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Enhancing Markets for Delivery of Improved Cookstove Development and Promotion Support in Ethiopia

**Market Analysis, Recommendations and Program Plan
FINAL**

Developed for the Ethiopian Federal Ministry of Water and Energy in partnership with the BARR Foundation and with the support of the Global Alliance for Clean Cookstoves

Accenture Development Partnerships

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1 List of Acronyms

CSA	Central Statistics Agency
DNA	Designated National Authority
ETB	Ethiopian Birr (national currency)
EPA	Environmental Protection Agency
FES	Fuel-Efficient Stoves
FGD	Focus Group Discussion
GDP	Gross Domestic Product
GoE	Government of Ethiopia
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Society for International Cooperation)
GTP	Growth and Transformation Plan
IAP	Indoor Air Pollution
ICS	Improved Cookstoves
IGA	Income-generating Activities
IRS	Institutional Rocket Stove
IT	Information Technology
KFW	A German Development Bank
LPG	Liquefied Petroleum Gas
MoWE	Ministry of Water and Energy
MoFED	Ministry of Finance and Economic Development
M&E	Monitoring and Evaluation
MFI	Microfinance Institution
NGO	Non Government Organization
PMO	Program Management Office
RHEEIP	Rural Household Energy End-Use Efficiency Improvement Project
UNDP	United Nations Development Programme
UNHCR	United Nations High Commission for Refugees
WFP	World Food Program

2 Executive Summary

To achieve the goal of disseminating 9.4 million cookstoves in 5 years there needs to be a focus on a market based solution where the government and supporting organizations enable the private sector to grow in all aspects of the value chain. The goal should be a market where customer demand ‘pulls’ products through the value chain as opposed to the government ‘pushing’ products to customers. To achieve this, there needs to be a coordinated approach from multiple stakeholders that focuses on customers and stimulating innovation.

Governments, bilateral organizations and several NGOs have been successful in training private producers and disseminating stoves to households. Consequently, there have been 1.8 million stoves disseminated in the last five years. (Miranda, 2011) However, the market is struggling from a lack of customer demand, which is making it less attractive for private businesses to enter the market. These factors combine to raise the risk of not achieving the 9.4 million target, and not significantly addressing the issues of deforestation and indoor air pollution.

The lack of customer demand can be attributed to product gaps, ineffective marketing, high prices, and limited distribution networks. Many private businesses participating in the market do not have the skills and capabilities to resolve these issues. Hence, supporting organizations, such as governments, will need to support private businesses and, in some cases, provide interim support by directly filling these gaps.

Thus, interventions must focus on the following strategic themes,

- Structure: Connect key participants across multiple organizations to enhance collaboration, and align structures within those organizations to support market functions.
- People: Enhance training and development to give government, private businesses and NGOs the skills they need to develop strategies and execute activities.
- Process: Focus on developing all aspects of the supply chain with more integration and connectivity between governments, private businesses and customers.
- Technology: Introduce new stoves that better meet customer needs and leverage information technology to better monitor and manage the market.

Undertaking such interventions supports the broader Ethiopian vision as they assist in delivering economic prosperity to private businesses and people, build the capacity of the government, reduce the country’s energy consumption, and lessen the pressure on limited natural resources by promoting improved technology and industrialization.

To implement this program there are three main options,

1. Foundation: Focus on setting up the program, developing coordination mechanisms and implementing organization change. There would be no emphasis on introducing new market capabilities, but changes introduced would set the stage for future projects and enable

governments and stakeholders to work together and work more effectively with better collaboration, accountability and responsibility.

- Set up cost: 9.1 million ETB
 - Operating cost: 0.7 million ETB per month
2. Foundation + Core: Implement all the foundation initiatives as well as deliver critical capabilities that enable a more efficient and effective cookstove market to emerge. This involves activities that enhance training, R&D distribution, policies and standards. (includes foundation costs)
- Set up cost: 24.1 million ETB
 - Operating cost: 0.9 million ETB per month
3. Foundation + Core + Expansion: All of foundation and core initiatives are delivered along with new innovative concepts that have the potential to accelerate growth. This includes carbon financing, new payment options, new products and improved reporting and IT systems. (Includes foundation and core costs)
- Set up cost: 61.1 million ETB
 - Operating cost: 1.5 million ETB per month

The above costs are based on the following major assumptions and exclusions,

- Costs are in addition to any current budgets or baseline costs, and
- Costs do not consider the entire budget required for expansion in to new regions.

Regardless of the implementation option selected, it is critical that a program management office (PMO) is set to run the program and a coordination mechanism is set up at each level of government.

The information contained in this report is based on preliminary analysis and should only be used as input into the final program design. Socialization and validation needs to be performed with stakeholders before the final program document can be created.

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3 Introduction and Methodology

The objectives of this report are to

- Discuss the key constraints that are restricting greater dissemination of cookstoves and limiting the evolution of a fully developed Ethiopian clean cookstoves and fuels market,
- Recommend solutions to address the constraints, and
- Propose an implementation plan.

To achieve this objective, the following actions were taken:

- A preliminary market assessment with focus on supply chain performance, government intervention, and product applicability was undertaken, and
- A preliminary customer study focusing on perceptions, cooking habits, willingness to purchase, needs, and preferences for improved cookstoves was completed

A qualitative analysis was performed using a combination of interviews and focus groups involving customers, distributors, manufacturers, governmental organizations, and NGOs. This analysis was performed in Addis Ababa, Tigray, Amhara, Oromia and the Southern Nations Nationalities Peoples' Region (SNNPR).

The following limitations were placed on this analysis:

- Regions: Only four major regions were visited due to time and resource constraints.
- Customers: It was not possible to reach truly remote or rural locations; therefore, only limited recommendations or comments can be made about these regions and populations.
- Scope of technology: The study focused primarily on solid biomass cook stoves due to limited time and access to other fuel types such as ethanol or biogas.
- Study time: All data was gathered during a single period; only qualitative data could be gathered on the effects of season or harvest time on stove production and sales.

This report is one of three reports that are being used to develop a program document and does not contain detailed content on technical and institutional issues. This shall be covered in the two other reports. It should be only viewed a proposed approach that can be used to inform the next phase of program planning and should not be seen as the final program plan.

Additionally, this report is designed for an audience who is relatively familiar with the Ethiopian cookstoves market, as it does not contain much background information regarding Ethiopia, the government structure, market participants, or products.

4 Market Analysis

The market analysis covers five main topics:

- Overview of the current supply chains,
- Analysis of issues,
- Discussion of the Knowledge, Attitude, and Practice (KAP) survey,
- Segment analysis examining issues preventing further adoption of cookstoves, and
- Market forecast analyzing how changes in key factors may influence market behavior.

In the Ethiopian market, there are several different supply chain models which largely vary by product; hence, explaining the current situation requires a distinct supply chain description for each product. A different approach is used to explain the supply chain issues, which are based on a typical value chain composed of raw materials, production, marketing, distribution and retailing, products, financing, and participants. This model was chosen to present the issues as to capture a wider range of topics and allow recommendations to direct greater focus on the cookstove market rather than specific products.

While customer-related issues could have been included in the aforementioned section, a subsequent section is dedicated exclusively to customers in light of the importance they play in achieving a market-based solution. The customer analysis focuses on presenting the findings of multiple focus groups in terms of knowledge, attributes and practices on key cookstove topics and presenting a more critical view of the main customer segments.

4.1 Current Supply Chains

Product Summary

Product	Mirt	Gonzye	Tikikil	Laketch	Merchayle	Ethanol	Traditional Enclosed Closes	Institutional Rocket stoves	Electric
Use	Injera baking stove that can simultaneously heat a pot	Injera baking stoves and can be reconfigured to cook food in pots	Cooking food in pots	Cooking food in pots	Cooking food in pots	Cooking food in pots	Injera baking	Cooking food in large pots	Models for both injera baking or cooking food in pots
Typical Users	Urban to Peri Urban Females	Peri Urban to Rural Females	Refugees (new product yet to be widely distributed)	Urban Females	Urban Females	Unknown	Rural Females	Institutions (eg, schools, universities)	Urban females of higher income status
Fuel	Wood, dried leaves, and dung	Wood, dried leaves, and dung	Wood	Charcoal pieces	Charcoal pieces and briquettes	Ethanol	Wood, dried leaves, and dung	Wood	Electricity
Manufacturing Model (Typical)	Small scale producers who only build Mirt stoves	Local cooperatives of women (3-12 people), typically rural or peri urban	Medium scale producers that produce in bulk orders for NGOs and producer other stoves	Medium scale producers in urban areas who produce multiple stove types	Medium scale producers in urban areas who produce multiple stove types	Unknown	Constructed in users kitchen	Built to order	Medium scale producers in urban areas who produce multiple stove types
Distribution Model (Typical)	Typically sold directly from production site	Typically sold through markets	NGOs distribute to refugees	Mixed models, some use distributors and retailers, whilst others sell direct from production site	Mixed models, some use distributors and retailers, whilst others sell direct from production site	Unknown	Constructed in users kitchen	Direct from producers	Mixed models, some use distributors and retailers, while others sell directly from production site

Product	Mirt	Gonzye	Tikikil	Laketch	Merchayle	Ethanol	Traditional Enclosed Closes	Institutional Rocket stoves	Electric
Technology	Insulated fire stove made from concrete	Insulated fire stove made from clay	Rocket stoves made from clay and metal	Insulated stove made from clay and metal that uses charcoal pieces and briquettes	Insulated traditional enclosed fire stove made from mud	Ethanol-fueled stove	Insulated traditional enclosed stove typically made from mud	Rocket stoves made from clay and metal	Stoves that use an electric heating element
Life Stage	+15 years	+7 years	2 years	+20 years	2 years	Unknown but relatively new	Decades	2 years	Unknown
Price	85 to 160 Birr (variation largely by region)	60 Birr	170 Birr	70 to 90 Birr (variation largely by region)	100 to 160 Birr	Unknown	Free, typically installed by Health Office or community	Unknown	For cookstoves, 170 Birr for single, 350 Birr for double For injera stove, >600 Birr
Household Usage	13%	2%	0.50%	0.50%	0.10%	Unknown	14%	Unknown	Unknown
Energy Benefit ¹	Energy Efficiency: 16% Fuel Savings: 50%	Energy Efficiency: 18% Fuel Savings: 54%	High Power 26% Simmering 41%	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown

¹ Values taken from study completed from Ministry of Water and Energy

Mirt

The supply chain for Mirt is characterized by small scale producers in urban areas that produce and sell stoves from their homes. Typically, they only produce Mirt stoves, which is their sole source of income. In the majority of cases, they are single female producers. Though male producers and larger businesses of more than eight people were observed, this represented an exception.

Small-scale production and the challenges involved in transporting heavy Mirt stoves typically compels producers to sell their stoves in their local communities. One Mirt producer organized centralized production and distribution of stoves to retailers through a Bajaj (a small vehicle with 3 tires), but this was an exceptional case. Another exception was noted in the Tigray region, where the Government Energy Office at the Worede level purchased stoves directly from producers and then distributed them to rural locales.

Mirt producers rely on assistance from the Energy Office, Women's Affairs and/or GIZ to set up their businesses, which can take the form of training, financing or distribution. Financing is organized in collaboration with microfinance institutions (MFIs). Both the Energy Office and GIZ provide ongoing support for producers and report the number of stoves produced.

Gonzye

The Gonzye stove is typically made by rural producers in associations of several women that range from two to twelve people. In addition to stoves, producers typically make and sell a range of clay products such as pots, Opesi stoves, and to mit'ads. In fact, previous experience in making clay products is a vital criterion the Energy Office uses when selecting new producers.

Gonzye are produced in rural areas because raw materials can be easily accessed and because it is targeted at rural customers. This implies limited access to distribution channels, requiring producers to transport stoves to more densely populated areas, such as markets, in order to sell them.

The Energy Office assists Gonzye producers with training and financing in order to establish production. Financing is organized in collaboration with Microfinance Institutions (MFIs). The Energy Office provides ongoing support for producers and also reports the number of stoves produced.

Tikikil

As opposed to the Mirt and Gonzye, the Tikikil stove is a relatively new product and has yet to be distributed on a large scale. To date, the overwhelming majority of products have been distributed by NGOs, to populations such as refugees. A very small number of products have been bought and used by individual customers in a market-based solution.

The stove is predominately supported by GIZ, which trains producers and manages reporting and evaluation. Additionally, because this product is sold in bulk to NGOs, the order process is largely orchestrated through GIZ, whereby GIZ receives the NGO order and then contacts a producer who can

fulfill the bulk order. The final contract and delivery are typically organized directly between the producer and NGO. However, there have been circumstances where GIZ acts as an intermediary between the producer and NGO by arranging payment and delivery.

The production of Tikikil requires two main components: metal cladding and a clay liner. Unique skill sets are required to produce these two components; hence, producers typically specialize in either component. In the majority of cases, the cladding producer is responsible for the final assembly of the product and hence the producer must procure the clay liners. There were a few instances where GIZ only purchased the cladding from a single producer and then organized the clay liners themselves. However, this was not commonplace.

The relationship and dependency of cladding producers on clay producers has resulted in problems fulfilling orders. This is largely because clay producers are not closely located to cladding producers resulting in transportation issues, and have limited capacity and cannot easily scale up production. The amount of coordination required to overcome these issues is often not feasible given the small scale of both producers.

Laketch

Similarly to the Tikikil stove, the Laketch stove has two major components: a clay liner and metal cladding. The difference in the products is attributed to the fuel type used: the Laketch uses charcoal while the Tikikil uses wood. The Laketch stove has been available for a number of years and has a more established supply chain; it is typically bought by customers rather than NGOs. The only observed example of NGO participation is a recent plan by the World Food Programme (WFP) and Ministry of Agriculture to distribute 200,000 Laketch stoves under a carbon financing program. In this plan, customers would still need to buy the stoves from WFP or the Ministry, but would be able to do so by paying by installment. This project is still in the initial phase.

The Energy Office designed the Laketch over 10 years ago and previously provided support to producers but has since stopped supporting these producers, largely because the Laketch has obtained market demand and is produced by many private organizations. It was observed that though the Laketch product could not be easily found in several peri-urban areas, it was commonly found in urban areas across Ethiopia.

The Laketch stove is quite popular with customers. Consequently, several manufacturers have begun producing the stoves, each with slight variations in product design. Many of these producers were in the Addis Ababa Region and often distributed finished products through merchants to other regions in Ethiopia. Despite this, there is much less availability of the Laketch when compared to standard charcoal stoves, such as the all-metal stoves, which have no fuel saving capability.

Merchayle

The Merchayle stove is very similar to the Laketch stove in that it is an improved charcoal stove but differs in that the Merchayle can use both charcoal briquettes as well as normal charcoal pieces as a fuel source.

The use of briquettes creates another complexity in the supply chain since not only do stoves have to be produced and distributed, but fuel needs to be produced and distributed. Consequently, the major bottleneck preventing more wide-scale use of this stove is the lack of briquettes production, which is very expensive. As a result, this stove is only really common in the Addis Ababa area, which is home to three to four briquette producers.

This stove has been popular with urban customers because it is thought to save the customers money through decreased fuel consumption. Its popularity has given rise to quite a few producers, distributors, retailers and this stove can be more commonly found in retail shops and local markets.

Additionally, this stove has been popular among businesspeople because it opens revenue channels from both stove and briquette sales. In fact, one distributor/retailer stated that the sale of charcoal briquettes was more profitable than the sales of stoves themselves.

Ethanol

Like Merchayle stoves, ethanol stoves have a more complex supply chain because of the interdependency of fuel and stove type. There were no observed examples of ethanol stoves being used; however, ethanol is currently being produced in Ethiopia and is being supported by Project Gaia. Further use of ethanol will be heavily reliant on the development of a supply chain that can provide a regular supply of fuel to customers at a reasonable price. It could be challenging for rural customers to get a regular supply of ethanol unless they produce it locally. Alternatively, ethanol might be more appropriate for urban customers where the high concentration of demand justifies the transportation cost of the fuel.

Traditional Enclosed Stoves

Traditional enclosed stoves are prevalent in selected areas of the market and were observed in Tigray and Amhara Regions. In fact, it was reported that 60% of households in Amhara Region have traditional stoves. These stoves are typically feature a large cooking surface for making injera, reduce fuel consumption, and are equipped with a chimney to reduce smoke. The Mirt and Gonzye are capable of similar fuel savings but do not have a chimney; hence, customers often prefer the traditional closed stoves.

There is no official price for these stoves, as they are often installed by local community groups, but they enjoy the support of the Health Office, with Health Extension workers being trained in production methods. The Health Office supports traditional stoves (as opposed to Mirt and Gonzye stoves) because they are equipped with a chimney. The Energy office does not currently support any traditional enclosed stoves. However, there are some cases where some type of stoves traditional enclosed stoves improved stoves, are accepted as improved stoves and are counted as improved ones.

Institutional Rocket Stoves

Institutional Rocket Stoves (IRSs) are in the early phases of production and have a similar technology to the Tikikil stove. They are typically sold to large organizations, such as schools, universities or hotels that cook on a large scale. GIZ is responsible for training producers and selects producers with large production facilities. IRSs are not examined in great detail in this report as none were observed during field visits.

4.2 Supply Chain Issues

This section contains an analysis of the key issues involved in growing the clean cookstoves market. In summary, the cookstoves market has moved through the early stages of development by focusing on building production capacity and promoting products to customers. The next stage of evolution needs to look at building capacity across all areas of the supply chain and generating customer demand. An effective supply chain is one that manages how products are developed and distributed to customers. Achieving this will result in market growth and a more self-sustaining market with less government assistance. However, there will still need to be some assistance and regulation from the government to support growth and ensure that the market is growing in line with its strategic objectives.

4.2.1 Raw Materials Issues

High Price of Cement

The major issues with raw materials are the price of cement and sheet metal. This is affecting the final sale price, reducing customer demand and limiting growth.

The price of cement has increased significantly recently and is a major issue for Mirt producers, as cement is a vital raw material. Several producers described how an increase in raw material costs had resulted in high final sale prices and reduced profit margins, both of which limit the ability of producers to grow. Economic growth in Ethiopia elevated both demand for and price of cement. This issue was exacerbated by the small-scale and low production volumes of Mirt producers, who cannot purchase cement in bulk at lower prices.

In response, the Energy Office has redesigned the Mirt to use less cement while maintaining product performance. This has had mixed results, as in some areas the price was still deemed too high and in other regions the new design was not popular with customers as it was perceived to be of lower quality.

Additionally, some producers in the Tigray region stated that sheet metal prices of stoves were too expensive, preventing them from producing Tikikil and Laketch stoves. While this was a bottle neck in production, the low production volume and hence small material purchases, was a major contributing factor to higher metal prices.

4.2.2 Production Issues

Excess Mirt Capacity

There has been significant attention from multiple organizations such as the Energy Office, Women's Affairs, and GIZ, on developing the production capacity in Ethiopia. This resulted in the emergence of several hundred producers of numerous products across the country. This problem is much more common for Mirt stoves than for any other product. While it is important to build production capacity, the sheer number of producers makes it difficult to manage the quality and ensure that stoves are being

produced according to standards. Additionally, there has not been sufficient attention given to matching the production capacity to the demand for products in the market.

Interviews revealed that many Mirt producers were producing well below capacity and struggling for sales. In fact, several producers had either stopped producing or were considering stopping production. Any decision to increase the number of Mirt stoves will reduce the likelihood of existing Mirt producers having sufficient demand and hence impact their businesses.

It would appear that the capacity of Mirt production exceeds demand, while the production capacity of charcoal stoves such as the Laketch and Merchayle is outpaced by demand. This is largely due to government intervention in the development of new Mirt producers rather than allowing market forces to determine capacity. It is vital that there is sufficient information to inform government decisions on where and how to increase capacity. Hence, any organization that decides to train new producers must ensure that there is customer demand and that existing producers are not producing far below capacity.

Complex Producer Management

There appears to be significant emphasis on training producers with several government agencies, including the Energy Office and Women's Affairs, all of which claim responsibility for training producers. Additionally, GIZ was observed to be training producers, and the Small and Micro-Enterprise Office was also assisting producers by helping them set up businesses and teaching them business skills.

While having the support of multiple organizations is not necessarily a problem, the lack of coordination between organizations often resulted in duplication of efforts and unclear roles and responsibilities. For example, in one region both the Energy Office and the Small and Micro-Enterprise Office claimed to be the main point of contact for producers and to be responsible for organizing microfinance.

Defining clear roles and responsibilities and enabling coordination would alleviate these issues and ensure that scarce resources are used more efficiently. Additionally, this would help to ensure that tasks are allocated to those with the greatest skills and capabilities. For example, Small and Micro-Enterprise might be much better at assisting with microfinance while the energy office might be better suited for producer training.

Many Small Scale Producers

The majority of cookstove producers are doing so on a very small scale, which is especially true for Mirt stoves but is also observed for charcoal, Gonzye and Tikikil stoves. This often results in small production sites and low production volumes. The main concern with small-scale production is that reduces the efficiency and quality.

Producers that are able to specialize in products and produce them at high volume are able to do so at lower cost, which in turn reduces the sales price. Moreover, they are able to develop specialized skills and knowledge, which leads to better quality products. The presence of multiple small-scale producers

increases the workload for government offices charged with visiting these producers for reporting and quality management purposes.

