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Global Alliance for Clean Cookstoves
Kenya Market Assessment
Intervention Options

Introduction

- This Market Assessment was conducted by Global Village Energy Partnerships (GVEP) International, a non-profit organization that works to increase access to modern energy and reduce poverty in developing countries, and Accenture Development Partnerships (ADP), the NGO-arm of the global business consultancy, on behalf of the Global Alliance for Clean Cookstoves (the Alliance).
- It is intended to provide a high level snapshot of the sector that can then be used in conjunction with a number of research papers, consumer surveys and other sources (most published on the Alliance's website) to enhance sector market understanding and help the Alliance decide which countries and regions to prioritize.
- It is one of sixteen such assessments completed by the Alliance to:
 - Enhance sector market intelligence and knowledge.; and
 - Contribute to a process leading to the Alliance deciding which regions/countries it will prioritize.
- Four assessments were conducted across East Africa in Kenya, Uganda, Tanzania and Rwanda as part of a broader effort by the Alliance to enhance the sector market intelligence and knowledge.
- Each assessment has two parts:
 - Sector Mapping – an objective mapping of the sector.
 - Intervention Options – suggestions for removing the many barriers that currently prevent the creation of a thriving market for clean cooking solutions.
- In each Alliance study a combination of GVEP, ADP, and local consultants spent 4-6 weeks in country conducting a combination of primary (in-depth interviews) and secondary research. They used the same Market Assessment 'Toolkit' for each country so that comparisons can be made. The Toolkit is available free of charge to all organizations wishing to use it in other countries.
- **The Alliance wishes to acknowledge the generous support of the following donors for the market assessments: Barr Foundation, Dow Corning Corporation, Shell Corporation, Shell Foundation, and the governments of Canada, Finland, and Spain.**

This market assessment was produced by Global Village Energy Partnerships (GVEP) International and Accenture Development Partnerships (ADP) on behalf of the Alliance. The findings, interpretations, and conclusions expressed in this work do not necessarily reflect the views of the Global Alliance for Clean Cookstoves or its partners. The Alliance does not guarantee the accuracy of the data.

Executive Summary

Project Approach and Background

Intervention Options

Roadmap

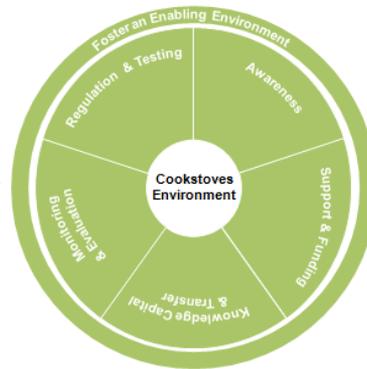
Conclusion

Appendix

Executive Summary

As a result of the Kenya cookstove market assessment, 8 intervention options have been identified through the Enabling Environment Framework and 10 intervention options identified through the Cookstoves Value Chain.

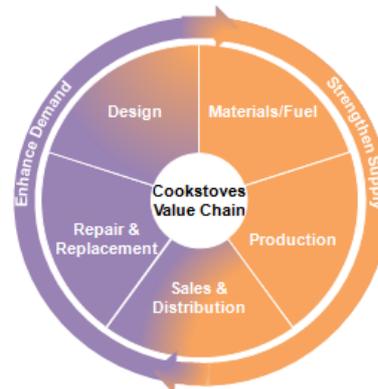
Fostering an Enabling Environment



Fostering an Enabling Environment Intervention Options

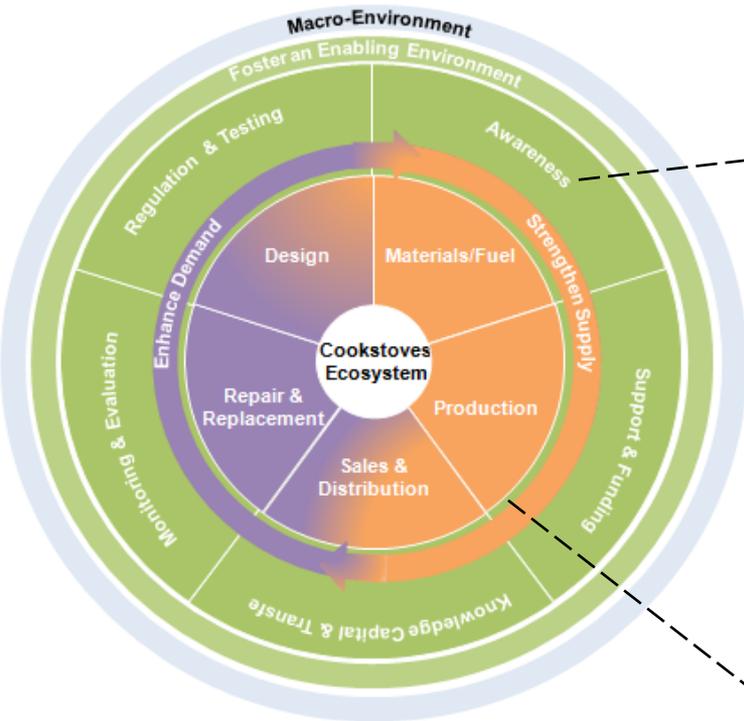
1. Regulation & Testing
2. Awareness
3. Knowledge Capital & Transfer

Enhancing Demand and Strengthening Supply: Cookstoves Value Chain



Enhancing Demand and Strengthening Supply Intervention Options

1. Design
2. Materials/Fuel
3. Production
4. Sales & Distribution



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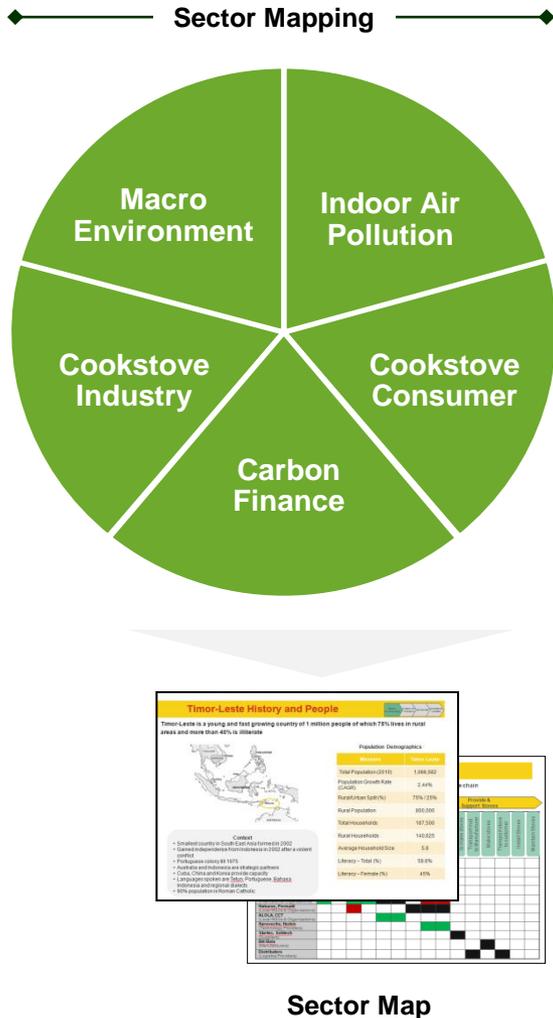
Roadmap

Conclusion

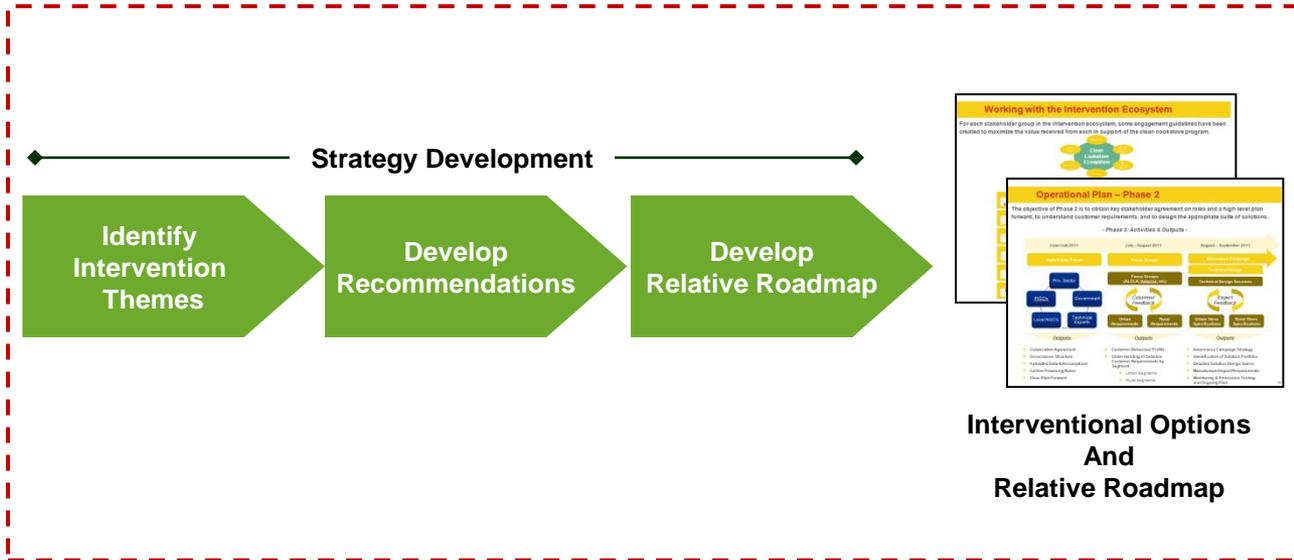
Appendix

Project Approach

A structured approach first assessed the market for a cookstove industry and then used the sector mapping output to develop the intervention options and Relative Roadmap.



