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Global Alliance for Clean Cookstoves

Ghana Market Assessment

Sector Mapping

Accenture Development Partnerships

April 2012

Introduction

- This Market Assessment was conducted by Accenture Development Partnerships (ADP), the not-for-profit arm of the global management consultancy, Accenture, 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.
- Full slate of market assessments include studies in: Bangladesh, Brazil, Colombia, East Timor, Ethiopia, Ghana, Indonesia, Kenya, Mexico, Nigeria, Peru, Rwanda, South Africa, Tanzania, Uganda and Vietnam.
- 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 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 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.

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In West Africa, Ghana, with a population of 24 million, stands out as having political stability and a vibrant democracy for almost two decades. Its economy, too, is notable; Ghana has moved from being a least developed country to a middle income country. While the situation is hopeful, 28.5% of the population remains below the national poverty line.

Like the country itself, the cookstove ecosystem is promising. Ghana is home to many improved cookstove producers that have each scaled to tens of thousands of cookstoves annually (and in one case to 100,000), and new entrants, such as Envirofit and CookClean, are regularly entering the market. The improved cookstove sector started in the 1990s with the Ministry of Energy's Ahibenso coalpot program. This program had limited impact, however, because production stopped when the limited government funding ran out. Starting in 2002, EnterpriseWorks/VITA, a division of Relief International (RI/EW) developed a sustainable production and supply chain for 'Gyapa' stoves, which are more efficient than the traditional coalpot. Initially trained by the RI/EW program, two companies broke away in 2007 and continue to operate today: Toyola Energy and Man & Man Enterprise, with Toyola having about 2/3 and Man & Man with 1/3, respectively, of Relief International/EnterpriseWorks' production capacity. Even with their combined throughput, these improved stoves only account for about 5% of the total cookstove market today.

Since the aforementioned Ahibenso coalpot program, the government's role in cookstoves has primarily been through its LPG subsidy. Originally intended to promote household LPG use, the subsidy has had the unintended effect of reducing fuel costs for commercial vehicles, usually taxis, instead. LPG supply has also been problematic, with frequent shortages. Furthermore, LPG is not easily accessible in rural areas. The government is exploring options to reduce the subsidy and to redirect funds to subsidizing LPG stoves and cylinders for the poor instead. In addition, the Energy Commission is working with KITE, a local development organization and energy think tank, to pilot renewable charcoal woodlots. The Energy Commission seeks to expand its activities in charcoal to help increase the regulation and efficiency of the sector.

Specific findings, organized by Macro Environment, Social and Environmental Impact, Consumers, Cookstove Industry, and Financing are summarized on the following page.

Sector Mapping Executive Summary (2/2)

	Findings
<i>Macro Environment</i>	Ghana has been a stable country with a representative democracy since 1993. Environmentally, deforestation is the largest issue facing the country. The government understands that action must be taken to alleviate the problem, and following the passage of its landmark Renewable Energy Act, is drafting a bioenergy policy which addresses woodfuel, biofuel, and biomass use in Ghana. Additionally, the government seeks to continue its policy of woodfuel substitution for LPG, which has had mixed results in the past. Generally, the government’s limited funds constrain its scope of action.
<i>Social and Environmental Impact</i>	Over 80% of households use biomass as their primary cooking fuel. This fact, coupled with rapid deforestation--over 70% of Ghana's forest cover has been eliminated--demonstrates the urgency of the situation. Beyond biomass, LPG is subsidized, but much of the subsidy has gone to commercial vehicle owners instead of households as commercial vehicle owners have retrofitted their vehicles to run on LPG, which is cheaper than petrol. The government is planning to phase out the subsidy. Overall, Ghana is well-positioned to take action in cookstoves because of the strength of its civil society, local enterprise and awareness of gender equality. Many NGOs, including women's group, operate in Ghana, helping to make civil society strong. In terms of equality between men and women, women are in position of power—out of the 23 ministries, four are headed by women. However, men still hold most seats in parliament (90+%). In general society, women are well represented in most professions, especially in services and sales, where they dominate (20% to 6%). In the cookstove sector, women are very prominent. They own the retail shops and are sales agents. At one major cookstove company, women represent 95% of the sales agents.
<i>Consumers</i>	Due to costs, large segments of the population will continue to use biomass in the foreseeable future. In northern Ghana and rural areas, basic wood stoves, such as three-stone fires and mud stoves, are most common. The 48% of the population that uses woodfuel is completely underserved as there are no at scale cookstove programs for woodstoves. Yam, cassava, plantain, beans, and maize are staple crops throughout Ghana and are dishes are typically cooked in pots with rounded bottoms. Because of the homogeneity in cooking, the most salient consideration in stove design is the fuel used.
<i>Cookstove Industry</i>	Ghanaians overwhelmingly continue to use traditional coalpots. Improved stoves, such as the ‘Gyapa’ and LPG stoves, are in use and well-accepted. On the plus side, Ghana has a robust low-tech cookstove sector which is self-sustaining due to a value chain which allows for manufacturing, distribution, and retailing actors to profit at each step of the way. But the most common improved stove, the ‘Gyapa’ stove, while more efficient, does not drive significant reductions in emissions. This in part stems from the lack of stove regulation, standards, and testing.
<i>Financing</i>	Financing is the major roadblock for producers to increase capacity and for consumers to purchase clean cookstoves. Carbon financing in Ghana is reasonably advanced, with two registered Gold Standard projects, and several more in the pipeline. Private capital is extremely limited though—commercial loans can have interest rates of as high as 30% and loans from MFIs are very expensive as well.

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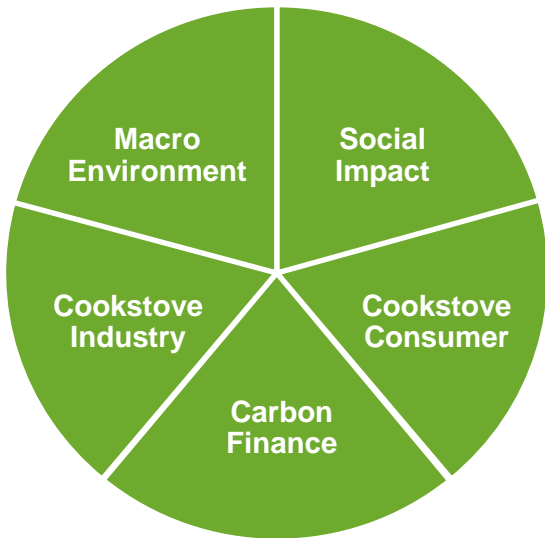
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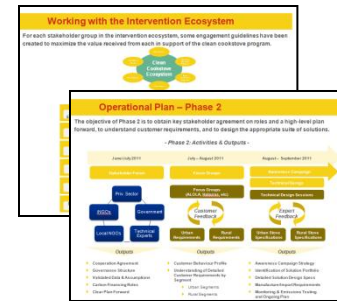
Project Approach

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.

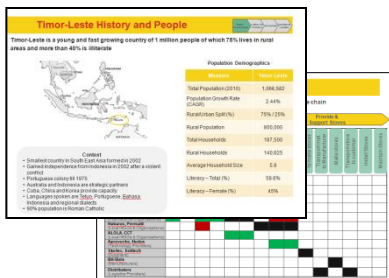
Sector Mapping



Strategy Development



Intervention Options And Relative Roadmap

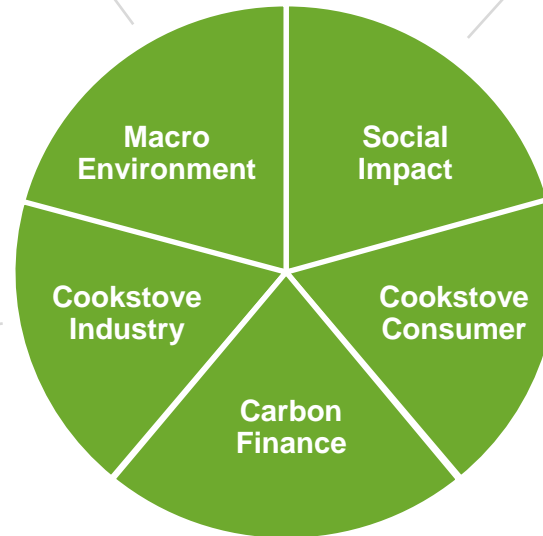


Sector Map

Sector Mapping Approach

Sector Mapping of the cookstove sector was conducted across five dimensions:

- *Social:* What is the country demographics & population distribution across regions?
- *Political:* How stable is government & what political risks will any program face?
- *Economic:* How much money do our potential customers have & what is the economic cycle?
- *Technological:* How sophisticated is the infrastructure & what is the plan for progress?
- *Environmental:* How do ecological conditions impact the success of cookstove programmes?
- *Gender:* How does gender play a role in clean cookstove use and purchase?



- How do people cook and what fuels are used in the region?
- What is the current HAP exposure profile of our target market? (Primary cause of HAP and size of problem)
- What are the other impacts caused by the use of poor cooking stoves?
- How does the impact of cookstoves stack up against other health & social priorities?

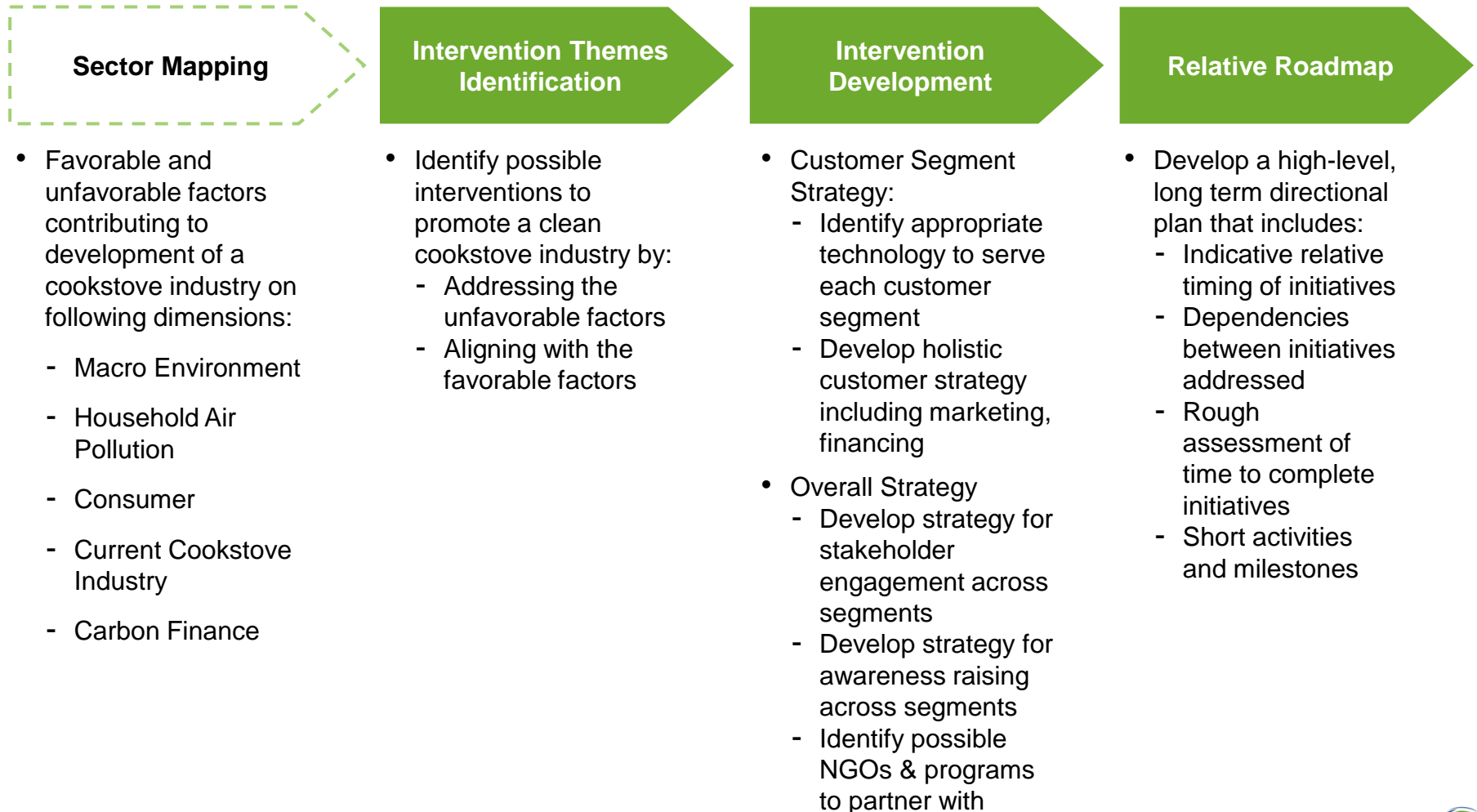
- What cooking devices are currently used within the region?
- Who are the main players active in the cookstove sector?
- What are the opportunities / threats for current & future cookstove programmes?
- How commercially attractive is the sector & what are likely to be some of the industry challenges?

