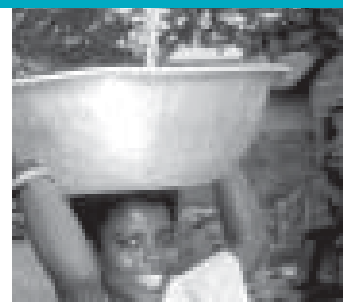
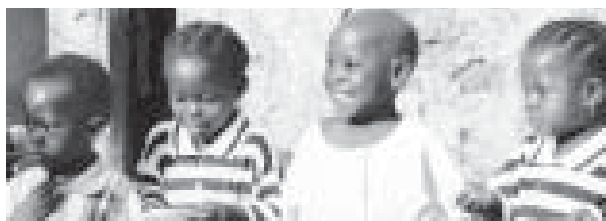


Ghana: Women's Energy Enterprise

Developing a Model for Mainstreaming Gender into Modern Energy Service Delivery



Energy Sector Management Assistance Program (ESMAP)

Energy Sector Management Assistance Program (ESMAP)

Purpose

The Energy Sector Management Assistance Program (ESMAP) is a global technical assistance partnership administered by the World Bank and sponsored by bi-lateral official donors, since 1983. ESMAP's mission is to promote the role of energy in poverty reduction and economic growth in an environmentally responsible manner. Its work applies to low-income, emerging, and transition economies and contributes to the achievement of internationally agreed development goals. ESMAP interventions are knowledge products including free technical assistance, specific studies, advisory services, pilot projects, knowledge generation and dissemination, trainings, workshops and seminars, conferences and round-tables, and publications. ESMAP work is focused on four key thematic programs: energy security, renewable energy, energy-poverty and market efficiency and governance.

Governance and Operations

ESMAP is governed by a Consultative Group (the ESMAP CG) composed of representatives of the World Bank, other donors, and development experts from regions which benefit from ESMAP's assistance. The ESMAP CG is chaired by a World Bank Vice-President, and advised by a Technical Advisory Group (TAG) of independent energy experts that reviews the Program's strategic agenda, its work plan, and its achievements. ESMAP relies on a cadre of engineers, energy planners, and economists from the World Bank, and from the energy and development community at large, to conduct its activities.

Funding

ESMAP is a knowledge partnership supported by the World Bank and official donors from Belgium, Canada, Denmark, Finland, France, Germany, the Netherlands, Norway, Sweden, Switzerland, and the United Kingdom. ESMAP has also enjoyed the support of private donors as well as in-kind support from a number of partners in the energy and development community.

Further Information

For further information on a copy of the ESMAP Annual Report or copies of project reports, please visit the ESMAP Website: www.esmap.org. ESMAP can also be reached by E-mail at esmap@worldbank.org or by mail at:

ESMAP
c/o Energy and Water Department
The World Bank Group
1818 H Street, NW
Washington, D.C. 20433, U.S.A.
Tel.: 202.458.2321
Fax: 202.522.3018

ESMAP Technical Paper 096/06

Ghana: Women's Energy Enterprise

Developing a Model for Mainstreaming Gender into Modern Energy

Report on Feasibility Study
prepared by
KITE (Kumasi Institute of
Technology and Environment)
for the World Bank, Accra Office



Energy Sector Management Assistance Program (ESMAP)

Copyright © 2006
The International Bank for Reconstruction
and Development/THE WORLD BANK
1818 H Street, N.W.
Washington, D.C. 20433, U.S.A.

All rights reserved
Produced in India
First printing July 2006

ESMAP Reports are published to communicate the results of ESMAP's work to the development community with the least possible delay. The typescript of the paper therefore has not been prepared in accordance with the procedures appropriate to formal documents. Some sources cited in this paper may be informal documents that are not readily available.

The findings, interpretations, and conclusions expressed in this paper are entirely those of the author and should not be attributed in any manner to the World Bank or its affiliated organizations, or to members of its Board of Executive Directors or the countries they represent. The World Bank does not guarantee the accuracy of the data included in this publication and accepts no responsibility whatsoever for any consequence of their use. The boundaries, colors, denominations, other information shown on any map in this volume do not imply on the part of the World Bank Group any judgment on the legal status of any territory or the endorsement or acceptance of such boundaries.

The material in this publication is copyrighted. Requests for permission to reproduce portions of it should be sent to the ESMAP Manager at the address shown in the copyright notice above. ESMAP encourages dissemination of its work and will normally give permission promptly and, when the reproduction is for noncommercial purposes, without asking a fee.

Contents

1.	Introduction	1
2.	Background	2
3.	Project Objectives	4
4.	Methodology: Stakeholders Analysis	5
5.	Socio-Economic Activities and Options for Micro-Enterprise	6
	Overview of Study Communities	6
	Biriwa	6
	Nyanfeku Ekroful	7
	Gomoa Pomadze	8
	Nyanyano	9
	Abandze	9
	Findings from Stakeholders' Analysis	10
	Existing Women's Groups in the Communities	10
	Reactions towards Proposed Job Opportunities	11
	Job Opportunities for the Youth	11
	Capital Formation and Savings	11
	Incomes	12
6.	Market for Proposed Enterprises	13
	Electrified Communities	13
	Internal Market	13
	External Markets	14
	Non-electrified Communities	15
7.	Conclusions and Recommendations	16

1. Introduction

This report is based on a stakeholders' analysis of the feasibility of embarking on a micro-enterprise on multiple energy services for women in rural fishing and farming communities in the Central Region of Ghana. The objective of the project is to test a business model for empowering women through income generation in energy service delivery. The model is based on the background experience of a project, which has been successfully piloted in Bangladesh. The model involves capacity-building among rural women and micro-enterprise development for modern energy service delivery to their communities and surrounding ones. Experience from the Bangladesh project has demonstrated that transfer of skills for manufacturing and production of energy service appliances can be accomplished without a high level of education among rural women. Such skills are considered as opportunities for initiating social transformation.

