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## **Global Alliance for Clean Cookstoves**

Nigeria 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.*

# Agenda

## Executive Summary

**Project Approach**

**Sector Mapping**

**Macro Environment Assessment**

**Indoor Air Pollution Assessment**

**Consumer Assessment**

**Cookstove Industry Assessment**

**Carbon Financing**

**Sector Mapping Summary**

## Macro

- Nigeria is the most populated country in Africa with 155 million people or 30 million households, distributed equally across urban and rural areas; The majority of the Nigerian population lives below the poverty line
- Nigeria is a leading economy in Africa, and the commercial hub for West Africa
- The Nigerian Government is characterized by frequent changes, slow and complex processes and numerous stakeholders; the Federal Government has a set of policies supporting the clean cookstove sector, however implementation capacity is limited
- Despite rich petroleum resources, Nigeria has a poor energy infrastructure restricting local production of cookstoves; high import duties and long wait times at ports increases the cost of importing products and fuels
- Deforestation is high and more acute in the north of the country which is part of the Sahara desert
- Corruption is widespread raising the cost and complexity of doing business in Nigeria

## Indoor Air Pollution

- Solid fuel usage is estimated to cause ~80,000 deaths annually, representing 3.8% of the national disease burden
- Indoor Air Pollution exists across the country and is caused by the use of fuelwood or charcoal in open fires; kerosene stoves are often poorly maintained and release toxic fumes
  - More than 74% of households rely on fuelwood or charcoal for cooking, of the remaining, 25% rely on kerosene; Clean fuel penetration is less than 1%
- There are several efficient cookstove programs in the country but none have achieved the scale required to serve the entire country
- Formed in April 2011, the Nigerian Alliance for Clean Cookstoves aims to install 10 million stoves nationwide within 10 years through a coordinated effort across partner organizations

## Consumer

- Cooking habits are generally uniform across the country; while urban households have adopted convenience such as instant food, in rural households traditional methods prevail
- Social events are frequent and require large volume cooking; even LPG households resort to fuelwood for events
- Many consumers already pay for stoves and fuel indicating that a willingness to pay does exist, except in rural poor households where wood is collected and used in open fires
- Consumers are seeking convenience and an alternative to kerosene – there is frustration around supply and price instability of kerosene

## Cookstove Industry

- Nominally priced (USD 2-3) metal frame stoves are produced locally and used for wood or charcoal cooking; available kerosene stoves vary in quality and price (USD 10-20) and are mostly imported; imported efficient woodstoves (USD 33-100) and LPG stoves (USD 100 minimum) are priced significantly higher
- Kerosene when purchased at Government subsidized price is the cheapest available fuel; however during supply shortages prices can rise up to three times the subsidized price
- Wood or charcoal are more expensive than LPG; however they can be purchased in smaller quantities – important for households that cannot afford the high upfront cost of LPG
- Both kerosene and LPG fuel supply chains are characterized by numerous impediments causing supply shortages and high costs
- Methanol is a potential alternative fuel, but the solution and distribution networks require considerable additional development before it can be widely available to households
- While there is no domestic large scale commercial stove production, there is increasing private sector participation in marketing and distribution of cookstoves

## Carbon Financing

- The strong progress of the Kyoto Clean Development Mechanism (CDM) for clean cookstove programs in Nigeria has created a favorable carbon financing environment for future project developers
- The upcoming creation of two CDM Programs of Activities for clean cookstoves will dramatically lower barriers for future project developers to receive accreditation and start receiving carbon revenues; although stringent solution and monitoring requirements may be a challenge for some programs
- The existence of a CDM-accredited cookstove creates opportunities for its use as a ready-to-go biomass solution; however its high price tag may only make it suitable for certain market segments

## Conclusion

- The scale of the Indoor Air Pollution issue and customer readiness are favorable factors to develop a cookstove industry in Nigeria
- However, a lack of local production capacity and high import costs make the development of a cost-effective cookstove sector challenging

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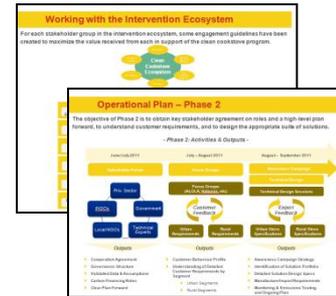
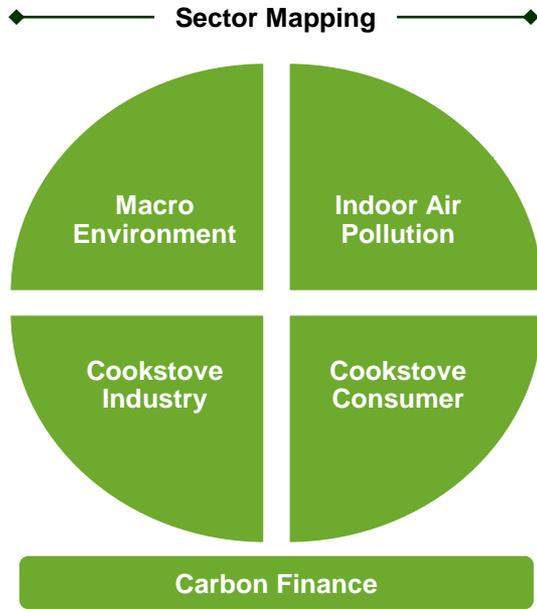
**Cookstove Industry Assessment**

**Carbon Financing**

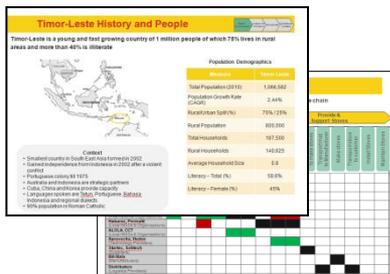
**Sector Mapping Summary**

# 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



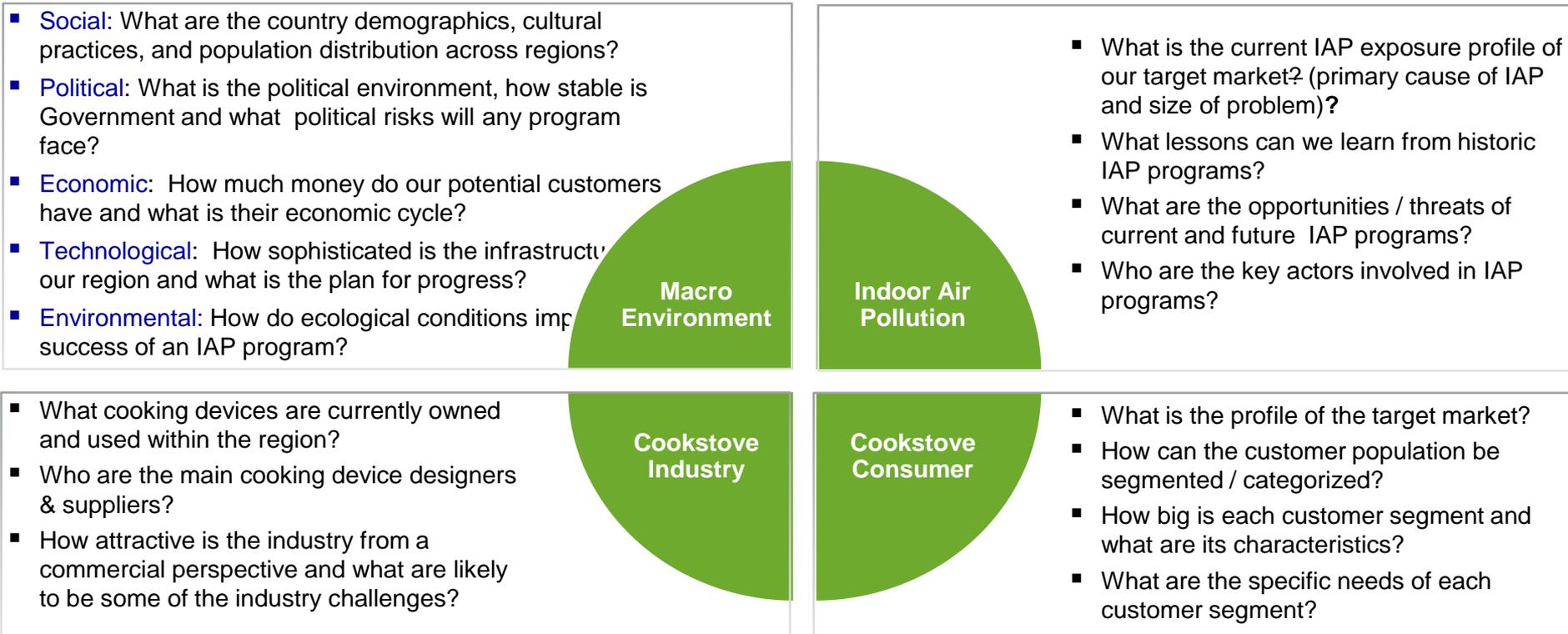
**Intervention Options And Operational Plan**



**Sector Map**

# Sector Mapping Approach

**Sector Mapping for a cookstove industry was conducted across four dimensions – macro environment, indoor air pollution, cookstove consumer, and current cookstove industry**

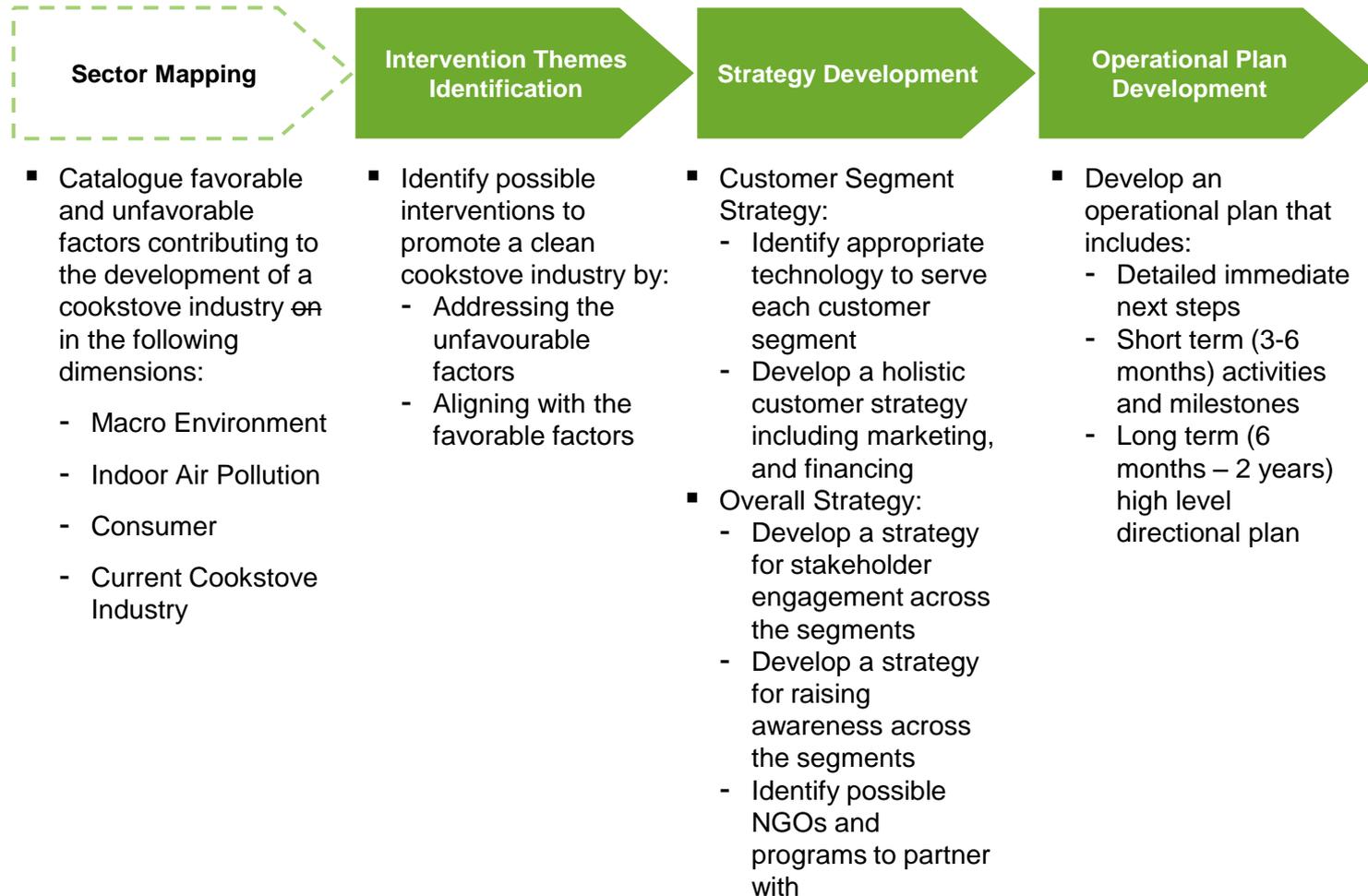


**Carbon Finance**

- 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

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



# Acknowledgements

Many organizations made valuable contributions to this study with their knowledge of Nigeria and/or experience in cookstove initiatives



