, EcoZoom has partnered with Equitel, which gives customers a decision and a payment plan in real time. BioLite has built its own pay-as-you-go encryption technology, which they include free with their system and which can be plugged into third party offerings, such as Angaza and SolarHub, or into distribution partners' Customer Relationship Management platforms directly.

Adequate collateral and liquidity of cash are also challenges for customers; some expenses are predictable but unavoidable, such as school fees or agricultural inputs, but others, such as household injuries or illnesses, can be unforeseen.

A TEC Biodigesters offer customers in Cambodia an aspirational upgrade to their kitchens, with a twin table top cookstove and rice cooker using biogas from a household biodigester at an installed cost of US \$650. Customers could either purchase on credit, paying approximately \$30/month for two years with an expected saving of \$23 a month. One issue is that all MFI loans in Cambodia require collateral and often only accept a land title. Customers typically only have one land title – a cookstove may not seem worth it if the alternatives include home electricity or a television. A TEC is developing a product to offer uncollateralised loans to customers from A TEC itself, to open up the market.

The source of microloans to customers can come from several sources, none of which is a silver bullet. Interviewees reported that partnerships with microfinancing through crowdfunding platforms like Lendahand and KIVA can raise large sums for enterprises, but that raising the funds is slow because the required funds must be aggregated by the platform before they become available to distribute. Partnerships with local banks are challenged because local bank transaction costs are typically too high for

microloans of cookstoves to individual customers. Enterprises can use their balance sheets to extend loans directly to customers, but this poses problems to enterprises' working capital needs and less mature enterprises may be ill-equipped to be lending institutions.

FINCA Microfinance Holding Company LLC (FMH) is a social investment partnership that owns and operates microfinance institutions and banks in 23 countries across five continents. In Uganda, FINCA developed BrightLife, a social enterprise focused on increasing community access to high quality energy products such as solar lanterns and clean cookstoves. BrightLife capitalises on two of FINCA's greatest strengths: their existing distribution network across Uganda's last mile, and their existing customer base, many of whom have previously taken loans to purchase products. Products are purchased and financed at the consumer's regular point of sale and FINCA's network of banking agents are trained to provide after-sales product education and support. FINCA's model reduces the distribution costs of its partner enterprises, providing the opportunity to further reduce the product price point and drive up business across FINCA's subsidiaries through increased sales.



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Section 5

Recommendations

Recommendations

All challenges covered in this report demonstrate that without collecting, interpreting and utilising insights derived from data, it is difficult to readily bridge knowledge gaps, direct market-building activities or attract investment into the clean cookstoves and fuels pipeline. A set of recommendations have been written to overcome the challenges and issues highlighted. Each core recommendation described in this section is set out with specific actions suggesting how to guide its delivery.

Challenge	Issues	Recommendation
Limited visibility of market, financial and customer data is hindering investment and market growth	The lack of market data collected limits investments made in enterprises	Recommendation 1: Prioritisation of data in assessing and driving market growth
	The lack of a standard approach to organise and apply data limits knowledge transfer within and across markets	Recommendation 2: Platform to support collation of data into a centralised repository, organised by a standard approach
	Misalignment between impact investors and customers on reportable indicators affects allocation of funds and adds onerous reporting requirements to enterprises	Recommendation 3: two-pronged data strategy aligning reportable indicators across impact and enterprises
Unpredictable customer demand complicates enterprise demand forecasting; deterring investment	Cookstove manufacturers have challenges in maintaining contact with customers and generating user data	Enterprise-focused financing
	Inherently low customer desirability, coupled with the high costs and effort required to ignite demand, limits investment	Enterprise-focused financing
	Customer affordability and access to credit inhibits demand for clean cookstove products	Consumer-focused financing

Figure 4: Summary of enterprise challenges, issues and recommendations

Recommendation 1: Prioritisation of data in assessing and driving market growth

This first recommendation serves as a call to action for sector stakeholders, from investors and advisors to the enterprises building the market directly, to focus more of their resources on the collection, collation and sharing of data, building deeper insights to inform other actors and assist with the collective acceleration of market growth.

