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Global Alliance for Clean Cookstoves

South Africa Market Assessment

Sector Mapping

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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- South Africa is a middle-income regional power, as well as an emerging market with an abundant supply of natural resources, a number of strong industries, and modern infrastructure.
- More than 10.1M people in South Africa use solid fuels for cooking.
- HIV/AIDS and unemployment have seized the bulk of attention from the health community in South Africa and Indoor Air Pollution (IAP) is not yet viewed as a major government priority.
- The problems related to cookstoves are unique to different geographic regions, and require unique interventions.
- Dirty, inefficient cookstoves and open fires cause major issues in South Africa, particularly around shack fires and energy poverty.
- Different geographic regions already have market-based channels for stoves and fuel products.
- In the current market, paraffin, LPG, and electric stoves are attractive options, however, more attention needs to be given to biomass-fueled cookstoves to address the needs of 'rural' communities.
- South Africa has all the capabilities to develop an effective cookstoves value chain, however, there are few organizations focused on raising awareness.

Implications for Intervention Options

- A Black Economic Empowerment-friendly cookstove programme that aligns with the central sustainability plan and caters to diverse provincial administrations is essential for attracting political support.
- The country needs employment generating activities; any program that stimulates employment will be much better received by the government and local population.
- Stakeholders such as the government and communities may not view IAP as a priority issue, given the urgency of other priorities.
- There is opportunity to generate awareness and create programs to mitigate health and social hazards, especially around safety and cost.
- The large variation in energy use across provinces suggests that any intervention must fully address the needs of its target region and tailor actions accordingly.
- The potential target market for advanced cooking solutions is over 30 million people in South Africa.
- Any improved cookstove will need to be priced competitively compared to existing stoves to stand a chance of success with customers in the marketplace.
- A low cost for fuel is critical for an improved cookstoves program, but it is also critical that customers are educated about how to interpret different prices.
- It is critical to develop an advocacy group or Alliance that can connect market players and raise awareness among government officials and households.

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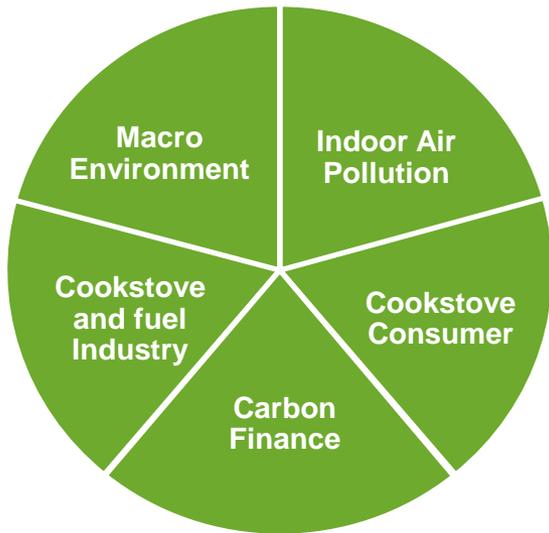
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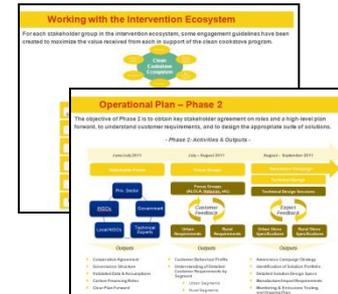
Project Approach

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

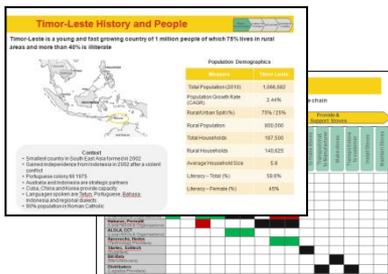
Sector Mapping



Strategy Development



Intervention Options And Operational Plan

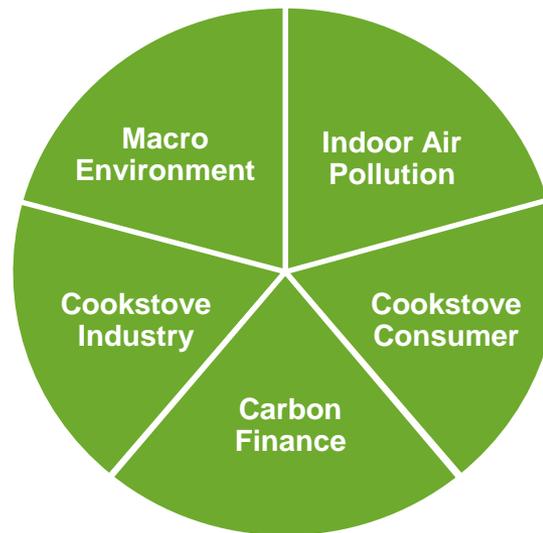


Sector Map

Sector Mapping Approach

Sector Mapping for a clean cooking industry was conducted on four dimensions – macro environment, indoor air pollution, cookstove consumer, and current cookstove industry.

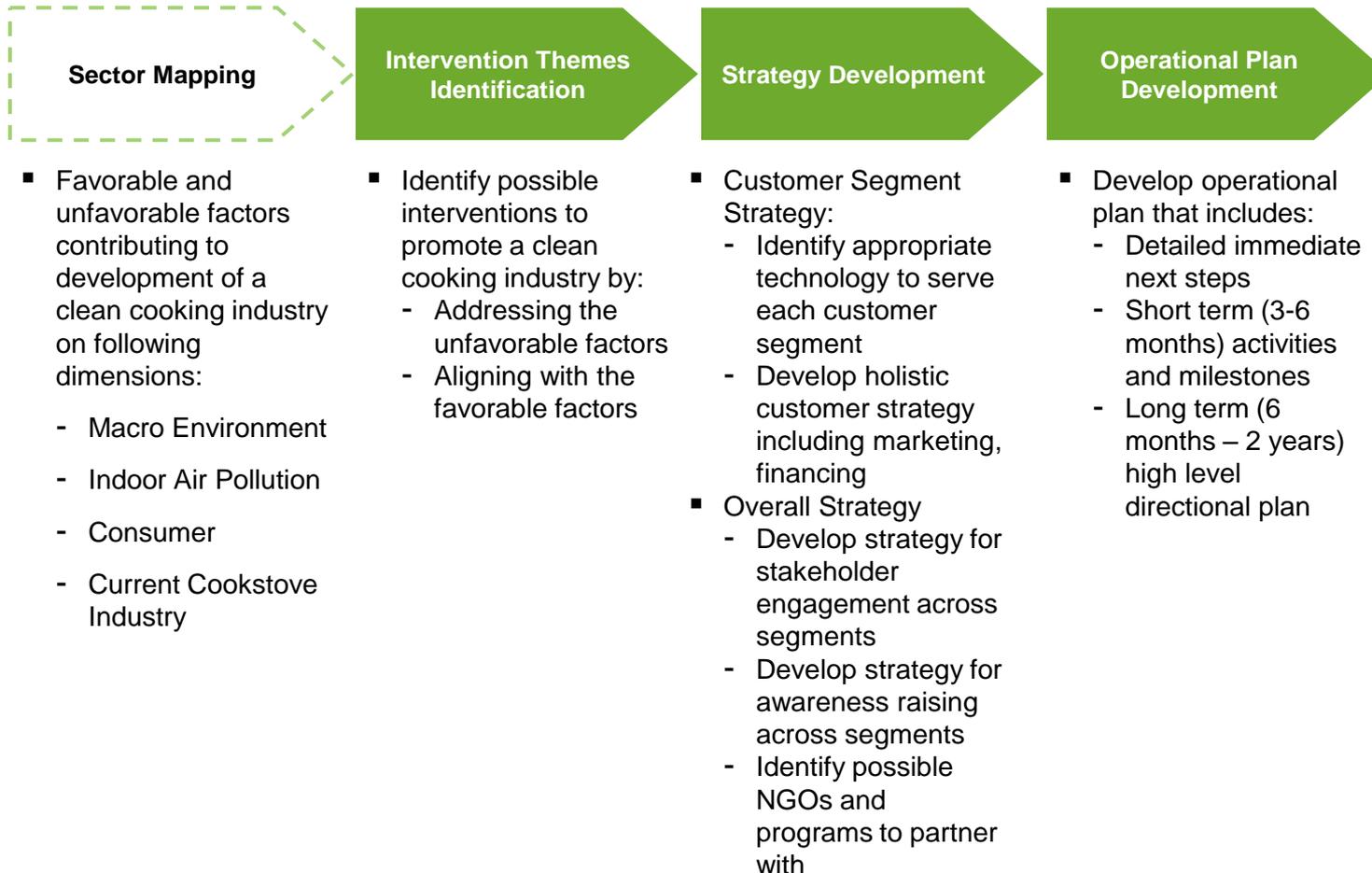
- Social: What is the country demographics and population distribution across regions?
- Political: What is the political environment, how stable is government and what political risks will any program face?
- Economic: How much money do the potential customers have and what is their economic cycle?
- Technological: How sophisticated is the infrastructure in the region and what is the plan for progress?
- Environmental: How do ecological conditions impact the success of an IAP programme?
- What cooking devices are currently owned and used within the region?
- Who are the main cooking device designers & suppliers?
- How attractive is the industry from a commercial perspective and what are likely to be some of the challenges to the industry?