The abundance of many small-scale producers is the result of a decentralized production strategy, which appears to have been chosen as a method of supporting jobs and also supporting greater geographical distribution. While a decentralized strategy does support both these objectives, a more centralized production approach with distribution channels would still support jobs and allow wide-spread geographic distribution. A major challenge with such an approach would be overcoming the increased costs from transporting stoves and the lack of distribution infrastructure.

Ultimately, there is not one correct model for all stoves and regions. There must be hybrid approaches that look at optimizing production volume, obtaining maximum coverage and minimizing costs.

Basic Production Methods

A variety of production methods and a lack of production technology (eg, jigs, cutting tools, presses) is resulting in variation in the quality and performance of products. This is true of all products and often arises because small-scale producers are not able to invest in improved processes and technology.

Typically, all production is done by hand with basic cutting equipment and molds. The greater use of production technology is an important step in developing a more efficient market. There was one observed example of a Tikikil producer who had innovated production techniques by using self-designed jigs and presses which allowed him to produce more precise components more quickly.

Another issue is the coordination required between cladding producers and clay producers in the production of Tikikil, Laketch and Merchayle. The emphasis from supporting organizations appears to have been on training and supporting metal cladding producers without considering the capacity of clay producers. Additionally, the separate production of these two components makes it more difficult to manage quality and ensure product performance. This example illustrates the importance of considering production techniques and supply chain constraints during the product design process.

4.2.3 Distribution and Retailing Issues

Lack of Capacity

There is a paucity of retailers distributing stoves largely because of insufficient demand. Additionally, the injera stoves are quite large and heavy, presenting logistical distribution challenges, one of the main reasons why a decentralized production strategy was implemented.

However, in Tigray Region, energy experts from the Energy Office were purchasing stoves from peri-urban producers and distributing and selling the stoves to rural communities. The energy experts used trucks to transport the stoves and often cooperated with other government offices, such as the Health Office, to transport the stoves. Despite the challenges involved in accessing vehicles, they were able to demonstrate that both a model of centralized production as well as decentralized distribution was possible.

Another major factor for the lack of distribution channels is the lack of modern infrastructure in Ethiopia. Many roads are in poor condition and some rural communities may not have paved roads at all leading to breakage and stove damage in transport. Gonzye stoves do not suffer the same issues largely because clay, the key raw material, can be found locally in the woredas where they are sold. Furthermore, the transportation also adds another expense to an already expensive Mirt stove.

The distribution approach of Mirt stoves contrasts with that of other cooking stoves, namely the Laketch and Merchayle. These two products typically have centralized urban production and leverage distribution channels to other areas or regions. However, it should be noted that these products are only found in urban areas and do not have the same extensive geographic presence of Mirt and Gonzye.

A market-based solution is necessary to expand the market, which necessitates using customer demand control over how and where products are pulled through the supply chain. (Tschumi & Hagan, 2010) Therefore, a major reason why improved charcoal stoves do not have greater geographic presence is simply because the customers in those regions do not demand these products. This is not to say they do not want the products; rather, lack of demand may imply that the products are deemed too expensive or that customers are not aware of the product benefits.

There is limited commentary to be made in regards to the Tikikil stove, largely because its primary distribution channel is through NGOs and hence outside a market-based solution. Securing greater distribution of the Tikikil stoves will involve similar issues to charcoal stoves; namely, that in many areas there is little customer demand. Additionally, NGOs may be able to innovate with their distribution model by getting customers to pay part of the full price or even work for their stoves. The work for food program has been used by the WHO and could be option for increasing stoves usage among some poorer segments of the population.

It would appear that the lack of customer demand for stoves is a large reason for why the existing merchants do not distribute improved cookstoves to markets and other areas. Many of the metal cladding producers also make all metal charcoal stoves, which are not improved stoves and do not improve fuel efficiency. However, these stoves are commonly distributed by merchants to different areas because there is demand for these products.

The difference in demand for these products can be explained by the price and level of customer understanding. All metal charcoal stoves are approximately 30 Birr, while the improved charcoal stove, Laketch, is approximately 70 to 90 Birr. While the Laketch is far more expensive, the fuel savings that could be realized for this product would easily cover the difference in upfront purchase price. Hence, customers either do not have sufficient money upfront to purchase the stoves or they do not understand the benefits.

Limited Use of Available Channels

There are existing distribution networks available but they are not being used effectively. Any strategy that looks to improve distribution should first consider what channels are available and try to leverage them where possible.

In the Tigray Region, energy experts in collaboration with health extension workers distributed stoves to rural customers. In other regions, there is a network of government officials capable of distributing products, but they do not do so because they do not consider it a part of their job or lack necessary resources, such as trucks.

Additionally, in many Woredes there is an extensive network of development agents from the Agriculture Office with the capability of distributing and selling stoves to customers. In some regions, there is no collaboration between development agents and energy experts. These development agents work in close partnership with the community and could assist with the distribution and promotion of stoves but also help ensure that communities use stoves correctly and assist with reporting and monitoring.

The extensive network of Mirt producers could also be viewed as a potential distribution network. Whilst these producers could continue to make Mirt stoves, they could also buy improved cooking stoves, such as Tikikil or Laketch from centralized producers, and then sell them to customers. This hybrid model would enable them to develop other sources of income and further develop their business.

Lack of Support and Development

The distribution capability is not sufficient as there has been limited attention given to it by supporting organizations, largely because of an emphasis on building production capacity. There were no observed examples of incentives or support mechanisms for distributors and retailers to sell stoves. Organizations that are trying to build the cookstove market have focused on building producer technical skills rather than developing the capability of the end-to-end supply chain.

The focus on decentralized production has impeded the growth of distribution channels, since it theoretically removes the need for such channels as producers can sell directly from their production site. While this approach can be effective, increasing support for distribution channels would support existing producers by expanding their customer base.

A primary advantage of building distribution networks is that they can apply to a variety of stoves and fuels. In a decentralized production model, every time a new stove is designed, in order to get broad-scale geographic distribution, all producers need to be trained and adopt new technology. However, when distributors are used, the training and new technology only needs to occur for a few producers, while distributors can focus on the distribution aspect. This elevated efficiency is the main advantage of using distributors. This same theory can be applied to new fuel types such as ethanol and charcoal briquettes.

Because of the variety of products and regions, there needs to be flexibility in distribution models. The right models must be paired with certain products, regions and customers to achieve optimal results.

Complex Fuel Distribution

The lack of distribution channels is also an issue for fuels, mainly charcoal briquettes and ethanol, as reliable supply chains that can provide sufficient quantities of fuel for customer adoption are needed. Without a guaranteed supply of fuel at an affordable, stable price, it may be difficult to get customers to switch their fuel source. The introduction of new fuel types also faces the issue of dependant technology adoption whereby a customer needs to select two types of technology at once in order for both to work. When introducing new fuels, consideration must be given to the fuel supply chain, its performance and relationship with stove supply chains.

Mass adoption of charcoal briquettes faces the problem of mutual dependence of technology adoption and small scale producers. Hence, for private organizations to justify supplying briquettes in an areas there needs to be Merchayle stoves available, but to justify supplying Merchayle stoves to be available in areas briquettes must be available. To address this problem, it is necessary to develop strategies that consider both fuel and stove distribution, something that requires collaboration between stove producers, briquette producers, distributors, and retailers to pick the regions they wish to target in order to develop all market components simultaneously. This appeared to be lacking in Ethiopia as in Hawassa, briquettes could be found but Merchayle stoves were not common, while in Bahir Dar, Merchayle stoves were available but briquettes were not.

While not observed, a similar problem could theoretically affect the adoption of ethanol stoves. Hence, in developing strategies for ethanol stoves, it will be critical to ensure that there is both availability of stoves and availability of fuel.

Additionally, ethanol is used as an additive to petroleum for use in the transportation sector. Given that Ethiopia must import all of its petroleum and the weakness of the Ethiopian currency, adding ethanol to petroleum is seen as being an important factor in growing the economy as it can be produced locally at lower cost. This constrains supply and increases, prices, thus presenting a challenge for ethanol use in the Ethiopian clean cookstoves market.

4.2.4 Marketing Issues

Limited Promotional Activities

There are a limited number of marketing and promotional activities due to the limited budget allocated to Woreda Energy Offices and the limited promotional capacity of small scale producers. Many producers cited the lack of marketing and promotions as a major reason for the lack of customer demand.

Several government departments, including the Energy Office and Women's Affairs, have assisted producers in organizing and participating in product demonstrations. The limited budget of many energy experts is not sufficient to run multiple product demonstrations, particularly across the wide geographic distribution of many Woredes. Additionally, it appears as though successful producers have organized product demonstrations on their own behalf without governmental support. However, because many

producers are very small, it is difficult for them to organize and pay for marketing materials to organize such demonstrations independently.

Producers believed that the product demonstrations were the most effective way of selling stoves. This was also confirmed by customer focus groups, which often stated that they need to see the product working before making a purchase. While effective, the cost of demonstrations limits their application. Promotion and demonstrations should be targeted in particular Woredes and toward customers where they are likely to have the greatest impact. This method is supported by a recent program by USAID in Bangladesh that found that well-designed, targeted clean cookstove promotional activities are more effective than implementing a large number of broadly themed activities. (USAID, 2009)

Moreover, many customers purchased cookstoves once they had seen them being used by their neighbor, which highlights the importance of network marketing and 'word of mouth' advertising. While this is an extremely effectively promotion channel, it is also the most difficult to control as it relies on products already being sold and positive customer sentiment.

Other methods of marketing have been used such as TV and radio spots organized by GIZ and brochures and posters developed by both the Energy Office and GIZ. There appears to be multiple organizations involved in marketing. The main concern with having multiple organizations is that there is the potential for duplicated efforts and an inconsistent approach. Collaboration can help to overcome these issues by defining the roles and responsibilities of each organization. Attention must also be given to carefully plan the frequency and location of these activities to ensure that that they do not overburden staff or promote products in Woredes with high product penetration.

Ineffectiveness of Marketing Messages

Many of the marketing messages are not effective because they do not successfully communicate the clean cookstoves and fuels value proposition and appeal to customers' needs. The marketing messages to date have focused on developing product awareness but have not communicated product benefits. Customers need to easily understand how the product will improve their lives. Several of the existing posters state the stoves are 'a fuel-saving stove.' While true, this is very difficult for a customer to put in context. A more effective message would be 'save 50 birr per month,' as customers can better understand how it might impact their lives.

Additionally, the marketing messages make it difficult for customers to understand how to purchase products. Posters did not display key selling information such as product price and producer contact details. Hence, a customer would need to call the government office to obtain a producer contact number and then call the producer just to get the price, a needlessly roundabout process. The reason that this information is excluded is that posters are made by the government and GIZ, which do not know the final price or the contact details. This could be remedied by simply providing blank spots for producers to write their own information.

There is also a lack of standards and brand differentiation to help customers make informed decisions about the quality and performance of products. It has been found that a strong brand can help maintain quality control; however, this must be done from the very onset of stove promotion and should be coordinated with any marketing campaign. (USAID, 2009) A recent program by USAID in Bangladesh found that if the community were given information on how to identify the design features of improved cookstoves and the names and contract details of recommended producers, it increased the likelihood of quality production. (USAID, 2009) Introducing a national branding for certified producers and products would help customers to identify and demand high quality products and consequently help to ensure that purchased products meet government standards and goals.

Ultimately, many of the issues regarding marketing messages are the result of a lack of knowledge and skills of the personnel responsible for marketing. A prime example of this is one regional marketing expert stating that he did not have the sufficient skills and knowledge to complete a marketing plan. This creates an additional concern of knowledge transfer, as it makes it particularly difficult to train local energy experts in marketing if there is not sufficient skill at the senior level.

4.2.5 Product Issues

Unsatisfied Customer Needs

Several customers needs remain unfulfilled. During field visits, customers and producers had multiple product ideas because they were not satisfied by the current product, which is limiting mass adoption of improved cookstoves. A full list of observed innovations and gaps can be found in Appendix 0 - Observed Innovations and Gaps.

While not all of these ideas for product design are valid, they illustrate that there is potential for product improvement and that they have not been heard or implemented. This is a source of concern, as successful programs, such as the Chinese, have modified products to cater to customers' needs who were able to disseminated over 100 million stoves by using research and development (R&D) to create products for specific markets and customers' needs. (Shuhua, Kun, & and Daxiong, 1993)

Unfulfilled customer needs exist because of a lack of product innovation arising from limited capacity to evaluate and execute ideas as well as the absence of a feedback loop that allows people at the top to understand customer needs and preferences. It is critical to continuously improve product designs as this helps to ensure that customers' needs are being met.

Lack of Product Management

There is no single department or group of people responsible for managing all the activities related to a product. Essentially, the Energy Office is has similar objectives to a private businesses, in that it is responsible for getting more households to buy stoves. Traditionally, in private sector organizations there is a product management team responsible for overseeing all the activities related to a product, such as sales, marketing, R&D and reporting. An example of such thinking is seen in the Chinese National

Improved Stoves Program, where product management was used to make strategic decisions at a regional level (Shuhua, Kun, & Daxiong, 1993).

Without a comprehensive product management view, it is difficult for the all aspects of the product to be managed. While this may not be the traditional role of government, it would help ensure greater coordination of activities and a clear understanding of market dynamics. Product managers are also able to assist by developing product and marketing strategies. Such activities were used by the Chinese in targeting specific areas and piloting new products and marketing approaches (Shuhua, Kun, & Daxiong, 1993).

Inadequate Reporting and Information Management

The current reporting structure does not accurately capture all the information required to monitor the cookstove market. Additionally, the multiple layers of government and large number of Woreda energy experts has resulted in an inefficient reporting process. Major gaps afflict information about customer needs and preferences, production capacity, product sales, product penetration, market share and product usage/performance. Without this information, it is difficult to plan effective intervention strategies and evaluate performance.

Most written reports only focus on production volume. This creates challenges because these reports need to manually aggregate to provide a view of market situation and production volume should not be reliable upon as a sole measure to understanding growth or market maturity. Furthermore, there is a tendency to over-report production volumes (Shanko & Lakew, 2008) Hence, it would appear that the number of customers using clean cookstoves and fuels is likely to be far less than the production volume quoted in reports.

In disseminating over 100 million stoves, the Chinese used a variety of information gathering techniques, such as surveys, to better understand the customer in terms of preference and fuel usages (Shuhua, Kun, & Daxiong, 1993). This type of thinking can be extended to the Ethiopian market, where qualitative information on customers and producers can improve processes and products. This information then forms a feedback loop that can be used to create innovation or encourage adoption of good ideas.

Without capturing additional data about customers, producers and sales, it is very difficult to manage a market-based solution to optimise strategies, improve product designs and tailor marketing campaigns.

Management of NGO Demand

The current process to manage NGOs orders is not effective, as it is based on bulk orders which are too large and too infrequent for small-scale producers to manage. There were several cases observed where producers were unable to fulfill NGO orders in time; several producers also mentioned that bulk orders made it challenging to manage working capital and inventory.

The majority of NGO orders are for Tikikil stoves, which are distributed free of charge to refugees. Unfortunately, it is difficult to predict demand because of the unpredictable nature refugees and funding.

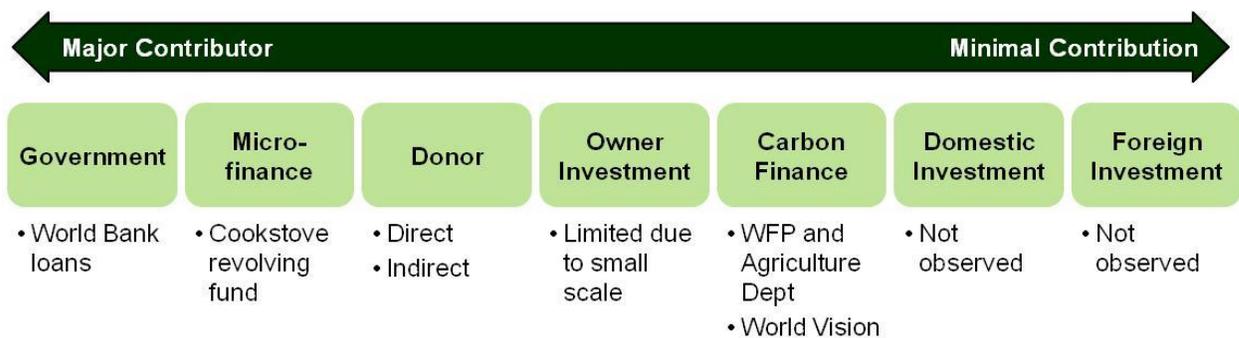
Additionally, there is a sense of urgency for these orders because the refugees need immediate assistance and the donors want to see their money used quickly.

This creates issues for small-scale producers who cannot easily increase production in a period of high demand. In order to fill these orders, producers need to quickly procure raw materials, obtain additional labor and stop or decrease production of other products.

Furthermore, many of these orders are for several hundred or several thousands of stoves, which requires significant capital to be invested by producers. NGOs often pay for the stove in two installments, half up front and the half on delivery. However, producers stated that this was not always sufficient to cover their costs for both materials and workers.

To resolve such issues there needs to be either more communication between NGOs and producers to better manage demand, or intervention of a third party to ensure that there is better demand or inventory management.

4.2.6 Financing Issues



Lack of Budget for Government Activities

Many Worede energy experts do not have a sufficient budget to execute their allocated tasks. In two separate regions, the annual Worede Energy budget was 3,000 and 5,000 Birr, dedicated to several energy projects related to electrification as well as cookstoves and cooking fuels. Additionally, many energy experts lacked resources such as computers, trucks or motorbikes. When these employees are expected to perform several critical market functions such as training, reporting, distribution and promotion, the lack of finances and resources makes it difficult.

Several remedies are available. Collaboration and resource sharing would be beneficial in ensuring that finances and equipment are used effectively. Additionally, the workload allocated to these energy experts seems to be very large. In developing a market solution, the government often needs to fill gaps that cannot be covered by the market, as in the case of Worede energy experts. Some of the tasks performed by the energy experts could theoretically be performed by market actors. However, the government still needs to assist private organizations by providing support and encouragement in the form of training,

policies or funding. Getting the private sector to perform such activities as distribution or training producers would help alleviate the burden.

Limited Sources of Funding

The current Ethiopian cookstove market is heavily reliant on government, bilateral organization (i.e. GIZ), and in very few cases NGO funding to drive growth. While this does not appear to be a problem at this point, any plans for future market growth may be constrained by these funding sources.

The funding for the revolving fund, among others, was largely facilitated through the Energy Office with funding from The Rural Household Energy End-Use Efficiency Improvement Project (RHEEIP), which was executed from 2006 to June 2011 from Federal to Woreda levels in six regions. The project was a sub component of the World Bank Energy Access Project, and phased out four months ago. The revolving fund under this project largely used MFIs but also included Women Associations.

The fund was designed for both new producers and the expansion of existing producers for injera baking stove producers not for other stoves producers. Future market growth should consider the mechanisms and policies for providing additional funds to existing producers, as these are people that should be driving much of the growth.

However, microfinance is not feasible in some circumstances because the maximum loan is often capped at 6,000 Birr, which may not be sufficient to fund large investments in machinery or technology. Additionally, several small-scale producers stated that they were not eligible for microfinance because they were individual producers, and MFIs would only lend to associations comprised of multiple producers. For some producers, there was also a lack of understanding about microfinance's status as a loan, not a grant. Better training of producer with emphasis on business skills would help to resolve such issues.

Future funding initiatives should look at increasing the maximum loan amount while imposing on constraints who can borrow such large values. Additionally, funding should be allocated for all market participants, including producers, distributors, retailers and customers, to help to ensure that all aspects of the market can access capital to fund growth.

Limited Customer Financing Options

There are limited customer financing options available, with the most common mechanism being some pay-by-installments managed either by the producer directly or by a third party such as GIZ, the Energy Office or Women's Affairs. However, in many cases pay-by-installments were not available and the customer had to pay the full price upfront. Pay-by-installments can be an effective way to get customers to purchase more expensive products and can be further justified as the money saved on fuel can be used towards paying for the stoves. Many producers were hesitant to offer such terms for fear of customers missing installments.

In one region, a government office did not manage the installments but rather was used to enforce payments when a customer stopped paying a producer. This model appeared to have merit as it allowed for minimal government involvement but also drew on government authority to enforce agreements.

Though microfinance was used to support producers, there were no observed instances in which an official MFI was used to support customers' purchases. This model has been used over several other countries to some success (GVEP International, 2009).

If high quality products are desired, then it is likely that the final price will increase. As the final price increases there needs to be consideration given to the purchase mechanism and finance made available to customers as to ensure maximum demand.