Collecting and analysing usage data is essential for supporting customer behaviour change

Behaviour change is iterative. All enterprises should have a customer feedback loop as part of their operating model^[1] to monitor customer adoption, proactively targeting interventions for customer training and informing their customer support strategies at the point of sale, all of which carries a cost and demands a certain level of sophistication. Despite these barriers, enterprises should ensure they put these capabilities in place now.

Enterprises that can gather, keep and analyse data on their customers will be at an advantage to peers that cannot. KOKO Networks has built and deployed the world's first cashless and automated billing and metering system for consumer cooking fuels and can use the data to offer incentives that drive higher fuel usage, like how telecoms companies offer targeted incentives to drive higher airtime usage. Their "KOKOpoint" ethanol fuel ATMs play targeted interactive videos during the fuel dispense process, educating customers on cooking behaviours that save time and money and enabling customers to understand the family health impacts of their cooking fuel choices. Their "myKOKO" app enables customers to earn commissions from referrals and door-to-door sales, which dramatically reduces the cost of customer acquisition when compared to traditional below the line marketing (20).

As touchscreen interaction increases across the developing world, enterprises should position their digital strategies such that they can capture and harness data,^[2] generate insights from it and take informed actions. R&D and innovation is needed amongst enterprises to help them iterate their business models and prioritise data collection and use^[3] There is also the opportunity for partnerships to form between 'digital' enterprises with a distribution focus that can potentially provide distribution as a service to other enterprises in the value chain; creating a more integrated value chain and offering the digital enterprise easier monetisation of its data assets.

Issue to be addressed:

The lack of market data collected limits investments made in enterprises

Recommendation 2: Platform to support collation of data into a centralised repository, organised by a standard approach

A common challenge to building effective market development strategies in fragmented markets is a lack of visibility into the interventions that are already in place, or have been tried, in other markets. There is also a lack of high-level visibility into the critical gaps in a market where intervention is urgently needed but not yet adequately addressed.

The Alliance has recently taken steps to integrate the Impact Industry Acceleration Framework into its future planning efforts (4). Progress has been made in mobilising resources and action on the ground through Country Action Plans, developed in collaboration with key market actors including local government representatives, Country Alliance Managers and the private sector. What current efforts do not address, however, is a greater need for market-derived data and an accessible framework through which to understand the supply, demand and environmental circumstances of national and local markets.

Financial interventions can be targeted more effectively and have greater impact when they are coordinated through a centralised market coordinator, such as the Energy Access Market Acceleratorⁱ. Such a mechanism provides greater visibility of where resources are already deployed, enabling stakeholders to more effectively target market gaps, potentially through partnerships (4). Considering the complexities that exist within clean cookstove and fuel markets, a key recommendation of this report is **to adopt an established market acceleration framework to support greater visibility of stakeholder activities and initiatives^[4]** engaged across the market and to help collect data and connect market actors in a more structured way, such that the data can help inform “up and coming” enterprise roadmaps and strategies for reaching scale and to assist commercial investors getting clearer visibility of successful and growing enterprises.

To facilitate the flow of information across markets, an online data platform could increase transparency, connecting investors and other stakeholders to relevant market information

Interviewees reported that applying for capital, and vetting applicants, is a time and labour-intensive process that often ends with no transaction being consummated. A deeper understanding of an enterprise’s geography, customer profile and role in the value chain could help investors and donors to tailor their financing vehicles (19). To provide investors and donors with greater visibility across enterprises in terms of their niche and status and, therefore, potential opportunities for partnership; a “one stop shop” platform should exist to house relevant market intelligence data for enterprises, investors and donors.

The proposed platform would contain quantitative financial data, including enterprises’ operating performance (such as revenues, margins and operating expenses) and certain cash flow and balance sheet metrics, plus qualitative data; such as the impacts of previously received grant funding. **Enterprises could provide the agreed financial and operational data on an**

Issue to be addressed:

The lack of a standard approach to organise and apply data limits knowledge transfer within and across markets

annual basis to the Alliance,^[5] who would then make the data available to qualified investors and donors on a secure platform.^[6] Aggregated annual findings could be presented^[7] by the Alliance to potential investors and donors in a “results report”, or a more limited release version targeted to financiers, to raise awareness of the continuing maturity of the sector.