- What carbon financing options exist for the country?
- What structures exist which can be leveraged for future carbon financing components?
- Which entities are likely to fill the required roles in the carbon finance operating model?

- What is the profile of the target population?
- How can the customer population be segmented / categorized?
- How big is each customer segment and what are its characteristics?
- What are the specific needs of each customer segment?

Intervention Options Approach

Intervention development was conducted by using sector mapping as input to identify intervention areas, develop recommendations and develop a high level roadmap.



Acknowledgements

Many organizations made valuable contributions to this study with their knowledge of Ghana or experience in cookstove initiatives.



New Energy

Ministry of Environment, Science, and Technology



Anomena Ventures



Man & Man Enterprises



Ministry of Women and Children's Affairs



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Social Environment

Ghana has over 6 million total households, is evenly split between rural and urban areas and is predominately Christian.



Context

- Formed by the merging of British Colonies Gold Coast and Togoland
- Achieved Independence from United Kingdom in 1957, becoming the first Sub-Saharan nation post European colonialism to do so
- Official Language: English
- 69% Christian, 16% Muslim, 9% Traditional and 7% other

Population Demographics

Measure	Ghana
Total Population (2010)	24,391,823
Population Growth Rate (CAGR)	2.4%
Rural/Urban Split (%)	49% / 51%
'Rural' Population	11,830,034
Total Households	6,097,956
'Rural' Households	2,957,508
Average Household Size	4.00
Literacy – Total (%)	67%
Literacy – Female (%)	50%
Life Expectancy (years)	61.45
Population below poverty line	28.5%

- Implications -

To reach the entire population a cookstove market needs to address equally both urban and rural areas.

Economic Environment (1/2)

Ghana has a growing economy and is a country rich in natural resources; however, high interest and inflation rates and a heavy reliance on natural resources inhibit growth and development.

Country Economics

Key Indicators	
GDP (2011 est.)	\$38.6 Billion
GDP Per Capita (2010 est.)	\$1,542
Economic Growth Rate (2011 est.)	13.4%
Inflation Rate (2011 est.)	10.9%
Unemployment	11%
Interest Rate	13.5%

Key Indicators	
Exports	-\$13.13 billion; gold, cocoa, timber, tuna, bauxite, aluminum, manganese ore, diamonds <i>Major markets:</i> Netherlands, France, UK, US, Ukraine, Belgium
Imports	-\$14.03 billion: capital equipment, petroleum, foodstuffs <i>Major suppliers:</i> China, Nigeria, U.S., Cote d'Ivoire, UK
GDP composition (2011 est.):	Agriculture 28.3% Industry 21% Services 50.7%

- Implications -

High interest and inflation rates contribute to the high cost of working capital and materials, which negatively affect cookstove programs.

Economic Environment (2/2)

Ghana has a number of economic issues, but most significant is high interest rates and heavy reliance on natural resources.

High Interest Rates

- Financial institutions see the limited access to capital for businesses as an opportunity to charge exorbitant interest rates
- Prime rates have dropped in the last couple of years from 18.5 to 13.5 percent , but lending rates still hover around 27%
- Banks are now charging on average between 27 and 37 % on loans
- Non-Bank Financial Institutions charge up to 60% on loans per annum

"We are not happy with the banks and we are asking them to cut their interest rates immediately,"

**- Minister of Finance and Economic Planning,
Kwabena Duffuor**

"It has been proven that most countries with large endowments of natural resources including oil and gas perform worse with respect to development and good governance."

- Ghanaian polymath, Professor Stephen Addae

'Resources Curse'

- Ghana recently discovered commercial oil off its coast, an estimated 1.8 billion barrels
- Gold production accounts for 5% of GDP and 37% of exports
- 60-70% of the population depends on agriculture for their livelihoods
- Infrastructure improvements are one of the greatest needs in the country

- Implications -

With high interest rates and a dependence on natural resources, access to donor funds and foreign capital are paramount in obtaining reasonable access to finance.

Political Environment

Ghana was the first sub-Saharan African nation to achieve independence in a post-colonialism era. It is relatively advanced, safe and stable compared to other African nations. Although, corruption is perceived to be a problem in the country.



Administrative Map

- Capital city is Accra
- Country divided into 10 regions and 170 districts
- Accra, Kumasi and Tamale are most populated urban areas
- Ashanti, Greater Accra and Eastern are the most populous and prosperous regions

Political Environment

Structure

- Constitutional Democracy
- President is head of state and head of government of a multi-party system
- President is elected to a four year term and able to serve two consecutive terms

Current Government

- Two party system; dominated by the National Democratic Congress and the New Patriotic Party
- 2012 is an election year for Ghana, with the next Presidential election set to take place on December 7, 2012

Working with the Government

- Government heavily focused on energy, education, infrastructure and health issues
- Corruption is an issues as Ghana ranks 69th in the world and higher than its neighbors in Transparency International Corruption Perception Index

- Implications -

A stable government and political environment are favorable for the cookstove sector, but need to be taken with a grain of salt.

The Ghanaian government is heavily focused on promoting access to energy, education, infrastructure and healthcare.

Current Situation

Health

- Malaria kills approx. 20,000 children under 5 each year
- 1.8% of adult population between ages 15-49 have HIV/AIDS
- Average of 13,000 new TB cases per year
- Infant mortality rate is 50 deaths / 1000 live births which is low comparably for Sub Saharan Africa

Infrastructure

- 8.55 internet users per 100 people
- 17.43 million mobile subscribers
- 47.6% of roads are paved
- Only 18% of the total population has access to improved sanitation

Energy

- 60.5% of population have access to electricity
- 14.3% of energy supplied by Nuclear and renewable sources
- Over 80% of the population uses biomass as an energy source

Education

- Primary school completion rate is 87%
- 68% of the population finishes secondary school
- 48% of teachers have received basic training in primary education

Government Priorities

- Prevention of and treatment for Malaria, HIV/AIDS, Tuberculosis and Guinea Worm Disease
- Expand program of immunizations

- Access to clean water in both urban and rural areas
- Infrastructure investment remains a key to laying the foundation for long term growth

- Increase access to modern forms of energy, i.e. LPG
- Support modernization and expansion of energy infrastructure to meet growing demands and ensure reliability

- Expanding access to education at all level of education
- Providing and improving infrastructural facilities
- Raising the quality of teaching and learning for effective outcomes

- Implications -

There are competing priorities in the government across key areas that would typically be associated with supporting cookstoves, specifically respiratory health and energy.

Women’s empowerment has improved greatly since colonial times, but still has a long way to go as women don’t have access to the same educational and employment opportunities as men.

Government Policies: Local Government Act of 1993 reserved half of the 30 per cent appointed member positions at the district assemblies for women.

Attitude to Gender A modest women's movement has developed to address gender differences and advance women's causes; however, men receive wider educational opportunities and are better represented in government and formal sector employment.

Cultural Background: Ghanaian’s emphasize values such as family, dignity and proper social conduct. Relationships within traditional society were based on family membership and inherited status; whereas, modern society are based on achieved status and formal education.

Gender-Based Violence: Sexual harassment in higher education and the workplace is prevalent.

Socio-Economic Background: Petty trade which is a prevalent occupation is almost exclusively dominated by women.

Gender Equality Statistics		
	Male	Female
Representation in Parliament (2012)	91.7%	8.3%
Head of Household	~70 - 75%	~25 - 30%
Literacy Rates	72%	59%
Tertiary School enrollment	67.52%	6.71%
Domestic Responsibilities	industrial workers, fishermen, farmers, businessmen	mothers, household caretakers, traders, farmers, and office workers

- Implications -

A cookstove sector has the opportunity to join the national movement in promoting women’s empowerment across all levels of the value chain.

Most of Ghana's energy is derived from biomass; clean energies such as gas and electric are produced, but are extremely unreliable as power outages and gas shortages plague the nation.

Key Energy Indicators	
Composition of primary energy use (2003)	Biomass: 60% Petroleum products: 29% Electricity: 11%
Electricity by generation method (2003)	Hydropower: 57% Thermal: 29% Import: 14% Solar: .01%
Supply Gap of Electricity	30%
Population with access to electricity (%)	43% (80% of domestic supply is consumed in cities and towns)
Petroleum Consumption in Ghana (2003)	Gasoline : 39% Kerosene: 5% Diesel: 52% LPG: 3%
Population with access to LPG (%)	10%

“Ghana as a country has experienced devastating intermittent shortage of Liquefied Petroleum Gas (LPG), leading to many households resorting to the use of charcoal.”

- Ghana Web Columnist

“Three months into 2012, Ghana has experienced three major worrying power outages that have raised serious concerns about the nation's energy sufficiency and security.”

- Editor, allAfrica

- Implications -

The large biomass market is likely to exist for the near future as the use of clean energy sources such as gas and electricity is unreliable.

Ecological Environment

Ghana feels the effect of widespread deforestation and desertification.