- What is the current IAP exposure profile of the target market? (Primary cause of IAP and size of problem)
- What lessons can we learn from historic IAP programmes?
- What are the opportunities / threats of current and future IAP programmes?
- Who are the key actors involved in IAP programmes?
- 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?
- 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?

Intervention Options Approach

Strategy Development was conducted by using sector mapping as an input to identify intervention areas, develop recommendations, and structure an operational plan



Acknowledgements

Many organizations made valuable contributions to this study with their knowledge of South Africa or experience in clean cookstove and fuel initiatives.



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South Africa is the 5th largest African country with a population of almost 50 million, 38% of which live in 'rural' areas and more than 50% of which live below the poverty line.



Context

- The country became a republic in 1961 after a referendum, before which it was a British colony.
- The historical policy of apartheid – the separate development of races – caused imbalances in housing, education, and health care between the white minority and black majority.
- The first multi-racial elections in 1994 brought an end to apartheid and ushered in majority black rule.
- There are 11 official languages including Zulu, English, and Afrikaans.
- 81% of the population is Christian.

Population Demographics

Measure	South Africa
Total Population (2010)	49,991,000
Population Growth Rate (CAGR)	1.4%
Rural/Urban Split (%)	38% / 62%
'Rural' Population	18,997,000
Total Households	14,155,017
'Rural' Households	5,378,906
Average Household Size	4.11
Literacy – Total (%)	86.4%
Literacy – Female (%)	85.7%
Life Expectancy (years)	49.33
Population below poverty line	50%

A clean cooking intervention in South Africa could serve a large market across 'rural' and 'urban' areas.

Political Environment

The country has been governed by the ANC party since the end of apartheid; provincial administrations are both culturally and politically diverse.



Administrative Map

- Capital city is Pretoria
- Country divided into 9 provinces, 53 districts and 279 municipalities
- Johannesburg, Pretoria, Durban and Cape Town are most populated urban areas
- Gauteng and Western Cape are the most populous and prosperous provinces

Political Environment

Structure

- Democratic Republic
- The President is both the Head of State and Head of Government and appoints the Cabinet
- National parliament elected every 5 years, the last election was in 2009

Current Government

- The ANC is the dominant party with ~65% of the vote, while opposition is relatively weak & fragmented
- Current government is heavily focused on job creation, healthcare, education, crime, and rural development

Working with the Government

- Black Economic Empowerment (BEE) Policy is a critical consideration for private sector and other organizations committed to market development
- Employment, access to energy and health care are government priorities

- Implications -

A BEE friendly clean cooking program that aligns with the central sustainability plan and caters to the diverse provincial administrations is essential for political support.

South Africa is a middle-income, emerging market regional power with an abundant supply of natural resources, strong industry, and modern infrastructure.

Country Economics

Key Indicators	
GDP (2010)	\$524 billion
GDP Per Capita (2010)	\$7,275
Economic Growth Rate (2010 est.)	2.8%
Inflation Rate (2010)	4.3%
Unemployment	23.8%
Youth Unemployment	48%

Key Indicators	
Exports	-\$85.8 billion; merchandise exports: minerals and metals, motor vehicles and parts, agricultural products. <i>Major markets:</i> China, U.S., Japan, Germany, U.K., Sub-Saharan Africa.
Imports	-\$81.86 billion: machinery, transport equipment, chemicals, petroleum products, textiles, and scientific instruments. <i>Major suppliers:</i> China, Germany, U.S., Saudi Arabia, Japan
GDP composition (2010):	Agriculture 2% Industry 30.8% Services 66.7%

- Implications -

The country is in need of employment generating activities; any program that stimulates employment will be better received by the government and local population.

Technological and Environmental Environment

The country faces serious challenges in health and electricity infrastructure; the government has identified priorities and has programs in place to address them.

Health

- 18% of adult population has HIV/AIDS
- 3.4 million orphans, 1.9 million due to AIDS
- Infant mortality rate is 41 deaths / 1000 live births
- Only 65% of the rural population has access to improved sanitation

Infrastructure

- Infrastructure improved dramatically due to the 2010 FIFA World Cup
- 4.42 million internet users
- 46.44 million mobile connections

Energy

- 75% of population has access to electricity
- 2.4% of energy is supplied by nuclear and renewable sources
- Government policy to provide complimentary energy to some of those with no grid access

Natural Resources

- Huge dependence on importing fossil fuels but only 0.05% deforestation
- One of the world's largest producers of platinum, gold, and chrome; also significant coal production
- Excellent regional access to huge gas field recently found near Mozambique

Current Situation

Government Priorities

- Prevention of and treatment for HIV/AIDS
- Maternal and infant health
- Access to clean water & food in rural or poor areas

- Infrastructure investment remains a key government priority as it will lay a foundation for long-term growth
- Light railway installed & growing in Gauteng province

- Expansion of electricity grid to provide universal access
- Ambitious energy and CO2 emission targets proposed due to COP17

- Continue exploiting huge reserves of minerals & resources
- Increasing investment in nuclear, wind, tidal, and solar energy

- Implications -

Serious health challenges dominate the government's focus; access to energy remains a challenge despite excellent infrastructure & rapid electricity expansion.

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Indoor Air Pollution (IAP) in South Africa

Although more than 10.1 million people in South Africa use solid fuels, the health impacts of IAP are lower than in other African countries.

How Many People Use Solid Fuels?

South Africa's Population: 50.6M People

Geography

Rural:
38% of total population
(19.2 million)

Urban:
62% of total population
(31.3 million)

Usage of Solid Fuels

41.2% of those living in rural
areas use solid fuels
(7.9 million)

6.9% of those living in urban
areas use solid fuels
(2.2 million)



19.9% (10.1 million) of total population uses solid fuels

What are the Health Impacts?

