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## **Global Alliance for Clean Cookstoves**

Nigeria Market Assessment

*Intervention Options*



# 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.*

## **Executive Summary**

**Situation**

**Recommended Interventions**

**Engagement Approach**

**Operational Plan**

**Case for Action**

**Delta Region Strategy**

**Appendix**

# Nigeria Sector Mapping

- Nigeria represents a very large market with an estimated 155 million inhabitants (5.5% of Africa's population)
- Nigeria has extreme poverty and serious health issues -- over half of the population lives under the poverty line and the average life expectancy is among the lowest in the world at 47.5 years
- Nigeria's population of those who cook with biomass is also very large in relative terms with 70% of the population burning firewood and less than 1% of the population using modern fuels
- As a result, rapid deforestation is a major concern with over half of the country's primary forests being destroyed in the last 10 years
- Although outdoor cooking is more common than indoor cooking, significant IAP exposure for many Nigerians still exists. Although many are concerned about the health effects, most have few alternatives
- Poor infrastructure, frequent power outages, limited manufacturing capacity, and pervasive quality control issues complicate efforts to provide for basic needs in many parts of the country
- A quarter of the population relies on kerosene. Kerosene is currently subsidized in Nigeria, however frequent shortages, export smuggling, and black market pricing have increased costs and led to significant sourcing challenges for most consumers
- While a large portion of the population currently collects firewood at little to no cost, those who purchase wood or charcoal often find themselves paying more on an ongoing basis than they would for LPG – a market dislocation generally attributed to high upfront costs and perception issues around LPG economics and safety
- A number of cookstove programs, some already benefiting from CDM carbon financing, are underway in Nigeria and are experiencing varying degrees of success

## LPG Adoption Strategy

- Current LPG solutions involve a high upfront cost which impede adoption, especially by those in lower income segments
- A LPG cookstove strategy should seek to minimize this cost by creating a Base of the Pyramid (BOP) LPG solution which is smaller in size (and therefore cost), and integrating a burner and cylinder in one solution
- To spread out upfront expenses, a large barrier for many consumers, a microfinance option should be investigated to allow consumers to pay for the solution in installments – previous program experience can be leveraged for how best to implement this
- To further reduce upfront costs for clean cookstoves and fuels, carbon finance should be leveraged to achieve accreditation for solutions and put carbon revenue to work lowering costs for consumers – structures currently in progress such as CDM PoA's should be utilized for this purpose
- The supply chain for LPG should be secured and streamlined to reduce unnecessary costs, ensure quality and safety, and guarantee a steady supply to Nigerian consumers
- A LPG cookstove strategy should first aim to penetrate the urban areas before expanding nationwide
- Branding, consumer education, and training on usage should be used to minimize both actual and perceived risks of LPG usage, as well as to help consumers to understand the potentially positive economic and health benefits of switching to LPG

## Efficient Biomass Solutions

- An efficient biomass stove solution for the Base of the Pyramid (BOP) consumers needs to be designed – only solutions currently available are Do-it-Yourself (DIY) stoves and pilot projects which are very limited in scale
- The importance of large-scale biomass solutions for commercial and large social usage is pronounced in this market; stoves should be designed to accommodate the needs of this segment
- As with a LPG solution, microcredit and carbon finance should be extended to further reduce upfront outlays

## Other Renewable Energy Sources

- There is an increased interest in developing the renewable energy and biofuel sector in Nigeria; the Government has launched several renewable energy programs
- Current renewable energy programs are mainly related to biogas and run by the Government; however, the programs are limited to the pilot phase
- Biogas solutions may not be suitable for national implementation, and therefore may remain as a community specific solution
- Technical expertise and program implementation support is required to scale up existing biogas programs
- The establishment of renewable energy villages could be used to promote sustainable renewable cooking fuels using agricultural byproducts

# Nigeria Illustrative Intervention Options

Executive Summary

## Enable Business Environment

- The national government should be engaged to review import duties on imported clean cookstoves and investigate the option of creating a tax-exempt product category for clean cookstoves as a 'social good' (perhaps a long-term strategy)
- Given the high potential for local LPG production to satisfy demand, current pricing and taxes on LPG should be reviewed as impediments to national adoption of a modern, locally-produced fuel
- To reduce market distortion towards a less-beneficial fossil fuel, the elimination of the kerosene subsidy should be considered along with consideration of a possible shift towards LPG subsidization
- Tax incentives can be used to encourage local clean cookstove production and attract infrastructure investment
- Local cookstove manufacturing activities can be encouraged by establishing an incubator clean cookstove manufacturing zone with a stable power supply

## Engagement Approach

- The cookstove strategy should take into account the various levels of stakeholders, and carefully consider the timing, benefits, and risks before engaging them
- The national Government should be engaged for those policy issues which best leverage their involvement
- Regional and state level governing bodies should be engaged as implementation partners and channels into the local government and communities; some larger NGOs may also be engaged at this level
- Local and community level engagement is recommended to gain deeper understanding of local solution requirements, as well as to conduct bottom-up awareness raising. Local NGOs, aid organizations and local entrepreneurs should also be engaged at this level
- Private sector stakeholders should be engaged to help with supply, distribution, retailing, and to build local capacity

**Executive Summary**

**Situation**

**Recommended Interventions**

**Engagement Approach**

**Operational Plan**

**Case for Action**

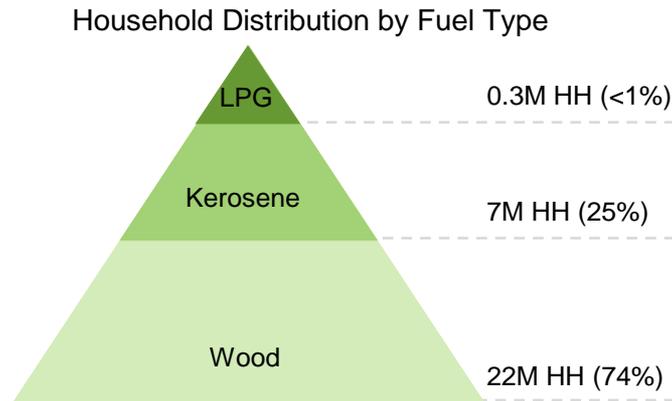
**Delta Region Strategy**

**Appendix**

# Indoor Air Pollution in Nigeria

Over 22 million households in Nigeria depend on solid fuel for cooking, which leads to ~80,000 deaths annually

*Less than 1% modern fuel penetration...*



*...coupled with very low fuel efficient stove adoption...*



~14,000 stoves

**<0.1%**  
of fuelwood dependent  
households

*...results in a significant health impact*

## Mortality from Solid Fuel Use

- 79,000 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

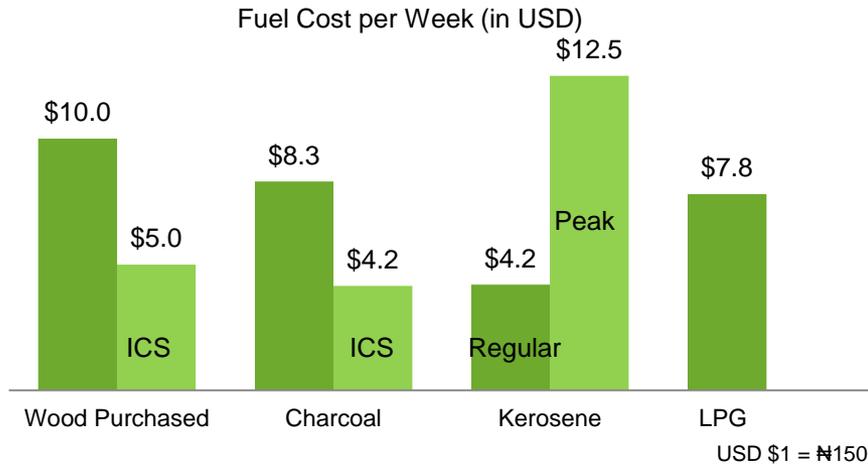
## National Disease Share

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

# Available Fuel Choices

**LPG is cost-effective but requires higher financial outlays than wood, charcoal or kerosene, and thereby limits adoption**

**Wood and charcoal currently cost more...**

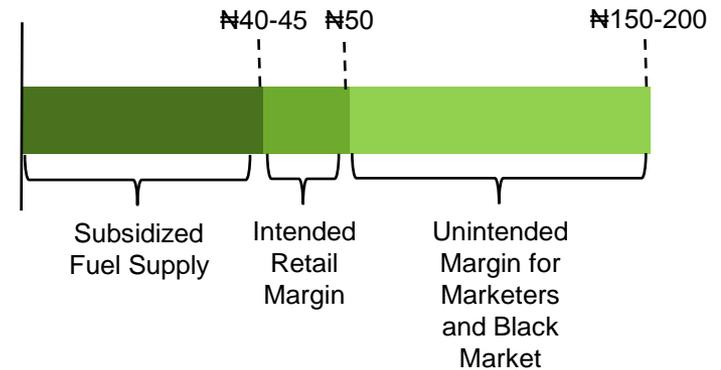


**...but can be purchased in small quantities**

Fuel Cost based on Purchase Unit

Fuel	Purchase Unit	Lasts For	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

**Kerosene is subject to price hikes and shortages...**



**... while LPG has significant barriers to adoption**

- High initial investment for stove and cylinders
- High financial outlay for LPG refills
- Safety concerns around LPG
- Lack of awareness around health and economic benefits

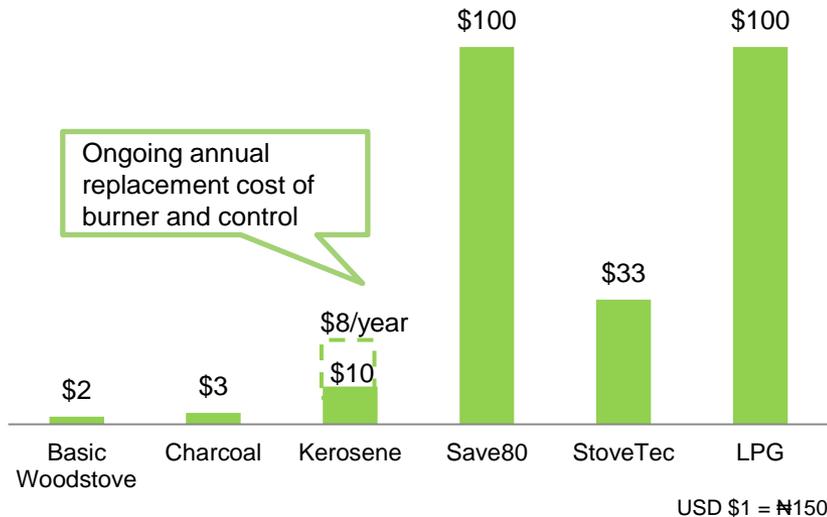
Note: Kerosene price fluctuates between ₦50 per liter to ₦150 per liter, ICS is assumed to have 50% efficiency