Topographical Map of Ghana



Source: UNEP, http://www.grida.no/graphicslib/detail/ghana-topographic-map_dfda

Climate

- The climate in Ghana is tropical with temperatures varying by season and elevation
- Except in the north, Ghana has two rainy seasons (April to July and September to November). In the north there is one rainy season that lasts from April to September
- Average precipitation is ~ 43 in. in the North and ~83 in. in the South

Deforestation

- The impact of deforestation is widespread impacting livelihoods, disturbing environmental functions and affecting the biological integrity of Ghana
- Since 1981, the rate of deforestation in Ghana has been 2% percent per year and Ghana's forests are now 25% of their original size

Other Environmental Issues

1. Desertification
2. Water Contamination

- Implications -

Cookstove interventions should be tied to improvements in deforestation as it is the highest priority environmental issue facing Ghana.

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Cooking Habits

People in Ghana generally eat similar food and have the same cooking habits. The primary difference is fuel used, which is dependent on fuel availability and household income.

Type of Food



Banku with fish in groundnut stew

- Yam, cassava, plantain, beans, and maize are staple crops in Ghana
- Popular dishes include fufu, which is pounded yam, cassava, or plantain, usually served with soup and banku, which is fermented maize
- Fufu and banku are usually served with a meat or vegetable stew
- Red-red is a dish served with fried plantains and beans
- Jollof rice is a spicy fried rice that is often served with a side of meat
- Additional dishes usually found in Northern Ghana include tuo zaafi (maize) and omo tuo (rice)

Cooking Habits



Woman cooking banku in a rounded pot.

- Women cook meals outdoors under a thatched roof, where available, if they are burning wood and use cleaner fuels such as LPG indoors
- Households often have multiple stoves so that they have the flexibility to cook multiple dishes at a time and also switch stoves depending on the amount they are cooking
- In urban areas, charcoal is the primary fuel and in rural areas, wood is the primary fuel. Despite government promotion, LPG use remains limited due to fuel shortages and higher priced stoves
- Ghanaians often prefer round-bottomed pots instead of flat-bottomed pots
- Type of food being cooked generally does not impact the cookware or fuel used
- Cooking can be fast, 30 minutes on LPG, to a few hours if making stew

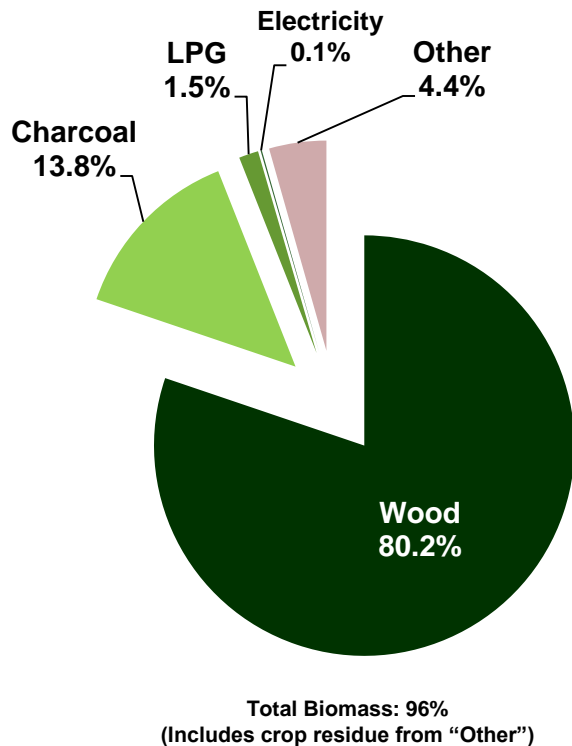
- Implications -

Cookstoves will need to accommodate round-bottom pots and specific stove models need to be created for each fuel type.

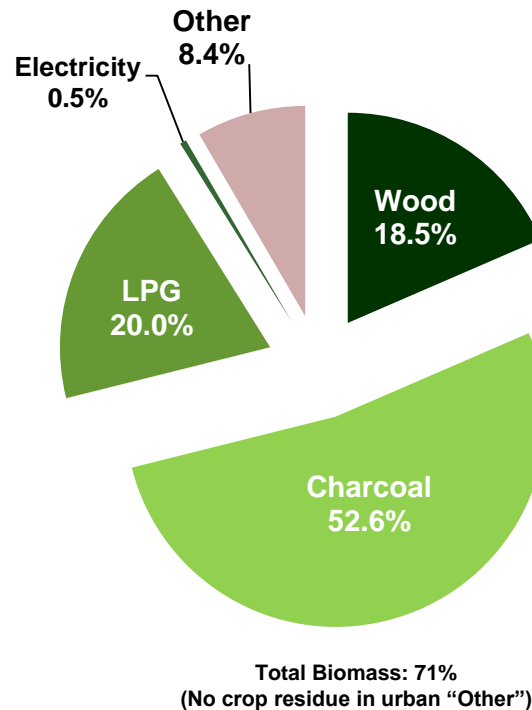
Fuel Usage & Availability

The main fuels are wood, especially in rural regions, and charcoal, which is predominant in urban regions.

Total Rural Fuel Use



Total Urban Fuel Use



Fuel use & availability

- According to the Ghana Living Standard Survey, conducted by the government, wood is the primary fuel Ghanaians use (nationally 53.5% wood versus 30.6% charcoal)
- However, stakeholder interviews believe that charcoal use is much higher. Part of this may be due to cookstove program foci in urban regions
- Fuel is determined by available supply and household income—For example, households may prefer charcoal but can only afford wood









Note: Stakeholder interviews suggest that LPG adoption may be lower than official data.

- Implications -

Cookstoves, at least in the short term, should address wood and charcoal fuel types.

Fuel Summary

Other cooking devices / fuels may also be attractive alternatives to the current stoves being used.

Fuel Type	Attractiveness	Pros	Cons
Firewood 		<ul style="list-style-type: none"> Can often be collected for free 	<ul style="list-style-type: none"> High levels of smoke Contributes towards deforestation
Charcoal 		<ul style="list-style-type: none"> Commonly found in all urban areas Typically cleaner burning than wood 	<ul style="list-style-type: none"> Charcoal production as currently practiced in Ghana is inefficient and contributes to deforestation Toxic fumes still present
LPG 		<ul style="list-style-type: none"> Very clean burning 	<ul style="list-style-type: none"> Supply shortages are regular More expensive than wood or charcoal
Electric 		<ul style="list-style-type: none"> Very clean 	<ul style="list-style-type: none"> Electricity is very expensive Power outages are common Many homes are not connected to the grid

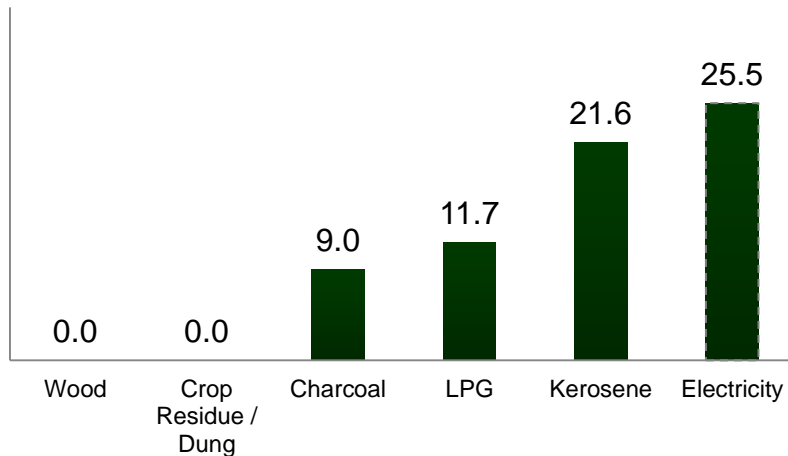
- High
- ◐ Medium
- ◑ Low
- Minimal

Available Fuel Cost

LPG, with the government subsidy, is only about 30% more expensive than charcoal on a fuel only basis.

Fuel Costs

Monthly Cost per Household (GHS)



- LPG, while more expensive than charcoal, is relatively economical
- Wood and crop residue/dung is generally collected (i.e. “free”) and not sold on the open market
- Kerosene is not typically used for cooking
- Electricity is the most expensive but kerosene is not far behind

Fuel	Unit Price (GHS)	Fuel	Unit Price (GHS)
Wood	Free	LPG	1.3 / kg
Crop Residue / Dung	Free (no evidence of market price)	Kerosene	0.91 / liter
Charcoal	~0.4 / kg	Electricity	~0.17 / kWh
Gasoline	1.72 / liter		

Pricing and Supply Observations

- Price of charcoal has been steadily going up, from GHS15 per 45 kg bag to GHS20 in the past year
- Electricity prices have been rapidly increasing in the last year
- LPG shortages still occur, especially in rural areas
- The government is exploring the option of reducing its subsidies on LPG
- In addition to being used for its intended purpose in the home, LPG is also used in commercial vehicles
- LPG fuel is inexpensive, but the upfront capital cost of cylinders and stoves is high
- Without the government subsidy, LPG could be up to ~50% more expensive

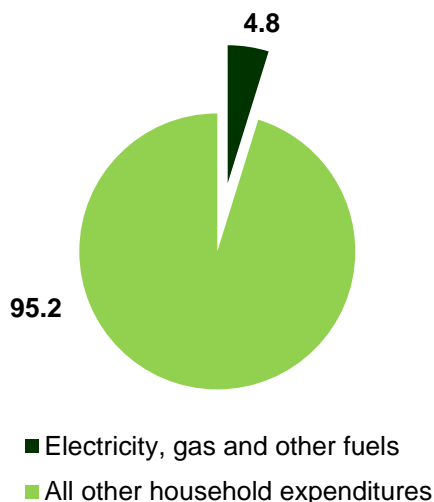
- Implications -

Lower income households may have to continue to use firewood and charcoal, but higher income households that do not currently use LPG may have the means to switch to it as long as the price is not too much higher than charcoal. Note: for this government subsidy may be necessary.

A small proportion of total household expenditure is on fuel. On average, however, significant time is invested in collecting firewood.

Share of consumers spending money on fuel

- According to the last Ghana Living Standards Survey in 2006, 4.8% of household income is spent on electricity, gas, and other fuels
- This is in line with calculations for household charcoal spend based on using a 45 kg bag per household every 2 months



Opportunity Cost of Firewood Collection

- Especially for households in poorer regions, fuel is not purchased and is typically collected
- The opportunity cost is significant—Ghanaians spend on average 7.35 days a year collecting firewood

	Proportion collecting firewood (%)	Average time spent (minutes per day)		
		Urban	Rural	Ghana
Male	16.9	25	24	25
Female	37.5	26	31	30
All	27.6	26	29	29

- Implications -

Although a small proportion of income is spent on fuel, the true cost of fuel is more accurately by its large opportunity cost, the time spent collecting firewood.

Household Air Pollution in Ghana

With more than 80% of the total population using biomass fuel for cooking and over 6,500 deaths annually attributable to HAP, the health burden of HAP exposure in Ghana is significant.

