Report on Alternative Energy Opportunities for Nima, Ayawaso Sub-Metro Area, Accra

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Prepared by: Amadu Mahama

NewEnergy

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1.0 Executive Summary

The aim of this study was to identify types of energy resources used and the patterns of utilization of such energy sources in the commercial district by food vendors and other income generating activities, with the view to developing a sustainable supply chain for alternative energy products such as Liquefied Petroleum Gas (LPG) and improved biomass cook stoves. This study was conducted in the central markets of high population density centres of two of the low income areas in East Ayawaso sub-Metro areas of Nima and Malaata markets in the Accra Metropolis. Surveys were conducted using semi-structured questionnaires; several key informants with deep knowledge of the communities were also interviewed. Information gleaned from the survey revealed that:

- The inhabitants of Nima are mainly migrants from the three Northern Regions engaged in the informal sector.
- Literacy rates and educational achievement among the inhabitants is lower than the national average for urban areas.
- Poverty and hardship are pervasive in the lives of the majority of families in this informal settlement.
- Housing and general living conditions are generally poor with low access to basic social services like water, electricity, drainage, sanitation and energy services.
- Fuel wood and charcoal are the main sources of energy for cooking while electricity, candles and portable rechargeable lamps are mainly used for lighting.
- A significant amount of electricity is also used for water heating.
- The supply of fuel wood and charcoal is regular and reliable, however prices are said to be increasing sharply and many users of crude biomass complain of the inconveniences associated with cooking with charcoal and firewood.
- Women are the main users of fuel wood and charcoal but the market for these products is dominated by men.
- While LPG cookers and accessories are readily available on the local market, uptake of LPG for both commercial and domestic cooking is very low, and often used for specific tasks like keeping cooked food warm throughout the day.

- The cooking gas itself is not easily available in the communities. Shortage of gas is a national problem with particularly acute impacts in these slum communities, where there is not a single LPG retailing sited within 5 kilometres of the market centres.
- The LPG market has been invaded by cars, especially commercial taxis which have been illegally converted from petrol to LPG.
- Motivation for these illegal and unsafe conversions is completely economic – the

  price of domestic LPG is government subsidized and consequently is much less costly than petrol or other fuels.
- Apart from crowding out domestic gas users, the use of LPG for commercial vehicles without proper oversight from any government agency on the quality of the installations has raised significantly, the potential of catastrophic accidents.
- Electricity service is available in the communities, but the markets are poorly served with sub-standard wiring, illegal connections and generally unreliable service due to several factors including overloaded transformers and frequent faults due to ageing equipment.
- Many food vendors still depend on kerosene and other oil wick lamps, or rechargeable lamps for activities after dark.
- A potential exists for the expansion of the market for clean energy technologies in the communities for both commercial and domestic cooking needs.
- A combination of entrepreneurial and community development spirit in the areas can be harnessed to support the development of a sustainable supply chain for clean energy products.
- Despite efforts to redevelop, plan or even attempts to evict inhabitants of Nima at certain times in the history of the community, it appears that this informal settlement will remain a long term feature of the landscape of Accra for generations to come.
- Despite many progressive and laudable programmes in the past to promote access to clean energy, particularly LPG and improved cook stoves, energy poverty persists in communities like Nima, and is deepening. Policy implementation has yet to be robust in advancing access to such laudable government programmes in disadvantaged communities like Nima.

This report concludes that there is a good case for the promotion sustainable energy resources and technologies to improve livelihoods in poor urban slums like Nima. The most practical technologies include: improved wood and charcoal stoves, together with awareness creation for LPG including information on safety and proper use of LPG. As an entry point, it is recommended that for cooking energy alternatives, a door-to-door delivery of two cleaner cooking energy alternatives, namely LPGas, CleanCook ethanol stoves and Gyapa energy efficient charcoal stoves be supported through the R+C project intervention using local entrepreneurs already established in the communities, targeting commercial food vendors and households which have a level of income to support such a transition from wood fuel. For lighting, the promotion of high quality rechargeable lamps to replace the cheap and low quality lamps currently available on the market is recommended. Furthermore this report proposes a number of energy policy interventions specifically targeted to improving sustainable energy utilization in poor urban and peri-urban areas.