# Available Cookstove Choices

**Modern or efficient fuel stoves are priced significantly higher than available traditional solutions or kerosene stoves, resulting in low penetration**

**Clean stoves are priced 3x times higher than traditional stoves...**

Upfront Cost of One Burner Cookstove (in USD)



**...and may not meet the needs of all segments...**

- Cooking in large pots with stirring
- Smoking fish or corn
- Large volume cooking for events and agribusinesses

**... resulting in low penetration**



**Save80**

~10,000 stoves (estimated)  
In North West states



**Stovetec**

~2,000 stoves  
In South East, South South and South West states



**Self-made Ekwuk Stove**

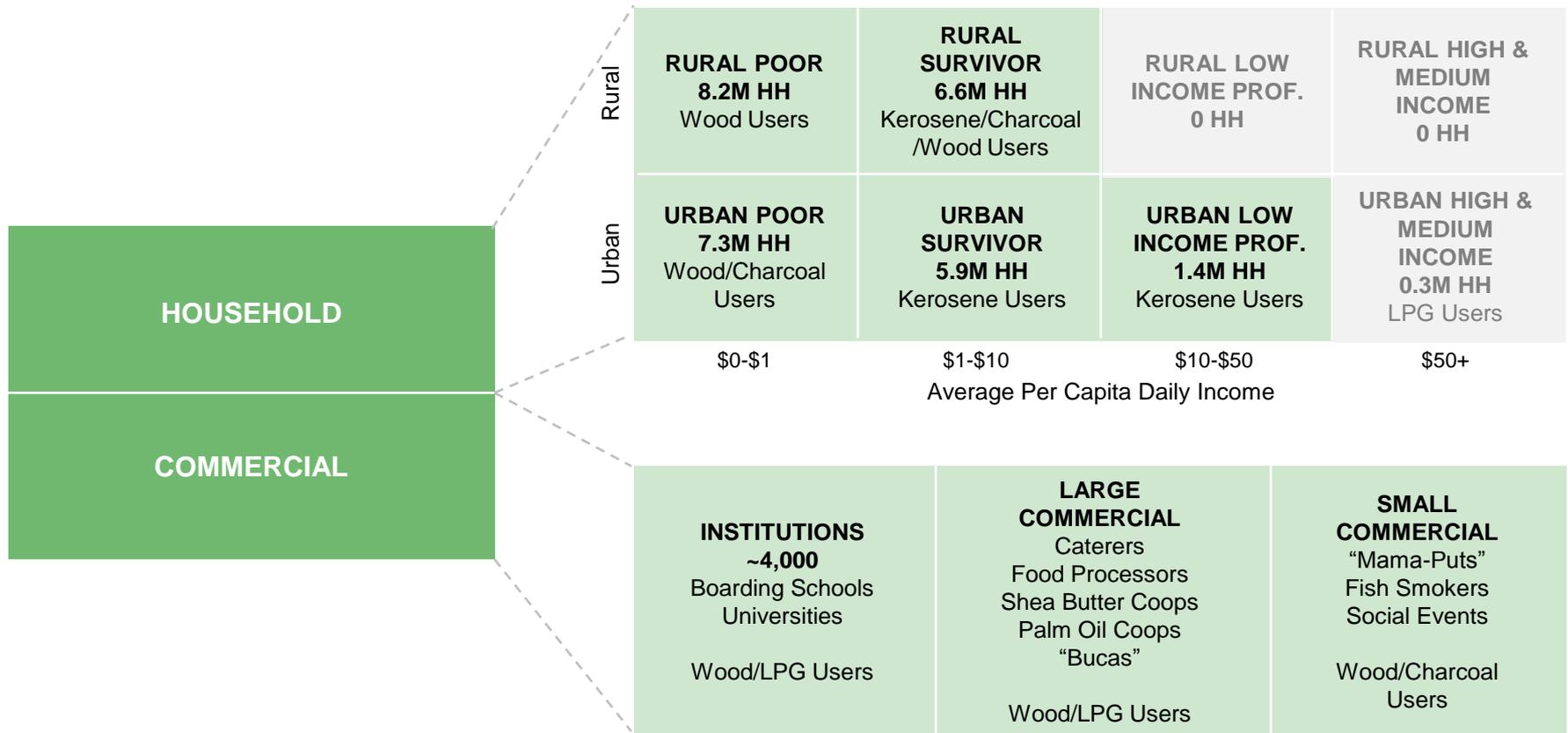
~5,000 stoves  
In Cross River State

**<0.1%**  
of fuelwood dependent households are using improved cookstoves

Note: LPG stove price includes cost for cylinder, stove and accessories

# Customer Segmentation

Stove and fuel usage varies across households, based on situation and income levels; large volume cooking varies based on the size of the operation



Source: National Bureau of Statistics, Accenture analysis

# 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



## Envirofit

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



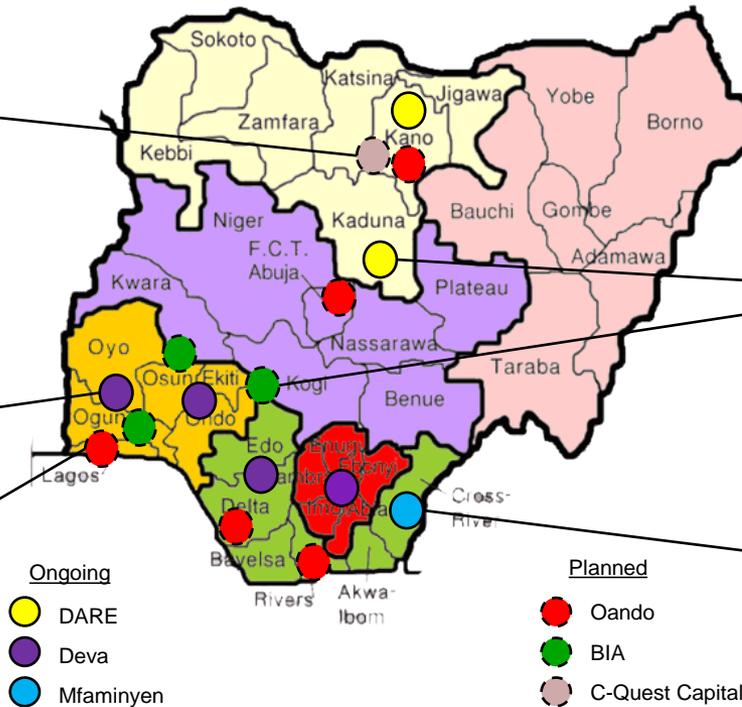
## DEVA

- 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 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

# Carbon Financing for Cookstoves

The Save80 cookstove program is already receiving carbon financing, and two imminent Program of Activities will be able to bring more cookstoves under carbon financing

*Conditions for carbon financing of cookstoves are very favorable...*

## Existing Designation National Authority

- Federal Ministry of Environment, Special Climate Change Unit

## Existing CDM-Accredited Cookstove Program

- Save80 cookstove program in partnership with Atmosfair and DARE

## Existing CDM-Accredited Cookstove

- Save80 cookstove

## Cookstove CDM Program of Activities in Progress

- Atmosfair CDM PoA
- C-Quest Capital CDM PoA

*...resulting in carbon financed program activity*

## C-Quest Capital CDM Program

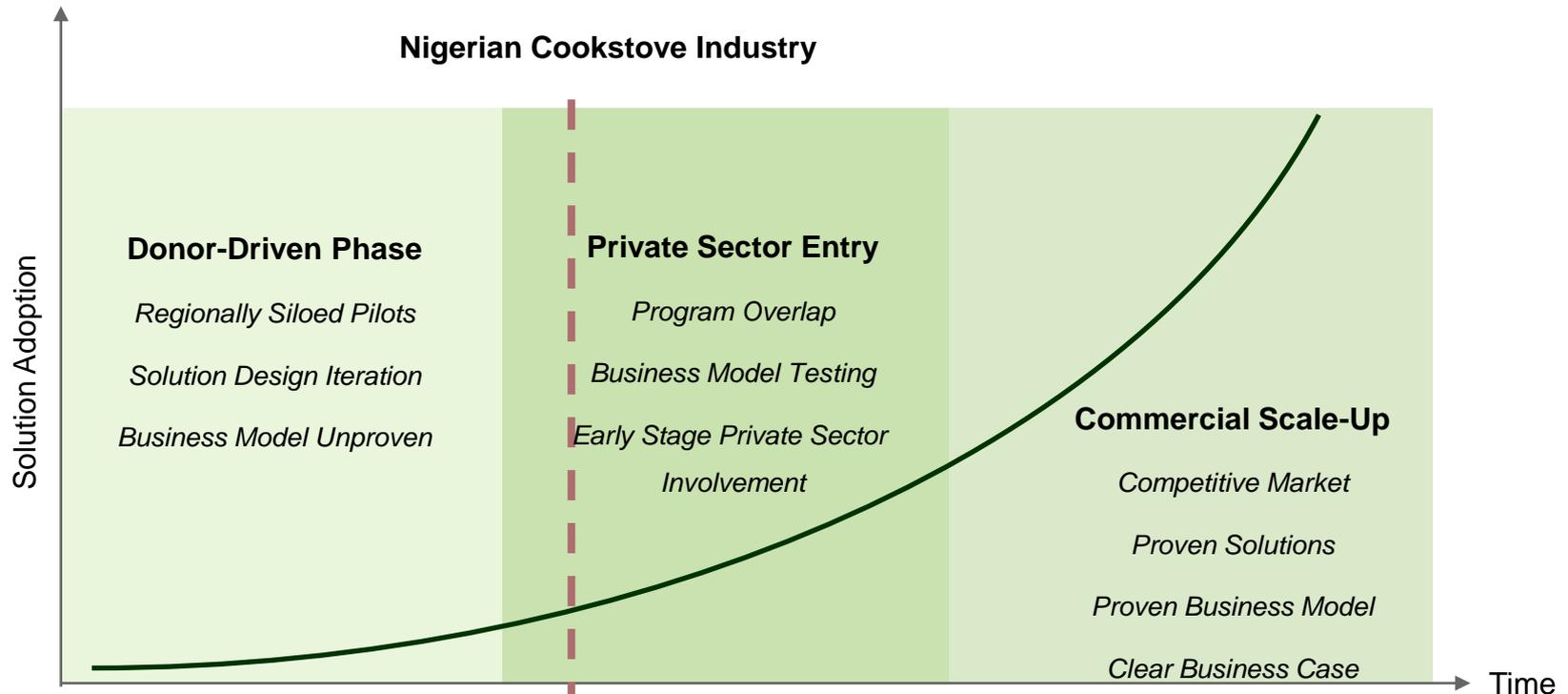
- C-Quest is program owner for CDM PoA
- C-Quest owns distribution and monitoring, framework ready
- Exclusive agreement with Envirofit to supply stoves
- Pilot in Kano starting early Q3 2011