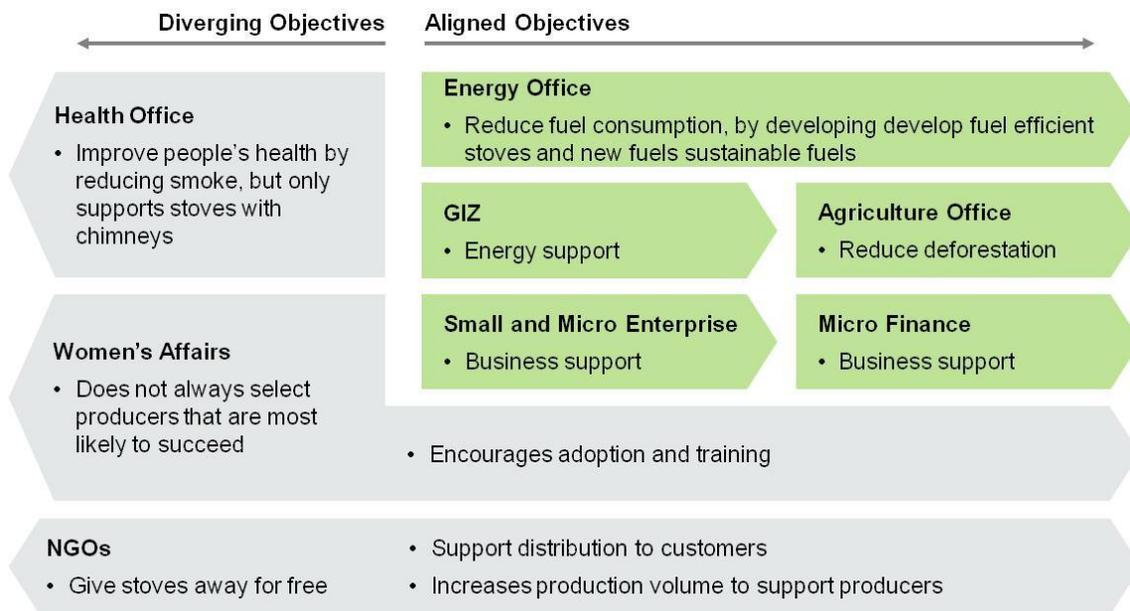
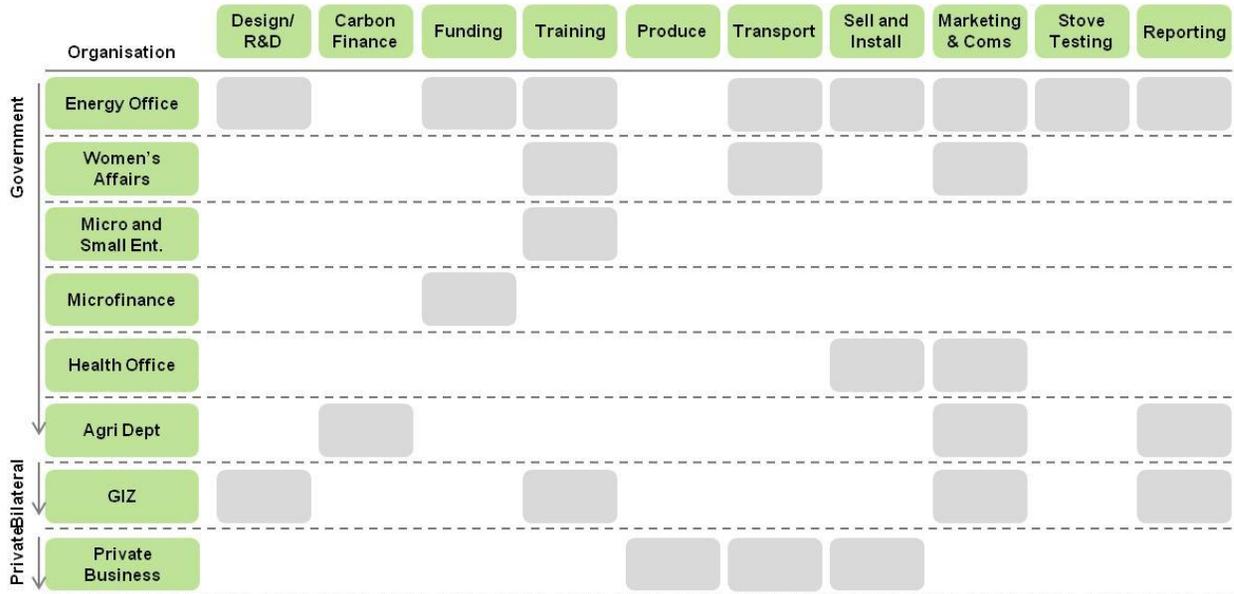
Limited Carbon Financing

There were very few examples of carbon financing observed in the Ethiopian market, limiting access to available funds. The major observed example was the WFP and Agriculture Office creating a plan to disseminate 200,000 Laketch stoves with carbon financing. However, this initiative is still in the conception stage. Nevertheless, it does indicate that there is potential for carbon financing in the Ethiopian market.

Additionally, there are multiple options for carbon financing in the Ethiopian market not directly related to the dissemination of stoves. For example, improved charcoal production for briquettes and improved kiln technology both have the potential to use carbon financing, as they both result in decreased emissions.

Carbon financing is a complex topic and requires detailed analysis and significant upfront investment. Hence, it requires the assistance of expert partners for calculations of baseline emissions, a detailed understanding of stove performance, a robust monitoring and evaluation plan, and a detailed understanding of all the setup and ongoing costs involved. Nevertheless, carbon financing represents a major opportunity to inject funds into the cookstove market to develop better and more affordable products.

4.2.7 Market Participants and Stakeholder Issues



Limited Coordination

There are multiple participants in the cookstove market with divergent objectives, a cause of wasted resources and prevention of wide dissemination of stoves. The organizations that were observed to be participating were the Energy Office, Agriculture Office, Environmental Protection Authority, Microfinance Office, Small and Micro-Enterprise Office, Health Office, Women's Affairs GIZ, and several NGOs such as WFP, World Vision, and Zoa.

Some of these agencies have conflicting objectives; for example, the Health Office wants reduced smoke and the Energy Office wants fuel reduction. Hence, the Health Office only supports stoves with chimneys and the Energy Office has only designed fuel-efficient stoves but with no chimneys.

Furthermore, several organizations are charged with supporting impoverished women and have focused on creating new jobs for women by training them as producers. Though this is not in direct opposition to the Energy Office's objective, it does not necessarily align with the optimal strategy for building capacity. Impoverished female producers may not have the same resources to grow a business effectively to achieve wide distribution and may also struggle during a period of low product demand. (USAID, 2009). Furthermore, additional producers should only be trained when there is sufficient demand as opposed to just giving new skills to people. This not to say that these two objectives cannot both be satisfied by a cookstove program. However, it is important to understand the priority objectives and when actions taken to achieve one objective may start to diminish the chances of achieving another.

Objectives do not need to be mutually exclusive. However, coordination and collaboration ensures that the objectives of multiple organizations are aligned.

Limited Capabilities

The government is involved in many business activities but is lacking the capabilities (people, process and technology) to effectively perform them. In a pure market-based approach, the government plays a minimal role. However, in developing markets, this is not practical because many private sector organizations lack resources, for which government compensates. The Ethiopian government has addressed market gaps by intervening in many areas such as product design, product testing, human resources (training producers), marketing, distribution, financing, and reporting. There has been an emphasis on production and technical skills but limited focus on product management, distribution and marketing.

This has resulted in a gap in the current market, whereby private sector organizations lack the necessary resources to engage in such activities and the government lacks the capability to perform them. To address this, the government can either look at building these capabilities internally by further training and investment or externally by offering additional support.

4.3 Knowledge, Attitude, and Practice Survey (KAP Survey)

This section discusses the results from customer focus group studies across various market dimensions related to customers' Knowledge, Attitude and Practices (KAP). A KAP survey is based on

- The Knowledge possessed by a community on a certain topic,
- The Attitudes people feel towards that topic, as well as any preconceived ideas they may have, and
- The Practices that people demonstrate as influenced by their knowledge and attitudes.

The objective of this section is to present general perspectives, highlight variations, and describe challenges in expanding customer adoption of improved cookstoves. Only qualitative analysis was used due to the small scale of focus groups. Further analysis of each segment will be done in the next section, 4.4 Segment Analysis.

4.3.1 KAP Market Dimensions

Wood

Wood is used as a common fuel source in the majority of regions and is obtained by either purchasing it or collecting it. In general, customers who purchased wood considered it a significant expense. Customers in rural, highly forested areas are more likely to collect wood, while customers in urbanized areas are more likely to buy it. Rural customers also commonly use animal dung as a fuel source. Typically, women were responsible for collecting wood. However, in some areas men stated that they would often accompany the women to protect them from rape and attack.

Three Stone Stoves/Fires

There is a high level of knowledge about three stone fires, with people either currently using them or having previously used them. Most customers understand that three stone fires are not ideal and would prefer to switch to improved stoves. However, in practice customers use three stone fires largely because they cannot afford improved stoves or do not believe that improved stoves offer any real benefit. Additionally, some customer not been provided with information about the improved cookstoves or they do not have access to suitable channels to buy improved cookstoves.

Traditional Enclosed Stoves

Knowledge of traditional enclosed stoves is isolated to particular regions; the observed regions were Tigray and Amhara. However, in these regions, people were fully aware of them and preferred them because they have a chimney to reduce smoke, are insulated to reduce fuel consumption and are enclosed to protect from flames. In practice, this preference often results in a greater tendency to have traditional stoves instead of improved injera stoves.

Improved Injera Stoves

In regions where improved injera stoves are distributed, people are very familiar with the products and had recognized that the stove would be beneficial for its reduced fuel consumption. Nevertheless, many people did not fully understand how much fuel could be saved and often required a product demonstration to convince them of product performance. Many people who purchased this stove only did so after they had seen the stove in use either in a demonstration or by their neighbors. Additionally, some customers who had seen neighbors' stoves break after short periods of use decided that the product was of low quality and avoided purchase.

When asked in focus groups why they did not have an improved stove many customers stated that they did not consider the stoves to be important or just simply that they had not considered buying one. This may be because the stove is not perceived as valuable and because access to firewood is not critical to the person in the household who is controlling the cash.

This can be further explained by the fact that 71% of people collect wood for free (Central Statistic Agency, 2005), while the main value proposition of injera stoves is that they save fuel and money. Hence for these households, while a fuel-saving stove would save time, there is no financial incentive. This is further exacerbated by the fact that often men make the purchase decision while it is women who collect the wood. Thus, the product benefit is even more detached from the person who makes the purchase decision.

Additionally, injera stoves range from 60 Birr for a Gonzye to up to 170 Birr for a Mirt. Though this may appear expensive, 60% of households earn more than 6,000 Birr per year and 88% of households earn more than 1,800 Birr per year (Shanko & Lakew, 2008). Hence, many customers could afford the stoves if they really wanted them. However, there are circumstances in which some people can legitimately not afford the stoves. For those 12% households earning less than 1,800 Birr per year and even for those customer earning less than 6,000 Birr per year, the purchase of a stove is a considerable expense.

Another, main challenge in getting a customer to purchase an improved injera stove is that the customer is likely already using a three stone fire that can cook injera. Hence, the purchase of an improved stove does not allow them to do anything new; it only allows them to do something better. This can be contrasted with other consumer goods such as mobile phones, whereby a customer with a mobile phone is able to talk to people across the country, while a customer without a phone cannot. Thus the value proposition of a mobile phone is significantly stronger than a stove, because a phone allows you to do something you could otherwise not do; while both a three stone fire and improved injera stove both cook injera.

Improved Wood Cookstoves

Customers across all regions had a limited knowledge of improved wood cookstoves, namely in Tikikil. Some customers in urban areas had heard about them but had not thought about purchasing a stove because it was too expensive or they used charcoal fuel. Hence, there were a very limited number of

people using this stove. It should be noted that this stove has been mainly distributed by NGOs to refugees and impoverished people.

Similar to improved injera stoves, improved wood cooktoves face the issue that customers who can collect wood for free have little reason to buy a stove that saves them fuel and time save from collecting less fuel wood may not be a compelling value proposition. This represents a major challenge and hence marketing and promotion strategies need to focus on customers and regions where wood is bought and is scarce.

Charcoal

Customers are very familiar with charcoal. Focus group results show that it appears to be commonly used, particularly in the peri-urban and urban areas. It was typically preferred because it has no smoke which allows it to be used in living areas for both cooking and heating. Many customers surveyed own charcoal stoves, with the majority having non-improved all-metal charcoal stove.

Improved Charcoal Cookstoves

Similarly to improved injera stoves, the majority of customer had heard about the improved charcoal stove. In peri-urban and rural areas, customers often did not purchase these stoves because they either thought they were too expensive or they were not available in their community. Hence, there were a limited number of customers who purchased these stoves. In contrast, customers in urban areas had greater access to stoves and believed that they could result in fuel savings, leading to more purchases.

Additionally, charcoal stoves differ from injera and wood stoves because most customers already own and buy charcoal stoves even if they use a three stone fire. This is because without a charcoal stove, it is very difficult to cook with charcoal. However, without an injera or improved wood stove, customers can use three stone fires, which are essentially free. Thus, there is likely to be a different behavior and psychology attached to improved charcoal stoves, where customers view purchasing an improved charcoal stove as an upgrade from an existing all-metal charcoal stove. This makes it easier to persuade people to purchase improved charcoal stoves.

Attitudes on Smoke

The majority of people were aware of the negative health impacts of smoke and indoor air pollution and hence preferred to have no smoke. Additionally, some people also stated that they did not like smoke because it stains their metal roofs.

Many of the people who did not like smoke simply accepted that it was an unavoidable part of life, while for others; smoke was a major factor influencing their choice of stove. Hence, often people had a preference for chimneys to remove smoke from the cooking area or for charcoal that produced no smoke.

In contrast, there were a few people who viewed smoke as a beneficial thing, and they believed it helped to waterproof and strengthen the house, reduce the number of mosquitoes, and help nearby crops grow.

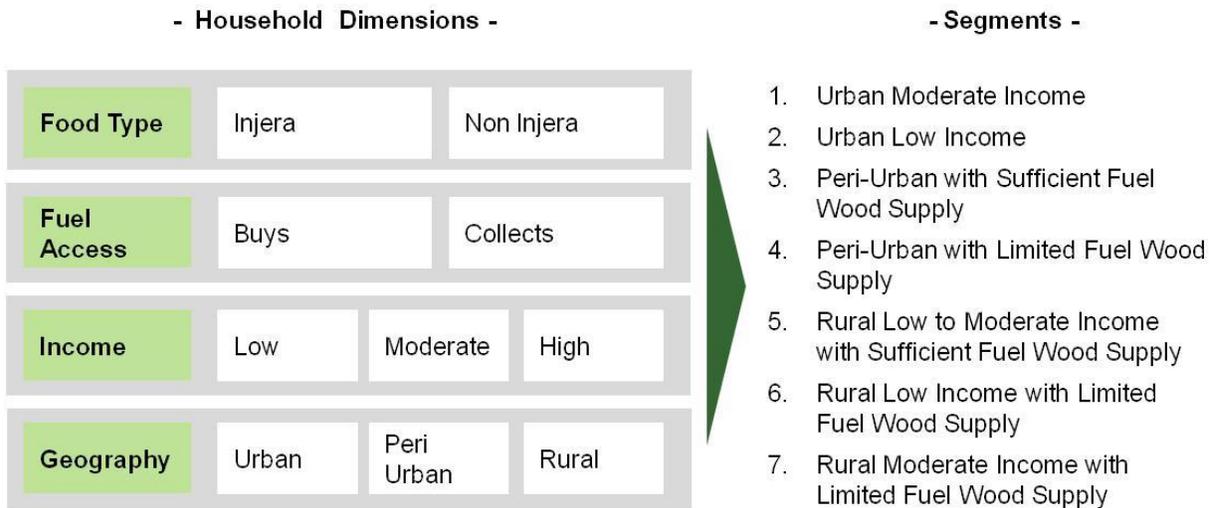
Other Cookstoves

Customers were familiar with a variety of other stove, mainly electric and kerosene. Many customers own kerosene stoves but did not use them frequently due to high fuel costs. Furthermore, many customers did not use electric stoves because the price of electricity was perceived as too expensive and the electricity supply wa unreliable. Those customers that did use electric stoves were typically of a higher economic status.

4.4 Segment Analysis

A variety of customer needs that can be seen from different segment perspectives. This section describes the high-level gaps and challenges that need to be addressed and contains a market segment breakdown and quantitative analysis. Further analysis of each segment could bolster the understanding of the issue, as it relates to income, fuel usage, household size, product penetration and, price elasticity.

The household segments for Ethiopia can be described thusly along several dimensions as shown below.



The segments do not explicitly separate non-injera cooking households, as these households were not observed during focus groups. However, government officials stated that these segments do exist and are not explicitly catered for by any of the existing stoves.

It is difficult to calculation the size of segments due to limited data. However, the table below lists some of the key data points to provide indication of the size.

Dimension	Variable	Size	Notes
Food Type	Injera	– Unknown, but likely significant	<ul style="list-style-type: none"> – No data could be obtained – Focus groups and interview suggest that injera cooking is highly common – However, the prevalence of injera cooking significantly by regions
	Non Injera	– Unknown	
Fuel Access	Collects	<ul style="list-style-type: none"> – Total 82.3% – Wood 70.8% – Crop residue 11.5% 	<ul style="list-style-type: none"> – (Central Statistic Agency, 2005) – Assumes that crop residue is free – Buys % assumes that all other fuels are bought such as electricity, LPG, kerosene
	Buys	<ul style="list-style-type: none"> – Total 17.7% – Wood 10.9% – Charcoal 1.3% – Kerosene 2.4% – Butane 0.5% – Electricity 0.4% – Other 2.1% 	
Income (Household)	Low	– 37% (Less than 6,000 Birr per year)	<ul style="list-style-type: none"> – (Shanko & Lakew, 2008) – Only for Tigray, Oromia, and Amhara Regions
	Moderate	– 51% (6,000 to 24,000 Birr per year)	
	High	– 10% (Greater than 24,000 Birr per year)	
Geography	Urban	– 16.6%	<ul style="list-style-type: none"> – (Central Statistic Agency, 2005) – Data only provide for urban and rural
	Peri Urban	– Unknown	
	Rural	– 84.5%	

4.4.1 Urban Moderate Income

This segment was observed in urban areas of several major regions. These households typically use wood for injera cooking and charcoal for cooking other foods. It was observed through focus groups that this segment was more likely to have Mirt stoves and all-metal charcoal stoves. However, there were households that used three stone fires.

Despite access to electricity, it is not commonly used for cooking because it is very expensive. In fact, fuel wood is cheaper. It would appear that a major factor influencing the stove usage of this segment is ongoing fuel cost. Hence, future enhancements to the electricity supply need to be considered in

cookstove dissemination strategies, as if the price of electricity was to drop, many customers in this segment would likely switch to electric cookstove and electric injera stoves.

The strategy to disseminate Mirt over the last ten years has focused on urban areas; coupled with product lifespan of over five years, this could result in a fairly high concentration of stove penetration in some urban markets. This data could not be obtained; hence, there is no quantitative analysis in this report. It is vital to future strategic work to consider existing penetration of injera stoves for this segment to ensure efforts are being allocated in the appropriate areas.

The main product applicable for this segment would appear to be improved charcoal stoves such as Laketch and Merchayle. Charcoal products are popular as they have less smoke and can be used in the main living area.

4.4.2 Urban Low Income

This segment is characterized by households living in major urban areas such as Addis Ababa, Hawassa or Bahir Dar, especially those who rent apartments from a landlord due to their low incomes. They will typically use a basic metal charcoal stove for cooking and a three stone fire for injera.

Households in this segment are a primary target for improved cookstoves because they typically buy fuel. Improved cookstoves will reduce fuel consumption hence costs. Additionally, because they are in urban areas, they typically have access to all the products.

The main factors preventing adoption of improved injera stoves are the size and cost of the cookstoves. Mirt stoves are very large and not easily transportable, which is a major problem for people that live in small households with no kitchen and who are likely to move because they rent an apartment. Charcoal stoves, on the other hand, are much more appealing due to their small size, transportability, and fuel savings.

4.4.3 Peri-Urban with Sufficient Fuel Wood Supply

This segment is characterized by households in areas with easy access to wood but which still need to buy it at a reasonably low price. They also use charcoal as fuel.

The size of improved injera stoves is a major constraint in adoption as these stoves will not fit into the small households. This is further problematic as some low economic households may even cook outdoors, making large injera stoves impractical. However, for customers with larger homes and separate kitchens, injera stoves are more applicable and marketing messages that focus on both the injera stoves ability to save fuel and protect people from the flame are effective in this segment.

This segment is also quite sensitive to the upfront purchase price, which has resulted in several customers showing a preference for the cheaper Gonzye stove over the Mirt. This segment shows a propensity to buy injera stoves as they can deliver fuel savings, which could be enhanced by improved marketing messages and increasing promotion activities.

Prior to using charcoal for everyday cooking, these households used kerosene but then switched to charcoal once the price of kerosene became too high. Similarly to kerosene, charcoal is preferred as it produces low smoke, can be used indoors, and is easy to use (the stove can be turned on and require constant attention such as adding fuel, like wood stoves). Improved charcoal stoves may be adopted by this segment as they currently use charcoal stoves and are concerned with fuel savings. To achieve this, there will need to be improved distribution of products and improved marketing messages to convince households that purchasing an expensive improved charcoal stove will save money in the long run, despite the upfront price.