2.0 Introduction

Energy is central to meeting basic human needs and improving living standards. People and enterprises everywhere require energy for the essential services of cooking food, heating water, and illumination in order to satisfy basic human needs and sustain income generating activities. Lack of choice in accessing adequate, reliable, good quality, safe and environmentally benign energy services to sustain economic and human development is the way in which energy poverty manifests itself. Typically a poor household may shift from using biomass, to kerosene, LPG and finally to electricity for cooking. This is true for both domestic cooking and commercial cooking. This shift phenomenon is often referred to as a 'fuel transition' from traditional (biomass-based) to modern household fuels. Past studies consistently indicate a strong correlation between household income levels and the types and amounts of fuel used for cooking (Cecelski *et al,* 1979;). Based on this observation, there is the notion of a "fuel-income ladder" to explain the shift to more convenient and higher-quality fuels as household incomes pass certain thresholds. Household fuel transitions

often accompany changes in economic activity and lifestyles, and are a central focus of national and state government policy.

The purpose of the survey was to assist the R + C project in establishing a targeted provision of modern energy services in Nima, the largest low income slum area in Ghana.

Specifically, the assignment sought to provide the following insights for decision-making:

1. Carry out an energy use profile of commercial food vendors and other productive uses of energy in Nima and New Town, focusing on the Central business areas (Nima and Malaata Markets). The two communities are both high density low income areas with peculiar energy needs.

2. Carry out a market survey of energy use appliances, to determine availability, affordability, reliability of supply, terms of purchase, and sources of supply.

3. Identify private-sector stakeholders in LPG and improved charcoal stove manufactures willing to collaborate in the creation of a sustainable supply chain of energy goods and services to meet the needs of the clients in the Nima community.

4. Design a framework for the creation of the supply chain, and facilitate the successful takeoff of the collaboration.

5. Identify a local NGO or other community-based group to carry out a monitoring of this collaboration to ensure that the goals of the collaboration are met.

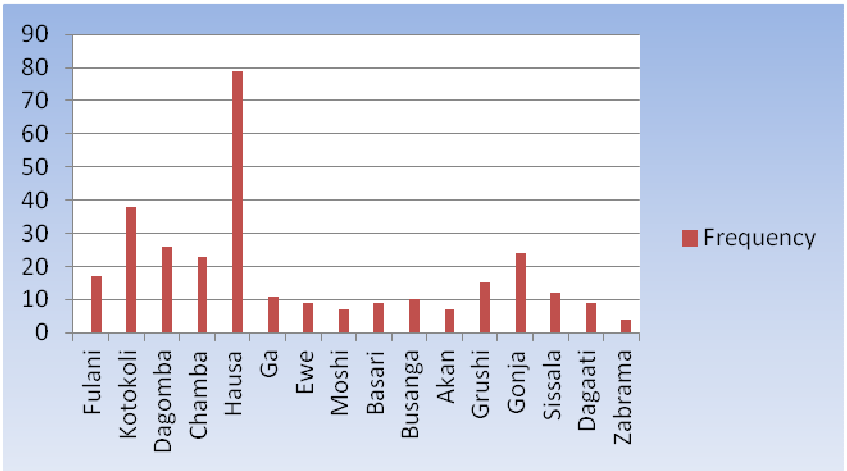
3.0 Methodology

A survey was conducted using semi-structured questionnaires; several key informants with deep knowledge of the communities were also interviewed. Data from the Ghana Living Standards Survey and project reports and analysis from development organizations currently working in the community were reviewed. It also employs mainly a qualitative approach.

4.0 Profile of Nima

Nima is one the largest low-income slum areas in Ghana. It is a migrant-dominated community made up of people from the three northern regions as well as others from the sub-region of West Africa, notably Wangaras, Zambramas who are mostly traders, Hausas and Fulanis who are also mostly butchers and herdsmen. Many of the people have migrated from the rural areas of Ghana in search of jobs in the urban areas of Accra. The population of Nima has grown from 29,797 in 1960 to 52,270 in 1970, to 69,004 in 2000. It is estimated that the population of Nima in 2011 is about 90,000 inhabitants. Nima is also a multi-ethnic area, the figure below gives a breakdown of ethnic composition of Nima.