## Atmosfair CDM Program

- Atmosfair is program owner for upcoming CDM PoA – currently operating as small-scale CDM project
- Distribution and monitoring agreements with DARE and BIA
- Currently selling Save80 stoves, exploring other stoves to include under the PoA

# On the Edge of Commercialization

While many cookstove programs are still being run by NGOs, several proven business models are available and private sector actors are now scaling up solutions and operations



Cookstove Programs in Nigeria:

**4**  
**Current NGO Programs**

**1**  
**Current Private Sector Program**

**3**  
**Planned Private Sector Programs**

# Challenges

While there is an opportunity to develop a commercial cookstove market, there are some challenges

## *Limited local production capacity...*

- Poor energy infrastructure allows low-tech production
- Current manufacturing facilities generate their own electricity at considerable cost
- Scale and strong business case required to make local manufacturing viable

**4%**

of GDP from  
Manufacturing

## *...requires technology to be imported at a high cost*

- High import duties
- High logistics cost
- Long and complex clearance processes at ports

Up to

**35%**

import duty on Save80

## *LPG is priced at international rates*

- LPG is produced domestically, but mainly exported
- Locally produced LPG is subjected to VAT
- LPG equipment is imported at a high tariff

**>20%**

import duty on LPG  
equipment

## *... resulting in high prices and low consumption*

- Save80 priced at USD 200 without carbon financing
- LPG cylinder and accessories priced at USD 70

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

# Nigerian Alliance for Clean Cookstoves

The Nigerian Alliance for Clean Cookstoves seeks to coordinate efforts in the cookstove sector

## 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 development of clean cookstove and fuel markets
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 about clean cookstoves; encourage knowledge sharing with international cookstove programs

# Scaling to Surrounding Countries

Any intervention in Nigeria has the potential to serve surrounding countries, all of which have high solid fuel usage

*Impact additional 150 million people, 30 million households*

## Burkina Faso

- SFU in >95% pop
- 22K deaths
- 738K DALYs
- 8.5% of national disease burden

## Ivory Coast

- SFU in 74% pop
- 9K deaths
- 290K DALYs
- 3.4% of national disease burden

## Ghana

- SFU in 87% pop
- 6K deaths
- 154K DALYs
- 2.2% of national disease burden

## Togo

- SFU in 87% pop
- 4K deaths
- 135K DALYs
- 6.4% of national disease burden

## Benin

- SFU in 95% pop
- 6K deaths
- 206K DALYs
- 6.8% of national disease burden

## Mali

- SFU in 95% pop
- 17K deaths
- 568K DALYs
- 6.6% of national disease burden

## Niger

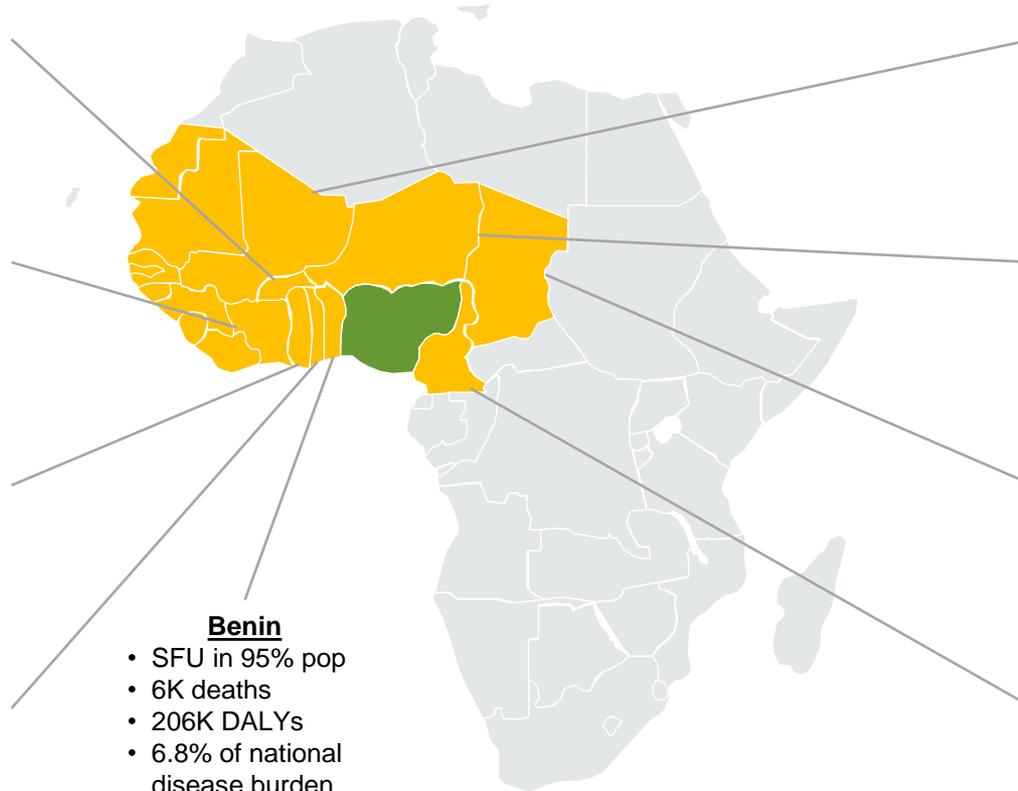
- SFU in >95% pop
- 14K deaths
- 463K DALYs
- 5.2% of national disease burden

## Chad

- SFU in >95% pop
- 9K deaths
- 286K DALYs
- 5.6% of national disease burden

## Cameroon

- SFU in 83% pop
- 13K deaths
- 417K DALYs
- 5.5% of national disease burden



**Executive Summary**

**Situation**

**Recommended Interventions**

**Engagement Approach**

**Operational Plan**

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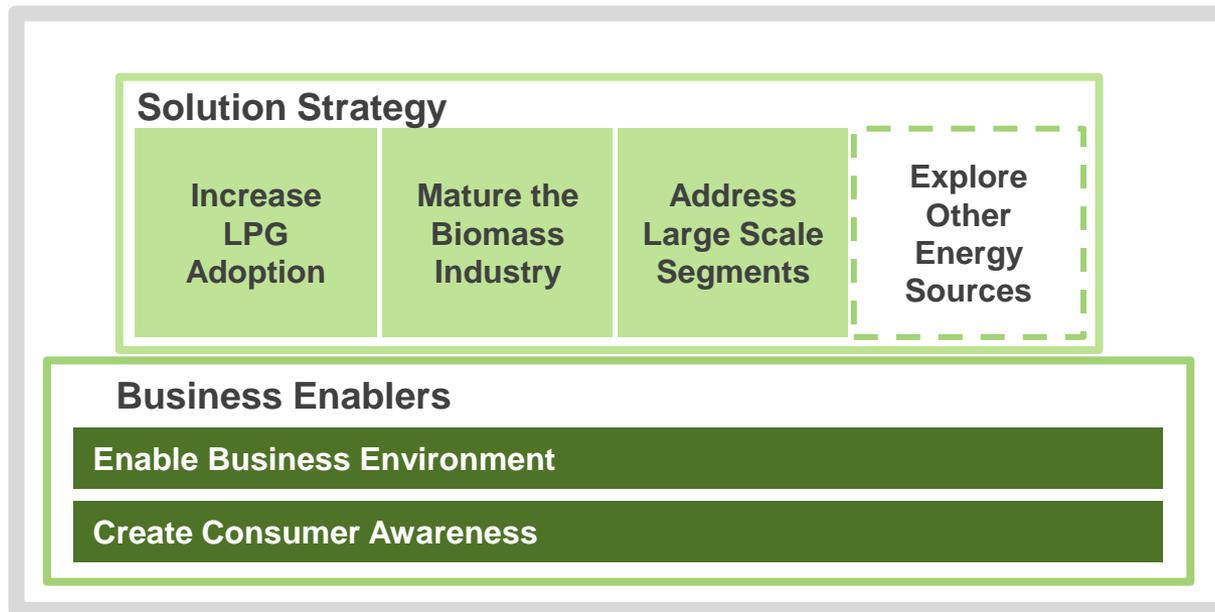
**Delta Region Strategy**

**Appendix**

# Illustrative Interventions

Recommended Interventions

Cookstove solutions, that address current market gaps and a more conducive business environment, are required to achieve a viable and sustainable clean cookstove industry



Legend

Potential future solutions

**Executive Summary**

**Situation**

**Recommended Interventions**

**Increase LPG Adoption**

**Mature the Biomass Cookstove Industry**

**Address Large Volume Segments**

**Explore Other Energy Sources**

**Enable Business Environment**

**Create Consumer Awareness**

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**Appendix**

# Increasing LPG Adoption



Recommended Interventions

A comprehensive LPG strategy addressing equipment and fuel costs, LPG distribution and consumer perception, is required to increase LPG adoption in Nigeria

## Current Situation

- High initial financial outlay for equipment (e.g. LPG cylinders, burner, valve) and recurring fuel refill
- International LPG pricing in Nigeria despite produced locally
- Consumer perceives LPG as a rich man's fuel even though it is more economical for households
- Lack of usage training and high safety concerns

### Illustrative Interventions

#### Introduce Base of Pyramid LPG Solution

- Introduce integrated solution
- Introduce smaller cylinder size
- Improve upfront affordability

#### Ensure Secured Supply Chain

- Ensure LPG availability
- Ensure secured distribution & retail
- Provide strong retail and after sales support