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Developmental Agency for Renewable Energy



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# Social Environment

With over 155 million people, Nigeria is the most populated country in Africa; 78 million people live in rural areas and over 100 million people live below poverty line



## Context

- Official language is English
- 50% Muslim, 40% Christian, 10% indigenous
- More than 250 ethnic groups – Hausa & Fulani (29%), Yoruba (21%) and Igbo (18%) are leading tribes
- Enterprising and aspiring population

## Population Demographics (2010)

Measure	Nigeria	
Total Population	155 M	
Annual Population Growth Rate	1.94%	15.5% of Africa's population
Rural / Urban Split	50% / 50%	
Rural Population	78 M	
Total Households	28 M	
Rural Households	14 M	
Average Household Size	5.5	Ranked among lowest in the world (#220)
People Below Poverty Line	55%	
Life Expectancy at Birth (years)	47.56	
Literacy – Total (%)	68%	

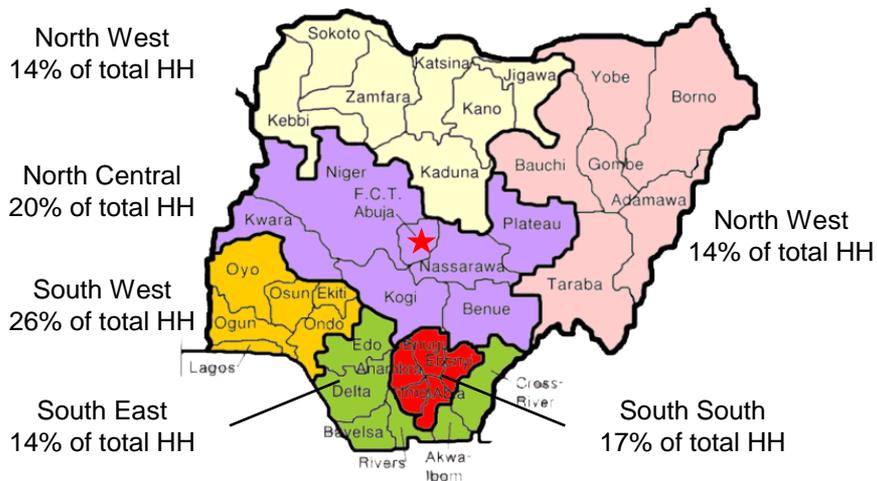
## - Implications -

**A cookstove intervention in Nigeria could serve a large market across both rural and urban areas**

# Political Environment

The Federal Government is responsible for setting policy and legislation; the State Governments are responsible for local implementation as per the Federal Government's direction

## Region and Population Representation



## Administrative Map

- Six geopolitical zones, one FCT, 36 states, 774 LGAs
- LGAs work closely with community and report to State Governments
- Tribal kings govern in parallel but in coordination with Government; buy-in from kings is critical for community projects

## Current Government

- President Goodluck Jonathan has been head of the state and Government since Feb 2010
- Re-elected in April 2011 and currently in process of appointing ministers

## Relevant Govt. Agencies

- Energy Commission of Nigeria defines policies
- The Federal Government sets policies and provides templates within which the State Governments implement them
- Relevant ministries - Environment, Health, Women Affairs, Science and Technology, Education

## Working with the Govt.

- *"Many stakeholders at Federal level, but more manageable number at State level. We work with local NGOs to identify the right stakeholders"*
- *"Private sector is more influential and effective when navigating the Government"*

## - Implications -

**A cookstove program should consider engaging State Government as implementation partners and have a well outlined engagement plan prior to approaching the Government**

# National Energy Policy

The National Energy Policy, published in 2003, has several clauses favorable to a clean cookstove program; however little progress has been made in implementation of the policy

## Policy (2003)

### Fuelwood

- Promote use of alternatives to fuelwood
- Promote improved efficiency in use of fuelwood
- De-emphasize fuelwood in nation's energy mix

### Natural Gas

- Expand utilization of natural gas as domestic fuel
- Reduce gas flaring
- Provide incentives to domestic consumers to use or convert to gas

### Coal

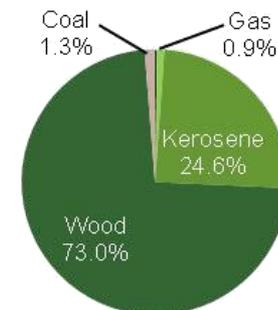
- Utilize coal as a viable alternative to fuelwood
- Provide incentives for large scale production of coal stoves at affordable prices
- Organize awareness programs for smokeless coal briquettes as fuelwood alternative

### Biomass

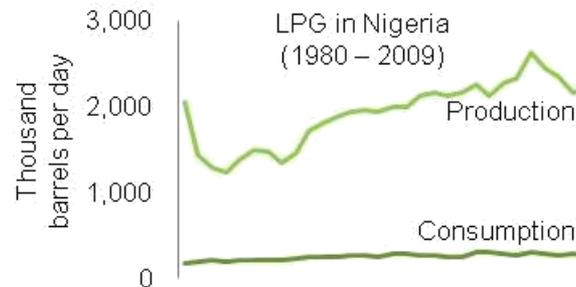
- Harness non-fuelwood biomass such as coal
- Promote biomass as an alternative; especially in rural areas
- Reduce health hazards from combustion of biomass

## Situation (2008)

Distribution of Nigerian households by cooking fuel shows that firewood is still most widely used



LPG consumption in Nigeria has been almost stagnant over last 30 years



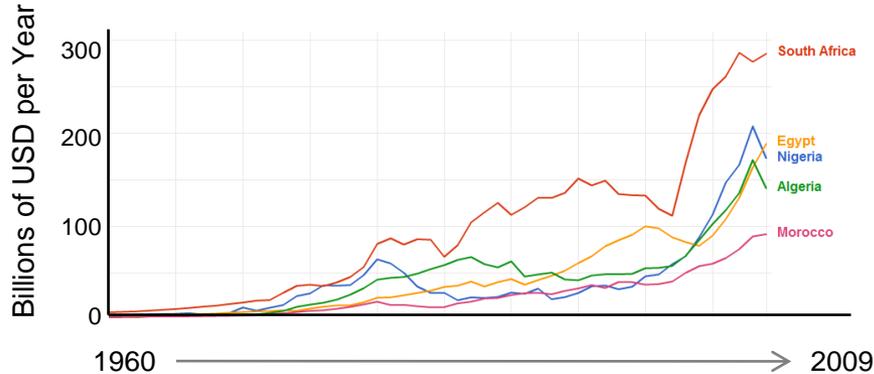
## - Implications -

***When working with the Government, a cookstove sector strategy should emphasize the potential progress that can be achieved towards the National Energy Policy***

# Economic Environment

**Nigeria's overall economy is growing but relies heavily on petroleum wealth; although underperforming, Nigeria's manufacturing sector is the largest in West Africa**

**Top African Countries by GDP**



**Context**

- Ranked 31<sup>st</sup> in the world in terms of GDP (2009)
- Nigerian petroleum exports form ~40% of GDP and over 80% of foreign exchange income
- Manufacturing accounts for 4% of GDP, while underperforming it is the second largest in Africa and produces a large proportion of goods for W. Africa
- Nigerians are well-regarded for being enterprising and good at capturing business opportunities

**- implications -**

**Nigeria's emerging manufacturing sector and existing services base has the potential to support a local cookstove industry and serve as a model for Africa, if infrastructure challenges can be overcome**

Key Indicators	Nigeria
GNI Per Capita (2009)	USD 1,190
Petroleum GNI Per Capita	USD 336
Non-Petroleum GNI Per Capita	USD 854
Economic Growth Rate (2010)	8.4%
Inflation Rate (2010)	13.9%
Unemployment (2011)	19%
Ease of Doing Business Rank	137 / 183
Occupation	<ul style="list-style-type: none"> <li>• Agriculture (70%)</li> <li>• Services (20%)</li> <li>• Industry (10%)</li> </ul>
Trade Restriction	<ul style="list-style-type: none"> <li>• High import duties, so far clean cookstoves do not qualify for rebates</li> </ul>
Access to Finance	<ul style="list-style-type: none"> <li>• Commercial bank prime lending rate (18%)</li> <li>• 16+ microfinance institutions with ~1 million borrowers</li> </ul>

**The current electricity supply is not conducive for increased local production; imports are subject to high levies and delays at port; however schemes exist under which goods can gain exceptions**

## Situation

### Power Supply

- In 2006, 10% of the rural population and 40% of the total population had access to electricity
- Supply of power has been stagnant for 30 years
- Two-thirds of all electricity is produced using generators; factories generally self-generate

### Transportation

- Principal ports - Lagos, Port Harcourt & Calabar
- Ports are congested and have high docking fees; goods are inspected on arrival
- Road transportation is the only option for inland distribution; roads are in poor condition, although the State Governments are funding repairs

### Telecommunication

- Poor landline penetration
- Good mobile penetration, however quality remains an issue

## Result

- The manufacturing sector contributes to only 4% of GDP
- Some of Nigeria's manufacturing has moved to Ghana as it has a better energy infrastructure
- High import duties - DARE has reported 35% import duties on the Save80 clean cookstove
- Slow and complicated custom clearance processes at ports increase the cost of imports

## Alternatives

- Manufacturing zones established by Shell Nigeria Gas Limited that provide power using LNG
- Ministry of Environment's renewable energy fund that provides import rebates to qualifying technology

## - Implications -

**Local production may lower costs but the poor energy infrastructure may offset these benefits; Cookstove imports can be made eligible for tax rebates but will require Government policy change**

**Rich in natural resources such as forests and petroleum reserves, Nigeria has a broad supply of cooking fuels such as LPG, methanol and coal; however improved supply chain planning is required**

## Situation

### Biomass

- Since 2000 primary forests are shrinking at 11% per year, the highest rate in the world<sup>1</sup>; deforestation is higher in the Saharan North of the country
- High rates of charcoal production, consumption, and export
- Proven coal reserves (650m tons<sup>2</sup>), untouched

### Petroleum and Derivatives

- 12<sup>th</sup> globally in oil production; largest producer of “sweet” oil in OPEC<sup>2</sup>
- 26<sup>th</sup> in natural gas production<sup>3</sup>
- 2<sup>nd</sup> in natural gas-flaring<sup>4</sup>
- LPG Production of 4M metric tons a year, almost all exported (2007)<sup>6</sup>
- Kerosene production 1.27 to 4M l/day (2001-07)<sup>3</sup>, estimated consumption 8 to 10M l/day, rest imported<sup>5</sup>

## Regulation

- All petroleum products produced in Nigeria are property of the government
- Kerosene is subsidized by the government but may undergo privatization as a result of recent supply and price fluctuations
- LPG is not currently subsidized

## Alternatives

- Potential for increasing local domestic consumption of LPG
- Potential for flared methane to be converted into methanol
- Potential for coal mining

## - Implications -

***Shrinking biomass reserves and a vast petroleum supply, support a move toward modern fuels; supply and price volatility makes kerosene less attractive***

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# Indoor Air Pollution in Nigeria

With less than a 1% modern fuel penetration in Nigeria, wood and charcoal used in open fires are the main cause of IAP, resulting in significant health damage across the country

## IAP Cause

## Scenes

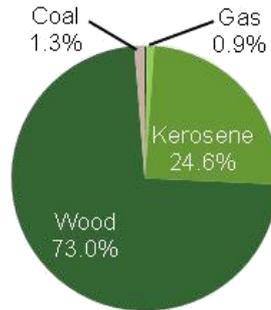
## Comments

## IAP Impact (2002)

### Cooking Fuel



Distribution of Households by Fuel Type



Fuel	No. of HH
Wood/Coal	22M
Kerosene	7M
Gas	0.3M

### Mortality from Solid Fuel Use

- 79K total deaths - 70K ALRI deaths in children <5 years and 9K COPD deaths in adults >= 30 years

### Morbidity from Solid Fuel Use

- 2.6 million disability adjusted life years - third highest in the world following India and China; remains the highest in Africa

### National Disease Share

- 3.8% of national burden of disease is attributed to solid fuel use

### Cooking Device



- Wood and charcoal dependent households rely on basic open fire stoves
- Kerosene users rely on stoves of varying quality causing varying levels of pollution
- Growing adoption of efficient stoves (~14K)

### Housing Structure



- In rural areas fuelwood is often used outdoors, reducing IAP; however there are homes where fuelwood and charcoal is used in enclosed structures
- In urban areas, IAP is often spread across multiple kitchens as well as in passages/halls

## - Implications -

**Intervention programs should aim to reduce open fire cooking with improved cookstoves and reduce the reliance on wood as a fuel source by promoting modern fuel usage**