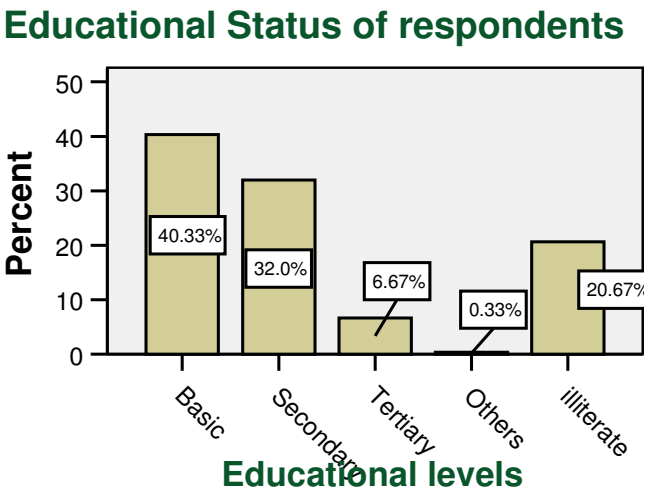
Figure 1: Ethnic diversity in Nima



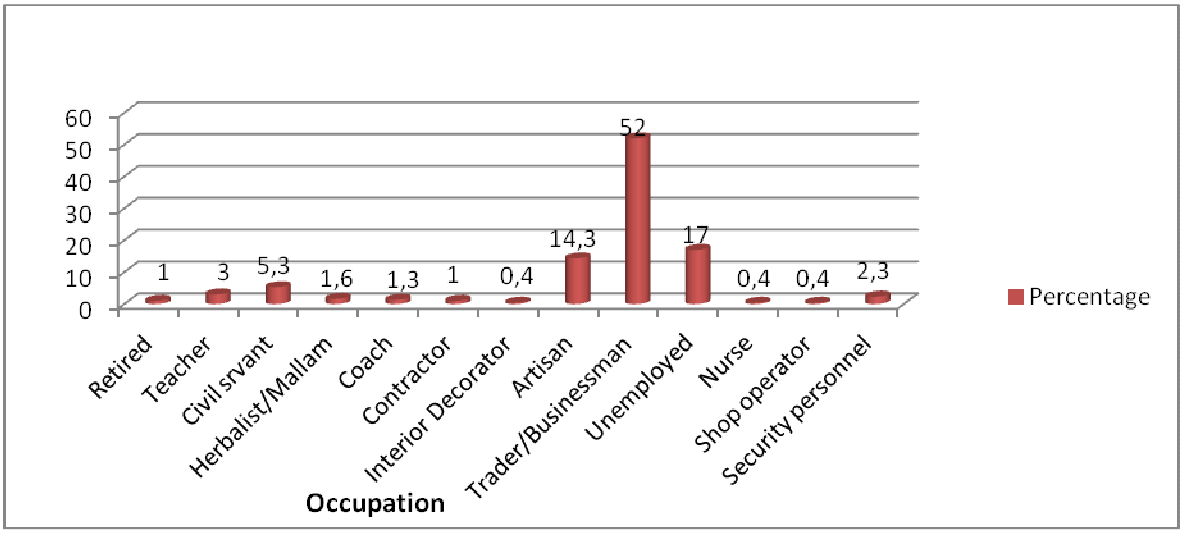
Source: Pronet, 2008

Nima is known for her slum conditions; sanitary conditions are very poor coupled with poor ventilation in most households due to congestion. Basic household facilities like toilets, bathrooms and kitchens are inadequate. Drainage and solid waste management is poor.

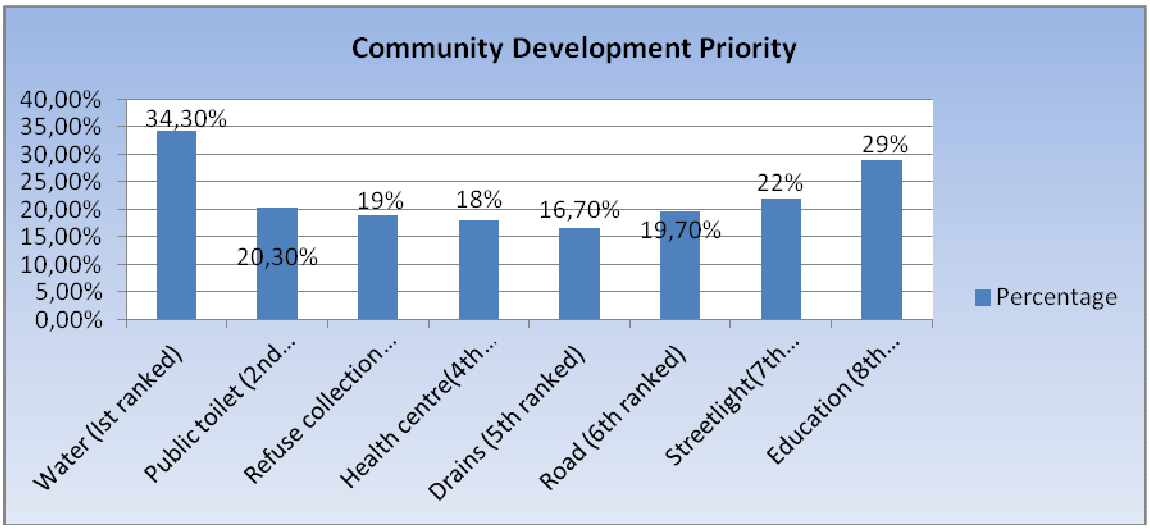
Educational facilities in the community are of poor quality, this reflects in the educational attainment of heads of households, which is much lower than the average in urban areas of Ghana. As many as 20% of the inhabitants are illiterate and 40% only have a basic educational level.