#### Build Consumer Trust

- Ensure safety
- Create strong brand
- Educate consumers

#### Review National Fuel Policy

- Refer to national policy review section

### Addressable Market

	RURAL POOR 8.2M HH Wood Users	RURAL SURVIVOR 6.6M HH Kerosene/Charcoal /Wood Users	RURAL LOW INCOME PROF. 0 HH	RURAL HIGH & MEDIUM INCOME 0 HH
Urban	URBAN POOR 7.3M HH Wood/Charcoal Users	<b>URBAN SURVIVOR 5.9M HH Kerosene Users</b>	<b>URBAN LOW INCOME PROF. 1.4M HH Kerosene Users</b>	URBAN HIGH & MEDIUM INCOME 0.2M HH LPG Users
	\$0-\$1	\$1-\$10	\$10-\$50	\$50+
	Average Per Capita Daily Income			



Potential Market Size:  
**7.3 million Households**

# Introducing a Base of Pyramid LPG Solution



Recommended Interventions

LPG adoption can be increased by introducing base of the pyramid solutions and exploring options to reduce the required upfront financial outlay

Introduce Base of Pyramid LPG Solution		
	Description	Potential Actors
<b>Introduce Integrated Solution</b>	<ul style="list-style-type: none"> <li>Reduce the number of components required to install LPG by introducing an integrated burner and cylinder solution                             <ul style="list-style-type: none"> <li>Oando is currently planning to roll out an integrated solution in Q3 2011</li> </ul> </li> </ul>	 <b>Oando</b>
<b>Introduce Smaller Cylinder Size</b>	<ul style="list-style-type: none"> <li>Introduce a smaller cylinder size that can be refilled in smaller increments                             <ul style="list-style-type: none"> <li>E.g. Oando's integrated 3kg LPG cylinder solution</li> </ul> </li> </ul>	 <b>Oando</b>
<b>Improve Upfront Affordability</b>	<ul style="list-style-type: none"> <li>Set up microcredit or installment payment options to enable low income consumers to spread out the upfront payment</li> <li>Support the creation of a new LPG PoA to reduce LPG stove costs via carbon financing</li> <li>Evaluate the potential to subsidize LPG solution kits for low income families based on predefined criteria</li> </ul>	  

# Securing the Supply Chain



Recommended Interventions

Any LPG intervention needs to ensure that there are minimal supply fluctuations and quality control issues in order to avoid the malfunctions currently experienced in the kerosene market

Ensure Secured Supply Chain		
	Description	Potential Actors
<b>Ensure LPG Availability</b>	<ul style="list-style-type: none"> <li>Avoid shortages by ensuring a secure supply of both imported and locally produced LPG to meet domestic demand</li> </ul>	 
<b>Ensure Secured Distribution</b>	<ul style="list-style-type: none"> <li>Establish a tight distribution network to:                             <ul style="list-style-type: none"> <li>Avoid unofficial levies</li> <li>Maintain steady product availability</li> <li>Ensure quality control</li> </ul> </li> </ul>	
<b>Provide Strong Retail &amp; After Sales Support</b>	<ul style="list-style-type: none"> <li>Establish branded retail outlets and an authorized dealers network for purchases and fuel refill drop-offs</li> <li>Establish centralized refilling plants to avoid product adulteration</li> <li>Perform quality control checks on LPG cylinders before re-circulating them into the market</li> </ul>	

# Increasing Consumer Awareness



Recommended Interventions

Along with ensuring stable supply and distribution it is critical to change customer perception through enhanced branding, training, and education

Build Consumer Trust		
	Description	Potential Actors
<b>Ensure Safety</b>	<ul style="list-style-type: none"> <li>• Provide quality equipment that is durable and safe to use</li> <li>• Perform quality control and remove malfunctioning equipment from circulation</li> </ul>	
<b>Create Strong Brand</b>	<ul style="list-style-type: none"> <li>• Ensure brand becomes synonymous with trust and safety</li> <li>• Partner with local or international accreditation agencies to develop standard guidelines for quality assurance purposes</li> </ul>	
<b>Educate Consumers</b>	<ul style="list-style-type: none"> <li>• Educate customers about economic cost-effectiveness of LPG to change perception of “rich man’s fuel”</li> <li>• Create awareness around the health benefits of replacing biomass and kerosene with LPG</li> <li>• Hold training sessions that educate consumers on the safe usage of LPG solutions</li> </ul>	 <b>Nigerian Alliance for Clean Cookstoves</b>

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**Mature the Biomass Cookstove Industry**

**Address Large Volume Segments**

**Explore Other Energy Sources**

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# Maturing the Biomass Cookstove Industry



Recommended Interventions

While a good start has been made in introducing biomass cookstove solutions in the Nigerian market, future efforts should focus on supporting identifying market barriers and reducing costs

## Current Situation

- Existing efficient biomass stoves are too expensive
- Lack of competition in the efficient cookstove market; Current cookstove programs are geographically siloed
- DIY and locally-made efficient biomass solutions are difficult to scale up due to limited capacity
- Lack of conducive manufacturing environment to support the development of a local efficient cookstove industry

## Recommended Interventions

### Encourage Competition

- Reduce entry barriers
- Provide support to expand existing programs
- Support carbon financing accreditation

### Improve Solution Affordability

- Identify BOP solution
- Leverage microfinance

## Addressable Market

		\$0-\$1		\$1-\$10		\$10-\$50		\$50+	
Rural		<b>RURAL POOR</b> 8.2M HH Wood Users		<b>RURAL SURVIVOR</b> 6.6M HH Kerosene/Charcoal/Wood Users		RURAL LOW INCOME PROF. 0 HH		RURAL HIGH & MEDIUM INCOME 0 HH	
Urban		<b>URBAN POOR</b> 7.3M HH Wood/Charcoal Users		URBAN SURVIVOR 5.9M HH Kerosene Users		URBAN LOW INCOME PROF. 1.4M HH Kerosene Users		URBAN HIGH & MEDIUM INCOME 0.2M HH LPG Users	



Potential Market Size:  
**22 million Households**

# Getting to the Right Solution



Recommended Interventions

The reduction of new entry barriers and provision of support for the expansion of existing programs will create competition in the market, thereby increasing choice and affordability of clean cookstoves

Encourage Competition		
	Description	Potential Actors
<b>Reduce Barriers to entry</b>	<ul style="list-style-type: none"> <li>Provide resources to potential project developers in areas such as technical assistance, business planning and access to funding</li> <li>Provide support for navigating the import process, potentially acting as a communication intermediary between prospective importers and foreign producers</li> </ul>	
<b>Provide Support to Expand Existing Programs</b>	<ul style="list-style-type: none"> <li>Provide support to scale up existing programs, e.g. Provide support to reduce distribution cost by engaging local NGOs and private sector partners to expand existing programs to other geographical locations</li> </ul>	<p>Nigerian Alliance for Clean Cookstoves</p>
<b>Support Carbon Financing Accreditation</b>	<ul style="list-style-type: none"> <li>Provide resources for project developers looking to receive carbon financing and accreditation</li> <li>If required, create GACC PoA open to use by any potential project developers seeking accreditation</li> </ul>	

# Addressing Solution Gaps



Recommended Interventions

**Affordability of improved biomass cookstoves can be addressed by working with current producers to identify a BOP improved biomass solution**

Improve Solution Affordability		
	Description	Potential Actors
<b>Identify BOP Solution</b>	<ul style="list-style-type: none"> <li>Work with cookstove manufacturers to design a very low cost solution for the Nigerian market</li> <li>Investigate sourcing and production models such as using recycled materials to lower the cost of potential solutions</li> </ul>	
<b>Leverage Microfinance</b>	<ul style="list-style-type: none"> <li>Work with microfinance organizations in Nigeria to prove the stove microfinancing model and establish it as a common practice, with standardized terms for various solutions</li> </ul>	<p><b>Central Bank of Nigeria</b> <b>COWAN Microfinance Bank Limited</b></p>

# Agenda

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**Delta Region Strategy**

**Appendix**

# Addressing Large Volume Segments

Solution Strategy	
Address Large Volume Segments	Address Large Volume Segments

Recommended Interventions

There is a need to introduce an efficient large volume cooking solutions to address the cooking needs of commercial and household social events

## Current Situation

- Large commercial segments, e.g. Buca owners, food processors, mainly use fuelwood
- Current global efficient cookstove product portfolio is mainly focused on household solutions
- Efficient stove solutions are introduced in Nigeria mainly for household consumption despite a large commercial segment market

## Recommended Interventions

### Increase Solution Choice

- Improve existing DIY solutions
- Increase solution choice of imported large volume efficient cookstoves
- Improve affordability of existing industrial LPG solutions

## Addressable Market

	\$0-\$1	\$1-\$10	\$10-\$50	\$50+
Rural	RURAL POOR 8.2M HH Wood Users	RURAL SURVIVOR 6.6M HH Kerosene/Charcoal /Wood Users	RURAL LOW INCOME PROF. 0 HH	RURAL HIGH & MEDIUM INCOME 0 HH
Urban	URBAN POOR 7.3M HH Wood/Charcoal Users	URBAN SURVIVOR 5.9M HH Kerosene Users	URBAN LOW INCOME PROF. 1.4M HH Kerosene Users	URBAN HIGH & MEDIUM INCOME 0.2M HH LPG Users

Average Per Capita Daily Income

<b>INSTITUTIONS</b> ~4,000 Boarding Schools Universities	<b>LARGE COMMERCIAL</b> Caterers Food Processors Shea Butter Coops Palm Oil Coops "Bucas"	<b>SMALL COMMERCIAL</b> "Mama-Puts" Fish Smokers Social Events
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Potential Market Size:  
**Pending Further Study**

# Developing Large Volume Solutions



Recommended Interventions

Large volume cooking needs can be met by partnering with global and local efficient cookstove manufacturers to introduce a variety of commercial large scale solutions

Increase Solution Choice		
	Description	Potential Actors
<b>Improve Existing DIY solutions</b>	<ul style="list-style-type: none"> <li>Examine past pilot program results and refine solution designs based on pilot results</li> <li>Identify potential institutions and large scale food vendors suitable for permanent built in designs</li> <li>Develop an implementation plan to scale up the program</li> <li>Provide stove building skills training</li> </ul>	
<b>Increase Solution Choice of Imported Large Volume Efficient Cookstoves</b>	<ul style="list-style-type: none"> <li>Partner with global efficient stove manufacturers to introduce existing large volume efficient cookstove solutions into Nigeria</li> <li>Work with suppliers to create and market a large scale solution designed for a Nigerian context and requirements</li> </ul>	
<b>Improve Affordability of Existing Industrial LPG Solutions</b>	<ul style="list-style-type: none"> <li>Work with the Government to ensure LPG affordability by reviewing national policy</li> </ul>	