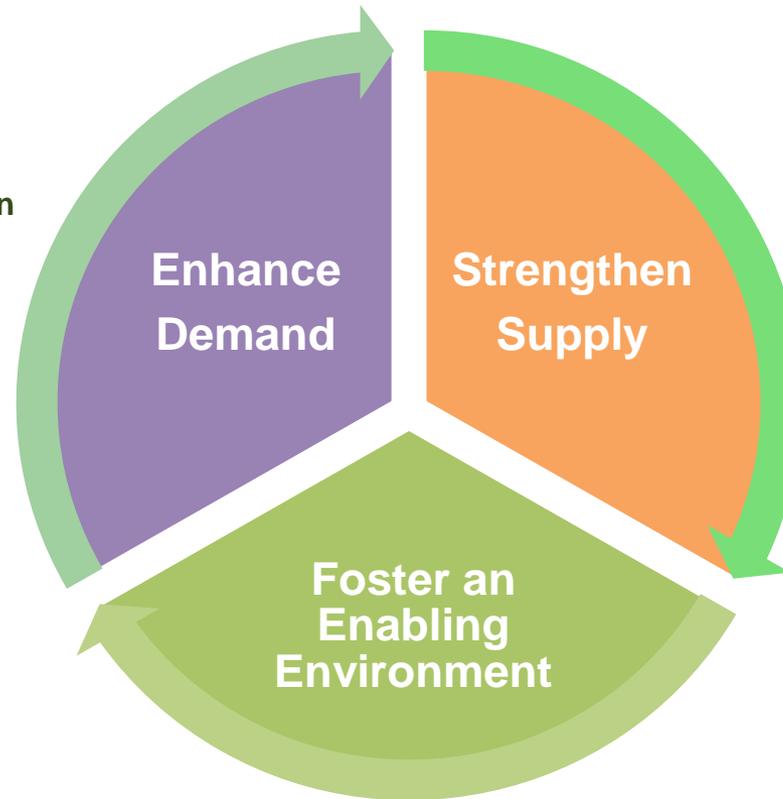
Focus of This Deliverable



A three-pronged strategy has been developed to spur the clean cookstoves market*

Project Approach and Background

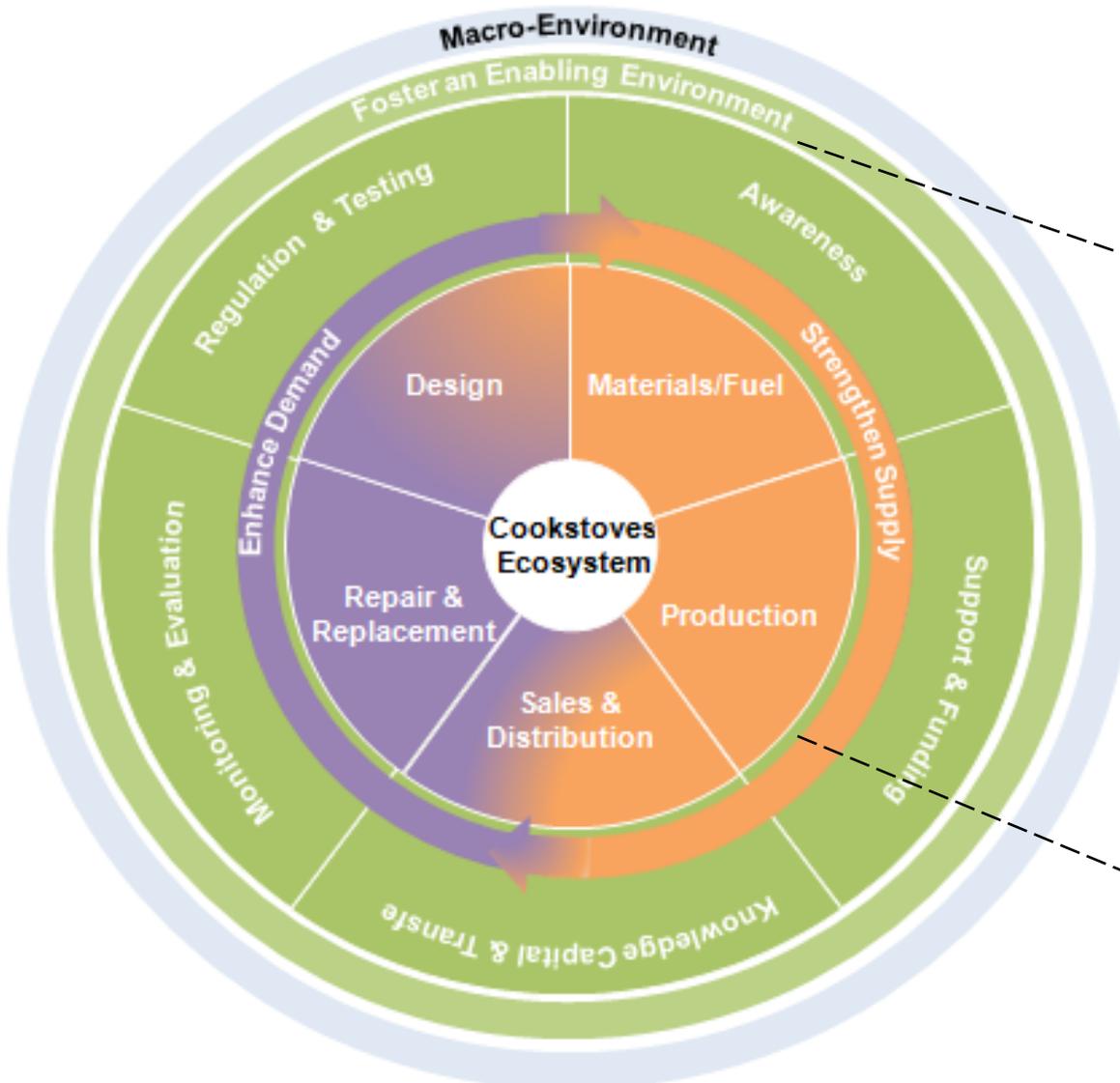
- Understand and motivate the user as a customer
- Reach the last mile
- Finance the purchase of clean cookstoves and fuels
- Develop better cookstove technologies and a broader menu of options



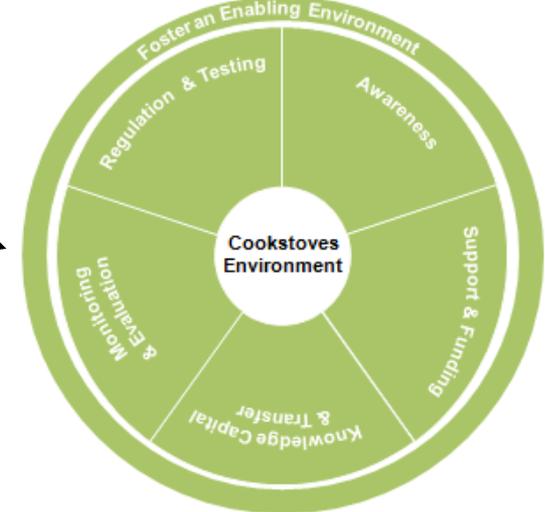
- Finance clean cookstoves and fuels at scale
- Access carbon finance
- Build an inclusive value chain for clean cookstoves and fuels
- Gather better market intelligence
- Ensure access for vulnerable populations (humanitarian)

- Promote international standards and rigorous testing protocols, locally and globally
- Champion the sector to build awareness
- Further document the evidence base (health, climate, and gender)
- Engage national and local stakeholders
- Develop credible monitoring and evaluation systems

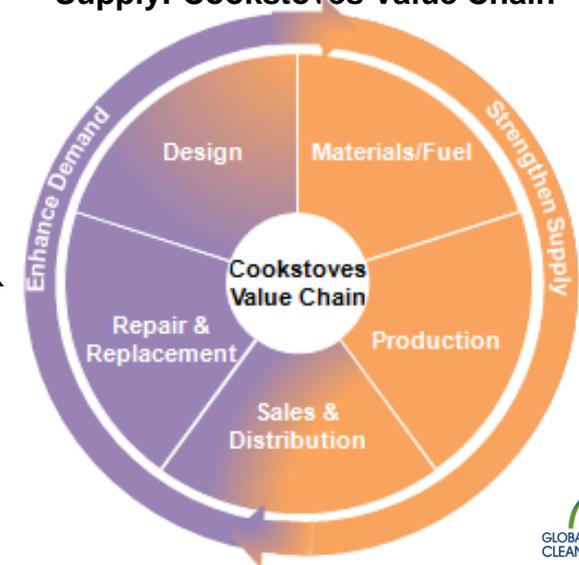
The Interventions are analyzed according to their impact to the three-pronged strategy



Fostering an Enabling Environment



Enhancing Demand and Strengthening Supply: Cookstoves Value Chain



Macro-Environment: Not in Scope for Intervention Options

- The availability of Improved Cookstoves is much higher than in the rest of East Africa, with production on a commercial basis. However much stove production is done through informal artisans and there is a lack of quality standards. Many stoves increase CO exposure while failing to reduce exposure to particulates enough to deliver significant health benefits.
- Many cookstove initiatives have taken place in the country but often lacked a commercial focus and have not been sustained.
- The market for stoves is primarily in urban and peri-urban areas and is growing as urbanization gathers pace.
- Access to modern fuels, such as kerosene and LPG, is relatively high in urban areas. Initiatives to switch users to cleaner technologies such as LPG by reducing upfront costs and purchasing quantity are being tested in the market.
- The cookstove value chain is highly fragmented. Production of components is often done separately and many middlemen exist to transport and retail stoves countrywide.
- Most production is done by small and medium scale enterprises. They often lack working capital to purchase materials in bulk & ensure continuous production, as well as capital to expand their markets.
- In rural areas the market is much weaker though GIZ appear to have been able to develop a commercially sustainable model working with local artisans. CO2Balance offers an alternative model which appears to achieve high levels of penetration in the communities it targets.
- A number of policy studies have been undertaken in recent years and a strong network of stakeholders exists.
- Carbon finance plays an important role in reducing the cost of quality stoves to the customer and is likely to continue as the main source of subsidy.