The vast majority of inhabitants make their living in the poorly paid informal sector as traders, labourers or artisans.



A recent inquiry into the community development priorities carried out by Pronet revealed the following:



5.0 The Nima Market

Nima market is one of the neighborhood markets located within the Ayawaso Central Sub Metro. The market serves as a commercial point for the people of Nima. It is also said to be one of the busiest market in the Accra Metropolis[1]. The Market serves as a bulk breaking point for traders dealing in Onions, Yams, Cassava, etc. Traders from Mali, Senegal, Nigerian and other parts of the Sub Saharan African countries convey here to do business

Mallaa Atta Market

6.0 Mallaa Atta Market

Mallaa Atta Market is one of the capitals central markets. It is located within the Ayawaso West sub Metro area. The two markets have poorly developed infrastructure, few properly constructed market stalls and very poor water and sanitation facilities. Both markets have large fuel wood markets and areas designated for sale of charcoal.

[1] AMA Market Assessment Report, 2008

7.0 Availability and Affordability of Clean Energy Products

7.1 Improved cook stoves

In both Nima and Malaata Markets, we could find traders selling improved charcoal stoves (Gyapa and Toyola brands) and different models of LPG appliances and accessories. While some traders offered brand new cylinders and accessories, second-hand cylinders were also common (even though the importation of such products have been declared illegal for many years now). The LPG cookers on sale included 2-4 burner table-top type and locally produced single and double burner varieties. The quality of the locally produced LPG burners was generally very poor, being made usually from scrap metal and no quality assurance mark from Ghana Standards Board. The quality of imported LPG accessories was equally suspect. Traders do not offer any warranties for goods they sell, the policy of "goods once sold are not returnable" appears to hold for all clean energy products on the market. The clean energy products (both LPG and Gyapa charcoal stoves) were more readily available in Malaa Atta Market than Nima Market.

Cost of Clean Energy Equipments

Products/equipments	Price (GHs)
Gas cylinder:	
3kg complete	45.00
6kg complete	55.00
5kg	40.00
9kg	45.00
15kg	60.00 – 70.00
47kg	220.00
Gas cooker	27.00 – 45.00
Gas stove	40.00
Gyapa coal pot:	
Small size	12.00
Medium size	14.00
Large size	50.00
Extra size	55.00
Charcoal	15.00 – 20.00 per bag
Hose: Low pressure	1.50 per yard
High pressure	3.00 per yard
Regulator:	
Low pressure	10.00 – 18.00
High pressure	20.00

Source: Authors survey results, March 2011

A locally produced commercial LPG burner on display

7.2 Availability of LPG

The clean energy supply (especially LPG) is very unreliable and extremely problematic. There is not a single LPG filling station in the whole of Nima and its environs. The closest gas refilling station is about 8 kilometers away (Caprice area, near Police Training School at Tesano). Practically none of the food vendors currently uses LPG as the main fuel. Some food vendors not currently using gas for cooking expressed an interest and willingness to switch to LPG if they could be assured of regular supply of gas without having to travel long distances to join long queues and spend valuable productive time looking for gas.

This type of scene is typical in gas stations all over the country
Source: http://energyaccess.wikispaces.com/LPG-Ghana+-+Case+Study

Respondents pointed out that the major barriers to switching to LPG are its unreliability and relatively higher cost when compared to firewood or charcoal. However many testified that the speed and convenience of cooking with gas more than compensates for the higher market prices of gas.

Among some of the respondents, there is a strong perception that gas for cooking is simply too dangerous especially following some well publicized dramatic domestic accidents in which there were major losses of life and property. Some even pointed out that their landlords would not permit them to use gas because of fear that this is too risky and could easily burn down their homes.

7.4 Safety Awareness

Lack of knowledge of the safety precautions needed in the use of LPG is a national problem. Safety concerns were highlighted in the interviews,—especially the need for greater emphasis on safety at the consumer end of the supply chain, where the industry's image and perception of it are the poorest. These concerns are echoed incidentally by the National Petroleum Authority which has referred to the importation of used and/or substandard cylinders from Europe and the Far East.