The stakeholders' analysis in five selected communities was carried out to assess the willingness and preparedness of women in these communities to engage in similar projects in Ghana. The findings of the analysis are presented in the report. This is followed up with some recommendations.

2. Background

Like any developing country, Ghana is faced with a myriad problems, which has rendered the majority of her people poor. Evidence has shown that poverty is felt more by those engaged in food crop farming and those living in rural areas, the majority of whom are women. The situation of women is aggravated by cultural practices and patriarchy, which have relegated women to the lowest level in society. Thus preference is always given to men in terms of employment opportunities and other responsibilities. Consequently, there are many more women than men who have not had the opportunity to improve their standards of living. They lack the necessary qualifications that can enable them to get engaged in well-paid jobs. To redress this phenomenon, governments and donor agencies have, for sometime now, taken a proactive approach to improve the lot of women by giving them the necessary support and by creating an enabling employment environment for them to earn a decent living. This is particularly so because women in developing countries are also the main support for their households. One such attempt is the pilot project on micro-enterprises in energy service delivery for women in Char Montaz, Bangladesh (ESMAP Technical Report 055/04). This project was very successful and, hence, the idea of replicating the same project in other developing countries, such as Ghana, with the ultimate objective that it will lead to social transformation by creating employment for women. However, the context is completely different and, hence, the need for a stakeholders' analysis to assess the feasibility of replicating this project in Ghana.

The promotion of gender equality and the empowerment of women is one of the Millennium Development Goals (MDGs). Among others, it focuses on:

- Increasing wage employment of women in the non-agricultural sector;
- Creating a role for women in sectors which are crucial to the lives of the poor; and
- Seeking innovative business models for income generation for women.

Modern energy is a crucial input to the development of the MDGs. This is because access to modern energy by the households can impact:

- Children's education, which also encourages them to seek higher social goals;
- Women's health at home and in medical services beyond nightfall; and
- Indoors air pollution reduction, which is a cause of disease in women and children.

The participation of women in the modern energy sector is minimal in contrast to the significant time and energy poor women spend on traditional energy – collecting biomass for cooking and in small-scale enterprises.

The objective of this stakeholders' analysis, therefore, is to assess the context within which the micro-enterprises can take place and whether one should go ahead to prepare a business plan as a first step towards the establishment of the micro-enterprise for multiple energy services for women. The overarching goal is to create employment in the energy sector for women in rural communities in Ghana. The project is targeting only women as a result of some of the above reasons.

3. Project Objectives

The specific objectives of the proposed project include:

- To replace kerosene lamps with efficient direct current (DC) lamps in rural households;
- To market efficient alternate current (AC) fluorescent lamps to the townships;
- To market solar home systems (SHS) components to the rural households;
- To service SHS components to the rural households;
- To offer micro-credit to the rural households; and
- To offer diesel micro-grid service/battery charging services/post-harvesting services.

4. Methodology

Stakeholders Analysis

This analysis brought together all caliber of people in each of the selected communities. They were made up of the chiefs and their elders, opinion leaders, the youth, assembly persons, teachers and particularly women in the informal sector who are the targets of the proposed project. In some cases, women and youth groups were met to discuss the feasibility of the proposed projects. The team also conducted a few key informant interviews to supplement information that came from the stakeholders' analysis.

The proposed micro-enterprises are expected to undertake multiple energy services which would include, but not be limited, to the following:

- Efficient DC lamp production (assembled for the non-grid communities and SHS users);
- Efficient AC lamp production (assembled for grid-connected communities); and
- Multi-purpose diesel platform for power generation for the community (minigrid) and for driving multiple productive end use equipment such as corn mills, tomato and pepper grinding machines, and dehuskers.

The requirements under each of the energy services were discussed with the stakeholders in detail and, where possible, reference was made to examples for their understanding.

5. Socio-economic Activities and Options for Micro-enterprise

Overview of Study Communities

Five coastal and farming communities were selected for the study, all in the Central Region of Ghana. The coastal communities are Biriwa, Abandze and Nyanyano. The farming communities are Nyanfeku Ekroful and Gomoa Pomadze. These communities are strategically located in the sense that they are not too far from the national and the regional capitals, and the women are facing some of the above-mentioned problems that women face in Ghana. The communities are also easily accessible by road.

Biriwa

Biriwa is a fishing community in the Mfantseman District in the Central Region of Ghana. It has a population size of 6,296 with females constituting 53 percent of the total population, according to the 2000 Population Census Report. The main fishing season begins in the third week of June and ends in the last week of September. The minor season begins in the last week of November and ends in the last week of December. The residents engage in two types of fishing — deep-sea and shallow sea fishing — and each requires different types of boats. The deep-sea fishing takes place late in the night so the fishermen set off around late afternoon and work throughout the night. They, therefore, require very bright lights to be able to work at night.

Residents in this community are engaged in clearly and well-defined gender roles. The main occupation for the men is fishing and fish smoking for the women during the peak fishing season. About 80 percent of the men in the community are fishermen and about 75 percent of the women are fish smokers. In the lean season, the men spend their time mending their nets and boats while the women engage in petty trading. There are 32 fishing groups at Biriwa, owning 62 canoes. One catch of deep-sea fishing yields about 120 very large bowls of fish, and each large-scale fishmonger buys about 40 bowls of fish after a catch. There are also about 80 fish smokers in the community and each fish smoker employs extra hands during the peak season to help with the smoking of the fish throughout the night. The women employ an average of two women each as extra hands for each oven during the peak season.