4.4.4. Peri-Urban with Limited Fuel Wood Supply

This segment was observed mainly in the Tigray Region and suffered from very high wood fuel prices. This often resulted in some customers using animal dung. This segment was highly adverse to smoke and consequently stated their preference for a chimney or charcoal stove. In several circumstances, customers did not buy charcoal but rather produced it themselves during injera cooking.

The challenges for this segment are that the existing injera stoves offer little value because these customers typically use enclosed stoves that deliver fuel savings and have a chimney. Without product enhancement of Mirt stoves, it is difficult to see how it will be adopted en masse. Additionally, these customers may have already addressed the fuel saving issue by building their own traditional enclosed stoves.

4.4.5. Rural Low to Moderate Income with Sufficient Fuel Wood Supply

This segment was largely observed in the SNNP Region and comprised a vast number of different cultures and cooking habits. This was the only segment for which some people stated their favorable view of smoke. However, this opinion was only expressed by a few people during focus group discussions. In fact, even within small villages, there were mixed opinions on this subject. It would appear that messages about the health impacts of smoke are reaching these communities; however, they are not entirely effective at changing opinions.

The challenge for increasing stove dissemination for this segment comes about because of the variety of customer needs and cooking habits and from diminished value propositions. Mirt and Gonzye stoves are designed largely for injera cooking. However, many households in this segment do not cook injera. While the Gonzye stove can be modified to cook other foods, its primary function is injera baking. Other wood-fueled stoves, such as Tikikil, may be more appropriate given that they can cook a variety of foods. The primary challenge is that Tikikil stoves sell for 170 Birr, far outside the reach of many of these customers. Additionally, apart from reduced smoke, the main selling point of improved stoves is reduced fuel consumption. Because this segment does not need to pay for fuel wood, this message has little effect. The segment is likely to be very common in Ethiopia, with 70.9% of households collecting wood as their primary source (Central Statistic Agency, 2005).

Any strategies to target this segment need to focus on improved product options as well as marketing messages that advertise fire protection, health, easier cooking and smoke reduction. Another main challenge for this segment is that purchases are likely to be male-dominated and given that these messages mainly appeal to women, who do the cooking.

4.4.4 Rural Low Income with Limited Fuel Wood Supply

This segment was observed mainly in the Tigray and Amhara Regions and is characterized by people who rely on agriculture for a living. Many had traditional stoves that resulted in fuel savings when compared to a three stone fire.

The challenges for increasing injera stove dissemination for this segment are the upfront price of stoves and high use of traditional stoves. The upfront price of stoves may be outside the range of many, which prevents them from purchasing such stoves. Additionally, because of the limited access to fuel wood, people have had to innovate by developing traditional enclosed stoves. Many of the people believe that the performance of these traditional stoves is the same as that of improved injera stoves, such as Mirt and Gonzye. Hence, the value proposition of improved stoves is diminished. Barring very low prices and highly effective marketing, it would be difficult to get mass adoption of improved injera stoves for this segment.

For non-injera cooking, this segment was also likely to use clay stoves such as Opegi and used either wood or animal dung as fuel. Thus, for this segment improved wood stoves, such as Tikikil would seem more appropriate. However, the main challenges will be the high upfront price of Tikikil stoves and the fact that it only used wood. In focus group discussions, this segment often stated that they thought stoves should only be 25 to 50 Birr, while the Tikikil stove is 170 Birr, which is out of their price range. Additionally, when wood gets expensive, these rural communities switch to animal dung as a free fuel and the Tikikil stove only uses wood. Hence, the value proposition of the Tikikil stove is diminished.

Achieving further adoption by households in this segment will require focus on cookstoves that can compete with traditional stoves by including features such as a chimney. Additionally, price discounting or subsidies may be required.

4.4.6. Rural Moderate Income with Limited Fuel Wood Supply

This segment is characterized by people who rely on agriculture for a living. Households in this segment use a combination of wood and charcoal for cooking.

The value proposition of existing injera stoves is effective for these segments, as the products offer fuel savings. The challenge for increasing stove dissemination for this segment is addressing the problem of stove affordability. Due to the cyclical nature of agriculture, this segment is more likely to buy stoves during periods of crop harvesting and sales when they have sufficient income. Typically, this is from September to December. Thus it is vital that marketing occurs prior to these periods. Additionally, production and distribution needs to be aligned with this period.

In some regions, some of these people had already developed traditional closed stoves that are effective at smoke reduction and fuel savings. Any promotion strategy must consider which stoves households possess and identify if any improved stoves offer a compelling value proposition.

4.4.7. Institutional

This segment is characterized by large organizations such as schools, universities or restaurants and was not included in focus groups studies; hence this segment was not addressed by this report.

4.5. Market Forecast

There are a variety of scenarios that could emerge in the Ethiopian cookstove and fuels market. It is challenging to present a consolidated view given the variation between regions in terms of fuel usage and market penetration of cookstoves. There are several key scenarios that can be applied. These scenarios are not mutually exclusive but rather represent different situations that could emerge if there is not intervention.

The scenarios are based on observations from field visits and key statements from the Growth and Transformation Plan (GTP) as produced by Ministry of Finance and Economic Development (MoFED).

4.5.5. Scenario 1: Increase in distribution and reliability of electricity

Rationale

This scenario is based on the plan in the GTP “to promote and increase the electric power supply coverage, [from which] the ongoing rural electrification access program will be strengthened.” Furthermore, the GTP states that electricity coverage will increase from 41 to 75% and power generating capacity will increase from 2,000 to 8,000 mw (MoFED, 2010).

Outcomes

At present, electricity is not commonly used to cook food and is most likely to be used in moderate- to high-income households in urban areas, which make up a small percentage of the population. However, the electricity network in Ethiopia continues to develop which could result in greater access to electricity and lower prices, leading in turn to an increase in the popularity of electric stoves. However, sufficient improvements are not foreseeable in the short term.

Additionally, as the Ethiopian economy further industrializes, much of the electricity produced will likely be consumed by businesses. This will curb the reduction in household electricity prices and limit the shift towards electric stoves.

The GTP does not limit to electrification to urban areas, in fact it is encouraging electrification in rural areas as a key component of rural transformation and industrialization. (MoFED, 2010) However, the GTP also targets to increase the number of customers with access to electricity from 2 to 4M, (MoFED, 2010) which still leaves a significant proportion of the country without electricity. Hence, there is unlikely to be a dramatic increase in the use of electric cookstoves in the near future, with wood continuing to be the primary fuel for cooking cross the country.

4.4.7. Scenario 2: Continued use of charcoal

Rationale

Based on focus groups studies, many people have switched from kerosene to charcoal for daily cooking. This is because kerosene prices have increased due to the removal of subsidies (Miranda, 2011). This scenario considers this observation and looks at how charcoal stoves will be used.

Outcomes

Currently there is an observed preference for charcoal in many urban and peri-urban areas due to the absence of smoke. Current statistics state that the consumption of charcoal as a primary fuel source is very low at 1.3% (Central Statistic Agency, 2005). However, since this statistic was calculated, the subsidy on kerosene has been removed.

However, focus groups discussions indicated that charcoal use was more common than indicated by the figure, which can be attributed to either a restricted sample size or the fact that charcoal is more typically a secondary fuel. Many customers said that they used charcoal as well as wood; hence, the statistics may not consider secondary fuel source. Furthermore, in some regions many customers used wood but produced their own charcoal when cooking injera, which may have not been considered in the study.

If this higher-than-expected charcoal use is accepted and there continues to be a strong preference for charcoal, it is likely the charcoal stoves could have a bigger role in the Ethiopian market. However, assuming the current baseline continues, there will still be constraints that prevent mass dissemination of charcoal stoves, such as the lack of charcoal briquette production and the lack of broad-scale distribution.

Charcoal briquettes have proved popular in Addis Ababa and have penetrated other major urban centres but are yet to be broadly distributed. There are currently only a few charcoal briquette producers and set-up costs are high. Hence, it is unlikely that there will be an increase in supply of briquettes without intervention. As more Merchayle stoves are sold, there will be increased demand for briquettes resulting in an increase in price. A key value proposition of this stove is the reduced fuel cost; hence any increase in briquette prices will likely result in a stabilisation of demand for stoves. Additionally, because the Merchayle stove relies on briquettes to optimise performance and minimise fuel consumption, the lack of briquettes being produced in other urban areas will prevent mass adoption.

Laketch, the other charcoal stove, does not rely on briquettes and uses normal charcoal pieces; hence it will become more popular across a greater geography and will likely have an increase in sales. However, rural and peri-urban areas have lower population densities which restricts the profitability of distributors and hence discourages them from working in these areas. Additionally, because the Laketch stove is no longer supported by the government there is unlikely to be investment in marketing and distribution, thus confining adoption to urban areas.

4.4.8. Scenario 3: Cement prices decrease

Rationale

This scenario is based on the GTP plan to provide specific support to the cement industry with a target of increasing total cement production capacity from 2.7 to 27 million tons per year, in 2015 (MoFED, 2010).

Outcomes

Should the supply of cement increase as per the GTP, cement prices will likely come down. While demand for cement from other industries will likely take up the majority of increased production, there should be additional materials available for stoves.

Currently, producers of Mirt injera stoves are suffering from a lack of demand largely due to the price, which is the result of cement prices. Other factors impact demand, such as product appropriateness and geographic distribution. In some regions, the Gonzye stove has become more popular than the Mirt because it is cheaper. However, this was limited to rural and peri-urban areas. The Gonzye stove is typically not sold in rural areas, and some customers in urban areas have stated an objection to clay stove.

In order to increase demand for the Mirt, the government may help with distribution, aid with marketing and promotions, or subsidise raw material costs. All of these measures would increase demand. However, a reduction in raw materials prices due to an increase in cement production would result in reduced production costs and allow producers to reduce prices.

It remains to be seen exactly what shall occur with respect to the final sale price. Often in such cases a ratchet effect can occur, whereby prices are quick to increase but slow to decrease. This often occurs because producers are not sure that cement price reductions will last or want to increase profits from increased margins. Additionally, if the government decides to intervene and assist in generating demand through distribution or marketing, producers may have sufficient demand to warrant keeping high prices.

The timing between cement price reduction and government intervention may have a significant impact on the final sale price. If cement prices fall before the increased government support, then it is more likely that producers will reduce sale prices to increase demand. However, if government support is sufficient to increase demand before cement prices fall, then producers may choose to keep prices high in order to maximise profits. Ultimately, the cement price needs to be managed and monitored by government official to ensure that intervention strategies are appropriately timed.

4.4.9. Scenario 4: Improved infrastructure

Rationale

This scenario is based on the GTP plan that emphasizes building infrastructure in Ethiopia, namely road construction, with a goal of reducing the proportion of areas further from 5km of all weather roads from 64% to 29% and increasing road density from 0.64 to 1.54 km/1000 people (MoFED, 2010).

Outcomes

There have been different supply chain models ranging from highly decentralised production, as for Mirt, to centralised production with distribution channels, as for Laketch and Merchayle. The choice of these supply chain models is largely due to product weight, customer demand and available infrastructure. Product weight and customer demand are assumed to be unchanged in this scenario. However, improved infrastructure in roads should reduce the time to transport materials between producers and customers, hence reducing costs, and an increase in the number of roads should increase the number of customers that can be reached, hence increasing market demand. Both of these factors lean towards supporting a supply chain with more centralised production and decentralised distribution, which would result in more specialised distributors and retailers.

Nevertheless, while customer demand does not change, there is unlikely to be a significant increase in distributors and retailers, as new Woredes would not be profitable due to lack of demand. However, if customer demand increased through improved marketing, promotions or price reduction, then it would be likely that private distributors and retailers would set up businesses.

Ultimately, when new geographic markets are being supported by the government, consideration should be given to the likelihood of improved infrastructure, as this could result in different supply change models being suitable. If there are no roads in a particular region, a small-scale decentralised approach may be best. However, if roads will improve, then a centralised production strategy with distributors may be more appropriate.

5. Strategy Analysis

This section contains illustrative interventions that could be designed to develop both a sustainable market based solution and support the achievement of 9.4M cookstoves target in five years. Each intervention is comprised of several possible initiatives, which could be executed during the program delivery period.

Principles

The concept of supporting a market based solution is based on the following principles:

- Enable the market environment to encourage private businesses to enter the market,
- Define the ‘rules of the game’ by developing policy and standards to ensure that business incentives align to social objectives,
- Build support functions or market enablers to reduce the barriers to entry for broader stove adoption,
- Develop the capacity and capabilities of market participants, both public and private, to improve co-ordination,
- For governments and development agencies, intervention is seen as a temporary role, except where they are playing longer-term roles within the market system in terms of regulation and policy setting, and
- Start from the customer by understanding their needs, wants and behaviors and use this to inform and guide decisions.

These principles have been used to guide strategies and initiatives.

Strategic Themes

In summary there are four strategic improvement areas,

- **Structure:** Connect key participants across multiple organizations to enhance collaboration, and adjust structures within those organizations to align to support market functions.
- **People:** Enhance training and development to give government, private businesses and NGOs the skills they need to develop strategies and execute activities.
- **Process:** Focus on developing all aspects of the supply chain with more integration and co-ordination between governments, private businesses and customers.
- **Technology:** Introduce new stoves that better meet customer needs and use IT to better control and manage the market.

Prioritization

There are many initiatives recommended and whilst all would be beneficial there are different priorities attached to each. These are based the importance an initiative plays in developing a market based solution. Priorities have been set as follows:

- **Foundation Initiatives** set up the program and government for success. Without these initiatives improvements in the market are very unlikely to occur.
- **Core Initiatives** are important to set up and enable a market based solution and allow the sector to move forward rapidly and successfully. Without these initiatives there would some progress but many of the issues would remain and growth would be significantly slowed.
- **Expansion Initiatives** are those that would accelerate market growth and development in novel ways and could be piloted to test their feasibility. Without these initiatives a market solution would be developed, although the growth of the market would be slowed.

5.4. Recommended Policies and Intervention Options

5.4.7. Develop a Coordination Mechanisms

Coordination is required at all levels to bring about increased cooperation such that the skills and capabilities of all parties are effectively used. Participating organizations would need to include multiple ministry offices, Civil Society Organizations (CSOs) and bilateral organizations.

ID	Initiative	Description and Rationale	Priority
In_01	Develop a national coordination mechanism	<ul style="list-style-type: none"> - This is required to provide a platform for various stakeholders to collaborate and coordinate activities. - This would enable greater information sharing and leverage the skills and resources of each organization. - See Appendix 11.6 - Suggested Coordination Forums, for suggested format and attendees. 	Foundation

In_02	Update program guiding principles	<ul style="list-style-type: none"> - Utilizes the coordination mechanism to update the existing guiding principles such that they can be agreed by all stakeholders. - These are required to make it explicitly clear what the program is trying to achieve and will ensure that future decisions are aligned to objectives. - Additionally, it is vital to have a clear understanding of priorities such that tradeoffs can be made. 	Foundation
In_03	Develop regional coordination mechanisms	<ul style="list-style-type: none"> - This is required to provide a platform for various stakeholders to collaborate and coordinate activities. - A framework should be developed in consultation with stakeholders. However, regions should have the flexibility to adapt it as required. - See Appendix 11.6 - Suggested Coordination Forums, for suggested format and attendees. 	Foundation
In_04	Develop zonal coordination mechanisms	<ul style="list-style-type: none"> - Individual regions are to develop a framework for coordination which is then used by zonal administrations. - Zones will be largely responsible for ensuring that woredas set up coordination mechanisms and that they are working effective. - See Appendix 11.6 - Suggested Coordination Forums, for suggested format and attendees. 	Foundation
In_05	Develop a woreda coordination mechanisms	<ul style="list-style-type: none"> - Individual regions are to develop a framework for coordination which is then used by woreda Administrations. - There will need to be customization of each coordination mechanism due to the different participants and needs of each woreda. - See Appendix 11.6 - Suggested Coordination Forums, for suggested format and attendees. 	Foundation

In_06	Develop woreda operating models	<ul style="list-style-type: none"> - This model should lists the roles, responsibilities and relationships of all participants to ensure that is clarity on who performs what tasks. - Woreda administrations are to be provided a template to ensure consistency and completeness. - See Appendix 11.5 - Woreda Operating Model, for suggested format and attendees. 	Foundation
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5.4.8. Use a Program Management Approach for Implementation

The decision to embark on a major program of such scale brings about complexity and challenges, which requires a strategic implementation that uses a program management approach. Doing this is highly critical as it sets the foundation for the overall program and provides a starting point for all other initiatives. This approach ensures that there is dedicated team to delivering the program and allows other staff to focus on their day to day activities.

ID	Initiative	Description and Rationale	Priority
In_07	Introduce a program management office (PMO)	<ul style="list-style-type: none"> - The PMO is responsible for managing the operational activities of the program, including costs, performance, scope, and timelines. - Specific details of PMO responsibilities can be found in the Section 7 - Implementation Strategy. - The PMO could be comprised of multiple stakeholders across, private sector, NGOs, governments, the UN, and bilateral organizations to co-ordinate across partners, leverage respective capabilities and align their programs 	Foundation
In_08	Cluster initiatives into projects of work	<ul style="list-style-type: none"> - Initiatives should be grouped into logical components which enables easy delivery. - A project lead will be responsible for delivering a project and gives stakeholders a key point of contact. - Specific details of the projects can be found in the Section 7 - Implementation Strategy. 	Foundation

In_09	Implement changes based on geographic phases	<ul style="list-style-type: none"> - To manage complexity and ensure that a high quality, it is recommended that implementation is done by phasing different regions and woredas. - Thus one region would be the first to implement a new organization structure and a few woredas would be the first to execute new operating model. - This reduces the complexity and ensures that there is adequate support available during periods of change. - The phasing of regions and woredas should be decided in coordination forums. (In_01) 	Foundation
In_10	Run pilot program to test and validate new concepts	<ul style="list-style-type: none"> - There are multiple initiatives and ideas being proposed which need to be tested to ensure that they are appropriate, which involves piloting multiple initiatives in different woredas. - The results can either be used to improve the initiatives or abandon them if they are deemed unsuccessful. - Ultimately, the most successful pilot programs should be encouraged and promoted by sharing lessons learned in coordination mechanisms. 	Core

5.4.9. Set up and Evaluate Carbon Financing

Carbon financing is recommended as it has the potential to generate revenue which can be reinvested into the market or given back to local communities to subsidise the cost of stove purchases. The main challenge for implementing carbon financing will be the large number of producers and diversity of product quality. This makes it very challenging to assess feasibility at this stage and also prevents revenue calculation.

The critically of the carbon financing to the cookstove market is mixed, as market has disseminated many stove without the assistance of carbon financing and if it was commenced immediately, revenues will not be generated for approximately two years. It is also unlikely that all stoves will be eligible for carbon financing due to the strict performance criteria. Thus carbon financing would only be applicable to a small number of the stoves in the 9.4M target.

Carbon financing should be further investigated, but considered as an additional financing option to accelerate market growth. Thus, budgets should not factor in carbon revenues until later in the program.

It is recommended that charcoal stoves, charcoal briquette production and improved clay kilns are the primary targets for carbon financing as they are popular technologies that result in decreased emissions. The Gold Standard Methodology should be used because there is more than one opportunity to earn carbon credits, some of which are not directly related to stoves.

Additionally, injera stoves (both Mirt and Gonzye) result in large fuel savings and hence decrease emissions. However, because of the current manufacturing strategy, variable product quality and modifications made by users, it is difficult at this stage to see how injera stoves could be candidates for carbon financing. There is a large number of Mirt and Gonzye stove producers who are typically typically small scale, decentralized, local producers. This presents a challenge for carbon financing as in order to ensure quality, hundreds of producers would need to be certified and recertified each year. This places an extremely large burden on carbon financing program as it require many site visits and product tests, which is costly and time consuming. It is unknown the exact details, but these costs could make carbon financing far less financial attractive and also distract from executing other tasks that help increase stoves use.

Furthermore, because of the large number of producers it is difficult to ensure that stoves are being made to sufficient standards to guarantee fuel savings and ensure stoves do not break. Carbon financing programs tend to be more aligned to large scale production where it is easier to ensure that a producer is making quality products.

Additionally, during field visits many of the customers had modified their injera stoves or were not using them correctly. This is concerning, as a carbon finance program will periodically visit a samples of customers to understand how they are using stoves and what the emissions reductions are. If the stoves are not being used as intended it creates doubts in validity of emissions reductions.

All these factors make it difficult to recommend carbon financing for injera stoves at this point in time. However, if improvements in production quality and producer certification are achieved, along with the changes to manufacturing and information systems, it could be possible for injera stoves to be candidates for carbon financing. Given the complexity of carbon financing it is necessary that an expert completes a more detailed assessment to validate the suitability of injera stoves.

It is expensive to set up carbon financing due to the amount of analysis and planning required. Hence, it is recommended that several of the new funding models are explored during the initial planning stages to help alleviate the initial upfront cost. Typically, this involves a model where the upfront costs are partially funded by an investment bank and partially funded by the government. The investment bank is the final buyer of the carbon credits, and will receive a discount on the carbon price they pay as compensation for contributing some of the upfront costs.

Given the complexity and technical nature of carbon financing it is recommended that carbon financing is pursued with the assistance of a specialized project operator who can complete a detailed evaluation.