7.5 Electricity Services

Electricity service for lighting and operation of electrical appliances is very chaotic in Nima. The utility companies have to deal with large numbers of illegal connections which result in huge revenue losses to the companies. The main market to a large extent is unlit as most of the business is carried out during the day. A few market stalls along the road do have power connection and operate at night.

7.6 Alternative Lighting Products

Food vendors who operate at night usually rely on kerosene or other oil lamps or rechargeable electric lanterns. A look at some of the rechargeable lanterns used in the community indicates very poor quality products which are not durable, and provide insufficient illumination.

8.0 Recommendations for a Way forward with Alternative Energy in Nima

Individual energy end-users, whether households or individuals do not simply substitute one fuel for another as income increases, but instead add fuels in a process of "fuel stacking". Modern forms of energy are usually applied sparingly at first and for particular services (such as electricity for radio and television, or LPG for making tea or hot bath) rather than completely supplanting an existing form of energy that already supplies a service adequately. The most energy-consuming activities in the household – cooking and heating – are the last to switch. Use of multiple fuels provides a sense of energy security, since complete dependence on a single fuel or technology leaves households vulnerable to price variations and unreliable service. Some reluctance to discontinue cooking with fuel wood may also be due to taste preferences and the familiarity of cooking with traditional technologies.

8.1 Improved Biomass Cook stove

As most of the inhabitants in our target community currently depend on fuelwood, our primary recommendation will focus on helping the community to make significant improvements in the efficiency of fuelwood use. Currently in Ghana there are no commercially available models of firewood stoves. Rocket stoves have been promoted Northern Ghana, but only on pilot basis with little commercial success. There is however a successful charcoal cookstove which is currently being marketed under various brand names, namely Gyapa and Toyola stoves. These models of fuel-efficient cook stoves are significantly less polluting than traditional stoves, and are already available in the Nima market for sale.

The information on all the superior features of the Gyapa charcoal stove is not well publicized, therefore the target population is largely unaware of the enormous economic and health benefits associated with switching to this technology. While the cook stove traders are well informed about the fuel efficiency, they have no idea about the health benefits of using improved charcoal stove. There has not been any advertising on this project on radio,

television or newspaper in the last ten years.

8.2 LPG cook stove for commercial cooking

The fastest growing improved cook stove programme in the world is the LPG stove. If the supply chain can be enhanced to assure consumers of a regular supply, and a micro-finance system introduced to reduce the affordability challenge for the initial equipment consisting of cooker, cylinder and installation accessories, a growing proportion of the urban households and energy- intensive enterprises can use LPG sustainably. GEE Technical Services in Accra has been producing high quality, durable and safe commercial LPG cookers for more than ten years (see pictures below A & B). The burners, valves and regulators are imported, while the metal housing and stands are made from locally available scrap metal. The cost ranges between GHC 50-75 depending on the size of the housing frame.

Translegacy Company ltd also produces LPG stoves in a traditional coal pot metal housing (see picture C)[2]. This is particularly suitable for first time users of LPG who will find the adapted design a fairly seamless transition. However, it has been reported that some stove users have actually charcoal in their Translegacy LPG stove in times when they have run out of LPG. This practice could lead to serious damage to the burner and reduce stove performance.

[2] KITE 2004. *Study of Social Impacts of Energy Interventions in Rural Communities in Ghana*

8.3 Ethanol Cook stove for domestic cooking

A new ethanol fuelled cook stove has been introduced to the Ghanaian market this year. At a retail price of about GHC 60, this stove is very clean burning, does not require LPG or other imported petroleum fuel, and has a fire power equal in strength to LPG. This stove is making great progress in Nigeria and Brazil, especially in urban areas where LPG supplies are still irregular. This product is ripe for introduction to the Nima market. The fuel is clean, renewable and non-explosive.

8.4 Lighting technology options

- High quality rechargeable lanterns like the Philips Uday mini is a high quality durable and portable light that can be charged from the grid electricity or solar panel during the day time and used by food vendors during the night time. The light quality is as good as a bulb powered by conventional electricity. The unit cost is GHC 120. DENG LTD in Accra is the importer of this product. It comes with a one year warranty, backed by after sales service and instalment payment can be arranged through selected DENG dealers. Other high quality lighting products brands include the Barefoot lighting kit, Sun Transfer and Gentlite all being promoted under the Ghana Energy Access and Development Project and the Lighting Africa initiative using reputable Ghanaian and international companies.

