United Nations Development Programme
Country: GHANA
PROJECT DOCUMENT[1]

Project Title: Promoting of Appliance of Energy Efficiency and Transformation of the Refrigerating Appliances Market in Ghana

UNDAF Outcome(s): Increased productive capacity for sustainable livelihoods, especially in the most deprived districts

UNDP Strategic Plan Environment and Sustainable Development Primary Outcome: Increased productive capacity for sustainable livelihoods, especially in the most deprived districts

UNDP Strategic Plan Secondary Outcome: Sustainable use of natural resources and good environmental management promoted

Expected CP Outcome(s): Establishment of regulatory framework for ensuring sustainable use of natural resources, water and energy for improved livelihood

CPAP Output(s): Sectoral policies and legislations harmonized to ensure integration of environmental concerns in the development agenda

Executing Entity/Implementing Partner: The Energy Commission
Implementing Entity/Responsible Partners: Ministry of Energy, Environmental Protection Agency

Agreed by (Government): Date/Month/Year

Agreed by (Executing Entity/Implementing Partner):

Date/Month/Year

Agreed by (UNDP):

Date/Month/Year

Programme Period:	2006-2011
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Project ID:	**00074729**
PIMS #	4003
Start date:	July 2011
End Date	June 2014
Management Arrangements	NEX
PAC Meeting Date	June 15th 2010

Total resources required	6 121 115 $
Total allocated resources:	6 121 115 $
✓ Regular (GEF)	1 722 727 $
Other:	
✓ Government (cash)	2 200 000 $
✓ Government (In-kind)	800 000 $
✓ UNDP	200 000 $
MLF	1 198 388$

Brief Description

The primary objective of the project is to improve the energy efficiency of appliances marketed and used in Ghana through the introduction of a combination of regulatory tools such as Minimum Energy Performance Standards and Information Labels (S&L), and innovative economic tools. The project will strengthen the regulatory and institutional framework, develop monitoring and enforcement mechanisms, and provide training to appliance professionals. The project will explore and test efficient market-based economic incentives complemented by repeated public outreach campaigns. Domestic refrigeration appliances will be the first end-use devices to be tackled, with a specific focus to address ozone depleting substances contained in the current stock of equipment.

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ACRONYMS

CDM	Clean Development Mechanism
CEPS	Customs, Excise and Preventive Service
CFL	Compact fluorescent lamp
CSIR	Council for Scientific and Industrial Research
CSIR-IIR	Institute of Industrial Research, CSIR
EC	Energy Commission
EE	Energy efficiency
EPA	Environmental Protection Agency
GDP	Gross domestic product
GEF	Global Environment Facility
GhEF	Ghana Energy Foundation
GHG	Greenhouse gas
GoG	Government of Ghana
GSB	Ghana Standards Board
HPMP	HCFC Phase-out Management Plan
MEPS	Minimum energy performance standards
MLF	Multilateral Fund
NARWOA	National Air-Conditioning and Refrigeration Workshops Owners Association
ODS	Ozone depletion substances
S&L	Standards and Labels
TPMP	Terminal Phase-out Management Plan

SECTION I: ELABORATION OF THE NARRATIVE

PART I: Situation Analysis

Context and Global Significance

With the advent of the 1998 drought that brought the water levels in the Volta River to one of the lowest levels since the construction of the Volta Dam, the era of cheap and plentiful renewable energy supplies in Ghana ended (Constantine, et. al., 1999) and brought about some of the initial efforts targeted at analyzing energy efficiency opportunities. Drought-induced power shortages in 1998 hampered industrial and service sector outputs and limited GDP growth to 2.0%, with rolling blackouts into 2000. With increasing domestic demand and limited hydroelectric supplies, Ghana began relying on oil-fired thermal electric generating plants to meet new electricity demands. Recognizing the potential benefits of energy efficiency, the Ghana Energy Foundation was formed, and a process of energy efficiency regulatory and programmatic development was begun.

The first energy efficiency regulations in Ghana were promulgated in 2005 with the law on air conditioners and compact fluorescent lights. Air conditioners were chosen as the first target of new energy efficiency regulations because of their role in the growth of peak electricity demand, and because much of the market in Ghana consists of new equipment. Thus air conditioners represented a simpler regulatory enforcement challenge than other appliances like refrigerators which are supplied largely through either domestic or imported used appliance supplies. The regulation of CFL's was undertaken to support market transformation programs that include subsidized distribution by helping assure the quality of the higher efficiency lighting products that consumers are being encouraged to buy.

Refrigerating appliances consume an average of 1,140 kWh/year in Ghana, or approximately three times more energy than the maximum allowed in countries with robust standards and labeling programs. Such inefficient appliances result in US$50 to US$100 per year of potentially unnecessary electricity expenses for a typical owner which he/she can ill- afford. The wasteful consumption of electricity results in more than 0.7 tons per year of CO_2 emissions per appliance, and uncontrolled release of ozone depletion substances (ODS) from used appliances can result in the equivalent of another 2 tons of CO_2 every time an inefficient, used appliance is improperly disposed or replaced. With about 2 million inefficient refrigeration appliances in use throughout Ghana, the economic cost of such inefficiency is many hundreds of millions of dollars to the national economy, while the avoidable greenhouse gas emissions is many millions of tons of CO_2 over the long term. Such economic and environmental damage needs to be mitigated by replacing inefficient, used refrigeration appliances in Ghana with more efficient and environmentally friendly versions of the same appliance.

Barrier Analysis

Many countries have introduced energy efficiency programs. The different policy and program tools available include labeling programs[2] minimum energy performance standards (MEPS),[3] and consumer rebate and incentive programs for the purchase of more efficient appliances. Each of these tools has proven to be highly effective approaches when targeting household demand. Many barriers, however, prevent the implementation of labeling, minimum energy performance standards, and consumer education and incentive programs and the penetration of higher efficiency appliances in Ghana and they include the following:

Lack of knowledge in the ministries and institutions in charge of enforcing labeling regulations on how to specifically proceed to implement and enforce regulations and how to develop support programs for Standards and Labels (S&L) in order to speed up the market transformation process;

Little information is available at the government level on the potential impact and cost effectiveness of S&L programs;

Customers lack information about the availability of energy efficient equipments and the cost effectiveness of investing in efficient appliances;

Inefficient pricing of energy services has resulted in unrealistic electricity tariffs that do not encourage energy conservation and adoption of energy efficient appliances;

Many consumers lack access to credit or capital, so that even a relatively small increase in first cost can be a severe barrier to purchasing a more efficient appliance; thus the need for a rebate program;

Lack of sustainable financing mechanisms and systems for maintaining energy efficiency incentive, rebate and education programs;

Local retailers are uncertain about the market demand of high efficiency models and lack the capacity to market these appliances. This and the former point lead retailers not to offer a sufficient range of efficient equipment because of the low demand for this type of appliance;

Lack of national experience and installations for testing household appliances according to international standards;

Lack of control on import of used refrigerators and freezers;

Lack of local manufacturing capacity; and

Availability of cheap used refrigerators on the local market.

Weak Policy, Legal and Regulatory Framework

In Ghana, a policy, legal and regulatory framework for energy efficiency has recently been developed and adopted. However, the adaptation of this framework into implementable activities requires tremendous efforts. There is currently a lack of information and know-how about how to proceed efficiently with these important steps. Without support, it is likely that the full implementation will take more time than if the Ghanaian Government can benefit from the experience gathered in other countries. The present project addresses this barrier with a comprehensive component on the strengthening and implementation of the policy,

[2] Energy Efficiency Standards and Labels (S&L) are complementary policy tools, which are instrumental in promoting a sustainable energy path. S&L programs compare favorably to other governmental energy policies because of their low cost of implementation and ability to transform the market of appliances in the long term.

[3] MEPS are regulations that prescribe a minimum energy performance for equipment or appliances. Energy efficiency labels are informative labels affixed to manufactured products indicating their energy performance and aiming at changing the perception and purchasing habits of customers. Energy Efficiency Standards and Labels (S&L) are complementary

legal and regulatory system. GEF involvement will provide the necessary resources for capacity building and this will be main catalyst to increase the efficiency of the in-kind effort that will be provided by the government and stakeholders.

Limited Institutional capability

In Ghana, the coordination between the various government ministries responsible for standard and labeling development, then implementation and enforcement is difficult. There is currently no experience on how a structured enforcement program should be implemented, and there is no laboratory that could perform energy efficiency test on household appliances. Often, the laboratory equipment does not exist and when it exists, the human resources of the laboratory are not trained to perform the required tests according to international standard. In order to have a measurable impact, this project will undertake a multi-sectoral approach to ensure that the energy efficiency measures are incorporated in the sectoral programs of the country. The GEF support is also essential to bring together the human resources needed for capacity building at the local laboratories and to train them and others stakeholders about internationally recognized ISO standards for equipment testing and adequate procedures for enforcement.

Low Public Awareness and Retailers Interest

Some stakeholders' perception is to the effect that the energy labeling system is not yet mature for the economic environment of Ghana and in general is better suited for industrialized markets where the purchasing power is higher. Awareness of the opportunities offered by the energy labeling system for household appliances and the associated energy savings is low among the general public and the retailers. This lack of information and awareness implies that both the demand and the supply for energy efficient appliances are minimal. As a consequence, the sales levels are very low for energy efficient appliances. There is therefore a need for dissemination of information on Standards and Labels benefits and opportunities to the general public and retailers in order to raise public awareness and generate activities in the sector. Such a process is the key option to building public confidence and acceptance regarding the energy labeling system. GEF involvement will allow the support of targeted awareness activities aimed at convincing the local retailers and the general population of the benefit of introducing higher efficiency appliances in the market. These efforts from the GEF will be complemented by local NGOs efforts.

Lack of Local Manufacturing Capacity

Currently, there is no local manufacturer of refrigeration appliances in Ghana, and there are no incentives to encourage local entrepreneurs to establish a manufacturing facility for refrigeration appliances that could compete with the current international trend of energy efficient household equipments. Local entrepreneurs are generally unaware that the manufacture of energy efficient refrigeration appliances is possible with minimal investment, and they also do not see the possible market for this category of appliances yet. The GEF funding will be used to bring experienced international experts that can run complex model of appliances and demonstrate the various ways, by which energy gains can be achieved with minimal investment in modern manufacturing technologies. Without GEF support, it is very unlikely that local manufacturing capacity will achieve this leap in technology in the near future.

Lack of Sustainable Financing for Accelerating Efficiency Improvements

Currently there is a lack of effective financing models and mechanisms for providing efficient and sustainable financing for appliance energy efficiency improvement programs. GEF funding will enable both the pilot testing of efficient appliance rebate and turn-in schemes that may eventually be financeable through carbon credits or government loan guarantee schemes or a combination of the two. If project activities can remove these barriers to efficient programs then, the project has the potential to have a positive impact that is many times greater than the programs that are funded directly.

The barriers presented above slow down the penetration of higher efficiency appliances in Ghana.

Overview of regulatory process

Regulations

The regulatory process for implementing appliance and equipment energy efficiency standards in Ghana begins with the Energy Commission. The Energy Commission's seven commissioners are appointed by the President of Ghana and the Minister responsible for Energy has ministerial responsibility for the Commission. Once an energy regulation is formulated by the Commission in consultation with the Ministry of Energy, the regulation is submitted to the Minister of Energy to be forwarded to the Attorney General for legal drafting. Once the formal legal draft of the regulation is available, the Minister of Energy presents it the Cabinet for approval, after which the Cabinet refers it the Parliament. The Parliamentary Select Committees on Subsidiary Legislation, and Mines and Energy then review the regulation and refer the regulation to the Parliament for a vote, after which it becomes law.

Politically, energy efficiency regulations in Ghana appear uncontroversial. To date the experience with the air conditioner and compact fluorescent lamp (CFL) energy efficiency law that was passed in 2005 appears favorable. And all sectors recognize the large economic benefits that are likely to accrue from energy efficiency standards and agree in principle that inefficient, used appliances that generate high utility bills should be discouraged to the maximum extent feasible. The only issues with any potential controversy appear to be those surrounding what methods of implementation and enforcement are likely to be the most feasible.

The Environmental Protection Agency (EPA) has regulatory functions (licensing and quota systems) of ozone depletion substances (ODS) and later also hydrofluorocarbons (HFCs). The EPA regulates ODS refrigerants and through the Ministry of Environment Science and Technology, alerts Parties to MP regarding used goods, primarily refrigerators containing ODS that may not be exported to Ghana.

Enforcement

The enforcement institutions in Ghana for energy efficiency standards are the Ghana Standards Board and the Customs, Excise and Preventive Service. The Ghana Standards Board maintains at all major ports in Ghana standard officers and inspectors charged with enforcing standards requirements on incoming shipments of goods. Meanwhile the Customs,

Excise and Preventive Service is charged with collecting customs and duties that are due on incoming shipments. The details of exactly how energy efficiency standards will be enforced on incoming shipments of goods still has to be worked out. The current formulation of the energy efficiency law requires shipments of goods to be turned back if they are not standard compliant. Yet, it is also possible that a method of customs fines and duties may be implemented for non-compliant goods as long as the fines are high enough to discourage inefficient product imports and to compensate for the damage to the national economy and consumers through the use of such inefficient products.

Stakeholder Analysis

The main stakeholders of this project include:

Energy Commission
Environmental Protection Agency (including its National Ozone Office)
Institute of Industrial Research, CSIR
Ghana Energy Foundation
Ghana Standards Board
Customs, Excise and Preventive Service
Repair and Maintenance: National Air-Conditioning and Refrigeration Workshops Owners Association (NARWOA), Ghana
Refrigerator Importers
Refrigerator Retailers e.g. Somotex Ghana Limited and Bosch Siemens Home Appliances Group
Consumer Groups
Financial Institutions (Banks)
Other Development Partners e.g. GTZ (a German sustainable development assistance agency)

Energy Commission

The Energy Commission (the Commission) is the regulating body for the Government of Ghana. There are seven commissioners appointed by the President of the country for various periods ranging from three to five years, and are eligible for re-appointment thereafter. The Commission was established by the Energy Commission Act 541 of 1997 with the authority for the formulation and promulgation of standards and regulations for the energy sector in Ghana. As such, it is the starting point for the formulation of energy efficiency standards in Ghana, and has a current set of commissioners who are extremely supportive of energy efficiency standards and labeling programs.

In addition to formulating regulations, the Commission is responsible for setting policy and procedures with regards to the continuing practicalities of enforcement. For example, under the current air conditioner and CFL efficiency regulation, the Commission is responsible for (1) certifying officers that supervise compliance with the labeling laws; (2) considering petitions challenging product seizures; and (3) disposing of forfeited shipments of non-compliant goods, among others.

The Commission is the Executing Agency of this project and it will implement and manage the project. The Commission will work closely with research institutions such as the Institute of Industrial Research, CSIR and build private-public partnership to ensure sustainable impact of the project.

Environmental Protection Agency

The Environmental Protection Agency (EPA) is the leading public body for protecting and improving the environment in Ghana. It was set up (initially as the Environmental Protection Council) over 30 years ago and it has offices across Ghana working on and carrying out Government policy, inspecting and regulating businesses and reacting when there is an emergency such as a pollution incident. A twelve-member board of directors, appointed by the President of Ghana, supervises its operations, and the management of its day-to-day operations is directly under an Executive Director and seven divisional heads (Directors).