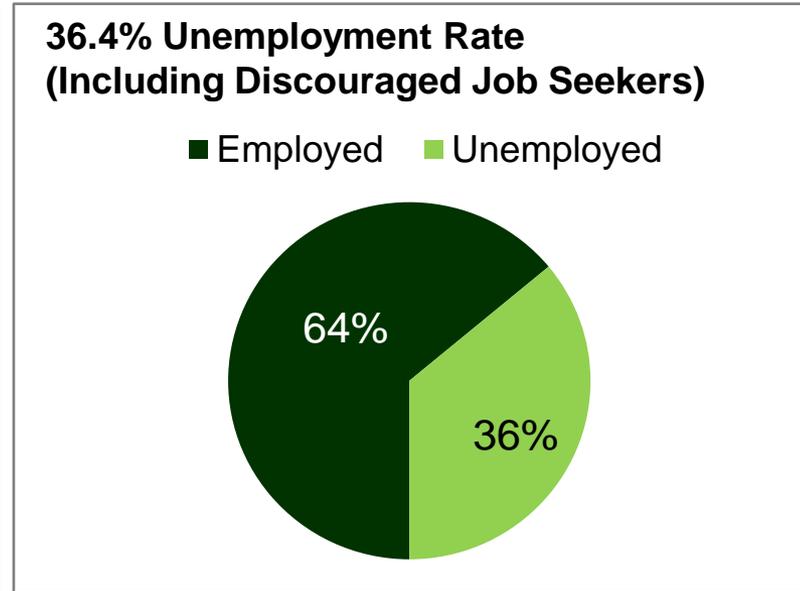
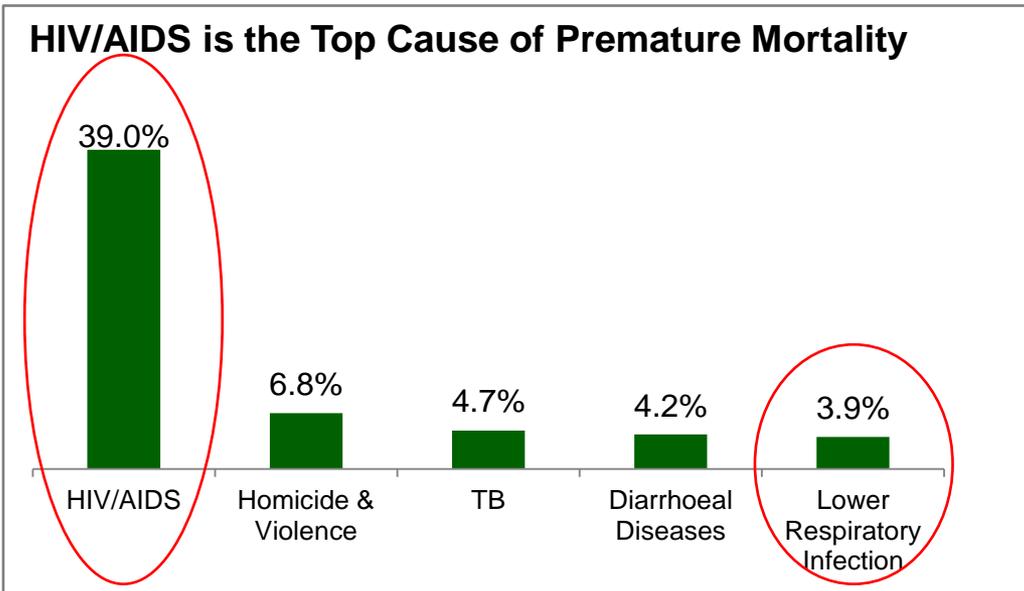
- 3,200 deaths per year due to indoor air pollution
- 1.3 DALYs/1000 cap/year
- Respiratory infections per year [DALYs/1000 capita]: 3.9

- Implications -

While a significant proportion of the population still relies on solid fuels (~20%), the incidence of deaths due to indoor air pollution is relatively low. IAP is not a strong case for change, but there are many other adverse health, economic, and environmental effects from burning solid fuels in traditional cookstoves or over open fires.

Indoor Air Pollution vs Other Priorities

Typically indoor air pollution is the major impetus for clean cookstove and fuels initiatives. However, South Africa is largely focused on issues of HIV/AIDS and unemployment.



Clean cookstoves and fuels have not traditionally been a priority for households or the government.

“Smoke is good – it keeps away mosquitoes and provides warmth, I have gotten used to burning eyes and it does not bother me”
- Homeowner in remote area

“Our focus is on providing universal access to electricity, clean water, and housing”
- South African Government

“We didn’t fight for that [biomass stove]”
- South African Government

- Implications -

Stakeholders including the government and local communities may not view indoor air pollution as a priority, given the urgency of other issues.

Cookstoves – The Case for Change

Inadequate cookstoves still cause major health and environmental issues in South Africa, particularly through shack fires and energy poverty associated with the high cost of fuel.

Use of traditional cookstoves and fuels has negative health and social impacts

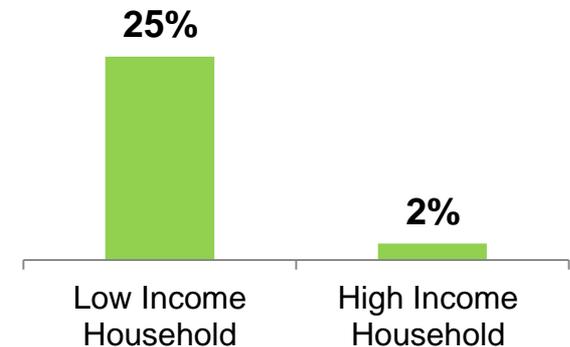
Stove and Fuel Type	Health and Social Hazards	Impact
Wood	<ul style="list-style-type: none"> Deforestation Loss of productive time spent collecting wood Environmental pollution 	
Coal	<ul style="list-style-type: none"> Prolonged indoor use can cause CO poisoning Environmental pollution 	
Paraffin	<ul style="list-style-type: none"> Shack fires Fumes 	
Ethanol	<ul style="list-style-type: none"> Poisonous if consumed 	
Gas	<ul style="list-style-type: none"> Risk of gas explosion 	
Electricity	<ul style="list-style-type: none"> Electrocution from makeshift wire connections Criminal activity with illegal connections 	

Key

- Low
- Moderate Low
- Moderate High
- High

Energy poverty is a huge problem among low income households

Percentage of Income Spent on Energy Costs

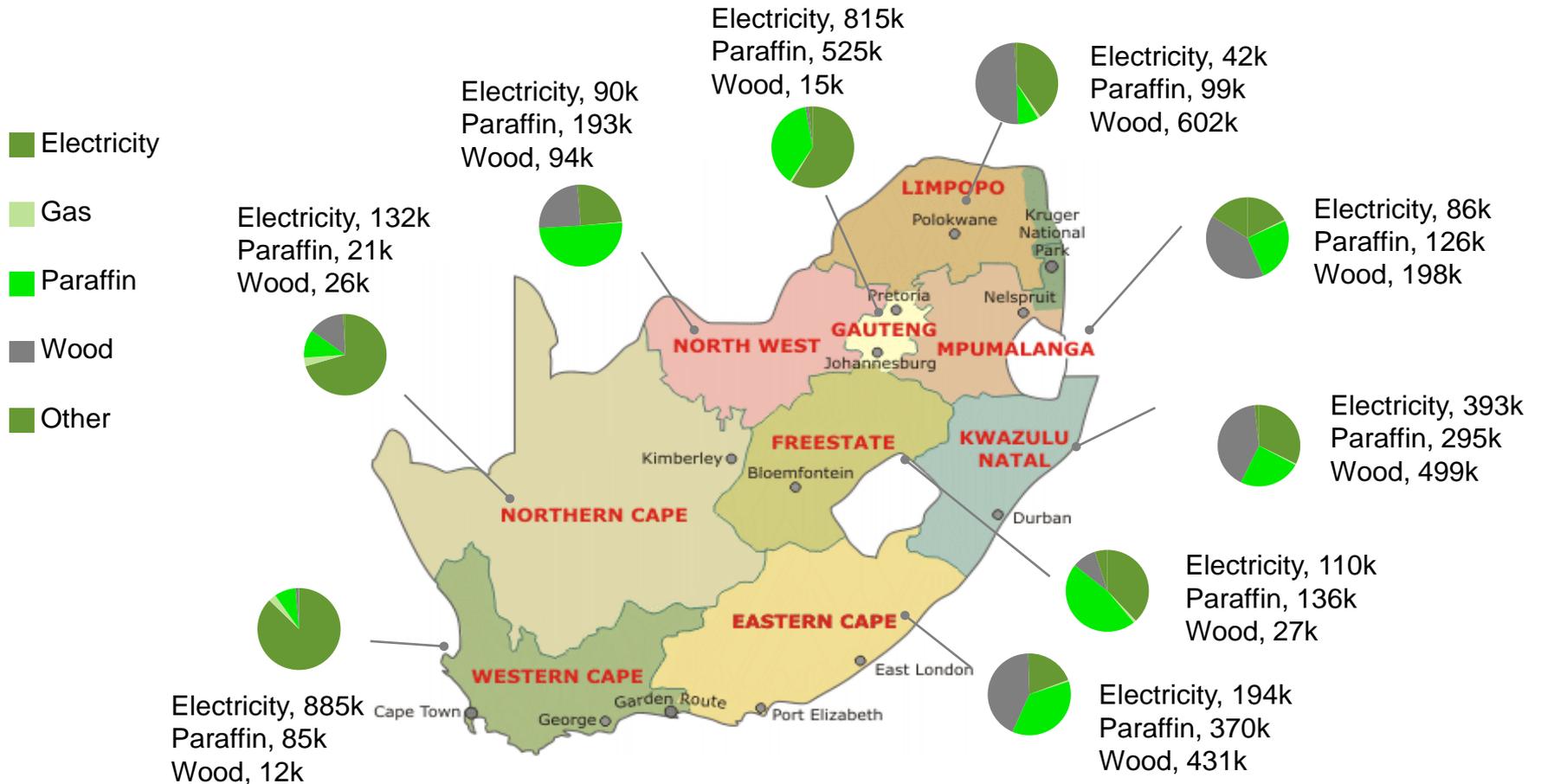


- Implications -

There is an opportunity to generate awareness and create programs to mitigate health and social hazards, especially around safety and cost.