8.5 Supply Chain Issues

A supply chain is a system of organizations, people, technology, activities, information and resources involved in moving a product or service from supplier to customer. Supply chain activities transform components into a finished product that is delivered to the end customer. The concept of one-stop Energy Shop is considered a viable option for piloting the range of alternative energy products in Nima. As a starting point, this model recognizes that there is no LPG filling station in the community. The private sector has shown neither appetite nor aptitude for establishing an LPG station

in this high density population area of Nima. Using a community development organization, the products to be tested will be passed through this single organization. The organization will also be responsible for monitoring the performance of the products with end-users and ensure that beneficiaries honour their agreed obligations for participating in the programme.

The one-stop Energy Shop will arrange door-to-door delivery of all the alternative energy products and provide end-user training to beneficiaries on how to use the products safely and economically.

Our survey identified the Mothers Club, a community-based women's Association which is carrying out excellent community development work in water and sanitation, maternal and child health, women's empowerment, and actively engages with community leaders, development organizations and local politicians. The Mothers Club has shown a keen interest in supporting the work of disseminating improved cook stoves and other alternative energy products.

8.6 Awareness Creation and Safety Education

Throughout LP Gas marketing, including the primary distribution stage, health, safety, and environmental issues must be taken seriously. LP Gas is hazardous unless kept under control and risk tends to be highest during product transfer, for example, during loading and discharge operations, but also during use, in homes and enterprises, market places and restaurants. There are safety standards and recommended practices for handling and storage of cylinders, use of gas, and maintenance of equipment and accessories.

It is critically important to use the safety guidelines as raw material to design a safety awareness campaign to teach users on the do-s and don't-s of LPG use. As part of the safety education programme, the maintenance of LPG cylinders for users should be encouraged. At the refilling points, arrangements should be made for cylinders to be checked for defects and customers advised to repair or replace defective cylinders.

Implement a series of promotional activities that effectively communicate the brand message and the benefits of all the alternative energy products to be promoted to the target customer groups. The purpose of this task is to aggressively promote the

products to the point that they are seen as the only desirable energy options, and to create a
demand. This is essential to ensure the successful launch.

Suggested promotional programs include:

- Organize public meetings to educate customers about the benefits of the alternative energy products and how to use these products safely and correctly.
- Provide local community leaders and opinion makers with free products/appliances to
  promote and disseminate the brand image and communicate the benefits.
- Provide the target beneficiaries with information on how they can participate in the alternative energy programme, and how such a programme can benefit their enterprises, their health and the environment.

Annex A: Ethanol burning cook stove

Project Gaia

Clean Burning Ethanol Stoves

After water, food, and shelter, surely a supply of energy for daily living is the quintessential element in reaching a better life.

Dr. C. A. Stokes, Energy Expert and a founder of Project Gaia

Our Mission is to promote clean-cooking alcohol stoves and fuels for commercial application under local ownership. We are currently engaged in projects in Ethiopia, Nigeria, and Brazil. We wish to facilitate projects in other countries where alcohol fuels can be sourced cheaply and a stove-fuel market can be established.

The Problems with Smoky Stoves:

Health: Indoor air pollution is responsible for almost 3% of illness globally and an estimated 1.6 million deaths per year, with nearly 800,000 deaths among children under 5. Many of these deaths are in Africa.

Environment: Overharvesting for fuelwood and charcoal leads to deforestation and desertification. High gas and soot emissions produce greenhouse gases and black carbon in the atmosphere, which adds to warming.

Safety: Women and children face harassment, abuse and even rape while gathering firewood. Kerosene and LPG are dangerous, prone to flare-up and explosion. There are many cases of children poisoned by drinking kerosene.

Addis Ababa woman cooking on the 2-burner CleanCook stove in her home.

The Promise of Alcohol Fuels: Ethanol & Methanol:

Alcohol fuels are safer and less polluting than petroleum fuels. They are relatively benign if spilled in the environment. Alcohol fires are extinguished with water. Well-designed alcohol stoves produce no harmful emissions and are powerful generators of carbon credits. Alcohol fuels are produced locally, from wasted or underutilized products, such as molasses, or even flare gas. Ethanol is the least toxic of liquid or gaseous fuels. Methanol's toxicity can be managed. Both alcohols are denatured with a bitter agent, color and odor. Today, ethanol is produced for less than half to cost of kerosene and methanol for less than half the cost of ethanol.

The CleanCook Stove: Ideal Appliance

This stove is made by the Swedish company Dometic AB. We certify it to be Best Available Technology. It is known for safety, durability and power. It has a life of 10+ years. Available in one or two burners, the CleanCook uses a spill proof fuel canisters that hold 1.2 liters per filling, sufficient for a family's daily needs (4 ½ hours at full power). The stove rates at 65% efficiency and burns as hot as an LPG stove. It produces very low emissions and no soot. It is available to be manufactured by local business partners in African markets.