**Executive Summary**

**Situation**

**Recommended Interventions**

**Increase LPG Adoption**

**Mature the Biomass Cookstove Industry**

**Address Large Volume Segments**

**Explore Other Energy Sources**

**Enable Business Environment**

**Create Consumer Awareness**

**Engagement Approach**

**Operational Plan**

**Case for Action**

**Delta Region Strategy**

**Appendix**

# Exploring Renewable Energy

Solution Strategy		Enabling Other Energy Sectors	
Energy	Health and Productivity	Transport	Industry
Water	Sanitation	Information and Communication Technology	Other

Recommended Interventions

**Current renewable energy programs for cooking fuel are limited to the pilot phase; Biogas programs could be a potential community specific solution**

## Current Situation

- Previous projects showed that solar cookstoves are not viable due to low consumer acceptability
- There is an increased interest in developing the renewable energy and biofuel sector in Nigeria; the Government has launched several renewable energy programs
- Current biogas programs are run by the Government, but are limited to the pilot phase
- Biogas solutions may not be suitable to be implemented across the country, therefore they will remain as a community specific solution

## Recommended Interventions

### Support Existing Biogas Programs

- Provide technical expertise support
- Provide implementation support

### Promote Renewable Energy Community

- Establish a renewable energy community

# Developing Renewable Energy Programs



Recommended Interventions

Technical and implementation support is required to scale up existing biogas programs; the Renewable Energy Village could facilitate adoption of biofuels as an alternative fuel source

Support Existing Biogas Programs		
	Description	Potential Actors
<b>Provide Technical Expertise Support</b>	<ul style="list-style-type: none"> <li>Provide technical support to improve efficiency of biogas digesters</li> </ul>	
<b>Provide Implementation Support</b>	<ul style="list-style-type: none"> <li>Provide assistance in developing business plans and obtaining funding</li> <li>Establish program management related training</li> </ul>	 
Promote Renewable Energy Community		
	Description	Potential Actors
<b>Establish a Renewable Energy Village</b>	<ul style="list-style-type: none"> <li>Evaluate the applicability of the Cleanstar Mozambique Community model</li> <li>Explore the potential to establish a renewable energy village in Nigeria                             <ul style="list-style-type: none"> <li>Community of small farming families; involved in agricultural activities to produce food and biofuel</li> <li>Centralized bioprocessing facilities for agricultural products; by-products can be used as a cooking fuel source</li> <li>Evaluate the potential of using palm oil as an alternative fuel source; explore feasibility of introducing plant oil cooker for household use</li> </ul> </li> </ul>	  <p>B/S/H/</p>

**Executive Summary**

**Situation**

**Recommended Interventions**

**Increase LPG Adoption**

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**Enable Business Environment**

**Create Consumer Awareness**

**Engagement Approach**

**Operational Plan**

**Case for Action**

**Delta Region Strategy**

**Appendix**

# Enabling Business Environment



Recommended Interventions

In order to create a more attractive environment for a clean cookstove industry, there is a need for policies that promote the adoption of cleaner cooking solutions and encourage local production

## Current Situation

- High import duties and a long custom clearance process result in high prices for imported solutions
- Value Added Tax imposed on domestically produced LPG; subsidized kerosene meant for household consumption is sometimes diverted for aviation purpose causing market distortions
- High cost of operation due to power supply shortages
- Local efficient cookstove manufacturers unable to scale up due to limited capacity

## Recommended Interventions

### Promote Clean Solution through Policy

- Reduce import duties
- Reduce LPG Value Added Tax
- Transfer kerosene subsidy to LPG
- Provide tax incentives to encourage investment

### Provide Business Operating Environment

- Establish incubator manufacturing zone

### Provide Capacity Building Support

- Provide technical expertise support
- Train and support local entrepreneurs

## Addressable Market

	<b>RURAL POOR</b> 8.2M HH Wood Users	<b>RURAL SURVIVOR</b> 6.6M HH Kerosene/Charcoal /Wood Users	<b>RURAL LOW INCOME PROF.</b> 0 HH	<b>RURAL HIGH &amp; MEDIUM INCOME</b> 0 HH
<b>Rural</b>				
	<b>URBAN POOR</b> 7.3M HH Wood/Charcoal Users	<b>URBAN SURVIVOR</b> 5.9M HH Kerosene Users	<b>URBAN LOW INCOME PROF.</b> 1.4M HH Kerosene Users	<b>URBAN HIGH &amp; MEDIUM INCOME</b> 0.2M HH LPG Users
<b>Urban</b>				
	\$0-\$1	\$1-\$10	\$10-\$50	\$50+
	Average Per Capita Daily Income			

<b>INSTITUTIONS</b> ~4,000 Boarding Schools Universities	<b>LARGE COMMERCIAL</b> Caterers Food Processors Shea Butter Coops Palm Oil Coops "Bucas"	<b>SMALL COMMERCIAL</b> "Mama-Puts" Fish Smokers Social Events
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Enable affordable solutions for:  
**All Households**

# Policies to Promote Clean Cookstoves



Recommended Interventions

A switch to efficient cookstoves and modern fuels can be encouraged by reducing import duties for efficient cookstove equipment and reviewing current fuel policies

Promote Clean Solutions Through Policy		
	Description	Potential Actors
<b>Reduce import duties</b>	<ul style="list-style-type: none"> <li>Work with the Government to                             <ul style="list-style-type: none"> <li>Create a new product category and exempt import duties for efficient cookstoves or related component parts (e.g. LPG cylinders, efficient biomass stoves, LPG burners, raw materials)</li> <li>Reduce the import tariff on imported LPG to boost household LPG consumption</li> <li>Simplify the process for shipment clearance at ports for efficient cookstove product category</li> </ul> </li> </ul>	 <p><b>Nigerian Alliance for Clean Cookstoves</b></p>
<b>Remove LPG Value Added Tax</b>	<ul style="list-style-type: none"> <li>Investigate the impact of pricing domestically produced LPG at a lower rate than international market rates                             <ul style="list-style-type: none"> <li>Ensure that there is no risk of cross-border smuggling</li> </ul> </li> <li>Lobby the Government to waive Value Added Tax on LPG</li> </ul>	 <p><b>Nigerian Alliance for Clean Cookstoves</b></p>
<b>Transfer Kerosene Subsidy to LPG</b>	<ul style="list-style-type: none"> <li>Investigate potential to divert kerosene subsidy to LPG to boost domestic consumption</li> </ul>	 <p><b>Nigerian Alliance for Clean Cookstoves</b></p>
<b>Provide Tax Incentives to Encourage Investment</b>	<ul style="list-style-type: none"> <li>Encourage investment in key infrastructure, e.g. LPG refineries, bottling plant, efficient stove manufacturing facilities, through provision of tax incentive packages</li> </ul>	

# Nurturing Local Manufacturing Capabilities



Recommended Interventions

A local clean cookstove industry can be nurtured by establishing an incubated manufacturing zone with a stable power supply and by providing capacity building support

## Provide Business Operating Environment

	Description	Potential Actors
<b>Establish Manufacturing Cluster</b>	<ul style="list-style-type: none"> <li>Evaluate the potential to establish a special clean cookstove manufacturing zone</li> <li>Ensure a stable power supply within the manufacturing zone</li> </ul>	 <p><b>Nigerian Alliance for Clean Cookstoves</b></p>

## Provide Capacity Building Support

	Description	Potential Actors
<b>Provide technical expertise support</b>	<ul style="list-style-type: none"> <li>Provide technical expertise support to improve the efficiency of locally manufactured stoves</li> </ul>	
<b>Train local entrepreneurs and youth</b>	<ul style="list-style-type: none"> <li>Establish programs to train local entrepreneurs and youth across key value chain activities, e.g. business management, manufacturing, distribution and marketing</li> </ul>	 <p><b>Nigerian Alliance for Clean Cookstoves</b></p>

**Executive Summary**

**Situation**

**Recommended Interventions**

**Increase LPG Adoption**

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**Address Large Volume Segments**

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**Engagement Approach**

**Operational Plan**

**Case for Action**

**Delta Region Strategy**

**Appendix**

# Creating Consumer Awareness



Recommended Interventions

Mass consumer awareness of clean cookstoves, and a correct perception of LPG safety and economics should be established to create market demand

## Current Situation

- Households know that smoke is bad, however they may not fully understand the full extent of IAP health hazards
- Low product awareness of improved cookstoves
- Low income families may not consider switching to LPG, even though it can be more economical, because LPG is often perceived as “rich man’s fuel”
- Widespread LPG safety concerns impede-LPG adoption

## Recommended Interventions



# Providing Right Education and Training



Recommended Interventions

A switch to efficient cookstoves and modern fuel can be encouraged by increasing product awareness and changing consumer perceptions on modern fuel

Promote Clean Solutions Through Policy		
	Description	Potential Actors
<b>Demonstrate Economics Benefits</b>	<ul style="list-style-type: none"> <li>Provide a clear demonstration of monetary savings through the reduction of fuelwood/ charcoal required</li> <li>Reduce the perception that LPG is significantly more expensive than other fuel sources</li> <li>Increase the appreciation of time value; reduction of time spent in collecting firewood or cooking, enabling women to:               <ul style="list-style-type: none"> <li>Invest time in other income generating activities or get involved in skill training activities</li> <li>Spend more time with their family</li> </ul> </li> </ul>	<p>Nigerian Alliance for Clean Cookstoves</p>
<b>Educate on Environmental Impact</b>	<ul style="list-style-type: none"> <li>Emphasize the impact of deforestation on climate change</li> <li>Example: Rapid deforestation and desertification in the North have caused significant loss of green pasture and inland migration of local communities</li> </ul>	<p>Nigerian Alliance for Clean Cookstoves</p>
<b>Educate on Health Impacts</b>	<ul style="list-style-type: none"> <li>Educate households on IAP and potential health impacts</li> <li>Emphasize efficient fuel stove as a means of improving quality of life</li> </ul>	<p>Nigerian Alliance for Clean Cookstoves</p>
<b>Provide Education and Training on LPG Safety</b>	<ul style="list-style-type: none"> <li>Educate households on operating procedures and safety precaution measures for modern clean fuel</li> </ul>	<p>Nigerian Alliance for Clean Cookstoves</p>