	Population (Households)	% Using Biomass	Total exposed to HAP
Rural (49% of total pop.)	2,957,288 →	96% →	2,838,996
Urban (51% of total pop.)	3,140,213 →	71% →	2,229,551
	Total →		5,068,547 (83% of total population)



Health Impact

- 6,500+ deaths annually attributable to Household Air Pollution
- A total number of 185.079 DALYs attributable to Household Air Pollution, of which 168,342 are attributable to children under 5 years old

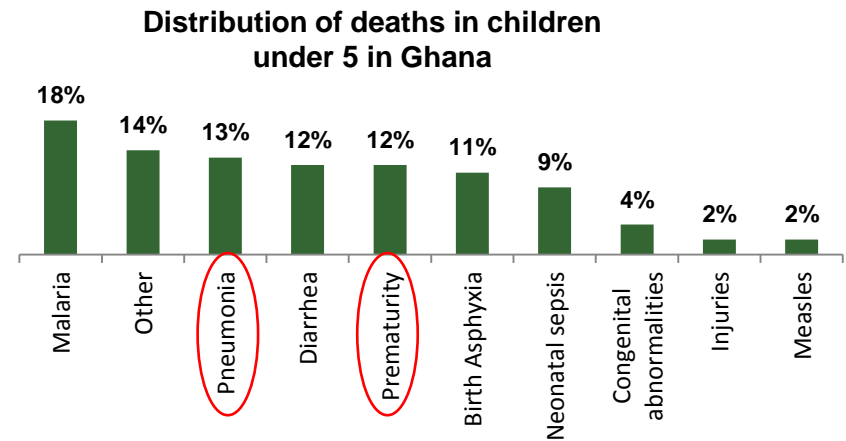
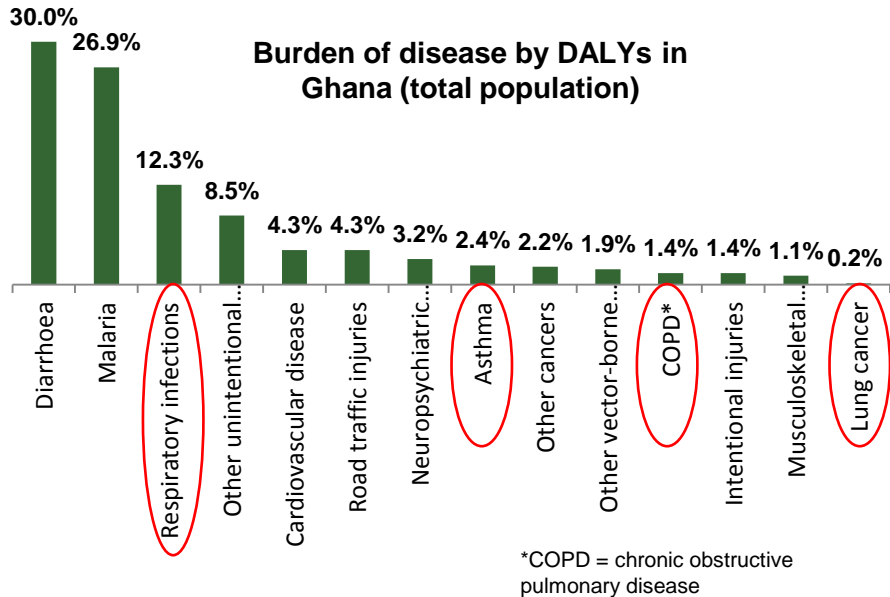
- Implications -

To address Household Air Pollution in a comprehensive manner, both rural and urban populations need to be served.

Household Air Pollution vs. Other Priorities

Social and Environmental Impact

Many diseases and conditions related to household air pollution have a significant burden of disease in Ghana. However, there are no Ghanaian studies on HAP's health impacts.



'There is also evidence of links between Household Air Pollution and low birth weight, TB, ischaemic heart disease, nasopharyngeal and laryngeal cancers.'

-WHO

'Nearly 50% of pneumonia deaths among children under five are due to particulate matter inhaled from Household Air Pollution.'

-WHO

- Implications -

HAP likely is the primary culprit for many diseases and conditions in Ghana. However, health studies should be done to help solidify the link.

Ghana has several environmental issues but the most significant is deforestation as it most directly impacts Ghanaian livelihoods.

Deforestation and Land Degradation

- Traditional farming methods, bush fires, and the harvesting of firewood contribute to the loss of top soil and biodiversity, salination of soil, and siltation of rivers
- 72% of the country is vulnerable to desertification
- Forests cover in Ghana has been reduced by over 70% since 1972



Part of the reason why deforestation has been so severe is the following:

- For indigenous energy production, 95% is woodfuels based
- Woodfuel business is a major source of employment for rural communities with up to 2.5 million people out of a population of 24 million working in it
- Woodfuel contribute 1.81% of total annual GDP

Given how entrenched woodfuels are in Ghanaian society, in order to combat deforestation, a robust multifaceted approach will be necessary. Improving cookstove efficiency will be key part of that strategy.

- Implications -

Because Ghanaians are highly dependent on firewood and charcoal for household energy, alleviating deforestation will have to address cookstoves and fuel production.

The Role of Gender and Cookstoves

Social and Environmental Impact

In Ghana, women are recognized as having primacy in cooking and in the kitchen.

Roles

Women continue to play a traditional roles in Ghanaian households. Women are expected to:

- Cook for the family
- Collect and/or buy fuel
- Rear children
- Clean the house

In the commercial sector, women also:

- Smoke fish for sale in markets
- Cook foods for sale at street-side vendors

Challenges

In Ghana, women are in a favorable position with regards to cookstoves.

- Women can influence policy (e.g. the Minister of Environment, Science and Technology is a woman)
- While women are not head of household, they typically take the lead in the kitchen and make all the decisions there
- In some households, women may have to consult with their husbands prior to major purchasing decisions

Opportunities

In addition to being the primary end user, women are the ones selling cookstoves because it's easier for women to convince other women the value and quality of improved cookstoves.

- Women are almost always the retailers that sell cookstoves in the local markets
- The sales agents in the field are also primarily women – Toyola's sales agents are 95% women

- Implications -

Because of women's centrality in the kitchen, women are the primary customer and their preferences and needs will need to be taken into careful consideration for any cookstove project.

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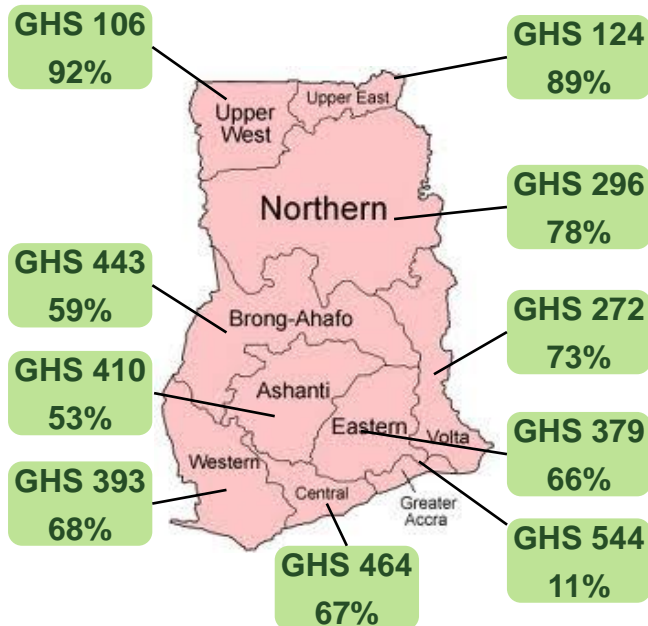
The customer segmentation in this section is an illustrative example of how the Ghana market could be grouped. They are based on the following assumptions:

- The customer segmentation is designed to provide a high-level view of the market and strengthen the understanding of the customer base and targeted interventions in Ghana
- The customer segmentation is based on a preliminary market assessment and has used a combination of both primary and secondary research. Further refinement of customer segmentation and customer profiles may be required for specific programs and regions
- The high-level customer segmentation calculations were derived based on the following assumptions:
 1. Fuel usage distribution varies by locality (rural/urban)
 2. Households sizes are the same in urban and rural areas. In actuality, rural areas most likely have slightly larger household sizes but recent data is no available
 3. Income is evenly distributed between different users of different fuel types. In actuality, income for each group is different. Typically, LPG > Charcoal > Wood
 4. Each Ghana Cedi is equal to 0.6 USD

Locality, Regions, and Income

Locality (urban versus rural), region, and income are closely tied together.

	Mean Annual Household Income (GHS)	Mean Annual Per Capita Income (GHS)
Urban	1,415	517
Rural	1,067	305
Ghana Overall	1,217	397



Key
Per Capita Annual Income: **GHS 200**
% Rural: **60%**

The poorest regions, with exception of Volta, are in the North.

- Rural localities are significantly poorer than urban regions
- Rural localities typically have larger household sizes as well
- Regions with a higher proportion of rural residents are highly correlated with lower mean annual per capital income
 - R-squared: 0.71
 - Significance: 0.002

- Implications -

Because region, locality (urban/rural), and income are very closely correlated, using just one of those characteristics as a segmentation will be sufficient.

Notes

(1) Rural/Urban split was calculated based on data in the GLSS 5 – this breakdown had to be calculated as it was directly presented.

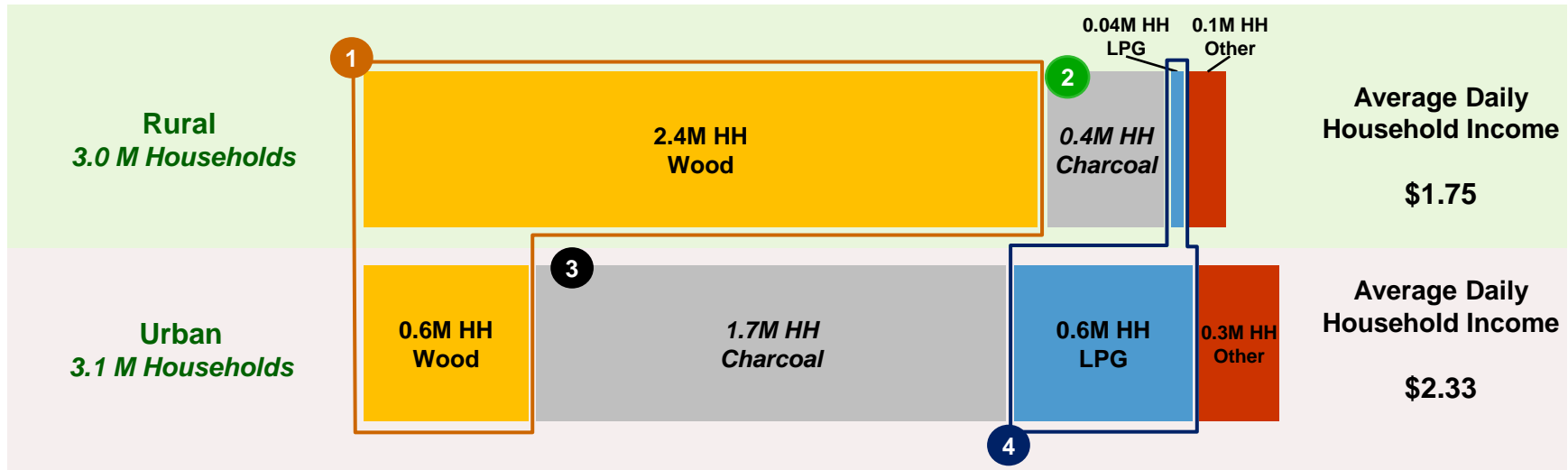
(2) GLSS 5 rural/urban data not displayed because it is outdated compared to newer population data

(3) Data has been presented “as is” in absolute, not PPP, from the GLSS 5. It has not been adjusted for inflation.