ID	Initiative	Description and Rationale	Priority
In_11	Hold carbon financing workshop	<ul style="list-style-type: none"> - In conjunction with partners who have experience in carbon financing, such as GIZ, SNV and Agriculture Office, hold a carbon financing workshop to understand experiences and allocate roles and responsibilities. - This could include international carbon project operators that can help provide input on technical topics. - Additionally, the existing program run by the Agriculture Office, WFP and KFW should be included as a key starting point and leveraged where possible. 	Expansion
In_12	Establish link with the current Designated National Authority (DNA)	<ul style="list-style-type: none"> - A Designated National Authority (DNA) determines whether the project submitted contributes to the countries sustainable development, and if so, it issues a Letter of Approval (LoA). - Currently, it is understood that Environment Protection Authority (EPA) performs this role. However, it is not known how far they have progressed and their level of expertise. - The Energy Office needs to work closely with this organization in developing a plan. 	Expansion
In_13	Select a carbon finance project operator	<ul style="list-style-type: none"> - A specialized carbon operator can assist with the detailed planning required in a carbon finance program. - This partner will be crucial to the success of the program and should be selected in conjunction with organizations that have experience in carbon financing. 	Expansion
In_14	Complete detailed carbon finance analysis and plan	<ul style="list-style-type: none"> - In conjunction with the project operator complete a detailed plan that covers, the type of stoves, target customers, and baselines that need to be analyzed. - This is a key checkpoint to verify that carbon financing is possible and should be ratified with stakeholders. 	Expansion

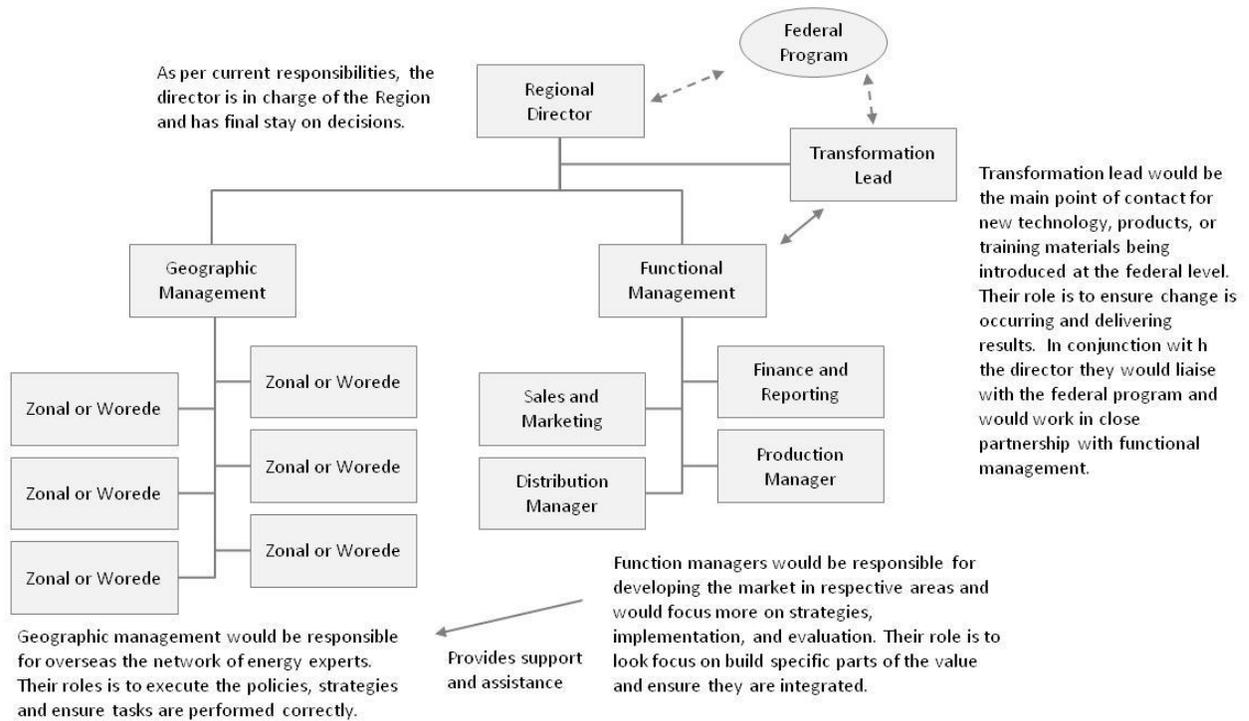
In_15	Compete baseline analysis and set up carbon asset	<ul style="list-style-type: none"> - If the decision to pursue carbon financing is verified, then detailed baseline analysis is required. This looks at the current emissions and behaviors of the target customers. - This should be done in conjunction with the project operator and should also serve as another checkpoint to verify feasible. 	Expansion
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5.4.10. Modify the Government Approach to be More Aligned to Market Activities

There has been much emphasis on training and managing producers, but minimal consideration of how producers fit into the overall market. Hence, several parts of the supply/value chain are underdeveloped. Ideally, the market would perform these functions itself, but in many cases it does not. Hence there needs to be support from the governments to encourage private businesses to enter the market, or in the interim, the government needs to fill the gap and perform these functions itself.

Because the government is involved in market functions either by performing or supporting them, there needs to be an increased focus from the government on structuring itself and behaving more like a business. This largely involves ensuring that it makes people are responsible and accountable for key parts of the supply/value chain. Changing the government structure to be more like a business ensures that there is greater focus on enabling and building a holistic market solution.

Figure 1: Regional Organization Structure



ID	Initiative	Description and Rationale	Priority
In_16	Introduce product managers at a national level	<ul style="list-style-type: none"> – These people are to be responsible for managing and coordinating all the functions that relate to a particular product including marketing, sales, reporting, and R&D. – Product managers are accountable for meeting sales targets, setting strategies and evaluating performance. – Product managers could be sourced from multiple organizations and stakeholders as needed. 	Core

In_17	Strengthen the R&D department at a national level	<ul style="list-style-type: none"> - It should be noted that R&D activities are already occurring at a national level. - This should be continued as emphasized as a way of improving cookstove technology. - This department should look at developing new technologies within Ethiopia or even obtaining it from overseas. - The R&D department needs to work closely with product managers to ensure that their work is aligned to what is required in the market place. 	Core
In_18	Introduce a functional manager at each regional level responsible for sales/marketing	<ul style="list-style-type: none"> - This ensures that there is a person focused on developing the sales and marketing capacity and capabilities of the market. - This person would be responsible for developing the marketing messages as well as ensuring that promotions and demonstrations are done in the most critical areas. - It should be noted that some regions have already implemented this. 	Foundation
In_19	Introduce a functional manager at each regional level responsible for distribution	<ul style="list-style-type: none"> - This ensures that there is a person focused on developing the distribution capacity and capabilities of the market. - This person would be responsible for ensuring ensure that products are being distributed from producers to local retailers or communities, by either supporting private distributors by organizing local energy experts. - They need to ensure the products are distributed to areas where there is customer demand and would need to work closely with the marketing manager to ensure that there is alignment of distribution and marketing strategies in each woreda. 	Foundation

In_20	Introduce a functional manager at each regional level for production	<ul style="list-style-type: none"> - This would ensure that there is a person focused on developing the production capacity and capability of the market. - This person would ensure that there are enough producers in the right areas and be responsible for ensuring quality. - They would need to ensure that standards are being adhered to and managed the producer evaluation process. - Additionally, this person would be expected to be the technical expert and understand the science and engineering of stove design and performance. 	Foundation
In_21	Introduce a functional manager at each regional level responsible for finance and reporting	<ul style="list-style-type: none"> - This would ensure that there is a person focused on developing the finance and reporting capabilities of the market. - This person would ensure that budget is being allocated to prioritized initiatives as per guiding principles and regional strategies. - They would also work very closely with MFIs to help managed the funding of all aspects the supply chain. - Should carbon finance be used in a region, this person would be responsible for liaising with implementer and ensuring a rigorous monitoring and evaluation process. 	Foundation

In_22	Introduce a person responsible for transformation and program activities in each region	<ul style="list-style-type: none"> - A dedicated person is required at a regional level to manage the knowledge transfer and communication between national and regional offices. - This person will ensure that new roles are introduced and training has been conducted. They would also help to provide input into region specific strategies and can be considered a program representative in the regional office. - Additionally, the person would be responsible for setting up coordination mechanism at a regional level. - In some cases this role could be filled by the regional director or by other functional managers. However, during periods of significant change it is advised that there is a person dedicated for this role. Once changes have been introduced to a region, this role will cease to exist. 	Foundation
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5.4.11. Introduce an Information Technology Based Reporting Tool

Accurate and reliable information is critical in monitoring and evaluating marketing performance. The first step is improved reporting templates. However, ultimately an IT system is needed to manage such large volumes of information. Additionally, the introduction of the IT system would be critical in enabling carbon financing, which requires a robust reporting capability.

There needs to be careful consideration in the implementation of any IT system to ensure that all users have the sufficient skills and technologies to effectively use it. For example, there is little point having a sophisticated IT system if the workers do not have computers/smart phones or if a reliable internet connection is not available in the areas.

ID	Initiative	Description and Rationale	Priority
In_23	Develop an online IT system and reporting tool	<ul style="list-style-type: none"> - The current reporting process is paper based and highly manual which creates inefficiencies and limits the richness and timeliness of data. - Developing an online IT system would improve data capture related to sales, producers and customers. It would make it easier to analysis the market behavior and develop strategies. - The success of this initiative is reliant on having computers/smartphones and connectivity available at Woreda level (In_30). 	Expansion

5.5. Approach to Remove Sectors Barriers

5.5.7. Modify Microfinance Policy

Microfinance is a critical market enabler that is used by private organizations to fund growth. The current microfinance environment is quite strong and has been effective in enabling production capacity. As the market grows across the supply chain, with the development more distributor and retailers, there will need to be additional finance available to fund growth. It should be noted that these changes should be done in collaboration with MFIs who are responsible managing the lending process.

ID	Initiative	Description and Rationale	Priority
In_24	Allow distributor and retailers to access the cookstoves revolving fund	<ul style="list-style-type: none"> - Modifying the procedures used by MFIs at a woreda level to allow cookstove distributors or retailers to access microfinance will help fund growth across the supply chain. - Additionally, existing producers that want to expand into distribution and retailing should be able to access to these funds. 	Core

In_25	Increase the maximum loan amount for existing businesses	<ul style="list-style-type: none"> - This would allow existing, successful producers or distributors to make more significant investments in technology to expand and grow. - Only existing businesses should have access to larger loans, as they have shown that they can run successful businesses and will be able to pay it back. - Additionally, producers should have access to addition capital when they can prove they have a guaranteed order, as occurs in the case for Tikikil stoves and NGO order. 	Core
In_26	Increase allocated budget for revolving fund	<ul style="list-style-type: none"> - In conjunction with MFIs, evaluate if the allocated revolving fund is sufficient to support the growth across the market place and then increase it if required. 	Core

5.5.8. Develop an Innovation Feedback Loop

Developing a feedback loop is critical in a market based solution as it ensures that people with the power to make decisions have enough information to understand what is needed in the market. This results in product innovation, more effective strategies, and improved evaluations.

A highly sophisticated feedback loop involves qualitative and quantitative information. The IT reporting tool (5.4.11 - Introduce an Information Technology Based Reporting Tool) largely takes care of quantitative information, hence the following initiatives focus on how to acquire qualitative information through improved processes and better customer engagements.

ID	Initiative	Description and Rationale	Priority
In_27	Develop a standard market research process	<ul style="list-style-type: none"> - Periodically a market research process should be performed that runs focus groups with customers and discusses issues with producers and distributors. - There should be toolkit developed that has sample questions and templates to guide the process. - This is to be done in conjunction with local woreda energy experts and should be used as a method of obtaining new ideas and evaluating the success of current products and interventions. - This should be conjunction with product management (In_12) and other functional managers. - This could be performed by people with the necessary skills such as consultants or research firms. 	Core
In_28	Include users in the product design process	<ul style="list-style-type: none"> - During the product development process customers, namely women, need to provide input and feedback from on designs and prototypes. - This should be done before any new product is released and should be done in conjunction with R&D (In_13) and product management (In_12). 	Core
In_29	Introduce a rewards program and recognition program	<ul style="list-style-type: none"> - This encourages ideas to flow up the hierarchy by offering financial bonuses or recognition incentives to energy experts who find innovations and share it with government officials. - This could also be offered to producers, distributors or retailers who innovate and perform above standards. Recognitions could be financial but could also be intrinsic such as 'producer of the year'. The exact rewards should be finalized by regional government officers. 	Expansion

5.5.9. Increase the Resources of Woreda Energy experts

Many of the initiatives recommended rely heavily on government energy experts either supporting private businesses or performing market functions. Hence, energy experts are a critical enabler of a market based solutions and require additional budget and resources to ensure that they can perform all their required duties.

ID	Initiative	Description and Rationale	Priority
In_30	Provide woreda energy experts with computers or smartphones	<ul style="list-style-type: none"> - Introducing computers would make it easier for information sharing between woredas, zones and regions. - This would allow training and toolkits to be more easily distributed to the frontline and for reports and performance data to be quickly pushed up the hierarchy. - The use of technology and internet access would also be critical for an improve M&E system and for carbon finance. - Computers could be shared between different government offices to ensure that their value is maximized. 	Expansion
In_31	Increase the budget of woreda energy experts	<ul style="list-style-type: none"> - Increasing the budgets of woreda energy experts would enable them to provide additional support to the market, by training private organizations, filling gaps, and running promotions. - Additionally, energy experts are expected to organize a collaboration forum (In_05) which will required additional budget. - It is very challenging to calculate the proposed budget increase at this stage. However, it should be calculated by performing a bottom analysis that estimates of all the tasks that need to be performed. 	Core

5.5.10. Increase the Skills of Government Staff

Government staff, namely the Energy Office, will be responsible for executing many initiatives and it is critical they have the skills to succeed. The existing technical and production training should continue, but be complemented with business training that focuses on the end-to-end value chain. This will ensure that energy experts understand what is meant by ‘building a cookstove market’, as opposed to just understanding ‘how to build a cookstove’. Training should involve staff, but with particular emphasis on

woreda energy experts and people responsible for functional roles such as marketing or distribution. In addition to training it critical to ensure that there are sufficient tools and materials available such that staff can effectively perform their duties once the training has finish.

ID	Initiative	Description and Rationale	Priority
In_32	Include business topics in introductory and ongoing training sessions	<ul style="list-style-type: none"> - Existing materials and syllabuses should be modified to include business topics, focusing on sales, marketing, promotion, distribution, and financing. - Training should be across all levels of government including regional, zonal and woreda. 	Core
In_33	Develop training toolkit	<ul style="list-style-type: none"> - The toolkit is designed to be used by woreda energy experts after they have completed training, such that they have materials for future reference. - Content is to includes sample marketing strategies, market assessment methods and decision trees. These tools will allow energy experts to complete basic business strategies to help develop the market. - The toolkit could either be electronic or paper based depending on the technology available to woreda energy experts. - Additionally, this toolkit could be shared with other offices if they are involved in support market activities (eg, MFIs, Agriculture office, Environmental protection, health office, NGOs). 	Core
In_34	Modify recruitment policy to hire people with business, economics, or market development skills or outsourcing functions to specialist organizations	<ul style="list-style-type: none"> - There is lack of staff with business skills in some government offices. - Modifying the recruitment policy to hire people with non technical backgrounds would be beneficial in getting a broader spectrum of people, which is important to enable several other initiatives (In_14,15,16,17). 	Foundation

In_35	Training the trainers to help shared knowledge	<ul style="list-style-type: none"> - It is critical to develop a network trained people such that skills and knowledge propagate through the government and across the sector. - In the initial phases of the program, the skills and knowledge will mainly reside with a few people such as functional or transformation managers. - This knowledge needs to be shared from the top down to key local energy experts. - The government already has a process that trains the trainers for technical and production skills; hence this should be leveraged for this initiative. 	Core
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5.5.11. Co-Develop Fuel Supply Chains

As fuel technology advances the mutual dependency of supply chains needs to be considered in order to get customers to adopt technology. Centralized planning and coordination is critical to achieving this, as it can ensure that participants are focused on a particular region.

ID	Initiative	Description and Rationale	Priority
In_36	Target specific areas for charcoal briquettes development	<ul style="list-style-type: none"> - Developing charcoal briquette production in specific areas will warrant Merchayle Distributors and Producers setting up operations in that area. - This required collaboration and communication between briquette producers, distributors and retailers which could be organized by Product Managers (In_12). - Suggested targeted areas are Hawassa or Bahir Dar, but this should be confirmed during implementation planning. 	Expansion
In_37	Target specific areas for ethanol development	<ul style="list-style-type: none"> - In conjunction with the Gaia Association target priority regions for Ethanol development. - Organization such as Gaia may have already completed such analysis and planning. Such topics should be discussed in the coordination mechanism. 	Expansion

5.6. Approach to Deliver Business Support

5.6.7. Build the Strength of Existing Producers

It is critical that organizations support existing producers by ensuring that they are able to sell a sufficient number of products to keep them producing. A lot of effort and time has been spent training existing producers and if they were lost there it would be costly to rebuild the existing capacity.

Many of the issues facing producers are not technical but rather stem from a lack of integration in to the overall cookstoves market. There is no one right answer to support producers, but rather there needs to be a general focus on developing producers’ business skills and helping them work in a market based solution.

ID	Initiative	Rationale	Priority
In_38	Limit the training of new Mirt producers.	<ul style="list-style-type: none"> - The lack of demand for Mirt stoves has left producers producing below. Hence, until demand increases it advisable to focus efforts on supporting the existing producers through improved marketing and distribution. - Once demand has increased new producers could be trained, but only if there is significant demand to warrant an increase in production capacity. 	Core
In_39	Revise Mirt producer selection criteria	<ul style="list-style-type: none"> - Improving the selection criteria would help to ensure that there is better retention of producers. - Whilst, training people with no technical or business background does help to support job growth, it also increases the risk that producers may fail. - The selection criteria should be modified to present a balanced view that ensures the best candidates are being selected and there is a high chance of their success. - Details of the suggested questions can be found in Appendix 11.8- Suggested Questions for Selecting New Producers. 	Core

In_40	Modify training materials to include business skills	<ul style="list-style-type: none"> - Training materials need to focus on technical and business skills to teach producers how to work in the holistic cookstoves market. - Content should include information on production management, distribution, sales, marketing and finance. 	Core
In_41	Provide interim support for selected producers to distribute products	<ul style="list-style-type: none"> - As an interim measure when private distributors do not exist, woreda energy experts could become distributors and link, retailers with producers, or customers with producers. - When this occurs additional budget should be allocated to these experts. - This should be done in collaboration with development agents, and health extension workers. - This initiative has been successful at increasing producer production volumes in parts of the Tigray Region. 	Expansion

5.6.8. Support the Development of Distributors and Retailers

The next big phase of market growth should come from distributors and retailers. It is important that the existing merchants are incentivized and encouraged to distribute improved cookstoves as well as piloting new innovative concepts. Woreda energy experts are vital in piloting new distribution models as these people may need to provide some assistance in the early stages to get the pilot up and running.

ID	Initiative	Rationale	Priority
In_42	Encourage existing Mirt producers to become retailers for improved charcoal stoves, charcoal briquettes and Tikikil stoves	<ul style="list-style-type: none"> - There is an extensive network of Mirt producers that could be used as retailers of other stove models in peri-urban areas, which would increase the geographic supply of products. - These producers typically have knowledge of the local stove market and have space to store inventory. - Local woreda energy experts would need to inform Mirt producers and would need to work with the regional distribution manager to set up the supply chain. - This concept should be piloted and only be considered when there is sufficient demand to justify distributing the stoves in the woreda. Hence, this initiative needs to be aligned to marketing activities in the woreda to ensure demand. 	Expansion
In_43	Encourage distributors and retailers to access microfinance	<ul style="list-style-type: none"> - Regional distribution managers (In_15) should contact existing merchants or producers and enable them use microfinance to fund distribution of cookstoves (In_24). - This is to be done in coordination with woreda energy experts and other government offices. 	Core
In_44	Selectively give new distributors and retailers product samples or products on credit	<ul style="list-style-type: none"> - Regional distribution managers (In_15) should consider giving product samples to new distributors or merchants as a means of getting them started and interested in improved cookstoves. - Another approach is to give distributors a few products on credit and request payment once the entire batch is sold. - These initiatives encourage distributors to start supporting products and if they prove popular then can purchase more from producers. - This could also be used for encourage Mirt producers to become distributors (In_42). 	Expansion

5.7. Strategies to Enhance Customer Demand

5.7.7. Facilitate Flexible Payment Terms for Customers

Facilitating flexibility payment terms is critical in ensuring that customers can purchase stoves. Whilst, this is often done in some regions, it is not widespread making it difficult for customers of lower economic status to purchase products.