As part of its corporate objectives, EPA seeks to: i) Create awareness to mainstream environment into the development process at the national, regional, district and community levels; ii) Ensure environmentally sound and efficient use of both renewable and non-renewable resources in the process of national development; and iii) Guide development to prevent, reduce, and as far as possible, eliminate pollution and actions that lower the quality of life.

The EPA has an Ozone Office, which has worked closely with Repair and Maintenance: National Air-Conditioning and Refrigeration Workshops Owners Association (NARWOA) for several years in training workshops on the substitution of chlorofluorocarbon (CFC) refrigerants with hydrocarbons in refrigeration systems. It was also instrumental in establishing the legislation and a licensing system for Ozone Depleting Substances.

The EPA proposes to embark on projects on (i) the phasing out of hydrochlorofluorocarbon (HCFC) based appliances; and (ii) the complimentary pilot project for the recovery and disposal of ODS. There are great opportunities for synergy between these projects and this project on the promotion of energy efficient refrigerators.

Institute of Industrial Research, CSIR

The research activities that have been carried out in support of the Ghana refrigerator and refrigerator-freezer efficiency standards were conducted by the Institute of Industrial Research (CSIR-IIR) of the Council of Scientific and Industrial Research (CSIR). The CSIR-IIR is one of the thirteen research institutes under the CSIR that was established as a public sector institution by the Government of Ghana with the mandate to undertake and co-ordinate research and development activities for the socio-economic development of Ghana.

The mission of the CSIR-IIR is "to drive national development and global competitiveness in industry through scientific and technological research." The key research and development programs of the CSIR-IIR are: i) Energy Technologies; ii) Environmental Management; iii) Materials and Manufacturing; and iv) Information Management. The CSIR-IIR coordinated and implemented the field research and data collection related to refrigerator and refrigerator-freezer energy efficiency standards in Ghana under its Energy Technologies Program.

Ghana Energy Foundation

The Ghana Energy Foundation (GhEF) was established in November 1997 by the Private Enterprise Foundation in collaboration with the Government of Ghana to promote sustainable development and efficient consumption of energy in all of its forms in Ghana.

The GhEF has extensive experience in developing and implementing energy efficiency policies and programs in Ghana. To a large extent, the implementation of mandatory energy efficiency standards with regards to air conditioners, is the result of a multi-year initiative by GhEF to promote energy efficiency and to push legislation through the Ghanaian Parliament in a bi-partisan manner. The GhEF recently organized a national program to distribute more than 6 million energy efficiency compact fluorescent lights to households as a measure to mitigate shortfalls in electricity supply that hit the country in 2006-2007. The GhEF also organized Ghana's first residential energy use survey (RECS), which thoroughly surveyed appliance use in a statistically representative sample of 3,000 households throughout the country. The GhEF is very actively involved in public education and implementation activities related to the new air conditioner standard. The GhEF also coordinated closely with the CSIR-IIR on the research conducted in support of the current refrigerator and refrigerator-freezer standard.

Customs, Excise and Preventive Service

Together with the Ghana Standards Board, the Customs, Excise and Preventive Service (CEPS) will be responsible for the enforcement of energy efficiency standards in Ghana. The CEPS is headed by the Commissioner who is appointed by the President on the advice of the Council of State. The Commissioner is supported by Deputy Commissioners in charge of i) Finance Administration and Human Resource; ii) Operations; iii) Preventive Service; and iv) Research/Monitoring and Planning.

Ghana Standards Board

The Ghana Standards Board (GSB) is the national standards body, and it supports the National Quality Infrastructure. The mission of the GSB is to contribute towards the strengthening of the economy of Ghana and towards the enhancement of the quality of life for all her people through the promotion of standardization. The GSB was established in 1967, and its key services include: i) national standards development and dissemination; ii) testing; iii) inspection; iv) product certification; and v) destination inspection of imported high-risk goods. The GSB has already established the minimum energy performance standard for refrigeration appliances in Ghana and this project is intended, among others, to strengthen the structures to facilitate the implementation of the standard. The GSB will work with the Customs, Excise and Preventive Service to ensure that quality standards are maintained for appliances coming into the Ghanaian market.

Repair and Maintenance: National Air-Conditioning and Refrigeration Workshops Owners Association (NARWOA)

The National Air-Conditioning and Refrigeration Workshops Owners Association (NARWOA) is a nationwide Trade Association of over 5,000 owners of repairer workshops of air conditioners and refrigerators in Ghana. It was established in 1988, with its headquarters in Accra. The Association has a good track record as being well-organized and being interested in undergoing training for greater efficiency and to explore new market opportunities in their business. The Ozone Office of Ghana's Environmental Protection Agency has worked closely with this Association for several years in training workshops on the substitution of CFC refrigerants with hydrocarbons in refrigeration systems.

Refrigerator Retailers

The potential refrigerator retailers include: i) Somotex Ghana Limited, Ghana; and ii) Bosch Siemens Home Appliances Group, Germany. Somotex Ghana Limited has more than 10 years experience in Ghana's electronics and appliances industry and it has 12 showrooms across the country as well as a full-fledged service and logistics facility. It has been a leading household name in the country known for quality products and service. The firm seeks to expand its portfolio of electronics appliances and plans to establish many more showrooms in the country in the years to come.

Bosch Siemens Home Appliances (BSH) Group is a corporate group operating worldwide, and together with a global network of sales and customer service firms, the BSH family is today made up of about 60 companies in almost 40 countries. Within a comprehensive brand portfolio, the main brands are Bosch and Siemens. The product range encompasses large and small home appliances, floor-care and hot water appliances. BSH is the largest manufacturer of home appliances in Germany and Europe, and one of the leading companies in the sector worldwide.

Other Development Partners

The German sustainable development assistance agency, GTZ, has also expressed interest in participating and supporting this project. The Bosch and Siemens Home Appliance Group has a track record of successful public-private cooperation with GTZ in activities including: i) Development of the approved CDM methodology AMS III.X., which credits both energy savings from refrigerator replacement programs; ii) Preparation of a CDM Program of Activities for demand-side management programs of Brazilian utilities to distribute high-efficiency refrigerators to poor households, as well as retail models; and iii) Advising the Voluntary Carbon Standard on its guidelines for VER methodologies to credit Montreal Protocol gases.

PART II: STRATEGY

Project Rationale and Policy Conformity

As the standard of living in Ghana improves, energy expenditures are expected to grow rapidly as more people obtain electricity and purchase refrigeration and space conditioning appliance for their basic comfort and household energy needs. Domestic refrigeration appliances accounts for a significant portion of the residential electricity consumption in Ghana, and refrigerators are the first main appliances to be purchased by households. Domestic refrigeration appliances present a significant potential for energy efficiency improvement (typically 50 percent in cost effective energy savings) and appear always as a priority in any market transformation strategy.

The project seeks to promote energy efficiency standards for refrigeration appliances in Ghana, and demonstrate replicable and scalable equipment turn-in and replacement program that removes inefficient and environmentally damaging appliances from the market and replaces them with more efficient and environmentally friendly models. By removing the barriers that currently inhibit the adoption of efficient refrigeration appliances; the project will allow Ghanaian households and businesses to reduce their energy expenditures while improving quality of life. Potential annual energy savings range from 30 percent to 50 percent depending on the success level of market transformation incentives and programs.

The project's global objective is to reduce Ghana's energy-related CO_2 and ozone depleting substance (ODS) emissions by mitigating the demand for energy in the country's refrigeration and air conditioning sector and by encouraging recovery, recycling and/or destruction of environmentally damaging refrigerants. This will be accomplished through the implementation of energy efficiency measures and standards for refrigeration appliances and also through the creation of a turn-in and replacement program for inefficient appliances and the ODS that they contain. The project activities will ensure that future refrigeration appliances meet acceptable efficiency, performance and environmental requirements in order to limit energy consumption and protecting the ozone layer.

Past energy efficiency initiatives in Ghana, have made good progress on promoting the efficiency of lighting and air conditioning, but the promotion of energy efficiency in the Ghanaian market need to be expanded to include refrigeration appliances which has high penetration rates in Ghanaian households. As a result, the technical capabilities of government institutions such as the Energy Commission, the Institute of Industrial Research (CSIR-IIR) and academic and private experts and technical institutions agencies must be reinforced in order to support the government's efforts to promote energy efficiency standards for an expanding number of appliance and equipment types.

The private sector, especially professionals such as scientists and engineers, has a key role to play in ensuring the dissemination and adoption of energy efficiency standards. Without a program of technical training, outreach and mobilization, it is doubtful that the private sector will be sufficiently empowered to implement creative energy efficiency standards and market transformation programs that can work well in the difficult Ghanaian socio-economic environment. Because of shortages of cash and capital, there is a large informal market for used inefficient goods (including a large percentage of refrigerators which are used) that will require skilled program design and intensive monitoring to be successful.

The requirements for a comprehensive capacity building and outreach program, along with strengthening the necessary legal, regulatory and institutional frameworks, are in line with GEF 4 Strategic Objective Climate Change Mitigation Programme 1 "To promote energy-efficient technologies and practices in appliances and buildings". Without GEF intervention, it is not clear that the government would be able to put in place a comprehensive policy initiative to integrate energy efficiency standards with voluntary market transformation programs like the turn-in and rebate program envisioned in this project.

The project proposes to work closely with the private sector to ensure that regulatory proposals and technical standards are widely disseminated and adopted throughout local industries and businesses. The proposed market transformation activities are designed to effect sustainable changes in three areas: (i) decision-makers and consumers of all types of energy-efficient and ODS-free refrigeration appliances; (ii) professionals such as engineers who advise decision-makers and manage the environmental aspects of energy and refrigerant management; and (iii) refrigeration repair and maintenance technicians to sell, recover, recycle and dispose of refrigerants that for the most part are ODSs.

This project is aligned with a number of regional and national GEF projects that have sought to introduce energy efficiency regulations. It seeks to build upon past successes by ensuring a tight integration between government agencies responsible for establishing the proper regulatory framework and the private sector operators who will be responsible for implementing energy efficiency regulations. Extensive consultations with public and private sector stakeholders through regular meetings, workshops and interviews have reaffirmed the willingness of the private sector to support this initiative as long as they are involved in it from the conception and design phase.

This GEF-funded project is aligned to the over-arching strategy for the refrigeration sector in Ghana involving various funding-sources and which is presented in this document in Annex C. This strategy ensures synergies are obtained from the various programmes involving the refrigeration sector and project future possibilities for funding that would ensure that the current programmes would remain sustainable.

Project Goal, Objective, Outcomes and Outputs/Activities

The project has been designed to erase some of the most significant barriers above and allow a faster transformation process for the market for refrigeration appliances in Ghana. Each outcome has been selected to address one particular category of barriers. The project is to establish an energy labeling system, setting and implementing a Minimum Energy Performance Standards (MEPS) and pushing efficiency levels beyond the mandatory standard through a consumer rebate, turn-in and incentive program.

The project has eight components:

<u>Component 1 Strengthening of regulatory and institutional framework</u>

This component provides technical assistance and capacity building to the government so it can proceed with S&L implementation. The component also includes support to facilitate access to information on the types of support and enforcement programs that can be

introduced in parallel to the legislation. The objective of this component is to create sufficient expertise within the government, so that it can undertake the implementation of the regulations and support programs for refrigeration appliances and equipment.

Component 2 Design of certification, labeling and enforcement systems

This component will provide the government agencies and at least one selected laboratory with support for the design of enforcement procedures and for the testing of appliances. The enforcement procedures will cover the manufacturers, importers and retailers and will ensure that all market actors are informed and are following the new regulation. This also includes the development of a market follow-up tool that will be required to provide the higher level of government with hard facts about the efficiency of the regulation, the evolution of the market and the impact of the programs introduced. Such monitoring will be useful both for the evaluation of impact of this project and to support the future government policy in the S&L domain.

Component 3 Training and public outreach

This component will support the information and awareness activities that are needed to change the perception of the customers about the importance of purchasing higher efficiency appliances and the cost effectiveness of doing so. This will be achieved through the preparation of a marketing plan and the implementation of marketing activities by local and international retailers. The customers, through better information, will react and begin to pay attention to the label and to the category of efficiency of the appliance they purchase.

Component 4 Establishment of refrigerating appliance test facility

This component first provides the design and cost estimates for a refrigeration appliance test facility. Subsequently, the refrigeration appliance test facility will be built and commissioned. Linkages will be sought with ongoing Terminal Phase-out Management Plan (TPMP) and upcoming HCFC Phase-out Management Plan (HPMP) programs funded by the Multilateral Fund (MLF) which also address the refrigeration sector from an ODS (Ozone Depleting Substances) perspective.

Component 5 Used appliance collection and disposal facilities

In this component a number of appliance-disposal facilities will be established in support of programs to replace inefficient used refrigeration appliances. Training and capacity-building activities will be conducted for the Ghana refrigeration appliance industry so that it understands environmentally friendly technologies and procedures for the collection and disposal of appliances and ODSs. The project will then formulate bid documents for used refrigerator collection and disposal services for the pilot programs included in this proposal. After bidding, a contract will be signed for used refrigeration appliance collection and disposal services for the project. The GEF-efforts will be complemented by a demonstration project in ODS-waste disposal centre funded by the MLF which will transport the ODS that is being recovered from the various GEF-funded collection centers to a central location in Accra for reclaiming and destruction. This MLF contribution will be added to the list of co-financing sources to the GEF programme.

Component 6 Efficiency program evaluation and monitoring capacity development

In this component, national professionals will be trained in energy efficiency program monitoring and evaluation study design, methods, technologies and procedures. There will also be a review of monitoring technologies and metering equipment which will be followed by subsequent field testing of the most promising monitoring and metering technologies. This component will conclude with the bid and contracting of the rigorous evaluation and monitoring services needed for impact evaluation of the pilot rebate and turn-in programs described in the next component.

Component 7: Conduct of refrigeration appliance rebate and exchange program

For this component, an appropriate refrigeration appliance rebate and turn- in program will be developed and implemented. The program will establish selection criteria which will include equipment that could have energy consumption improvements through subsidized replacement of the refrigerant. The refrigeration appliance rebate and turn-in program will include subsidies on new efficient refrigerators that will be mainly financed by the Government of Ghana, with equipment support from GEF.

A rigorous program impact evaluation study will be conducted to provide data on the impact of the rebate and turn-in program. The results of the impact evaluation study will be disseminated so that the information becomes well-documented and widely known.

Component 8: Financial design of follow-up national market transformation programs

This component will formulate business plans and finance models for several program follow-up and scale-up scenarios. Amongst the program follow-up financing options, carbon finance potentials for program follow-up will be accurately estimated and publicized. In addition, designs for loan guarantee and capital financing programs that can facilitate follow-up implementation will be formulated and publicized.

At the global level, the project will limit the growth in energy demand from the household sector, and will ensure measurable and sustainable global benefits in slowing the growth rate of GHG emissions resulting from the combustion of carbon based fuels and the consumption of electric power, which in turn will contribute to the mitigation of climate change.