Implications for Intervention Options

- The government has adopted policy positions on domestic cooking fuels with support from various policy advisors. Opportunities exist to develop stronger, more coordinated, interventions.
- Reliable up to date information on the market does not exist and there is limited data on specific market segments and on successful marketing approaches.
- There is strong consumer demand for cleaner cooking technologies and the use of LPG could expand significantly. Innovations within the LPG sector show promise and should be engaged with.
- Ceramic jikos have achieved high levels of penetration in urban and peri-urban areas but the quality of most of these stoves is poor. There is an opportunity to raise quality.
- Even better quality stoves made locally increase exposure to CO – redesign of the basic KCJ is needed as part of a ‘quality’ drive.
- Education in fuel use and cooking practice is needed as well as increase in the quality of appliances.
- Encouragement of more consolidation amongst local producers would help with developing quality. Production of finished stoves at scale and of consistent quality would help raise quality in the market. The barriers to scaling from current artisan production are significant and entrepreneurs attempting to do this will need considerable support (financial and technical).
- In rural areas a ‘market’ approach is more difficult to develop but there appears to be potential for scaling up local artisan installation of affordable mud stoves (GIZ).
- CO2Balance projects, which disseminate stoves for virtually free, achieve high levels of penetration of stoves in communities targeted. There is some tension between this approach and those of market based programs, which better coordination of activities might address.

The Case for Action

The Kenyan cookstove market is relatively mature but has yet to reach the scale and levels of stove performance that its situation demands.

- The Case for Action -

What's Happening?

Cookstove use has a significant impact in Kenya with 67%¹ of the population exposed to IAP and 14,300² deaths every year.

Deforestation and soil erosion is a growing concern due to the 57% biomass energy supply deficit³.

The cookstove market is mature with numerous private sector and NGO players operating but few are yet to reach scale.

So What?

The stove market is well developed while there appears to be an opportunity to improve the quality of many stoves in the market.

With 78% of the population in rural areas⁴, many of the people most in need, have poor access to, and in some cases, awareness of ICS.

Consumer price sensitivity is high³ which pressures producers to focus on cost rather than quality

Why Now?

With serious issues around biomass usage & decades of in-country experience, there is significant potential to stimulate market development.

Several carbon projects are in the pipeline and will soon have passed the certification process.

The private sector is diverse but in some cases struggling to increase demand, scale up & expand its reach.

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Fostering an Enabling Environment

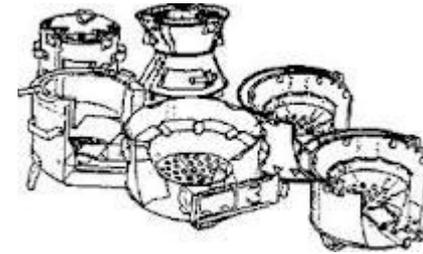
Background on the sector

The decades of activity in the Kenyan cookstove market has helped to create a relatively supportive environment for the sector. The emergence of the Kenyan Ceramic Jiko (KCJ) stove and training of countless artisanal producers, led to a strong & diverse market that significantly influenced the entire region. This early success helped drive ICS penetration in urban and peri-urban areas, where fuel is typically bought rather than collected. However, many rural communities remained untouched due to their isolated location and lower potential for market focused stove businesses. In recent times this has changed with GIZ and CO2Balance making inroads into certain rural communities in which they work.

The market today

The quality of stoves in the market appears to vary greatly. This is down to several factors. Firstly, the diverse range of producers; from the local artisan 'jua kali' base, to carbon developers such as CO2Balance, large national players like Musaki Enterprises, to importing multinationals like Envirofit. Secondly, many consumers appear extremely price sensitive and unwilling to pay for the more expensive stoves¹, which can pressure some producers to focus on

lowering the price rather than improving quality. Thirdly, the current official standards only enforce quality across a small fraction of the market (discussed later).



Reliable, comprehensive research that demonstrates the durability, efficiency and emissions of major products in the market is limited. Some data has been collected but this has proved difficult to compare and contrast due to differing levels of detail, reliability and testing protocols. However, the information that is available has shown that thermal efficiencies across the major players can range from 20 – 40%, implying that many consumers do not see the full benefit of the potential fuel savings. For some groups, the potential of improving ICS penetration is great. For example, 31% of the urban charcoal segment (income \$1 - \$3 / day) use a jiko with no clay liner³, delivering much lower fuel savings than a higher quality product would.

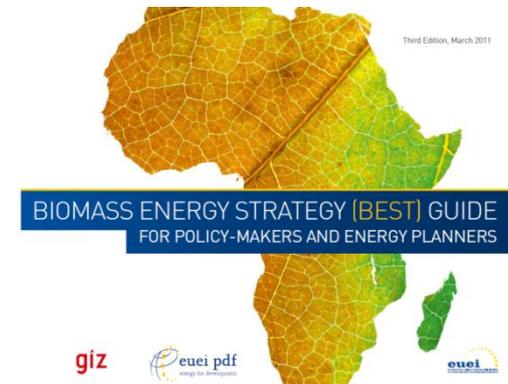
Fostering an Enabling Environment

A greater concern is that certain improved stoves actually increase CO or PM emissions compared to a traditional stove². Although the overall health impact of this result is hard to determine, any increase in harmful emissions is clearly something to be wary of.

Monitoring the quality of stoves is often the aim of any established market. In Kenya, this is no different. The Kenya Bureau of Standards (KEBS) developed household stove standards back in 2005 which apply to certain models. KEBS only regulates sales in supermarkets, a fraction of the total market. Furthermore, these standards currently address thermal efficiency, durability and the testing approach, not the volume of harmful emissions.

Beyond KEBS, there are several government initiatives that could reshape the sector. First and foremost is the biomass strategy the government is developing in partnership with the EU Energy Initiative – Partnership Dialogue Facility (EUEI PDF). Beyond that, the Prime Minister’s Office (PMO) has taken responsibility for promoting cross cutting issues in Kenya such as renewable energy. Two of those projects directly influence the sector – the Greening Kenya Initiative and the ‘Kerosene Free Kenya Programme’. The latter, in particular, could have big consequences for the sector with its goal of making solar

lanterns, green charcoal & ICS available to 10 million HHs in the next two years. Little is known of the implementation plans in place to achieve this goal but such interest in growing the sector is clearly an exciting prospect.



On a larger scale, the government has also joined forces with France to promote the Paris-Nairobi Climate Initiative, with the aim of achieving universal access to clean energy by 2030. This initiative has specific commitments to “create an enabling environment” for investments in clean energy and “carry out capacity building programmes for public and private actors in key energy value chains, notably: clean, safe and affordable cooking...”¹. This is yet another indication of the growing momentum taking place in Kenya for the growth & development of the stove sector.

Fostering an Enabling Environment

Building the market for the future

The intervention options presented in this paper focus on three areas initially; Regulation & Testing, Awareness and Knowledge Capital & Transfer.

On Regulation & Testing, the perception of poor quality stoves is present but this must be founded in science. It's proposed that a benchmarking study of the sector would help provide a baseline for future development.

Furthermore, the results could also be used as the basis on which to develop the sector and drive up the quality of products in partnership with the government, producers and NGOs. For many producers, testing remains an expensive luxury which their small margin businesses cannot afford. Improving access to and acceptance of testing is another vital component to driving up quality. Testing facilities exist at the University of Nairobi and KEBS, while GIZ are reportedly developing another, so capacity is not the issue, access is. It's proposed that the expensive barrier to testing is reduced through subsidies to help producers access the science necessary to support their product development. On broader policy, it's vital for the stove sector to work closely with the Kenyan government to ensure that any interventions in the sector are closely aligned with the 2030 Biomass Vision funded by EUEI PDF.

Despite the decades of activity in the Kenyan stove sector, the prevalence of improved cooking practices is still perceived as low. Consumer research has shown a surprisingly high willingness to purchase kitchen utensils amongst the firewood segments and most affluent urban charcoal users¹. To capitalize on this untapped opportunity, it's proposed that a broad coalition is formed across the sector to raise consumer awareness of fuel saving cooking practices and help stimulate behavioral change.

Finally, the gaps in market knowledge already mentioned make it more difficult to target pilot initiatives and tailor interventions to specific segments or specific regions. To counteract this, it's proposed that further consumer research is done to establish the actual size of the market (estimates vary greatly) and the subtleties of the different segments within that. Further research should also be performed on the urban kerosene market as market intelligence in this significant sector appears extremely limited. All of this research could, first and foremost, help shape any market interventions for donors, the Global Alliance or other NGOs. But beyond that, the research could be shared with producers and distributors to help inform their upcoming plans to stimulate further demand in the market.