Distribution of Fuel Use in South Africa

The problems related to cookstoves are unique to different geographic regions, and require unique interventions.



- Implications -

Large variation of energy use across provinces suggests that any intervention must fully understand its target region and tailor actions accordingly.

Existing Markets for Cookstoves and Fuels

Different geographic regions already have market-based channels for clean cookstoves and fuels.

← 'Urban'

'Rural' →

Supermarket	Petro Station	Tuck Shop	Agents
<p>Cookstoves</p> <ul style="list-style-type: none"> Gas, Paraffin, Electric <p>Fuels</p> <ul style="list-style-type: none"> Ethanol, Paraffin, Wood Pellets 	<p>Fuels</p> <ul style="list-style-type: none"> Paraffin (only some stations) 	<p>Cookstoves</p> <ul style="list-style-type: none"> Gas, Paraffin, Electric Burner (larger shops only) <p>Fuels</p> <ul style="list-style-type: none"> Paraffin, Gas 	<p>Cookstoves</p> <ul style="list-style-type: none"> Wood, Paraffin <p>Fuels</p> <ul style="list-style-type: none"> Paraffin, Gas
			

- Implications -

A diverse existing market for cookstoves and fuels in South Africa offers advantages for clean cooking interventions, as compared to other developing countries. However, a pure market solution still presents an opportunity for fulfilling basic energy needs.

Overview of Cookstove Initiatives in South Africa

Health and Social Impacts

Various organizations have pursued clean cooking initiatives in South Africa, with different goals.

Private Manufacturers



Government



Umdoni Municipality
in KwaZulu-Natal

Basa Magogo Project



Paraffin Safety Association
Southern Africa



NGOs



UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD

Academia

- Implications -

While several clean cooking initiatives are in progress, there is no one organization that is best suited to scale-up and address identified gaps.

Cookstove Initiatives in South Africa

– Private Manufacturers

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

	Restio Energy	Wonderbag	Arivi	Bio Heat
Who	Private company established in 2001. Focused on policy, regulation, consulting and distribution of green products.	Natural Balance, the company behind the Wonderbag, was founded in 2005 as one of South Africa's first social enterprises.	Private company that designed the Arivi stove, which was a finalist in the 2009 INDEX Awards.	Biocorp Holdings (Pty) Limited was formed in July 2005 for the large scale production of bio-ethanol gel fuel derived from sugar cane.
What	Distributing EcoZoom wood- and charcoal cookstoves. Initially their focus was on rural communities, but now it has shifted to rapidly growing townships. More than 5,000 cookstoves have been distributed.	The Wonderbag is an insulated cooker that continues to cook a pre-heated dish through heat retention over the course of several hours. 150,000 Wonderbags have already been placed in homes.	Designed a safe and economical paraffin stove to reduce the safety risks traditionally associated with paraffin cookstoves.	The company has been manufacturing and marketing gel fuel and illuminating lamp oil under the brand name of BIOHEAT™.
Challenges	Has conflicting priorities with the government, since improved wood cookstoves are contradictory to the government's push for universal electricity.	The use of a Wonderbag requires behavioral changes and associated customer education.	The high price point (~R1000) makes it unattainable for most potential customers.	Although distribution channels have been established, concerns exist regarding accidental ethanol poisoning and inefficiency of ethanol gel.
Partners	GIZ, World Bank	Unilever, Microsoft, Frog, Grindrod, Nedbank, JPMorgan, Barrows, Goedgedacht, Collins PE, Abbeyleix Women, Youth for Survival		Municipalities, supermarket chains

Cookstove Initiatives in South Africa

– NGOs

NGOs working in this area have a variety of focus areas ranging from stove distribution, behavior change, training and education, advocacy, and compiling industry knowledge.

	SunFire Solutions	Basa Magogo Project	Paraffin Safety Association Southern Africa
Who	A development organization and leading promoter of solar cookers in South Africa.	Nova Institute is a non-profit organization that provides training on the Basa Magogo method.	The South African Petroleum Industry Association (SAPIA) joined together to coordinate a response to paraffin safety, with a focus on ingesting and poisoning. This resulted in the formation of the Paraffin Safety Association of Southern Africa (PSASA) in 1996.
What	SunFire Solutions predominantly manufactures and supplies parabolic reflectors.	Basa Magogo is a new method of lighting cookstoves whereby paper and wood are placed on top of coal, causing the fire to burn from the top downwards. Benefits of this method may include cleaner air, health improvements, and energy savings, as compared to traditional methods.	<p>Providing training and educational material to paraffin users through a network of partnerships.</p> <p>Working with industry, regulatory organizations and other bodies to set safety standards and lobby government to have these made mandatory.</p> <p>Compiling a knowledge base about the domestic use of paraffin and its consequences by conducting incidence surveillance, research, and collating and interpreting all available information.</p>
Challenges	Solar cookers are often used as an add-on solution and are paired with other types of stoves for use on days when sunshine is not available.	Direct demonstration and training is necessary to adopt the Basa Magogo method. This requires extensive time and resources.	PSASA has had difficulty engaging the government and has received some pushback for its focus on paraffin in light of the government's emphasis on universal electricity.
Partners	Solar Cookers for Africa	eMbalenhle Community, Sasol, Fair Climate Programme of the Protestant Church in the Netherlands	SAPIA

Cookstove Initiatives in South Africa

– Government

The government is focused on creating regulation to ensure safe devices, as well as funding cookstove and fuel initiatives in areas where electricity is not available.

	NRCS Regulation	Umdoni Municipality in KwaZulu-Natal
Who	Public entity that reports to the Minister of Trade and Industries for administration of technical regulations that protect human health and safety, and the environment.	Umdoni is providing free bio-ethanol gel-fuel and bio-fuel cookstoves as a part of the Municipality's free basic services commitment.
What	Approves compliant non-pressure paraffin cookstoves and heaters. Consumers are warned not to purchase unsafe non-pressure paraffin cookstoves and heaters as they may cause serious injury, death or destruction of property.	The project will roll-out and sustain support for a bio-ethanol gel-fuel for bio-fuel cookstoves to 4,000 rural households in the Umdoni Municipality. Once beneficiary households are electrified the gel-fuel supply will be suspended.
Challenges	Many households still use non-compliant paraffin cookstoves and even approved paraffin cookstoves still present a risk of fire.	The project is funded by carbon financing. Additionally, the program is only supported until households gain access to electricity, despite the fact they may not be able to afford electricity.
Partners	Paraffin cookstove and heater manufacturers	PACE Centre

Cookstove Initiatives in South Africa

– Academia

Health and Social Impacts

Academic institutions are focused on clean cookstove testing and policy research. They also provide information services to various stakeholders.

	University of Johannesburg SeTAR Centre	University of Cape Town Energy Research Centre
Who	The Sustainable Energy Technology and Research (SeTAR) Centre is a part of the University of Johannesburg, a public university.	The Energy, Poverty and Development group within the Energy Research Centre is concerned with energy issues that affect sustainable development and improved livelihoods for poorer communities in South Africa and other developing countries. It is part of the University of Cape Town, a public university.
What	The SeTAR Centre is a multi-disciplinary energy research facility that accommodates the technical activities of an air emission testing lab initiated by the UJ EnerKey programme. A German-South African Research Initiative, the aim is to use energy as a key element for the sustainable development of the urban region of the Gauteng Province. The SeTAR Centre is engaged in the design and testing of improved combustion devices.	The research generally includes a process of feedback to national policy-makers and energy supply agencies. The experiences gained through fieldwork and policy research are carried into the ERC Masters program, to reach a wider spread of energy/development students and professionals from South Africa and other countries. Capacity-building and information services are also provided for groups of people involved in improved energy for the poor, such as end-users, community leaders, schools, local government and energy suppliers. UCT is working with Engineers Without Borders to improve commercial cookstoves in surrounding townships near Cape Town.
Challenges	Securing consistent funding for the University's programs is a constant challenge. Additionally, the University is working to commercialize its inventions, including an improved coal-fired cookstove.	With the recent shortage of LPG, the Engineers Without Borders project was delayed and project viability is at risk.
Partners	ProBEC, German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), Other UJ Departments	Engineers Without Borders, National Policy-makers and Energy Supply Agencies

Related Health and Social Programs

South Africa has several health and social programs that target poor and rural customers.