OUTCOME 1: STRUCTURES AND MECHANISMS FOR IMPLEMENTATION OF APPLIANCE ENERGY EFFICIENCY STANDARDS AND LABELS (S&L) STRENGTHENED (US$308,869 including US$50,000 from GEF)

An enabling Regulatory and Institutional Framework for Appliance Energy Efficiency Standards and Labels (S&L) for refrigeration appliances has been developed and adopted, with funding by the Government of Ghana through the Energy Commission. The Energy Efficiency Standards and Labeling (Refrigerator, Refrigerator-Freezer and Freezer) Regulations, LI 1958 was passed by Parliament in November 2009. The purpose of this outcome is to strengthen the structures and mechanisms to support the implementation of the energy efficiency standards for refrigeration appliances under this Regulation. Technical

assistance and capacity building will be provided to the Government so it can proceed with S&L implementation.

Output 1.1 – S&L implementation regulations reviewed through stakeholder consultations

Implementation of energy efficiency standards for refrigeration appliances in Ghana will be extremely challenging. Perhaps over 80 percent of imported refrigeration appliances in Ghana are used and are likely to be inefficient and using refrigerants that are damaging to the ozone layer.

This output will consist of a technical, legal and stakeholder review of the S&L implementation regulations to address the following questions and issues:

What is the capacity of the private sector to comply with the standards and how can voluntary programs help build capacity for private sector compliance?

What are the various means and mechanisms for non-compliance and how can both monitoring, enforcement and incentive programs increase compliance?

How can the impact and the scope of the efficiency standards be expanded through both future regulation and voluntary programs to enable continued improvement in refrigeration appliance environmental and energy performance?

Are there ways in which the legal and regulatory framework of standards and labeling programs can be improved to enhance the effectiveness of implementation?

Activities:

Conduct a technical and legal review of the appliance standards regulations in Ghana in the context of best international practices

Conduct a stakeholder consultation for reviewing the standard and the posing key issues and questions

Training sessions to regulatory staff reviewing regulation and implementation responsibilities

Produce review report documenting results

Output 1.2 – Consulting and advice provided to enforcement authority staff and government ministries, departments and agencies, involved in S&L program

The capabilities of government agencies that are responsible for enforcing and monitoring compliance of the energy efficiency standards will need to be strengthened. The Government of Ghana has clear mechanisms for enforcement with specific enforcement monitoring and oversight responsibilities relegated to the Ghana Standards Board, Customs and the Energy Commission respectively.

Activities:

- Design monitoring and enforcement plan and schemes
- Conduct capacity building sessions for stakeholders on monitoring and enforcement

Output 1.3 – Monitoring and data collection studies performed for end-use sales and appliance energy use.

Some fairly comprehensive surveys and monitoring of refrigeration appliance sales and energy use have been performed in Ghana some years ago. For instance, the Energy Commission initiated in 2006 a national survey that involved the measurement and evaluation of the energy consumption and efficiencies of refrigerators in 1000 households throughout Ghana. The baseline data on refrigerators in Ghana is summarized in Annex A. However, there remain substantial and significant baseline information gaps that need to be filled and updated in order to effectively design market transformation programs and regulations. These gaps include: (1) a lack of information on the more informal refrigeration appliance markets; (2) lack of detailed information on appliance prices on the relationship between prices and efficiency, (3) lack of information regarding consumer willingness to pay for different appliances and appliance features; and (4) a lack of detailed information on appliance distribution networks, repair services, and sales.

Activities:

- Obtain stakeholder input on remaining baseline information gaps with respect to refrigeration appliance efficiency and refrigerants
- Design data collection instruments for filling remaining information gaps
- Conduct additional baseline information collection

OUTCOME 2: NATIONAL TESTING, CERTIFICATION, LABELING AND ENFORCEMENT MECHANISMS AND INFRASTRUCTURE ADOPTED (US$ 422,758 including US$60,00 from GEF)

While some efficiency, testing, certification, labeling and enforcement mechanisms and infrastructure has been established in Ghana as part of the country's air conditioner efficiency standards, the infrastructure for refrigeration appliances is currently lacking. This output addresses this key gap.

Output 2.1 – National testing and certification procedures defined

This output will develop the procedures for the enforcement and for the testing, certification and monitoring of refrigeration appliances with standards and labeling requirements. The enforcement procedures will cover the manufacturers, importers and retailers and will ensure that all market actors are informed and are following the new regulation.

The Ghana Standards Board has already adopted international test standards for domestic refrigerators but for routine monitoring of compliance and estimation of program impacts a much easier and cheaper quick test will be needed for field verification. Therefore this output will review stakeholder input on the enforcement and monitoring scheme. Procedures for the scheme will be documented in detail and a draft set of procedures will be produced. These draft procedures will include an inexpensive field verification protocol that can be used for routine monitoring of labeling and standards compliance without the necessity of formal test laboratory results. The consistency between formal ISO test results and rapid evaluation field performance will be then be tested and verified to establish error tolerances for compliance evaluation using quick test results. Final draft procedures will be reviewed in a stakeholder consultation and then finalized procedures will be adopted.

Activities:

Review material from Output 1.2

Compile and compose draft procedures

Define field quick test protocol

Verify field quick test protocol with ISO tested and certified refrigeration appliances and establish error tolerances for quick test from field verification results

Hold stakeholder consultation to review draft testing and certification procedures

Finalize procedures

Output 2.2 – Verification and enforcement procedures developed and state inspectors trained

This output will provide training and field verification of the certification and enforcement procedures. Even for refrigeration appliance suppliers that are participating in the pilot tests included in this project, some level of certification and enforcement will be necessary. The certification and enforcement of labeling and performance standards for appliances participating in the pilot projects will provide both training and field testing opportunities for the certification and enforcement procedures.

Activities:

Design and produce initial training materials for certification and enforcement procedures for enforcement officials, importers, distributors and retailers

Provide training to first batch of program participants

Develop field test certification and enforcement procedures for efficient appliances participating in pilot project, in coordination with pilot project development

Produce report on field test results

Review and finalize training materials and modalities

Implement large-scale training program for labeling certification and enforcement

OUTCOME 3: INCREASED CONSUMER'S AND RETAILER'S AWARENESS AND IMPROVED MARKETING OF APPLIANCE ENERGY EFFICIENCY STANDARDS AND LABELS (US$620,000 including US$150,000 from GEF)

The awareness of the opportunities offered by energy efficient appliances and the associated energy savings is low among the general public and the retailers in Ghana. This low awareness has resulted in a situation where both the demand and the supply for energy efficient appliances are minimal. As a consequence, the sales levels are very low for energy efficient appliances. The project will embark on the dissemination of information on the benefits and opportunities from energy efficient appliances to retailers and the general public in order to raise public awareness and generate activities in the sector.

The strategy is in line with the 5 year Residential Demand Side Management Plan of the Ministry of Energy under its Medium Term Energy Strategy, which emphasizes an objective to "to create awareness among residential consumers of opportunities for energy efficiency". Additionally, the 2009 Budget Statement of the Government of Ghana mentioned that "the Ministry of Energy will implement measures to improve energy conservation in electricity consumption through energy management and efficiency projects in public institutions and also public education on energy conservation".

Effective standards-setting and labeling programs require a communications campaign to support acceptance and use of the new standards and/or labels. Consumers and retailers need encouragement and stimulation to change their behavior.

Output 3.1: Enhanced awareness and knowledge of retailers' management and retail staff trained in appliance energy efficiency issues and sales rationales.

This output will facilitate the building of capacity of salesmen of refrigeration appliances to market efficient appliances. The current demand for this type of appliance remains low and as a result, salesmen do not offer a sufficient range of efficient equipment due to the uncertainty about the market demand of high efficiency models.

Most retailer staff (salesmen) lack specific knowledge and arguments to enable them to convince the consumers to purchase energy efficient appliances. Retail staff need to be trained to provide customers with proper information on the benefits to purchase more expensive, but energy efficient appliance, and to increase the number of labeled appliances in their shops.

It is expected that as consumers become more conscious of the benefits of energy efficient refrigeration appliances, retailers of the appliances may experience not only increase in sales, but also gain an advantage over competitors and improve their corporate image.

The activities related to this outcome aim to make refrigerator retailers aware of efficient refrigerators. When this information is clearly communicated to retailers, they can prepare to meet this new demand for efficient appliances. The activities will be coordinated by the Energy Commission and the CSIR-Institute of Industrial Research.

Activities:

Organize awareness campaign for management of retailers of energy efficient refrigeration appliances – information sessions, in-house presentations, and mass media advertising

Train retail staff on the benefits and opportunities for selling energy efficient refrigeration appliances, and sales strategies

Output 3.2: Enhanced consumers' awareness of appliance energy efficiency characteristics, standards and labels, and of costs and benefits of more efficient products.

This output will address the poor perception of customers of refrigeration appliances about the importance of purchasing higher efficiency appliances and the consequent cost effectiveness of investing in efficient appliances. Generally, customers also lack information about the availability of energy efficient equipments. The output will be achieved through the preparation of a marketing plan and the implementation of marketing activities by local and international retailers. The consumers' level of awareness and understanding of energy are major factors that affect their purchases of energy-efficient appliances. With better information, it is expected that the customers will react and begin to pay attention to the label and to the category of efficiency of the appliance they purchase.

This output is intended to make efficient refrigerators an attractive option for all consumers. The activities involved are meant to heighten awareness and appreciation of efficient

refrigerators, thereby increasing the consumers' willingness to pay for these refrigerators. The awareness creation activities will be done jointly by the Energy Commission, Energy Foundation, the Consumer Association of Ghana, environmental community-based organizations and the mass media.

Activities:

Train staff of the Consumer Association of Ghana, environmental community-based organizations and the mass media to have sufficient knowledge to provide specific information on energy efficient refrigeration appliances to consumers

Assist the Consumer Association of Ghana, environmental community-based organizations and the mass media to regularly organize media events and information campaigns at national and local level on the benefits of energy efficient refrigeration appliances

Organize national events, press-conferences and other events devoted to the benefits of energy efficiency of household appliances

Distribute leaflets on efficient refrigerator at commercial sites – large shops, stadia etc

Assist retailers to develop marketing plan – including awareness leaflets

Local and international retailers implement marketing activities – through television, radio and newspaper advertisements etc

OUTCOME 4: ESTABLISHMENT OF REFRIGERATING APPLIANCE TEST FACILITIES (US$550,000 including US$300,000 from GEF)

A key component of the initiative to promote energy efficient refrigeration appliances in Ghana is the availability of a testing facility to test compliance of the appliances with the minimum efficiency levels specified in the standard. As retailers of refrigeration appliances are encouraged to sell energy efficient appliances and consumers are encouraged to pay potentially more for energy efficient products, it is necessary to establish a facility that will accurately measure compliance with the new regulatory requirements of refrigeration appliances.

The facility will be used to test refrigeration appliances to verify manufacturer claims on efficiency, and by measuring the energy use and performance of appliances and confirming the accuracy of comparative efficiency labels attached to those appliances. The facility will be an independent test laboratory accredited by the Ghana Standards Board to undertake these tests

Output 4.1: Refrigeration appliance test facility designed and budgeted

In this output, the design drawings and other details of the refrigeration appliance will be prepared and cost estimates will be made. The activities related to this output will be coordinated by the Ghana Standards Board and the CSIR-Institute of Industrial Research,

Activities:

Prepare bid documents for design and cost estimates of refrigeration appliance test facility

Sign contract with a firm for the design and cost estimates of refrigeration appliance test facility

Output 4.2: Refrigeration appliance test facility built and commissioned

Following the provision of the design and cost estimates, a process will be initiated to select an appropriate firm to construct the refrigeration appliance test facility, according to the approved design and cost. Consequently, appropriate staff will be recruited and trained by the Ghana Standards Board and the CSIR-Institute of Industrial Research to operate the appliance test facility.

Activities:

Prepare bid documents for the construction of a refrigeration appliance test facility
Sign contract with a firm for the construction of a refrigeration appliance test facility
Train staff on operation of refrigeration appliance test facility
Commission refrigeration appliance test facility

OUTCOME 5: ESTABLISHMENT OF USED APPLIANCE AND ODS COLLECTION, DISMANTLING AND DISPOSAL FACILITIES (US$1,208,000 including US$300,000 from GEF)

This outcome is aimed to establish local facilities for the collection and environmentally-friendly disposal of used refrigerators/freezers and ODS.

Output 5.1: Used Appliance Collection and Disposal Facilities (UACDF) established

Early retired or end of life refrigerators/freezers (which are largely energy-inefficient as well) contain ozone-depleting refrigerants and/or foam blowing agents, depending on the year they were manufactured. In addition to depleting the ozone layer, these substances are also potent greenhouse gases (GHGs) that contribute to climate change when emitted to the atmosphere. While the refrigerants used in newly manufactured units are still potent GHGs, these appliances do not contain ozone depleting substances (ODS) and are significantly more energy efficient than older models.

To reduce energy demand, ozone depletion, and global climate impacts, it is critical that the older and inefficient refrigerators are permanently removed from homes, offices and other locations and properly disposed of so that environmentally-harmful refrigerants and foam blowing agents are captured and recycled or destroyed. Given the large number of refrigerated appliances expected to be taken out of service under the market transformation, the environmental impacts of removing and properly disposing of old appliances can be significant.

In support of programs to replace inefficient used refrigeration appliances, the first step is in establishing the "Used Appliance Collection and Disposal Facilities (UACDF)" that will include regional collection, dismantling and disposal centres for the recovery of ODS waste in the refrigerants and insulation foam. This output will be complemented by a demonstration project in ODS-waste disposal centre to be funded by the Multilateral Fund which would transport ODS cylinders from the UACDFs to a central disposal Center located in Accra for recycling to augment import or for destruction using the plasma-arc technology. The insulation foam will be stored safely for subsequent transport and destruction whilst the metals and byproducts will be sold to metal scrap dealers

Activities:

Prepare bid documents for the architectural and engineering design and cost estimates of the UACDFs

Sign contracts with firms for architectural and engineering design and cost estimates of used refrigerator collection and disposal facility.

Output 5.2: Ghana refrigeration appliance industry understands environmentally friendly technologies and procedures for the collection, dismantling and disposal of appliances and ODSs.

Technicians recovering refrigerants need special training to safely handle the appropriate equipment and apply the appropriate technology that can perform the recovery in an efficient and cost-effective manner. Training and capacity-building activities will therefore be conducted for the Ghana refrigeration appliance industry so that it understands environmentally friendly technologies and procedures for the collection, dismantling and disposal of appliances and ODSs.

Activities:

Training and capacity-building sessions for refrigeration technicians on environmentally friendly technologies and procedures for the collection, dismantling and disposal of appliances and ODSs.

Output 5.3: Bid documents formulated for ODS and used refrigerator collection and dismantling and disposal.

To facilitate the selection of appropriate contractors to construct the used refrigeration appliance and ODS collection, dismantling and disposal facility, appropriate bid documents will be formulated by the Energy Commission.

Activities:

Formulation of bid documents on the establishment of used refrigeration appliance and ODS collection, dismantling and disposal facility.

Output 5.4: ODS Disposal Centre designed and implemented.

The final stage for the establishment of the used refrigeration appliance and ODS collection, dismantling and disposal facility will be the signing of a contract between the Executing Agency, the Energy Commission, and the firm with the winning bid.

Activities:

Sign contract with firm with winning bid for establishment of used refrigeration appliance and ODS collection, dismantling and disposal facility.