The fish smokers also require a good lighting system to be able to work throughout the night. For example, if there are four women attending to one large oven, they are all expected to have their own light to move around the oven to ensure that the fish does not get burnt. During the peak season, a large-scale fish smoker (that is someone with an average of 10 large ovens) uses an average of 1 gallon of kerosene each night to work. The fishermen also use 1 gallon of petrol mixed with a cup of diesel on each fishing trip for lighting. The lighting systems used by both the fishermen and fishmongers are very dangerous to their health and pose a risk to their lives. Thus children are not allowed to go near the ovens when the women are smoking fish.

The minimum number of ovens one can have to be in a viable business is about six. The bowls used for collecting the fish are corrosive and have to be replaced regularly. These bowls are also used for storing water.

Both the fishermen and fish smokers do not make use of formal financial institutions despite the considerable large size of their enterprises. They rely on moneylenders in the community for loans at an interest rate of 50 percent to 100 percent. The fishmongers buy the fish on credit from their husbands, many of whom are also fishermen and pay back after marketing the product. There are only a few fishmongers who work without taking credit from moneylenders.

Though Biriwa is on the national grid, only about 45 percent of the residents use electricity and about 25 percent of them also use radios. The residents suffer from frequent power outages. People in the neighboring villages rely on battery for energy. These are smaller villages with about 600 people residing in the largest populated village. For example, Ektukrom has about 50 people.

Nyanfeku Ekroful

This is a farming community with a population of about 3,000 people. Nyanfeku Ekroful is surrounded by about 10 smaller villages. The largest village has about 500 people. There are more women in the community than men. The majority of the men have migrated out of the village. The village has no women's groups. All the farmers have secondary occupations, where the proceeds from their farming activities are used as starting capital for their secondary occupation.

The main crop in this community is cassava and traders come from Accra and Takoradi on specific days of the week to buy it. There are no processing plants in the village for cassava. The farmers rely on credit from a few wealthy members of their community for loans to do their farming. The interest rate is often 100 percent. Like fishing, farming activities are also seasonal and, during the lean season, the farmers live on proceeds from their farming activities until the next season. The farmers require the loans to prepare their land and to buy farm inputs. The secondary occupations of some of the women in this community include hairdressing, dressmaking, and production of batik and tie-and-dye fabrics. With the exception of a few teachers who are in the formal sector, the majority of the residents of Nyanfeku Ekroful do not make use of formal financial institutions.

The marketing of these secondary activities is difficult during the lean season. According to the hairdressers, they make an average profit of C40,000 a month. Dressmakers make a profit of C19,000 on each piece of clothing they make but this trade is highly seasonal, thus they do not rely on it for their livelihood. Those who are into batik and tie-and-dye production make C1,000 on each yard of calico. The farmers make an average profit of about C300,000 a year. Others make as much as C1000,000 a year. Nyanfeku Ekroful is on the national grid but not many people use electricity because of the high cost involved. Household electricity bills vary from C65,000 to C80,000 a month and many of the residents find this very expensive. The community members complained about frequent power outages. There are a few households that depend on lanterns because they do not have electricity in their houses. Those who use kerosene spend an average of C4,000 a month on it for lighting. There is no car battery service at Nyanfeku Ekroful. There is only one grinding mill in the community for grinding cassava. They also do not have a mill for flour and bakers have to travel to other communities to mill their flour.

Gomoa Pomadze

Gomoa Pomadze is a farming community, but some of the women are also petty traders. The traders depend on the proceeds from their farms as capital for their trading activities. The seasonal nature of farming in the communities impacts negatively on their livelihoods. The women in this community do not belong to any trade group, but work as individuals. There is, however, no gender discrimination when it comes to occupation. The petty traders in the community indicated that they were more interested in promoting their trading business, thus any support for them should be geared towards the expansion of their trading enterprises.

There are five diesel grinding mills in the community but they do not mill flour, and the women expressed the desire to have a diesel plant that would make it possible for them to have a flourmill. About 50 percent of the residents in this community do not use electricity. Those using it also find the bills too high. The rest use lanterns for lighting.

About 80 percent of the youth in this community are unemployed.

Nyanyano

Nyanyano is a fishing community in the Central Region but the community enjoys the locational advantages of being very close to the national capital, Accra. It has a population of about 7,000. About 70 percent of the men are fishermen. The others work informally as salt miners and petty traders. The women are mainly fishmongers but some are into petty trading. Like fishing, salt mining is done by the men and the women do the selling. There is, therefore, a clear division of labor in this community.

Like the other communities, the residents of Nyanyano do not make use of the formal financial institutions. They rely on moneylenders for loans and pay an interest rate ranging from 50 percent to 100 percent.

Nyanyano is on the national grid but the residents find the electricity bills too high. Unlike the other fishing communities covered in this report, the fishmongers here use electricity as lighting for smoking fish at night.

There are some women's groups/associations in this community but they are either faith-based or political. The fishmongers have formed an association which is linked to a political party through which they have been able to access funding for their business. While the men team up to pull resources together to do the fishing, the women do not. Many of the youth in the community including those who have learnt various trades are unemployed. The male youth find jobs at the salt mines but the girls are not engaged in any kind of work.

The community has six grinding mills for maize and vegetables.

Abandze

Abandze, like Biriwa, is a fishing community along the coast of the Central Region. Abandze is surrounded by 10 communities, which are smaller in population compared to that of Abandze with a population of 3,000 people. The majority of the men (90 percent) in this community are fishermen, while the rest work as clerical staff, drivers or traders in the informal sector. About 70 percent of the women are fishmongers, 20 percent distill alcohol and the rest are petty traders.