(4) Data from the GLSS is used because newer data with regional breakdown is not yet available.

Target Market Identification

Stove consumers can be most usefully segmented along two dimensions: locality (rural/urban) and fuel type. As aforementioned, locality approximates income and region.



Note: (1) Boxes are to scale. (2) "Other" includes kerosene, crop residue, none, and other fuels. (3) Total may not sum due to rounding.

Segment Key

- 1** *Wood Primary* Users of wood are typically very low income
- 2** *Charcoal Primary* These households may have the ability to afford LPG, but do not have access to a steady supply of LPG
- 3** *Charcoal with LPG access* While low income urban consumers may continue with charcoal, higher income ones could be switched to LPG
- 4** *LPG Primary* This group should be encouraged to continue with LPG

- Implications -

Each of the four segments has distinct needs and situations in which targeted interventions can be applied. The Wood Primary segment has the greatest need—it is very large and is currently not served by any major cookstove programs.

Household Segment Profiles

The targeted population can be segmented into four groups: (1) Wood Primary (2) Charcoal Primary (3) Charcoal with LPG Access (4) LPG Primary.



Wood Primary



Charcoal Primary

	Wood Primary	Charcoal Primary
Size in Households	• 3M (48% of total households)	• 0.4M (7% of total households)
Profession	• Predominantly agriculture (~69% to ~75%)	• Predominantly agriculture (~75%)
Household Income	• \$56.77 per month (\$1.87 per day)	• \$53.35 per month (\$1.75 per day)
Cooking Device & Fuel	• Combination: 3-stone open fires & mud stoves • Mainly collected fuelwood	• Combination: Coalpots primarily, may also use 3-stone or mud stoves when using wood • Purchased charcoal primarily; may also use wood
Cooking Location	• Outdoors (~85%) / indoors if heavy rain (15%)	• Outdoors (~85%) / indoors if heavy rain (15%)
Cooking Frequency	• Two to three meals a day	• Two to three meals a day
HAP Exposure	• Moderate	• Low
HAP Awareness	• Low	• Low
Environment Impact	• Moderate	• Moderate
Barriers to Switch	• High as current cooking device is zero or v. low cost • If wood is easily collected, fuel is effectively free	• Moderate as the economics of fuel savings can be used to convince users to switch
Willingness to Pay	• Low ability to pay for stove or fuel	• Willing if it can save them on fuel costs
Purchase Drivers	• Currently limited, but increased awareness of health risks may help	• Money saved on fuel • Ease of use, aesthetics, and durability

Note: The descriptor “primary” is used because households often use multiple stove technologies in the home and “primary” refers to the tech used most.

Household Segment Profiles

The Charcoal with LPG Access and LPG Primary segments generally live in urban areas and have greater income than the two previous segments.



Charcoal with LPG Access



LPG Primary

Size in Households	• 1.7M (27% of total households)	• 0.7M (11% of total households)
Profession	• Varies (largest categories are service and sales 26%); craft and trade 22%; agriculture and fisheries 19%)	• Varies (largest categories are service and sales 26%); craft and trade 22%; agriculture and fisheries 19%)
Household Income	• \$70.75 per month (\$2.33 per day)	• \$69.60 per month (\$2.29 per day)
Cooking Device & Fuel	• Combination: Charcoal primarily in a traditional coalpot; small proportion uses more efficient stoves	• Combination: LPG stove primarily but uses charcoal when LPG is not available
Cooking Location	• Outdoors primarily; indoors when raining	• Indoors
Cooking Frequency	• Two to three meals a day	• Two to three meals a day
HAP Exposure	• Moderate	• Very low
HAP Awareness	• Moderate	• Moderate
Environment Impact	• Moderate	• Low
Barriers to Switch	• Moderate because an economic case for switching can be clearly made	• Using one of the cleanest stoves already
Willingness to Pay	• Willing if it can save on fuel costs	• Willing
Purchase Drivers	• Money saved on charcoal	• Ease of use and durability

Customer Segmentation Summary

HAP exposure is the highest and willingness to pay the lowest for Wood Primary, which is the largest segment of the population.

Customer Segment Characteristics

Segment	Size	HAP Exposure	HAP Awareness	Affordability	Willingness to Pay	Alternative Use	Distribution Access
Wood Primary	High	Medium-High	Low	Minimal	Minimal	Minimal	Medium-High
Charcoal Primary	Low	Medium	Low	Medium	Medium	Minimal	Low
Charcoal with LPG Access	Medium	Medium	Medium	Medium	Medium	Minimal	Medium-High
LPG Primary	Low	Minimal	Medium	Medium-High	High	Minimal	Medium-High

This large market is currently underserved as no large clean cookstove programs serve this demographic.

Education around HAP, fuel usage and alternative energies is necessary to increase demand for clean cookstoves in these segments.

There will be significant challenges to convince this segment to pay for a clean wood stove.

Key | ○ Minimal | ◐ Low | ◑ Medium | ◒ Medium-High | ● High

- Implications -

The Wood Primary segment has the greatest need and is also the most challenging segment to serve. For charcoal users, they are served to some extent by existing cookstove programs in the urban areas but those programs can be expanded to include rural areas and stoves can be improved to be made cleaner.

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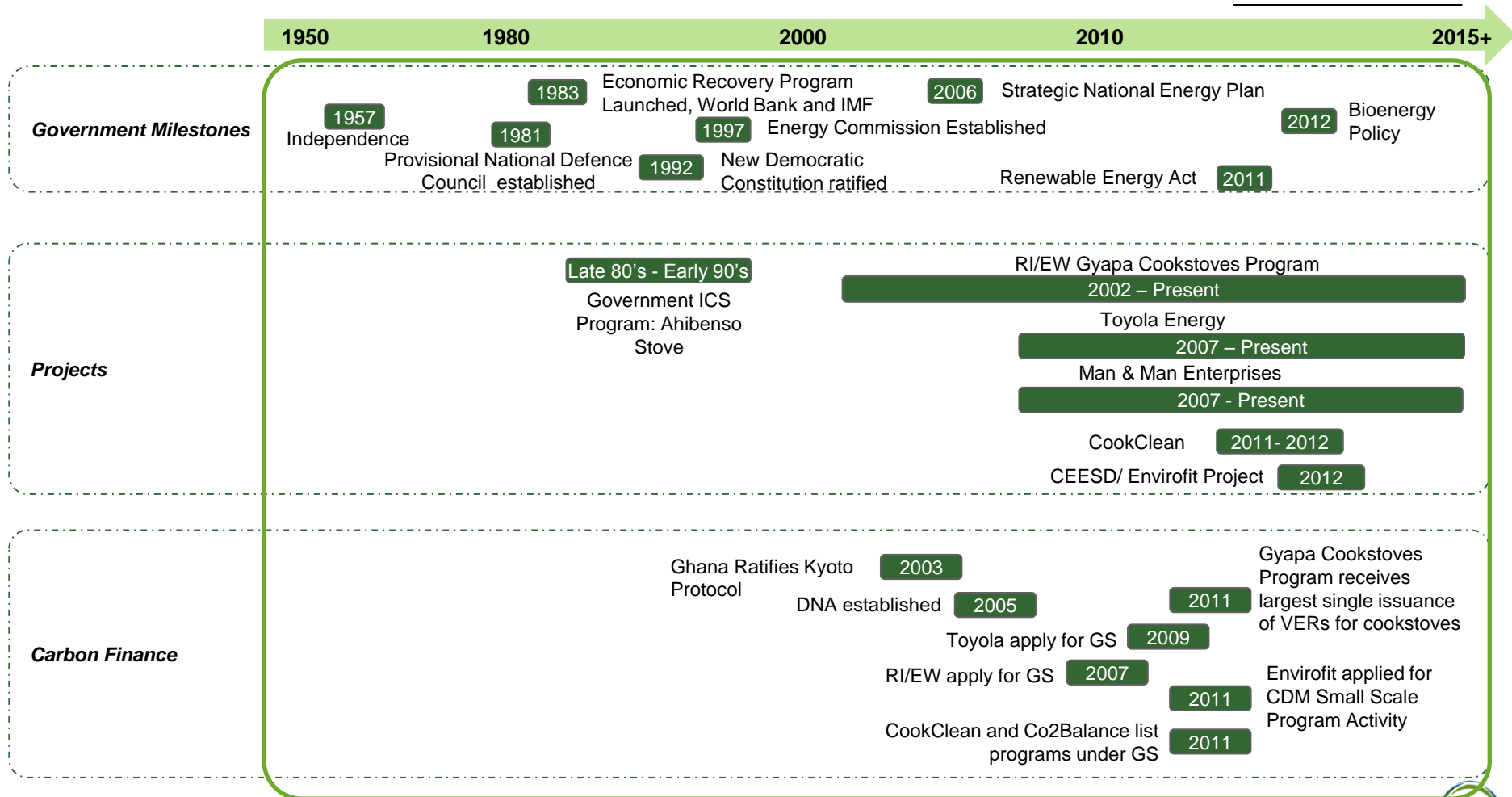
Carbon Financing

Sector Mapping Summary

History of Cookstoves in Ghana

The government had a small cookstove program in the early 90's, but otherwise there wasn't much mobilization in the sector until 2002 when USAID funded the RI/EW Gyapa Fuel Efficient Cookstoves program.

Non-Exhaustive



Ghana has several government policies in place outlining the framework by which it will regulate and promote the renewable energy sector.

	Strategic National Energy Plan (SNEP) 2006-2020	Renewable Energy Act of 2011	Bioenergy Policy (draft)
Author	Energy Commission	Energy Commission, Parliament	Energy Commission
Significance	Early plan defines the intent of the government	Government has demonstrated public commitment to renewable energy	Government is following-up their commitment with specific action plans
Objectives	<ul style="list-style-type: none"> • Ensure energy needs are met sustainably • Increase renewable energy sources to 10% nationally by 2020 • Increase rural electrification via renewables to 30% by 2020 	<ul style="list-style-type: none"> • Support the development, utilization, and efficient management of renewable energy sources 	<ul style="list-style-type: none"> • Promote and facilitate the sustainable use of biomass
Approach	<p>Relevant policy implications includes:</p> <ul style="list-style-type: none"> • Encouraging District Assemblies to provide electricity services to their off-grid communities via mini-grids and micro-grids through alternative distributed generation sources such as biomass • Government support of the private sector to provide decentralized renewable energy systems for individual and commercial needs. Government support could include arranging concessionary credits for the local dealers 	<ul style="list-style-type: none"> • Establishing feed-in tariffs for localized electricity production (e.g. home solar grids) • Establishment of a renewable energy fund • Control and management of bio-fuel and wood fuel • Licensing of companies working in the renewable energy sector 	<ul style="list-style-type: none"> • Education and awareness creation • Incentives for a sustainable supply, production and utilization of woodfuel • Establishment of databases, standards, and procedures for operators and greater collaboration among relevant municipal and district authorities • Technical and funding assistance • Streamlining of transportation and marketing of commercial production and consumption of woodfuels • Improve demand side management and institutional and regulatory frameworks

Note: This list was compiled by stakeholder interviews. It is not an exhaustive list.