	Rural Household Energy	Rural Development	Poverty Reduction	Health Program
Program	The Integrated National Electrification Program (INEP)	Comprehensive Rural Development Programme	UNDP South Africa	National HIV Counselling and Testing Campaign
Objective	To create new infrastructure, while maintaining its existing framework, to ensure that previously unconnected households have access to electricity.	The CRDP aims to address poverty and food insecurity by maximizing the use and management of natural resources to create vibrant, equitable and sustainable rural communities.	To improve the capacity of local government to deliver effective basic social services & strengthen participatory governance processes.	To reduce the spread of HIV/AIDS through counseling and testing. Targets for number of people tested were set at 15 million.
Results	<p>Since the start of the program in 1991, 4,050,968 homes have been electrified. The targets have not been achieved due to delays in concluding some commercial contracts.</p> <p>Qualifying low income customers are eligible for 50kWh of free electricity per month.</p> <p>The annual average price increase is 24.8%.</p>	21 CRDP sites have been implemented and the National Department of Rural Development and Land Reform aims to roll out 160 sites by the year 2014.	Democracy, good governance and administration are strengthened in poor communities.	Of the 10.2 million people who were tested in the national HIV Counseling and Testing (HCT) campaign, 17 – 18% or about 1.7 million were found to have HIV. While figures vary from province to province, Mpumalanga is leading in the preliminary data.

- Implications -

While not directly tied to a cookstove initiative, several health and social programs could provide critical support to the Alliance for clean cooking initiatives.

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Cooking habits and food preferences vary greatly across racial and economic lines in South Africa. Some rural areas still rely on open fires, while crowded townships have generally moved to paraffin.

Type of Food



- Food varies significantly across provinces
- Food in poorer communities is generally comprised of a starch (e.g. pap or rice) combined with meats
- Pap or moroho (wild spinach) are cooked in large pots and require lengthy cooking times

Cooking Habits



Open fires in more 'Rural' areas

- Open fires are used outdoors or in semi-enclosed annexes
- Cooking is more traditional so firewood use is deeply engrained in culture

Densely populated 'Urban' areas

- In townships, the high density of the population forces many to cook indoors with paraffin cookstoves
- Many people often eat stewed chicken at roadside stalls

Household Social Events

- Households often cook for the extended family so large pots are common, especially during funerals which are a community event
- Wood is the popular choice for cooking large quantities of food

- Implications -

The flexibility, ease of use, and low cost of open fires will be a challenge to the adoption of clean cookstoves and fuels. Any cookstove program must carefully consider all three of these factors.

Rural vs Urban areas in South Africa

The nature of South Africa's settlements means that the distinction between rural and urban areas is almost impossible. Consumer behaviors, needs, and attitudes must be defined by other factors.

"Currently there is no formally agreed and accepted definition of 'rural' within South Africa."

- *Rural Local Government in South Africa,*
Ian Goldman and Kian Reynolds

"In the past, Statistics South Africa (StatsSA) classified areas proclaimed as municipalities (mostly the cities and "white" towns and their associated "townships") as urban, and everything else as rural. However, StatsSA no longer reports on "rural" versus "urban" populations because there is no official definition of rural."

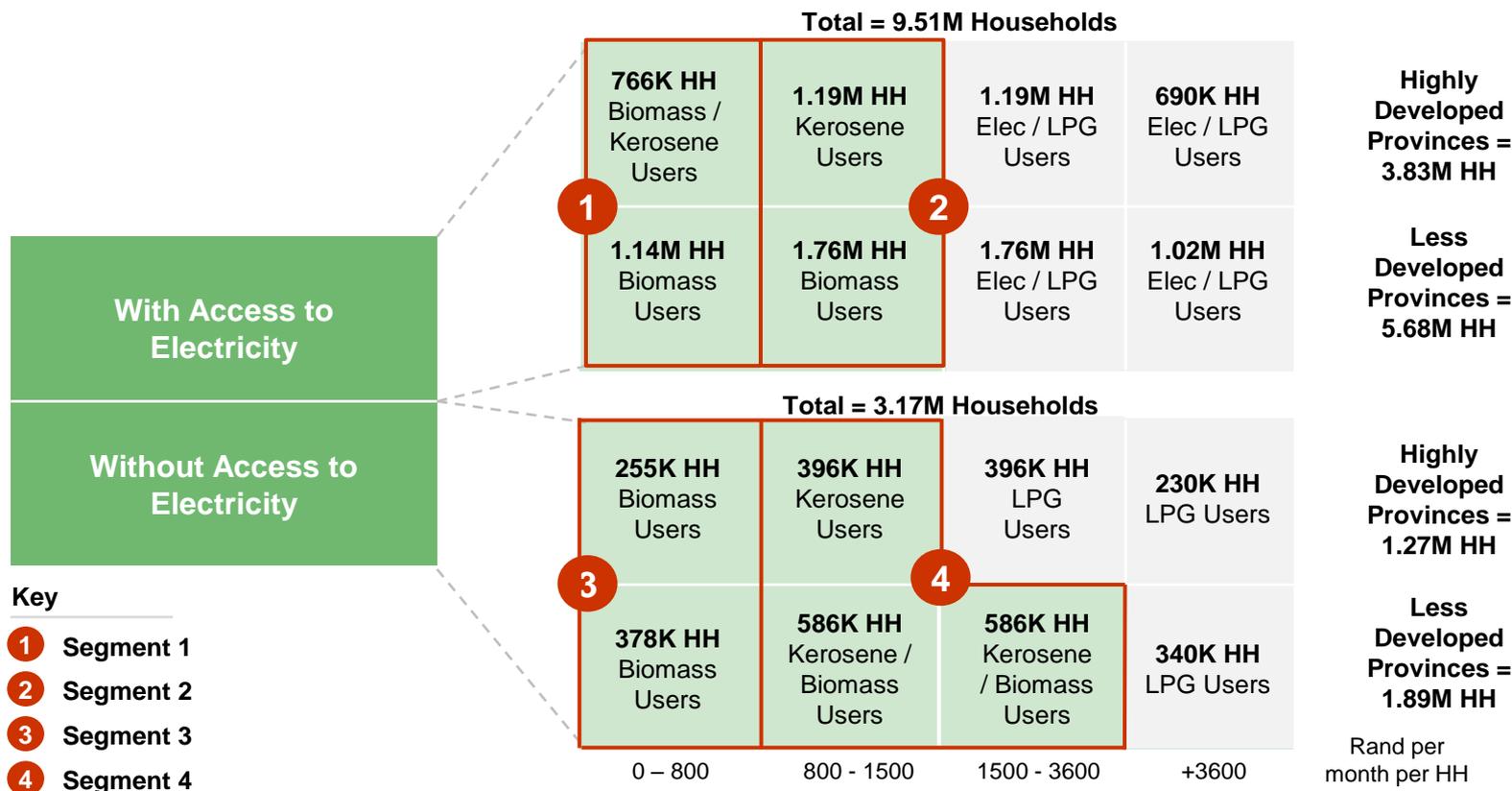
- *RURAL HEALTH STRATEGY FOR SOUTH AFRICA,*
Rural Doctors Association of Southern Africa"

Understanding the South African Consumer Landscape

- The statements above illustrate the challenge of defining urban and rural populations in South Africa. It is proposed that any consumer profile focuses on 3 other factors instead:
 - Access to electricity
 - Household income (and hence level of poverty)
 - Province
- For the purposes of this segmentation exercise, it was decided to split the 9 provinces into 2 groups:
 1. Three '**Highly Developed Provinces**' with dominant use of electricity for cooking
(Gauteng, Western and Northern Cape)
 2. Six '**Less Developed Provinces**' where wood and kerosene are the dominant cooking fuels
(Eastern Cape, KwaZulu Natal, Freestate, North West, Limpopo and Mpumalanga)

Target Market Identification

In addition to household income and province, access to electricity is a significant factor in determining which cooking technology a consumer will use.



- Implications -

The potential target market for clean cookstoves includes a population of over 30 million people located around the country.

Electrified Household Segment Profiles

The targeted population can be segmented into 1) those unemployed and earning less than 800 Rand/month per household; and 2) those that hover just above and below the poverty line due to pensions or work.