There are several examples of sectors where such a platform exists and where larger numbers of companies participate. The Global Impact Investing Network (GIIN), for instance, has ‘ImpactBase’ – a searchable, online database of impact investment funds and products designed to connect impact investors with one another (22). The collection of the financial performance data is provided by JP Morgan Chase & Co., a commercial investment bank. The International Renewable Energy Agency (IRENA) has developed the Sustainable Energy Marketplace, a virtual platform highlighting promising low-carbon energy projects in developing countries, helps developers, financiers and enterprises to connect on projects (23). The transparency offered by platform-based collaboration places an emphasis on matchmaking and joint financing and potentially automates some of the work needed for due diligence requirements.

The value for enterprises in providing this data is that there will be less time wasted chasing unsuccessful deals; investors and donors will be able to use the platform to screen the sector, “pre-qualify” a list of enterprises of interest to them and inform their prospective partnerships and financial vehicles.^[8] Enterprises will also be being considered by a wider pool of commercial and impact investors, including some who may be attracted to the sector through increased transparency and accessible market data. Enterprises could also potentially be able to efficiently screen current sources of funding looking for a potential home and see how they compare with their peers using a consistent but anonymised dataset, which could inform their longer-term market strategies.

Investors could share lessons learned and anonymised, non-confidential information on the platform;^[9] providing a rich market intelligence that would support knowledge transfer and assist future investors, donors and enterprises in operating more resiliently in that market.

An inclusive, locally organised approach should be taken to map common barriers and gaps and agree an action plan

Whilst there are many differences between national markets within a region, common challenges abound. To drive a collegiate approach on defining, working on and sharing information on areas of mutual interest, regional working groups could be convened to promulgate the broader adoption of best practices^[10] across regional communities. An East African Community working group, for example, would consist of representatives from the Alliance, national industry associations in Kenya, Uganda and Tanzania, and a selection of enterprises – and perhaps even a sample set of customers from across these countries. The regional working groups would map out their local market and identify policy areas and skills gaps that are inhibiting enterprises from scaling, or preventing customers from adopting clean cookstoves and fuels.^[11]

Shell Foundation has been active in developing market accelerators. These independent teams have a core objective of accelerating access to energy, be it clean cooking or electricity access. The accelerators are currently supporting three countries (Uganda, Rwanda, Ethiopia); looking at the market holistically and assessing what the local market barriers are, such as local policy implementation, taxation levels and skills availability (26).

Once common interests have been identified, short term task forces should be set-up, with a subset of volunteers nominated by the wider working group to drive the issue on their behalf until a proposal or recommendation can be brought back for validation. An example of this approach is Sustainable Energy for All (SE4All), which has created ‘Opportunity Springboards’ around key thematic areas that continue to gain momentum across global markets. The springboards are serviced by regional hubs across the globe and are constantly kept informed through a steady stream of market-derived data (24).

Given the complexity of the sector, this report believes no single long-term roadmap or strategy is realistic or feasible, as so many different potential solutions exist and as enterprises continue to innovate. **Several ‘Transition Scenarios’ should be identified for each major market to see where potential support can have the highest impact.**^[12] Once a Transition Scenario has been endorsed by the stakeholders within that market, **clear goals and timelines with accountabilities and dependencies should be attributed to each approved ‘transition scenario’.**^[13]

Recommendation 3: Adoption of a two-pronged data strategy aligning reportable indicators across impact and enterprise strengthening

An impact industry is defined by two distinct outputs: the generation of significant social and environmental impacts – typically undertaken by more traditional development actors such as donors, governments and non-profits with no expected financial return – and the development of profitable and scalable businesses. Given this stark duality, it should be assumed that performance of an impact industry is most accurately measured by a combination of indicators, spanning both the impact and profit-driven aspects of the industry.

A two-pronged strategy to data collection and analysis of the clean cookstoves and fuels sector^[14] would support the effective measurement of impact indicators typically prioritised by donors in the early stages of an impact industry’s lifecycle, while pre-emptively developing mechanisms through which to collect more commercial, financially-driven performance data, that become increasingly important to the industry’s viability as it grows and matures.