The women in this community work as individuals and do not have trade groups or associations. The fishmongers employ extra hands to work for them during the peak season. During the lean season, the fishermen do shallow sea fishing but the catch from this type of fishing is very small. All the unemployed youth in this community work with the fishermen. In the sale of fish after any catch, priority is given to the wives of the fishermen before any other person. The woman's profit from her work is what takes care of the family throughout the year. The men pay for school fees and hospital bills. During the peak season, one catch can yield a profit of C5000,000 maximum and a minimum of C1000,000 when the catch is poor. It was noted in this community that some of the fishmongers sponsor the fishermen to go to sea and on their return those women are given the priority to buy the fish before any other person.

Both the fishermen and fishmongers make very little use of formal financial institutions. They rely on moneylenders in their community for loans to invest in their business for which they pay an interest rate ranging from 50 percent to 100 percent. Both the fishermen and the fishmongers said that they do save because the nature of their work does not make it possible. They always have to have cash at hand to buy the necessary inputs, as and when they are available against their peak season.

Abandze is on the national grid and 80 percent of the people use electricity. They, however, complained of the high electricity bills, especially in recent years. Kerosene lanterns are used as a source of lighting during smoking of fish at night. These fishmongers spend an average of C1,000 per day on kerosene for such purposes. The community suffers from frequent power outages. There are grinding mills in the community for flour, cereals, nuts and vegetable but the community finds them inadequate for the number of people they serve.

Findings from Stakeholders' Analysis

This section discusses the outcome of the stakeholders' analysis, highlighting some of the chances of establishing an energy service delivery project in the above communities.

Existing Women's Groups in the Communities

Group formation pools together capital, in terms of financial, human and physical resources of individual members. Thus their number and resources are considered as their asset. It is also economically more viable to work with existing groups in communities because the members know and can vouch for each other. An existing group is also more likely to be sustained (provided the individual members are committed to their course) than newly created ones. Individual commitments in groups with the purpose of undertaking a project, are not as strong as those in an already existing group, which again questions the sustainability of the project that brings women together as a group. Experience has shown that an existing group enhances the opportunity of the group to take loans from formal financial institutions. Evidence in many cases all over Ghana has shown that working with existing women's groups is a preferred option.

This study, however, showed that women's trade groups do not exist in any of the communities selected. Women's faith groups do exist in all communities and they can be encouraged to take up this project. They are perhaps the only existing women's groups in the communities that can be relied on for any group activity. Forming a group for a specific project is risky as failure of the project will most likely lead to the demise of the group.

The analysis showed that the women are more interested in individual small-scale and petty trading businesses than manufacturing. In the fishing communities, for example, each fish smoker worked as an individual and controlled all aspects of the business, with very little division of labor. Each fish smoker is responsible for purchases, supervision of smoking, as well as the marketing of the final products (that is several baskets of smoked fish), which includes transportation of the baskets of smoked fish to the hinterlands, particularly Kumasi and Techiman. This individualistic approach to business by the women makes it difficult for them to benefit from economies of scale, which would have made it possible for them to pool their resources together. To confirm the fact that women in the communities studied are more comfortable working as individuals, participants at each of the stakeholders' meetings

ended up advising the research team that their living standards would improve if they gave money to the individual women to invest in their current businesses. They also proposed to the research team at the end of each discussion that a preferred choice would be to give them credit to enhance their petty trade as a starting point while being trained to go into any of the proposed small-scale enterprises. Implicitly, the introduction of any micro-enterprise in these rural communities would require **an initial awareness creation through animation**, through which the benefits of the micro-enterprise could be better appreciated by the women to convince them about the viability of the project.

Reactions towards Proposed Job Opportunities

While the women were very enthusiastic about job creation for them in the communities, they were not particularly keen on the jobs being proposed, such as assembling of lamps. It sounded quite strange to them that they were being asked about non-traditional enterprises, although they admitted that there were no gender barriers in the choice of trade and employment. Rather, the men in the communities selected (particularly the opinion leaders) were more enthusiastic about the proposed projects and wished the terms could be broadened to include them. The women categorically said that they were used only to their traditional economic activities and that they would be more comfortable continuing with such activities, if they were improved upon. This again confirms the view that any micro-enterprise that is new to the women would have to be properly introduced to the women to enable them to appreciate the project and its benefits for them.

Job Opportunities for the Youth

Over 50 percent of the youth in the communities who have completed basic education are unemployed or underemployed. Those with vocational skills are underemployed. Invariably, they end up in the same traditional economic activities as their parents. As a woman in Abandze puts it, *"Education or no education, they all end up in their gold mine, which is the sea."* This quotation illustrates the way people are entrenched in their traditional economic activities. At Nyanyano, where the team had the opportunity to talk to a youth group, the youth were also apprehensive about the type of economic activities the project was proposing. Some of the skills, the youth (made up of mainly girls) said, they would like to acquire included traditional vocational skills taught in vocational schools in the country. They mentioned, for example, dressmaking, batik and tie-and-dye, and hairdressing, although experience throughout the country has shown that such skills are not fully utilized in the rural settings of the country.

Capital Formation and Savings

Capital formation for the inhabitants of the communities studied is very low and seasonal. This is partly due to the over reliance on mainly one source of income generation. Thus they do not make use of formal banks due to lack of collateral. At Nyanfeku Ekroful, of 30 women, only one person could take a loan of C3,000,000 from a rural bank through a contact person (who is living outside the community).