Foster an Enabling Environment

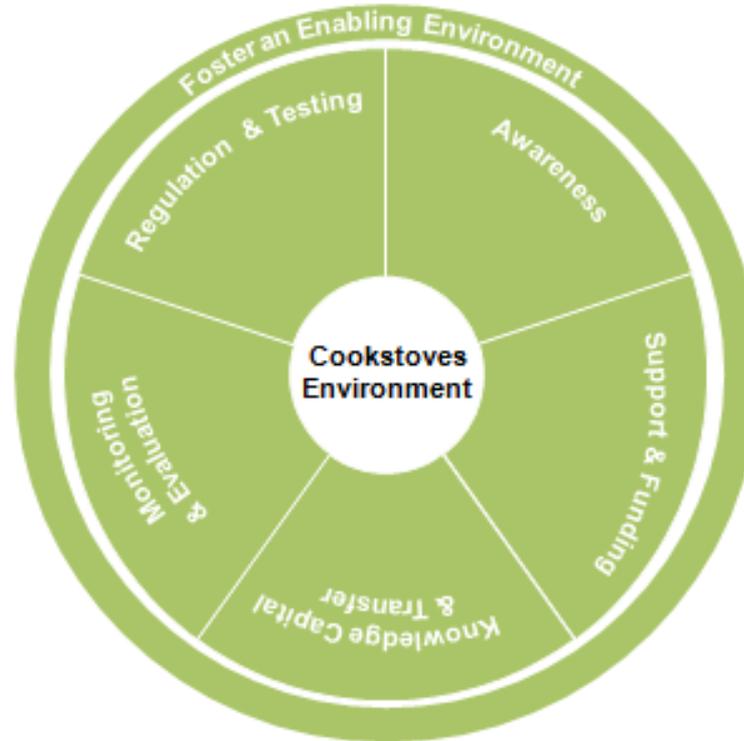
Through gaps identified in the Enabling Environment Framework, Intervention options will focus on Regulation & Testing, Awareness and Knowledge Capital & Transfer.

Regulation & Testing

- ✗ Indoor Air Quality Standards
- ~ Cookstove Standards
- ✗ Fuel Standards
- ~ Standard Enforcement

Monitoring & Evaluation

- ~ Monitoring implementations
- ✓ Tracking and Quantifying Success



Awareness

- ~ Consumer Awareness
- ~ Stakeholder Awareness
- ✓ Government
- ~ Private Sector

Support & Funding

- ~ Government
- ✓ INGOs and Associations
- ~ Local NGOs and Associations
- ✓ Private Sector
- ~ Academics

Knowledge Capital & Transfer:

- ✗ Health
- ✓ Environment
- ✗ Gender
- ✓ Consumer Research

KEY: ✓ Advanced/ Favorable ~ Has Potential/ Neutral ✗ None/ Unfavorable □ Focus Area

Regulation and Testing (1/2)

The standard of stoves within the market is currently difficult to determine. Local testing centers could use their facilities to help address this gap and provide a baseline for the sector.

Situation

Several stove testing facilities exist at academic institutions such as the University of Nairobi, who are already partnered with leading global players such as Berkeley & Aprovecho. GIZ is also developing a new facility with Kenya Industrial Research Institute (KIRDI). However, many local producers have limited access to these facilities due to the high cost.

Rationale

- Initial testing indicates a large variation in stove performance (e.g. 20 – 40% thermal efficiency across the major players)
- However, accurate & comprehensive data covering the entire market is challenging to source due to gaps & dissimilar testing approaches

Intervention Options

	<i>Involved Parties</i>	<i>Likelihood of Success</i>	<i>Budget</i>	<i>Estimated Time</i>
1. Use local testing centers to benchmark the products in the market	Academic Institutes, Private Sector, Alliance	High	Medium	6mths
2. Improve stove producers' access to testing facilities through subsidies	Academic Institutes, Private Sector, Alliance	Medium	Small	12mths

Regulation and Testing (2/2)

Clean, improved stoves account for a fraction of the current market. A lack of industry standards or enforcement reduces the potential benefits of stove usage.

Situation

There is a huge diversity of products in the market yet questions remain over their performance and durability. KEBS stove standards only apply to household products sold in supermarkets (approx. 2000 / month), leaving the rest of the market untouched. The government is currently developing a biomass 2030 strategy in partnership with the EUEI PDF so the policies that emerge from this process are likely to shape the sector over the longer term.

Rationale

- Some charcoal stoves are proven to increase CO emissions¹ when compared to a traditional stove. Particulate emissions remain at dangerous levels
- There is a perception that 'counterfeiting or copying' is a common occurrence amongst the jua kali sector²

Intervention Options

	<i>Involved Parties</i>	<i>Likelihood of Success</i>	<i>Budget</i>	<i>Estimated Time</i>
3. Work with the government on stove standards and investigate whether KEBS could be expanded	Govt, Private Sector, Alliance, ISAK	Small	Small	2 - 3yrs
4. Support the government in developing their biomass 2030 vision & its associated policies	Govt, EUEI PDF, Alliance	Medium	Small	1 – 2years

Regulation & Testing (1/2)

An impartial, accurate view of stoves in the market is key to influencing key stakeholders and helping to drive up the overall quality and performance of stoves.

- Intervention Options-

- Actions -

- Outcomes-

1. Use local testing centers to benchmark the main products in the market

- Commission local testing centers to benchmark the sector to present an impartial, accurate view of stoves in the market
- Share results with donors, NGOs & producers to strengthen the commitment for higher quality stoves and ensure future interventions use this as baseline

- Internationally connected testing centers aligned and connected to the global stove standards movement
- A reliable, impartial view of stove performance across the sector that can be used to influence government, donors, NGOs and producers
- Evidence to support an intervention focused on product development of underperforming stoves (discussed later)

2. Promote importance of stove performance by improving SME's access to testing facilities

- Support access to testing for smaller producers and NGOs to test their stoves, e.g. provide subsidies or grants
- Where improvement is required, link high potential producers with technical experts to help improve the performance of their stoves

- Greater use of testing in the market by players of all size
- Increased awareness around stove performance and understanding of the importance of product quality

3. Work with the government on stove standards & investigate expansion of KEBS

- Work with the government & ERC to expand existing KEBS standards to institutional stoves & across the household market
- Work with KEBS to develop long term plans for enforcing these standards across new distribution channels

- Clear stove standards for the Kenyan market that align with international standards
- Clear benchmarks that producers can aspire to and customers can refer to

Regulation & Testing (2/2)

An impartial, accurate view of stoves in the market is key to influencing key stakeholders and helping to drive up the overall quality and performance of stoves.

- Intervention Options-

4. Support the government in their development of a biomass 2030 vision & the associated policies

- Actions -

- Work with government to understand components of Vision2030 and how this policy will translate into action on the ground including ownership, targets and timelines
- Provide expert cookstoves advice & work to ensure that cookstoves are an integral part of the vision
- Work with government to align their biomass vision with any cookstove sector strategy

- Outcomes-

- Biomass 2030 vision has a strong cookstoves focus
- Selected interventions from any cookstove country strategy are supported by and aligned with the wider government vision

The cookstove sector is mature with numerous stakeholders. However, low appreciation for quality amongst some producers & consumers challenges the potential impact of the sector.

Situation

Decades of cookstove initiatives have established some consumer demand but less of an awareness of the benefits of ‘clean’ products. There is still a gap in consumers’ understanding of the importance of quality when purchasing stoves. There are also energy saving cooking practices that are not widely displayed.

Rationale

- 20% of rural-firewood users spent \$15-30 on kitchen utensils over 12 months: almost triple the number who spent the same on cooking appliances¹
- 18% of the rural firewood segment will invest in a cooking appliance in the next 12 months¹
- 48% of the charcoal urban segment plan to invest in utensils¹

Intervention Options

	<i>Involved Parties</i>	<i>Likelihood of Success</i>	<i>Budget</i>	<i>Estimated Time</i>
5. Increase awareness of ‘quality’ across the major players in the sector	SACCOs, NGOs, producers & distributors Alliance	Medium	Small	2yrs
6. Raise consumer awareness of methods that reduce fuel consumption	NGOs, Private Sector	Medium	Medium	1 – 2years

A greater appreciation for product quality within the sector & amongst consumers is critical to drive up stove standards. Increased awareness of fuel consumption & cooking practices may also help to reduce the environmental, economic and health burden associated with stove use.

- Intervention Options-

5. Increase awareness of quality through SACCOs, NGOs, producers & distributors

6. Raise awareness of methods that reduce fuel consumption (work with relevant NGO partners)

- Actions -

- Use stove benchmarking data to emphasise the importance of stove performance amongst influential market stakeholders
- Work with key partners to develop consumer messaging that promotes the drive for quality amongst both men & women (heads of households)
- Pilot campaigns to test their effectiveness amongst various consumer segments

- Identify potential partners active or interested in cookstoves, energy programmes & household wellbeing
- Develop messaging and campaigns around 'improved cooking practices'
- Pilot & improve the approaches before sharing amongst the wider sector
- Integrate successful messaging into larger complimentary campaigns to drive consumer behaviour change

- Outcomes-

- Increased awareness of quality amongst both the key players in the sector and certain consumer groups
- Body of consumer evidence that supports the drive for improving product quality across the market
- Consumer data to support the intervention that looks to develop distinct branding around quality stoves

- Increased consumer and sector awareness around household fuel usage and cooking practices
- Measurable, reduced cooking fuel consumption in the campaign's target areas

Knowledge Capital & Transfer

The available market intelligence has gaps around the precise market demand and understanding consumer behavior in certain segments. Further research is needed to help businesses and programs address specific consumers segments.

Situation

The Shell Foundation conducted consumer research in 2007 across 250 hhs. The research provides a basic understanding of consumers, but is not extensive nor accessible to producers. With many small producers based across the country (e.g. close to raw materials, instead of close to their consumers) they are potentially missing out on opportunities to sell to other segments.

Rationale

- Existing consumer research excludes some segments & is dated
- 18% of the rural firewood segment intend to invest in a cooking appliance in the next 12 months yet this segment is yet to be researched¹

Intervention Options

	<i>Involved Parties</i>	<i>Likelihood of Success</i>	<i>Budget</i>	<i>Estimated Time</i>
7. Conduct & share consumer research to assess overall demand, consumer needs & behaviors	NGOs, Producers, Distributors,	Medium	Small	6 - 12mths

Knowledge Capital & Transfer

Little is known about kerosene usage behavior despite its wide use in urban areas. Research is needed to determine the risks and opportunities in this sector.