ID	Initiative	Description and Rationale	Priority
In_45	Encourage retailers to offer pay-by-installments to customers	<ul style="list-style-type: none"> - Woreda energy experts should communicate the benefits of pay-by-installments to retailers and producers. - Additionally, training materials should include details of different payment methods and how they should be offered to customers. 	Expansion
In_46	Government officials to act as mointor the payments terms to ensure customers pay, when using pay-by-installments	<ul style="list-style-type: none"> - Woreda energy experts,local kebele administrations, or another government office if more appropriate, should act as enforcing agents to ensure that customers fulfill the payment agreement. - Hence, when a customer does not keep up to date with payments, the government should intervene and discuss the issues with the customer. - This is to be made clear to customers when they are purchasing a stove so they are aware that the contract will be enforced by a third party. 	Expansion

5.7.8. Change Marketing Messages to Focus on Product Benefits for Customers

The current marketing messages focus on product awareness rather than communicating the product benefits, which is limiting the effectiveness of promotions. Future marketing strategies should consider the customer’s perspective and communicate how a product addresses their needs and improves their life. It is vital to have consistent marketing messages such that if a customer sees an ad on TV, a poster in the street or talks to someone at product demonstration, the same product value proposition is being communicated. This ensures that marketing messages ‘get inside the customer’s head’ and hence increases the likelihood that they will purchase a stove.

ID	Initiative	Description and Rationale	Priority
In_47	Align all marketing messages to focus on the customer value proposition	<ul style="list-style-type: none"> - There needs to be consistent and clear message that focus on product benefits and articulate why a customer should buy and correctly us an improved cookstove. - The key messages should be developed by people with experience in marketing and should be included in all training materials, toolkits, and promotions (eg, TV and Radio). - All stakeholders that engage in marketing should use the same clear, agreed messages to ensure consistency. 	Expansion
In_48	Modify brochures and posters to contain better selling information	<ul style="list-style-type: none"> - Posters need to be updated to better communicate the value proposition of cookstoves and to give customers enough information to purchase a stove. - A recommended retail price (RRP) could be included or space left for producers to write their own price. - Additionally, space should also be left for producers to write their name, contact details, and location. - Messages should focus on communicating the indicative fuel savings in terms of Birr and kilograms of wood save. Thus making it easier for customers to understand the product benefits. 	Expansion

5.7.9. Conduct More Targeted Promotions

Promotions and product demonstrations are critical in achieving product awareness and vital in communicating the product benefits, which has been recognized by many producers, government officers and customers. However, promotions are only effective if they target the right customers with the right products. Thus is it important to have targeted promotions that consider market dynamics. Additionally, targeted campaigns are more effective at using scare resources, such as budget and time.

ID	Initiative	Description and Rationale	Priority
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In_49	In agriculture areas, align promotional activities to crop harvesting	<ul style="list-style-type: none"> - Due to the cyclic nature of agriculture, farmers have more money at certain times of the year and are hence more likely to buy stoves. - Promotions should start several months before harvesting to create awareness. 	Core
In_50	Leverage the network of development agents and health extension workers	<ul style="list-style-type: none"> - There is an extensive network of government officers that can assist in promoting and selling stoves, thus enabling greater geographic distribution. - Collaboration between the energy experts and these officials is critical to ensuring that this network is used effectively. (In_ 5, 6) 	Core
In_50	Developed targeted promotions strategies for different regions, zones, woredas, and kebeles	<ul style="list-style-type: none"> - There are a variety of customers across Ethiopian each with different needs. Hence, there is not a 'one size fits all' promotion strategy. - Thus there needs to specific promotions strategies developed for each woreda and kebele that consider the customers' needs, existing product penetration, price sensitivity, and influence of opinions leaders (eg, church) . - The regional sales/marketing manager (In_15) should be responsible for ensuring that this gets done and should use the market research processes to collect data (In_27). - Additionally, training and toolkits (In_32, 33) should empower local energy experts to execute strategies and also help provide feedback to the regional manager. - Coordination mechanisms should be used to assist with implementation and communicate strategies to other participants. 	Core

5.7.10. Generate Demand through Customer Advocacy

Customer advocacy is a very powerful marketing tool and can assist in generating demand by getting customers to sell to their neighbors as potential customers. However, it is difficult to control and is only effective once there are a sufficient number of people using the stoves. Hence, strategies around

customer advocacy need to focus on ‘kick starting’ the market by getting interest and getting a few select customers using stoves.

ID	Initiative	Description and Rationale	Priority
In_52	Use competitions to give away a few free stoves in new selected woredas and kebeles	<ul style="list-style-type: none"> - Social adoption relies on having a few select customers using stoves. Hence, giving away free stoves in a competition can generate demand by getting people interested in new products. - It also allows other people in the community to observe their neighbors using stoves, which in turn generates demand. - Careful consideration needs to be given to ensure that competitions do devalue the product, by making it appear ‘free’. 	Expansion
In_53	Offer commissions or rewards to customers that sell products	<ul style="list-style-type: none"> - Customers that sell improved stoves to other customers could be offered rewards or cash incentives from producer or retailers. - This can assist in creating a network of retailers that promote and encourage sales. - It should be noted that this initiative can come with risks and customers that sell products may become opportunistic and not promote or sell products correctly. 	Expansion

5.7.11. Improve Stove Design to Better Cater for Customer Needs

Critical to generating customer demand is developing products that customers want and are willing to buy. The first step in achieving this is, is understanding customer needs and letting this inform the product design process.

Initiatives listed below represent the key findings from focus groups. However, it should be noted that there needs to a continuous cycle of improvement where new ideas are found and evaluated. Additionally, the initiatives listed below are based on field visits in a few select regions and there may be more urgent stove improvements needed in other regions. Nevertheless, executing these initiatives would help to increase customer demand in the regions that were analyzed in this report.

ID	Initiative	Description and Rationale	Priority
In_54	Introduce new versions of the Mirt stove to cater for different customers	<ul style="list-style-type: none"> - Many customers would not buy Mirt stoves because it did not have the feature they want. - The recommended features are a chimney attachment, option without dual cooking function, and a mitad lip for the lighter, thinner Mirt version. - Designs should be configurable such that new features can be added or removed with minimal changes to the overall design. - The feasibility needs to be validated by an engineer in R&D (In_13) in conjunction with product management (In_15). 	Expansion
In_55	Modify the Tikikil product to address customer concerns	<ul style="list-style-type: none"> - Several customers suggested that the Tikikil stove is too small to fit their pots and would not buy one because the base is too small and appears unstable. - Additionally, the Tikikil stove was deemed too expensive by most customers. Hence it is recommended that during the product design process, consideration is given to reducing the production costs and hence reduce the final sale price. - The Tikikil stove does not have wide spread geographic distribution, hence it difficult to say whether product modifications are needed yet. - However, there is the opportunity to complete a new version before disembarking on a broad marketing and distribution strategy. - The feasibility needs to be validated by an engineer in R&D (In_13) in conjunction with product management (In_15). 	Expansion

5.7.12. Introduce New Stoves and Products to Give Customers More Choice

Whilst product improvements are important is it also important to recognize when new products are needed. Similarly to the previous strategy the first step is to understand customer needs and let this inform the product design process.

The initiatives listed below are based on field visits in a few select regions and there may be more urgent stove models needed for other regions. Nevertheless, the initiatives below would help to increase customer demand in the regions that were analyzed in this report. It is vital that new product ideas are continually being developed, evaluate and implemented.

ID	Initiative	Description and Rationale	Priority
In_56	In conjunction with the Health Office, develop a certified design for traditional stoves	<ul style="list-style-type: none"> - Traditional enclosed stoves have shown to be popular with customers and can result in fuel savings. - The Health Office is promoting and installing traditional stoves in some regions, hence developing a standardized and tested design would ensure that stove being installed meet all the necessary performance criteria. - The feasibility needs to be validated by an engineer in R&D (In_13) in conjunction with product management (In_15). 	Expansion
In_57	Develop small cement stove that can be used for daily cooking (i.e., non injera)	<ul style="list-style-type: none"> - Several customers and producers have requested a small cement stove that can be used for daily cooking. - Developing this product would give customers more choice and promote market growth. - The feasibility needs to be validated by an engineer in R&D (In_13) in conjunction with product management (In_12). 	Expansion

5.8. Methods of Improving Production of Cookstoves

5.8.7. Only Promote Producers that Meet Standards

There are two main approaches to ensure quality products are being made by producers, being either to force them through legal mechanisms or to encourage them by offering benefits. The first approach can be difficult to implement and can create additional barriers to entry, whilst the second approach encourages producers to meet standards as it makes them more profitable. Hence, the second approach is recommended.

There are several different type of benefits that could be offered, such as microfinance, training, technical support. However, many of these are only provided at the start of a business and are not effective at encouraging ongoing quality. Hence, the best approach is to only use government sponsored marketing

for producers that meet government standards. Thus, there is an incentive for producers to meet standards as they will benefit from government marketing and promotions, whilst uncertified producers will need to organize their own marketing and promotions.

The challenge in this approach is that many producers make the same products and hence it is difficult for a customer to distinguish between a high quality product and a low quality product. To overcome these issues branding and selective product demonstrations should be used.

ID	Initiative	Description and Rationale	Priority
In_58	Develop product and producer standards	<ul style="list-style-type: none"> - Standards should be introduced to define what is a good product and a good producer. - This ensures that there is a reference point for all producers and supporting organizations. 	Core
In_59	Align marketing and branding to product and producers that meet standards	<ul style="list-style-type: none"> - Producers who meet standards should receive certificates of certification or product tags (branding). - This 'brand' should be communicated in all marketing and promotion efforts organized by the Government. This allows a customer to easily distinguish a high quality product from a low quality product. - Additionally, this does not prevent producers from entering the market as they may still make products by will not receive the marketing benefits. 	Core
In_60	Align promotions to product and producers that meets standards	<ul style="list-style-type: none"> - Producers that meet standards should be supported by government and partners during product demonstrations. - This involves only organizing promotions for quality producers and only giving out details of quality producers during organized demonstrations. 	Core
In_61	Develop and complete annual producer verification process	<ul style="list-style-type: none"> - Energy experts should visit producers periodically to re-certify them at which point they then become certified for the next year. - If a producer does not meet standards then they lose their certification and hence benefits. - Random inspections and product testing should be used. 	Core

In_62	Communicate and implement standards	<ul style="list-style-type: none">- To implement the new standards there should be sufficient notice given to producers such that they have time to improve their quality.- Producer certification should commence several months before any branded marketing campaigns as to give local energy experts time to visit all the producers in their woreda to make an assessment.	Core
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6. Objectives

6.4. General Objectives

The general overall objectives of the Ethiopian Government can be seen in the Growth and Transformation Plan (GTP) (MoFED), 2010) which states the following,

Ethiopia’s long-term vision is,

“To become a country where democratic rule, good-governance and social justice reigns, upon the involvement and free will of its peoples; and once extricating itself from poverty and becomes a middle-income economy.”

Its vision in the economic sector is,

“To build an economy which has a modern and productive agricultural sector with enhanced technology and an industrial sector that plays a leading role in the economy; to sustain economic development and secure social justice; and, increase per capita income of citizens so that it reaches at the level of those in middle-income countries.”

Additionally the GTP states its pillar strategies (MoFED, 2010) are;

1. Sustaining faster and equitable economic growth
2. Maintaining agriculture as a major source of economic growth
3. Creating favorable conditions for the industry to play key role in the economy
4. Enhancing expansion and quality of infrastructure development
5. Enhancing expansion and quality of social development
6. Building capacity and deepen good governance
7. Promote women and youth empowerment and equitable benefit

The cookstove program contributes to these visions and pillar strategies based on the following.

Program Contribution	Impacted Objective	Measures
Focuses on developing a market based solution that will deliver economic growth and prosperity to private businesses and people.	Vision, Pillar 1 and 3	– Contribution of the cookstoves market to total GDP
Improves the health of Ethiopian citizens, namely women and children, by promoting improved stoves that reduce indoor air pollution.	Pillar 5	– Incidences of respiratory diseases and infections

Reduces the burden placed on households of either buying or collecting fuel, thus allowing people to focus on other activities that improve their lives and grow the economy.	Vision and Pillar 7	– Percentage of household budget spent on purchasing fuel
Builds the skills, knowledge and capacity of the government and private sector which in turn creates economic growth.	Pillar 3	– Number of people employed and/or working in the cookstoves market
Reduces the country’s biomass energy consumption by increasing the use of improved cookstove technology.	(Pillar 1 and 3)	– Total fuelwood consumption by households – Total fuelwood consumption by non-households – Fuel wood consumption per capita

The successes of these contributions should be measured by using the plan specified in the GTP, which relies on basis of survey and census data gathered by the Central Statistics Agency (CSA) and analysis conducted by MoFED based on administrative data from sectors and inputs from CSA. (MoFED, 2010) Hence, the above measures need to be validated with the CSA and included in any reporting processes.

6.5. Specific Objectives

This section contains the specific objectives of the program and links them to recommended strategies. More detail of the strategies can be found in Section 5 - Strategy Analysis.

ID	Specific Objective	ID	Strategy
Obj_1	Effectively use resources to achieve the best results	5.4.7	Develop a Coordination Mechanisms
		5.4.8	Use a Program Management Approach for Implementation
Obj_2	Improve information flow and enable the market to innovate	5.4.11	Introduce an Information Technology Based Reporting Tool
		5.4.9	Set up and Evaluate Carbon Financing
		5.5.8	Develop an Innovation Feedback Loop
Obj_3	Increase the use of improved cookstoves	5.7.7	Facilitate Flexible Payment Terms for Customers

		5.7.8	Change Marketing Messages to Focus on Product Benefits
		5.7.9	Conduct More Targeted Promotions
		5.7.10	Generate Demand through Customer Advocacy
		5.7.11	Improve Stove Design to Better Cater for Customer Needs
		5.7.12	Introduce New Stoves and Products to Give Customers More Choice
Obj_4	Increase access household access to new technology and new fuels	5.5.11	Co-Develop Fuel Supply Chains
Obj_5	Build the capacity and capabilities of government	5.4.10	Modify the Government Approach to be More Aligned to Market Activities
		5.5.9	Increase the Resources of Woreda Energy experts
		5.5.10	Increase the Skills of Government Staff
Obj_6	Develop a strong, stable and robust private sector	5.6.7	Build the Strength of Existing Producers
		5.8.7	Only Promote Producers that Meet Standards
		5.6.8	Support the Development of Distributors and Retailers
		5.5.7	Modify Microfinance Policy

6.6. Expected Outputs

This section lists the specific objectives, their outputs and related key performance indicators (KPIs). Additional detail of KPIs can be found in Section 8.5 - KPIs.

ID	Specific Objective	Expected Outputs	ID	KPI
Obj_1	Effectively use resources to achieve the best results	Collaboration of stakeholders at all levels	KPI_1	Attendances of stakeholders at coordination forums
		Initiatives implemented as per budget	KPI_2	Program actual vs. planned Cost
Obj_2	Improve information flow and enable the market to innovate	Minimal government participation in the market	KPI_3	Government funding vs. Private funding
		Customer centric products that meet customer needs	KPI_4	Number of products available in each region
Obj_3	Increase the use of improved cookstoves	Customer demand for cookstoves	KPI_5	Number of improved stoves produced and sold
			KPI_6	Proportion of households using improved stoves
Obj_4	Increase access household access to new technology and new fuels	Increased use of briquettes	KPI_7	Number of woredas with availability of both Merchayle stoves and charcoal briquettes
			KPI_8	Number of households using improved charcoal stoves
		Increased use of ethanol	KPI_9	Number of households using ethanol
Obj_5	Build the capacity and capabilities of government	Highly knowledgeable and skilled government employees	KPI_10	Money invested on training per government employee

		Knowledge and skills are retained in the government	KPI_11	Retention rate of government staff
Obj_6	Develop a strong, stable and robust private sector	Successful producers that remain in the market for many years	KPI_12	Producer retention rate
			KPI_13	Sales vs. production capacity
		Integrated supply chain	KPI_14	Number of distributors supporting improves cookstoves
		Market growth	KPI_15	Period on period growth in the number of stoves sold
		High quality stoves	KPI_16	Emissions performance of stoves
			KPI_17	Thermal efficiency and energy savings of stoves

7. Implementation Strategy

The purpose of this section is to define the delivery strategy for the Ethiopian Cookstove Program. It will form the basis for the solution plan and underpins the approach for setting up the program and implementing initiatives.

7.4. Approach

The program implementation methodology is based on the concept of capability delivery, whereby new capabilities are designed, built and implemented by a program and project team. Once these capabilities are implemented they are expected to be used by market participants such as the governments and private organizations.

It is envisaged that there will be eleven projects as part of this program, being

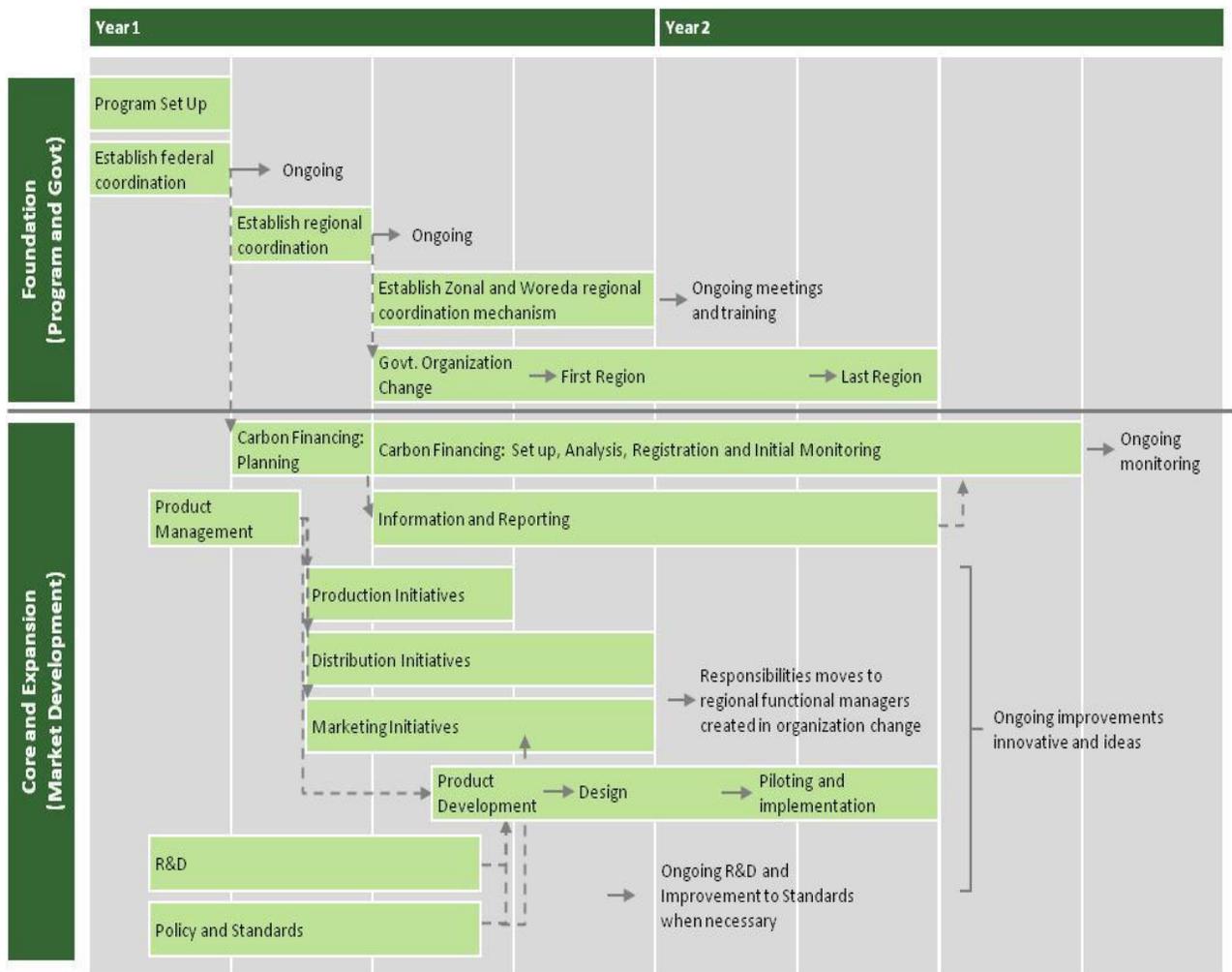
1. Program Set up
2. Coordination Mechanism Establishment (Federal, Regional, Zonal and Woreda)
3. Organization Change
4. Product Management
5. Information and Reporting
6. Production Initiatives
7. Marketing Initiatives
8. Distribution Initiatives
9. Product Development
10. Research & Development
11. Policy and Standards

Each project is based on grouping initiatives that require similar skills and knowledge to implement. This ensures effective and efficient delivery of the program.

The detailed initiatives are described in, Section 5 - Strategy Analysis and the mapping of initiatives to project is contained in Section 7.9.8- Project/Component to Initiative Mapping.

7.5. Program and Project Roadmap

Figure 2: Program Plan



7.6. Implementation Scenarios

There are many initiatives, with the order of importance being; foundation, core then expansion. This is not to say the expansion initiatives deliver fewer results than foundation or core initiatives; it merely suggests that without foundation and core initiatives there is no point introducing expansion initiatives. The same logic applies for core initiatives and their relationship with foundation initiatives.

It is recommended that all projects and initiatives are implemented. However, there are various different implementation scenarios based on the prioritization of initiatives which can significantly impact the cost. The scenarios are as follows and all include a 20% contingency, (the Excel file used to calculate these costs is found in Appendix 11.4 - Related Documents.)