Issue to be addressed:

Misalignment between investors and customers on reportable indicators affects allocation of funds and enterprise resources

Recommendations for Future Financing of the Sector

Financing of clean cookstoves and fuels markets should continue to cover actors across the entire value chain, from producer through to end-user. Enterprises can help to unlock access to individual customer cookstove loans. This report also recommends a more patient instrument to develop the pipeline of enterprises.

Enterprise-focused financing

The types of activities undertaken by an organisation vary significantly based on where in the value chain it operates and its relative level of maturity. The distribution of financing instruments shifts by country as regulatory, political and environmental influencers impact financing options available. The aggregation and mapping of anonymised data within a centralised, open source data model that can be evaluated by value chain segment, enterprise development lifecycle and geography, could empower commercial and impact investors to take on higher levels of risk tolerance and effectively streamline the due diligence process that underpins all grant, equity and debt financing in the sector needed today. The transition of a business from being grant dependent to a sustainable social enterprise that is ready for equity and debt is a big step and not one where all will ultimately succeed.

Issues to be addressed:

Cookstove manufacturers have limited potential for recurrent revenues

Inherently low customer desirability, coupled with the high costs and effort required to ignite demand, limits investment

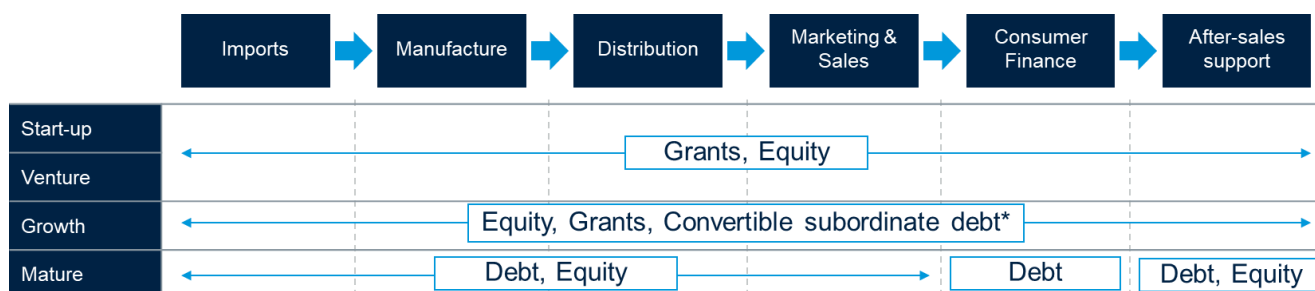


Figure 5: Types of capital preferred by enterprise by segment and maturity (Report Authors)

* Convertible subordinated debt is described further in this report, but can be defined as an instrument that offers the prospect of some return that is commensurate with the market, but without putting pressure on the company to make that return. It does this with a junior capital instrument backed up by a grant. Payback is triggered when the enterprise reaches minimum cash flow levels.

More strategic engagement with, and participation of, bilateral and multilateral donors

Bilateral and multilateral organisations historically invest in projects and initiatives that promote conditions for market growth by addressing the cultural and political nuances of each country’s regulatory and consumer environment and ensuring that gaps and challenges are addressed across every segment of the value chain. In doing so, these organisations assist the entry of enterprises, assure and attract investors, and support capital inflows that enable incumbent businesses to further tailor their products to consumer demand (19). **Bilateral and multilateral donors should be encouraged to participate in developing the market**^[15] by offering a source of risk capital to “crowd in” further commercial investments.

Financial assistance should be aligned with the sector's maturity and enterprise needs

Innovative approaches to deploy resources are needed to help enterprises to grow, at which point more conventional financial investments can be deployed. It should be acknowledged that presently, all businesses in the sector exhibit some vulnerability and that the majority of enterprises can be generalised as still being at an early stage of development. Impact-focused funders should focus on building the market and capital preservation and recycling of capital for greater impact, rather than expecting near-term profitability and the ability to generate Return on Investment. As such, this report suggests that financial assistance be closer aligned to the sector's early stage enterprises and that this financing be largely through grant capital with flexible, risk-tolerant financing to foster promising and viable business models and technologies.