- Implications -

Government policymakers and implementers are aggressively working in the bioenergy sector, cookstove programs should closely collaborate with the government to share knowledge and align strategies.

Sources: (1) International Energy Agency
<http://www.iea.org/textbase/pm/?mode=re&id=4276&action=detail>
 (2) Energy Commission
 (3) Renewable Energy Act, 2011



Current Technology Landscape

Traditional stove designs dominate the market and can be used for a variety of different fuel types.

3 Stone Fire





- Most common stove in Northern Ghana and rural areas
- Used with firewood and other biomass fuels which are collected
- Very poor fuel utilization
- Easily adaptable

- Ease of use 
- Availability 

Mud Stove





- Self-made stoves based on local materials
- Used with firewood and other biomass fuels
- Adaptable to cooking needs and pots

- Ease of use 
- Availability 

Coal Pot





- Most popular charcoal stove, made of thick scrap metal
- Sold by retailers in different sizes based on need, easily available in public markets
- Lifetime between 2-4 years

- Ease of use 
- Availability 

Tire Rim



- Charcoal stove made from a used vehicle rim
- Very heavy to carry and not easily adaptable
- Lifetime between 3-5 years

- Ease of use 
- Availability 

Key | ○ Minimal  Low  Medium  Medium-High  High

Note: 'Ease of Use' refers to how easy the stove is to use and its compatibility with existing cooking styles

Note: 'Availability' refers to how broadly available the stove is to consumers and if fuel required for use is readily available

Current Technology Landscape

'Improved stoves' are being distributed primarily in urban and peri-urban areas throughout Ghana for Charcoal and LPG fuel sources.

'Gyapa'



- Produced locally by RI/EW, Toyola and Man & Man Enterprises
- Charcoal stove made of metal casing with ceramic liner
- Sold in different sizes
- Lifetime between 3-5 years

- Ease of use
- Availability

Cookmate



- Charcoal stove made of all galvanized steel
- Sold in three different sizes
- Fuel savings of up to 50% over traditional stove

- Ease of use
- Availability

Envirofit



- CH-2200 Charcoal stove
- Currently pilot testing stove in 3 selected districts
- Reduction of fuel consumption by up to 60% and smoke emissions by up to 80%
- Expected lifetime over 5 years

- Ease of use
- Availability

LPG



- LPG stove with a grate placed on top of a gas canister
- Cooks faster and burns more efficiently than biomass stoves
- Commonly sold in public markets but LPG suffers from supply problems across the country

- Ease of use
- Availability

Key | ○ Minimal | ◐ Low | ◑ Medium | ◒ Medium-High | ● High

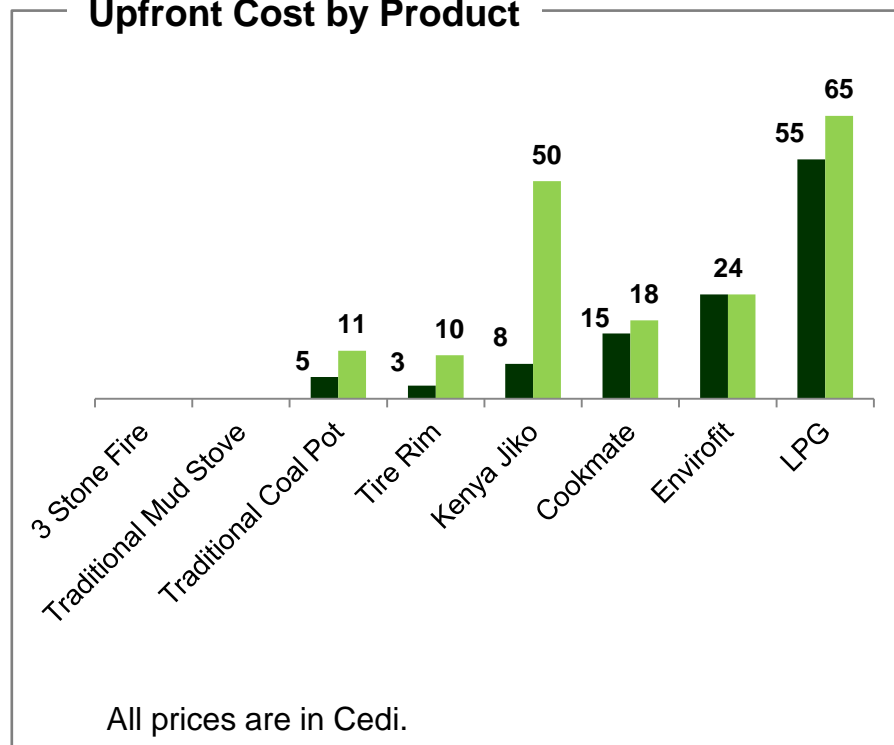
Note: 'Ease of Use' refers to how easy the stove is to use and its compatibility with existing cooking styles

Note: 'Availability' refers to how broadly available the stove is to consumers and if fuel required for use is readily available

Available Cookstove Cost

ICS range from 12 – 80 Cedis (\$5-50) based on the business, material and model size. Traditional firewood stoves are primarily made by hand and are free while traditional charcoal stoves range from 6-11 Cedis (\$3-6).

Upfront Cost by Product



Observations

- There currently isn't an improved firewood stove design being promoted in Ghana
- The improved stoves have an impressive payback period of only 2-3 months due to fuel savings
- The cost of fuel is included in the market price for the LPG stove. When subtracted, LPG stoves are about 10 Cedi's cheaper
- Free traditional stove designs dominate the rural market where affordability of the stoves is an issue as income levels are lower
- Traditional and improved stoves are predominately sold side by side in larger markets by retailers who purchase the stoves directly from manufacturers
- Traditional mud stoves are self made and used heavily in rural areas

- Implications -

ICS must tout the economic and health benefits of the stoves as they compete directly with free and lower cost traditional stoves.

Standards and Testing

CSIR and KNUST have both performed research and testing on stoves, but the organizations are grant and project based and do not currently support any nationwide efforts. There is an interest among stakeholders to develop an industry wide standard, but nothing specifically has been done yet.

Testing & Research

Organization

**Kwame Nkrumah
University of Science
and Technology**



Involvement

- Perform cookstove testing in the Technology Consultancy Center at the university
- Developed an improved Ahibenso stove in the 1990's
- Interested in the testing of stoves due to the LPG gas program and deforestation
- Currently engaged in testing biogas and biochar
- Performed some WBTs and fuel efficiency test on the Gyapa, Ahibenso and traditional coalpot stoves

**Council of Scientific
and Industrial
Research**



Institute of Industrial Research

- Partnered with UC Berkeley in conducting a test of firewood stoves in Ghana
- Past ICS program included the distribution of 1000+ clay firewood stoves

Institute of Food Research

- Received a grant from the Food and Agricultural Development Organization of the United Nations to research and develop an industrial LPG fish smoker for the coastal fishing communities
- Partnered with Gratis Foundation on the project

Standards

- Although standards for consumer products have been developed in the past, there are no relevant ICS standards being promoted yet across the sector
- There is stakeholder interest and industry wide recognition of a need to create standards for ICS

*"We need to address the challenge of 'clean' cookstoves in Ghana. To do that we need to develop an industry capacity for the standards and accreditation of stoves.
– Manager, Ministry of Energy*

- Implications -

Creation of a national cookstoves research, standards and testing facility could build on existing work performed by academic and government institutions in the country.

Overview of Cookstove Initiatives in Ghana

Multiple organizations have pursued cookstoves initiatives in some capacity; however, they have not yet penetrated the market with any scale.

Private Organizations



Man & Man Enterprises



Government



Ministry of Women and Children's Affairs



Ministry of Energy

Ministry of Environment, Science, and Technology



Anomena Ventures



GEDA



NGOs



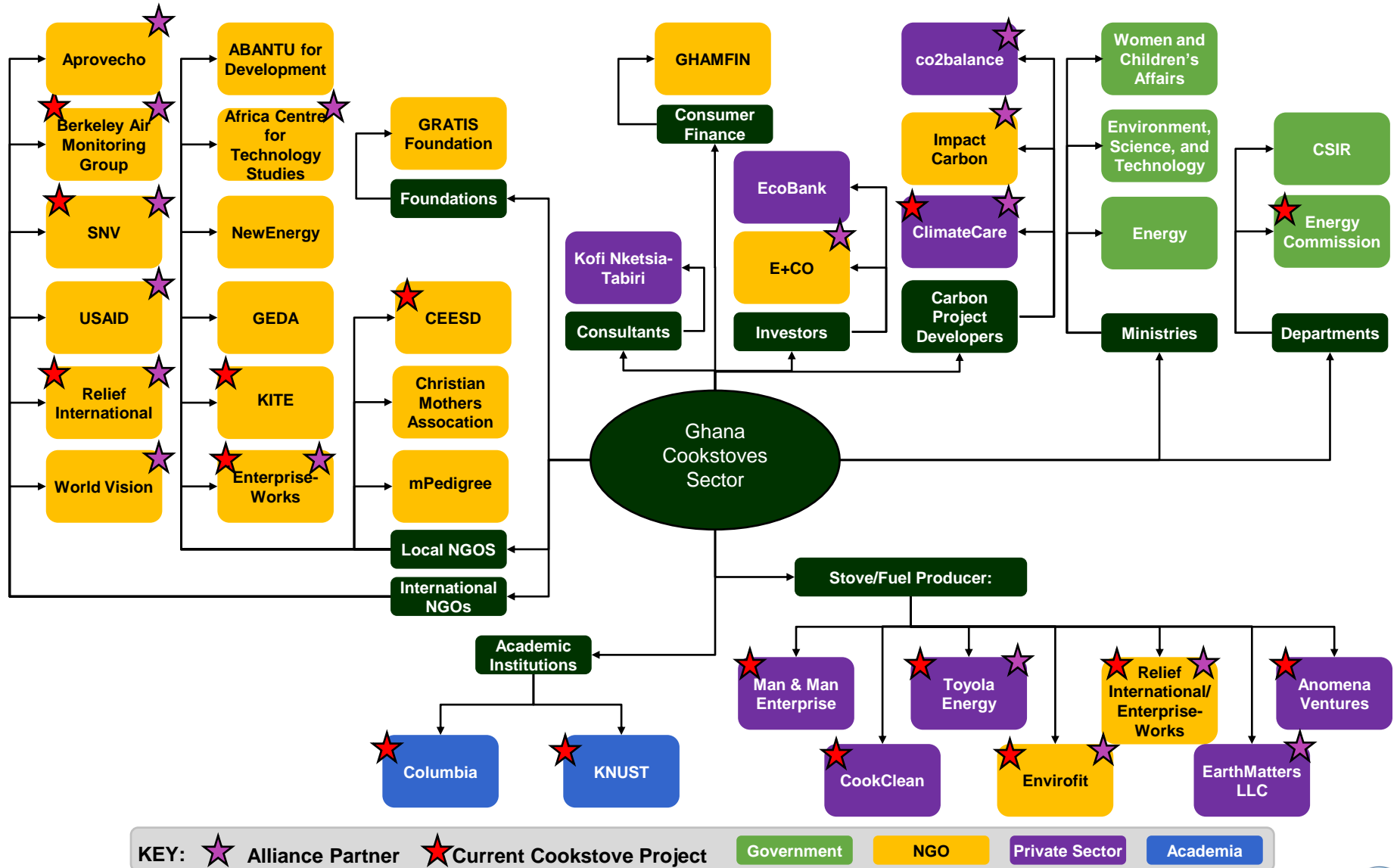
KNUST

Academia

- Implications -

A lack of significant involvement in cookstoves from government and academic institutions suggests there is an opportunity to promote policy and research within the sector.