**Executive Summary**

**Situation**

**Recommended Interventions**

**Engagement Approach**

**Operational Plan**

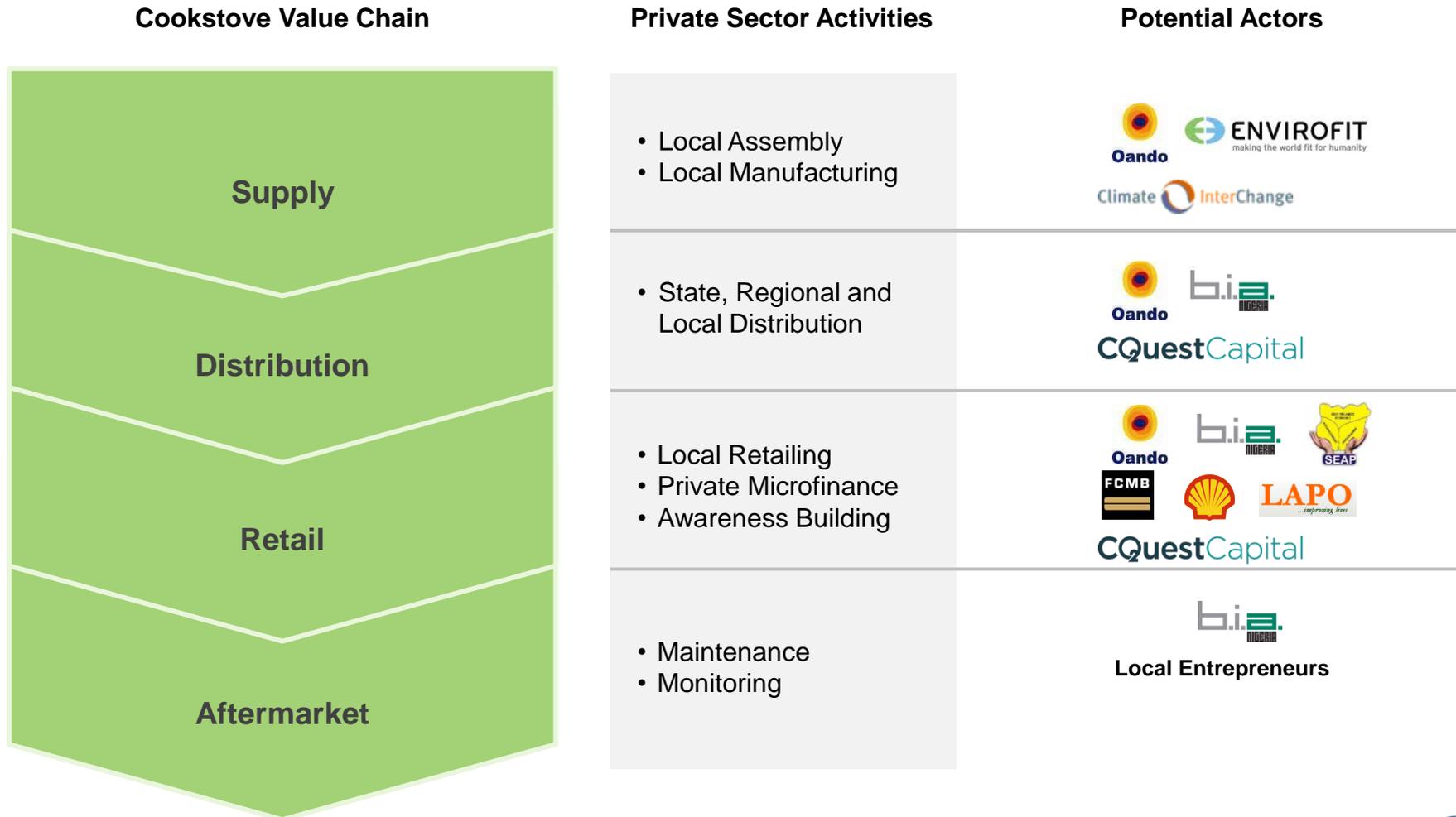
**Case for Action**

**Delta Region Strategy**

**Appendix**

# Private Sector as Spear Head

Activities across the cookstove industry value chain must be spearheaded by the private sector



# Additional Stakeholder Engagement

While the private sector is the driver, additional stakeholders need to be engaged for policy support, awareness raising, and program coordination

Engagement Level	Example Entities	Engagement Activities	Potential Actors
<i>National Level</i>	<i>National Government</i>	<ul style="list-style-type: none"> <li>• Policy Review</li> <li>• Country-wide Awareness Campaigns</li> </ul>	 <p><b>Nigerian Alliance for Clean Cookstoves</b></p>
<i>Regional &amp; State Level</i>	<p><i>State Government</i>  <i>State Institutions</i>  <i>Regional &amp; State NGOs</i></p>	<ul style="list-style-type: none"> <li>• Regional &amp; State Level Awareness</li> <li>• Program Coordination</li> </ul>	 <p><b>Nigerian Alliance for Clean Cookstoves</b></p>
<i>Local and Community Level</i>	<p><i>Local Government</i>  <i>Community Chiefs</i>  <i>Local NGOs</i>  <i>Community Stakeholders</i></p>	<ul style="list-style-type: none"> <li>• Bottom-Up Awareness</li> <li>• Program Pilots</li> <li>• Solution Design</li> </ul>	 <p><b>Schools, Churches, Mosques</b></p>

**Executive Summary**

**Situation**

**Recommended Interventions**

**Engagement Approach**

**Operational Plan**

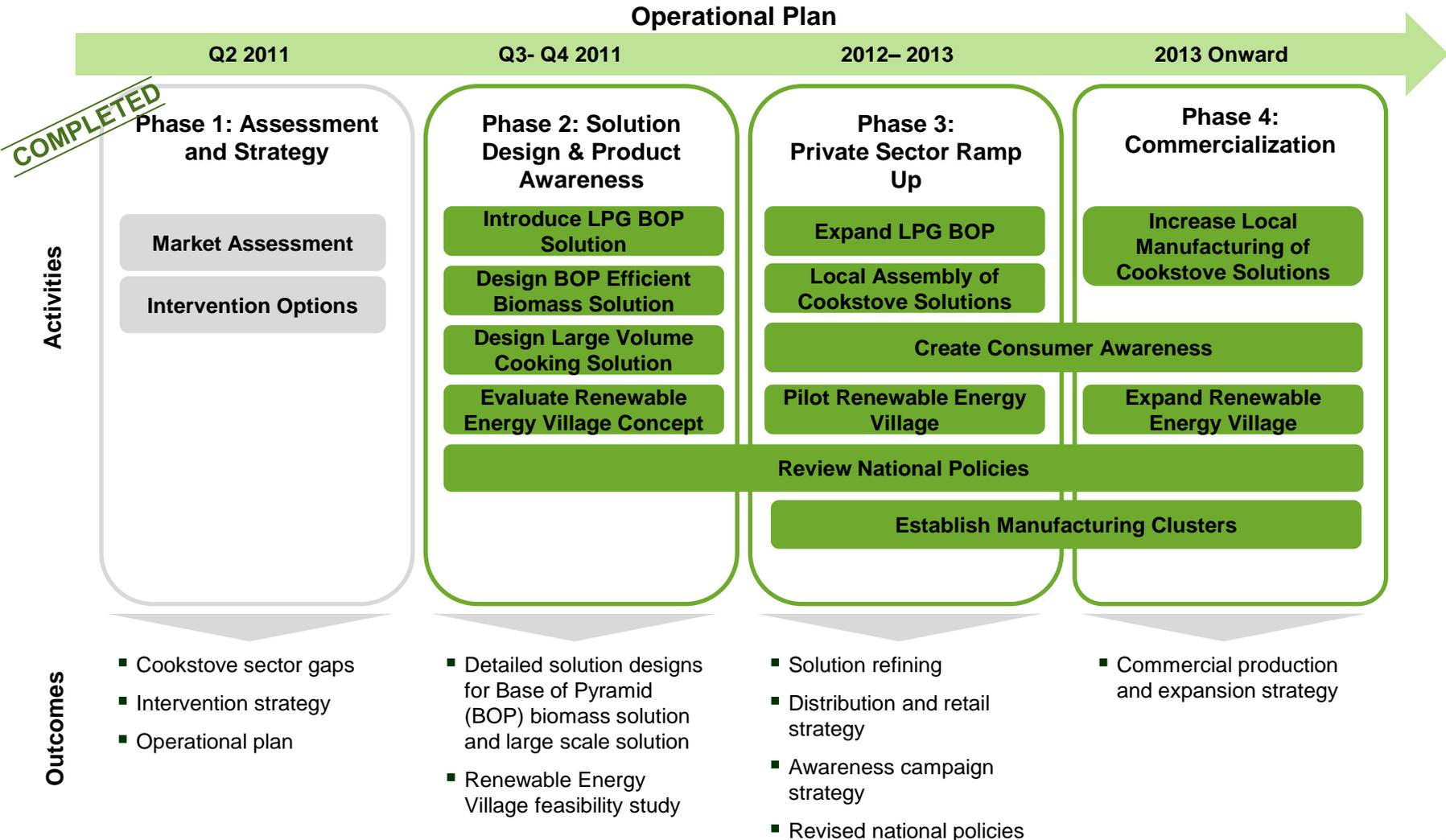
**Case for Action**

**Delta Region Strategy**

**Appendix**

# Operational Plan

The next phases of a cookstove initiative in Nigeria will involve stakeholder mobilization, solution design, and pilot projects leading to scaled programs in order to achieve the long term goal



**Executive Summary**

**Situation**

**Recommended Interventions**

**Engagement Approach**

**Operational Plan**

**Case for Action**

**Delta Region Strategy**

**Appendix**

## Nigeria represents a large cookstove market that is conducive for a commercial market-based approach

- Nigeria represents a large market with over 29 million households in need of a cookstove intervention
  - Potentially address 20% of the Alliance's "100 by 20" goal
  
- Nigeria can serve as a hub for West Africa, Chad and Cameroon
  - Potentially address additional 20% of the goal
  
- There is momentum in the market with the formation of the Nigerian Alliance for Clean Cookstoves; several Global Alliance members are already part of the Nigerian Alliance
  - Potential for a coordinated effort across country
  
- Cookstove programs are taking the next leap and looking for private sector partners to commercialize solutions
  - Potential for testing a commercial approach to addressing the issue of indoor air pollution
  - Potential for Alliance members to lend support with their knowledge and experience

# Illustrative Roles and Actors

A number of stakeholders identified in this study could fill the roles required of a coordinated cookstove program in Nigeria. Stakeholders should be aligned based on their primary capabilities