1. **Foundation:** Focus on setting up the program, developing coordination mechanisms and implementing organization change. There would be no emphasis on introducing new market capabilities, but changes introduced would set the stage for future projects and enable governments and stakeholders to work together and work more effectively with better collaboration, accountability and responsibility.
 - Set up cost: 9.1 million ETB
 - Operating cost: 0.7 million ETB per month
2. **Foundation + Core:** Implement all the foundation initiatives as well as deliver critical capabilities that enable a more efficient and effective cookstove market to emerge. This involves activities that enhance training, R&D distribution, policies and standards.
 - Set up cost: 24.1 million ETB
 - Operating cost: 0.9 million ETB per month
3. **Foundation + Core + Expansion:** All of foundation and core initiatives are delivered along with new innovative concepts that have the potential to accelerate growth. This includes carbon financing, new payment options, new products and improved reporting and IT systems
 - Set up cost: 61.7 million ETB
 - Operating cost: 1.5 million ETB per month

There are additional scenarios that could be developed by only including some of the core and expansion initiatives, which may help to priorities efforts and minimize costs. The detailed costs of each project are shown below in the Section 7.9.7 - Project/Component Costing.

The costs calculated above were based on the following assumptions,

- Costs do not consider or include the current salaries and budgets of government employees working on cookstoves. Hence, the costs shown above are in addition to any current budgets or baseline costs.
- Costs do not consider the additional budget required for expansion in to new regions, as this has been assumed as part of the baseline budget. The exception to this is when new roles have been proposed in government structures. (eg, sales and marketing manager)
- When new roles have been proposed as part of an initiative, it is assumed that a new person needs to be hired at the current government salaries. Many people could be recruited from within the government which would minimize costs. However, the capacity of these people was not known and hence these people were included in calculations.
- Many of the initiatives will require energy experts perform new or modified tasks, which are assumed to be part of their job and hence no additional cost has been included.
- Best practices were used to calculate the costs for many initiatives, which were typically quoted in USD. These were converted into ETB using an exchange rate of 17 ETB: 1USD.

7.7. Piloting Strategy

Many initiatives, particularly expansion initiatives, should be piloted in selected woredas before being implemented on a large scale. Regional governments, through the transformation manager in collaboration with new functional managers, should decide on the pilots they wish to run. Once a pilot is completed the transformation manager should complete a report with the assistance of the woreda energy expert to capture learnings and make recommendations on how or if the initiative should be further implemented.

The decision to pilot an initiative in a woreda should be based on:

- The initiative solving a problem that is currently faced in the woreda,
- The woreda energy expert being capable of performing that tasks, and
- Sufficient budget being available.

During the pilot period there will need to be close contact between the woreda energy expert, transformation manager and functional manager. Thus it is recommended that pilots are conducted within reasonable geographic proximity to regional or zonal office. Once the initiative is deemed successful then it can be implemented across a greater geography.

Multiple pilots may be run simultaneously; however, they should be in different woredas as to minimize the burden on local energy experts. Additionally, if new ideas are create during the feedback process (5.5.8- Develop an Innovation Feedback Loop) these ideas should be considered for piloting and should be integrated into an ongoing process where new ideas are gathered, assessed, developed, piloted then implemented if successful.

7.8. Implementation in New Regions

Currently, there are cookstoves program in six out of the nine regions. (Miranda, 2011) However, the Federal Government has plans to incorporate all nine regions in the this program. It is critical to have a detailed understanding other customers specific needs, government and private business capabilities before venturing into new regions. Thus, for these new regions, it is recommended that region specific implementation plan is developed per region and foundation intiatives are completed before starting cookstoves operations in these regions.

In this report, costs for foundation initiatives for new regions have been included in calculations and total costs. However, this report has not covered all the other additional costs and activities that will need to occur to set up operations in new regions. This is because these regions were excluded from analysis. Additionally, this is largely a budgeting activity which is outside the scope of this report.

Additional analysis is needed to understand the full implications of setting up operations into new regions. This needs to be done in close conjunction with regions.

7.9. Projects/Components

7.9.7. Project/Component Costing

ID	Project/Component	Set up Costs (ETB '000)				Ongoing Cost (ETB '000 per month)			
		Foundation	Core	Expansion	Total	Foundation	Core	Expansion	Total
1	Program Set Up	4,514	-	-	4,514	40	-	-	40
2	Coordination Mechanism	3,048	-	-	3,048	395	-	-	395
3	Organization Change	-	850	-	850	150	122	-	272
4	Information and Reporting	-	-	14,620	14,620	-	-	3	3
5	Carbon Finance	-	-	12,325	12,325	-	-	470	470
6	Product Development	-	-	3,400	3,400	-	-	-	-
7	Product Management	-	425	-	425	-	20	5	25
8	R&D	-	8,500	-	8,500	-	20	-	20
9	Policy and Standards	-	2,275	-	2,275	-	-	-	-
10	Marketing Initiatives	-	-	850	850	-	-	-	-
11	Production Initiatives	-	425	-	425	-	-	-	-
12	Distribution Initiatives	-	-	150	150	-	-	-	-
	Total	7,562	12,475	31,345	51,382	585	162	478	1,225
	Contingency 20%	1,512	2,495	6,269	10,276	117	32	96	245
	Budget Total	9,075	14,970	37,614	61,659	703	194	573	1,470

7.9.8. Project/Component to Initiative Mapping

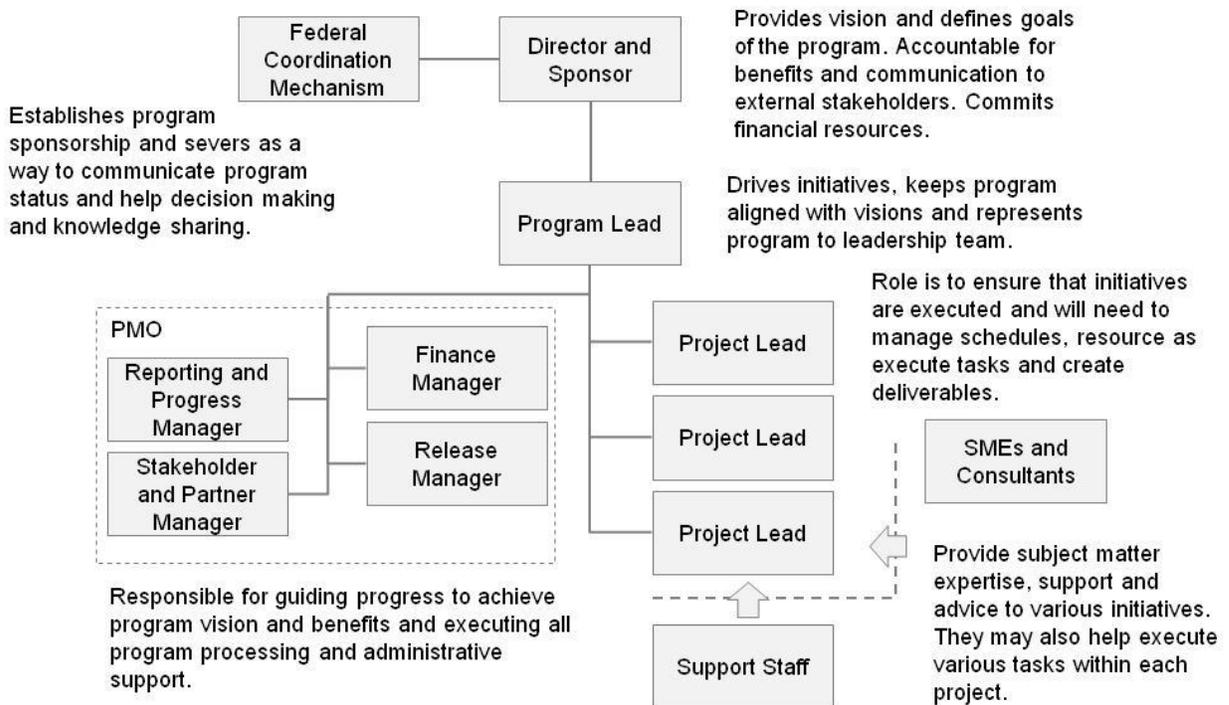
ID	Project/Component	Initiatives (as per 0 -		
		Foundation	Core	Expansion
1	Program Set Up	7, 8, 9,	10	-
2	Coordination Mechanism	1, 2, 3, 4, 5, 6	-	-
3	Organization Change	18, 19, 20, 21, 22, 34,	31, 32, 33, 35	-
4	Information and Reporting	-	-	23
5	Carbon Finance	-	-	11, 12, 13, 14, 15
6	Product Development	-	-	54, 55, 56, 57
7	Product Management	-	16, 27	29
8	R&D	-	17, 28	-
9	Policy and Standards	-	24, 25, 26, 58, 59, 60, 61, 62	36, 37
10	Marketing Initiatives	-	49, 50, 51	47, 48, 52, 53
11	Production Initiatives	-	38, 39, 40	
12	Distribution Initiatives	-	43	41, 42, 44, 45, 46

7.10. Implementation Model

The model selected is based on ensuring clear roles and responsibilities, as well as ensuring that there is accountability for different projects.

7.10.7. Program Organization Structure

Figure 3: Program Structure



7.10.8. Steering Committee

The steering committee is a collective group of senior representatives from different stakeholders that are involved in the program. It is recommended that the coordination forums being proposed are also used for the steering committee. Refer to Appendix 11.6 - Suggested Coordination Forums for more details.

The Energy Office should be the lead for the steering committee and the PMO should organize logistics. The roles and responsibilities of other stakeholders need to be established during the first meeting.

7.10.9. Program Lead

The program lead is appointed by the director/sponsor and is responsible for overseeing all activities related to the program. Their role differs from the director/sponsor as they are not responsible for directly engaging with stakeholders.

The program lead and the director/sponsor must work closely to ensure that the vision is being executed and that program is moving forward in the correct direction. Additionally, the program lead supervises the program management office (PMO) and all the project leads. Hence this person must do the following,

- Understand master baseline version of all initiatives and activities
- Baseline consolidated estimate and baseline schedule initiatives such that change control can be initiated if change are required
- Facilitate thorough quality assurance of estimates, before baseline, then consolidate and store estimates
- Establish common methodology and deliverable templates so everyone is “speaking the same language”
- Efficient notification, prioritization, tracking, and escalation process will contribute to timely issue resolution
- Ensure project leads are kicking off each phase properly and consistently
- Risk and issue management plan and log

7.10.10. Program Management Office

The PMO is responsible for managing the ‘what’ – ensuring resources are dedicated appropriately and acting as the steward of the program mission by ensuring proposed projects are aligned with strategic goals. Responsible for managing the ‘how’, they are providing a discipline for managing complexity, managing iterations to deliver business benefit while minimizing impacts to timeline, quality and cost. Managing communications with internal audiences, external audiences, and executives to ensure common messages, executive sponsorship, and appropriate stakeholder involvement. Assign ownership and accountability for results as well as maintain a balance of both business and technical focus. Transparency is critical to success, it is important to establish and enforce standard activities throughout the project. PMO owns and oversees the following activities and deliverables across the program. There are specific roles in the PMOs as described below. Typically each role is allocated to a separate person. However, in smaller scale projects one person may perform two or more of the roles.

The people who work in the PMO could be come from multiple stakeholders across, private sector, NGOs, governments, the UN, and bilateral organizations to co-ordinate across partners, leverage respective capabilities and align their programs.

Finance Manager

- Manages program and project costs
- Manages program budget
- Ensures correct allocation of budget

Stakeholder and Partner Manager

- Works with external vendors or partners

- Develops materials for communication to steering committee
- Helps to manage the involvement of multiple organizations to ensure collaboration

Release Manager

- Manages the phasing of implementation across all projects
- Execute cross team dependency reviews
- Baseline consolidated estimates and baseline schedules
- Works closely with project leads to ensure that new initiatives are being delivered to regions effective and according to release schedules
- Helps to organize the change management and communications to regions, zone or wordedas
- Provides inputs in the prioritization of initiatives and feasibility
- Creates a critical path and identifies project interdependencies

Monitoring & Evaluation Manager

- Works closely with the project leads to report on status
- Measures and communicates how the program is tracking against objectives
- Organizes and delegates reporting or data collection to support staff or regional managers
- Tracks and report milestone achievements and variances

7.10.11. Project Leads

Project leads are responsible and accountable for managing and delivering initiatives. Hence, they need to,

- Approach projects from both a project management perspective as well as a content perspective
- Work closely with the PMO to manage program wide activities
- Work closely with the program director to ensure that work is aligned to visions
- Develop, update and managed project plans, budgets and resources
- Liaise with regional stakeholder to ensure that projects meet their needs and are adopted successfully
- Source and manage additional support staff if required
- Source and manage SMEs and consultants if required

The project leads could be come from multiple stakeholders across, private sector, NGOs, governments, the UN, and bilateral organizations to co-ordinate across partners, leverage respective capabilities and align their programs.

7.10.12. Subject Matter Experts (SMEs) and Consultants

SMEs and consultants may be used when required for expertise and guidance on specific topics. They could be used to support any part of the program, including PMO duties to project delivery.

7.10.13. Support Staff

Support staff are required to support the project leads by executing tasks. It is expected that many of the existing personnel of the Federal Energy Office would be able to fill these roles. The program director, project leads and director should identify and allocate the people with the right skills and knowledge to support each project.

7.11. Timeline

This section contains a detailed timeline of the planned activities by phase. It should be noted; that this timeline is an initial perspective that needs to be validated with stakeholders and should only be used as input into future planning decisions.

The timeline is based on a logical sequence of activities taking into account dependencies and implementation time. It does not consider many other factors that could change the sequence or duration of activities, being,

- The availability of resources and key staff,
- The available budget and cash flows, and
- Dependencies with other projects outside the scope of this report, such as technical or institutional initiatives.

These variables should be considered when developing the final program plan. It is suggested that the PMO is responsible for this task and completes it during the initial phases of the program when there is more information available and broader agreement from stakeholders.

The excel file used for the program plan can be found in Appendix 11.4- Related Documents.

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	Phase	Responsible	End of period																							
			Year 1												Year 2											
			Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13
1.0 Program Set Up																										
1.1 Establish PMO	Federal Energy Office																									
1.2 Finalise budget	PMO																									
1.3 Develop regional roll out plan	PMO																									
2.0 Coordination Mechanism																										
2.1 Federal	PMO																									
2.2 Regional	Regions																									
2.3 Zonal	Zones																									
2.4 Worede	Woredas																									
3.0 Organisation Change																										
3.1 Develop materials	Project Lead, Support Staff																									
3.2 Region 1	Project Lead, Support Staff and Region																									
3.3 Region 2	Project Lead, Support Staff and Region																									
3.4 Region 3	Project Lead, Support Staff and Region																									
3.5 Region 4	Project Lead, Support Staff and Region																									
3.6 Region 5	Project Lead, Support Staff and Region																									
3.7 Region 6	Project Lead, Support Staff and Region																									
3.8 Region 7	Project Lead, Support Staff and Region																									
3.9 Region 8	Project Lead, Support Staff and Region																									
4.0 Region 9	Project Lead, Support Staff and Region																									
4.0 Information and Reporting																										
4.1 Develop requirements	Project Lead and Support Staff																									
4.2 Vendor selection	Project Lead and Support Staff																									
4.3 Build and Test	Vendor																									
4.4 Implement and roll out	Project Lead and Regions																									

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	Phase	Responsible	End of period																							
			Year 1												Year 2											
			Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13
5.0 Carbon Finance																										
5.1 Initial planning	Project Operator																									
5.2 Project design document	Project Operator																									
5.3 Approval of PDD	DNA																									
5.4 Validation of PDD	DOE																									
5.5 Registration	Gold Standard																									
5.6 Mointoring	Project Operator																									
5.7 Issurance of VERS	Gold Standard																									
5.8 Verificaiton and certification	DOE																									
6.0 Product Development																										
6.1 Mirt	R&D and Product Manager																									
6.2 Tikikil	R&D and Product Manager																									
6.3 Traditional	R&D and Product Manager																									
6.4 Cement cookstoves	R&D and Product Manager																									
7.0 Product Management																										
7.1 Introduce new product mgmt roles	Project Lead and Support Staff																									
7.2 Develop product strategy and targets	Project Lead and Support Staff																									
8.0 R&D																										
8.1 Introduce R&D mgmt roles	Project Lead and Support Staff																									
8.2 Develop capabilities	Project Lead and Support Staff																									
9.0 Policy and Standards																										
9.1 Create policy and guidelines	Regional Energy Office																									
9.2 Develop materials (eg, toolkits, brochures)	Regional Energy Office																									
9.3 Communicate changes	Regional Energy Office																									

Accenture Development Partnerships

	Phase	Responsible	End of period																							
			Year 1												Year 2											
			Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13
10.0	Marketing																									
10.1	Engage regions to understand specific	Project Lead and Support Staff																								
10.2	Develop materials (eg, toolkits, brochures)	Project Lead and Support Staff																								
10.3	Develop region specific plan	Project Lead, Support Staff and Region																								
10.4	Pilot ideas in selected Woredes	Project Lead, Support Staff and Region																								
10.5	Scale up	Project Lead, Support Staff and Region																								
11.0	Production																									
11.1	Develop materials (eg, toolkits, brochures)	Project Lead and Support Staff																								
11.2	Communicate changes	Project Lead and Support Staff																								
12.0	Distribution																									
12.1	Engage regions to understand specific	Project Lead and Support Staff																								
12.2	Develop materials (eg, toolkits, brochures)	Project Lead and Support Staff																								
12.3	Develop region specific plan	Project Lead, Support Staff and Region																								
12.4	Pilot ideas in selected Woredes	Project Lead, Support Staff and Region																								
12.5	Scale up	Project Lead, Support Staff and Region																								

→ Regions are expeted to be semi-self sufficient and can start to organise their own marketing in conjunction with Federal Product Managers

→ Regions are expeted to be semi-self sufficient and can start to organise their own marketing in conjunction with Federal Product Managers

7.12. Resources Requirements

7.12.7. Program Personal Required

Type	Number	Roles and Responsibility	Timeframe
Program Lead	1 x 100%	<p>7.10.8 - Steering Committee</p> <p>The steering committee is a collective group of senior representatives from different stakeholders that are involved in the program. It is recommended that the coordination forums being proposed are also used for the steering committee. Refer to Appendix 11.6 - Suggested Coordination Forums for more details.</p> <p>The Energy Office should be the lead for the steering committee and the PMO should organize logistics. The roles and responsibilities of other stakeholders need to be established during the first meeting.</p>	Program Duration

		Program Lead	
Stakeholder and Partner Manager	1 x 50%	7.10.10 - Program Management Office	Program Duration
Reporting and Progress Manager	1 x 50%	As above	Program Duration
Finance Manager	1 x 50%	As above	Program Duration
Release Manager	1 x 50%	As above	Program Duration
Project Leads	6 x 100%	7.10.11 - Project Leads	Project duration, with the expectation that once one project is finished the Project Lead can start another

7.12.8. Government Personal Required

Type	Number	Roles and Responsibility	Timeframe
Product Managers (National Level)	5 x 100%	5.4.10 - Modify the Government Approach to be More Aligned to Market Activities	Ongoing, with potential to use existing staff if available
R&D Lead (National Level)	2 x 100%	As above	Ongoing
Sales and Marketing Manager (Regional Level)	9 x 100%	As above	Ongoing
Distribution Marketing Manager (Regional Level)	9 x 100%	As above	Ongoing
Production Manager (Regional Level)	9 x 100%	As above	Ongoing
Finance and Reporting Manager (Regional Level)	9 x 100%	As above	Ongoing
Transformation Manager (Regional Level)	9 x 100%	As above	Only during periods when new structures, processes and technologies are being introduced to regions

7.12.9. Staffing Strategy

Staff to fill the additional roles can be source via four options,

1. Recruit new staff,
2. Use existing staff within the Energy Office,
3. Consultants, or
4. Leverage the staff from other partners (eg, GIZ, SNV, or Agriculture Office)

Program cost calculations assumed that Option 1 would be used. However, staff sourcing should be based on availability, cost, knowledge and experience. Hence alternative options may be more viable in some case. Thus options 2, 3 and 4 should be explored. However, any decisions to Options 2 or 3 should be verified with the program director and sponsor. If Option 4 is used then the steering committee should be consulted to discuss what resources are available from different stakeholders.

7.12.10. Procurement Strategy

The procurement of resources, such as computers, for the program will be the responsibility of the PMO team and should be performed during the program set up phase. The list of required materials should be communicated and agreed with the director and program sponsor. It critical that this done with enough lead time to allow the PMO to acquire the resources before projects and initiatives start.

8. Monitoring and Evaluation Plan

The framework chosen for the Monitoring and Evaluation (M&E) Plan is based on linking Key Performance Indicators (KPIs) to objectives and using reports to ensure that results are communicated. KPIs have been designed to measure both program performance and results being delivered by the program. The focus has been on simplistic KPIs that can be easily and accurately calculated across multiple regions and woredas.

The frequency of KPI calculation is based on assumptions regards current manual reporting process, if this was to become more automated then the frequency of reporting could be increased.