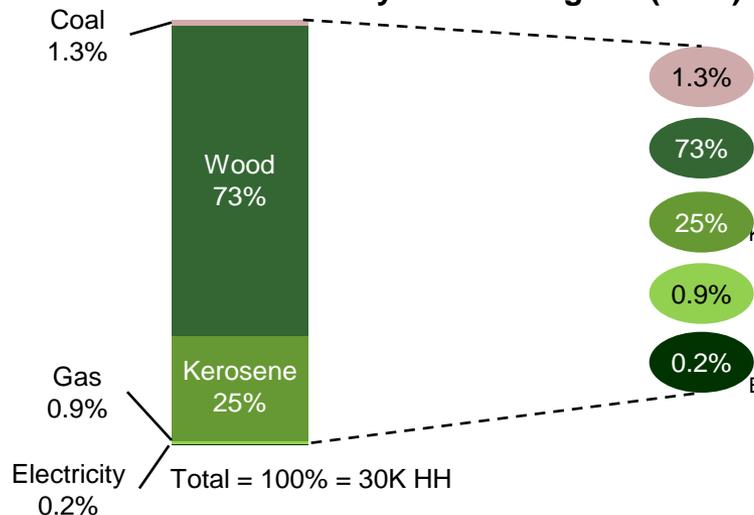
Note: Wood numbers include households (HH) using wood as well as charcoal

Source: National Bureau of Statistics Nigeria, IAP National Burden of Disease Estimates, WHO (2007)

# Household Cooking Fuel Consumption

Fuelwood dependent households exist across the country; coal, kerosene and LPG dependent households are located mainly in South West

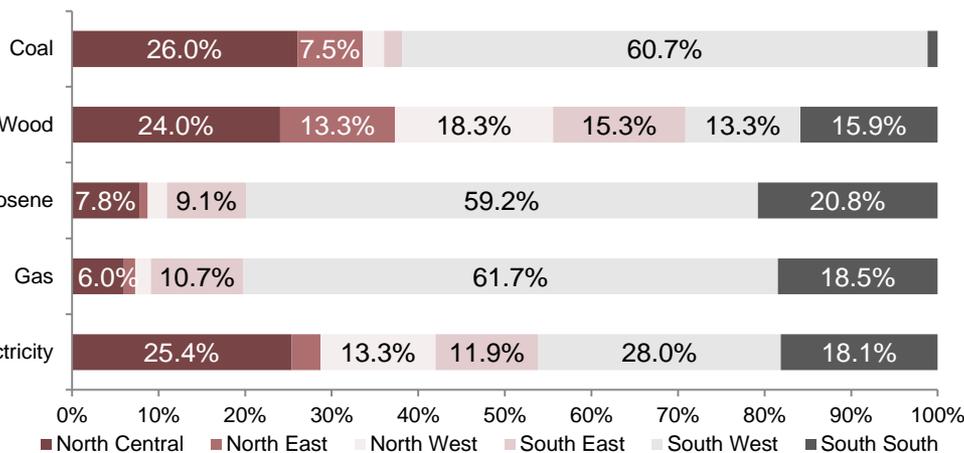
Household Distribution by Fuel for Nigeria (2008)



## Fuelwood

- Fuelwood is the most popular household cooking fuel
- The North Central region has the highest dependency on fuelwood

Distribution of Household by Fuel and Region (2008)



## Kerosene

- The majority of kerosene dependent households are located in the southern regions
- The South West, because of Lagos, has the highest kerosene using households

## LPG

- LPG penetration is very low
- The majority of LPG users are located in the South West region – Lagos and Ogun are the only two states where LPG users are higher than biomass users

## - Implications -

**The arid North is the region most dependent on fuelwood and could be a good pilot for efficient woodstoves, whilst the South West could be a good place for an intervention aiming to displace kerosene with LPG**

# Indoor Air Pollution Awareness

**While the government does not have any programs to reduce IAP, they are interested in providing awareness raising support; consumer awareness currently exists, although without active solution seeking**

	Awareness Level	Awareness Type	Comments from the Field
<b>Federal Government</b>	Moderate	<ul style="list-style-type: none"> <li>National policy to reduce health hazards from fuelwood combustion</li> <li>Ministries of Health, of Environment and of Women Affairs are members of the Nigerian Alliance for Clean Cookstove</li> </ul>	<p><i>"We are interested in collaborating with the Nigerian Alliance to help improve the lives of our women and the environment"</i></p> <p><i>- Government official</i></p>
<b>State / Local Government</b>	Low	<ul style="list-style-type: none"> <li>Low IAP issue awareness</li> <li>Cross River state had intentions to fund cookstove programs under the Emission Reduction Strategy program</li> </ul>	<p><i>"Our grandmothers and mothers have been cooking in a smoky environment and lived long"</i></p> <p><i>- Public Health official</i></p>
<b>NGOs</b>	High	<ul style="list-style-type: none"> <li>Several international and local NGOs are involved in pilot cookstove programs</li> <li>Nigerian Alliance for Clean Cookstove, a public- private initiative has been formed to tackle IAP issue</li> </ul>	<p><i>"Smoke from cooking can be observed everywhere, we are interested in starting a program in Jigawa state but lack expertise"</i></p> <p><i>- Country Director, international NGO</i></p>
<b>Consumer</b>	Moderate	<ul style="list-style-type: none"> <li>People are aware that smoke causes burning eyes and coughing, but lack education on the impact of smoke</li> <li>Consumers are willing to adopt a more convenient solution than kerosene</li> </ul>	<p><i>"While women do not like smoke, they do not have a full understanding of the health impact ; they are also not aware of improved cookstoves"</i></p> <p><i>- Cookstove program coordinator</i></p>

## **- Implications -**

**Awareness raising and education are critical components of a successful cookstove intervention**

# Nigerian Alliance for Clean Cookstoves

The Nigerian Alliance for Clean Cookstoves was established in April 2011 with the aim to introduce 10 million fuel efficient stoves to Nigeria by 2021

## Current Members



**USAID**  
FROM THE AMERICAN PEOPLE



*Federal Ministry of Health  
Federal Ministry of Environment  
Federal Ministry of Women Affairs  
Energy Commission of Nigeria*

## Potential Members



**giz**



**Goal:** 10 million clean cookstoves in Nigeria by 2021

**How:**

1. **Policy** – Work with the Federal Government to develop policies which foster the development of a clean cookstove market
2. **Quality Certification** – Partner with research centers, private sector and standard issuance organizations to ensure that only high quality stoves are certified for the Nigerian market
3. **Financing** – Structure financing options to ensure affordability and access to Nigerian households
4. **Advocacy** – Create mass awareness of clean cookstoves; encourage knowledge sharing with international cookstove programs

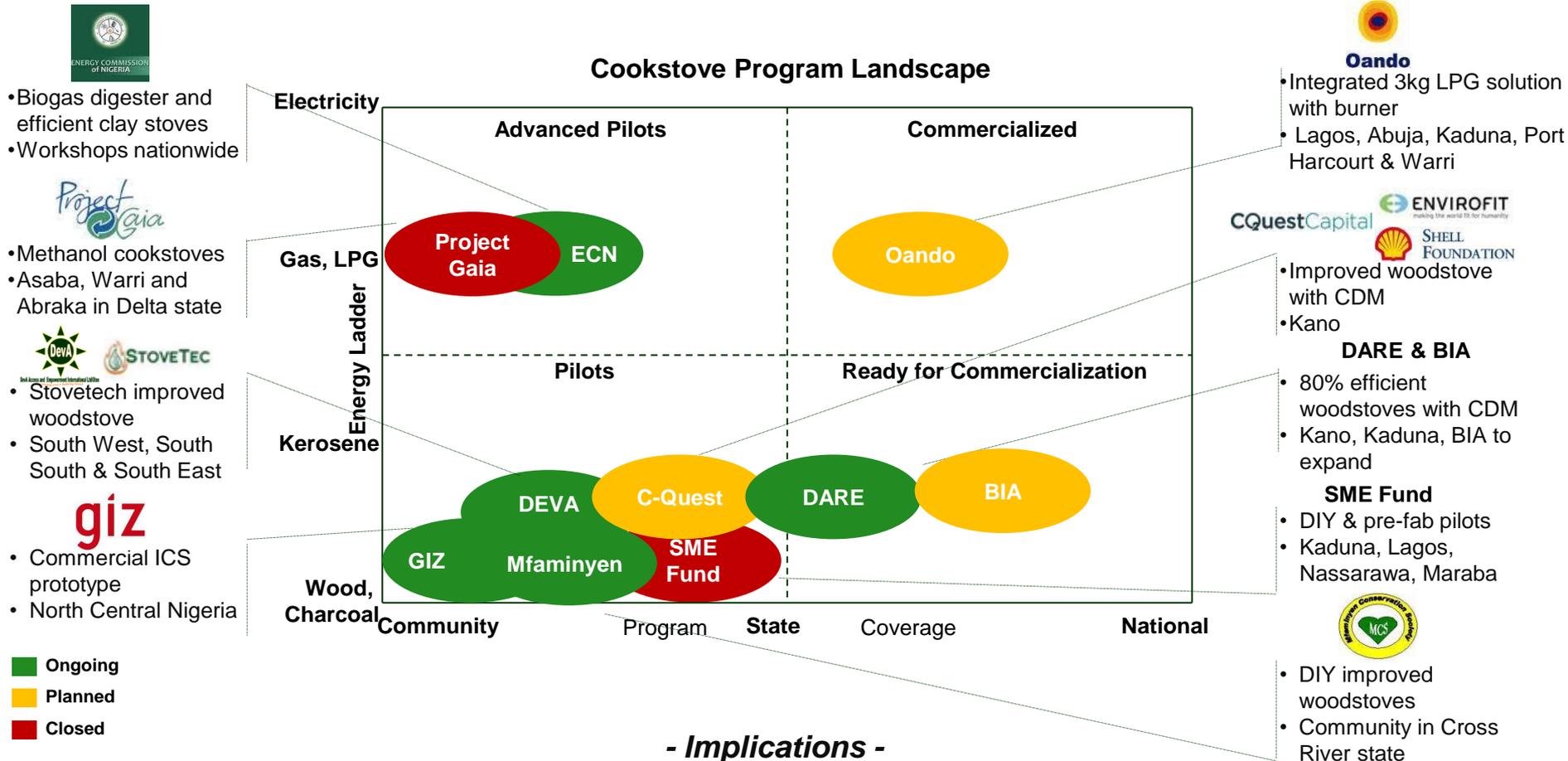
Established only recently so no significant progress as yet

## - Implications -

***The Nigerian Alliance for Clean Cookstoves can play the central coordinative body role in order to provide support and ensure effective implementation of cookstove programs***

# Cookstove Program Landscape

Several organizations have initiated pilot cookstove programs; however, the road to scaling up the programs into a sustainable industry remains challenging



## - Implications -

**Multiple entities running cookstove programs means that a large base of collective experience exists from multiple partners who may be available to leverage existing program reach for future holistic interventions**

# Cookstove Program Footprint

Several fuel efficient solutions (commonly region or segment focused) are already in or entering the market, with competition emerging in several states



## C-Quest

- Target urban and rural HH across income levels
- Planned pilot for Q3 2011



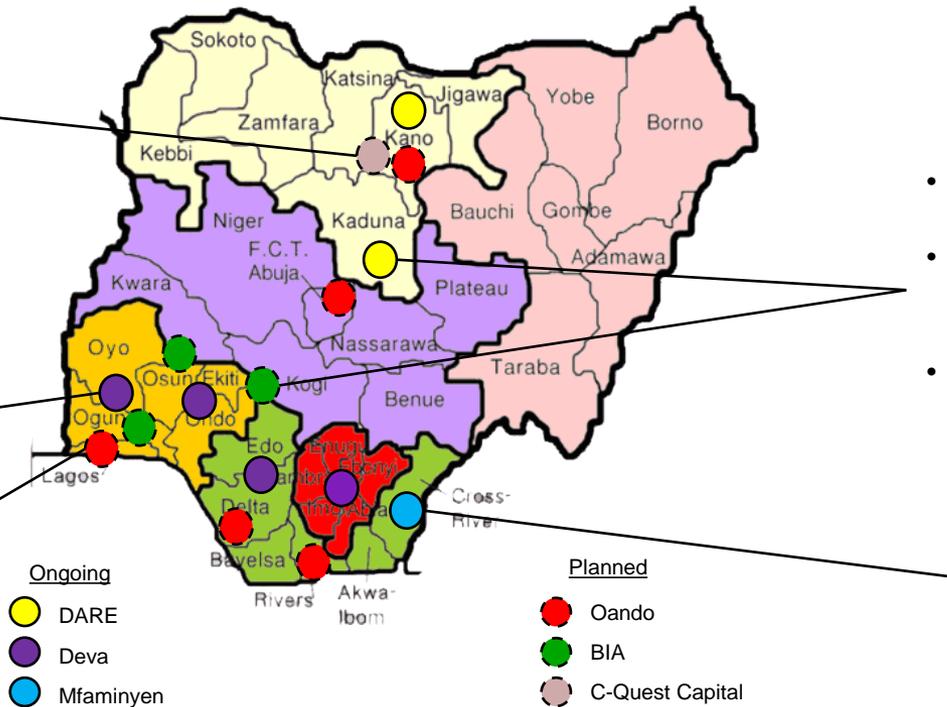
## DEVA

- Target rural agricultural communities
- ~2,000 stoves to date



## Oando

- Five Urban centers
- Target urban low income
- Planned launch Sep 2011



## Save80 (DARE & BIA)

- Target urban and rural HH above the poverty line
- DARE limited by CDM to 12.5K stoves a year in North West
- BIA to commercialize for South West and North Central