There was also only one woman out of 18 at Abandze who said that she saved with a formal banking institution. Their inability to make use of formal institutions results from the fact that they work in the informal sector, which formal institutions are skeptical about when it comes to giving credits/loans. Almost 90 percent of the women depend on credit annually, for which the interest rate ranges between 50 to 100 percent. At the beginning of every season, they borrow money from moneylenders to prepare for the season. The fish smokers need money to buy new fishing trays, to repair their ovens, to buy the fish, to pay the extra hands they employ, to buy new baskets for packing the fish to carry to market centers, etc. All this requires a large sum of capital at one go, which the people often do not have. The fishermen also require money to prepare for the season. However, with high interest rates, it is obvious that they are only working for the moneylenders who, at the end of the season, take back their money with interest. Some residents who have farms but are not farmers do farming as a secondary occupation and income from the farm, for most of them, serves as the main initial capital that is invested in their primary occupation.

Those who have learnt one trade or the other and live and work in the communities studied are the worst off in terms of capital formation. Dressmakers, hairdressers, and batik and tie-and-dye makers do not have a market for their products in the communities. Their work is seasonal, and once the season is over they shift to other activities such as farming or fishing. In another case, a dressmaker said that she makes clothes for people on credit and is forced to hold on to the clothes until such time that the owners can pay for them. According to a batik and tie-and-dye maker, she makes only a profit of C1,000 on one yard of calico that she buys but it takes her a very long time to dispose off the products. The long waiting period locks up the initial capital investment. This is because when they are not able to sell their goods at the appropriate time, they end up misusing the income as and when they are able to do so. According to hairdressers, they spend more on paying utility bills than on sustaining their business.

Incomes

Therefore, income generation is low and seasonal. This is also because the majority of residents do not have their own capital base to run their businesses and always have to fall back on moneylenders who charge a very high interest rate of either 50 or 100 percent, depending on the amount that is borrowed. The principle, however, is that the larger the amount required, the higher the interest rates. According to the fishmongers, when the season is good in terms of the harvest, they are able to make a profit of C5,000,000 maximum and a minimum of C1,000,000 per season. This profit is expected to support them throughout the rest of the year while they carry on with other petty activities of little significance. Hence, the larger the profit, the better it is for them because they are then able to cater for themselves and their families until the next season.

6. Market for Proposed Enterprises

Electrified Communities

Internal Market

All the communities studied are on the national grid and, therefore, rely on it for electricity supply. Despite this, there are opportunities in the communities which favor the establishment of some energy service delivery centers. For example, it was observed that none of the communities had a mill for kneading flour. Bakers have to travel to the next large town to knead their dough before coming back to bake it. In the farming communities where the main crop is cassava, it was also noted that there were no mills for grinding the cassava. The farmers sold their cassava fresh, implying that they were unable to add value to what they produce, hence their low income. Adding value to their produce would mean processing their cassava in one form or the other and the first step towards that is grinding the cassava if there is a cassava grinding mill in the two communities. Besides the cassava and flour, the mill can also be used to grind vegetables and nuts, such as tomatoes and palm kernel. Thus the idea of setting up a diesel plant that can have multiple functions was welcomed by the women.

Since many fish smokers use silver pans and trays for their work, there is a market for such items in the fishing communities. At the beginning of each fishing season, the fish smokers buy an average of 10 of such pans for their business. However, they all have to travel to the largest nearby market to buy such items. Many of them go to buy them from Mankessim Market. Since all fishing communities see the pan as a necessary working implement, the women thought they could produce such pans locally to reduce the cost involved in traveling to buy from another market. In addition, production of such items in their own communities will create employment for others and it represents a market in all fishing communities in the Central Region. Thus, the women in all the communities were in favor of a micro-enterprise for producing aluminum pans for carrying fish.

Much as there is a clear indication that the fishermen and fish smokers work throughout the night during the peak season and, therefore, depend absolutely on a good lighting system, the women were apprehensive of producing lamps that could be used for this purpose. It was noted that special lanterns that use diesel are used for deep-sea fishing. Smaller types of the same lanterns are used by the women

when smoking their fish at night. There is, therefore, a market for such lanterns and an alternative that will save energy and is health-friendly could compete with what they are currently using, provided the price of the new one could be reasonable. The cost of the lanterns, which are made from scrap and empty cans, is very low, though they are harmful for health. The large lantern costs C5,000 and the small one, C1,000. The fishermen and fish smokers find the cost of the diesel and kerosene (respectively) rather high since they require a large volume each season. Thus any new lantern, which will cost more than the one currently being used, would have to be more efficient if the people are to patronize it.

None of the communities visited rely on batteries for domestic lighting and appliances and there are no battery charging plants in the five communities. Economically, therefore, this will not be a viable venture to go in for unless the plant serves multiple purposes. However, since many of the residents in the communities find the electricity bills very high, especially in the last two years, an alternative energy supply for lighting will be acceptable provided it has a reasonable cost. Encouraging the people to use alternative source of energy would require awareness creation about available alternative energy. Implicitly, establishing a battery charging plant will not be the first priority but promoting the usage of the plant through awareness creation in the communities will be.

External Markets

It was, however, established that there was a significant market for efficient AC lamps throughout the country. The main source of lighting for 43 percent of houses (1,615,879 houses)¹ in Ghana is electricity from the national grid. These houses use both incandescent bulbs and energy-efficient lamps. A national campaign for the promotion of energy-efficient lamps being pursued by the Government of Ghana and the Energy Foundation is fast yielding positive results. Distributors of energy-efficient lamps have seen a significant rise in sales. One of such distributors was supported by the African Rural Energy Enterprise Development (AREED) Program, being implemented by KITE, to expand its operations.

It is, therefore, expected that the locally assembled AC lamps will be able to compete favorably with what is currently imported for use in the country. Current prices for compact fluorescent lamps range between \$2.5 and \$4 whilst the 2 and 4 feet energy-efficient fluorescent AC lamps are priced between \$9 and \$12. To penetrate this market, the locally assembled lamps should be reasonably priced to attract both distributors and potential end use customers.