Situation

Kerosene is still the most widely used fuel in urban areas yet there appears to be little market intelligence around its usage. As mentioned previously, the government is trying to reduce kerosene usage through its Kerosene Free program but this impact of this is unknown.

Rationale

- 45% of urban consumers use kerosene yet research on issues and opportunities around its usage is sparse¹.

Intervention Options

	<i>Involved Parties</i>	<i>Likelihood of Success</i>	<i>Budget</i>	<i>Estimated Time</i>
8. Instigate study into kerosene usage amongst urban consumers	Private Sector, NGOs, Govt.	High	Small	6 mths

Knowledge Capital & Transfer

Additional research can fill gaps in consumer intelligence and help inform efforts that look to link producers to potential new markets.

- Intervention Options-

- Actions -

- Outcomes-

7. Conduct consumer research to assess the overall demand, consumer needs & behaviors

- Identify gaps in existing research & agree objectives
- Partner with independent third party to run study then share research amongst the sector
- Couple with SME development package to link producers to new demand markets

- Deeper understanding of all relevant consumer segments
- A tool to motivate and encourage SMEs producers & distributors

8. Instigate study into kerosene usage amongst urban consumers

- Partner with the Government's 'Kerosene Free Kenya Programme and commission a study into the use of kerosene amongst urban users
- Develop targeted interventions to address any health, safety or social issues around kerosene use

- Improved market intelligence around the urban kerosene segment (58% of the urban population, ~672K hhs)
- Targeted interventions to address and improve conditions for this seemingly neglected group

Cookstoves Value Chain

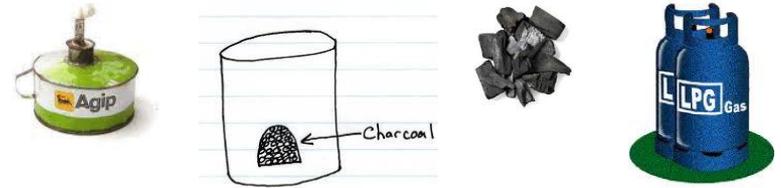
Products in the Market

As mentioned previously, the Kenyan cookstove market is mature following decades of NGO, private sector and government activity. The range of products is fairly diverse with numerous portable models available, in addition to the presence of fixed rocket stoves, biogas burners and, of course, stoves for the more modern fuels. As the range of products varies dramatically, so does their performance. With limited stove testing publicly available, certain stoves could clearly benefit from further product development to drive up efficiencies, reduce emissions and lengthen their durability.

Availability of Materials & Fuel

Raw materials are widely available with ceramic liner producers normally located close to the source. Anecdotal evidence suggests that these producers still struggle to take advantage of group buying, although some cooperatives have emerged to address this. In terms of fuel access for consumers, wood is the dominant rural fuel consistent with other countries in the region. However, in the urban areas, kerosene is the dominant fuel followed closely by charcoal. Although LPG is further behind, trends indicate that its use and distribution is steadily growing¹. However, for LPG to expand its footprint, there are several

barriers to overcome such as unfavourable policy, unreliable supply and prohibitively high upfront cost. The unfavourable policy is a particular concern as the current VAT bill under discussion proposes to reverse the VAT exemption the government applied in 2005. Any additional tax will obviously increase the price and move it further from the reach of many consumers.



Despite these challenges, innovative LPG initiatives such as Pima Gas, a new product from Premier Gas, part funded by the International Finance Corporation (IFC), appear encouraging. This particular initiative aims to unlock the potential market that is keen to use LPG but cannot afford the high initial cost of the cylinder & prohibitively expensive minimum refill volumes. Their approach of offering smaller, 1Kg canisters & \$0.5 minimal refills shows promise. They are also looking to address the uncertainty of supply by building a 200,000 ton storage facility in Nairobi. Efforts like this should be watched with interest and supported where possible.

Production

The stove production base is very fragmented in part due to historic programs and policies aimed at encouraging decentralisation. Now, however, this decentralisation makes affecting change in the market more challenging. Monitoring stove performance, enforcing standards and supporting product development is much more difficult in this environment. That said, there are several larger producers with real potential to scale up if the demand is proven and some of the barriers to growth can be removed. These producers, if given the right support and incentives, could scale up their production to take advantage of greater economies of scale and the efficiency savings related to mechanisation. A more consolidated market would help drive up ICS penetration rates and with the right incentives, the overall quality of stoves in the market.

Sales & Distribution

Although issues have been raised around product quality and scale of production, the greatest challenge in Kenya remains sales and distribution. Larger players such as Paradigm & Envirofit have both cited stove “distribution” as their primary barrier. It is believed that many of the smaller companies that make up the distribution network of these larger producers, struggle to access the finance necessary

to purchase stock and transport them cost effectively to new markets¹.

In rural areas, the challenge is even greater with only 2 – 8% of rural firewood users owning an ICS¹. This is likely to be down to a few reasons. First of all, at least 60% of these consumers collect their wood for free² while the remainder will likely pay lower prices than in urban areas due to greater local availability. Secondly, previous programs have not historically addressed the rural areas due to the distribution and economic challenges. These barriers make the task of increasing ICS adoption amongst these communities particularly difficult. Despite that, there is some evidence of success with GIZ and CO2 Balance both displaying impressive results. GIZ, in particular, have trained thousands of local producers who now build approximately 140,000 Jiko Kisasa and 400,000 rocket stoves annually³.

For carbon developers, these rural areas are ideal markets to generate carbon credits so the further expansion of their efforts seems likely. Providing their target communities remain rural, there appears to be no evidence that the distribution of free or heavily subsidized stoves will distort the market, a common concern in this area.

Strengthening Supply & Enhancing Demand

The intervention options presented in this section focus on four areas initially; Design, Materials / Fuel, Production and Sales & Distribution.

Due to the diverse nature of the sector, numerous stove designs are currently available. The issue is apparently not one of choice but one of stove performance & durability. The informal, 'Jua Kali' artisanal sector has proven effective at increasing ICS adoption but monitoring & raising the quality of these stoves appears immensely difficult. To address this, it's proposed that 'high potential' producers are identified and their growth supported. We define 'high potential' as businesses slightly above the artisanal level, with established operations, commitment to quality, an ambition to grow and a clear plan to achieve that. Anecdotal evidence from the GVEP DEEP program, one that worked to support SME stove businesses, suggests that finding these 'high potential' producers could be much more challenging than initially expected. Given that, it's critical not to underestimate the level of effort that will be required to correctly identify these businesses and the importance of doing this effectively.

However, once these producers are selected, they could

be given targeted design and R&D support to improve the durability and performance of their stoves, particularly in relation to emissions. Moreover, once this 'quality' is assured, a stronger brand can be developed to help distinguish them in the market and grow their presence. This last piece is crucial and an important way to take advantage of the increasing consumer demand for stoves, as evidenced in the impressive sales of the GIZ rocket and Envirofit stoves when compared to their lower quality peers¹. This emphasis on branding would also help counteract the reported practice of jua kali counterfeiting and copying².

For fuels, a greater push of LPG usage is proposed. Urban charcoal users have shown desire to switch³ and although the price remains considerably higher than charcoal, there is clear potential amongst higher income groups. In addition, it's proposed that more is done to create a supportive environment for the promising LPG initiatives such as Pima Gas. The supply of LPG throughout the country is currently a prominent issue due to the rising demand. Supply bottlenecks, caused by insufficient storage facilities, have been a major driving force for this rise in price, prompting the Kenya Pipeline Company (KPC) to resurrect plans for constructing inland storage and bottling facilities in various parts of the country.

Addressing these broad, strategic issues as well as developing more specific, supportive policy will be vital to the path of LPG adoption rates. Maintaining VAT exceptions, reducing tariffs on stoves and even subsidizing cylinders would all be beneficial if the government had the appetite & resources to follow this path. Please note, charcoal production is another critical factor to consider but this was deemed out of the scope of this paper.

On the production level, larger players such as Envirofit and Paradigm have strong plans in place. However, the market remains very fragmented with countless businesses producing hundreds each month, but seemingly only one, Musaki, producing in the thousands. Once there is proven demand (discussed later), producers should be given targeted support, in terms of expertise and access to favourable finance, to increase mechanization and scale up their production volumes. Accessing finance has been anecdotally reported through the GVEP DEEP program as a particular challenge for SME producers.

At an artisanal level, it's proposed that the formation of groups (e.g. cooperatives) would be an important first step that could help reduce material costs. Some groups have already formed, so it would be important to understand the

successes and issues encountered so far. It would be beneficial to work with groups such as ISAK, who have recently formed to support private cookstoves businesses. Although this intervention would initially aim to capitalize on group buying, it would also help create a platform for producers to share knowledge, access resources and of course, make it easier to later link them to new markets. Should these groups show promise, there is also the longer term, ambitious option of linking them to carbon finance. In such a situation, they could, again, take advantage of economies of scale to appear more attractive to carbon developers while at the same time, share the burden of M&E between the group.

For all of these production focused interventions, it's important to emphasise that efforts to scale up must only be attempted once enough demand has been stimulated in the market. Recent assessments have commonly identified this as a major barrier to growth in the sector.

Cookstoves Value Chain

The final area for recommended intervention is in the sales & distribution section of the value chain. This area is absolutely crucial and commonly seen as the biggest barrier to the growth of clean, improved cookstove adoption in Kenya. The following interventions have been proposed across four themes; specific marketing & distribution support, building consumer credit for high end stoves, improving access to carbon finance and capitalizing on the success of existing programs to target hard to reach, rural communities (discussed overleaf).