We have the Technology, we can create the Market.

Domestic markets for ethanol are the ideal markets. The highest value and best use of domestically produced ethanol is not for export; it is for cooking fuel for quality, high performing stoves. Export of ethanol is costly. Only the largest producers can command the best prices. Ethanol for cooking (and other appliances) also has many advantages over fuel blending. Blending with gasoline is technically challenging and the ethanol must be dried. The infrastructure costs are high. In contrast, stoves are easily placed in the market. They run best on hydrous ethanol and can even run with higher water content. Auto engines must be new and high compression to burn ethanol blends cleanly and efficiently. The market for cooking fuel is many times larger than for all other potential uses, including fuel blending.

Contact Us:

U.S. - Project Gaia, Inc.
Harry Stokes/Brady Luceno
info@projectgaia.com
+1 (717) 495-4274
Fax +1 (717) 334-7313
No. 1 Lincoln Square
P. O. Box 4190
Gettysburg, PA 17325 USA

Ethiopia- Gaia Association
Milkyas Debebe
gaiaassociation@ethionet.et
milkyasd@projectgaia.com
+251 (11) 618 35 40

Nigeria- Project Gaia
Joe Obueh
jobueh@projectgaia.com
+234 (805) 311 0500

Brazil- Projecto Gaia
Regina Couto
rcouto@projectgaia.com
+55 (31) 9985-3257

WWW.PROJECTGAIA.COM
WWW.PROJETOGAIA.ORG

WELCOME TO THE MOTHERS' CLUB IN DEVELOPMENT

OUR VISION

The Mothers Club in Development is a Non-Governmental and Non-Profit making Community-Based Organization formed by a group of women whose vision is to see a Ghanaian society where women, children, the Girl child and the underprivileged enjoy equal decent and sustainable livelihoods.

OUR MISSION

To contribute to the creation of a Ghanaian society where underprivileged women, adolescent girls and children are empowered to realize their rights and responsibilities and act upon them to secure decent and sustainable livelihoods for themselves.

OUR KEY STRATEGIES

To accomplish our mission, we vigorously pursue the following strategies

1. Technical and vocational skills training for poor and vulnerable women and girls.
2. Education and sensitization of women and girls on social issues that affect their well being, such as Sexual Reproductive Health, HIV/AIDS, Family Planning, Water, Sanitation and Hygiene
3. Mobilization of women and girls for community development.

WHAT WE DO

We are the main Women and Mothers' Support Group in the Nima-Maamibi Community.
Over the years we have partnered key institutions
such as Red Cross Society, LRC, RAVI, the Ghana Health Service, the Ghana AIDS Commission,
National Health Insurance Scheme and NGOs
like CHF International, Hope for Future Generation, ProNet, Y-SEF and Basic needs is undertaking vital projects aimed at improving the wellbeing of the people and our competence and loyalty have stood the test of time
as we have always delivered according to expectation.

WHERE WE HAVE PROVED OUR WORTH

- Water, Sanitation and Hygiene (WASH) Education
- HIV/AIDS Education, Counseling and Testing
- Field Education on R3M
- Tuberculosis Treatment support
- Mental Health Education
- First Aid Administration
- Malaria, Cholera and Diarrhea education and sensitization
- Community Mobilization
- Home Base Care
- Drama/Sketches
- All types of immunization
- Child Welfare Clinic Education
- School Class by Class Education

HOW YOU CAN BE OF HELP

To make our organization sustainable, we welcome and partnership from any individual or organization that seeks to engage us in any of the activities enumerated above on a mutually beneficial basis. Our team of competent and loyal volunteers is ready to be at your service.

CONTACT US

Head Office: Nima Hot-Coffee (Near BUZA 11)
Postal Address: P.O. Box NM 507, Nima, Accra Ghana
Email: mothersclubgh@yahoo.com
Contact Person: Mariam Salifu (Coordinator)
Mobile: +233 277 822 692/ +233 242 281 811

MOTHERS CLUB IN DEVELOPMENT.....WE CARE.....!!!!

Goilgas

SAFETY HINTS

FOR FURTHER INFORMATION CONTACT:

LPG MARKETING MANAGR
GHANA CO. LTD (ZONAL OFFICE)

Tel: 233702, 231500, 233703

OR

THE HEALTH AND SAFETY ADVISOR
GHANA OIL CO. LTD (HEAD OFFICER

Tel: 228822, 228865, 221906

THE LEAK MUST NEVER UNDER ANY CONDITION BE TRACED WITH A LIGHTED MATCH OR OTHER NAKED FLAME A NAKED FLAME MUST NEVER BE USED TO PROVIDE LIGHT IN A ROOM WHERE A LEAK IS SUSPECTED.