## Mfaminyen

- Target rural HH of all income in Mfaminyen community
- ~5,000 stoves to date

### - Implications -

**Current programs are region and segment focused. A cookstove program should enable these programs to span segments and expand across the country**

# Cookstove Programs (1/3)

**Some Nigerian cookstove programs have leveraged a “train the trainer” approach while others have begun to leverage carbon financing to reduce the end cost of pre-fabricated stoves to consumers**

	Oando	DARE & BIA	C-Quest
Partners	<ul style="list-style-type: none"> <li>Oando</li> <li>“Special Purpose Vehicle” (SPV) partners, E.g. Shell Foundation, Grameen, KFW</li> </ul>	<ul style="list-style-type: none"> <li>Atmosfair</li> <li>DARE</li> <li>Climate Interchange</li> <li>BIA</li> <li>Credit Direct Line (CDL)</li> </ul>	<ul style="list-style-type: none"> <li>Envirofit, Shell Foundation</li> </ul>
What	<ul style="list-style-type: none"> <li>Base of Pyramid LPG solution</li> <li>Integrated burner and cylinder</li> <li>Priced at ₦5,000 for cylinder and burner and ₦600 for gas refill</li> </ul>	<ul style="list-style-type: none"> <li>Save80 cookstoves at USD 100 with CDM financing</li> <li>BIA to commercialize model and provide micro financing through CDL</li> </ul>	<ul style="list-style-type: none"> <li>Envirofit G3300 model</li> <li>Design tweaked for local considerations</li> </ul>
How	<ul style="list-style-type: none"> <li>First phase to launch in key commercial zones – Lagos, Port Harcourt, Kaduna, Abuja and Warri</li> <li>Five year plan to expand nationwide</li> </ul>	<ul style="list-style-type: none"> <li>Demonstrate through church, mosque &amp; school, solicit and choose from list of people who want to purchase</li> <li>Community leaders vouch for customers</li> </ul>	<ul style="list-style-type: none"> <li>C-Quest controls PoA, distribution and monitoring</li> <li>Exclusive arrangement with Stovetec to provide stove technology</li> </ul>
Financing	<ul style="list-style-type: none"> <li>Self financed by consumer</li> <li>Raised ₦1 billion through “SPV” to provide loans</li> <li>Micro franchise to reach end consumers</li> </ul>	<ul style="list-style-type: none"> <li>Self financed by consumer</li> <li>Carbon Financing to reduce stove cost</li> <li>Installment payment option available to end consumers</li> </ul>	<ul style="list-style-type: none"> <li>Self financed by consumer</li> <li>CDM financed, risk borne by C-Quest</li> </ul>
Challenges	<ul style="list-style-type: none"> <li>Low consumer awareness</li> <li>LPG safety concern – need to establish credibility</li> <li>High import cost</li> </ul>	<ul style="list-style-type: none"> <li>High import duties (35%) and long lead time for custom clearance (up to 8 months)</li> <li>Low product awareness</li> <li>Can sell only 12,500 stoves annually under CDM</li> </ul>	<ul style="list-style-type: none"> <li>PoA is for all of Nigeria, but cannot scale as yet because of the need to be able to track stoves efficiently</li> </ul>
Lessons Learnt	<ul style="list-style-type: none"> <li>Critical to ensure tight distribution network and quality control of the LPG cylinder</li> </ul>	<ul style="list-style-type: none"> <li>Need to create mass consumer awareness</li> </ul>	<ul style="list-style-type: none"> <li>Not yet operational</li> </ul>

# Cookstove Programs (2/3)

**Other cookstove programs have focused on local entrepreneurs and provide both pre-fabricated and “Do it yourself” stove solutions with micro financing options to reduce upfront costs**

	Mfaminyen Conservation Society	DevA	SME Fund
Partners	<ul style="list-style-type: none"> <li>• Wild Gift Foundation</li> <li>• Cross River State Government</li> </ul>	<ul style="list-style-type: none"> <li>• StoveTec</li> </ul>	<ul style="list-style-type: none"> <li>• Energy in Common (United States)</li> </ul>
What	<ul style="list-style-type: none"> <li>• Locally-designed mud stove solution – the Ekwuk stove</li> </ul>	<ul style="list-style-type: none"> <li>• Efficient woodstoves</li> </ul>	<ul style="list-style-type: none"> <li>• DIY woodstove solution</li> <li>• Ready made efficient woodstove</li> </ul>
How	<ul style="list-style-type: none"> <li>• “Train the trainer” approach – enables community to self assemble stove</li> <li>• Involved in 51 communities</li> <li>• Developing portable model to be sold for ₦5,000</li> </ul>	<ul style="list-style-type: none"> <li>• Leverage on network of local entrepreneurs to distribute stoves</li> </ul>	<ul style="list-style-type: none"> <li>• Pilot DIY solution in Kaduna, Nakawara, Lagos, Maraba</li> <li>• Provide training for local entrepreneurs</li> </ul>
Financing	<ul style="list-style-type: none"> <li>• Initial funding from Wild Gift</li> <li>• Potential funding from Cross River State Government under Emission Reduction Strategy Program</li> </ul>	<ul style="list-style-type: none"> <li>• Installment payment available for end consumers</li> </ul>	<ul style="list-style-type: none"> <li>• Received fund in terms of debt capital from Energy in Common, United States</li> <li>• Exploring carbon financing option</li> <li>• Provide micro financing option for end consumers</li> </ul>
Challenges	<ul style="list-style-type: none"> <li>• Difficult to qualify for State funding</li> <li>• Community may not actively build the stove after training – need reward incentive</li> <li>• Raw materials for enhanced ready made model are difficult to source</li> </ul>	<ul style="list-style-type: none"> <li>• High local manufacturing cost</li> <li>• Lack of funding</li> <li>• High logistical cost prevent expansion the Northern region</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of local production capacity</li> <li>• Lack of interest among state and local government</li> <li>• Poor implementation of government programs</li> </ul>
Lessons Learnt	<ul style="list-style-type: none"> <li>• Mud stoves not suitable for outdoor cooking</li> </ul>	<ul style="list-style-type: none"> <li>• Not available</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce distribution cost through network of local entrepreneurs</li> <li>• Need to create mass consumer awareness for them to adopt the stove</li> <li>• Local entrepreneurship is critical to ensure sustainable business model</li> </ul>

# Cookstove Programs (3/3)

**Some cookstove programs are exploring the idea of introducing renewable energy and modern clean fuel as an alternative fuel source**

	Energy Commission	Project Gaia	GIZ*
Partners	<ul style="list-style-type: none"> <li>• None</li> </ul>	<ul style="list-style-type: none"> <li>• Centre for Household Energy and Environment</li> <li>• Stokes Consulting Group</li> <li>• Dometic</li> <li>• Delta State's Ministry of Power and Energy</li> </ul>	<ul style="list-style-type: none"> <li>• GIZ</li> <li>• Shea butter production community</li> </ul>
What	<ul style="list-style-type: none"> <li>• Prototype biogas digester</li> </ul>	<ul style="list-style-type: none"> <li>• Methanol cookstove by Dometic</li> </ul>	<ul style="list-style-type: none"> <li>• Efficient mud stove for commercial shea butter production</li> </ul>
How	<ul style="list-style-type: none"> <li>• Prototype available through two research centers in the university</li> <li>• Conducted workshops, youth training program on stove manufacturing and installation</li> </ul>	<ul style="list-style-type: none"> <li>• 150 households from three communities selected for pilot</li> </ul>	<ul style="list-style-type: none"> <li>• Installed prototype of efficient wood stove in shea butter production community</li> <li>• In past installed efficient woodstoves in school</li> </ul>
Financing	<ul style="list-style-type: none"> <li>• Federal funds</li> </ul>	<ul style="list-style-type: none"> <li>• Funded by United States Environmental Protection Agency (USEPA)</li> <li>• Pilot stoves provided to the families</li> </ul>	<ul style="list-style-type: none"> <li>• GIZ</li> </ul>
Challenges	<ul style="list-style-type: none"> <li>• Low product awareness</li> <li>• Lack of interest from state government</li> </ul>	<ul style="list-style-type: none"> <li>• Distribution network and transportation cost</li> <li>• High investment required</li> </ul>	<ul style="list-style-type: none"> <li>• In past pilot, stove fell out of use</li> <li>• Too many stakeholders in government</li> <li>• Lack of technical competency</li> </ul>
Lessons Learnt	<ul style="list-style-type: none"> <li>• Improved cookstove should not be more than 5,000 Naira to meet household affordability</li> </ul>	<ul style="list-style-type: none"> <li>• Methanol price should not exceed upper limit of current kerosene price</li> <li>• Ensure safety of methanol canister</li> </ul>	<ul style="list-style-type: none"> <li>• Critical to identify the right stakeholders</li> <li>• Bottom up, community level actions are more effective</li> </ul>

Source: Energy Commission, Project Gaia, Oando Plc

Note: \* Industrial model

# Related Environmental Programs

Several environmental initiatives are in planning or underway in partnership with the Ministry of Environment and the private sector



Focus

- Abuja Green City - low carbon emission city
- Renewable energy village
- Energy efficient housing scheme
- Forest protection

Participants

- Ministry of Environment
- Green Carbon Afrique
- Creation Environmental Services
- Integra Integrated Renewable Energy Svc
- Ministry of Environment
- Ministry of Environment
- ASO Savings Loans Plc
- Ministry of Environment
- The United Nations
- Cross River State

Programs

- Initiative under Nigeria's Voluntary Emission Reduction (VER) strategy
- Covers 2,000 hectares and is private sector funded, Govt. to provide enablers
- Biofuels, "Rice-to-Energy", wind and solar energy, energy efficient housing
- Provide technology based community that attracts investors, manufacturers, distributors and maintenance service for all renewable energy components
- Encourage on the job training and mentoring
- Involve 1,200 energy efficient housing units
- First 300 houses commissioned mid December 2010
- In March 2011, Nigeria's REDD+ Readiness Program was endorsed

## - Implications -

***A cookstove intervention should explore partnering with existing environmental programs to benefit from the momentum already created***

# Related Women and Rural Development Programs

Indoor Air Pollution Assessment

Several health, women's empowerment and community development initiatives are underway that have operational frameworks in place to reach communities



Focus

- Women and child health
- Free medical help program

- Microfinance for women

- Community outreach in Niger Delta

Participants

- Ministry of Health
- Various state ministries of health

- Ministry of Women Affairs
- Bank of Industry (BOI)
- Nigerian Agricultural, Cooperative and Rural Development bank (NACRDB)

- Shell Nigeria
- Community leaders from Rivers, Bayelsa and Delta states
- Various NGOs

Programs

- Immunization, Nutrition, HIV/AIDS, Malaria, Tuberculosis programs
- In rivers states, mosquito nets were distributed under the free health program, homes are monitored for net usage

- In partnership with BOI programs offer microfinance to women for business expansion
- In partnership with NACRDB programs offer microfinance to women for agricultural activities

- 25 Active agreements covering 400 communities under the Global Memorandum of Understanding
- Shell provides funds and the community determines which initiatives to use the funds for
- NGOs assist communities in the implementation
- Examples of programs include Transport to Wealth Program, and Healthcare Program

## - Implications -

***A cookstove intervention can leverage the reach of existing development programs to disseminate stoves and create awareness in target communities***

# Agenda

**Executive Summary**

**Project Approach**

**Sector Mapping**

**Macro Environment Assessment**

**Indoor Air Pollution Assessment**

**Consumer Assessment**

**Cookstove Industry Assessment**

**Carbon Financing**

**Sector Mapping Summary**

# Cooking Habits

**Cooking habits and food are generally uniform nationwide, but may vary from a rural to an urban setting; urban has traded traditional cooking for speed and convenience**

## Type of Food



- The type of food cooked is generally uniform across the country
- Food generally comprises of a starch (yam or cassava) combined with stews or soups
- Stews are cooked in large pots and require considerable stirring
- Yam and cassava dishes require significant boiling and preparation time
- Food cooked over wood is preferred, but households are willing to forego taste for convenience

## Cooking Habits

### Rural

- Open fire is used outdoors to avoid smoke and reduce fire hazards
- Cooking is more traditional and hence more complex
- Food is dried and preserved by hanging over cooking area

### Urban

- Kitchens are often located in enclosed passages
- Reduced cooking time by replacing yam and cassave with rice
- Many professionals often eat at roadside stalls called buca

### Household Social Events

- A strong culture exists of cooking for 50+people, usually twice a month
- Fuelwood is the popular choice for cooking large quantities