¹2000 National Populations Census

Non-electrified Communities

As stated above, all the communities studied were connected to the national grid and therefore possibilities for the establishment of a mini-grid power system for the communities could not be explored. However, preliminary investigations and consultations reveal that such possibilities could be explored in the Northern and the Upper East regions of Ghana. These are the least electrified regions in Ghana and have concession areas of SHS as the main source of lighting. Solar lanterns are more extensively promoted in these regions.

Further studies will have to be conducted in specific communities to ascertain the feasibility of using a multi-purpose diesel engine to generate electricity for such communities, process some of their farming produce such as shear nuts, and assembling DC lamps. The location of this enterprise in the northern part of the country would also enable the enterprise to test the products in the immediate foreign markets such as Burkina Faso.

A report by the DANIDA Renewable Energy Development Program, 'Roadmap for the development of renewable energy in Ghana' indicates that as of December 2002, 4,270 SHS had been installed throughout the country by private companies and government-initiated projects. Each installation has at least two DC lamps.

The Manager of the Renewable Energy Services Project (RESPRO), which operates a SHS concession on a fee-for-service basis, has expressed strong interest in the locally assembled lamps. These lamps could be used for new installations and could also be used to replace burnt out lamps. Prices of imported DC lamps range between \$12 and \$15. These DC lamps, when assembled locally, can be sold at \$8.

The multiple activities undertaken by this potential enterprise will improve the financials of the business. Preliminary financial analysis for the production of only DC lamps revealed that given a loan of \$8,000 for a term of six years with an interest rate as low as 3 percent, the company will have to sell at least 5,000 DC lamps annually to break even. This cannot be easily achieved initially considering the fact that this business will be a new one, providing a new local product.

7. Conclusions and Recommendations

This study was carried out to assess the possibility of getting women in some communities in the Central Region to participate in energy micro-enterprises as a means of creating employment for women who have been left out of energy projects for so long. One very positive finding was that the community leaders and chiefs are more than eager to ensure that their people are gainfully employed to reduce the crime rate. Consequently, they have pledged to assist the project with a physical structure, as a temporary workshop, should the project take off and this will be a big advantage for women entrepreneurs.

It was also noted that though the project sounded foreign to many women, this challenge could be surmounted when they were provided with the requisite skills for such an enterprise and especially when a fellow woman is the champion. This suggests that prior to the commencement of the project, training sessions should be held where women would be exposed to entrepreneurship skills and basic business management techniques. Irrespective of the success story of the pilot project in Bangladesh, its feasibility in the Ghana context will require that adequate education and promotion of the business model is undertaken to ensure its successful adoption by the beneficiaries.

Based on the above analysis, therefore, the following recommendations are made:

1. Preparing a business plan for any of the studied communities will be rather immature at this stage since there are no operational women's group, and individual women entrepreneurs to pursue the projects are yet to be identified. In general, the enterprises being envisaged are not traditionally known to the people. Awareness creation among the women about the essence of the micro-enterprise and what they want to produce needs to be carried out to prepare the minds of the people, and especially women entrepreneurs, for the delivery of modern energy services.
2. Nyanyano presents the most appropriate option among the communities for siting the pilot of this project in an electrified community. This is because:

- The community is closest to the largest market for both AC and DC lamps in Accra, the capital town of Ghana;
- The procurement of components and tools from abroad and Ghana respectively can easily be facilitated in Accra;
- Most of the young women we met had at least nine years of basic education; their ages were between 17 and 35 years;
- The chief, his elders and the women expressed keen interest in the establishment of the enterprise; and
- The chances of identifying a woman entrepreneur in Nyanyano is higher than the other communities. The chief hinted that a couple of women who had the potential to take up such an enterprise were not available at the time of the visit. We intend to follow up on this positive development to meet the individual women.

It is therefore recommended that Nyanyano is selected as the pilot electrified community for this project and further work be done to identify a capable woman entrepreneur from the community to be the owner of the proposed project.

3. A new area where the rural communities are largely unelectrified will need to be identified and studied with the view to selecting one of the communities and identifying a women's group, or failing that, an individual woman entrepreneur for the other proposed project. Preliminary discussions with energy experts in Ghana suggest that a suitable place for this would be the Northern and Upper Regions. With this report, therefore, permission is being sought from the World Bank to enable KITE personnel to proceed with the feasibility study for three unelectrified communities in the Northern and Upper Regions and subsequent business plan preparation for the selected women's group or individual woman entrepreneur in one of the communities.

Energy Sector Management Assistance Program (ESMAP)