Given current pipeline maturity, **consideration should be given to a subordinated debt vehicle,**^[16] which is effectively quasi-equity but with a longer repayment tail. This financial vehicle blends grant funding – potentially from multilateral or bilateral donors – with a junior capital instrument, provided by an impact investor looking for an equity-like position that offers the prospect of some return, commensurate to the market. The grant takes the first loss position, serving as a backstop to reduce risk for other investors. The vehicle offers financial returns to the impact investor without prematurely demanding repayments from the enterprise, potentially putting it under financial duress. Payback is determined by the profitability of the underlying business. A cash flow participation note is agreed between the enterprise, impact investor and donor at the outset, determining the payment trigger. No payments are made until the agreed 'honeymoon' period is over and the enterprise sustains a minimum cash flow level. To attempt to return some yield, payments could be returned at a pre-agreed multiple, akin to a royalty scheme. It is envisaged that this would be done on a one-off basis, with principles applied to a portfolio, rather than being negotiated for each individual investment.

A portion of the patient capital pool should be earmarked for technical assistance and management capacity building

Low financial acumen of enterprises during capital raises is a barrier for them in securing funding. To support management development and capacity building, **a portion of patient capital should support finance capacity building through a Results Based Financing approach to technical assistance.**^[17] To qualify, an enterprise must be able to demonstrate improved performance against agreed reportable indicators aligned with organisation strengthening, such as demonstrating internal audit capability or using a competitive tendering process.

'A businessman in Africa told me that Coca-Cola lost money there for 12 years. In other words, it required over a decade for one of the most competent companies on Earth to break even on the sale of a mildly addictive sugary drink that is absurdly cheap to make. Imagine what it takes when you're focused on impact.'

Kevin Starr, Mulago Foundation, Stanford Social Innovation Review (SSIR) (12)

Consumer-focused financing

Some enterprises interviewed are bypassing external consumer finance providers to become loan providers themselves; extending credit to customers from their own balance sheets, enabling Base of Pyramid customers to purchase products. This approach works if repayments by the consumer are of a high enough priority to be made and if a third-party, such as a DFI, multilateral organisation or a donor, is in place to backstop the credit risks. **There is potential for a debt vehicle to be made available to a small number of enterprises approved as having the requisite financial acumen^[18]** to have access to funds that are ring-fenced for the customer. A pool of banks could be identified with their balance sheets acting as guarantors. This impact capital could be made available to enterprises in the form of low yield debt, strengthening enterprise balance sheets such that they can lend directly to the customer to enable the purchase of the fuel and, or, underlying clean cookstove product, with repayment facilitated by monthly instalments. This type of receivable financing could also be backstopped by a first loss provision provided by a donor or foundation – an approach that introduces a debt-like vehicle into the value chain while providing an equity cushion. Then, as the debt portfolio matures and habits are proven, this pool of receivables can be packaged into a fund that would buy the paper from the originator to both increase capacity and absorb investor demand.

Enterprises should leverage relatively low-cost technologies or novel partnerships to educate and attract customers

Cooking is such a deep part of local culture; customers require training to shift their behaviours when switching to newer fuels. Optimal usage of cooking solutions hooked up to pay-as-you-go could be offered by texting instructions or advice in real-time, or by indicating the financial savings that could be accrued by adapting their cooking style. Harvard and Stanford Universities found in a study of Kenyan farmers that farmers that were texted simple instructions such as “remember to weed this week”, increased their sugar cane yields by 11% compared with the control group (22). **Enterprises could consider “nudging” existing customers to recommending their product to people in their social network, perhaps by offering a referral code by SMS.^[19]** Brand awareness could be increased by incentivising social media photo posting campaigns, for instance.

The clean cookstoves and fuels sector could learn from telecom companies in terms of how they encourage loyalty amongst their existing mobile phone customers and make it easy and normal for customers to seek out upgraded models. This currently does not happen in clean cookstove markets. **Individual customer “progression plans” could be put in place to reward loyal customers that honour their existing payments with upgraded units,^[20]** transitioning towards higher quality fuels over time.