Township Survivor



Township Poor

	Township Survivor	Township Poor
Size in Households	• 633K (5% of total households)	• 2.95M (23.3% of total households)
Profession	• Unemployed	• Domestic worker or old age pensioner
Household Income	• 0 – 800 Rand per month (~\$0 - \$3 per day)	• 800 – 1500 Rand per month (~\$3 - \$10 per day)
Cooking Device & Fuel	• Combination: 3-stone open fires & paraffin cookstoves • Mainly collected fuelwood but also paraffin	• Combination: 3-stone open fires & paraffin cookstoves • Purchased/occasionally collected fuelwood or paraffin
Cooking Location	• Outdoors / indoors for paraffin cookstoves	• Outdoors / semi-enclosed annexes
Cooking Frequency	• One meal a day	• One to two meals a day
IAP Exposure	• Low, fumes from Kerosene bad, risk of fire high	• High, smoke not seen as a problem
IAP Awareness	• Low	• Moderate
Environment Impact	• Low	• Moderate
Barriers to Switch	• High as current cooking device is zero or v. low cost • If wood is easily collected, fuel is effectively free	• Cultural attachment to smoke and second uses of open fire – light, insect repellent, social nature
Willingness to Pay	• Low ability to pay for stove or fuel	• Willing if it can save on fuel costs
Purchase Drivers	• Money saved on paraffin	• Money saved on fuel • Ease of use and durability

Non-Electrified Household Segment Profiles

The targeted population can be segmented into 1) those unemployed, below the poverty line, and earning less than 800 Rand/month per household; and 2) those in local employment



Unofficial Settlement Survivor



Medium Income peri-urban

	Unofficial Settlement Survivor	Medium Income peri-urban
Size in Households	• 1.91M (15% of total households)	• 1.57M (12.4% of total households)
Profession	• Unemployed	• Retail Shop Assistant
Household Income	• 0 – 800 Rand per month (~\$0 - \$3 per day)	• 800 – 3600 Rand per month (~\$3 - \$15 per day)
Cooking Device & Fuel	• Combination: 3-stone open fires & paraffin cookstoves • Paraffin and collected fuelwood	• Combination: 3-stone open fires & paraffin cookstoves • Purchased fuelwood and paraffin
Cooking Location	• Outdoors for fire / indoors for paraffin cookstoves	• Outdoors / semi-enclosed annexes
Cooking Frequency	• One meal a day	• Two meals a day
IAP Exposure	• Low, safety risk from paraffin fires	• Moderate, smoke not seen as a problem
IAP Awareness	• Low	• Moderate
Environment Impact	• Low	• Moderate
Barriers to Switch	• High as current cooking device is zero or v. low cost • If wood is easily collected, fuel is effectively free	• Ease of use and safety of stove. Aspiration to use LPG and electricity as main cooking fuel
Willingness to Pay	• Low ability to pay	• Willing if it can save on fuel costs
Purchase Drivers	• Money saved on paraffin	• Money saved on fuel • Ease of use and durability

Customer Segmentation Summary

The township and unofficial settlement survivor segments exhibit high levels of health and safety risks, including IAP exposure, but have little ability to afford a higher upfront cost. The township poor and medium income peri-urban segments have a greater willingness and ability to pay for clean cookstoves.

Customer Segment Characteristics

Segment	Size	IAP Exposure	IAP Awareness	Affordability	Willingness to Pay	Alternative Use	Distribution Access
Township Survivor	Low	Medium	Minimal	Low	Low	Low	Medium
Township Poor	High	Low	Minimal	Medium	Medium	Low	Medium
Unofficial Settlement Survivor	Medium	High	Minimal	Low	Low	Medium	Medium
Medium Income Peri-Urban	Medium	Medium	Minimal	Medium	Medium	Medium	Low

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

Education around IAP, fuel usage and alternative energies is necessary here

Improved biomass stove would potentially work well with this segment

Opportunity to develop and market an improved paraffin stove

- Implications -

A cookstove solution should be tailored for the needs of each segment based on variables such as size, IAP exposure, safety risks, price, and the eventual value proposition.

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Current Technology Landscape

South Africans use a variety of different cookstove designs to cook over open fires.

Open Fire



- A traditional open fire that uses a tripod to support the pot while cooking food
- Typically, these cookstoves are found in separate kitchens or used outside

- Use 
- Availability 

Open Fire



- A specially designed pot for open fires that has its own supports
- They are much heavier and larger than standard pots
- Typically, these pots are used less frequently than standard pots
- They are also quite expensive but last for a long time

- Use 
- Availability 

Imbaula



- Basic stove that is made from a metal drum with holes punched in it
- It can be used for coal and wood
- It is most common in urban areas

- Use 
- Availability 

Key |  Minimal  Low  Medium  Medium-High  High

Current Technology Landscape

Paraffin and electric cookstoves dominate the clean energy market, with limited use of LPG.

Electric



- Electric cooktops are the most common cooking method across South Africa
- Customers typically have small cookstoves that sit on the bench, however, some people with more wealth have separate, free standing electric stoves/ovens

- Use ●
- Availability ●

Paraffin - Wick



- Commonly purchased from retailers and hardware stores
- In recent years, there have been initiatives to ban unsafe stove models, however, many still exist

- Use ◐
- Availability ◐

Paraffin - Pressure



- Less popular than the wick stove
- The same design is also used by many people while camping

- Use ◐
- Availability ◐

LPG



- Stove is easily available in many stores, but requires customers to carry heavy tanks of fuel from fuelling stations
- Common in the market but LPG suffers from supply problems

- Use ○
- Availability ◐

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

Current Technology Landscape

Several other clean cooking products are available, but have not been widely adopted.

Wonderbags



- A person cooks food on the stove for a short period of time before transferring to a Wonderbag, where the heat is retained and continues to cook the food
- This reduces the amount of energy needed

- Use ○
- Availability ○

Ethanol Gel



- Gel cookstoves can be easily found in supermarkets and hardware stores
- Anecdotal accounts state that the stove has very low power and is difficult to cook with
- The stove needs to be used with a gel fuel sold by the same company

- Use ○
- Availability ○

Improved Biomass (IBS)



- Stove is engineered to reduce the amount of wood consumed while cooking
- Typically imported from overseas
- Only limited distribution observed

- Use ○
- Availability ○

Solar



- A large parabolic dish that captures the sun's rays to cook food
- In good sunlight it can boil water in comparable times to electric cookstoves, however, is not useful in low light or at night

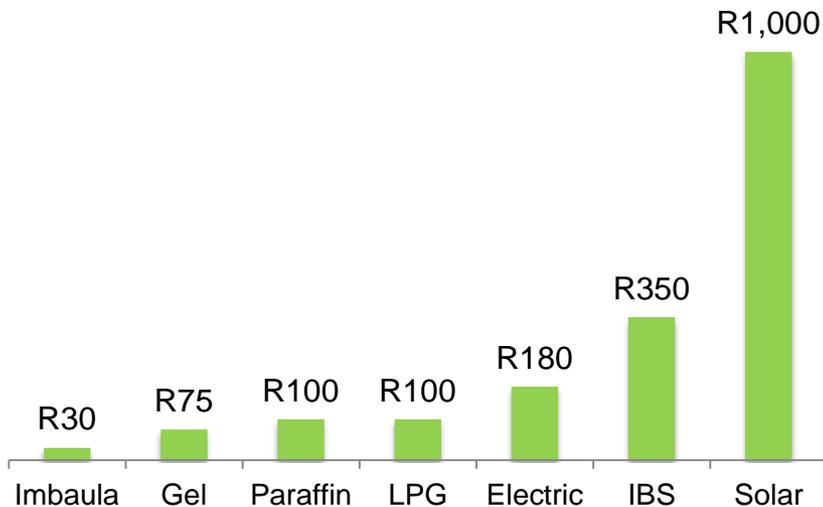
- Use ○
- Availability ○

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

Cost of Available Cookstoves

Solar cookers and improved biomass cookstoves are typically targeted at poorer communities; while these technologies can have higher upfront costs, this can be made up in fuel savings.

Upfront Cost by Product ¹



All prices are for a single cookstove. More expensive cookstoves with two burners also exist.