List of Technical Paper Series

Region/Country	Activity/Report Title	Date	Number
SUB-SAHARAN AFRICA (AFR)			
Africa	Power Trade in Nile Basin Initiative Phase II (CD Only): <i>Part I: Minutes of the High-level Power Experts Meeting; and Part II: Minutes of the First Meeting of the Nile Basin Ministers Responsible for Electricity</i>	04/05	067/05
Cameroon	Decentralized Rural Electrification Project in Cameroon	01/05	087/05
Chad	Revenue Management Seminar. Oslo, June 25-26, 2003. (CD Only)	06/05	075/05
Côte d'Ivoire	Workshop on Rural Energy and Sustainable Development, January 30-31, 2002. (French Only)	04/05	068/05
Ethiopia	Phase-Out of Leaded Gasoline in Oil Importing Countries of Sub-Saharan Africa: The Case of Ethiopia - Action Plan.	12/03	038/03
	Sub-Saharan Petroleum Products Transportation Corridor: Analysis and Case Studies	03/03	033/03
	Phase-Out of Leaded Gasoline in Sub-Saharan Africa Energy and Poverty: How can Modern Energy Services Contribute to Poverty Reduction	04/02	028/02
East Africa	Sub-Regional Conference on the Phase-Out Leaded Gasoline in East Africa. June 5-7, 2002.	03/03	032/03
		11/03	044/03
Ghana	Poverty and Social Impact Analysis of Electricity Tariffs	12/05	088/05
	Women Enterprise Study: Developing a Model for Mainstreaming Gender into Modern Energy Service Delivery	03/06	096/06
	Sector Reform and the Poor: Energy Use and Supply in Ghana	03/06	097/06
Kenya	Field Performance Evaluation of Amorphous Silicon (a-Si) Photovoltaic Systems in Kenya: Methods and Measurement in Support of a Sustainable Commercial Solar Energy Industry	08/00	005/00
	The Kenya Portable Battery Pack Experience: Test Marketing an Alternative for Low-Income Rural Household Electrification	12/01	05/01
Malawi	Rural Energy and Institutional Development	04/05	069/05
Mali	Phase-Out of Leaded Gasoline in Oil Importing Countries of Sub-Saharan Africa: The Case of Mali - Action Plan. (French)	12/03	041/03
Mauritania	Phase-Out of Leaded Gasoline in Oil Importing Countries of Sub-Saharan Africa: The Case of Mauritania - Action Plan. (French)	12/03	040/03
Nigeria	Phase-Out of Leaded Gasoline in Nigeria	11/02	029/02
	Nigerian LP Gas Sector Improvement Study	03/04	056/04
	Taxation and State Participation in Nigeria's Oil and Gas Sector	08/04	057/04
Regional	Second Steering Committee: The Road Ahead. Clean Air Initiative in Sub-Saharan African Cities. Paris, March 13-14, 2003	12/03	045/03

Region/Country	Activity/Report Title	Date	Number
Regional	Lead Elimination from Gasoline in Sub-Saharan Africa. Sub-Regional Conference of the West-Africa Group. Dakar, Senegal March 26-27, 2002. (French Only)	12/03	046/03
	1998-2002 Progress Report. The World Bank Clean Air Initiative in Sub-Saharan African Cities. Working Paper #10 (Clean Air Initiative/ESMAP)	02/02	048/04
	Landfill Gas Capture Opportunity in Sub-Saharan Africa	06/05	074/05
	The Evolution of Enterprise Reform in Africa: From State-owned Enterprises to Private Participation in Infrastructure — and Back?	11/05	084/05
Senegal	Regional Conference on the Phase-Out of Leaded Gasoline in Sub-Saharan Africa	03/02	022/02
	Elimination du Plomb dans l'Essence en Afrique Sub-Saharienne Conference Sous Regionales du Groupe Afrique de l'Quest. Dakar, Senegal. March 26-27, 2002.	12/03	046/03
	Alleviating Fuel Adulteration Practices in the Downstream Oil Sector in Senegal	09/05	079/05
South Africa	South Africa Workshop: People's Power Workshop	12/04	064/04
Swaziland	Solar Electrification Program 2001-2010: Phase 1: 2001-2002 (Solar Energy in the Pilot Area)	12/01	019/01
Tanzania	Mini Hydropower Development Case Studies on the Malagarasi, Muhwesi, and Kikuletwa Rivers Volumes I, II, and III	04/02	024/02
	Phase-Out of Leaded Gasoline in Oil Importing Countries of Sub-Saharan Africa: The Case of Tanzania — Action Plan.	12/03	039/03
Uganda	Report on the Uganda Power Sector Reform and Regulation Strategy Workshop	08/00	004/00
WEST AFRICA (AFR)			
Regional	Market Development	12/01	017/01
EAST ASIA AND PACIFIC (EAP)			
Cambodia	Efficiency Improvement for Commercialization of the Power Sector	10/02	031/02
	TA For Capacity Building of the Electricity Authority	09/05	076/05
China	Assessing Markets for Renewable Energy in Rural Areas of Northwestern China	08/00	003/00
	Technology Assessment of Clean Coal Technologies for China Volume I — Electric Power Production	05/01	011/01
	Technology Assessment of Clean Coal Technologies for China Volume II — Environmental and Energy Efficiency Improvements for Non-Power uses of Coal	05/01	011/01
	Technology Assessment of Clean Coal Technologies for China Volume III — Environmental Compliance in the Energy Sector: Methodological Approach and Least-Cost Strategies	12/01	011/01
Philippines	Rural Electrification Regulation Framework. (CD Only)	10/05	080/05
Thailand	DSM in Thailand: A Case Study	10/00	008/00
	Development of a Regional Power Market in the Greater Mekong Sub-Region (GMS)	12/01	015/01
Vietnam	Options for Renewable Energy in Vietnam	07/00	001/00
	Renewable Energy Action Plan	03/02	021/02
	Vietnam's Petroleum Sector: Technical Assistance for the Revision of the Existing Legal and Regulatory Framework	03/04	053/04