OUTCOME 6: DEVELOPMENT OF EFFICIENCY PROGRAM EVALUATION AND MONITORING CAPACITY (US$652,920 including US$150,000 from GEF)

The financial and social performance of a full scale national refrigeration appliance market transformation program will depend very sensitively on the details of the program design. This is because there is a very large diversity of both appliances and customers in the market,

some (though a very few) of whom are using efficient appliances very effectively and some who are using extremely inefficient appliances containing ozone depleting refrigerants. A program that accurately targets the most inefficient and environmentally damaging refrigeration appliances will produce large program benefits at relatively modest program costs, which a badly designed and implemented program could waste a large portion of resources pushing consumers to replace many refrigerators even when they are currently functioning rather well.

Any program and institution will have strong internal incentives to promote "success" where success is usually defined at meeting the initial program objectives. This can often result in the over-reporting of successful activities and the under-reporting of failure or challenges to program progress. If program designers and implementers wish to maximize the efficiency of implementation and resource allocation in a program, they must have accurate, detailed and objective information regarding program impacts.

Output 6.1: Professionals are trained in energy efficiency program monitoring and evaluation study design, methods, technologies and procedures.

This output will address the need in Ghana for a pool of professionals who can conduct rigorous randomized control impact evaluation studies.

For this output, an international consultant team with extensive experience in the design and conduct of rigorous randomized control impact evaluation studies will be contracted to train a pool of professionals from institutions in Ghana interested in forming similar teams. The consultant team will conduct training workshops with professional experiences in statistics, survey and economics and will teach both the principles and practices of rigorous impact evaluation. The trainees will then form study design teams that will create a wide range of designs for refrigerator program pilot projects. To validate the study designs produced by the trainee teams, the international consultants will assist the trainee design teams in conducting pre-tests of trainee study designs and evaluate both the teams and the results of pretests.

Activities:

Perform outreach to universities, research institutes and consulting firms that may be interested in conducting rigorous program impact evaluation studies

Conduct bid for international consultants to perform training and capacity building activities for Ghanaian rigorous program evaluators

Training of program evaluators including production of study designs for a variety of refrigeration appliance turn-in and market transformation programs.

Pre-tests of study designs and study data collection instruments

Output 6.2: Promising monitoring technologies and metering equipment are tested and well-known in Ghana.

A key factor in the accuracy of program impact evaluation is the amount of data that can be collected, and the key to feasibly collecting large amounts of monitoring and efficiency testing data for equipment will be the transaction cost of measurement and metering.

Just in the last few years there have been some improvements in metering technologies that can potentially impact the design of efficiency program monitoring activities. Earlier surveys

of refrigerator efficiency in Ghana initially used "Kill-A-Watt" meters which were then improved upon by converting to modified rehabilitated utility meters. When the "Kill-A-Watt" meters were field tested in a 100 household refrigerator end-use survey in 2006/7 it was found that the meters provided incomplete data when the refrigerators experienced power outages. This prompted researchers to use rehabilitated utility meters for the follow-up survey of 1000 households that were robust in the face of such outages.

Currently, new meters and data loggers are available that can record appliance and equipment energy use at high time resolution which cost less than US$200 each. The advantage of the high time resolution measurements is that this provides detailed trace of energy use behavior that is almost unique for each individual fridge, and as such can almost provide an "energy fingerprint" for each refrigeration appliance that is tested and monitored. This could be extremely useful for a rigorous, national program of refrigerator turn-ins and rebates; as such energy fingerprints could potentially be used to forecast refrigerator consumption, behavior and impacts at high resolution.

Activities:

Survey metering and monitoring equipment and methods

Acquire evaluation samples of a large range of metering and monitoring equipment

Field test efficacy, ease and effectiveness of different technologies, methods and equipment

Write equipment and methods evaluation report

Produce presentation and training materials based on evaluation which will be included in other components of capacity building and pilot testing activities.

Output 6.3: Pilot rebate and turn-in program evaluation, and monitoring services are bid and contracted to qualified local professionals

Once a pool of professionals are trained in rigorous program impact evaluation design and methods, and once there are appropriate measurement and monitoring equipment and techniques available to these professionals, it is then possible to bid and contract with local professionals and institutions for the project design, implementation, and evaluation for the pilot projects.

Activities:

Prepare bid documents for the detailed design, implementation and evaluation of refrigeration appliance market transformation pilot projects

Contract with international organization such as the International Initiative for Impact Evaluation for the technical review of pilot project studies

Contract with several local institutions and actors for the design, implementation and evaluation of a range of the best pilot project designs

Contract with independent experts for the verification and review of pilot project results.

OUTCOME 7: CONDUCT OF REFRIGERATION APPLIANCE REBATE AND EXCHANGE PROGRAM THROUGHOUT GHANA THAT DISTRIBUTE AT LEAST 50,000 EFFICIENT APPLIANCES (US$1,597,921 including US$460,000 from GEF)

This outcome will include an appliance rebate and turn-in program, which will include subsidies on new efficient refrigerators that will be mainly financed by the Government of

Ghana, with equipment support from GEF. It will have selection criteria which may include equipment that could have energy consumption improvements through subsidized replacement of the refrigerant. Also a cut-off date will be specified to prevent people from promptly importing used refrigerators in order to retire them for rebate (and even resell them). The guidelines on the appliance rebate and turn-in program is presented in Annex D.

Output 7.1: Carbon finance options for the Pilot Rebate and Exchange Program are accurately estimated and well known.

Climate change mitigation finance is perhaps one of the most promising forms of sustained finance for a national scale program. Yet crediting procedures and methodologies are complicated and sometimes controversial. With the evaluation studies of the pilot programs, this project will have some of the best and most accurate data regarding the potential climate impacts of refrigeration appliance market transformation programs. With this information, international and local consultants should re-evaluate climate financing potential from both the compliance and voluntary carbon credit markets and provide detailed estimates of carbon market financing revenues and expenses.

Activities:

Develop an inventory of baseline data for estimating carbon emissions reduction from domestic refrigerators on energy gains

Review availability of approved methodologies and protocols for project registration

Identify and mitigate the technical, financial and regulatory risks of the carbon projects

Develop a pipeline of Project Idea Notes according to UNFCCC procedures and protocol

Review of procedures and protocols of voluntary and compliance carbon credit markets

Drafting of templates for carbon finance applications

Research and data collection regarding carbon credit prices and transaction costs

Research regarding carbon finance market participants and agencies

Estimation of costs and revenues for different market transformation program designs

Report regarding carbon financing options and potential

Identify potential carbon credit buyers.

Output 7.2: Designs for loan guarantee and capital financing programs that can facilitate implementation of Pilot Rebate and Exchange Program are known and available.

Given the potential for very significant program revenues from a national scale refrigeration appliance market transformation program, loan financing should logically be available to provide some of the up-front capital necessary to facilitate implementation of the Pilot Rebate and Exchange Program and the subsequent national-scale program. This output addresses the potential for loan financing by having experts meet with the financing institutions that may be able to provide such financing either through the Ghana Government, with the assistance of the Ghana Government or through the private sector.

Given the potential for large positive development impacts from a national efficient refrigeration appliance market transformation program, there should also be large-scale grant financing that should be available to the Pilot Rebate and Exchange Program and the subsequent national-scale program. For this output, experts will present the results of rigorous evaluation studies that quantify the socio-economic performance of potential programs and gauge the potential for finance from public and private granting institutions.

Activities:

Review of procedures and protocols and priorities of Ghana Government and international development bank financing

Meetings with representatives of Ghanaian and international development finance institutions and presentation of results and performance regarding economic, social and poverty-reduction impacts

Analysis and estimation of terms and costs of financing from different specific financing institutions

Consultations with business plan development consultants

Draft market transformation program financing report.

Output 7.3: The refrigeration appliance rebate and turn-in program is documented and available.

The first task of the pilot project contractors is to provide a detailed design of the pilot project and the accompanying rigorous impact evaluation study. The rigorous impact evaluation study needs to estimate the quantified social, economic and environmental performance of the adopted market transformation approach. Because of the multiple and potentially competing objectives and priorities for the information that is collected during the course of the pilot projects, it is important to have the pilot project and study designs reviewed by stakeholders in a consultation session. After the consultation session, the modified designs (which are modified in response to stakeholder comments) then should be reviewed by development impact research experts to validate the technical feasibility of the impact data collection approaches proposed by each pilot project contractor. In response to both stakeholder and expert input, the pilot project contractors will finalize the project and study designs and documents the finalized projects in a pilot project design report. Guidelines for the refrigerator turn-in and redemption of coupons are presented in Annex D.

Activities:

Pilot project contractors prepare pilot project and study designs for the refrigeration appliance market transformation strategy

Stakeholder consultation to review and comment on market transformation pilot project and study designs

Expert review of pilot project and study designs

Revision and production of finalized pilot project and impact study designs.

Output 7.4: The organizational and logistical feasibility of the appliance rebate and turn-in program is demonstrated.

Before implementation of a rigorous impact study, three preliminary activities need to be completed: i) regulatory approval; ii) pre-testing of metering and monitoring equipment; and pre-testing of data collection instruments and procedures. Regulatory approval of the study assures that the study designs are fair and ethical with respect to the human subjects

participating in the study. As for pretesting the physical metering and monitoring equipment, this is done as a separate activity in output 6.2. But each study will have protocols, interview forms and data collection instruments and procedures that will need to undergo final field pre-testing before they are used in the full-scale study.

In addition, before any market transformation activities are undertaken in the pilot projects baseline data will be collected. The baseline data will collect background information on the program participants and their existing socio-economic conditions and energy use to provide the starting point for detecting changes that can indicate impacts from the market intervention program.

During implementation of the pilot market transformation program, there will be both treatments (those participants participating in the full incentives and activities of the program) and controls (those folks who do not receive any incentives or interventions from the program). Treatments and controls will be randomized (e.g. selected via lottery) so as to provide reliable counterfactual information for the impacts measured in the market intervention group.

After this first wave of treatment data collection, the study contractors will draft a preliminary data report that is reviewed by international experts to assure the technical quality of the studies. The results of this review will then be incorporated into the design of a follow-up data collection activity that evaluates the permanence and durability of program impacts.

This output will conclude with data summary reports for each of the studies which describe in detail the study design, the data collection methods, qualitative observations during the conduct of the study, and provide summaries of the data collected.

Activities:

Final pre-testing of project data collection instruments
Institutional and regulatory approvals for impact studies
Collection of baseline data for pilot projects
Implementation of pilot market transformation program for randomized sub-sample of study participants
Data collection for treatment and control groups for pilot market transformation program
Drafting of preliminary study data report
Expert review of preliminary study report
Design of follow-up data collection instrument design finalized
Follow-up data collection conducted
Study methods and data summary report finalized

Output 7.5: Rigorous estimates of the impact of the rebate and turn-in program is well-documented and widely known

This output will take the data from output 7.3 and perform the analysis that translates this data into quantitative social, economic and environmental impacts. The first step of this process is for the study contractors to propose a series of metrics for energy use, economic, benefit environmental benefit (e.g. emissions reduction or ozone depleting substance (ODS) disposal), poverty reduction, and health benefits (if applicable). The study contractors will

present their proposals in a consultation session that will include both program stakeholders and subject area experts so that they can refine both the metrics and the technical methods for estimating the metrics. Study contractors will finalize metrics and methods and submit the methodological proposal to the GEF Project Manager for approval.

Once the metrics and methods are approved the contractors will conduct the impact analysis and submit their results for expert review, completing their study analysis reports based on the feedback from the reviewers.

Once the pilot project analysis reports are completed the contractors will present their results in a stakeholder consultation to solicit feedback, comments, and an indication of potential future applications and implications of study results. Based on the input from the consultation, the analysis study reports will be finalized.

Activities:

Stakeholder consultation for sharing preliminary study data and proposed impact analysis methods and metrics

Program impact methodologies and metrics finalized

Analysis of study data performed and preliminary study report written

Expert review of study analysis reports

Completion of study analysis reports

Stakeholder consultation on study analysis results

Study analysis reports finalized

OUTCOME 8: DEVELOPMENT OF VARIOUS FEASIBLE FINANCE MODELS FOR NATIONAL SCALE FOLLOW-UP OF PILOT REBATE AND EXCHANGE PROGRAM (US$255,000 including US$90,000 from GEF)

While the regulations and labeling programs will affect most if not all refrigeration appliances in Ghana, the incentive and inefficient appliance turn-in programs will have direct impacts that are at a smaller scale. The pilot programs envisioned in this project are likely to directly impact several tens of thousands of refrigeration appliance purchases and provide their main benefit by building the capacity and knowledge for designing and scaling up a national scale market transformation programs. The key to scaling up to a national turn-in and rebate program will be having a business plan that lays out how to effectively build the necessary organizational infrastructure and arranging feasible forms of financing that can pay for program costs at national scale. This outcome and its attendant outputs address these programmatic needs.

Output 8.1: Business plans are available for several program follow-up scenarios.

This output addresses the need to have a plan along with attendant cost estimates, organizational recommendations, and schedule estimates that can take the lessons from the pilot projects and scale them up to all areas of the country. Ultimately the business plan development and refinement should be performed by Ghanaian experts who can provide local expertise to the institutions that eventually implement the national program. But international experts can bring knowledge and expertise from program scale-up designs in other countries and experiences. Since it is difficult to forecast the exact institutional arrangements for

implementation of the national program, several different scale-up plans should be developed. The different plans should incorporate the different strategies tested during the pilot program experiments conducted for Outcome 7, and should prioritize based on the performance of the different strategies based on the results of the rigorous impact evaluation studies. Consultants during this phase of the project should meet with representatives of different government and private institutions that may have an interest in organizing or participating in the national scale program to gauge their interest and the issues that need to be resolved before they can feasibly participate.

Activities:

Recruitment, bidding and contracting of international business plan consultant team

Recruitment, bidding and contracting of local business plan consultant teams

Individual meetings with government agencies and potential national program implementers and policy-makers

Selection of at least three program scale-up approaches

Development of draft business plans based on pilot project reports and stakeholder input

Stakeholder consultation for reviewing business plans

Drafting of final business plan reports

Presentation of market transformation business plan

A potential project partner Bosch Siemens Home Appliances Group (BSH) proposes in-kind contribution towards Outcomes 7 and 8 including:

Helping to establish, in consultation with local entities, the infrastructure for implementation of the following activities:

Stakeholder dialogue

Sale forces and consumer education

Marketing

Logistics and reverse logistics

Recycling

Assisting in the establishment of appropriate metrics for the assessment of effectiveness

Assessing and monetizing CO_2 Credit generation possibilities as a contribution to ensuring a sustainable implementation model

Identifying appropriate productions based on consumer requirements and financing means

Scaling-up and expending programs as appropriate, based on results

Discounted price on BSH refrigeration units

Project Implementation

Table 1 presents the implementation schedule of the project. Project Component 1 - Structures and mechanisms for implementation of appliance energy efficiency standards and labels (S&L) strengthened – will be accomplished within the first year of the project. Project Components 2,3,4,5,6,7 and 8 will commence at various times later in the first year and run concurrently to completion early in the third year. Component 9 – Project Management covers the entire duration of the project. The Terms of Reference of key Project Personnel are presented in Annex B.

Project Indicators, Risks and Assumptions

There are four types of direct benefits of the project as it relates to GEF and Government of Ghana objectives: two that are socio-economic and two that are environmental.

The largest benefit in terms of potential economic value to the Ghanaian economy and people is the economic savings from more efficient energy use. This impact should be approximately several hundred dollars of net benefit over the long term for those households that switch from a less efficient to a more efficient refrigeration appliance. This economic benefit also contributes to Ghana's achievement of its Millennium Development Goals when the benefit is seen by poor households who spend a large fraction of their income on electricity bills.