Firstly, for marketing & sales, this would consist of two parts; access to finance to support the distribution networks of the larger players and specific marketing support for producers of high quality stoves to test new approaches amongst consumers. Sharing of best practice from other countries in the region then providing the funds to test them would help reduce the barriers to innovative and higher risk social marketing. On distribution, the recent partnership between Unilever and Envirofit shows real promise for driving growth. This should be watched with interest and similar arrangements could be brokered between other larger players and companies with established distribution networks.

On end finance of stoves, its proposed that SACCOs and other MFIs are approached to increase their energy portfolios. The low price of stoves is typically too low for micro credit to be financially feasible but the high costs of LPG stoves and canisters present an opportunity to break this historic situation. The MFI groups could also act as a further marketing channel for these products.

The emergence of carbon finance in the Kenyan market has already had a significant impact. The signs are that this momentum will increase so it's proposed that more could be done to help local producers access the benefits of carbon finance. Any 'brokering' of alliances in the market would also help carbon finance developers identify potential partners.

Finally, the issue of addressing the vast rural population remains. It's proposed that a two prong approach is undertaken. Firstly, the significant success of GIZ's EnDev program should not be underestimated. A further feasibility study should be performed to see whether this approach could be replicated for other rural areas across the country. Any replication would likely require significant funds, the EnDev program cost approximately \$8M¹, so careful consideration must be given to this. The second approach, is to work with carbon developers such as CO2 Balance and the government to identify potential at risk, rural communities where win-win opportunities could be brokered. Such opportunities would give remote rural communities access to ICS while carbon developers could get favorable conditions and support for their projects.

Enhance Demand and Strengthen Supply: Cookstoves Value Chain

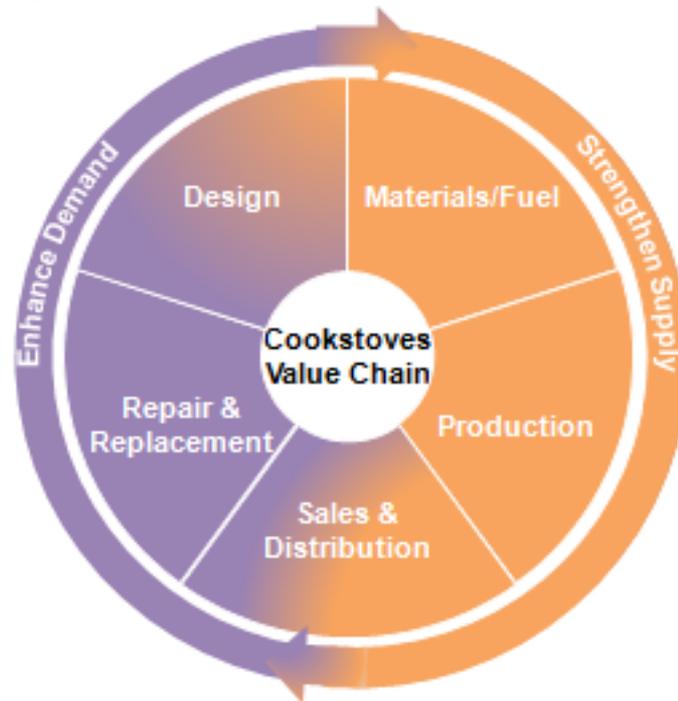
Through gaps identified in the Cookstoves Value Chain, intervention options will focus on Design, Materials / Fuel, Production and Sales & Distribution.

Design

- ✓ Stove Type
 - ~ Fixed
 - ✓ Portable
 - ✓ Biogas Digester
 - ✗ Solar
- ~ R&D
 - ~ Private
 - ~ Gov't/Academics

Repair & Replacement

- ~ Supply of Repair Skills and Parts
- ~ Post-sales Service



Materials/Fuel

- ✓ Stove Raw Material Supply
- ~ Stove Raw Materials Cost
- ~ Fuel Value Chain
 - ✓ Biomass
 - ✗ Clean Coal
 - ✗ Solar/Biogas
 - ~ Petro based
- ~ Cost of Clean Fuels

Production

- ~ Scalability
 - ~ Handmade
 - ~ Masons
 - ~ Factory
- ✗ Producer Fragmentation
- ✗ Producer Financing
 - ✗ Access to Capital

Sales & Distribution

- ~ Financing Purchasing (micro-credit)
- ~ Carbon Financing
- ~ Customer Segmentation
- ~ Last Mile Distribution
- ✗ Reach Vulnerable Populations

KEY: ✓ Advanced/ Favorable ~ Has Potential/ Neutral ✗ None/ Unfavorable ■ Focus Area

Despite the presence of several high performing products, many stoves still appear to have room for improvement. Targeted product support could improve efficiency, durability and emission standards and differentiate these models in the market.

Situation

There is a diverse range of products in the market but many have efficiencies lower than 30% & dangerously high emissions of CO & PM¹. Price is the dominant factor for consumers considering purchasing a stove. This, coupled with the abundance of small producers means that the market is dominated by poor performing stoves.

Rationale

- Testing has shown that certain KCJ & Uhai stoves actually increase CO emissions by 4ppm compared to traditional stoves². Particulate emissions also remain at dangerous levels
- “Stove cost” was the main consideration for those who buy fuel. This price sensitivity pushes producers to focus on lower costs rather than increase quality

Intervention Options

	<i>Involved Parties</i>	<i>Likelihood of Success</i>	<i>Budget</i>	<i>Estimated Time</i>
9. Support ‘high potential’ producers with technical & branding expertise to improve the quality of their product	NGOs, Private Sector,	Medium	Medium	12mths

By investing in high potential producers with a strong commitment to quality, the penetration rate of improved stoves could be increased.

- Intervention Options-

9. Support 'high potential' producers with technical & branding expertise to improve the quality of their product

- Actions -

- Identify high potential producers with ability to scale and an opportunity to improve their stove performance
- Partner technical experts (e.g. Aprovecho) with producers to identify improvements based on testing
- Work with producers to develop distinct branding for these higher quality stoves
- Provide access to funding for prototyping, pilots & consumer testing

- Outcomes-

- Evidence that illustrates the consumer demand for higher performance stoves and support the push for quality
- Increased market penetration for stoves with efficiency levels of 30+%
- Increased consumer awareness around the concept of stove performance & 'quality'

There is clear consumer demand to switch to modern, aspirational fuels despite rising costs. Improved access to these clean fuels is critical to meeting this demand.

Situation

Fuel prices are increasing across the board, with LPG up 110%, kerosene up 25% and charcoal up ~80% this year alone¹. However, demand for LPG increases steadily despite the high initial cost (stove \$20 + cylinder ~\$75)² that prevents a larger uptake in urban areas. The government removed VAT on LPG in 2005 as part of an initiative to increase adoption but is now considering a bill that looks to reverse this.

Rationale

- 57% of urban charcoal users aspire to upgrade to gas³
- Demand for LPG has increased 25% in the past year primarily due to weaker domestic currency and supply bottlenecks⁴

Intervention Options

	<i>Involved Parties</i>	<i>Likelihood of Success</i>	<i>Budget</i>	<i>Estimated Time</i>
10. Work with the government to improve access to LPG and pilot initiatives to promote their use	Gov, Private Sector	Medium	Medium	2 – 3years

Ref: 1 – Smart Company, Spot Check, 2011 (Daily Nation).

2 – GVEP DEEP Study, 3 – Shell Foundation, Breathing Space, 2007, 4 – Argus International LPG, 2011

The current government push to promote LPG use and develop a biomass strategy presents an ideal opportunity to advance the adoption of clean fuels and stoves.

- Intervention Options-

10. Work with the government to improve access to LPG and pilot initiatives to promote their use

- Actions -

- Work with government to make LPG more accessible for consumers
- Share best practice LPG practices and policy from other countries
- Partner with LPG stove producers & fuel distributors to test pilot initiatives
- Scale up successful initiatives with government and business support

- Outcomes-

- Increased government support for LPG
- Evidence from pilots to support the scale up of broader LPG programs
- Improved accessibility of LPG in certain communities

Small & fragmented artisans have little incentive to scale up production due to limited demand. Access to working capital & knowledge also appear to be contributing factors.

Situation

Local artisans play a huge role in cookstove production in Kenya. It's been reported that many producers make products as a side line business as it does not offer adequate revenues. Due to inadequate demand & poor access to working capital, many producers cannot scale up or in some cases, break even with their stove product line.

Rationale

- There are a myriad of producers selling ~100 stoves per month, but only a handful breaking the 1000 mark - e.g. Musaki¹
- There are thousands of stove producers across the country. GIZ alone have trained 1800 rocket stove builders & 300 Jiko Kisasa producers

Intervention Options

	<i>Involved Parties</i>	<i>Likelihood of Success</i>	<i>Budget</i>	<i>Estimated Time</i>
11. Provide 'soft loans' to producers to scale up their operations	SACCOs, MFIs, Private Sector, NGOs, Alliance	Medium	Medium	2 Years
12. Support production capacity building for artisans & larger producers	Private Sector, NGOs, Alliance	Medium	Medium	1yr – 18mths

High potential producers, showing a commitment to demand & quality, could be invested in to support the scale up of their production through capacity & funding.