## - Program Roles and Potential Actors -

Coordinate Programme	<i>Nigerian Alliance for Clean Cookstoves</i>			
Provide Funding				
Provide Technical Expertise				
Build Manufacturing Capacity				
Conduct Awareness Activities				
Lobby for Policy Change				
Implement Programs				

# Agenda

**Executive Summary**

**Situation**

**Recommended Interventions**

**Engagement Approach**

**Operational Plan**

**Case for Action**

**Delta Region Strategy**

**Appendix**

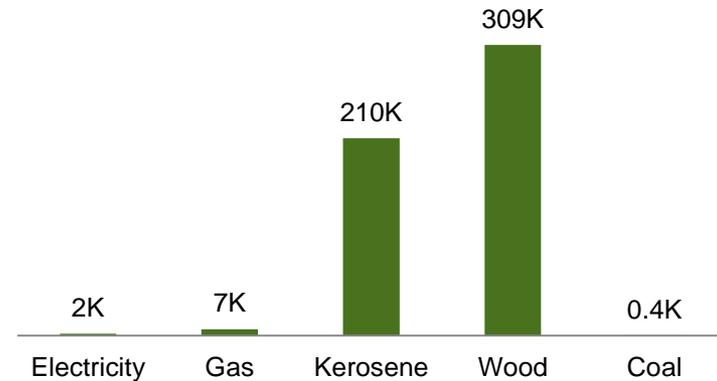
# Impact Potential

The Rivers, Delta and Bayelsa States comprise 0.5 million households, the majority of which rely on wood and kerosene for cooking

**The Niger Delta**  
(Rivers, Bayelsa and Delta states)



**Market Size (in HH) by Fuel Type – Delta States**



## Context

- Oil producing states that fall under Shell Nigeria's area of influence
- Characterized by wetlands and swamps that create difficult to reach remote areas
- Unrest and armed violence makes the region difficult to work in

## Market Size

- Region has approximately 528K households
- <0.02% modern fuel penetration
- Majority of rural and remote households depend on wood
- LPG usage limited to urban households

# Consumer Profile – Obio Hospital Survey

Delta Region Strategy

The customer survey in the Obio Community Hospital yielded valuable insights into the usage, purchasing habits, and consumer preferences of the urban and peri-urban consumer segments

## Consumer Profile

- Participants were mostly mothers from Port Harcourt urban and peri-urban areas
  - Roughly 80% live in apartments
- Average age 28, all married
- Average household size: 4.5
- Average monthly household income: ₦63,176
- Medium to high level of IAP awareness
- Mostly indoor cooking (82%)

## Current Fuel Expenditure

- Typical average fuel costs (per month)
  - **Kerosene** – ₦2,536
  - **Gas** – ₦3,436
  - **Electric** – ₦1,000
  - **Wood** – ₦1,050
  - **Charcoal** – N/A

## Current Stove Usage and Cost

- Majority of women utilized gas or kerosene for cooking
  - **Kerosene** (50%) – ₦2,246
  - **Gas** (38%) – ₦13,057 (₦3,680 removing outliers)
  - **Electric** (6%) – ₦1,250
  - **Wood** (6%) – ₦1,075
  - **Charcoal** (0%) – N/A

## Cooking Habits and Preferences

- Average willingness to pay: ₦3,933
- Ideal number of burners for a potential solution (average): 2.2
- Important to be able to accommodate stirring and large pot sizes

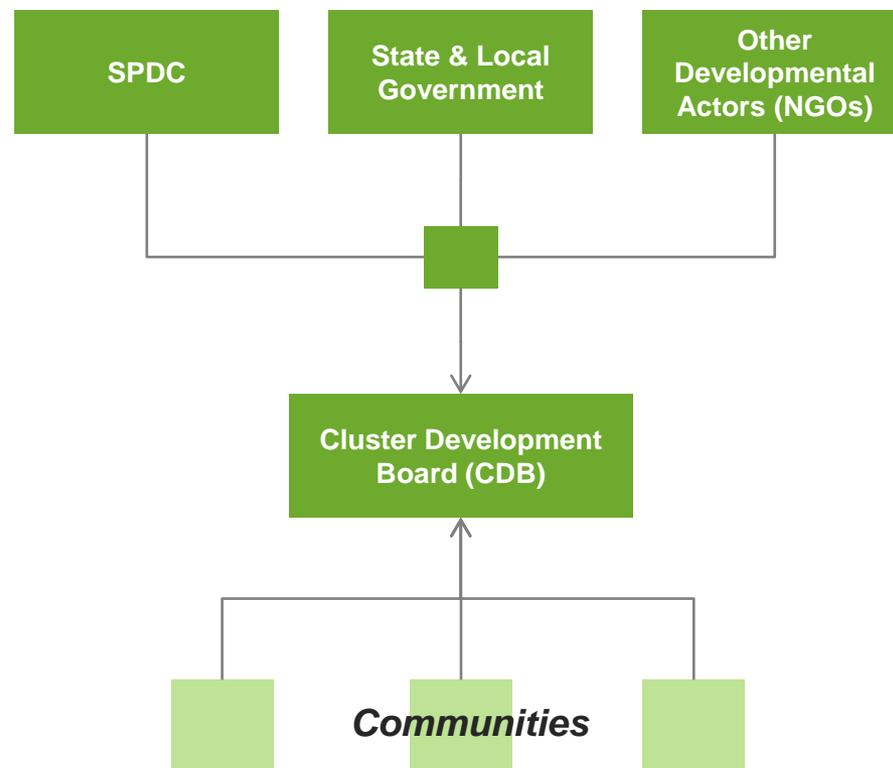
# A Strong Governance Structure – The GMoU

The Global Memorandum of Understanding (GMoU) is a unique structure put in place between the SPDC and communities in the Niger Delta to roll out social projects and development programs

## How It Works

- Agreement between SPDC and a group of several communities (called clusters)
- Clusters are based on local Government or clan/historical affinity lines
- Contains well-defined governing structures including the Cluster Development Board (CDB) and a Steering Committee chaired by the State Government
- The Cluster Development Board (CBD) functions as the main supervisory and administrative organ, ensuring implementation of projects and setting out plans and programs
- Communities then decide the development they want while SPDC provides secure funding for 5 years
- SPDC also provides access to development experts/NGOs to help deliver projects and build the capacity of the CDBs to grow into registered community development foundations.

## GMoU Structure



# Fostering Entrepreneurship: LiveWire Program

Shell Nigeria's LiveWire Youth Program encourages local entrepreneurship in the Delta region by providing participants with valuable training, mentorship, and grant funding for new businesses

## Program Objectives

- International youth enterprise development program started in 2003
- Provides access to resources, advice on starting a business, and a mentoring program for young entrepreneurs in the early stages of their business start-up
- Also assists participants in developing the necessary skills to manage a new business.

## Progress so Far

- Have funded numerous business types:
  - Catering and confectionary (most common)
  - Hotel
  - Laundry
  - Restaurant
- Roughly 3,200 youths trained and 500 businesses established
- One program graduate won the Central Bank of Nigeria's 'Young Entrepreneur of the Year' Award

## Program Model



# State Level Institutional Infrastructure

The Rivers State Ministry of Health provides an example of a strong local infrastructure with ongoing community engagement and relevant health programs, creating an ideal partnership opportunity

*The Delta Region has a strong institutional infrastructure...*

*...and a track record of successful program implementation.*

## Rivers State Ministry of Health & Community Health Centers

- State Ministry of Health generally works under the guidelines of the Federal Ministry of Health
- Federal Ministry sets policies and provides templates – State Ministry of Health implements and adapts federal template for local relevance
- Ministry has a broad network of community health centers
- Estimates that 1 in every 2 communities has a local health center
- Each center is staffed by a doctor, nurse, and lab technician
- Health centers are a local epicenter for community health programs and awareness raising activities

## Mosquito Net Program

- Provide mosquito nets to communities and train on usage
- Conduct house-to-house monitoring to ensure proper usage

## Free Medical Care Program

- Free medical care provided for those under 6, and over 60, years of age
- Plan to expand free coverage to all citizens regardless of age

## Health Education Department

- Health education department is charged with running awareness campaigns, conducting training and creating campaign materials

# Other Considerations and Feedback

A number of common themes emerged from conversations with community and state-level stakeholders, providing valuable insight into potential program approaches and challenges

## Groups Met

- GMoU NGO Group
- Mfaminyen Conservation Society
- Women's Community Leaders Group
- GMoU Community Leaders Group
- River's State Ministry of Health
- Livewire Youth Program

## Selected Quotes

*"Our programs have experienced success but changing minds is a very slow process, it's been 4 years and we are finally seeing results"*

*- Government health official*

*"It will be very difficult to make a compelling value proposition for rural fishermen as they currently do not pay for their firewood"*

*- Community Leader*

## Common Feedback

- Important to segment market based on usage (small residential vs. large social vs. small commercial)
- Any solution must address typical activities in communities (such as fish smoking)
- Safety is a major concern for both kerosene and prospective LPG users
- Best to take a simultaneous top-down approach through state actors and bottom-up approach through community leaders
- Demonstrations are key to conveying a value proposition
- Stress the health aspect as little importance is placed on time saved
- Engage the youth as a channel to spread the message
- If there is a business case, distribution will not be a problem – local entrepreneurs will rush to fill the gap
- Microcredit is challenging in the Delta region but certain models have worked

# Illustrative Strategies for Delta Region

From initial experience in the Delta region, a set of contextualized solutions and approaches is recommended to address the various market segments and needs within the region

## Urban Dwellers

### *Solution*

#### Base-of-Pyramid LPG Solution

- Urban consumers could be targeted with an appropriate LPG solution available in smaller canister sizes

### *Approach*

- Provide usage education and training to reduce negative safety perceptions
- Leverage LiveWire Program to engage local entrepreneurs to distribute and retail solution

## Rural Communities

### *Solution*

#### Base-of-Pyramid Wood Solution

- For remote communities where fuel purchase is less common, an efficient firewood solution is needed

### *Approach*

- Leverage the infrastructure of community health centers, NGOs, and other partners to reach communities
- Leverage LiveWire Program to engage local entrepreneurs to distribute and retail solution
- Build bottom-up awareness through GMoU community leaders