Cookstove and fuels enterprises should consider moving business models to be more aligned with the “circular economy” by switching from a focus on volume sales to prizing the performance of a product; leasing cookstoves instead of selling them. This approach has been taken by

Issues to be addressed:

Customer affordability and access to credit inhibits demand for clean cookstove products

Michelin; customers can now buy “Tyres as a Service”, where drivers pay a small amount per mile travelled, rather than buying the tyre outright (23). This model encourages loyalty and truly aligns the incentives of the customer and the enterprise, as both parties want the tyres to last as long as possible. Another example of a company using this model is Nespresso, who offer the option of leasing their personal coffee machines to customers who agree to purchase a minimum number of coffee capsules (23). Whilst fuels and cookstoves are coming together in tighter partnership, another way enterprises could offer their “Cookstoves as a Service” would be to partner with food providers, such as recipe delivery firms, given their obvious linkage to cookstoves. In this model, weekly deliveries could provide new opportunities for more frequent customer interactions. A recipe card would come with the delivery, offering step-by-step instructions on operating the stove to cook the meal; educating or training customers with new culinary skills and offering the potential for partnerships with local food suppliers. Recipe delivery service companies are currently proving popular in the developed world. Urban dwellers aspire to the same cooking standards and experiences of citizens in the Global North. The pull of such aspirations should not be underestimated.

Summary of Actions

Specific actions and their owners are captured in Figure 5. The context around these actions are provided in the supporting text. ‘R’ indicates the stakeholder responsible for the action. ‘C’ indicates where a stakeholder is consulted by the stakeholder responsible for the action.

No.	Action	The Alliance	Enterprises	Investors & Donors
1	Enterprises should have a customer feedback loop as part of their operating model		R	
2	Enterprises should position their digital strategies such that they can capture and harness data		R	
3	Enterprises need R&D to innovate and iterate their business models; prioritising data collection and use		R	
4	Adopt an established market acceleration framework to support greater visibility of stakeholder activities and initiatives	R		
5	Enterprises could provide agreed financial and operational data on an annual basis to the Alliance		R	
6	The Alliance could make the data available to qualified investors and donors on a secure platform	R		
7	Investors and donors should use this source of information to inform their prospective partnerships and financial vehicles	R		
8	The Alliance could aggregate and present annual findings to attract potential investors	R		
9	Investors could share lessons learned and anonymised, non-confidential information on the platform			R
10	The Alliance should convene regional working groups to promulgate the broader adoption of best practices	R		
11	Regional working groups could map out their local market and identify common barriers inhibiting enterprises from scaling	R	C	
12	‘Transition scenarios’ should be identified for each major market to see where potential support can have the highest impact	R	C	C
13	Clear goals and timelines with accountabilities and dependencies should be attributed to each approved ‘transition scenario’	R	C	C
14	A data collection strategy for the sector would support the effective measurement of impact and commercial indicators		C	R
15	The Alliance should encourage bilateral and multilateral donors to participate in developing relevant markets	R		C
16	The Alliance should consider designing a subordinated debt vehicle, rather than a commercial debt fund	R		C
17	A portion of patient capital could support finance capacity building through a Results-Based Financing approach			R
18	A debt vehicle could support a small number of enterprises adjudged to possess the requisite financial acumen		C	R
19	Enterprises could consider “nudging” existing customers to recommending their product to people in their social network		R	
20	Customer “progression plans” could be put in place to reward loyalty that honour their existing payments with upgraded units		R	

Figure 5: Summary of recommended actions



Section 6

Conclusion

Conclusion

The maturity of the clean cookstove and fuels sector has advanced significantly across a series of select geographies, where collective, coordinated action has been successfully mobilised by sector advocates, such as the Global Alliance for Clean Cookstoves, individual national alliances, local lobbying enterprises and pioneer investors willing to take on higher risk. Yet to achieve a step-change in clean cookstove and fuel adoption rates akin to impact industries such as off-grid lighting, actors require greater visibility of market, financial and customer data; enabling stronger, more representative forecasting of market growth and more suitable financial instruments.

The Clean Cooking Working Capital Fund was challenged by the unsuitability of many enterprises to absorb commercial debt. This will come, but currently there is a need to help selected enterprises to continue to grow without putting them under the strain of commercial level debt repayments. A quasi-equity vehicle where junior capital is backed up with a grant and a longer repayment tail could offer enterprises financial support and impact investors the possibility of a return proportionate to the market. To address the current low levels of financial skill levels within many enterprises, a portion of patient capital should support technical and financial capacity building for executives within enterprises with promising near-term prospects. To support customer financing, a select number of more mature enterprises, that possess the requisite financial acumen, could be supported in offering cookstove loans directly to their customers through a ring-fenced debt vehicle.