Observations

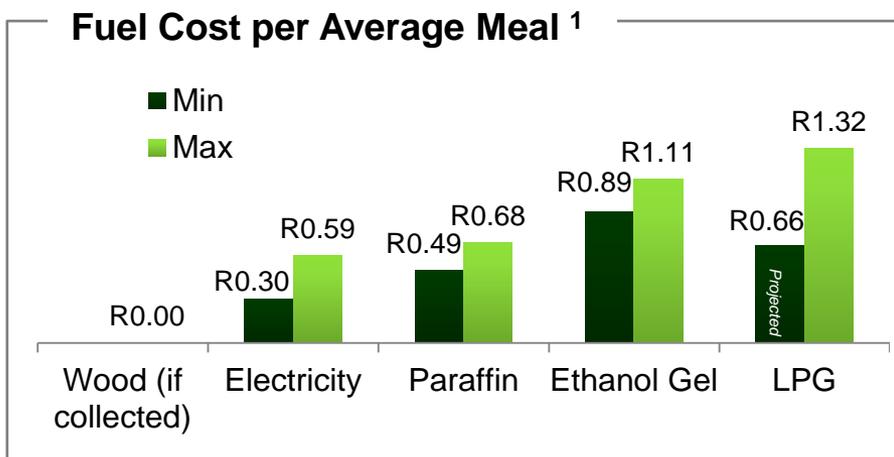
- Improved Biomass cookstoves (IBS) are expensive relative to other technologies and are not commonly found in retail outlets
- Paraffin, gel, LPG and electric cookstoves can be easily bought
- Imbaula cookstoves typically last for 6 months and paraffin cookstoves typically last 1 year, while LPG and electric cookstoves tend to last over 1 year
- Payment for cookstoves is almost always in cash
- Many customers do not understand the concept of a payback period, whereby a clean cookstove may cost more upfront, but will save money by reducing fuel costs

- Implications -

Any improved cookstove will need to be priced competitively with existing options in order to succeed in the marketplace.

Cost of Available Fuels

The price of fuel tends not to impact customer preferences; however, availability, transport and customer knowledge heavily impacts fuel usage.



Fuel	Unit of purchase	Cost
Wood	1 bushel (~ 120kg) lasts one month	Free
Paraffin	1 L bottle	10 Rand
Electricity	91 kWh lasts one week, but is used of other purposes	100 Rand
Ethanol Gel	5 L bottle	32 Rand
LPG	10 kg	300 to 400 Rand

Pricing Observations

- The cost of electricity has increased in recent years and is due to increase at about 25% per year over the next few years
- The price of LPG expected to decrease
- Given that many customers are very price sensitive this will impact usage

Logistics Observations

- It is difficult to purchase LPG as customers need to carry heavy tanks over large distances and must provide large amounts of cash upfront
- Many households do not have access to electricity and hence it is not even an option for them

- Implications -

A low cost fuel is critical for an improved cookstoves program, but it is also critical that customers are educated about how to interpret different prices.

Current Technology Landscape

In the current market, paraffin, LPG and electric cookstoves are the most attractive options. However, more attention must be given to biomass cookstoves to address the needs of more 'rural' communities.

	Low Cost	Availability	Secondary Uses	Usability	Housing Structure	Aesthetics	Cleanliness	Performance	Health Benefits	Ranking
Open Fire	●	●	●	◐	○	◐	◐	◐	○	7
Imbuala	●	●	●	◐	●	○	◐	◐	○	6
Paraffin - Wick	●	●	○	◐	●	◐	●	◐	●	4
Paraffin - Pressure	●	●	○	◐	●	◐	●	●	●	2
LPG	◐	○	○	●	●	◐	●	●	●	2
Electricity	●	●	○	●	◐	◐	●	●	●	1
Gel - Safety	●	◐	○	◐	◐	◐	●	◐	●	9
Improved Biomass Stoves	◐	◐	○	●	●	◐	◐	●	●	7
Solar Cooker	○	○	○	○	◐	◐	◐	○	●	10
Wonderbags	●	◐	○	◐	●	●	●	◐	●	4

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

- Implications -

Specific community needs vary across South Africa, and will therefore dictate unique intervention options.

Additional Technologies Considered

There are new innovations available that have the potential to overcome safety issues.

Technology	Attractiveness	Pros	Cons
Improved Paraffin cookstoves 		<ul style="list-style-type: none"> Improves safety by reducing the risk of shack fires Improves fuel efficiency Requires minimal 'change' in consumer behavior 	<ul style="list-style-type: none"> More expensive than existing cookstoves (~250 Rand) Challenging to sell to customers Existing paraffin stove manufacturers may respond aggressively
Ethanol and Methanol cookstoves 		<ul style="list-style-type: none"> Clean and reduces IAP There is an existing ethanol market in South Africa Cookstoves can be made locally, thus supporting job growth Potential to leverage existing paraffin supply chains 	<ul style="list-style-type: none"> No existing supply chain – production, distribution and retail Ethanol is blended with petrol creating potential supply pressures Does not offer a major change from paraffin Ethanol gel cookstoves are already commonly found and distributed

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

Cookstove Industry Value Chain

South Africa has the capability to develop an effective clean cookstoves value chain, however, there are few organizations focused on raising awareness.

Key:	Manage Program				Raise Awareness			Provide & Support cookstoves									
	Coordinate Program	Provide Funding	Coordinate Project (Region)	Centralize Act. (Mktg, Ops, Fin)	Educate on IAP	Raise product awareness	Run Promo Activities	Import & retail cookstoves	Design cookstoves	Train Stove Manufacturers	Test cookstoves	Supply Materials	Transport mat. to Manufacturer	Make cookstoves	Transport stove to customer	Sell and install cookstoves	Maintain cookstoves
Department of Energy	Blue	Yellow									Yellow						
Local Government			Blue		Blue	Blue	Blue										
International Organizations	Yellow	Yellow			Blue	Blue	Blue										
NGOS and Religious Organization	Yellow				Yellow	Yellow	Yellow										
Local Manufacturers								Green	Green		Green	Green	Green				
International Manufacturers								Yellow	Green	Green			Green				
Universities					Yellow					Green							
Local Entrepreneurs and Distributors					Blue	Blue	Blue	Green							Yellow	Yellow	Yellow
Local Small Businesses							Blue	Green							Yellow	Yellow	
Local Large Businesses	Green	Green	Yellow	Yellow	Blue	Blue	Blue										

- Implications -

It is critical to develop advocacy groups that can connect market players and raise awareness among government and households.

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Market Attractiveness

While South Africa has the capability to run carbon financing programs, the business case is not as strong, as it is not a least developed country.

	Designated National Authority (DNA) & Programs of Activities (PoA)	Stove & Program Accreditation	Carbon Baseline	Country Classification	Scale of Program	Monitoring & Evaluation
Best Case ↑ ↓ Worst Case	Pre-existing DNA & related PoA	Pre-existing CDM-accredited stove program in country	Previous cookstove projects to leverage for baselining	Least Developed Country	Estimated income will significantly outweigh costs of registration & monitoring	Approved cookstove monitoring methodology in use in country
	Pre-existing DNA; No PoA	Pre-existing GS-accredited stove program in country	Similar projects (e.g. Biomass) to use as proxy for baselining	Advanced developing country	Unclear business case for carbon financing activities	Approved monitoring methodology in use in country
	Clear organizational candidate for role of DNA	No accredited cookstoves or stove programs in country	No previous projects to use as reference	Developed Country	Costs of registration & monitoring will likely outweigh income generated by carbon credits	Clear monitoring partnership opportunities and capabilities
	No clear candidate or competing agencies					Lack of monitoring capabilities or partnership opportunities

- Implications -

Carbon financing for clean cookstove projects can be effectively implemented, but may suffer from a lack of demand for the credits on European markets.

Carbon Finance Programs

There have been carbon financed cookstove projects in South Africa, including those which provide funding for educational programs and support stove dissemination.

	Community Education (Basa Magogo Project)	Improved Biomass cookstoves	Ethanol Gel
Description	<ul style="list-style-type: none"> • Carbon finance pays for community demonstrations on improved ways to light coal cookstoves to reduce carbon emissions 	<ul style="list-style-type: none"> • Efficient biomass cookstoves replace traditional three stone fires for impoverished schools 	<ul style="list-style-type: none"> • Ethanol gel cookstoves and fuel are distributed to the community using “Free Basic Alternative Energy Policy” to provide upfront funding • Carbon revenue is then given
Participants	<ul style="list-style-type: none"> • NOVA Institute • ICCO-Kerk • Fair Climate Programme of the Protestant Church in the Netherlands • Department of Minerals and Energy (DME) • Gold Standard 	<ul style="list-style-type: none"> • E+Co • Hewmatt Energy • Gold Standard • McWilliam Mabaso (Local Entrepreneur, Stove Producer) 	<ul style="list-style-type: none"> back to the community • PACE • Bioheat (gel cookstoves) • Umdoni Municipality in KwaZulu-Natal
Outcomes	<ul style="list-style-type: none"> • In 2007 and 2008, Nova added 60K more households • Coal purchase savings on average R608 per household p.a • 1.3 ton of CO₂eq per household p.a 	<ul style="list-style-type: none"> • 20 large industrial and 20 household cookstoves in 2008 	<ul style="list-style-type: none"> • ~5000 cookstoves distributed • ~700K rand delivered to the communities after 1 to 2 years

- Implications -

The lessons learned by these projects need to be shared and communicated to other South African organizations that are pursuing carbon finance for their cookstoves projects.