Ghana Stakeholder Mind Map – For Sector Mapping



Note: This is not a comprehensive list of organizations working in cookstoves. It is designed to be a working document that expands over time

Cookstove Initiatives in Ghana

– Private Manufacturers

Private manufacturers are focused on producing and selling stoves and fuels through a profitable business model.

	Toyola Energy	Man & Man Enterprises	CookClean	Anomena Ventures
Who	Toyola is a private energy efficient stove manufacturer focused on profitably serving Ghana's urban poor and low income rural households. Their ICS program has run since 2007. Suraj Ologburo the CEO was trained under the RI/EW ICS program in 2002.	Man & Man produces energy efficient charcoal stoves . There ICS program It is the winner of the 2011 International SEED Initiative award for entrepreneurship in sustainable development Michael Agyei the CEO was trained under the RI/EW ICS program.	CookClean is a social entrepreneurship with a mission to improve social, environmental, and economic conditions for low income families. Founded in 2009 , it has spent the last 2 years developing and ICS tailored to Ghanaian market.	Anomena seeks to promote increased access to clean energy.
What	Toyola Energy trains and pre-finances ceramicists, producers, marketers and end users to disseminate the Toyola Coalpot stove to urban and rural communities in Ghana. They received funding from E+CO in 2007 to help fund their Gold Standard carbon finance program.	Man and Man Enterprises is responsible for the product development, manufacturing and marketing of the Holy Stove. The organization trains local men and women across the value chain. The Holy stove is sold mainly in Accra and Kumasi.	CookClean has spent the last 2 years developing and piloting the 'Cookmate' stove in Ghana. The organization will employ local women to directly distribute the stoves. CookClean has applied to the Gold Standard for registration of their carbon finance program.	ICS program focused on distributing LPG stoves for Street vendors in Northern Ghana.
Challenges	Access to capital at favorable rates to increase production and modernize of facilities	1. Additional capital to : <ul style="list-style-type: none"> Invest in a kiln and prepare production liners Expand distribution area Expand operations to Togo 2. Links to investors interested in CDM/GS projects	1. Financing: Need access to carbon credit to keep program going 2. Lack of government commitment and support	Scaling the production of the stoves
Partners	E+CO, SNV, KITE		Co2balance	GEDA, Christian Mothers Association

Cookstove Initiatives in Ghana

– NGO's

Multiple NGO's are pursuing cookstoves initiatives in Ghana. The largest and most influential players are highlighted below.

	Relief International/ Enterprise Works (RI/EW)	KITE	SNV	Center for Energy, Environment and Sustainable Development (CEEDS)
Who	Enterprise Works, a division of Relief International works to build sustainable enterprises that create jobs, increase productivity, captures market opportunities and generates income in Ghana.	Established in 1996, KITE is a leading actor in energy, technology and environment in Ghana. KITE has focused on the implementation of public benefits projects.	Founding partner of the Alliance, active in the renewable energy sector in Ghana since 2010 with a focus on biomass and solar energy projects.	Relatively small NGO in Kumasi focused on distributing technologies to promote clean energy and environmentally friendly technologies
What	RI/EW has developed the Gyapa fuel efficient cookstove program since 2002. RI/EW supports the Gyapa value chain through market awareness, business support services, production training and tools and loans for business expansion.	KITE assists small to medium size organizations in developing their business, i.e. assembling a business plan, market research and analysis, and other enterprise development services.	Investigating a cookstove project in Northern Ghana in partnership with KITE and Toyola energy	Pilot testing the Envirofit CH-2200 charcoal stove in three districts in the Ashanti region. Currently have the only registered CDM cookstove project in Ghana.
Challenges	Working capital to continue business expansion, market penetration and awareness campaign	Access to affordable financing for cookstove programs	Unknown	Lack of private sector investment in clean energy
Partners	Climate Care, Enterprise Works/ Ghana	Energy Commission, SNV, New Energy, Government, UNDP	KITE, Toyola	Envirofit

Source: Stakeholder Interviews and Organization websites

Cookstove Initiatives in Ghana

– Government & Academia

Government and academic institutions are all aware of and have supported cookstoves in some form in the past.

	Ministry of Energy, Renewable Energy Division	Ministry of Environment, Science and Technology	Energy Commission	Council of Scientific and Industrial Research (CSIR)	Kwame Nkrumah University of Science and Technology (KNUST)
Who	Established in 2010, the Renewable Energy Division sits within the Ministry of Energy. The energy sector's vision is to: 1. Develop an Energy Economy 2. Secure a reliable supply of high quality energy	The Ministry of Environment, Science and Technology (MEST) exists to establish a strong national scientific and technological base for accelerated sustainable development of the country.	Established in 1997, the Energy Commission sits within the Ministry of Energy. It is managed by seven commissioners appointed by the President of Ghana.	Established by the government in 1958, CSIR falls under the Ministry of Environment, Science and Technology, although it works across government ministries.	Established in 1952, KNUST is a first class public university located in Kumasi, Ghana focused on engineering, science and technology.
What	The renewable energy division is focused on the development and promotion of renewable energy for increasing access to sustainable energy services. Including woodfuel, hydro, solar, wind, biofuels, waste-to-energy and animal traction.	Houses the designated National Authority (DNA) for Ghana on CDM projects and the scientific and industrial research center (CSIR). Interested in promoting more CDM projects.	The role of the Energy Commission is to recommend national policies for the development and utilization of indigenous energy resources and to advise the Minister of Energy on national policies for the supply of electricity, natural gas, petroleum, and renewables.	CSIRs objective is to generate innovative technologies for agriculture, industry, health and the environment. IIR partnered with UC Berkeley to distribute 1000 clay woodstoves. CSIR has also performed research and assisted in the development of a fish smoker sold in fishing villages along the coast.	Technology Consultancy Center has focused on basic testing of wood, charcoal and LPG stoves and is working to develop a design that would work for all three fuel types. They have tested Bio-Char as a fuel source and have conducted WBT on the Ahibenso, Gyapa and Traditional stoves.
Challenges	Funding	Getting organizations to pursue and complete the CDM process	Funding required to execute action plans	Lack of grants and funding to further support cookstove studies and research	Lack of grants and funding to further support cookstove studies and research
Partners	Energy Commission, Environmental Protection Agency (EPA)	CSIR, EPA	Ministry of Energy, EPA, KITE, NGOs, and UNDP	FAO, Universities, Academics and Polytechnic Institutions	

Cookstove Industry Value Chain

In Ghana capabilities exist across the value chain, but to create a thriving market government, financial institutions, local manufactures and entrepreneurs capabilities need to be augmented.

Key:	Manage Program					Raise Awareness			Provide & Support Stoves									
	Coordinate Program	Provide Funding	Coordinate Project (Region)	Centralize Act. (Mktg, Ops, Fin)	Gender Programs	Educate on HAP	Raise product awareness	Run Promo Activities	Import & retail stoves	Design stoves	Test stoves	Train Stove Manufacturers	Supply Materials	Transport mat. to Manufacturer	Make stoves	Transport stove to customer	Sell and install Stoves	Maintain Stoves
Multilaterals/Donors	Partial	Full	Partial	Partial	Basic	Partial	Partial											
Government		Basic			Partial	Basic	Full	Basic		Basic	Partial							
Banks/Financial Institutions		Basic	Partial	Basic														
NGOS and iNGOs	Full	Partial	Full	Full	Partial	Full	Partial	Full	Partial	Partial	Basic	Full	Full		Basic	Basic	Basic	Basic
Utility Company (e.g Mobile)				Full		Full	Full											
International Manufacturers							Basic		Basic				Partial	Full				
Local Manufacturers	Full	Partial	Full	Full	Partial	Basic	Full	Basic	Partial	Full	Full	Basic	Full	Full				
Local Entrepreneurs					Partial	Basic	Full	Partial	Partial	Basic		Full	Full	Full	Basic	Partial	Full	

- Implications -

Generating support and funding from the government and financial institutions will help augment the operations of local manufactures and entrepreneurs on the ground.

Ghana Alliance for Clean Cookstoves

The Ghana Alliance for Clean Cookstoves is currently being established to strengthen local actors working in the cookstoves sector, support government achieve its renewable energy policy and climate change program goals and increase consumer awareness on the importance of fuel efficient and clean cookstoves.

Goal

Increase awareness and collective action within the cookstove sector to lead to increased opportunity within Ghana and internationally

Objective

- 1) Provide the platform for a collaborative, technical sharing entity for active organizations working in fuel efficient and clean cook stoves to promote:
 - Innovative ideas
 - Information
 - Product standardization
 - Sector wide best practices
 - Increase consumer awareness
- 2) Promote awareness and raise the profile of the sectors positive work in Ghana at the international level

- Implications -

The Ghana Alliance for Clean Cookstoves could potentially act as the central coordinative body role to provide support and ensure effective implementation of cookstove programs across Ghana.

Note: The Ghana Alliance for Clean Cookstove is not yet an established organization. Information is based on the initial concept note.