R&D is fundamental in driving innovation and capturing data is crucial in validating the nature of the research by linking it with the customer's needs. Without a robust data collection strategy to inform enterprises, strategies risk being misinformed or misdirected. Enterprises that have put their data management and analysis strategies in place have an advantage over those that are not equipped to capture and use data.

There is a need to adopt an established market acceleration framework (4) to assist stakeholders with the collation and sharing of data; building deeper insights and assisting the collective acceleration of markets by supporting greater knowledge transfer of best practices, empowering market actors to focus on market gaps and providing their core competencies, rather than adding to unnecessary competition of overlapping services along the value chain.

Market visibility and structure starts with alignment on what needs to be measured and how so. The debate has long been around which type of indicator (commercial or impact) to focus on, when in fact the strategy should encapsulate the measurement of both commercial and impact indicators. Misalignment between impact investors and customers on these reportable indicators affects the allocation of funds. A two-pronged strategy to data collection and analysis would support the effective measurement of environmental impact indicators, while pre-emptively developing mechanisms through which to collect more commercial, financially-driven performance data as the industry grows and matures.

Enterprises need to innovate to find ways of moving from today's status quo towards a future where customers see clean cookstoves and fuels as desirable and upgradeable products. Achieving this will offer enterprises more opportunity for recurrent revenues from existing customers and less variable demand data, whilst customers get upgraded towards more desirable and healthier options.

Ultimately it is customer demand that determines an enterprise's success. There needs to be a cross-sector move towards a heavier prioritisation of data and financiers should take a more risk-tolerant stance to catalyse additional funds, support R&D efforts and offer technical assistance to build management capacity within mature enterprises, driven by robust market intelligence made possible by an increasingly data-driven sector.

Section 7

Appendix

Appendix

Methodology

The project had four phases spread over nine weeks. The Analysis Phase ran for two weeks, followed by three weeks for the Assessment Phase and a four-week Report Development and Amplification Phase.

Analysis Phase

The Analysis Phase had three elements:

1. Identifying key questions to be answered by the literature review and interviews
2. Conducting the literature review
3. Conducting interviews