- Intervention Options-

11. Provide 'soft loans' to producers with proven local demand & commitment to quality to scale up their operations

- Actions -

- Once demand is proven, work with high potential producers to identify funding gaps (on the proviso a high quality product -those without would need to focus on technical improvements first)
- Provide soft loans that allow them to invest in working capital and scale up their operations
- Link this in closely with any local efforts to stimulate demand

- Outcomes-

- The improved access to finance helps producers expand their operations
- Increased number of high quality stoves present in the market

12. Support capacity building for artisans & larger producers to scale up production

- For artisans, set up or work with existing production groups (e.g. formed by GIZ & Practical Action) to capitalize on group buying of materials
- For larger producers, work with them to identify skill and knowledge gaps
- Provide business coaching & support to help address these
- Where finance, marketing or technical assistance is needed, link to other intervention programs

- Lower raw material costs for promising artisans and smaller producers
- Greater number of committed producers with an ability to scale.
- Increased likelihood of these businesses being successful

Sales & Distribution (1/4)

Higher end stoves, both consumer & institutional, are often prohibitively expensive for cash purchases. Micro credit could help reduce this barrier and act as an additional marketing channel.

Situation

Approximately 1.5 - 3.4m households own an improved stove¹, with the majority paying in cash. A lack of consumer financing opportunities may be a barrier to investment in higher quality stoves & LPG hardware, although the purchasing power clearly exists in some segments. In the institutional sector, the Energy Regulatory Commission (ERC) is working with KEBS to develop standards and also encouraging banks to give loans to institutions.

Rationale

- Formal micro lenders don't finance large numbers of stoves. They are willing - if marketing & service is provided elsewhere²
- The initial cost of LPG is extremely high - stove \$20 + cylinder ~\$75³
- Demand for LPG has increased 25% over the past year & is projected to double in the next 2 years⁴

Intervention Options

	<i>Involved Parties</i>	<i>Likelihood of Success</i>	<i>Budget</i>	<i>Estimated Time</i>
13. Foster micro credit opportunities for higher end stoves, LPG canisters & institutional stoves	SACCOs, MFIs, Private Sector, ERC, Alliance	Small	Medium	1 – 2years

Sales & Distribution (2/4)

Cost effective distribution and increasing consumer demand remains a challenge for most in the sector. Targeted marketing support could help pave the way for increased growth.

Situation

Of the 1.5 - 3.4m households that own an improved stove¹, only a fraction is thought to own a product with both very high efficiencies & low emissions. For those higher end stoves, distribution and marketing are widely recognised as the primary barriers to increased sales in the market. These companies are experimenting with innovative distribution models, such as Envirofit's recent pilot to tie up their products with Unilever.

Rationale

- Paradigm & Envirofit both cite stove “distribution” as their primary barrier²
- 36% of stove business owners cite ‘marketing’ as their major challenge. Of these 14% cite ‘finding new markets’ as the main *marketing* challenge³

Intervention Options

	<i>Involved Parties</i>	<i>Likelihood of Success</i>	<i>Budget</i>	<i>Estimated Time</i>
14. Link producers to established supply chains and local retail outlets	Producers Distributors , Private Sector, Alliance	Medium	Small	1 – 2years
15. Provide marketing support to producers & distributors to build consumer demand	Private Sector, Alliance	Medium	Small	2years

Sales & Distribution (3/4)

Carbon finance is already influencing the sector but many are yet to capitalize on this. More needs to be done to help link producers with the potential of carbon credits.

Situation

Carbon finance is relatively advanced in Kenya with 5 cookstove projects already registered and several carbon project developers active in the market. This trend is likely to increase because of the favorable market conditions mentioned throughout this report. Although many producers are already active in the carbon market, many more have yet to take advantage of this opportunity.

Rationale

- There is a big pipeline of carbon projects in Kenya. 5 carbon projects on cookstoves have already been registered with another 9 under validation¹.

Intervention Options

	<i>Involved Parties</i>	<i>Likelihood of Success</i>	<i>Budget</i>	<i>Estimated Time</i>
16. Link producers to carbon finance developers and upcoming PoAs	SACCOs, MFIs, Private Sector, Alliance	Medium	Small	2years

Sales & Distribution (4/4)

Many rural communities remain out of reach of cookstove programs and unattractive for businesses. Building on the success of GIZ and CO2Balance could help reverse this low penetration rate.

Situation

Despite the large ICS market, some consumers remain out of the reach of distributors & producers, including many in vulnerable & rural settings. Despite that, GIZ and CO2 Balance have both managed to increase uptake in rural areas through their programs. The increasing use of carbon finance is likely to produce greater interest in rural communities where the need for ICS is great, but affordability is poor.

Rationale

- The GIZ EnDev program disseminated stoves to 2.88M people in mainly rural, poor areas without the use of direct subsidies

Intervention Options

	<i>Involved Parties</i>	<i>Likelihood of Success</i>	<i>Budget</i>	<i>Estimated Time</i>
17. Investigate feasibility of replicating the GIZ EnDev success in other rural communities	GIZ, Govt, NGOs Alliance	Small	Small	1 – 2years
18. Broker win-win opportunities with carbon developers to address rural communities	Govt, Carbon Developers, Private Sector, Alliance	Medium	Small	2years

Sales & Distribution (1/2)

Increasing and expanding the distribution networks will help producers access new markets. Motivating micro lenders to fund high end stove purchases is another sales channel to drive demand.

- Intervention Options-

- Actions -

- Outcomes-

13. Foster micro credit opportunities for higher end stoves, LPG canisters & institutional stoves

- Identify microcredit organisations interested in financing stoves (e.g. SACCOs & other savings groups)
- Work with lenders to develop their energy portfolios & promote the use of higher end stoves (both consumer & institutional)

- Greater awareness around the potential of energy investments amongst SACCOs & micro lenders
- Increased promotion of higher end stoves (e.g. LPG) by SACCOs & micro lenders
- Lower initial barrier for consumers interested in higher end stoves

14. Link producers to established supply chains and local retail outlets

- Identify potential corporate partners that could partner with local producers to sell stoves (e.g. Unilever with East Africa Energy)
- Fund pilots in certain locations to test consumer acceptance and support the setting up of distribution networks

- Increased distribution network and marketing opportunities for high end stove producers
- Increased awareness of higher end stoves amongst consumers

15. Provide marketing support to producers & distributors to build consumer demand

- Work with prominent players (e.g. Paradigm, East Africa Energy, etc.) to provide sales and marketing support
- Where gaps exist, work with quality local producers & distributors to increase their marketing skills
- Fund pilot programs to develop and test new stove marketing approaches

- Increase stove demand in the pilot areas
- Improved marketing capabilities and market knowledge at several of the larger producers

Sales & Distribution (2/2)

Linking producers and remote, rural communities to the potential of carbon finance, can help increase ICS distribution networks, consumer awareness and ultimately, penetration rates.

- Intervention Options-

- Actions -

- Outcomes-

16. Link producers to carbon finance developers and upcoming PoAs

- Promote the benefits and implications of carbon finance amongst stove businesses
- Link interested businesses to existing and new carbon project developers
- Encourage knowledge transfer and share best practices across the region with other national carbon bodies

- Improved awareness amongst market players around the benefits and opportunities of carbon finance
- Greater competition and diversity of carbon finance support projects in Kenya

17. Investigate feasibility of replicating the GIZ EnDev success in other rural communities

- Work with GIZ & Govt. to investigate the feasibility of replicating their program in other rural communities
- If positive, commission a study to investigate how could be achieved
- If promising, mobilize resources and partners to roll out the program

- Increased ICS adoption rates amongst the 2.6M rural households
- Increased artisan production base & consumer awareness of ICS where previously this was likely to have been limited

18. Broker win-win opportunities with carbon developers to address rural communities

- Use consumer research and work with Government to identify vulnerable consumer segments
- Link with new or existing carbon project developers to enhance this group's access to ICS

- Greater number of vulnerable consumers provided for
- Carbon finance projects are given additional support in identifying potential markets

Executive Summary

Project Approach and Background

Intervention Options

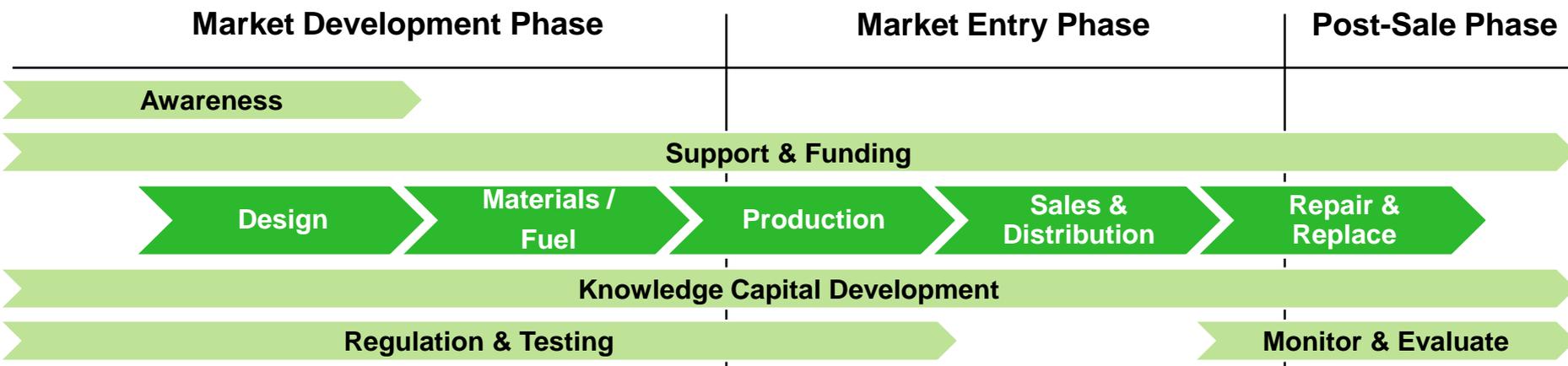
Roadmap

Conclusion

Appendix

Intervention Options Roadmap Overview

The Cookstove Value Chain is a sequential process, and contains interdependencies. Similarly, the Enabling Environment Framework components should be done in lock-step with the value chain.