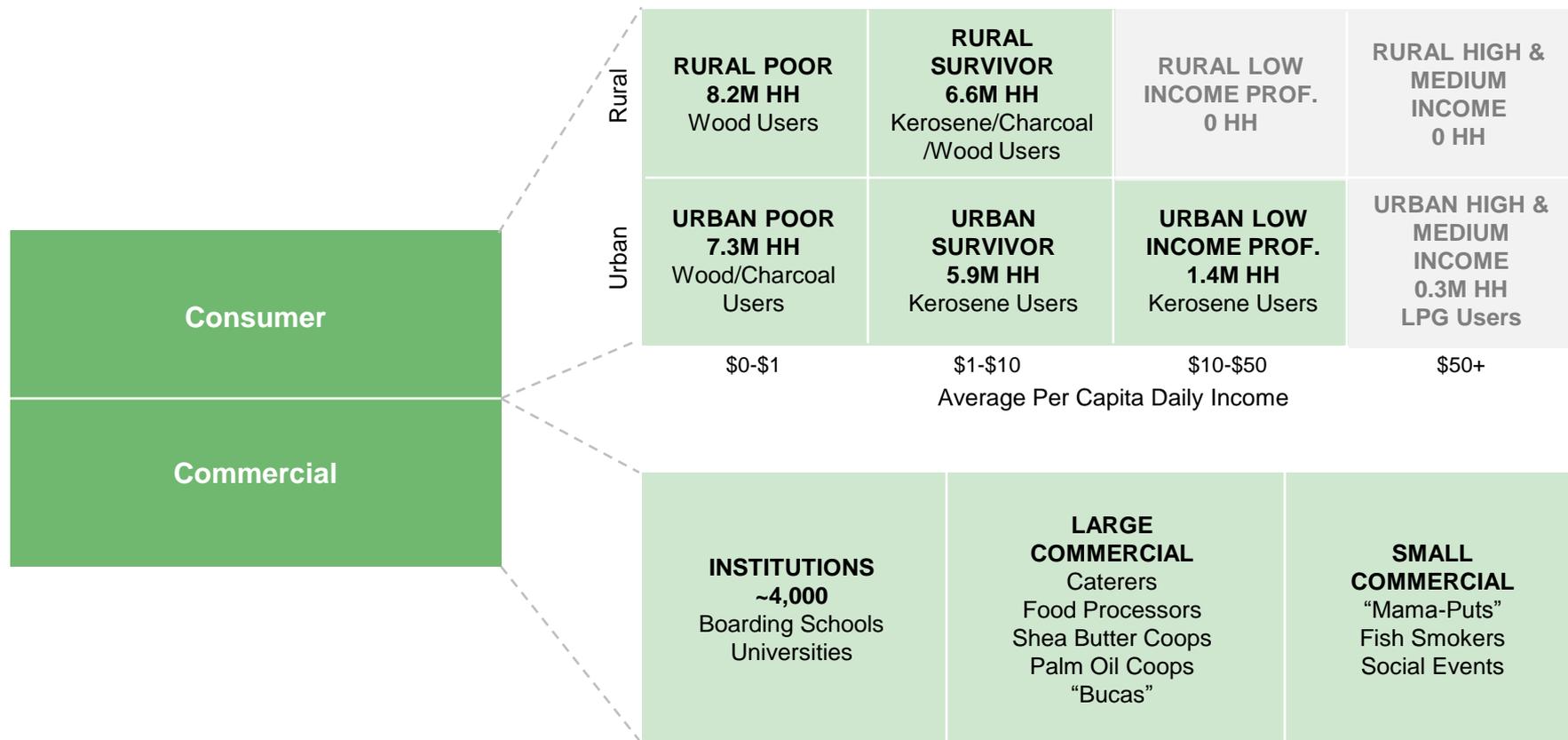


## - Implications -

***A cookstove solution can potentially be scaled across the country, however the solution must be sturdy and accommodate large pots***

# Customer Segmentation

A cookstove market can be divided into two key segments - consumer and commercial. Consumers can be further segmented based on urban vs. rural location and on income



## - Implications -

**A cookstove solution should be tailored for the needs of each segment on dimensions *variables* such as size, fuel type, price and value proposition**

Note: 1) The above assumes most low income professionals live in towns attached to urban areas.

2) Mama-puts are road-side stalls that serve meals 2 -3 times a day

Source: National Bureau of Statistics, Accenture Analysis

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# Rural Household Segment Profiles

The targeted rural population can be segmented into 1) subsistence farmers or temporary laborers who live below poverty line; and 2) people engaged in agribusiness that are economically better off



Rural Poor



Rural Survivor

Size in Households	• 8.2M (28% of total households)	• 6.6 M (22%)
Profession	• Subsistence farmers & laborers	• Agribusiness
Daily Income	• \$0 - \$1 per capita	• \$1 - \$10 per capita
Cooking Device & Fuel	• Three-stone open fires • Collected fuelwood	• Locally manufactured stoves • Purchased fuelwood, charcoal or kerosene
Cooking Location	• Outdoors / semi-enclosed annexes	• Outdoors / semi-enclosed annexes / kitchens
Cooking Frequency	• One to two meals a day	• Two to three meals a day
IAP Exposure	• High, HH do not like smoke but are used to it	• High, lesser in case of kerosene
IAP Awareness	• Low	• Moderate
Environment Impact	• High	• Moderate
Barriers to Switch	• High as current stove is at zero cost • Higher in South where wood is abundant; lower in North because harder to collect in Saharan parts	• Moderate as looking for smoke-free solutions but concerned about kerosene price and LPG safety
Willingness to Pay	• Low	• ₦1,500 to ₦2,000 (price for kerosene stove)
Purchase Drivers	• Time saved in collecting and cleaning pots	• Money and time saved • Convenience, ease and durability

# Urban Household Segment Profiles

The targeted urban population can be segmented into 1) households below the poverty line (<\$1 per day); 2) food sellers and small business owners who make up to \$10 per day; and 3) lower income professionals who make up to \$50 per day



Urban Poor



Urban Survivor



Urban Low Income Professional

Size in HH	• 7.3M (24%)	• 5.9M (20%)	• 1.4M (5%)
Profession	• Hawkers, odd jobs	• Small business, food stalls, etc.	• Government or professional
Daily Income	• \$0 - \$1 per capita	• \$1 - \$10 per capita	• \$10 - \$50 per capita
Cooking Device & Fuel	• Open fires • Collected/purchased wood/charcoal	• Locally manufactured stoves • Purchased wood/charcoal/kerosene	• Locally manufactured kerosene stoves
Cooking Location	• Outdoors / passages / rooms	• Outdoors / passages / rooms	• Passages / kitchens
Cooking Frequency	• One to two meals a day	• Two to three meals a day	• Two to three meals a day
IAP Exposure	• High	• Moderate	• Moderate to low
IAP Awareness	• Low	• Moderate	• Low
Environment Impact	• High	• Moderate	• Low
Barriers to Switch	• High	• Moderate	• Low as awareness is high and kerosene is getting expensive
Willingness to Pay	• Low	• ₦1,500 to ₦2,000 • ₦200 to ₦250 per week for fuel	• ₦1,500 to ₦5,000 for stove • ₦300 to ₦600 per week for fuel
Purchase Drivers	• Money and time saved	• Money and time saved • Health benefits to a lesser extent	• Convenience, ease and durability • Health benefits

# Large Volume Segment Profiles

The commercial segment can be further divided into 1) institutions such as boarding schools; 2) large commercial such as food processors and caterers; and 2) small commercial such as food vendors



Institutions



Large Commercial



Small Commercial

	Institutions	Large Commercial	Small Commercial
Type	<ul style="list-style-type: none"> <li>• Boarding schools</li> <li>• University hostels</li> </ul>	<ul style="list-style-type: none"> <li>• Shea butter, palm oil, etc cooperatives</li> <li>• Event caterers</li> </ul>	<ul style="list-style-type: none"> <li>• Buca owners/Mama-puts</li> <li>• Fish smokers</li> <li>• Household social events</li> </ul>
Cooking Device & Fuel	<ul style="list-style-type: none"> <li>• Open fires with wood</li> </ul>	<ul style="list-style-type: none"> <li>• Open fires with wood</li> </ul>	<ul style="list-style-type: none"> <li>• Open fires with wood or charcoal</li> </ul>
Cooking Location	<ul style="list-style-type: none"> <li>• Enclosed area</li> </ul>	<ul style="list-style-type: none"> <li>• Outdoors</li> </ul>	<ul style="list-style-type: none"> <li>• Outdoors</li> </ul>
Cooking Frequency	<ul style="list-style-type: none"> <li>• Three times a day</li> </ul>	<ul style="list-style-type: none"> <li>• Daily</li> </ul>	<ul style="list-style-type: none"> <li>• Twice a day for bucas/mama-puts</li> <li>• Once a day for fish-smokers</li> <li>• Twice a month for social events</li> </ul>
IAP Exposure	<ul style="list-style-type: none"> <li>• Moderate (outdoor cooking)</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate (outdoor cooking)</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate (outdoor cooking)</li> </ul>
IAP Awareness	<ul style="list-style-type: none"> <li>• Moderate</li> </ul>	<ul style="list-style-type: none"> <li>• Low</li> </ul>	<ul style="list-style-type: none"> <li>• Low</li> </ul>
Environment Impact	<ul style="list-style-type: none"> <li>• High</li> </ul>	<ul style="list-style-type: none"> <li>• High</li> </ul>	<ul style="list-style-type: none"> <li>• High</li> </ul>
Barriers to Switch	<ul style="list-style-type: none"> <li>• Low for ICS as saves cost</li> <li>• High for LPG –expensive for bulk</li> </ul>	<ul style="list-style-type: none"> <li>• Low for ICS as saves cost</li> </ul>	<ul style="list-style-type: none"> <li>• Low for ICS as saves cost</li> </ul>
Purchase Drivers	<ul style="list-style-type: none"> <li>• Money and time saved</li> <li>• Health and environmental benefits</li> </ul>	<ul style="list-style-type: none"> <li>• Money and time saved</li> <li>• Health and environmental benefits</li> </ul>	<ul style="list-style-type: none"> <li>• Money and time saved</li> <li>• Health benefits</li> </ul>
Willingness to Pay	<ul style="list-style-type: none"> <li>• Moderate – High</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate – High</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate – High</li> </ul>

# Customer Segmentation Summary

The poor and survivor segments represent a large proportion of the population and exhibit high IAP exposure levels. Willingness to pay and distribution access are better in urban professional and commercial segments

Customer Segment Characteristics

Segment	Size	IAP Exposure	IAP Awareness	Affordability	Willingness to pay	Alternative Use	Distribution Access
Rural Poor	High	High	Moderate Low	Moderate Low	Moderate Low	Moderate Low	Moderate Low
Rural Survivor	High	High	Moderate	Moderate	Moderate	Moderate	Moderate Low
Urban Poor	High	Moderate Low	Moderate Low	Moderate Low	Moderate Low	Moderate Low	Moderate
Urban Survivor	High	Moderate	Moderate	Moderate	Moderate	Moderate Low	Moderate
Urban Low Income Prof.	Moderate Low	Moderate Low	Moderate Low	Moderate	Moderate High	Moderate Low	Moderate
Institutions	Moderate Low	Moderate	Moderate	Moderate	Moderate High	Moderate Low	Moderate
Large Commercial	Moderate Low	Moderate	Moderate Low	Moderate	Moderate High	Moderate Low	Moderate
Small Commercial	Moderate	Moderate	Moderate Low	Moderate	Moderate High	Moderate Low	Moderate

Low     
 Moderate High  
 Moderate Low     
 High

Lack of reliable and secure distribution access for kerosene and LPG

**- Implications -**

***A cookstove solution should be tailored for the needs of each segment on variables such as size, type, price and value proposition***

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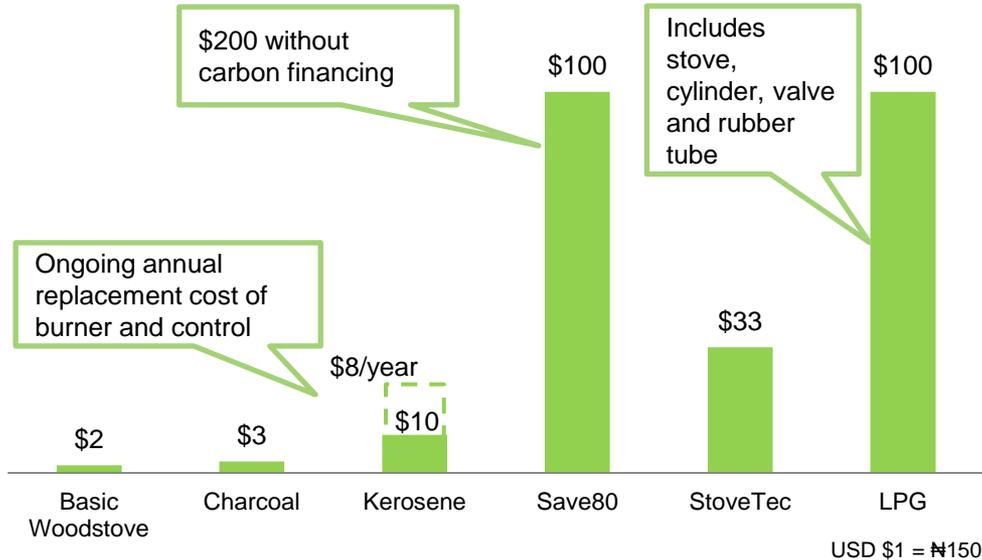
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# Available Cookstove Usage and Cost