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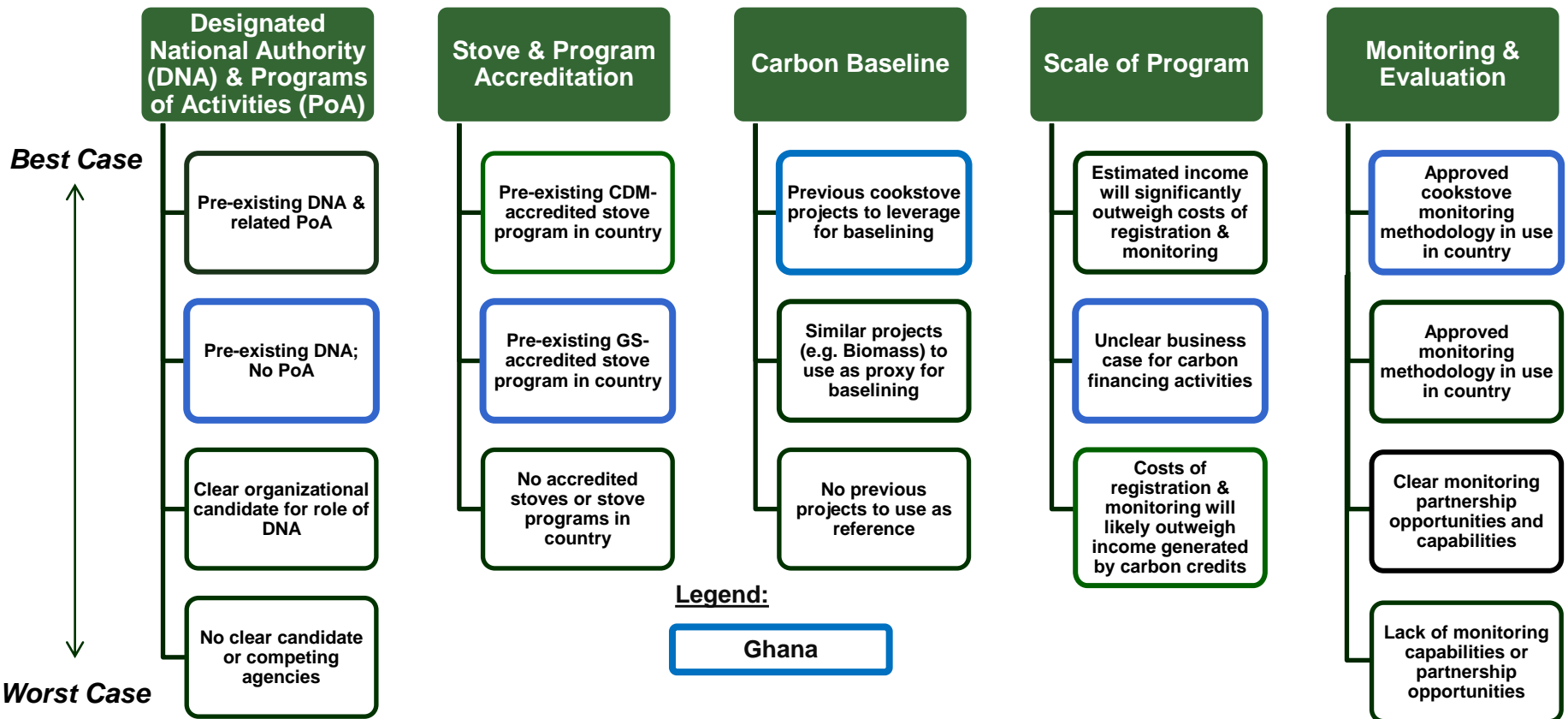
Carbon Financing

Sector Mapping Summary

Carbon Finance Market Attractiveness

Ghana has two accredited and two registered Gold Standards (GS) stove projects and one registered small scale CDM project; however, Ghana is losing its 'LDC' status at the end of 2012.

Carbon Finance Attractiveness Criteria – Ghana



- Implications -

Previous cookstove projects can be leveraged for baselining, but any projects pursuing CDM need to register their project before the end of 2012 to access to the European carbon markets.

Carbon Finance Landscape

Ghana has a Designated National Authority and projects which are currently receiving GS VER's, but it does not have any large cookstove PoA's registered in the country.

Carbon Financing Landscape – Ghana

Area	Data	Comments
Designated National Authority	Ministry of Environment, Science and Technology; Environmental Protection Agency	Contact Name: Mr. Peter Justice Dery and Mr. Jonathan A. Allotey
CDM Program of Activities	No Ghana specific PoA's have been registered to date	Ghana will lose its LDC status at the end of 2012 and then will no longer be eligible to obtain CDM credits
CDM Projects	<p>1 listed CDM Program activity:</p> <ol style="list-style-type: none"> 1. Envirofit Cookstove Program for Ghana 	Envirofit program activity is under a broader West Africa regional PoA
Gold Standard Projects	<p>2 registered GS projects:</p> <ol style="list-style-type: none"> 1. Relief International/Enterprise Works - Gyapa Improved Cookstoves in Ghana 2. Toyola Energy - Improved Household Charcoal Stoves in Ghana <p>2 listed GS projects:</p> <ol style="list-style-type: none"> 1. Co2Balance - Greater Accra Improved Cook Stoves 2. CookClean Ltd. - Efficient Kitchen Practices in Ghana 	Relief International/Enterprise Works and Toyola Energy have been issued GS VER's. Co2Balance and CookClean Ltd. are still pending GS validation
Carbon Funds	GS VER's	- Relief International/Enterprise Works and Toyola Energy are currently receiving carbon credits

Carbon Finance Programs

There are two Gold Standard registered carbon finance programs in Ghana: Relief International and Toyola Energy.



Focus

- The replacement of inefficient traditional charcoal with Gyapa fuel efficient stoves to reduce cooking fuel expenditure, improve health and reduce deforestation
- Reduce greenhouse emissions by disseminating fuel-efficient charcoal stoves

Participants

- Climate Care (Project Developer, Carbon Broker)
- Relief International/Enterprise Works (Implementer)
- E+CO (Project Developer)
- Toyola Energy (Implementer)

Description

- GS Registered
- Began in 2002
- Grants from USAID/EPA/ Shell
- Currently producing and selling 100,000+ stoves per year
- Stove type: Gyapa Fuel Efficient Stove
- Monitoring includes:
 - Production and sales records of ceramicists, manufacturers, retailers and end users
 - Intensive product quality checks at each production stage
 - Third Party quarterly Kitchen Surveys
- GS Registered
- Began in 2010
- Goal is to distribute 300,000 ICS per year
- Stove type: Toyola Coalpot
- Monitoring includes:
 - Serial #'s on stoves
 - Total sales record (Serial #) – date, mode of use, model, # purchased
 - Site visits
 - Electronic and paper files

Carbon Finance Programs (Cont.)

Three carbon finance projects are pending approval; two projects listed with the GS and one under a Small Scale CDM Program Activity.



Focus

- Distribute water filters and efficient stoves in Ghana, and support their effective use
- Introduce energy efficient cook stoves and set out to reduce fuel use and associated greenhouse gas emissions by end users
- To distribute efficient, clean-burning stoves at an affordable price

Participants

- JP Morgan (Project Developer)
- CookClean Ltd. (Distributor)
- Co2balance (Project Developer)
- To be Identified (Distributor)
- Envirofit (Project Developer)
- Center for Energy Environment and Sustainable development (Implementer)

Description

- GS Listed Production to begin in fall of 2012, 3000 stoves per month
- Stove Design:
 1. Basic mud stove
 2. Firewood stove “WoodStove”; metal rocket design
 3. Firewood & Charcoal Stove ‘Combi’; metal rocket design
- 5 year lifespan for stoves if properly maintained.
- Monitoring to include:
 - Site Visits
- GS Listed Project is currently on hold; seeking DNA approval
- Goal is to distribute 20,000+ stoves in 7 communities in Eastern Ghana
- Stove will be a firewood stove
- Monitoring includes:
 - Site visits
- Small Scale CDM Programme Activity
- Began in 2009
- Goal is to distribute 12,000 ICS in 3 selected districts
- Stove type: Envirofit CH2200
- Monitoring includes:
 - Serial #'s on stoves
 - Sales Record – name, address, church and neighbor
 - Site visits
 - Electronic and paper files

Overall Carbon Finance Feasibility

Ghana has a unique opportunity to leverage existing carbon financing activities to support clean cookstove programs; however, there are a few risks.

- Supportive Market Criteria -

Existing Designation National Authority

Largest Gold Standard accredited cookstove program in the world

Proven stove design for obtaining carbon credits

- Potential Risks-

Scale of programs required to justify setup and maintenance costs

Accessibility of information needed to setup a program

Long term future of carbon market

Opportunities

- Organizing stakeholders to pursue a large scale plug and play PoA or PDD to support access to carbon finance revenues for smaller scale programs in Ghana
- Set up a carbon finance portal to readily access information from the DNA and other sources. Promote knowledge sharing and transfer of best practices across programs.
- Ongoing assessment of the voluntary carbon market needs to be done to ensure that demand for carbon credits can be assessed and the feasibility of each project confirmed.

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Cookstove Industry Summary

The Ghana cookstove sector has great potential given the large market, favorable macro and social environment, and mobilization of key players across the sector.

Macro	Social & Environment	Consumer	Cookstove Industry	Carbon Finance
<ul style="list-style-type: none"> + Large potential market + Government recognizes the broad benefits of ICS + Government has new and existing policies promoting renewable energy - High interest and inflation rates make it difficult to access financing - Government has many competing priorities 	<ul style="list-style-type: none"> + Severity of deforestation makes improving cookstoves and fuel a high priority + Number of HAP related deaths creates a strong case for change + Huge reliance on biomass fuel presents a huge potential market + Compelling economic benefits for ICS for many parts of the country + Women are generally recognized and empowered in Ghanaian society 	<ul style="list-style-type: none"> + Consumers have already been introduced to improved cookstoves + There is existing use of clean technologies such as LPG - Very low affordability amongst those with the greatest need (wood users in rural areas) - Lack of awareness of the health effects of Household Air Pollution 	<ul style="list-style-type: none"> + Strong and diverse cookstove sector (both NGO & SME) + Mobilization of stakeholder in the sector - Lacking a wood ICS to address the wood fuel market - Limited distribution network in rural areas - Lack of an accredited standards and testing facility in country 	<ul style="list-style-type: none"> + Attractive CF market characteristics + Existing programs to leverage for baselining - High setup costs for programs in country - Limited access to information for carbon projects at the national level - Ghana losing its LDC status at the end of 2012
Favourable	Favourable	Moderately Favourable	Moderately Favourable	Moderately Favourable

- Implications -

There is potential for market growth if consumer awareness can be increased and the value chain augmented to address the existing gaps within the sector.

Glossary of Terms

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

AIDS – Acquired Immune Deficiency Syndrome	MFI – Microfinance Institution
AREED – African Rural Energy Enterprise Development	NGO – Non-Governmental Organization
CDM – Kyoto Clean Development Mechanism	PD – Product Development
CEESD – Center for Energy, Environment and Sustainable Development	KNUST – Kwame Nkrumah University of Science and Technology
CF – Carbon Finance	iNGO – International Non-Governmental Organization
CSIR – Council of Scientific and Industrial Research	LDC – Least Developed Country
DNA – Designated National Authority	PDD – Project Design Document
EPA – Environmental Protection Agency	PoA – Program of Activities
FAO – Food and Agriculture Organization	RI/EW – Relief International/ Enterprise Works
GACC – Global Alliance for Clean Cookstoves	RFP – Request for Proposal
GHS – Ghana Cedi	SNEP – Strategic National Energy Plan
GDP – Gross Domestic Product	SME – Small and Medium Enterprise
GEDA – Gender and Energy Network	TB – Tuberculosis
GS – Gold Standard	UN – United Nations
HAP – Household Air Pollution	UNEP – United Nations Environment Program
HIV – Human Immunodeficiency Virus	UNDP – United Nations Development Program
IAP – Indoor Air Pollution	UNICEF – The United Nations Children's Fund
ICS – Improved Cookstove	USAID – United States Agency for International Development
ISO – International Organization for Standardization	USD – US Dollars
LPG – Liquid Petroleum Gas	VER – Verified Emission Reduction
	WB – The World Bank