1. Benchmark the market
2. Improve access to testing facilities
3. Establish government standards / expand KEBs
4. Support biomass vision 2030
5. Increase awareness of quality
6. Increase awareness of improved cooking practices
7. Conduct consumer research
8. Conduct kerosene market research
9. Help improve product quality
10. Lobby government to increase use of LPG

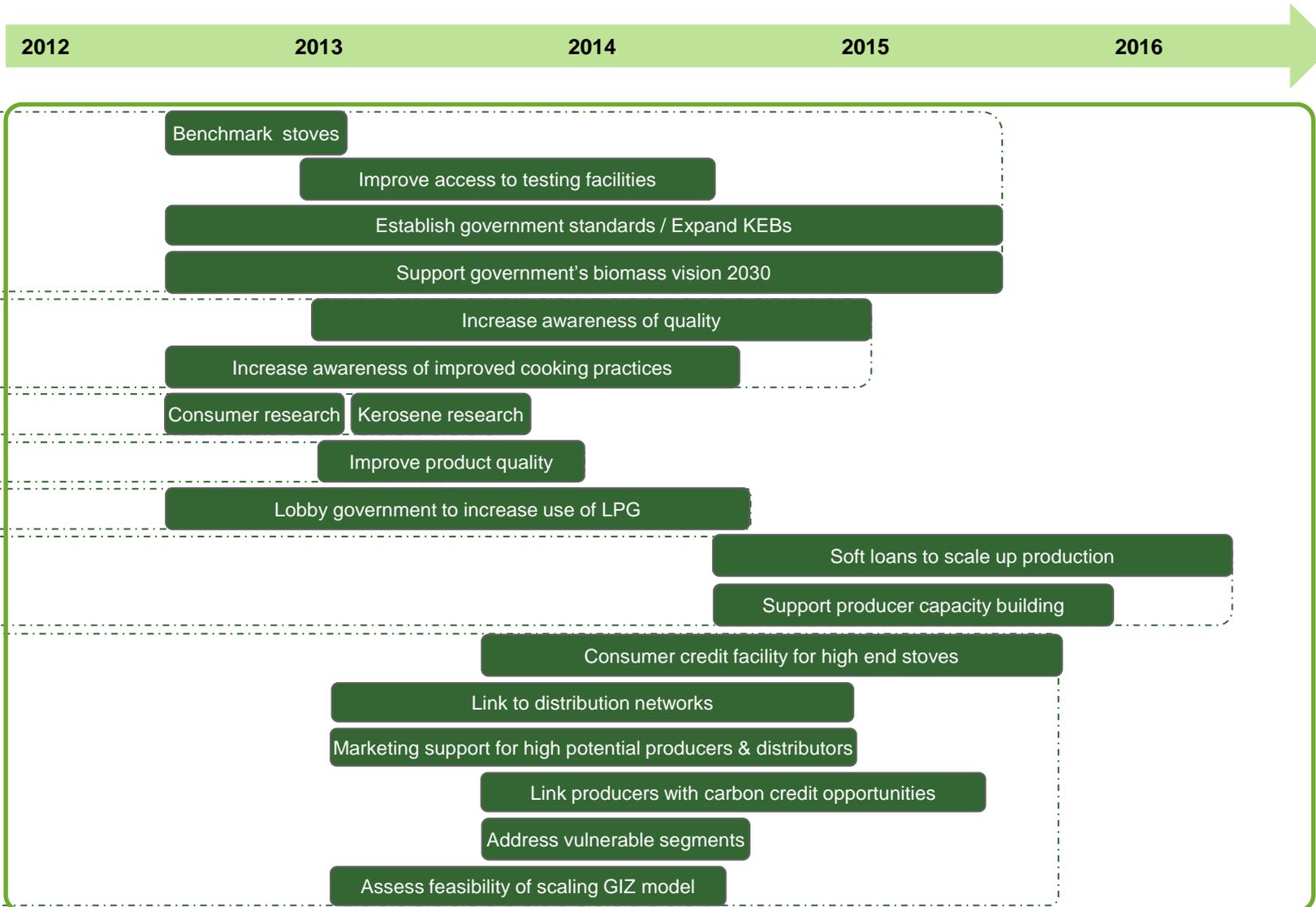
11. Soft loans to scale up production
12. Support producer capacity building
13. Foster credit facility for high end stoves
14. Link to established distribution networks
15. Marketing support for high potential producers & distributors
16. Link producers with carbon credit opportunities
17. Investigate feasibility of replicating GIZ model
18. Broker win-win projects for vulnerable communities

Key

-  Cookstove Value Chain Component
-  Enabling Environment Framework Component



Intervention Roadmap



Executive Summary

Situation

Intervention Options by Customer Segment

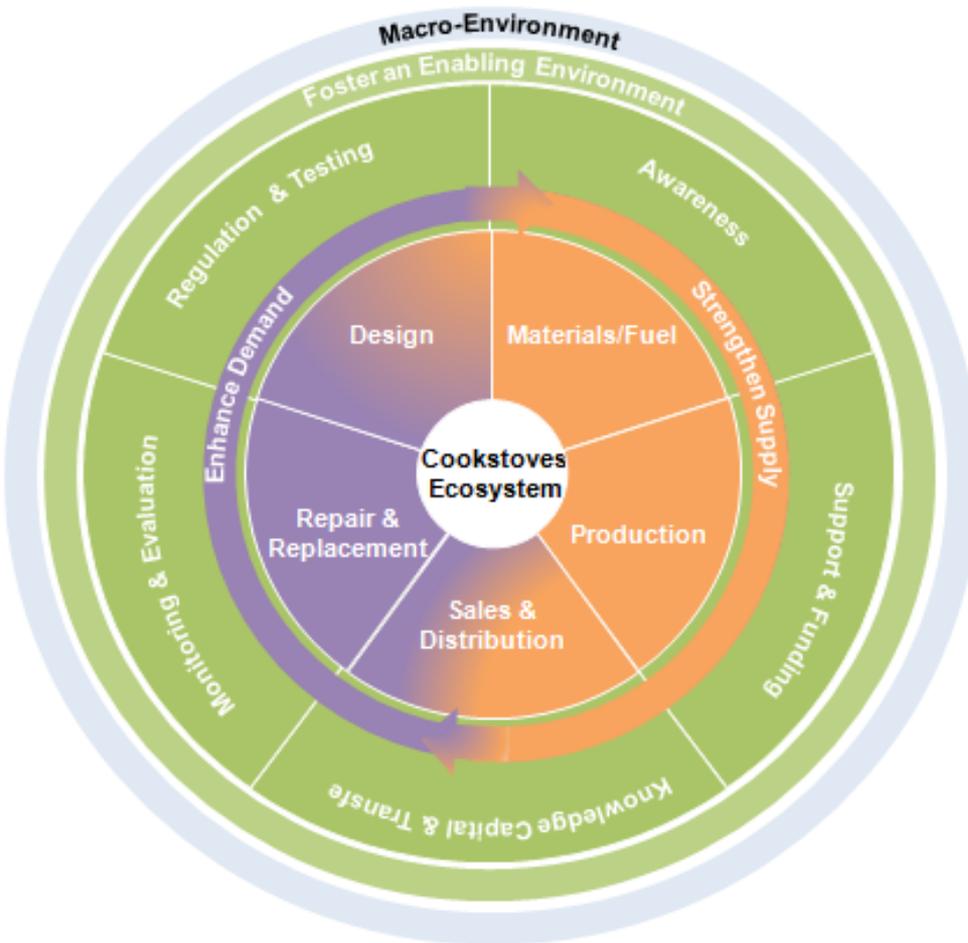
Intervention Options Roadmap

Conclusion

Appendix

Conclusion

In Kenya, the cookstove sector is diverse but fragmented with a myriad of players. Demand around high quality products needs to be stimulated to help increase the production & adoption of clean, improved stoves.



Macro Environment

- Around 5 million households are exposed to IAP, causing 14,300 annual deaths
- 78% of the population live in rural areas where wood is the dominant fuel (+88%)

Enabling Environment

- Clean, improved stoves only account for a fraction of the current market with standards playing a small role in the sector
- Consumers are very price sensitive and there is a perception that quality is not a priority for them, however there is a lack of robust data to back up this observation

Cookstoves Value Chain

- Sales & distribution are commonly seen as the biggest challenges as producers & distributors struggle to generate enough demand
- Several opportunities exist around the supply of clean fuels, which many charcoal users want to switch to
- Once demand leads, production scale up must quickly follow to help reduce costs

Executive Summary

Situation

Intervention Options by Customer Segment

Intervention Options Roadmap

Conclusion

Appendix

Glossary of Terms

Below is a list of commonly used acronyms used throughout the report:

ADP	Accenture Development Partnerships	ISAK	The Improved Stoves Association of Kenya
CDM	Kyoto Clean Development Mechanism	KCJ	Kenya Ceramic Jiko
CO	Carbon Monoxide	KIRDI	Kenya Industrial Research Institute
EUEI	European Union Energy Initiative	KEBS	Kenya Bureau of Standards
ERC	Energy Regulatory Commission	LPG	Liquid Petroleum Gas
GIZ	Gesellschaft für Internationale Zusammenarbei	NGO	Non-Governmental Organization
GVEP	Global Village Education Partnership	PM	Particulate Matter
HH	Household(s)	SME	Small to Medium Sized Enterprise
IAP	Indoor Air Pollution	VAT	Value Added Tax
ICS	Improved Cookstove	SACCO	Savings and Credit Cooperative
ICT	Information and Communication Technologies		
iNGO	International Non-Governmental Organization		