Basic open fire stoves are locally made and available at minimal cost, while other commercially available stoves are imported; LPG and improved stoves are priced significantly higher

Upfront Cost of One Burner Cookstove (in USD)



Cookstove Usage

- Majority of the population uses basic wood or charcoal stoves, or three stone fires
- Commercial operators - caterers, bucas and agri-business - use open fires as they are perceived to be cheaper Kerosene and LPG stoves are limited to urban and peri-urban areas, and towns
- Efficient woodstoves are expensive, have not yet fully been developed, or reached critical volume to benefit from economies of scale
- Basic wood and charcoal stoves are manufactured by local welders; some kerosene stoves are locally made, although most are imported from China
- High import duties and long lead times for custom clearance increases the cost for improved stoves
- Carbon financing may reduce the cost of efficient woodstoves, however stringent requirements also limit the potential stove options

## Basic Wood and Charcoal Stoves



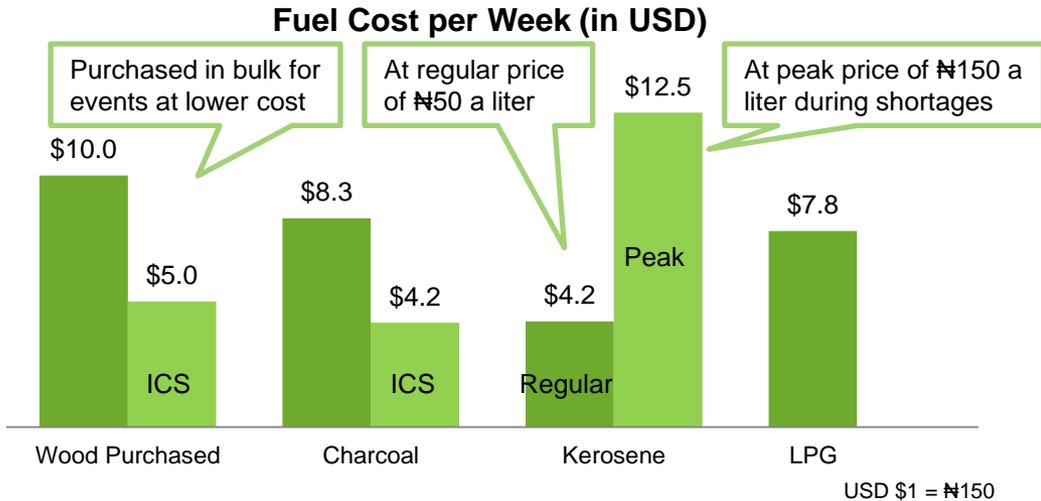
## - Implications -

**The upfront cost of cookstoves is a major factor in the limited adoption of modern fuels and improved biomass cooking solutions. A cookstove intervention should aim to reduce this cost**

Note: Kerosene stoves with 2 burners cost USD \$15-20; StoveTec may cost USD \$40 on instalment payment plan; Envirofit not in market as yet  
Source: Interviews

# Available Fuel Usage and Cost

In the long run purchased wood and charcoal cost more, however in the short run they can be purchased in smaller quantities requiring less financial outlay



## Fuel Usage

- Households with access to trees collect wood, while many in urban areas and towns purchase wood
- In arid Northern states, people now spend more time collecting wood; charcoal usage is heavier in these states
- Due to supply and price fluctuations, kerosene is increasingly becoming inconvenient and costly leading some kerosene users to switch LPG
- LPG is perceived as being more expensive and a “rich man’s fuel” due to its high upfront cost
- Safety concerns regarding LPG exist; but similar concerns regarding kerosene have not impeded adoption
- LPG penetration is limited to higher income groups in urban areas
- A small number of homes supplement fuel with electric hot plates; however low power availability limits usage

## Fuel Cost based on Purchase Unit

Fuel	Purchase Unit	Usage	Cost
Wood	5 sticks	1 meal	₦100 / USD 0.67
Charcoal	Small bags	1 day	₦150 / USD 1
Kerosene	1 liter	1 meal	₦50 / USD 0.33 - ₦150 / USD 1
LPG	12.5 kg cylinder	~3 weeks	₦3,500 / USD 23

## - Implications -

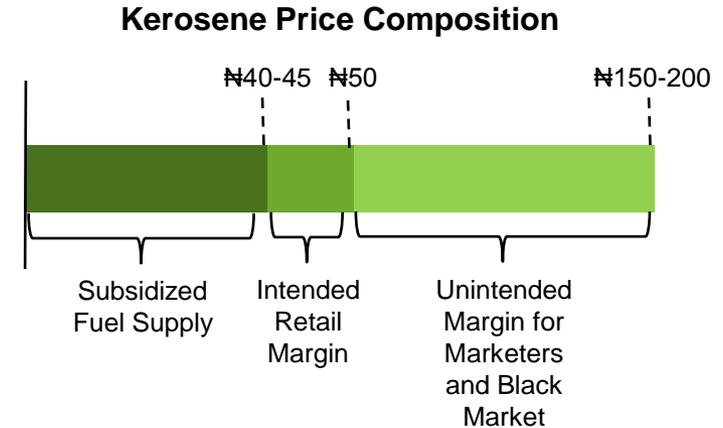
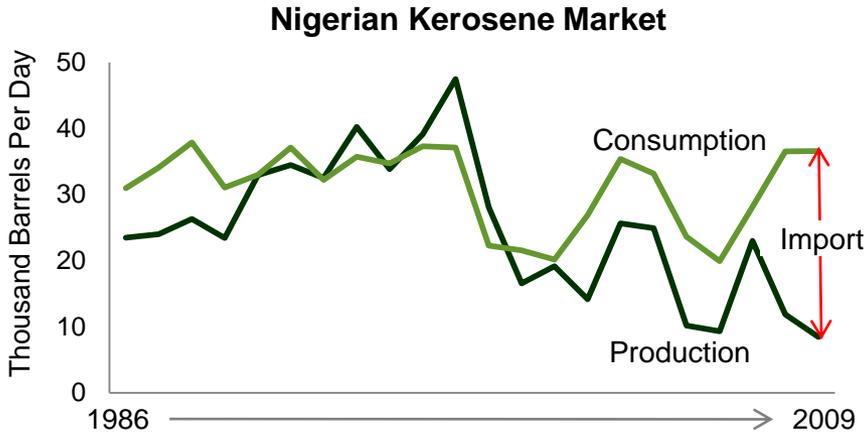
**The higher long-run cost of purchasing biomass and the inconvenience with kerosene lowers the barrier for clean fuels. A cookstove program should consider a base of the pyramid modern fuel solution**

Note: Fuel cost calculations are for family of average size (5 persons), cooking average two meals a day

Source: Interviews

# Kerosene Situation in Nigeria

Numerous issues in the kerosene supply chain cause wild price fluctuations, supply shortages, smuggling, hoarding, and adulteration of kerosene with cheaper gasoline



- Domestic kerosene production is not sufficient for demand levels
- Kerosene has a dual purpose – as household fuel and as aviation fuel
- NNPC imports kerosene and retails at a subsidized rate (₦50/liter) for household consumption, and instructs independent marketers to also sell at ₦50/liter
- Kerosene for aviation is priced at ₦170- ₦200 per liter

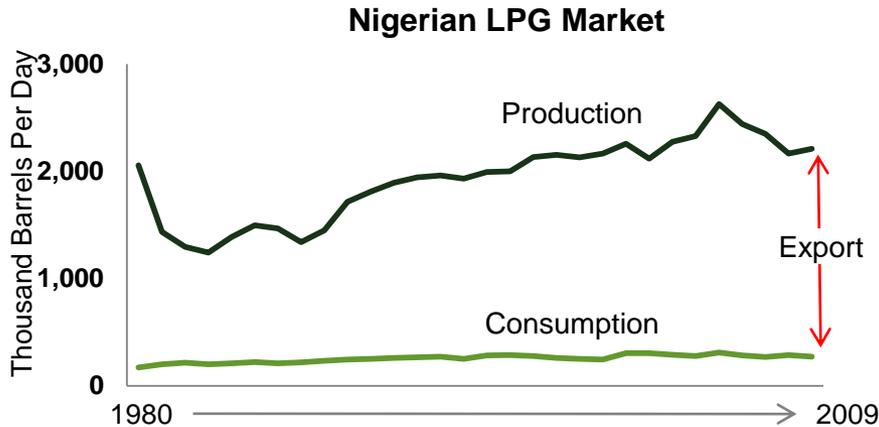
- NNPC fuel depots sell at ₦50/liter but independent marketers sell at ₦150- ₦200 per liter, causing long lines at fuel depots, kerosene adulteration and black market activity
- Prices have become prohibitive for many Nigerians
- Subsidized kerosene meant for household consumption is sometimes diverted for aviation purposes
- Kerosene adulterated with gasoline has led to burns, explosions, and other safety incidents

## - Implications -

**Despite widespread adoption by a large portion of the population, kerosene's safety concerns, price fluctuations and weak regulatory environment make it a less attractive option**

# LPG Situation in Nigeria

**Nigerian LPG production can easily meet current local market demand, however domestic LPG consumption remains limited due to high LPG price**



Result	
Country	Per Capita LPG Consumption
Cameroon	1.9 kg/year
Ivory Coast	3.2 kg/year
Ghana	2.1 kg/year
Senegal	10.5 kg/year
Nigeria	0.5 kg/year

- World's 8<sup>th</sup> largest proven gas reserves; yet limited production; significant wastage in flaring
- International pricing for LPG in Nigeria, Value Added Tax imposed on locally produced LPG
- High cost of logistics due to poor infrastructure and illegal levies at depots and refineries raise cost
- Retail market is very fragmented, no quality control for cylinders and refilling procedures; available sizes require high money outlay

- Lowest LPG consumption in West Africa - estimated annual domestic consumption ~0.5kg per capita
- LPG perceived as a rich man's cooking fuel; not considered as an alternative by the majority of population; unaffordable for people who can only buy fuel in smaller quantities
- Leakages and adulteration are common, resulting in safety concerns and high barriers to adoption

## - Implications -

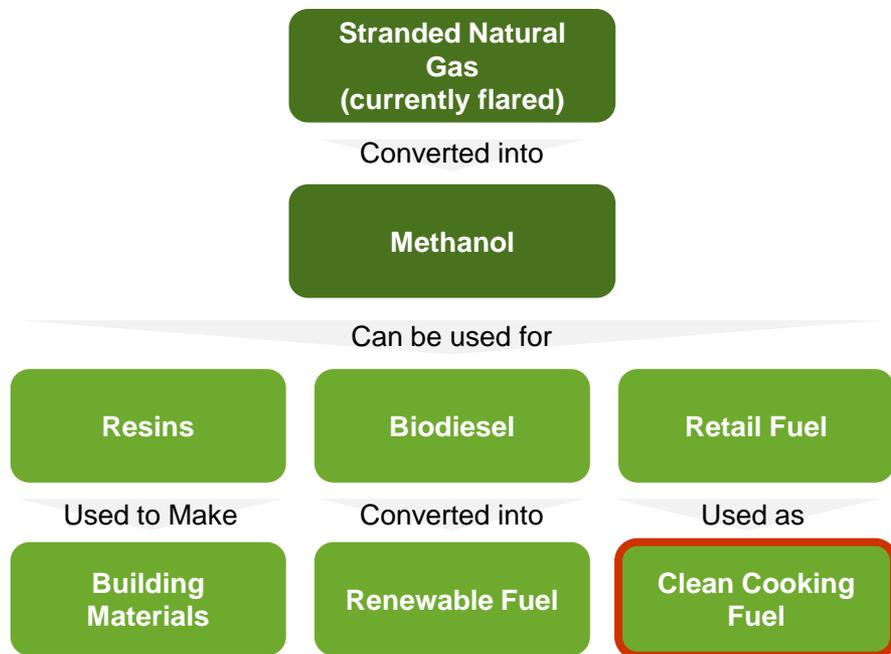
***A key focus of any cookstove intervention should include increasing domestic LPG consumption and planning to secure the LPG supply chain***

# Methanol Potential in Nigeria

**There is an unique potential to utilize flared natural gas to create a methanol cooking solution for Nigeria, simultaneously reducing pollution from both gas flaring and cooking**

## Potential for Methanol

Natural gas which is currently flared and wasted can instead be converted into a clean burning methanol cooking fuel as below:



## Current Situation

- In 2007, 150 households participated in a methanol cookstove pilot study conducted by Project Gaia
- The stove and its methanol fuel were accepted by almost all the respondents that participated in the study
- Statoil is investigating the potential to divert flared gas into methanol production, developing a business plan, and looking for partners