Region/Country	Activity/Report Title	Date	Number
SOUTH ASIA (SAS)			
Bangladesh	Workshop on Bangladesh Power Sector Reform	12/01	018/01
	Integrating Gender in Energy Provision: The Case of Bangladesh	04/04	054/04
	Opportunities for Women in Renewable Energy Technology Use in Bangladesh, Phase I	04/04	055/04
EUROPE AND CENTRAL ASIA (ECA)			
Russia	Russia Pipeline Oil Spill Study	03/03	034/03
Uzbekistan	Energy Efficiency in Urban Water Utilities in Central Asia	10/05	082/05
MIDDLE EASTERN AND NORTH AFRICA REGION (MENA)			
Regional	Round-table on Opportunities and Challenges in the Water, Sanitation and Power Sectors in the Middle East and North Africa Region Summary Proceedings, May 26-28, 2003. Beit Mary, Lebanon. (CD)	02/04	049/04
Morocco	Amélioration de l'Efficacité Energie: Environnement de la Zone Industrielle de Sidi Bernoussi, Casablanca	12/05	085/05
LATIN AMERICA AND THE CARIBBEAN REGION (LCR)			
Brazil	Background Study for a National Rural Electrification Strategy: Aiming for Universal Access	03/05	066/05
	How do Peri-Urban Poor meet their Energy Needs: A Case Study of Caju Shantytown, Rio de Janeiro	02/06	094/06
Bolivia	Country Program Phase II: Rural Energy and Energy Efficiency Report on Operational Activities	05/05	072/05
Chile	Desafíos de la Electrificación Rural	10/05	082/05
Ecuador	Programa de Entrenamiento a Representantes de Nacionalidades Amazónicas en Temas Hidrocarbúricos	08/02	025/02
	Stimulating the Picohydropower Market for Low-Income Households in Ecuador	12/05	090/05
Guatemala	Evaluation of Improved Stove Programs: Final Report of Project Case Studies	12/04	060/04
Honduras	Remote Energy Systems and Rural Connectivity: Technical Assistance to the Aldeas Solares Program of Honduras	12/05	092/05
Mexico	Energy Policies and the Mexican Economy	01/04	047/04
	Technical Assistance for Long-Term Program for Renewable Energy Development	02/06	093/06
Nicaragua	Aid-Memoir from the Rural Electrification Workshop (Spanish Only)	03/03	030/04
	Sustainable Charcoal Production in the Chinandega Region	04/05	071/05
Regional	Regional Electricity Markets Interconnections — Phase I Identification of Issues for the Development of Regional Power Markets in South America	12/01	016/01
	Regional Electricity Markets Interconnections — Phase II Proposals to Facilitate Increased Energy Exchanges in South America	04/02	016/01
	Population, Energy and Environment Program (PEA) Comparative Analysis on the Distribution of Oil Rents (English and Spanish)	02/02	020/02
	Estudio Comparativo sobre la Distribución de la Renta Petrolera Estudio de Casos: Bolivia, Colombia, Ecuador y Perú	03/02	023/02
	Latin American and Caribbean Refinery Sector Development Report – Volumes I and II	08/02	026/02
	The Population, Energy and Environmental Program (EAP) (English and Spanish)	08/02	027/02

Region/Country	Activity/Report Title	Date	Number
Regional	Bank Experience in Non-Energy Projects with Rural Electrification Components: A Review of Integration Issues in LCR	02/04	052/04
	Supporting Gender and Sustainable Energy Initiatives in Central America	12/04	061/04
	Energy from Landfill Gas for the LCR Region: Best Practice and Social Issues. (CD Only)	01/05	065/05
	Study on Investment and Private Sector Participation in Power Distribution in Latin America and the Caribbean Region	12/05	089/05
GLOBAL			
	Impact of Power Sector Reform on the Poor: A Review of Issues and the Literature	07/00	002/00
	Best Practices for Sustainable Development of Micro Hydro Power in Developing Countries	08/00	006/00
	Mini-Grid Design Manual	09/00	007/00
	Photovoltaic Applications in Rural Areas of the Developing World	11/00	009/00
	Subsidies and Sustainable Rural Energy Services: Can we Create Incentives without Distorting Markets?	12/00	010/00
	Sustainable Woodfuel Supplies from the Dry Tropical Woodlands	06/01	013/01
	Key Factors for Private Sector Investment in Power Distribution	08/01	014/01
	Cross-Border Oil and Gas Pipelines: Problems and Prospects	06/03	035/03
	Monitoring and Evaluation in Rural Electrification Projects: A Demand-Oriented Approach	07/03	037/03
	Household Energy Use in Developing Countries: A Multicountry Study	10/03	042/03
	Knowledge Exchange: Online Consultation and Project Profile from South Asia Practitioners Workshop. Colombo, Sri Lanka, June 2-4, 2003	12/03	043/03
	Energy & Environmental Health: A Literature Review and Recommendations	03/04	050/04
	Petroleum Revenue Management Workshop	03/04	051/04
	Operating Utility DSM Programs in a Restructuring Electricity Sector	12/05	058/04
	Evaluation of ESMAP Regional Power Trade Portfolio (TAG Report)	12/04	059/04
	Gender in Sustainable Energy Regional Workshop Series: Meso-American Network on Gender in Sustainable Energy (GENES) Winrock and ESMAP	12/04	062/04
	Women in Mining Voices for a Change Conference. (CD Only)	12/04	063/04
	Renewable Energy Potential in Selected Countries: Volume I: North Africa, Central Europe, and the Former Soviet Union, Volume II: Latin America	04/05	070/05
	Renewable Energy Toolkit Needs Assessment	08/05	077/05
	Portable Solar Photovoltaic Lanterns: Performance and Certification Specification and Type Approval	08/05	078/05
	Crude Oil Prices Differentials and Differences in Oil Qualities: A Statistical Analysis	10/05	081/05
	Operating Utility DSM Programs in a Restructuring Electricity Sector	12/05	086/05
	Sector Reform and the Poor: Energy Use and Supply in Four Countries: Botswana, Ghana, Honduras, and Senegal	03/06	095/06



Energy Sector Management Assistance Program (ESMAP)
1818 H Street, NW
Washington, DC 20433 USA
Tel: 1.202.458.2321
Fax: 1.202.522.3018
Internet: www.worldbank.org/esmap
E-mail: esmap@worldbank.org