In addition to this large economic benefit, the largest environmental benefits are the reduction in CO_2 and ODS emissions. The decreased emissions come from decreased energy use, decreased imports of inefficient refrigerators that use destructive refrigerants, and from increased recovery and disposal of ODS in refrigerants and insulating foams.

There are four types of impacts that the project with have on the availability and use of more efficient and environmentally friendly refrigeration appliances:

Adoption of minimum efficiency standards and ODS prohibitions will decrease the imports of inefficient and environmentally damaging appliances;

The implemented pilot projects will increase the efficiency and environmental performance of appliances in the households that are targeted in the pilot projects;

A national refrigerator replacement and turn-in program that is part of this project will accelerate the elimination of the most inefficient and damaging refrigerators and refrigerants; and

A national refrigerator incentive and educational program that follows this project will help increase the efficiency and environmental performance of appliances beyond the levels indicated in the minimum performance standards.

Table 1: Project Implementation Schedule

Project Components	Sub-components	Year 1				Year 2				Year 3			
1. Structures and mechanisms for implementation of appliance energy efficiency standards and labels (S&L) strengthened	1.1 – S&L implementation regulations reviewed through stakeholder consultations	■	■										
	1.2 – Consulting and advising provided to enforcement authority staff and government ministries, departments and agencies, involved in S&L program *		■	■									
	1.3 – Monitoring and data collection studies performed for end-use sales and appliance energy and ODS use*			■	■	■	■	■					
2. National testing, certification, labeling and enforcement mechanisms adopted	2.1 – National testing and certification procedures defined			■	■	■	■	■	■				
	2.2 – Verification and enforcement procedures developed and state inspectors trained*				■	■	■	■	■	■			
3. Increased consumer's and retailer's awareness and improved marketing of appliance energy efficiency standards and labels	3.1 – Enhanced awareness and knowledge of retailers' management and retail staff trained in appliance energy efficiency issues and sales rationales*				■	■	■	■	■	■	■		
	3.2 – Enhanced consumers' awareness of appliance energy efficiency characteristics, standards and labels, and of costs and benefits of more efficient products					■	■	■	■	■	■	■	
4. Establishment of refrigerating appliance test facilities	4.1 – Refrigeration appliance test facility designed and budgeted				■	■	■	■	■				
	4.2 – Refrigeration appliance test facility built and commissioned							■	■	■	■		
5. Establishment of used appliance and ODS collection and disposal facilities	5.1 – Ghana refrigeration appliance industry understands environmentally friendly technologies and procedures for the collection and disposal of appliances and ODSs **				■	■	■						
	5.2 – Bid documents formulated for Used Appliances Collection and Disposal Facilities (UACDFs)					■	■						

Project Components	Sub-components	Year 1				Year 2				Year 3			
	5.3- Contract signed for UACDFs												
	5.4 - Transport of ODS cylinders to Destruction Centre												
	5.5 – ODS Disposal Centre designed and implemented												
6. Development of efficiency program evaluation and monitoring capacity	6.1 – Professionals are trained in energy efficiency program monitoring and evaluation study design, methods, technologies and procedures												
	6.2 - Promising monitoring technologies and metering equipment are tested and well-known in Ghana												
	6.3 - Pilot rebate and turn-in program evaluation and monitoring services are bid and contracted to qualified local professionals												
7. Conduct of refrigeration appliance rebate and exchange program throughout Ghana that distribute at least 50,000 efficient appliances	7.1 Carbon finance options for Pilot Rebate and Exchange Program are accurately estimated and well known												
	7.2 - Designs for loan guarantee and capital financing programs that can facilitate implementation of Pilot Rebate and Exchange Program are known and available.												
	7.3 - The refrigeration appliance rebate and turn-in program is documented and available												
	7.4 - The organizational and logistical feasibility of the appliance rebate and turn-in program is demonstrated.												
	7.5 - Rigorous estimates of the impact of the rebate and turn-in program is well-documented and widely known												
8. Development of various feasible finance models for national scale follow-up of pilot rebate and exchange program	8.1 - Business plans are available for several program follow-up scenarios												
9. Project Management													

All of these impacts and benefits are quantitatively measureable to fairly high precision if well designed impact and evaluation studies are conducted. The focus of this project is to conduct very high quality measurements of impacts so that a national scale program can be replicated with performance-based financing from international sources (e.g. carbon markets, and bilateral donors) and the Government of Ghana.

In terms of measuring impacts, this project is breaking new ground compared to how market transformation programs are currently evaluated in other countries. There are few if any efficiency programs that conduct impact evaluations using rigorous academic methods and randomized controls. Typically what happens when more detailed and accurate evaluations are done, is that the evaluators find that impacts are more complex than originally presumed in the program design. These complexities are likely to decrease impacts compared to what is typically claimed, but a more rigorous measurement makes the claims of the program more accurate.

Perhaps the biggest risk of the project is the disincentive that comes with measuring impacts with high accuracy. Often it may be politically possible to support program claims that are slightly inflated, and then to evaluate the programs with general indicators that are not very precise. By doing randomized impact studies with large numbers of households, this program will be able to estimate impacts with a high level of precision. The assumption of this project is that the greater precision and reliability of the impact estimates will lead to a greater likelihood of funding for the follow-up national program. This project will mitigate this risk by not only educating stakeholders about efficiency, but by also educating a wide range of national and international stakeholders about the importance of measuring impact accurately and basing program funding on rigorous and accurate impact measurements, rather than imprecise claims. The indicators that could be used to measure the impact of the proposed initiatives are presented in Table 2.

Table 2: Key Indicators for Impact Monitoring

Impact to Be Monitored	Indicators	Verification Means
Economic benefits to households	Reduction in energy costs per household	Rigorous impact evaluation of pilot projects with randomized controls to measure economic savings
CO_2 emissions reduction benefits	Decrease in energy consumption	Rigorous impact evaluation of pilot projects with randomized controls to measure decreased electricity consumption
ODS emissions reduction benefits	Mass of ODS substance recovered	Rigorous impact evaluation of pilot projects with randomized controls, to measure recovery of foam and ODS refrigerants
National poverty reduction benefits	Reduction in poverty gap for poor households	Rigorous impact evaluation of pilot projects with randomized controls to measure poverty gap reduction

Legislative Risks

There are minimal legislative risks related to this project. The Parliament of Ghana passed and adopted the Energy Efficiency Standards and Labeling (Refrigerator, Refrigerator-Freezer and Freezer) Regulations, LI 1958 in November 2009. Additionally, extensive consultations with the key Ministries (Ministry of Energy, Ministry of Environment, Science and Technology and Ministry of Finance and Economic Planning) during the Preparatory Phase of this project have confirmed broad administrative support for the implementation of this Legislative Instrument on refrigerator appliances.

Institutional Risks

In order to have a measurable impact, this project requires a multi-sectoral approach to ensure that the energy efficiency standards on refrigeration appliances are incorporated in the sectoral programs of each participating Government ministry. There is always the risk in any administration that institutional rivalries will slow down cooperation among ministries. This risk will be mitigated with frequent stakeholder consultations, which will facilitate ongoing policy dialogue between public and private sector stakeholders and provide a forum to harmonize the programs of participating ministries.

Technical Risks

Successful implementation of this project requires an increase in the technical capacity of the staff of the Energy Commission and adequate capacity in the private sector. This risk will be addressed by having project outcomes that will assist the Energy Commission in developing the necessary in-house technical skills and by providing training courses to some members of NARWOA in partnership with private and public sector partners. The intensive training on pilot project and impact study design will create the pool of project partners that can work with the Energy Commission to implement the key technical components of the program.

Expected Global, National and Local Benefits

GEF resources are being sought to improve the energy efficiency of appliances in manufactured, marketed and used in Ghana through the introduction of a combination of regulatory tool and innovative economic tools. The project will strengthen the regulatory and institutional framework, developing monitoring and enforcement mechanisms, and providing training to appliance professionals. The project will explore and test efficient market-based economic incentives complemented by repeated public outreach campaigns. Demonstrating the success of the initiative on energy efficient refrigeration appliances in Ghana will set an example for replicability in other neighboring countries that lack formal energy efficiency programs, and will also support on-going efforts to create regional programs for pooling the national resources and capabilities of individual countries.

Extensive consultations with public and private stakeholders confirm the timeliness of a program on energy efficient refrigeration appliances in Ghana that can strengthen national capabilities in the area of energy efficiency at a time of rising energy costs. The Ministry of Finance and Economic Planning has expressed considerable concern over the ability of Government ministries and agencies to absorb energy costs through existing budgetary

mechanisms and believes that an energy efficiency program will not only help reduce energy bills but also create an energy efficiency culture at the level of decision makers and functionaries.

At the local level, a strong emphasis on developing the technical capabilities of refrigeration engineers and technicians and creating energy efficiency awareness among decisions makers (consumers, retailers etc.) will help invigorate a dormant energy efficiency industry. It will also allow Ghana to meet its MDG goals by reducing the cost of energy services for Ghanaian households, especially poorer households that are seeing a greater share of their household income dedicated to energy expenditures, including home energy bills.

Country Ownership: Country Eligibility and Country Buy-in

Ghana ratified the UNFCCC on 9th June 1995. After the HPMP inception workshop held in June, 2009 in Accra, Ghana, an overarching strategy was formulated as an Integrated Plan for Energy Efficiency, Climate Mitigation and ODS Reduction for the Refrigeration Sector in Ghana (see Annex C) with the objectives to combine and sequence environmental finances for the:

Phasing out of HCFC in the refrigeration servicing sectors with a MLF funding of US$1 million;

Promotion of Energy Efficient refrigerators for the domestic and commercial sectors with a GEF approved funding of USS1.7 million and

Development of an ODS disposal centre pilot project with a MLF funding of US$ 198,000.

The project was designed with inputs from the major Government ministries and agencies (Ministry of Energy, Ministry of Environment, Science and Technology, Institute of Industrial Research, Environmental Protection Agency, Customs, Excise and Preventive Service etc.) in the course of stakeholders consultations that were held to review the objectives of the project and discuss expected outcomes. It fits within the Government's overall plan to reduce energy costs in its household and commercial sectors through refrigeration appliance efficiency standards and practices.

Furthermore, the 2009 Budget Statement of the Government of Ghana mentioned that "the Ministry of Energy will implement measures to improve energy conservation in electricity consumption through energy management and efficiency projects in public institutions and also public education on energy conservation". The Statement also mentions that the Energy Commission will facilitate the preparation of regulations including the Energy Efficiency Standards and Labeling (Refrigerator, Refrigerator-Freezer and Freezer) Regulations, LI 1958 to govern the operations of the Energy Sector as provided under the Energy Commission Act 541. The Government demonstrated its commitment to the establishment of viable and effective energy efficiency policies with the adoption of this Regulation in November 2009.

The project is relevant to the UNDP mandate through its strong emphasis on capacity development and technical training for the management and staff of private sector retailers of refrigeration appliances in order to provide them with the necessary know-how and technical skills to advise consumers and other decision makers about the benefits and opportunities of

using energy efficient refrigeration appliances. It also fits the UNDP's mandate by helping improve the capabilities of enforcement agencies, leading to better governance through sustained technical and institutional support.

Sustainability

Sustainability of the project will depend upon various factors including the impact of awareness campaigns on the benefits and opportunities from the purchase and use of energy efficient refrigeration appliances, and the technical assistance and capacity building program for retailers and refrigeration technicians to ensure that all stakeholders involved gain full ownership of the of the project. Through previous awareness creation activities and pilot projects undertaken by the Energy Foundation, there is a core group of households and private sector companies in Ghana that have some familiarity with the technical, financial and commercial aspects of energy efficient projects. One of the purposes of this project is to stimulate sufficient demand for energy conservation measures so that the sale and use of energy efficient refrigeration appliances will become an accepted practice. Sustainability will also come from the quality of the regular reviews of the project.

The sustainability of project will be ensured by:

Strengthening the Energy Efficiency Department of the Energy Commission to coordinate the implementation of the project;

Updating the legal and institutional framework governing energy efficiency, when necessary; and

Providing training to refrigeration technician, refrigeration appliance retailers and community-based organizations;

Regarding the project's financial sustainability, it is important to note that there will not be a need for a similar project in the future in Ghana once the identified barriers are removed. The adoption of the Energy Efficiency Standards and Labeling (Refrigerator, Refrigerator-Freezer and Freezer) Regulations, LI 1958 should be an irreversible process unless there is a major policy reversal that could not have been anticipated.

Replicability

The proposed model is highly replicable as long as energy efficiency is better understood by consumers and retailers of energy efficient refrigeration appliances and the general public, and the sale and use of energy efficient appliances become a standard practice in the household and commercial sectors. The key is to implement the Energy Efficiency Standards and Labeling (Refrigerator, Refrigerator-Freezer and Freezer) Regulations, LI 1958, and to provide strong case studies of the savings involved for households.

The proposed pilot rebate program on energy efficient refrigeration appliances should provide a solid foundation for transforming the customers' perception of energy efficiency. The impact of the rebate program will be documented to highlight the benefits of energy efficient refrigeration appliances, and the information will be shared and widely disseminated at workshops, conferences and through mass media.

A number of specific activities are proposed under this project that can ensure its replicability:

Strong partnership with trade associations (e.g., Repair and Maintenance: National Air-Conditioning and Refrigeration Workshops Owners Association (NARWOA)). will ensure that project information is disseminated via newsletters and workshops to the professional membership of these associations;

Strong partnership with private sector and in particular key appliances retailers (typically Somotex Ghana Limited) and manufacturers (typically Bosch Siemens Household Appliances Group)

National energy efficiency events (sponsored by the Minister of Energy) will help send a strong message to the private sector, and through the media, to the general public, about the benefits of energy efficient refrigerator appliances; and

Regular training programs will be offered to refrigerator appliances technicians and retailers.

PART III: Management Arrangements

The project on energy efficient refrigeration appliances provides the Government of Ghana with a good opportunity to strengthen the institutional, technical and organization capabilities of its agencies in the area of energy efficiency, especially as it applies to the refrigeration appliances. A prime beneficiary will be the Energy Commission, which will act as Execution Agency, under the tutelage of the Ministry of Energy. The Energy Commission has been clearly identified by the Ministry of Energy and the other ministries as the best entity for driving this project forward and for establishing a technical competency centre in the area of energy efficiency refrigeration appliances.

The Energy Commission has been responsible for championing the passing of the Energy Efficiency Standards and Labeling (Refrigerator, Refrigerator-Freezer and Freezer) Regulations, LI 1958, and providing technical expertise to other government departments, and engaging most of the different activities identified for the execution phase. The Energy Commission will rely on contractors and consultants where private sector expertise is more suited to the tasks at hand. The Energy Commission has good working relationships with the relevant line Ministries for many years and this should ensure their cooperation the execution of the project.

In order to accord proper acknowledgement to UNDP/GEF for providing funding, a UNDP/GEF logo will appear on all relevant UNDP/GEF project publications, including among others, project hardware and vehicles purchased with UNDP/GEF funds. Any citation on publications regarding projects funded by UNDP/GEF will also accord proper acknowledgment to UNDP/GEF.