## Challenges

- Safety is a high concern as methanol is highly toxic
- High upfront investment in plants (methanol, resin, biodiesel, etc) would be required
- Considerable investment in the distribution network would be required as leveraging existing kerosene distribution will expose methanol to issues similar to kerosene

## - Implications -

***Although requiring a significant upfront investment and government support, methanol has the potential to supply clean fuel, grow local industry and generate employment***

# Current Technology Landscape

When available cookstove technology was rated against high level parameters, LPG and efficient wood stoves stood out

Rating:

- High - 4
- ◐ Medium - 3
- ◑ Low - 2
- ◒ Minimal - 1

	Low Cost	Availability	Secondary Uses	Usability	Housing Structure	Aesthetics	Cleanness	Performance	Health Benefits	Safety
Basic Cookstove	●	●	◐	●	◑	◑	◑	◑	◑	◑
Charcoal Stove	●	●	◐	●	◑	◑	◑	◑	◑	●
Efficient Cookstove	◑	◑	◑	◑	◑	◑	◑	◑	◑	●
Kerosene Cookstove	◑	●	◑	◑	●	◑	◑	◑	◑	◑
LPG Cookstove	◑	◑	◑	◑	●	●	●	●	●	●
Methanol Cookstove	◑	◑	◑	◑	●	●	●	●	●	●

## - Implications -

**Consumers may be willing to adopt efficient or modern fuel cookstoves, if they were customized for local needs and made available at a cost-effective price**

# Cookstove Industry Value Chain

There is domestic capacity for commercial production of cookstoves and emerging private sector engagement in distribution and marketing of cookstoves

	Manage Program		Raise Awareness			Provide & Support Stoves										
Key:	Coordinate Program	Provide Funding	Coordinate Project (Region)	Educate on IAP	Raise product awareness	Run promotional activities	Import & retail stoves	Design stoves	Test Stoves (Efficiency, etc)	Train Stove Manufacturers	Supply materials to make stoves	Transport mat. to Manufacturer	Make stoves	Transport stove to customer	Install Stoves	Maintain Stoves
<b>MoH, MoEnv, ECN</b> (Federal Govt. Agencies)	Basic capability or potential	Partial capability		Full capability	Full capability	Full capability										
<b>State/Municipal Govt.</b> (State & local Govt. Agencies)	Full capability	Partial capability	Partial capability	Full capability	Full capability	Full capability										
<b>World Bank</b> (Multilateral Orgs.)	Partial capability	Full capability	Partial capability	Partial capability	Partial capability	Partial capability										
<b>USAID, GIZ, HBS</b> (Bilateral Orgs.)	Full capability	Full capability		Full capability	Full capability	Full capability			Partial capability	Partial capability						
<b>DARE, Mfaminyen, DEVA, SME Fund, ICEED</b> (Local NGOs)			Full capability	Full capability	Full capability	Full capability	Full capability	Partial capability	Partial capability	Full capability			Basic capability or potential	Full capability	Full capability	Full capability
<b>BIA, Oando, Shell, Local Entrepreneurs</b> (Private Sector in Import, Distribution & Retail)	Full capability	Full capability	Full capability	Full capability	Full capability	Full capability	Full capability	Partial capability	No capability	No capability	Full capability	Full capability	Basic capability or potential	Full capability	Partial capability	Partial capability
<b>FCMB/CDL, Atmosfair, C-Quest</b> (Microfinance, Carbon financing)		Full capability														

## - Implications -

**The cookstove industry in Nigeria is at a stage where it could thrive if provided with some enablers that allow the private sector to see a commercial business case**

# Agenda

**Executive Summary**

**Project Approach**

**Sector Mapping**

**Macro Environment Assessment**

**Indoor Air Pollution Assessment**

**Consumer Assessment**

**Cookstove Industry Assessment**

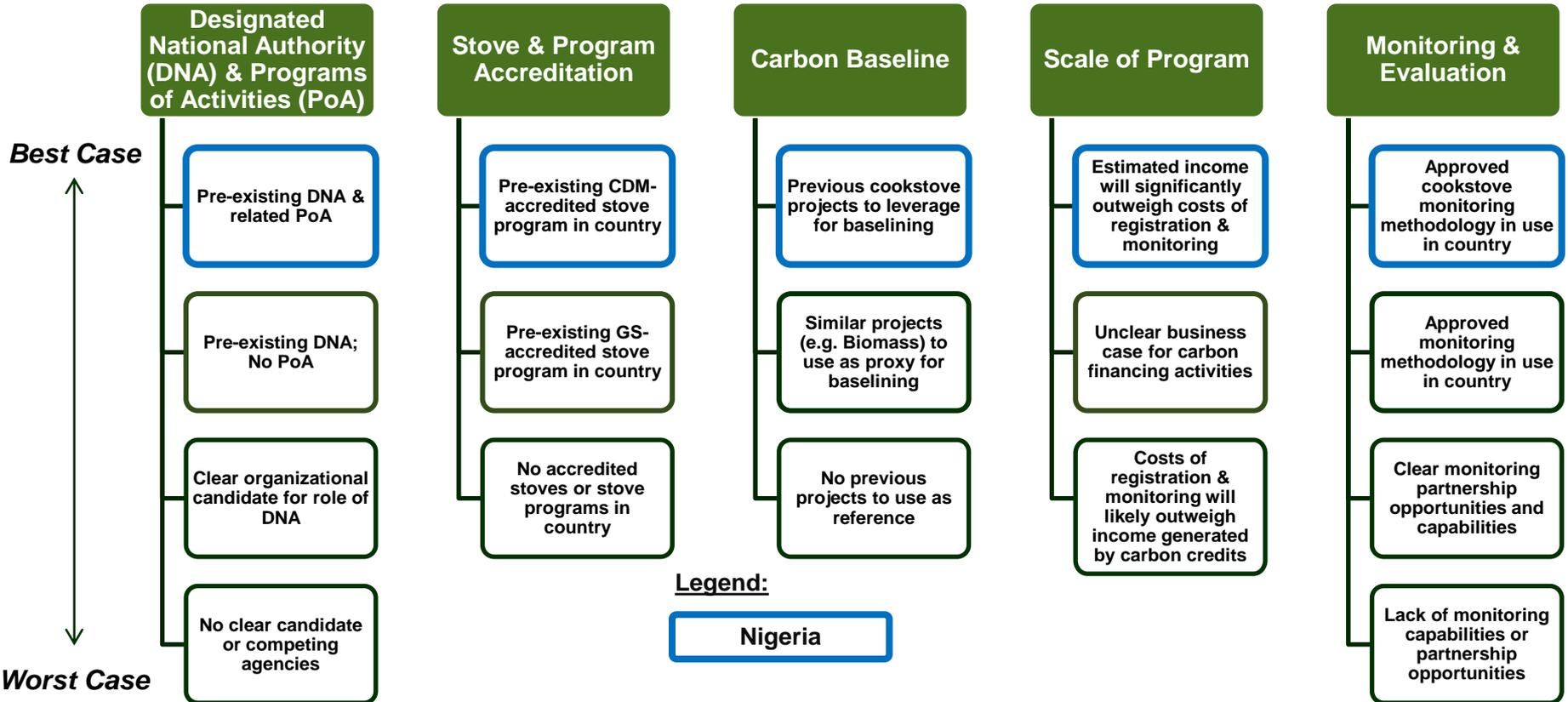
**Carbon Financing**

**Sector Mapping Summary**

# Carbon Finance Market Attractiveness – Nigeria

Nigeria already has one CDM-accredited stove program and a PoA for clean cookstoves in the immediate future

## Carbon Finance Attractiveness Criteria – Nigeria



### - Implications -

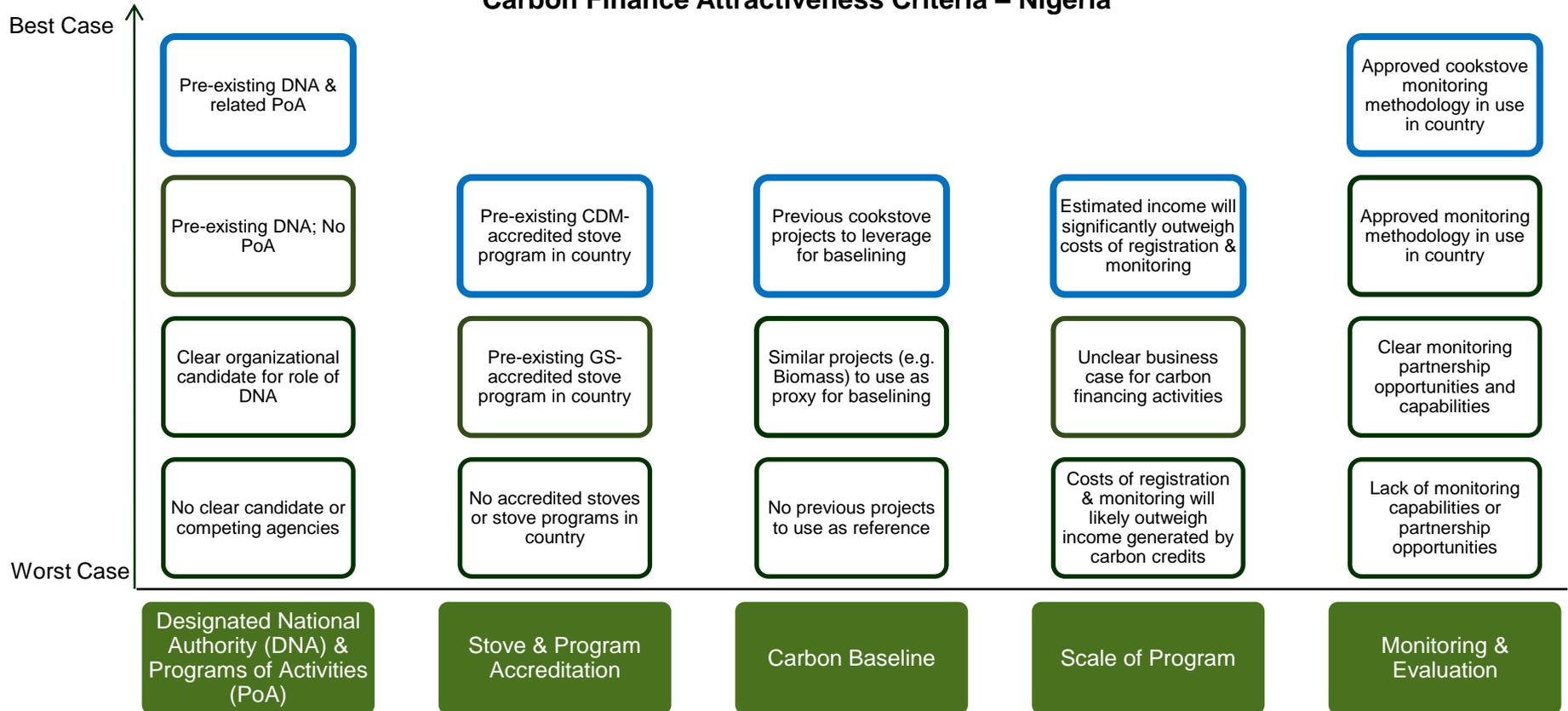
**Nigeria ranks very highly on the high-level market attractiveness criteria to support a potential cookstove program with carbon financing revenues**

Note: Clean cookstove PoA currently in process of registration with expected approval end of 2011

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**Carbon Finance Attractiveness Criteria – Nigeria**



**- Implications -**

**Nigeria ranks very highly on the high-level market attractiveness criteria to support a potential cookstove program with carbon financing revenues**

**Legend:**



Note: Clean cookstove PoA currently in process of registration with expected approval end of 2011

# Carbon Finance Landscape

**Nigeria has a Designated National Authority for CDM projects, a CDM-approved stove design, has projects which are currently receiving CDM CER's, and an upcoming CDM cookstove Program of Activities**

## Carbon Financing Landscape – Nigeria

Area	Data	Comments
Designated National Authority	Federal Ministry of Environment Special Climate Change Unit	Contact Name: Dr. Samuel A. Adejuwon
CDM Projects	5 registered CDM projects	One of which is a cookstove program
Gold Standard Projects	No registered Gold Standard projects	Gold Standard used to certify some CDM projects
CDM Program of Activities	2 CDM-PoAs: C-Quest Cookstove CDM PoA (approved) Atmosfair Cookstove CDM PoA (expected end of 2011)	-
Accredited Cookstove Programs	1 – Atmosfair's Cookstove Program	CDM / GS accredited
Carbon Funds	None	-
Other Mechanisms	None	-

# Carbon Finance Programs

Several programs with carbon financing components have already begun in Nigeria, including the Atmosfair CDM-accredited cookstove program and the creation of a cookstove PoA for future projects

**Focus**



- Improved cookstove program
- Guinea Savannah Zone



- Atmosfair Clean Cookstove Program of Activities



- CQuest Capital (CQC) Clean Cookstove Program of Activities

**Participants**

- Atmosfair (Implementer)
- DARE (Distributor)
- Gold Standard CDM (Certification)
- Climate Interchange - Save80 (Design)