8.4. Reports

Report	Coverage	Role	Primary Purpose and Audience
Annual Performance Report	National and regional programs	<p>Reports on program performance in the past year.</p> <p>Details outcomes being delivered and program and status, by summarizing other reports.</p> <p>Identify potential improvements in program delivery.</p>	<p>Monitors performance and provides information for the Annual Program review.</p> <p>Primarily for program steering committee, directors, ministers, and international organization to help them understand the effectiveness of strategy and program implementation.</p>
Benefits Report (Half Yearly)	Country and regional programs	<p>Reports on outcomes being delivered in terms of program objectives, including stoves, household impacts and product performance.</p>	<p>Monitors the results being delivered by the program.</p> <p>Primarily for program steering committee, directors, ministers, and international organization to help them understand the outcomes being delivered by the program.</p>

<p>Status Report (Quarterly)</p>	<p>Country and regional programs</p>	<p>Report on program costs, timelines, schedule, scope, risks and issues.</p>	<p>Monitors program status and is used in coordination forums.</p> <p>Primarily for program steering committee, directors, ministers, and international organization to help them understand the outcomes being delivered by the program.</p>
<p>Evaluation Report (Per Project)</p>	<p>Evaluation of projects during implementation and at completion</p>	<p>In depth assessments of activities, mainly focused on effectiveness, successes and relevance.</p>	<p>Provides evidence of delivery and includes lessons learnt that can be feed into continuous improvement and future design.</p>

8.5. KPIs

ID	KPI	Baseline	Target	Data	Responsibility	Frequency
KPI_1	Attendances of stakeholders	First meeting	90% (TBC)	Number of participants in each coordination mechanism	National – PMO Region – Transformation Lead Zonal and Worede – Energy Office	Quarterly
KPI_2	Actual costs vs. planned	Final program and project budget	100% of planned budget (TBC)	Costs from each project and initiative	PMO	Quarterly
KPI_3	Government funding vs. Private funding	2011	TBC during program kick off	Program, federal and regional costs, vs. loans taken by private market, plus private investment by the market	PMO	Half Yearly
KPI_4	Number of products available in each region	2011	TBC with by each Region	List of products and product versions being produced	Product Managers	Half Yearly
KPI_5	Number of improved stoves produced and sold	2011	9.4 M over 5 year	Current production reports	PMO	Quarterly
KPI_6	Proportion of households using improved stoves	2011	TBC with by each Region	Products sales in conjunction with market research survey. Carbon finance M&E reports if available.	Federal – PMO Regional – Reporting Manager with assistance from Marketing Manger	Half Yearly

KPI_7	Number of woredas with availability of both Merchayle stoves and charcoal briquettes	2011	TBC by product managers	Qualitative studies	Regional – Reporting Manger with assistance from Distribution Manager	Half Yearly
KPI_8	Number of households using improved charcoal stoves	2011	TBC by product managers	Product sales and market research surveys	Regional – Reporting Manger with assistance from Marketing Manager	Half Yearly
KPI_9	Number of households using ethanol	2011	TBC by product managers	Product sales and market research surveys	Regional – Reporting Manger with assistance from Marketing Manager	Half Yearly
KPI_10	Money invested on training per government employee	2011	TBC based on budget	Money spend on employees by training type (eg, technical or business) vs. number of employees	Regional – Reporting Manager	Half Yearly
KPI_11	Retention rate of government staff	2011	TBC by Region	Number of employees that reassign in a period vs. number of employees at start of period	Regional – Reporting Manager	Half Yearly
KPI_12	Producer retention rate	2011	TBC by Region	Number of producers that quit in a period vs. number of producers at start of period	Regional – Reporting Manager	Half Yearly

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KPI_13	Sales vs. production capacity	2011	TBC by Region	Per product, the sum of the sales of each producers vs. the sum of production capacity of each production	Regional – Reporting Manager with assistance for Production Manager	Half Yearly
KPI_14	Number of distributors supporting improves cookstoves	2011	TBC by Region	Survey of all distributors	Regional – Reporting Manager with assistance for Distribution Manager	Half Yearly
KPI_15	Period on period growth in the number of stoves sold	2011	TBC Region	Current production reports	PMO	Half Yearly
KPI_16	Emissions performance of stoves	Laboratory testing	TBC by R&D	Field studies and carbon finance M&E reports if available	Regional – Reporting Manager with from Production Manager	Half Yearly
KPI_17	Thermal efficiency and energy savings of stoves	Laboratory testing	TBC by R&D	Field studies and carbon finance M&E reports if available	Regional – Reporting Manager with from Production Manager	Half Yearly

9. Summary and Conclusion

This document aims to deliver a market assessment, recommend strategies and present an approach to implement a national cookstove program.

The central theme is that it is critical to enable a market based solution where customer demand ‘pulls’ products through the value chain as opposed to the government ‘pushing’ products to customers. To achieve this, the program needs to focus on a collaborative approach from multiple stakeholders.

The information contained in this report is based on preliminary analysis and should only be used as input into the final program design. As a next step, strategies and approaches recommended in this report need to be socialized and validated with multiple stakeholders. Additionally, further analysis will be required for many strategies to understand the specific details for implementation such as partners and funding sources.

Due to time limitations, this report only analyzed the selected regions, being Addis Ababa, Tigray, Amhara, Oromia and the Southern Nations Nationalities Peoples’ Region (SNNPR). The development of a national program should include analysis on all regions, which does not need to occur immediately but should be done before completing a plan for these regions.

Furthermore, the final program document should include strategies and recommendations from a technical and institutional perspective; both topics were excluded from this report.

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11. Appendix

11.4. Related Documents

11.4.7. Ethiopian Cookstoves Program – Program Plan and Costs



Microsoft Office
Excel 97-2003 Worksheet

11.4.8. Ethiopian Cookstoves Program – Organization Structures



Microsoft Office
PowerPoint 97-2003 Presentation

11.4.9. Ethiopian Cookstoves Program – Scenarios



Microsoft Office
Excel 97-2003 Worksheet

Observed Innovations and Gaps

Mirt

- The Mirt stove is able to cook injera and boil water at the same time. The major issue with this is that injera is only cooked, on average, every three days; hence limiting any benefit of dual cooking. In fact many customers modified their Mirt stoves to remove the dual cooking function.
- The Mirt stove does not have a chimney, which was viewed as a major constraint limiting sales. Consideration could be given to developing a chimney attachment for the existing Mirt design.
- The new version of the Mirt was introduced to reduce the amount of cement required and hence reduce its price. The new design also saw the removal of lip on the top edge where the mitad sits. Several producers stated that customers preferred the old version simply because it had a lip.
- In the Tigray region many customers complained the firemouth is too small and does not allow them to use larger pieces of wood, which is critical because often these people use large logs to make charcoal. Developing a Tigray specific version with a slightly larger inlet may assist sales, whilst still ensuring that it is designed correctly as opposed to customers making modifications themselves.
- Many customers requested a Mirt stove that could be more easily transferred from house to house. This was particularly important for customers that rent houses. Consideration could be given to designing a Mirt stove that can be assembled and disassembled more easily.

Gonzye

- The Gonzye stove has the potential to be rearranged to cook multiple types of food, not just injera cooking. However, in practice this functionality was not commonly used and the stove was viewed as an injera stove that was not practical for other cooking.
- There is gap between the mitad and Gonzye stove that allows smoke to be released. However, several customers stated that the flames often come out through this gap and burn the injera.
- In the SNNP Region there were several mitad plates that were too small for the Gonzye stoves hence the stove was not effective. Consideration could be given to ensuring that any Gonzye designs work with the mitad plates used in the region.

Laketch

- Nothing observed

Merchayle

- Nothing observed

Tikikil

- Some customer complained the inlet is too small to use much of the wood they collect; hence customers need to chop up wood, which they do not like.
- Some customers suggested the top of the stove is too small to fit the large pots that they regularly use.
- Some customer expressed concerns that the base was too small and the stove would not be stable.

Product Gaps

- A cement stove that can be used daily cooking. Some customers have innovated by removing the dual cooking part of the Mirt and using this as a separate stove. Whilst, one producer had even made a cement stove that resemble a 'mini Mirt' that could be used for daily cooking.
- Several customers stated their preference for traditional enclose mud stoves. However, there is no approved design.
- Several producers were observed to be making a cement injera stove that sits off the above the ground on a metal frame. However, there is no approved design.
- Passive room chimneys would to help remove smoke in many homes, whilst keeping the existing Mirt and Gonzye designs.

11.5. Woreda Operating Model

Below is the suggested operating model for woreda administrations, NGOs, and bilateral organizations. This should only be used as a starting point, as each woreda is different and hence the operating model should be customized to suit specific needs.

Function	Players	
	Responsible	Support
Funding	<ul style="list-style-type: none"> - MFIs are responsible for lending to private organizations and responsible for managing the process, including credit assessment and collection. 	<ul style="list-style-type: none"> - Micro and Small Scale Enterprise Office (MSSE) assist in developing documentation and registering businesses. - Energy Office assists by linking producers to MSSE but does not contact MFIs.
Training	<ul style="list-style-type: none"> - Energy Office is responsible for technical training. - MSSE is responsible for business training. 	<ul style="list-style-type: none"> - GIZ to provide support. - Women’s Affairs to provide support.
Production	<ul style="list-style-type: none"> - Private organizations are responsible. 	<ul style="list-style-type: none"> - Energy Office to assist in training and production techniques.
Distribution	<ul style="list-style-type: none"> - Private organizations are responsible. 	<ul style="list-style-type: none"> - Energy Office should support distributors by providing training and connecting them with producers. - In some areas where there is an absence of distributors, the Agriculture Office, Health Office and Energy Office may organize distribution. - NGOs may also support for refugees.
Sell, Install and Service	<ul style="list-style-type: none"> - Private organizations are responsible. 	<ul style="list-style-type: none"> - Energy Office and Women’s Affairs to support in training on marketing and sales techniques.

Marketing	<ul style="list-style-type: none"> - Private producers should be encouraged to perform their own marketing. - However, in the event they do not have skills or resources the Energy Office and GIZ are to both takes keys roles in developing promotion strategies, identifying target markets and developing content. 	<ul style="list-style-type: none"> - Private producers are expected to participate in demonstrations and should also contribute funds when possible. - Women’s Affairs, Health Office, Energy Office should also assist in performing marketing, but should have aligned strategies, target areas and messages. - SMEs and consultants should be used to assist in developing marketing analytics, identify target customers, and developing marketing strategies
Reporting	<ul style="list-style-type: none"> - Energy Office should be responsible for developing reports and collating feedback. 	<ul style="list-style-type: none"> - GIZ has significant knowledge and skills in this area and should work closely with the Energy Office. - In rural areas the Agriculture Office and Health Office should assist in gather data.

11.6. Suggested Coordination Forums

Below are the suggested structures for the proposed coordination mechanisms. It should be noted that the federal to regional forum is the official communication mechanism to discuss program and strategic directions. However, the “transformation lead” as suggested in a new regional Organization structure should have regular contact with the program office, project Leads and SMEs/consultants.

Forums	Agenda	Frequency	Participants
National / Program Steering	<ul style="list-style-type: none"> - Program direction - Decide program roles and responsibilities - Share learnings - Identify funding mechanisms and sources - Evaluate strategies and propose initiatives 	Quarterly	<ul style="list-style-type: none"> - Federal Energy Office (lead) - Health Office - Agriculture Office - GIZ - SNV - UNHCR - Gaia - WFP - EPA - National NGOs - Other participants may attend if needed.
Federal to Region	<ul style="list-style-type: none"> - Program status - Key decisions - Feedback of initiatives - Share learnings 	Quarterly	<ul style="list-style-type: none"> - Federal Energy Office - Regional Energy Offices - Other participants from the federal forum may also attend.
Regional	<ul style="list-style-type: none"> - Plan regional approach - Allocate operational roles and responsibilities - Customize federal initiatives and plans to regional needs - Develop policy and strategies - Discuss current performance on initiatives - Collate feedback and recommendations for federal forums - Develop objectives, priorities and initiatives for zonal and regional forums 	Quarterly	<ul style="list-style-type: none"> - Regional Energy Offices (lead) - Health Office - Agriculture Office - MFIs - Micro and Small Scale Enterprise Office - Women’s Affairs - GIZ - SNV - UNHCR - Gaia - WFP - Regional NGOs - List may change depending on Region specific requirements and if organizations have operations in that region

<p>Zonal</p>	<ul style="list-style-type: none"> - Understand and review regional direction - Manage the woredas and ensure that woreda forums are being run and reports generated - Review woreda reports and collate for regional review <p>If no zones exist, then these agendas items are move to the regional Level</p>	<p>Quarterly</p>	<ul style="list-style-type: none"> - Energy Office (lead) - Health Office - Agriculture Office - MFIs - Micro and Small Scale Enterprise Office - Women’s Affairs - NGOs - Others organizations that are working in the zonal should be included
<p>Woreda</p>	<ul style="list-style-type: none"> - Understand and review regional direction - Understand and communicate roles and responsibilities - Identify, plan and discuss tasks - Share resources and knowledge - Develop feedback, recommendations and ideas for to be presented at zonal and regional forums - Develop reports and prepare for zonal and regional review 	<p>Monthly</p>	<ul style="list-style-type: none"> - Energy Office (lead) - Health Office - Agriculture Office - MFIs - Micro and Small Scale Enterprise Office - Women’s Affairs - NGOs - Others, including supporting organizations that are working in the woreda

11.7. Standards for Assessing Cookstove Products

This section contains a list of key questions that serves as a checklist before any product is released. This is done from a market perspective and does not consider many of the technical questions that also need to be addressed. These questions are to be answered before a product is released, but should also be used at each stage of the product development lifecycle to ensure that products are being developed with the correct objectives in mind.

ID	Questions	Outcomes	Rationale
1	Have customer requirements been captured and used as critical inputs into the designs process?	A product design that addresses a customer need	Customer needs should be considered from the very onset of design
2	Does the new product design have the support of stakeholders?	Wide spread support for new products	To get full market support it is necessary to get acceptance from all stakeholders
3	Have raw materials, production methods and supply chain constraints been considered in design?	Products are able to be easily produce and integrate with the existing market	Design should not just focus on the final product but consider how it is produced
4	Does the product meet performance standards?	Products should meet standards technical standards	Ensure products meet standards on emissions, efficiency, and durability
5	Has the final cost and hence final sale price of the product been estimated and is it within the target segments price range?	Product are affordable for customers	There is little point having products that meet all the performance requirements but cannot be afforded by customers
6	What is the estimated customer demand for the product and is it sufficient for producers and distributors to make a profit?	Private organizations will want to produce and sell the product	Without having customer demand there is no merit in producing a new product
7	Does the market have all the necessary functions to support the product?	All aspects of the market should be considered	Consideration should be given to all market functions, such as financing, marketing and distribution
8	Has the design and prototype being shown and tested with users?	Customers agree that they would buy and use the product	There needs to be confirmation that the product will be accepted by a customer

11.8. Suggested Questions for Selecting New Producers

This section contains a suggested list of questions to help select new producers. It is not the final assessment criteria but aims to indicate the additional information that should be asked before deciding whether or not to select a new producer.

1. Is there sufficient capacity in the local market already?
2. Are the existing producers in the local market successful and struggling to meeting demand?
3. Would it be more feasible to scale up the production of an existing producer rather than train a new producer?
4. Could products from existing producers be transported and sold in this market?
5. What will happen to other producers in the market if a new producer is trained?
6. What did the proposed producer do before wanting to produce cookstoves? Why do they want to do it?
7. Does the proposed new producer have a technical background? If not, how will they get the necessary skills?
8. Does the proposed new producer have a business background? If not, how will they get the necessary skills?
9. Are there other businesses that would be better suited to the person's skills set and experience? Would it be more suitable for this person to work for another producer rather than own their own business?
10. Has the proposed producer put together a business plan?
11. How will the proposed producer cope if there is a decrease in market demand?

11.9. Cookstove Usages and Sales Scenarios

It is not possible to complete a demand forecast due to uncertainties about the final program. Hence, this section focuses on two scenarios that examine how various targets would impact the stoves market.

The scenarios are,

1. **9.4 million Stoves:** Scenario calculates the impact of disseminating 9.4 million in 5 years on the number of households using improved. This looks at the minimum and maximum number of households that could be impacted based assumptions regarding on the number of stoves per household.
2. **100% of households:** Scenario calculates the minimum number of stoves that need to be produced to get 100% of households using one improved cookstoves. This assumes that each household would only have one stove, hence why it is the minimum number of stoves.

11.9.7. Summary of Findings

If 9.4 million stoves are disseminated over 5 years, then it is likely that there will be 41% to 56% of households using improved stoves. The variation in households is dependent on the assumption made regarding the number of stoves per households; with 41% assuming that all households have an injera stove and another improved stove, and 56% assuming that each household will only have one stove. The later assumption is not valid; however, it indicates the upper most bounds of the scenario.

This is a considerable improvement from the current percentage households using an improved stove, which is somewhere between 29% and 31%. This number was only calculated based on the stoves sold over the last 5 years; hence it is likely to be slightly higher. The exact number could not be calculated due to data limitations.

It should be noted that this scenarios assumes a similar the product spilt (product to product sales ratio) as today and also assumes breakage rates. This scenario should be taken as illustrative only, with further more detailed analysis required to develop a complete product demand.

If there is to be 100% of households using an improved stove then there needs to be a minimum of 17 million stoves produced over 5 years. This number assumes that, each household will only has one stove, product will break and that there is a similar product spilt as today. Because of these assumptions, this number is only illustrative and should be used as a starting point to understand what is required to achieve certain targets.

11.9.8. Scenario 1: 9.4 million Stoves

	2010	2011	2012	2013	2014	2015	5 Year Total
Demographics							
Population	82.9	84.7	86.6	88.5	90.4	92.4	
Households	11.8	12.1	12.4	12.6	12.9	13.2	
Stove Production							
Mirt	1,154.8	509.7	509.7	509.7	509.7	509.7	2,548.3
Gonzye	151.3	167.7	167.7	167.7	167.7	167.7	838.7
Closed Stove	933.3	393.9	393.9	393.9	393.9	393.9	1,969.6
Opesi	133.0	70.1	70.1	70.1	70.1	70.1	350.3
Merchayle	4.5	184.0	184.0	184.0	184.0	184.0	919.9
Laketch	57.0	278.6	278.6	278.6	278.6	278.6	1,393.0
Tikikil	64.7	279.0	279.0	279.0	279.0	279.0	1,395.2
Total	2,498.6	1,883.0	1,883.0	1,883.0	1,883.0	1,883.0	9,415.0
Stoves in Use							
Mirt	1,529.3	1,733.1	1,896.1	2,026.5	2,130.9	2,214.4	
Gonzye	185.8	316.4	420.8	504.4	571.2	624.7	
Closed Stove	1,705.9	1,929.3	2,130.3	2,311.1	2,474.0	2,620.5	
Opesi	153.5	146.8	143.5	141.8	141.0	140.5	
Daily cooker	9.0	190.0	311.3	392.5	447.0	483.5	
Laketch	57.0	316.8	490.8	607.5	685.6	737.9	
Tikikil	64.7	311.4	434.7	496.4	527.2	542.7	
Total	3,705.1	4,943.6	5,827.5	6,480.3	6,976.9	7,364.2	
Household (max)							
	31%	41%	47%	51%	54%	56%	
Household (min)							
	29%	33%	36%	38%	40%	41%	

11.9.9. Scenario 2: 100% of Households

	2010	2011	2012	2013	2014	2015	5 Year Total
Demographics							
Population	82.9	84.7	86.6	88.5	90.4	92.4	
Households	11.8	12.1	12.4	12.6	12.9	13.2	
Stove Production							
Mirt	1,154.8	921.2	1,044.3	1,167.4	1,290.4	1,413.5	5,836.8
Gonzye	151.3	264.1	309.5	354.9	400.2	445.6	1,774.3
Closed Stove	933.3	595.2	637.7	680.2	722.6	765.1	3,400.9
Opesi	133.0	98.9	109.9	121.0	132.0	143.1	604.9
Merchayle	4.5	159.6	211.3	263.0	314.7	366.4	1,315.0
Laketch	57.0	245.1	319.8	394.4	469.1	543.8	1,972.1
Tikikil	64.7	257.1	369.5	481.8	594.2	706.6	2,409.1
Total	2,498.6	2,541.2	3,001.9	3,462.6	3,923.4	4,384.1	17,313.2
Stoves in Use							
Mirt	1,529.3	2,144.6	2,760.0	3,375.4	3,990.7	4,606.1	
Gonzye	185.8	412.7	639.6	866.6	1,093.5	1,320.4	
Closed Stove	1,705.9	2,130.6	2,555.2	2,979.9	3,404.6	3,829.2	
Opesi	153.5	175.6	197.7	219.8	242.0	264.1	
Daily cooker	9.0	165.6	322.3	478.9	635.6	792.2	
Laketch	57.0	283.3	509.5	735.8	962.1	1,188.4	
Tikikil	64.7	289.4	514.2	738.9	963.6	1,188.4	
Total	3,705.1	5,601.8	7,498.6	9,395.3	11,292.1	13,188.8	
Household (max)							
	31%	46%	61%	74%	87%	100%	