## Large Scale & Small Commercial

### *Solution*

#### Large Scale Biomass Solution

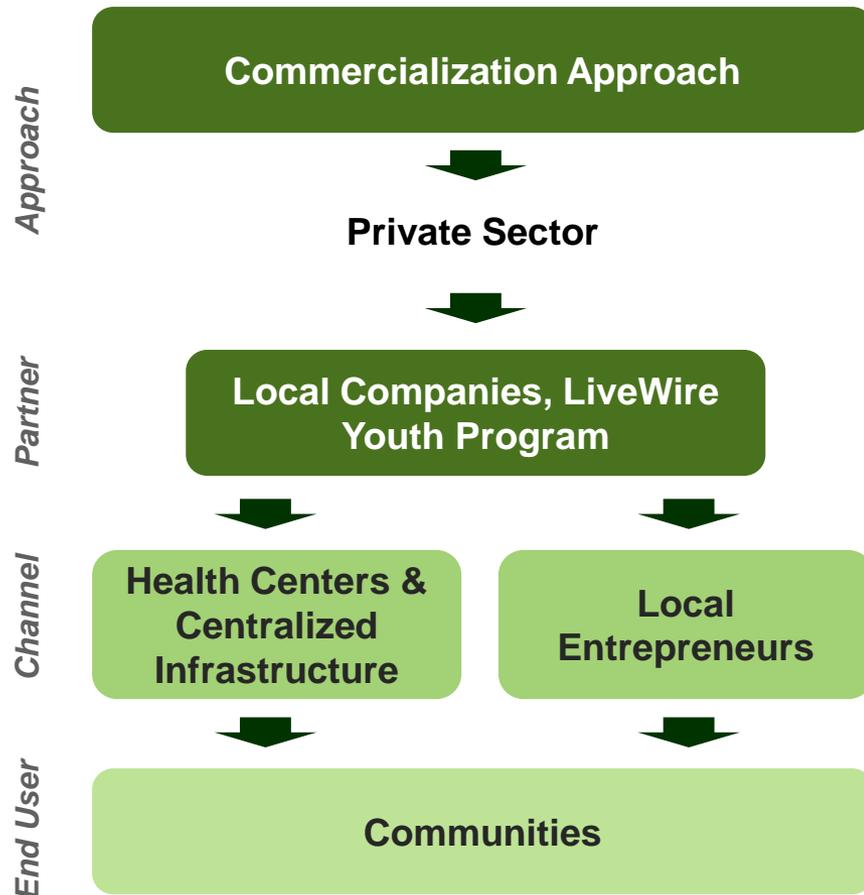
- Address large presence of small commercial activities such as bucas and fish smoking
- Solution also appropriate for large social gatherings

### *Approach*

- Conduct workshops with local commercial actors (e.g. LiveWire participants) and GMoU community leaders to design appropriate solution
- Stress reduced fuel needs and economic benefits

# Commercialization Approach for Delta Region

By taking a private sector commercialization approach, the program can leverage both established infrastructure and distributed local entrepreneurship to reach consumers



## Upfront Costs

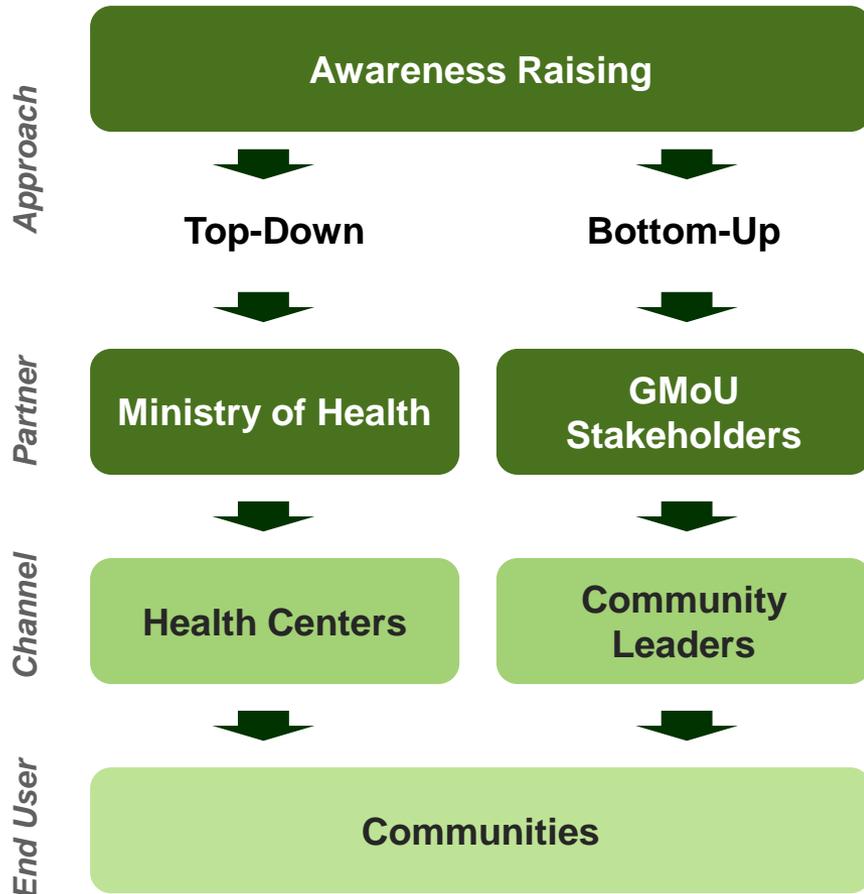
- **Leverage Shell Nigeria's Microcredit program** to reduce upfront costs of stoves to consumers
- **Take advantage of carbon financing structures** such as upcoming CDM program of activities to further reduce stove costs

## Support Small-Scale Industry

- **Leverage current manufacturing zone model** for local manufacturing used in Otta
- **Expand LiveWire program or start new program** to fund and train local entrepreneurs interested in stove industry
- **Conduct capacity building activities** or manufacturing pilots, bringing in technical expertise from local and international partners

# Awareness Raising in the Delta Region

Awareness raising should be approached by top-down messaging through formal channels and more informally through grassroots engagement of community leaders and stakeholders



## Approach

- From top-down, focus on leveraging existing health and aid organization infrastructure to spread issue awareness and health focus
- Work with local community stakeholders to create product awareness from bottom-up

## Value Proposition

- Stress health benefits to communities and especially to mothers
- Commercial segments will place more value on a compelling economic case
- Provide demonstrations to showcase smoke and fuel usage reductions

# Agenda

**Executive Summary**

**Situation**

**Recommended Interventions**

**Engagement Approach**

**Operational Plan**

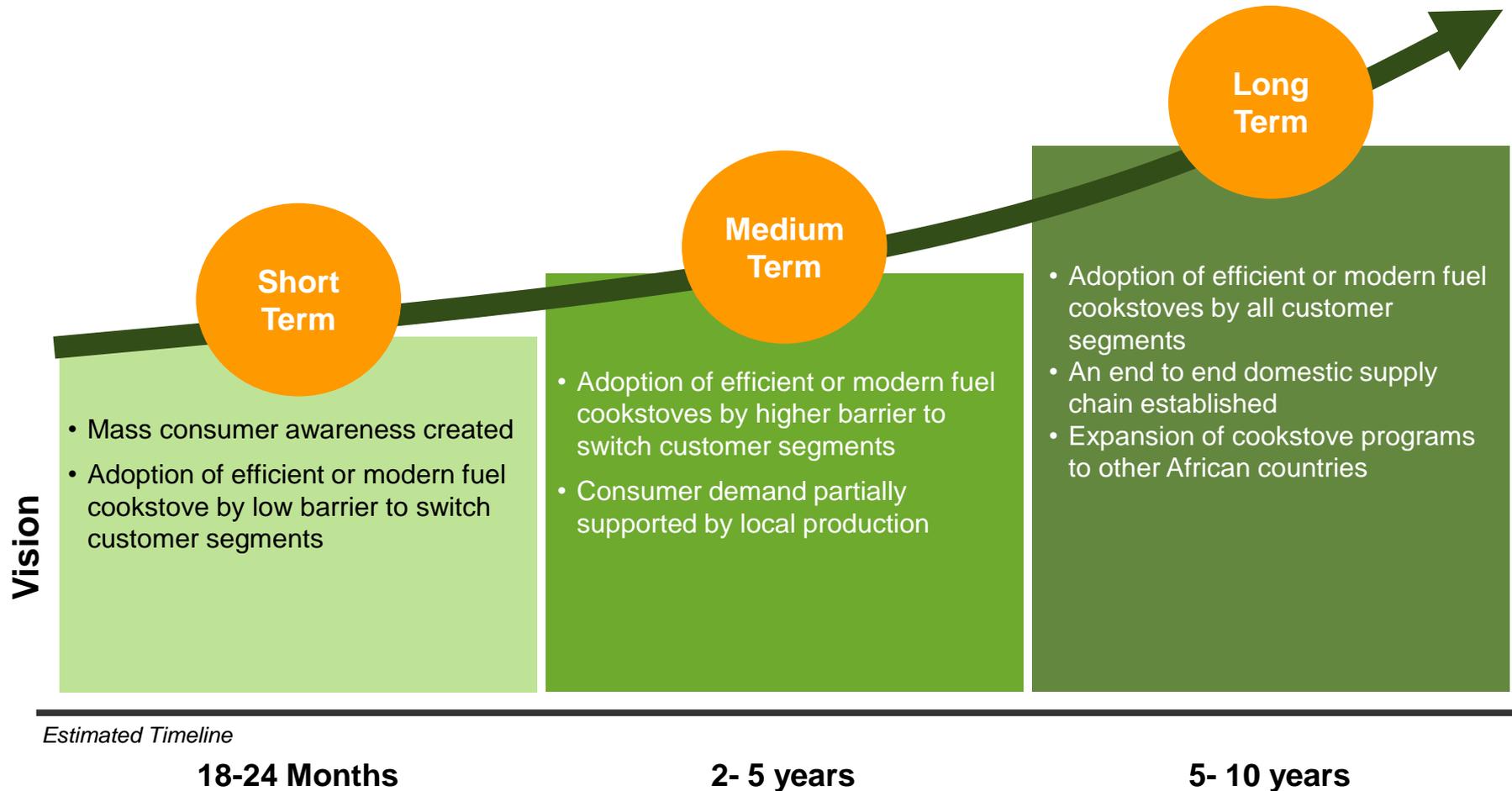
**Case for Action**

**Delta Region Strategy**

**Appendix**

# Vision

The long term vision is to create a sustainable end to end domestic supply chain for efficient and modern cooking solutions that serves Nigeria and neighboring countries



# Glossary of Terms

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

Alliance – Global Alliance for Clean Cookstoves

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

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