PART IV: Monitoring and Evaluation Plan and Budget

Project monitoring and evaluation will be conducted in accordance with established UNDP and GEF procedures and will be provided by the project team and the UNDP Country Office (UNDP-CO) with support from UNDP/GEF. The Logical Framework Matrix in Section II Part II provides *performance* and *impact* indicators for project implementation along with their corresponding *means of verification*. These will form the basis on which the project's Monitoring and Evaluation system will be built. The Monitoring and Evaluation Plan and Budget of the project are presented in Table 3.

The following sections outline the principle components of the Monitoring and Evaluation (M&E) Plan and indicative cost estimates related to M&E activities. The project's Monitoring and Evaluation Plan will be presented and finalized in the Project's Inception Report following a collective fine-tuning of indicators, means of verification, and the full definition of project staff M&E responsibilities.

Monitoring and Reporting

Project Inception Phase

A Project Inception Workshop will be conducted with the full project team, relevant government counterparts, co-financing partners, the UNDP-CO and representation from the UNDP-GEF Regional Coordinating Unit, as well as UNDP-GEF (HQs) as appropriate.

A fundamental objective of this Inception Workshop will be to assist the project team to understand and take ownership of the project's goals and objectives, as well as finalize preparation of the project's first annual work plan on the basis of the project's logframe matrix. This will include reviewing the logframe (indicators, means of verification, assumptions), imparting additional detail as needed, and on the basis of this exercise finalize the Annual Work Plan (AWP) with precise and measurable performance indicators, and in a manner consistent with the expected outcomes for the project.

Additionally, the purpose and objective of the Inception Workshop (IW) will be to: (i) introduce project staff with the UNDP-GEF *expanded team* which will support the project during its implementation, namely the CO and responsible Regional Coordinating Unit staff; (ii) detail the roles, support services and complementary responsibilities of UNDP-CO and RCU staff vis-à-vis the project team; (iii) provide a detailed overview of UNDP-GEF reporting and monitoring and evaluation (M&E) requirements, with particular emphasis on the Annual Project Implementation Reviews (PIRs) and related documentation, the Annual Project Report (APR), Tripartite Review Meetings, as well as mid-term and final evaluations. Equally, the IW will provide an opportunity to inform the project team on UNDP project related budgetary planning, budget reviews, and mandatory budget rephasings.

The IW will also provide an opportunity for all parties to understand their roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference for project staff and decision-making structures will be discussed again as needed in order to clarify for all, each party's responsibilities during the project's implementation phase.

Table 3: Monitoring and Evaluation Plan and Budget

Type of M&E Activity	Responsible Parties	*Budget US$ excluding Project Team Staff time*	Time Frame
Inception Workshop	Project Coordinator UNDP Ghana UNDP GEF Regional Coordinating Unit	*5,000*	Within first two months of project start up
Inception Report	Project Team UNDP Ghana	*None*	Immediately following IW
Development of a Methodology for Measuring Appliances Performance and Related Emissions Reduction	Oversight by GEF Technical Advisor Short-term international consultant	*9,000*	Immediately following IW
Measurement of Means of Verification for Project Purpose Indicators	Project Coordinator will oversee the hiring of specific studies and institutions, and delegate responsibilities to relevant team members	*To be finalized in Inception Phase and Workshop.*	Start, mid and end of project
Measurement of Means of Verification for Project Progress and Performance (measured on an annual basis)	Oversight by Project GEF Technical Advisor and Project Coordinator Measurements by regional field officers and local IAs	*To be determined as part of the Annual Work Plan's preparation.*	Annually prior to APR/PIR and to the definition of annual work plans
APR and PIR	Project Team UNDP Ghana UNDP-GEF Regional Coordinating Unit	*None*	Annually
TPR and TPR report	Government Counterparts UNDP Ghana Project team UNDP-GEF Regional Coordinating Unit	*None*	Each year, upon receipt of APR
Steering Committee Meetings	Project Coordinator UNDP Ghana UNDP GEF Regional Coordinating Unit	*None*	Following Project IW and subsequently at least once a year
Periodic status reports	Project team	*None*	To be determined by Project team and UNDP CO
Technical reports	Project team Hired consultants as needed	*10,000*	To be determined by Project Team and UNDP-CO

Mid-term External Evaluation	Project team UNDP Ghana UNDP-GEF Regional Coordinating Unit External Consultants (i.e. evaluation team)	*12,000*	At the mid-point of project implementation.
Final External Evaluation	Project team, UNDP Ghana UNDP-GEF Regional Coordinating Unit	*18,,000*	At the end of project implementation
Terminal Report	Project team UNDP Ghana External Consultant	*None*	At least one month before the end of the project
Lessons learned	▪ Project team ▪ UNDP-GEF Regional Coordinating Unit (suggested formats for documenting best practices, etc)	*None*	Annually
Type of M&E Activity	**Responsible Parties**	***Budget US$ excluding Project Team Staff time***	**Time Frame**
Audit	UNDP Ghana Project team	*7,500*	Annually
Visits to field sites (UNDP staff travel costs to be charged to IA fees)	UNDP Ghana UNDP-GEF Regional Coordinating Unit (as appropriate) Government representatives	*13,000*	Annually
TOTAL INDICATIVE COST *Excluding project team staff time and UNDP staff and travel expenses*		**US$ 74,500**	

Monitoring responsibilities and events

A detailed schedule of project reviews meetings will be developed by the project management, in consultation with project implementation partners and stakeholder representatives and incorporated in the Project Inception Report. Such a schedule will include: (i) tentative time frames for Tripartite Reviews, Steering Committee Meetings, (or relevant advisory and/or coordination mechanisms) and (ii) project related Monitoring and Evaluation activities.

Day to day monitoring of implementation progress will be the responsibility of the Project Manager, Director or Chief Technical Advisor (depending on the established project structure) based on the project's Annual Work Plan and its indicators. The Project Team will inform the UNDP-CO of any delays or difficulties faced during implementation so that the appropriate support or corrective measures can be adopted in a timely and remedial fashion.

The Project Coordinator and the Project GEF Technical Advisor will fine-tune the progress and performance/impact indicators of the project in consultation with the full project team at the Inception Workshop with support from UNDP-CO and assisted by the UNDP-GEF Regional Coordinating Unit. Specific targets for the first year implementation progress indicators together with their means of verification will be developed at this Workshop. These will be used to assess whether implementation is proceeding at the intended pace and in the right direction and will form part of the Annual Work Plan. The local implementing agencies will also take part in the Inception Workshop in which a common vision of overall project goals will be established. Targets and indicators for subsequent years would be defined annually as part of the internal evaluation and planning processes undertaken by the project team.

Measurement of impact indicators related to global benefits will occur according to the schedules defined in the Inception Workshop and tentatively outlined in an indicative Impact Measurement Template. The measurement, of these will be undertaken through subcontracts or retainers with relevant institutions or through specific studies that are to form part of the projects activities.

Periodic monitoring of implementation progress will be undertaken by the UNDP-CO through quarterly meetings with the project proponent, or more frequently as deemed necessary. This will allow parties to take stock and to troubleshoot any problems pertaining to the project in a timely fashion to ensure smooth implementation of project activities.

UNDP Country Offices and UNDP-GEF RCUs as appropriate, will conduct yearly visits to projects that have field sites, or more often based on an agreed upon scheduled to be detailed in the project's Inception Report / Annual Work Plan to assess first hand project progress. Any other member of the Steering Committee can also accompany, as decided by the Steering Committee. A Field Visit Report will be prepared by the CO and circulated no less than one month after the visit to the project team, all Steering Committee members, and UNDP-GEF.

Annual Monitoring will occur through the Tripartite Review (TPR)**.** This is the highest policy-level meeting of the parties directly involved in the implementation of a project. The project will be subject to Tripartite Review (TPR) at least once every year. The first such meeting will be held within the first twelve months of the start of full implementation. The project proponent will prepare an Annual Project Report (APR) and submit it to UNDP-CO

and the UNDP-GEF regional office at least two weeks prior to the TPR for review and comments.

The APR will be used as one of the basic documents for discussions in the TPR meeting. The project proponent will present the APR to the TPR, highlighting policy issues and recommendations for the decision of the TPR participants. The project proponent also informs the participants of any agreement reached by stakeholders during the APR preparation on how to resolve operational issues. Separate reviews of each project outcome may also be conducted if necessary.

Terminal Tripartite Review (TTR)

The terminal tripartite review is held in the last month of project operations. The project proponent is responsible for preparing the Terminal Report and submitting it to UNDP-CO and LAC-GEF's Regional Coordinating Unit. It shall be prepared in draft at least two months in advance of the TTR in order to allow review, and will serve as the basis for discussions in the TTR. The terminal tripartite review considers the implementation of the project as a whole, paying particular attention to whether the project has achieved its stated objectives and contributed to the broader environmental objective. It decides whether any actions are still necessary, particularly in relation to sustainability of project results, and acts as a vehicle through which lessons learnt can be captured to feed into other projects under implementation of formulation.

The TPR has the authority to suspend disbursement if project performance benchmarks are not met. Benchmarks will be developed at the Inception Workshop, based on delivery rates, and qualitative assessments of achievements of outputs.

Project Monitoring Reporting

The Project Coordinator in conjunction with the UNDP-GEF extended team will be responsible for the preparation and submission of the following reports that form part of the monitoring process.

(a) Inception Report (IR)

A Project Inception Report will be prepared immediately following the Inception Workshop. It will include a detailed First Year/Annual Work Plan divided in quarterly time-frames detailing the activities and progress indicators that will guide implementation during the first year of the project. This Work Plan would include the dates of specific field visits, support missions from the UNDP-CO or the Regional Coordinating Unit (RCU) or consultants, as well as time-frames for meetings of the project's decision making structures. The Report will also include the detailed project budget for the first full year of implementation, prepared on the basis of the Annual Work Plan, and including any monitoring and evaluation requirements to effectively measure project performance during the targeted 12 months time-frame.

The Inception Report will include a more detailed narrative on the institutional roles, responsibilities, coordinating actions and feedback mechanisms of project related partners. In addition, a section will be included on progress to date on project establishment and start-up

activities and an update of any changed external conditions that may affect project implementation.

When finalized the report will be circulated to project counterparts who will be given a period of one calendar month in which to respond with comments or queries. Prior to this circulation of the IR, the UNDP Country Office and UNDP-GEF's Regional Coordinating Unit will review the document.

Annual Project Report (APR)

The APR is a UNDP requirement and part of UNDP's Country Office central oversight, monitoring and project management. It is a self -assessment report by project management to the CO and provides input to the country office reporting process and the ROAR, as well as forming a key input to the Tripartite Project Review. An APR will be prepared on an annual basis prior to the Tripartite Project Review, to reflect progress achieved in meeting the project's Annual Work Plan and assess performance of the project in contributing to intended outcomes through outputs and partnership work.

The format of the APR is flexible but should include the following:

- An analysis of project performance over the reporting period, including outputs produced and, where possible, information on the status of the outcome;
- The constraints experienced in the progress towards results and the reasons for these;
- The three (at most) major constraints to achievement of results;
- AWP, CAE and other expenditure reports (ERP generated);
- Lessons learned; and
- Clear recommendations for future orientation in addressing key problems in lack of progress.

Project Implementation Review (PIR)

The PIR is an annual monitoring process mandated by the GEF. It has become an essential management and monitoring tool for project managers and offers the main vehicle for extracting lessons from ongoing projects. Once the project has been under implementation for a year, a Project Implementation Report must be completed by the CO together with the project. The PIR can be prepared any time during the year (July-June) and ideally prior to the TPR. The PIR should then be discussed in the TPR so that the result would be a PIR that has been agreed upon by the project, the executing agency, UNDP CO and the concerned RC.

The individual PIRs are collected, reviewed and analyzed by the RCs prior to sending them to the focal area clusters at the UNDP/GEF headquarters. The focal area clusters supported by the UNDP/GEF M&E Unit analyze the PIRs by focal area, theme and region for common issues/results and lessons. The TAs and PTAs play a key role in this consolidating analysis.

The focal area PIRs are then discussed in the GEF Interagency Focal Area Task Forces in or around November each year and consolidated reports by focal area are collated by the GEF Independent M&E Unit based on the Task Force findings.

The GEF M&E Unit provides the scope and content of the PIR. In light of the similarities of both APR and PIR, UNDP/GEF has prepared a harmonized format for reference.

Quarterly Progress Reports

Short reports outlining main updates in project progress will be provided quarterly to the local UNDP Country Office and the UNDP-GEF regional office by the project team.

Periodic Thematic Reports

As and when called for by UNDP, UNDP-GEF or the Implementing Partner, the project team will prepare Specific Thematic Reports, focusing on specific issues or areas of activity. The request for a Thematic Report will be provided to the project team in written form by UNDP and will clearly state the issue or activities that need to be reported on. These reports can be used as a form of lessons learnt exercise, specific oversight in key areas, or as troubleshooting exercises to evaluate and overcome obstacles and difficulties encountered. UNDP is requested to minimize its requests for Thematic Reports, and when such are necessary will allow reasonable timeframes for their preparation by the project team.

Project Terminal Report

During the last three months of the project, the project team will prepare the Project Terminal Report. This comprehensive report will summarize all activities, achievements and outputs of the Project, lessons learnt, objectives met, or not achieved, structures and systems implemented, etc. and will be the definitive statement of the Project's activities during its lifetime. It will also lay out recommendations for any further steps that may need to be taken to ensure sustainability and replicability of the Project's activities.

Independent Evaluation

The project will be subjected to at least two independent external evaluations as follows:-

- Mid-term Evaluation

An independent Mid-Term Evaluation will be undertaken at the end of the second year of implementation. The Mid-Term Evaluation will determine progress being made towards the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, terms of reference and timing of the mid-term evaluation will be decided after consultation between the parties to the project document. The Terms of Reference for this Mid-term evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF.

- Final Evaluation

An independent Final Evaluation will take place three months prior to the terminal tripartite review meeting, and will focus on the same issues as the mid-term evaluation. The final evaluation will also look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental goals. The Final

Evaluation should also provide recommendations for follow-up activities. The Terms of Reference for this evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF.

- Audit Clause

The Government will provide the Resident Representative with certified periodic financial statements, and with an annual audit of the financial statements relating to the status of UNDP (including GEF) funds according to the established procedures set out in the Programming and Finance manuals. The Audit will be conducted by the legally recognized auditor of the Government, or by a commercial auditor engaged by the Government.

Learning and Knowledge Sharing

Results from the project will be disseminated within and beyond the project intervention zone through a number of existing information sharing networks and forums. In addition:

The project will participate, as relevant and appropriate, in UNDP/GEF sponsored networks, organized for Senior Personnel working on projects that share common characteristics. UNDP/GEF shall establish a number of networks, such as Integrated Ecosystem Management, eco-tourism, co-management, etc, that will largely function on the basis of an electronic platform.

- The project will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to project implementation though lessons learned.

The project will identify, analyze, and share lessons learned that might be beneficial in the design and implementation of similar future projects. Identify and analyzing lessons learned is an on-going process, and the need to communicate such lessons as one of the project's central contributions is a requirement to be delivered not less frequently than once every 12 months. UNDP/GEF shall provide a format and assist the project team in categorizing, documenting and reporting on lessons learned. To this end a percentage of project resources will need to be allocated for these activities.

PART V: Legal Context

This Project Document shall be the instrument referred to as such in Article I of the Standard Basic Assistance Agreement between the Government of Ghana and the United Nations Development Programme, signed by the parties on …… The host country implementing agency shall, for the purpose of the Standard Basic Assistance Agreement, refer to the government co-operating agency described in that Agreement.