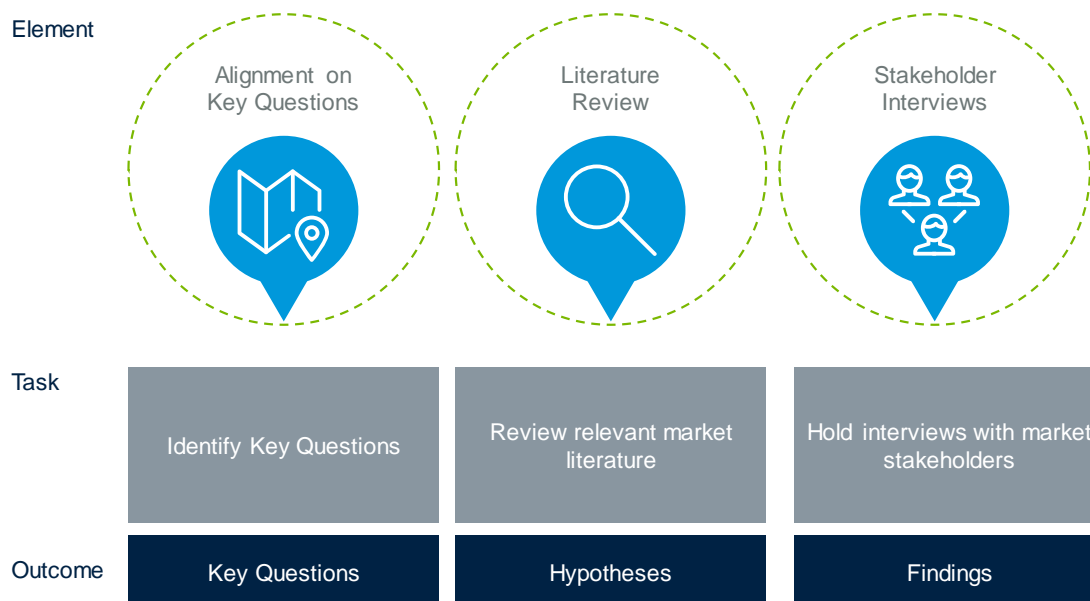


Figure 6 The Analysis Phase had three sequential elements

Alignment on Key Questions

To understand what has shaped the development of the clean cookstoves and fuels market and the needs of enterprises, two lines of enquiry were taken; the first looked at how the clean cookstoves market has evolved – by understanding how market conditions changed and how enterprises have adapted. The second line of enquiry looked at how market financing has evolved – by understanding how investors and financing vehicles have changed over time. These research areas were further decomposed into 26 key questions.

Literature Review

The team then analysed 130 relevant documents (see Appendix 7.5) to formulate initial hypotheses, structured around each of the key questions.

Interviews

These initial hypotheses were then taken into 27 interviews with the following companies, representing enterprises, investors, donors and advisors. The list of companies consulted can be found in the Appendix.

Key Questions

How have market conditions evolved?

1. What are key features of the clean cooking markets in SSA (segmented into East, West, South) and India in terms of regulatory environment, supply chain, access to finance and consumer adoption?
2. How have the Sub-Saharan African and Indian clean cooking markets evolved over the past three to five years?
3. What lessons learned can we apply from similar sectors? (e.g. off-grid electric)
4. How has the sector defined “scaling”?

How have enterprises evolved?

5. What type of enterprises (technologies, business models) have entered / comprise the clean cooking market and where in the value chain do they sit?
6. What types of enterprises have been most successful in scaling?
7. What are the success stories of the industry and what could be replicated?
8. What types of enterprises have been least successful in scaling?
9. What types of enterprises did not make it to financial close?
10. What can we learn from those companies that were in the WCS pipeline but didn't make it to financial close?
11. What pain points have contributed to the enterprises inability to scale and types of support (including financing) is needed?
12. What types of enterprises are attracting funding today?
13. What is required to grow the industry?

How have investors evolved?

14. What types of investors have historically invested in the clean cooking market? How have the types of investors evolved?
15. How have investors historically measured returns, both financially and in terms of impact? How has this measurement evolved?
16. How have investor timelines evolved?
17. What are the wider challenges that have prevented investors from financing the market?
18. What is needed for the pipeline to be financeable?

How have financing vehicles evolved?

19. What types of financing have been provided to date (e.g. types of capital and investment structure terms) and how has that evolved over the last few years?
20. How have financing mechanisms performed?
21. Why did the WCF not take off under the market conditions
22. What financing needs exist in the different types of companies and business models?
23. Based on the defined geography, how has the regulatory environment impacted the type of financing vehicles used
24. How has the impact of grant money on the sector change over time?
25. Has the impact of grant money over time mirrored that of other sectors?
What can be learned from other sectors with regards to successful approaches (e.g. USAID DIV, ASAIID DCA guarantees)?

Stakeholders Interviewed

- Acumen
- A-TEC
- BioLite
- BIX Capital
- BURN Manufacturing
- CLASP
- Deutsche Bank
- EcoZoom
- Enclude
- Energy Access Ventures
- Engie Rassembleurs d'Energies
- Envirofit
- GACC
- I-DEV
- Inyenyeri
- KOKO Networks
- Montpellier Foundation
- NewLight Africa
- OPIC
- Osprey Foundation
- PayGo Energy
- RVO
- SEAF
- Shell Foundation
- SimGas

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Section 8

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¹ The Energy Access Market Accelerator fills this gap by aggregating high quality, standardised information and services across all parts of the energy access ecosystem through increased collaboration. The Energy Access Market Accelerator supports both new and existing enterprises at various stages of maturity – from start-ups to more mature businesses – to overcome key market challenges by providing access to vetted information, assets and services, leveraging best in class tools and service providers already in the market and developing new solutions to meet market demand. In so doing, the Energy Access Market Accelerator increases. For access to the latest version of this research report please contact Ted London (tlondon@umich.edu) and Colm Fay (colmfay@umich.edu).

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