- Atmosfair (PoA Owner)
- UNFCCC

- CQuest Capital (PoA Owner)
- UNFCCC
- Envirofit (planned supplier)
- Shell Foundation (grant provider)

**Description**

- Began in 2009
- Uses CDM-certified Save80 stove
- 120,000 VERs sold
- Monitoring includes:
  - Individual contracts
  - Stove installation record
  - GPS location of each stove
  - Monitoring visits

- Created in 2010
- Program of Activities will allow future clean cookstove programs to receive carbon credits more easily and reduce barriers to accreditation through inclusion in PoA

- Created in 2011
- C-Quest Capital has both distribution and retail strategies in place and was awaiting selection of a supplier
- Has selected Envirofit to supply stoves to Northern Nigeria
- Plans to expand to other regions of Nigeria after proving model in Northern region
- First pilot planned for Kano state

# The Cookstove CDM Programs of Activities

The Atmosfair and C-Quest Capital CDM Programs of Activities represent unique opportunities to create carbon-finance ready cookstove programs with increased speed and lower costs

	Response	Additional Comments
<b>Benefits</b>	<ul style="list-style-type: none"> <li>• Reduced cost, risk and complexity</li> <li>• Increased speed of certification</li> </ul>	<ul style="list-style-type: none"> <li>• Current high cost for DOE's to certify additional CPA's will be reduced due to a recent UN EB decision</li> </ul>
<b>Stove Eligibility</b>	<ul style="list-style-type: none"> <li>• Any kind of stove eligible for CDM Program of Activities but must achieve &gt;50% efficiency</li> <li>• Stove efficiency must be consistent</li> </ul>	<ul style="list-style-type: none"> <li>• Stringent eligibility requirements may make local production not feasible in the short-term</li> </ul>
<b>Other Requirements</b>	<ul style="list-style-type: none"> <li>• Must work through Atmosfair or CQC as they are the Managing Entities of the Programs of Activities</li> <li>• Not eligible for VER's</li> </ul>	<ul style="list-style-type: none"> <li>• Positive response from Atmosfair's project manager with regard to inclusion of other projects</li> <li>• CQC has signed exclusive agreement with Envirofit for stoves</li> </ul>
<b>Readiness</b>	<ul style="list-style-type: none"> <li>• Atmosfair expects the Program of Activities to be approved by end of 2011</li> <li>• Per Shell Foundation feedback CQC PoA is registered – however not yet in UNFCCC registry</li> </ul>	<ul style="list-style-type: none"> <li>• Atmosfair:                             <ul style="list-style-type: none"> <li>• Already had auditors onsite, and received feedback</li> <li>• Currently in 2<sup>nd</sup> round of feedback response</li> </ul> </li> </ul>

# Overall CF Market Attractiveness

**As a result of these conditions, the country represents an ideal opportunity for potential carbon financing activities in support of a clean cookstove program, with very few risks**

## Highlighted Market Criteria

Existing Designation National Authority

Existing CDM-Accredited Cookstove Program

Existing CDM-Accredited Cookstove

Existing Cookstove CDM Programs of Activities

Ideal Market Conditions for Cookstove Program Carbon Financing in Nigeria

## Potential Risks

- Accredited stove (Save80) may not be appropriate to all regions and consumer segments
- Stringent efficiency requirements for inclusion in CDM Program of Activities may restrict stove options
- PoA managing entities may limit the solutions allowed into their PoA, reducing competition

# The Save80 Improved Cookstove

As the only CDM-accredited improved cookstove in the world, the Save80 is uniquely positioned to reduce biomass consumption in Nigeria, although the upfront cost is still a concern

## The Save80 Improved Cookstove



**Efficiency:**  
(above 3-stone fire)

**80%**

**Capacity:**

**8 Liters**

**Retail Cost:**  
(with CDM)

**USD 100**

## The Save80 at a Glance

- High quality, high cost improved cookstove
- Sourced from Climate InterChange AG in Germany, shipped in parts and assembled in-country
- Reduces fuel consumption by 80%
- Can use heat retention container, called the 'Wonderbox', to further increase efficiency
- High quality assurance requirements limit ability to produce locally
- Currently being used in pilots by Atmosfair

## Kyoto CDM and the Save80 Stove

- The Save80 cookstove is the only CDM-accredited improved cookstove in the world
- Sale of CDM CER's can reduce the upfront cost of stoves to consumers to USD 100 in Nigeria
- Some pilot projects in Nigeria have already received CDM CER's

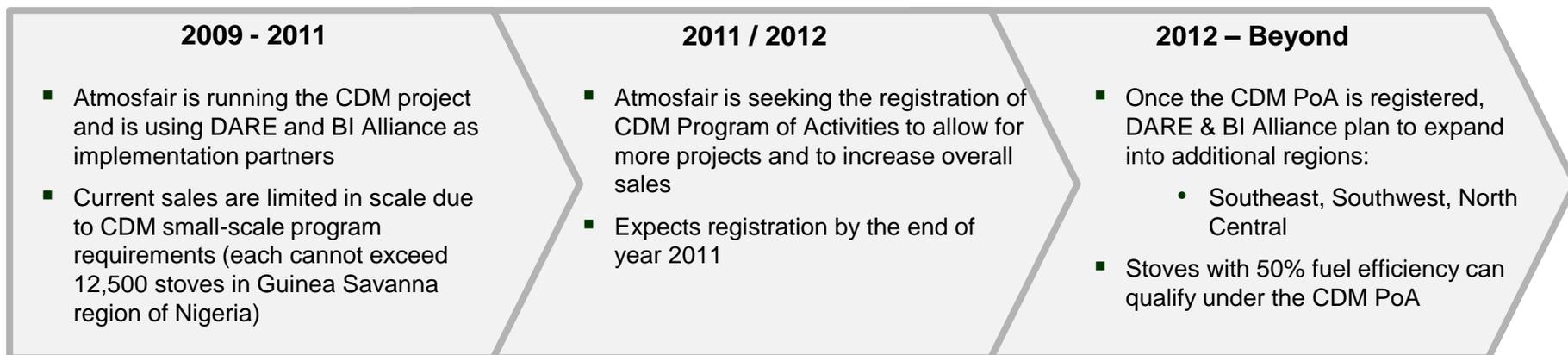
## - Implications -

***A cookstove program should consider the Save80 as an efficient and high quality solution for Nigerian firewood users with low purchasing power***

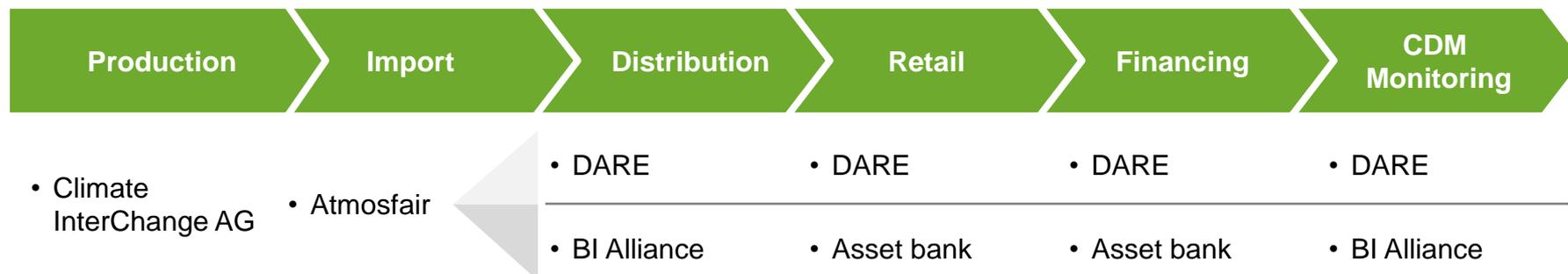
# Timeline and Value Chain of the Save80

The Save80 cookstove programs have had success in small-scale pilots in Nigeria, and are now ready to be expanded into a CDM Program of Activities

## The Save80 Timeline in Nigeria



## The Save80 Program Value Chain



### - Implications -

**An efficient stove intervention should consider introducing a choice of woodstoves that offer 50% efficiency and can qualify for CDM financing under the upcoming PoA**

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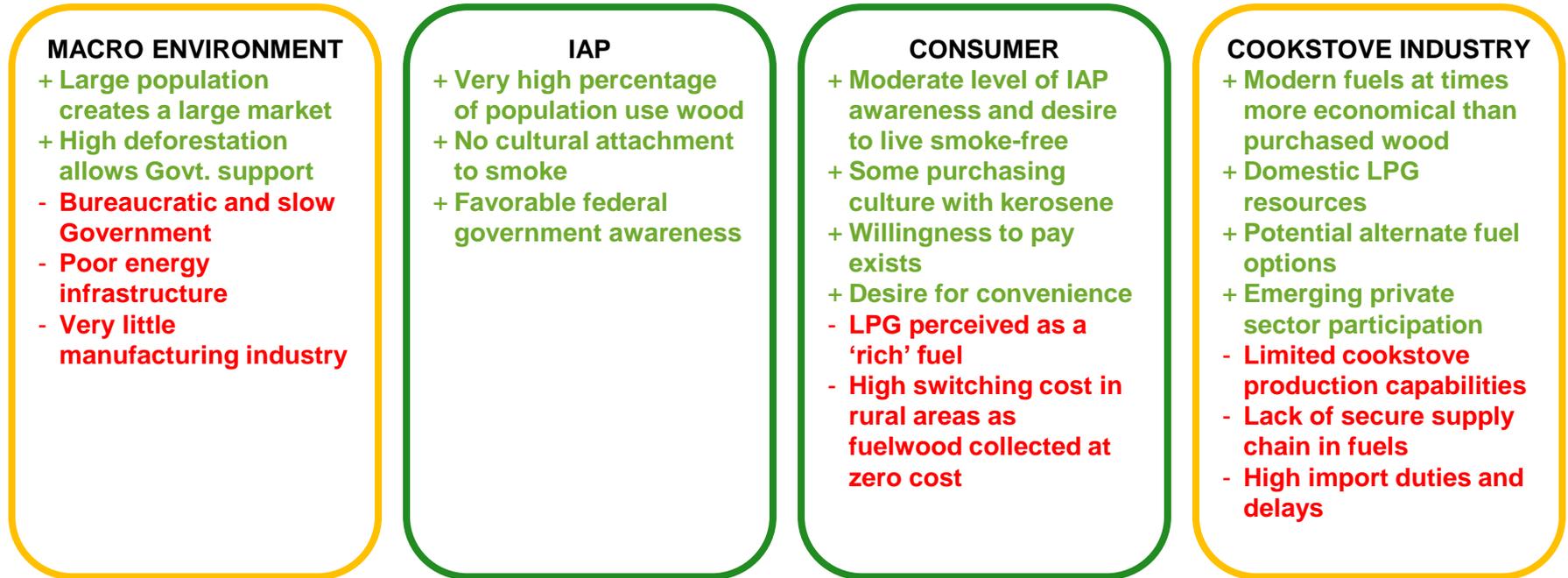
**Cookstove Industry Assessment**

**Carbon Financing**

**Sector Mapping Summary**

# Sector Mapping Summary

Nigeria's large number of solid fuel burning households, particularly those paying for fuel, provide an attractive market for clean cookstoves.



# Appendix

# Glossary of Terms

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

ALRI – Acute Lower Respiratory Infection

CDM – Clean Development Mechanism

CDL – Credit Direct Line

CER – Certified Emission Reduction (from CDM project)

CF – Carbon Finance

COPD – Chronic Obstructive Pulmonary Disease

CPA – CDM Program Activity

CPA-DD – CDM Program Activity Design Document

DALY – Disability Adjusted Life Year

DNA – Designated National Authority

DOE – Designated Operational Entity

EB – Executive Board

ECN – Energy Commission of Nigeria

ER – Emission Reductions

EU-ETS – European Emission Trading Scheme

FAO – Food and Agriculture Organisation

FCMB – First City Monument Bank

FCT – Federal Capital Territory

GACC – Global Alliance for Clean Cookstoves

GS – Gold Standard

GS TAC – Gold Standard Technical Advisory Committee

GWP – Global Warming Potential

HH – Household(s)

IAP – Indoor Air Pollution

ICS – Improved Cookstove

LGA – Local Government Area

LPG – Liquid Petroleum Gas

MFI – Microfinance Institution

MoE – Ministry of Environment

MoH – Ministry of Health

MoWA – Ministry of Women Affairs

NGO – Non-Governmental Organization

NNPC – Nigerian National Petroleum Corporation

NRB – Non-Renewable Biomass

PDD – Project Design Document

PIN – Project Idea Note

PoA – Program of Activities

PoA-DD – Program of Activities Design Document

SFU – Solid Fuel Use

UNFCCC – United Nations Framework Convention on Climate Change

USAID – United States Agency for International Development

USD – US Dollars

VER – Verified Emission Reduction (voluntary market)

WHO – World Health Organization