The UNDP Resident Representative in Accra is authorized to effect in writing the following types of revision to this Project Document, provided that he/she has verified the agreement thereto by the UNDP-GEF Unit and is assured that the other signatories to the Project Document have no objection to the proposed changes:

1. Revision of, or addition to, any of the annexes to the Project Document;

2. Revisions which do not involve significant changes in the immediate objectives, outputs or activities of the project, but are caused by the rearrangement of the inputs already agreed to or by cost increases due to inflation;

3. Mandatory annual revisions which re-phase the delivery of agreed project inputs or increased expert or other costs due to inflation or take into account agency expenditure flexibility; and

4. Inclusion of additional annexes and attachments only as set out here in this Project Document.

PART VI: Stakeholder Involvement Plan

During the preparatory assistance phase, a stakeholders' consultation was held to ensure broad consultation of the stakeholders and maximize opportunities to disseminate the project information.

The project will schedule a number of consultations at the start of the project, as well as at critical points during its implementation to ensure: (i) close coordination with private sector companies representing refrigerator retailers, repairers etc; and (ii) continued collaboration between the Energy Commission and participating ministries to ensure the broadest possible level of political and administrative support.

Participation and involvement of these stakeholders with continue during the project through: (i) national energy efficiency forums which will be proposed annually; (ii) project Steering Committee meetings that will meet bi-annually or quarterly; (iii) electronic newsletters that will be distributed through professional trade associations to their membership; and (iv) training sessions and other outreach/capacity building activities designed to provide the necessary technical tools to industry professionals.

The project will ensure that there is a forum for a policy dialogue regarding energy efficiency with both public and private sector representatives. This forum will act in an advisory capacity to the Energy Commission. This forum will also serve as a platform to ensure that each participating line ministry (Energy, Environment Science and Technology, Trade and Industry.) is actively pursuing sectoral policies that are aligned with the objectives of this project, thus ensuring that energy efficiency concerns become imbedded inside the sectoral programs of each Ministry.

SECTION II: STRATEGIC RESULTS FRAMEWORK AND GEF INCREMENT

PART I: Incremental Cost Analysis

Project Components	**Sub-components**	**Baseline**	**Alternative**	**Increment (Alternative-Baseline)**
1. Structures and mechanisms for implementation of appliance energy efficiency standards and labels (S&L) strengthened	1.1 – S&L implementation regulations reviewed through stakeholder consultations 1.2 – Consulting and advising provided to enforcement authority staff and government ministries, departments and agencies, involved in S&L program 1.3 – Monitoring and data collection studies performed for end-use sales and appliance energy and ODS use	Poor policy/ institutional/ regulatory framework on energy efficient refrigeration appliances Cost: US$190,000 (GoG) *Sub-Total Comp: US$190,000*	Capacity building of enforcement authority staff and government ministries, departments and agencies, involved in S&L program Cost: US$ 50,000 (GEF) US$ 63,869 (MLF) US$ 5,000 (UNDP-Ghana) *Sub-Total Comp: US$ 308,869*	Effective and efficient structures and mechanisms for appliance energy efficiency standards and labels (S&L) are created Incremental Cost: US$ 50,000 (GEF) US$ 63,871 (MLF) US$ 5,000 (UNDP-Ghana) *Sub-Total Comp: US$ 308,869*
2. National testing, certification, labeling and enforcement mechanisms adopted	2.1 – National testing and certification procedures defined 2.2 – Verification and enforcement procedures developed and state inspectors trained	Lack of framework for national testing, certification, labeling and enforcement mechanisms and infrastructure for refrigeration appliances Cost: US$155,000 (GoG) *Sub-Total Comp: US$155,000*	Assistance to develop national testing, certification, verification and enforcement procedures Cost: US$ 60,000 (GEF) US$ 202,758 (MLF) US$ 5,000 (UNDP-Ghana) *Sub-Total Comp: US$ 422,758*	Fully operational national framework for national testing, certification, labeling and enforcement mechanisms and infrastructure Incremental Cost: US$ 60,000 (GEF) US$ 202,758 (MLF) US$ 5,000 (UNDP-Ghana) *Sub-Total Comp: US$ 422,758*

Project Components	**Sub-components**	**Baseline**	**Alternative**	**Increment (Alternative-Baseline)**
3. Increased consumer's and retailer's awareness and improved marketing of appliance energy efficiency standards and labels	3.1 – Enhanced awareness and knowledge of retailers' management and retail staff trained in appliance energy efficiency issues and sales rationales 3.2 – Enhanced consumers' awareness of appliance energy efficiency characteristics, standards and labels, and of costs and benefits of more efficient products	Consumers and retailers of refrigeration appliances have low awareness of appliance energy efficiency standards and labels Cost: US$ 0 *Sub-Total Comp: US$ 0*	Consultations with consumers and retailers of refrigeration appliances to create awareness of appliance energy efficiency standards and labels Cost: US$ 150,000 (GEF) US$ 10,000 (UNDP-Ghana) US$ 460,000 (GoG) *Sub-Total Comp: US$620,000*	Customers show high interest in energy efficient refrigeration appliances, and retailers improve their marketing of such appliances Incremental Cost: US$ 150,000 (GEF) US$ 10,000 (UNDP-Ghana) US$ 460,000 (GoG) *Sub-Total Comp: US$ 620,000*
4. Establishment of refrigerating appliance test facilities	4.1 – Refrigeration appliance test facility designed and budgeted 4.2 – Refrigeration appliance test facility built and commissioned	No refrigerating appliance test facilities exist in Ghana Cost: US$ 0 *Sub-Total Comp: US$ 0*	Assistance to set up a refrigerating appliance test facilities in Ghana Cost: US$ 300,000 (GEF) US$ 10,000 (UNDP-Ghana) US$ 240,000 (GoG) *Sub-Total Comp: US$ 550,000*	Fully operational refrigerating appliance test facilities established in Ghana Incremental Cost: US$ 300,000 (GEF) US$ 10,000 (UNDP-Ghana) US$ 240,000 (GoG) *Sub-Total Comp: US$ 550,000*
5. Establishment of used appliance and ODS collection and disposal facilities	5.1 – ODS incinerator designed with cost estimates 5.2 – Ghana refrigeration appliance industry understands environmentally friendly technologies and procedures for the collection and disposal of appliances and ODSs 5.3 – Bid documents formulated for ODS and used refrigerator collection and disposal 5.4- ODS Destruction Centre designed and implemented	No used appliance and ODS collection and disposal facilities exist in Ghana Cost: US$ 0 *Sub-Total Comp: US$ 0*	Assistance to set up collection and disposal facilities for used appliance and ODS Cost: US$ 300,000 (GEF) US$ 198,000 (MLF) US$ 710,000 (GoG) *Sub-Total Comp: US$ 1,208,000*	Fully operational collection and disposal facilities for used appliance and ODS is established in Ghana Incremental Cost: US$ 300,000 (GEF) US$ 198,000 (MLF) US$ 710,000 (GoG) *Sub-Total Comp: US$ 1,208,000*

Project Components	**Sub-components**	**Baseline**	**Alternative**	**Increment (Alternative-Baseline)**
6. Development of efficiency program evaluation and monitoring capacity	6.1 – Professionals are trained in energy efficiency program monitoring and evaluation study design, methods, technologies and procedures 6.2 - Promising monitoring technologies and metering equipment are tested and well-known in Ghana 6.3 - Pilot rebate and turn-in program evaluation and monitoring services are bid and contracted to qualified local professionals	Low capacity of Ghanaian professionals in efficiency program evaluation and monitoring Cost: US$ 0 *Sub-Total Comp: US$ 0*	Assistance to train Ghanaian professionals in efficiency program evaluation and monitoring Cost: US$ 150,000 (GEF) US$ 302,920 (MLF) US$ 200,000 (GoG) *Sub-Total Comp: US$ 652,920*	Ghanaian professionals have adequate skills in efficiency program evaluation and monitoring Incremental Cost: US$ 150,000 (GEF) US$ 302?920 (MLF) US$ 200,000 (GoG) *Sub-Total Comp: US$ 652,920*
7. Conduct of refrigeration appliance rebate and exchange program throughout Ghana that distribute at least 50,000 efficient appliances	7.1 Carbon finance options for Pilot Rebate and Exchange Program are accurately estimated and well known 7.2 - Designs for loan guarantee and capital financing programs that can facilitate implementation of Pilot Rebate and Exchange Program are known and available. 7.3 - The refrigeration appliance rebate and turn-in program is documented and available 7.4 - The organizational and logistical feasibility of the appliance rebate and turn-in program is demonstrated. 7.5 - Rigorous estimates of the impact of the rebate and turn-in program is well-documented and widely known	There are no incentives for customers to purchase or exchange for efficient refrigeration appliances Cost: US$ 0 *Sub-Total Comp: US$ 0*	Assistance to develop carbon financing and capital financing schemes for Pilot Rebate and Exchange Program Cost: US$ 460,000 (GEF) US$ 400,841 (MLF) US$ 120,000 (UNDP-Ghana) US$ 617,080 (GoG) *Sub-Total Comp: US$ 1,597,921*	Soft financing schemes are created to encourage customers to purchase or exchange for efficient refrigeration appliances Incremental Cost: US$ 460,000 (GEF) US$ 400,841 (MLF) US$ 120,000 (UNDP-Ghana) US$ 617,080 (GoG) *Sub-Total Comp: US$ 1,597,921*

Project Components	**Sub-components**	**Baseline**	**Alternative**	**Increment (Alternative-Baseline)**
8. Development of various feasible finance models for national scale follow-up of pilot rebate and exchange program	8.1 - Business plans are available for several program follow-up scenarios	There is no framework for financing national scale follow-up of pilot rebate and exchange program Cost: US$ 0 *Sub-Total Comp: US$ 0*	Assistance to develop feasible finance models for national scale follow-up of pilot rebate and exchange program Cost: US$ 90,000 (GEF) US$ 30,000 (MLF) US$ 50,000 (UNDP-Ghana) US$ 85,000 (GoG) *Sub-Total Comp: US$ 255,000*	Feasible finance models are established for national scale follow-up of pilot rebate and exchange program Incremental Cost: US$ 90,000 (GEF) US$ 30,000 (MLF) US$ 50,000 (UNDP-Ghana) US$ 85,000 (GoG) *Sub-Total Comp: US$ 255,000*

PART II: Logical Framework Analysis of Project

Strategy	Indicators	Baseline (Year 0)	Target	Sources of Verification	Risks and Assumptions
GOAL: To reduce Ghana's energy-related CO_2 and ozone depleting substance (ODS) emissions	Cumulative amount of GHG reduced in kilotons of CO_2	None	CO_2 reduction- 251.6 kilotons comprising: - 129.6 kilotons CO_2 abated from energy savings - 122.0 kilotons CO_2 abated from CFCs (ODS) removal	Project implementation reports GHG inventories and reports to UNFCCC	The policy/ institutional/ regulatory framework in Ghana is fully supportive of the project objectives
PROJECT OBJECTIVE: To improve the energy efficiency of refrigeration appliances in Ghana through the introduction of energy efficiency standards, and demonstration of equipment turn-in and replacement program	Reduced consumption of electricity by households, institutions and commercial firms for refrigeration Tons of CO_2 emissions reduction	Large number of refrigeration appliances with poor energy efficiency and ozone depleting substances in Ghana	• Purchase of 50,000 energy efficient refrigeration appliances by year 3 of project implementation Energy savings – 216,000 MWh CO_2 reduction- 251.6 kilotons	Refrigeration appliances imports / retailers survey Project implementation reports	The policy/ institutional/ regulatory framework in Ghana is fully supportive of the project objectives Strong involvement for project from retailers and consumers of refrigeration appliances Project is implemented as per plan
OUTCOME 1: Structures and mechanisms for appliance energy efficiency standards and labels (S&L) strengthened	Policy/ institutional/ regulatory framework on energy efficient refrigeration appliances	Poor policy/ institutional/ regulatory framework	Policy/ institutional/ regulatory framework on energy efficient refrigeration appliances is fully operational	Survey of major stakeholders	Major stakeholders are willing to support the project objectives
Output 1.1: S&L implementation regulations reviewed through stakeholder consultations	Stakeholders engaged in consultations	None	Majority of stakeholders fully review S&L implementation regulations	Stakeholder consultation reports	Stakeholders actively participate in the review of S&L implementation regulations
Output 1.2: Consulting and advising provided to enforcement authority staff and government ministries, departments and agencies	• Enforcement authority staff and provided with consultancy and advisory services	None	Enforcement authority staff and MDAs involved in the S&L program build adequate capacity to implement the program	Performance Reports on enforcement authority staff and MDAs involved in the S&L	Enforcement authority staff and MDAs involved in the S&L are willing to support the project objectives

(MDAs), involved in S&L program					
Strategy	**Indicators**	*Baseline (Year 0)*	*Target*	**Sources of Verification**	**Risks and Assumptions**
Output 1.3: Monitoring and data collection studies performed for end-use sales and appliance energy use	• Launching of monitoring and data collection studies	None	Detailed database on end-use sales and energy use of refrigeration appliances	Report on end-use sales and energy use of refrigeration appliances published	Consumers and retailers of refrigeration appliances, and MDAs involved in the S&L are willing to cooperate in data collection
OUTCOME 2: National testing, certification, labeling and enforcement mechanisms and infrastructure adopted	• Framework for national testing, certification, labeling and enforcement mechanisms and infrastructure	• None	• Framework for national testing, certification, labeling and enforcement mechanisms and infrastructure is fully operational	Survey of retailers and consumers of refrigeration appliances	Retailers and consumers of refrigeration appliances support the project objectives
Output 2.1: National testing and certification procedures defined	• Framework for testing and certification procedures on refrigeration appliances	• None	• National testing and certification procedures are published	• National testing and certification procedures documents	• Key stakeholders involved in testing and certification procedures cooperate in project
Output 2.2: Verification and enforcement procedures developed and state inspectors trained	• Number of state inspectors trained on verification and enforcement procedures	• None	• At least 150 state inspectors trained nationwide on verification and enforcement procedures by Year 3 of project	• Project implementation reports	• State inspectors cooperate to be trained on verification and enforcement procedures
OUTCOME 3: Increased consumer's and retailer's awareness and improved marketing of appliance energy efficiency standards and labels	Consumers and retailers who become more aware of appliance energy efficiency standards and labels and retailers who improve their marketing	None	Majority of consumers and retailers become more aware of appliance energy efficiency standards and labels and retailers improve their marketing	Consumers and retailers survey Project implementation reports	Retailers and consumers of refrigeration appliances support the project objectives