South African Organizations

Despite the existence of only a few carbon financing projects related to clean cookstoves, South Africa has experienced organizations that could implement carbon projects.

PACE



- The PACE Centre aims to reduce the cost of making the carbon market work and links carbon revenue with poverty alleviation
- They offer support, advice and a new mechanism to facilitate local carbon-saving projects that have developmental benefits
- They have developed “Credible Carbon™”, which is their own registry for carbon credits

South South North



- SouthSouthNorth is a network-based non-profit organization sharing two decades of experience in the fields of climate change and social development
- Particularly, they have experience on housing projects in South Africa, but do not have direct experience on cookstoves

Carbon Check



- Acts as the Designated Operational Entity (DOE) across South Africa and Africa
- Validates that emission reduction schemes satisfy CDM requirements
- Also verify emissions reductions targets have been met

University of Cape Town



- Through their Energy Research Centre (ERC) and Graduate School of Business, The University of Cape Town has extensive knowledge of sustainable energy and carbon financing
- They have also audited several carbon financing projects by providing independent assessment of emission reductions

South Africa also benefits from having an established banking system, which has prior experience in the carbon market. However, the focus has traditionally been on larger projects, rather than smaller cookstove projects.

Nedbank



- Nedbank Capital has a dedicated Carbon Finance Team to view carbon dioxide (CO₂) and other emissions holistically
- This team has experience with CDM and project management, but not directly related to cookstoves
- Their clients are mostly large organizations with large scale projects, such as Sasol (a large South African oil company)

Standard Bank



- Standard Bank Group is facilitating grants to numerous small projects across Africa, but nothing related to cookstoves
- Standard Bank and the German government are funding the African Carbon Asset Development (ACAD) facility, a public private partnership led by the United Nations Environment Programme (UNEP)
- This provides grants to help assist CDM project costs such as validation or registration

- Implications -

Local banks could drive support for carbon financing for clean cookstoves; however cookstove projects lack scale and have limited revenue potential. Hence, it will be important to appeal to the social responsibility goals of the bank.

Even if a project can be established, carbon credits need to be sold to make the project viable. This represents a major risk for South Africa, as it is not a least developed country.

Buyers of Credits	Current Situation	Issues	Demand Trend
European Union Emissions Trading Scheme	<ul style="list-style-type: none"> The EU is the main market for carbon credits developed in South Africa through CDM 	<ul style="list-style-type: none"> The EU has indicated that it will favour the group of least developed countries (LDCs) South Africa is not considered a LDC, hence it will be ineligible to sell credits as of 2013 	 Decreasing
Other International Buyers (Voluntary)	<ul style="list-style-type: none"> Small voluntary purchases from international organizations pursuing social responsibility initiatives 	<ul style="list-style-type: none"> The size of this market is limited by doubts about the future of the global carbon market and enforcement of emissions reductions 	 Steady
South Africa Buyers (Voluntary)	<ul style="list-style-type: none"> Sold via local registries to South African institutions that have corporate responsibility initiatives Credits are priced above the EU market price because they are based on reducing poverty as well as reducing carbon 	<ul style="list-style-type: none"> There is limited demand because South Africa is a developing country and has no obligation to reduce emissions Often local banks buy credits and try to resell on the market, either globally or locally 	 Steady

- Implications -

The lack of demand for South African carbon credits makes carbon financing for cookstoves less attractive and more challenging than in other least developed countries.

Government and Community Support

Lack of awareness and understanding by the government and local communities is a major challenge in developing carbon projects.

- Key Stakeholders -

National Government

- Required to approve the project through the DNA (Department of Energy)
- South Africa is considered well organised and is a model for implementation in other African countries

District and Municipal Government

- Provides the final project approval, - without their support the project will not go ahead
- Challenges in communicating the concept of carbon finance and agreeing how the revenue is allocated
- Each of the 53 districts need to approve before a project can be implemented

Local Communities

- No official approval needed, however, local tribes and chiefs need to give support for projects to be successful
- Critical to deliver results quickly to show that the project is helping the community

Final Users

- The final customers need to buy and use the cookstoves
- Carbon revenue distribution is critical: give it back to the community to use at their discretion or subsidise the stove price

- Implications -

It is vital to start with the district government and obtain their support, then begin to engage local municipalities. Finally, the national government can be engaged for approval.

Overall Carbon Finance Feasibility

South Africa represents a major opportunity for carbon financing, but utilizing local partners who have experience working with the government and local communities will be critical.

- Supportive Market Criteria -

Existing Designation National Authority

Existing carbon finance for clean cookstove programs via voluntary markets

Strong local organizations with carbon financing capabilities

- Potential Risks-

Cookstoves are not a focus for the government

Getting the approval of district governments will be challenging and time consuming

Long term future of carbon market is unknown, particular in South Africa

Opportunities

- Pursuing carbon financing for clean cooking projects in South Africa would be highly beneficial to increase adoption of improved cookstoves and should be done with multiple small scale projects that can be adapted to local communities.
- The assistance of local NGOs and carbon implementers will be critical.
- 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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While the South African market is large and well developed, consumers – and particularly the government – do not recognize IAP as an issue, or value the benefits of clean cookstove technologies.

Macro	Health & Social Issues	Consumer	Cookstoves Industry	Carbon Finance
<ul style="list-style-type: none"> + Strong economic performance improves access to funding + Government is keen to support employment generating opportunities - Government focused on electrification & not biomass or paraffin cookstoves - Government engagement in cookstoves has been extremely limited 	<ul style="list-style-type: none"> + Shack fires are a well publicized problem in townships + Abundance of local organizations willing to partner and tackle IAP - Minimal consumer level awareness - Limited number of pilot programmes for biomass & paraffin cookstoves - IAP not priority issue due to high prevalence of AIDS/HIV and unemployment 	<ul style="list-style-type: none"> + Very large proportion of people using biomass or dangerous paraffin cookstoves + Large target market willing to buy if the product/price is right - Very low affordability amongst those with the greatest need - Improved biomass and paraffin cookstoves not perceived as aspirational like electricity - Cultural attachment to smoke and traditional cooking methods 	<ul style="list-style-type: none"> + Strong and diverse private sector + Entrepreneurial culture & high unemployment creates opportunities for market development - Abundant firewood in more 'rural' areas - Access to clean fuels limited 	<ul style="list-style-type: none"> + Multiple organizations experienced and capable of running projects + Many households using biomass - Challenges in getting government support - Limited demand for South African carbon credits
Unfavourable	Moderately Favourable	Moderately Favourable	Favourable	Moderately Favourable

- Implications -

Strong private and academic sectors show positive signs for clean cooking interventions, but significant government and cultural barriers present challenges.

Glossary of Terms

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

ACAD – African Carbon Asset Development

AIDS - Acquired Immune Deficiency Syndrome

ANC – African National Congress

BEE – Black Economic Empowerment

CDM – Kyoto Clean Development Mechanism

CO₂ - Carbon dioxide

DNA – Designated National Authority

EU – European Union

GACC – Global Alliance for Clean Cookstoves

GDP – Gross Domestic Product

GIZ – Gesellschaft für Internationale Zusammenarbeit

HH – Household(s)

HIV - Human Immunodeficiency Virus

IAP – Indoor Air Pollution

IBS – Improved Biomass Stove

ICS – Improved Cookstove

INEP – Integrated National Electrification Program

iNGO – International Non-Governmental Organization

LDCs – Least Developed Countries

LPG – Liquid Petroleum Gas

NGO – Non-Governmental Organization

PoA – Programs of Activities

UN – United Nations

UNDP – United Nations Development Program

UNEP – United Nations Environment Programme

UNICEF – The United Nations Children's Fund