1. Leaks should be handled as follows:
   a. If the leak is from the rubber tubing, replace the rubber tubing
   b. If the leak is from the regulator, turn off the gas at the regulator tap and remove it from the cylinder. Contact the nearest GOIL GAS Distributor for a new one. Do not attempt to repair it.
   c. If the leak is from the cylinder or the valve, do not attempt to repsi: but remove cylinder to an open space away from naked flames and contact the GOIL GAS Distributor.
   d. If the leak is from the appliance, do not use the appliance until it has been serviced.

FIRE:

1. In the event of a fire occurring in the premises, all cylinders should be removed to a safe distance.
2. In the unlikely event of the installation (i.e. cylinder or appliance) itself catching fire the following procedures should be followed:
   a. Endeavour to remove the regulator
   b. Extinguish the flames by covering with a wet towel, blanket or rug
   c. Call the Fire Service for assistance.

GENERAL MAINTENANCE:

1. Pressure regulators should not be tampered with in any way. Defective regulators should be replaced.
2. The synthetic rubber tubing should be inspected frequently for cracks & renewed at the least sign of deterioration.
3. Appliance tubing/piping should be inspected at least once a year. Stove burners & pans supports should be regularly washed in warm soapy water.

HOW TO INSTALL

PLACING OF CYLINDER ON THE CONSUMER'S PREMISES

1. In a private house, no more than two cylinders should be placed per room. Out covered storage is always preferred.
2. Goil gas is heavier than air and cylinders should never be placed in cellars, basements or even on a staircase leading below ground level where gas could collect.
3. In a room where the cylinder (s) is (are) placed, ventilation must be possible at floor level. Normal openings of about few centimetres wide under the doors are sufficient.
4. The cylinders must be placed vertically and must be readily accessible. They should not be moved when in use.
5. Cylinders, which are not connected to the appliance whether full or empty, should be fitted with the valve security nut & the cylinder cap.
6. The cylinders must not be placed near a naked fire.
7. If cylinders are placed in sink cupboards, these cupboards must be provided with ventilation opening at the floor level.
8. Cylinders must be placed on a wooden platform to prevent rusting & deterioration of the cylinder foot-ring.

CONNECTING CYLINDERS TO THE APPLIANCE

1. The pressure regulator supplied by the GOIL GAS Distributor/Dealer should be inserted firmly, but not violently, & turned to the right to the full extent of the lugs, before turning on the tap.
2. Advise your GOIL GAS Distributor/ Dealer should the black rubber washer visible inside the top brass valve fitting on the cylinder be unduly torn or misplaced.
3. If electric light is not available, a pressure regulator should be fitted during daylight. There must be no naked flame in the room whilst fitting the pressure regulator.
4. Only thick synthetic rubber tubing as supplied by the GOIL GAS Distributor/Dealer may be used for connecting the appliance.

PLACING THE DOMESTIC APPLIANCE

1. Appliance must be placed in spaces suitable for the purpose & where an adequate supply of air is available to the appliance to ensure complete combustion.
2. When placing the appliance, care should be taken to ensure that there is no danger of combustion of inflammable materials such as curtains, etc.
3. Sufficient space should be left between a cooking stove & the wall to ensure that burnt gases from the oven may escape freely.
4. The length of the rubber tubing connecting the appliance should not exceed two metres.
5. The tubing must be replaced at the least sign of deterioration i.e. with cracks on the surface etc.
6. If for any reason it is necessary to place the cylinder further than two metres from the appliance, permanent copper tubing should be used.

HOW TO OPERATE

1. When lighting a burner with a match, the lighted match should be held to the burner before turning on the gas. Never turn on the gas & start looking around for matches.
2. When the appliance is not in use it is advisable as an added precaution to close the cylinder valve, especially at night.

LEAKAGE

1. When a leak occurs it will be indicated by the disagreeable odour of the escaping gas. The following precautions should be taken immediately before attempting to detect the leak:
   a. Extinguish all naked flames in the premises
   b. Disconnect regulator & insert safety plug
   c. Open all the doors & windows to create a draught to disperse the gas.
   d. When the gas has dispersed, the leak may be detected by means of a solution of soap & water applied to the joints & other suspected sources of leakage. If there is a leak, bubbles will foam.