Output 3.1. Enhanced awareness and knowledge of retailers' management and retail staff trained in appliance energy efficiency issues and sales rationales	Number of awareness sessions offered to retailers' management Number of training sessions offered to retail staff Attendance rate	None	3 awareness sessions / year 5 training sessions / year 75% attendance rate	Program implementation reports	Retail companies of refrigeration appliances participate in awareness and training sessions
Strategy	**Indicators**	**Baseline (Year 0)**	**Target**	**Sources of Verification**	**Risks and Assumptions**
Output 3.2. Enhanced consumers' awareness of appliance energy efficiency characteristics, standards and labels, and of costs and benefits of more efficient products	Number of dissemination activities offered to consumers Number of consumers covered by dissemination activities	None.	500,000 households become aware of characteristics of more efficient refrigeration appliances in Year 3	Consumer surveys Program implementation reports	Effective awareness activities are offered to consumers of refrigeration appliances
OUTCOME 4: Establishment of refrigerating appliance test facility	Appliance test facility	None	Commissioned test facility	Operational test facility	Pre-construction processes proceed as per plan
Output 4.1. Refrigeration appliance test facility designed and budgeted	Design drawings and budget on refrigeration appliance test facility	None	Design drawings and budget on refrigeration appliance test facility completed	Technical and financial proposal from a firm for the design and cost estimates of refrigeration appliance test facility	Bid documents for design and cost estimates of refrigeration appliance test facility are appropriately prepared in good time
Output 4.2. Refrigeration appliance test facility built and commissioned	Refrigeration appliance test facility	None	Commissioned refrigeration appliance test facility	Fully operational refrigeration appliance test facility	Building and commissioning of refrigeration appliance test facility are undertaken within time and budget limits
OUTCOME 5: Establishment of used appliance and ODS collection and disposal facilities	Collection and disposal facilities	None	Commissioned collection and disposal facilities	Operational collection and disposal facilities	Pre-construction processes proceed as per plan
Output 5.1. Ghana refrigeration appliance industry understands	Number of capacity building sessions offered to refrigeration technicians	None.	500 refrigeration technicians undergo capacity building by year 3	Consumer surveys Project implementation reports	Refrigeration technicians are interested in building capacity on the collection and

environmentally friendly technologies and procedures for the collection and disposal of appliances and ODSs	Attendance rate		of program implementation		disposal of appliances and ODSs
Strategy	**Indicators**	**Baseline (Year 0)**	**Target**	**Sources of Verification**	**Risks and Assumptions**
Output 5.2. Bid documents formulated for Used Appliances Collection and Disposal Facilities (UACDFs)	Bid documents for ODS and used refrigerator collection and disposal	None.	Completed bid documents for ODS and used refrigerator collection and disposal	Completed bid documents	Bid documents are appropriately prepared in good time
Output 5.3. Contract signed for UACDFs	Contract document	None	Contract documents signed with firm with winning bid	Signed contract document	Contract documents are appropriately prepared in good time
Output 5.4. ODS Disposal Centre designed and implemented	ODS Disposal Centre	None	Commissioned ODS Destruction Centre	Fully operational ODS Disposal Centre	Building and commissioning of ODS Disposal Centre are undertaken within time and budget limits
OUTCOME 6: Development of efficiency program evaluation and monitoring capacity	Skilled Ghanaian professionals in efficiency program evaluation and monitoring	None	Adequate no. of skilled Ghanaian professionals	Project implementation reports	Full commitment of Ghanaian professionals
Output 6.1. Professionals are trained in energy efficiency program monitoring and evaluation study design, methods, technologies and procedures	Number of professionals trained in energy efficiency program monitoring and evaluation	None	30 professionals trained by year 3 of program implementation	Project implementation reports	Ghanaian professionals are interested to be trained
Output 6.2. Promising monitoring technologies and metering equipment are tested and well-known in Ghana	Monitoring technologies and metering equipment	None.	Good awareness and availability of proven monitoring technologies and metering equipment	Project implementation reports	Experts adequately review monitoring technologies and metering equipment and make recommendations
Output 6.3. Pilot rebate and	Number of local professionals	None		Contractors' evaluation	Selected contractors have

turn-in program evaluation and monitoring services are bid and contracted to qualified local professionals	contracted for program evaluation and monitoring services			and monitoring services reports	appropriate skills in evaluation and monitoring services
Strategy	**Indicators**	**Baseline (Year 0)**	**Target**	**Sources of Verification**	**Risks and Assumptions**
OUTCOME 7: Conduct of refrigeration appliance rebate and exchange program throughout Ghana that distribute at least 50,000 efficient appliances	Framework for refrigeration appliance rebate and exchange program	None	Large no. of households exchange for efficient refrigerators	Refrigerator consumers and retailers survey	Refrigerator consumers and retailers support project objectives
Output 7.1. Carbon finance options for Pilot Rebate and Exchange Program are accurately estimated and well known	Number of evaluated carbon finance options for Pilot Rebate and Exchange Program	None	Sustainable carbon finance options for Pilot Rebate and Exchange Program are well-documented	Project implementation reports Business Plan on sustainable carbon finance options	Experts adequately review carbon finance options for Pilot Rebate and Exchange Program and make recommendations
Output 7.2. Designs for loan guarantee and capital financing programs that can facilitate implementation of Pilot Rebate and Exchange Program are known and available	Number of loan guarantee and capital financing schemes that facilitate Pilot Rebate and Exchange Program	None	Sustainable loan guarantee and capital financing schemes are well-documented and adequately disseminated	Project implementation reports Business Plan on sustainable loan guarantee and capital financing schemes	Experts adequately review loan guarantee and capital financing schemes and make recommendations
Output 7.3. The refrigeration appliance rebate and turn in program is documented and available	Comprehensive document on refrigeration appliance rebate and turn in program	None	Document on refrigeration appliance rebate and turn in program is well-documented and adequately disseminated	Project implementation reports	Progress of the S&L program is well-monitored and documented
Output 7.4. The organizational and logistical feasibility of the appliance rebate and turn-in program is demonstrated	Operational appliance rebate and turn-in program	None	The appliance rebate and turn-in program is feasible in organizational and logistical terms	Project implementation reports	Progress of the S&L program is well-monitored and documented

Strategy	**Indicators**	**Baseline (Year 0)**	**Target**	**Sources of Verification**	**Risks and Assumptions**
OUTCOME 8: Development of various feasible finance models for national scale follow-up of pilot rebate and exchange program	Finance models for national scale follow-up	None	Finance models for national scale follow-up ready for implementation	Documents on finance models for national scale follow-up	Finance models are feasible
Output 8.1. Business plans are available for several program follow-up scenarios	Business plan	None	Comprehensive business plans prepared by the end of third year of program	Business plan documents Project implementation reports	Adequate data for business plans becomes available from program implementation

SECTION III: TOTAL BUDGET AND WORKPLAN

Award ID		**TBD**								
Award Title		**TBD**								
Business Unit		**GHA10**								
Project Title:		**GEF PIMS 4003 CC-M FSP Ghana Energy Efficiency**								
Outcome	**Responsible Party**	**Source of Funds**	**Donor Name**	**Atlas Budgetary Account Code**	**ATLAS Budget Description**	**Amount (USD) Year 1**	**Amount (USD) Year 2**	**Amount (USD) Year 3**	**Amount (USD) Total**	**Budget Notes**
OUTCOME 1: Structures and mechanisms for implementation of appliance energy efficiency standards and labels (S&L) strengthened	EC	62000	GEF	71300	Local consultants	10 000	8 000	6 000	24 000	1
	EC	62000	GEF	71600	Travel	5 000	2 000	1 000	8 000	2
	EC	62000	GEF	72200	Equipment & Furniture	8 000	3 000	1 000	12 000	3
	EC	62000	GEF	74500	Miscellaneous	2 000	3 000	1 000	6 000	4
					Sub-total GEF	**25 000**	**16 000**	**9 000**	**50 000**	
		4000	UNDP-Ghana	71300	Local consultants	4 000	-	-	4 000	1
		4000	UNDP-Ghana	71600	Travel	1 000	-	-	1 000	2
					Sub-total UNDP-Ghana	**5 000**	**-**	**-**	**5 000**	
					Total Outcome 1	**30 000**	**16 000**	**9 000**	**55 000**	
OUTCOME 2: National testing, certification, labeling and enforcement mechanisms adopted	EC	62000	GEF	72100	Contractual Services-Companies	10 000	15 000	15 000	40 000	5
	EC	62000	GEF	71600	Travel	-	3 000	2 000	5 000	6
	EC	62000	GEF	72200	Equipment & Furniture	6 000	3 000	1 000	10 000	7
	EC	62000	GEF	74500	Miscellaneous	2 500	1 250	1 250	5 000	8
					Sub-total GEF	**18 500**	**22 250**	**19 250**	**60 000**	
		4000	UNDP-Ghana	72100	Contractual Services-Companies	5 000	-	-	5 000	5

	Sub-total UNDP-Ghana					**5 000**	**-**	**-**	**5 000**	
	Total Outcome 2					**23 500**	**22 250**	**19 250**	**65 000**	
OUTCOME 3: Increased consumer's and retailer's awareness and improved marketing of appliance EE standards and labels	EC	62000	GEF	71300	Local consultants	10 000	20 000	20 000	50 000	9
	EC	62000	GEF	72200	Equipment & Furniture	20000	40000	40000	100 000	10
	Subtotal GEF					**30 000**	**60 000**	**60 000**	**150 000**	
	EC	4000	UNDP-Ghana	71300	Local consultants	-	3 000	5 000	8 000	9
	EC	4000	UNDP-Ghana	71600	Travel	-	-	2 000	2 000	11
	Sub-total UNDP-Ghana					**-**	**3 000**	**7 000**	**10 000**	
	Total Outcome 3					**30 000**	**63 000**	**67 000**	**160 000**	
Outcome 4: Establishment of refrigerating appliance test facilities	EC	62000	GEF	71300	Local consultants	3 000	12 000	10 000	25 000	12
	EC	62000	GEF	71200	International Consultants	-	12 000	8 000	20 000	13
	EC	62000	GEF	71600	Travel	-	3 000	2 000	5 000	14
	EC	62000	GEF	72200	Equipment & Furniture	20 000	140 000	90 000	250 000	15
	Sub-total GEF					**23 000**	**167 000**	**110 000**	**300 000**	
	EC	4000	UNDP-Ghana	71300	Local consultants	1 000	4 000	3 000	8 000	12
	EC	4000	UNDP-Ghana	71600	Travel	1 000	1 000	-	2 000	14
	Sub-total UNDP Ghana					**2 000**	**5 000**	**3 000**	**10 000**	
	Total Outcome 4					**25 000**	**172 000**	**113 000**	**310 000**	

OUTCOME 5: Establishment of used appliance and ODS collection and disposal facilities	EC	62000	GEF	71300	Local consultants	15 000	20 000	15 000	50 000	16
	EC	62000	GEF	71200	International Consultants	10 000	10 000	10 000	30 000	17
	EC	62000	GEF	72100	Contractual Services Companies	20 000	15 000	15 000	50 000	18
	EC	62000	GEF	72200	Equipment & Furniture	150 000	10 000	10 000	170 000	19
					Sub-total GEF	**195 000**	**55 000**	**50 000**	**300 000**	
					Total Outcome 5	**195 000**	**55 000**	**50 000**	**300 000**	
OUTCOME 6:. Development of efficiency program evaluation and monitoring capacity	EC	62000	GEF	71300	Local consultants	-	15 000	15 000	30 000	20
	EC	62000	GEF	71200	International Consultants	-	10 000	10 000	20 000	21
	EC	62000	GEF	72200	Equipment & Furniture	10 000	45 000	45 000	100 000	22
					Sub-total GEF	**10 000**	**70 000**	**70 000**	**150 000**	
					Total Outcome 6	**10 000**	**70 000**	**70 000**	**150 000**	
OUTCOME 7: Conduct of refrigeration appliance rebate and exchange programs throughout Ghana that distribute at least 50,000 efficient appliances	EC	62000	GEF	71300	Local consultants	35 000	35 000	30 000	100 000	23
	EC	62000	GEF	71200	International Consultants	15 000	15 000	10 000	40 000	24
	EC	62000	GEF	71600	Travel	2 000	2 000	2 000	6 000	25
	EC	62000	GEF	72200	Equipment & Furniture	270 000	24 000	20 000	314 000	26
					Sub-total GEF	**322 000**	**76 000**	**62 000**	**460 000**	
	EC	4000	UNDP Ghana	71300	Local consultants	20 000	20 000	20 000	60 000	23
	EC	4000	UNDP Ghana	71200	International Consultants	10 000	10 000	10 000	30 000	24
	EC	4000	UNDP Ghana	71600	Travel	10 000	10 000	10 000	30 000	25

	Sub-total UNDP Ghana					**40 000**	**40 000**	**40 000**	**120 000**	
	Total Outcome 7					**362 000**	**116 000**	**102 000**	**580 000**	
8. Development of various feasible finance models for national scale follow-up of pilot rebate and exchange program	EC	62000	GEF	71300	Local consultants	15 000	15 000	10 000	40 000	27
	EC	62000	GEF	72200	Equipment & Furniture	30 000	15 000	5 000	50 000	28
	Sub-total GEF					**45 000**	**30 000**	**15 000**	**90 000**	
	EC	4000	UNDP Ghana	71300	Local consultants	15 000	10 000	10 000	35 000	27
	EC	4000	UNDP Ghana	71200	International Consultants	5 000	5 000	-	10 000	29
	EC	4000	UNDP Ghana	71600	Travel	5 000	-	-	5 000	30
	Sub-total UNDP Ghana					**25 000**	**15 000**	**10 000**	**50 000**	
	Total Outcome 8					**70 000**	**45 000**	**25 000**	**140 000**	
9. Project Management	EC	62000	GEF	71300	Local consultants	15 000	15 000	10 000	40 000	31
	EC	62000	GEF	71600	Travel	5 000	4 000	4 600	13 600	32
	EC	62000	GEF	72200	Equipment & Furniture	49,127	15,000	10,000	74,127	33
	EC	62000	GEF	72500	Supplies	10,000	5,000	5,000	20,000	34
	EC	62000	GEF	72400	Communication	7,000	5,000	3,000	15,000	35
	Sub-total GEF					**86,127**	**44,000**	**32,600**	**162,727**	
	Total Outcome 9					**86,127**	**44,000**	**32,600**	**162,727**	
Total GEF						**757 627**	**535 250**	**429 850**	**1 722 727**	
Total UNDP Ghana						**77 000**	**63 000**	**60 000**	**200 000**	
TOTAL Project						**834 627**	**598 250**	**489 850**	**1 922 727**	

Budget notes:

General Cost Factors:

- Short-term national consultants (NC) are budgeted at US$ 1500 per week.
- Project Coordinator (PC) budgeted at US$ 2000 per week
- International consultants (IC) are budgeted at US$2500 per week.
  DSA's are budgeted at US$ 200 per day.
-
- International flight tickets are budgeted at US$ 1000 per round trip.
- Other expenses are based on UNDP standard costs.
  The project will look for cost-savings wherever possible using programmatic approach so far applied in Climate Change portfolio, particularly connected with costs associated with office equipment purchase and maintenance, technical support connected with information technologies and logistics, as well as communication costs and vehicle sharing.

Outcome 1:

1 Local consultant will be hired to support the strengthening of the structures and mechanisms for implementation of appliance energy efficiency standards and labels (S&L)
2 The travel costs cover the visits of local consultants to selected parts of the country as part of their TOR as well as their DSA
3 Equipment to be purchased are computer hardware and software for participating institutions
4 Printing and reproduction of legal and technical documentation.

Outcome 2:

5 Local firms will provide technical services to develop verification and enforcement procedures and train state inspectors trained
6 The travel costs include the DSA and in-country travels of the project staff of local firm
7 Equipment includes testing equipment, computer hardware and software for certification and enforcement
8 Miscellaneous expenses cover training materials and stationery

Outcome 3:

9 Local consultants will be involved in awareness campaigns and training of retailers
10 Equipment includes audio visual and other advertising equipment for awareness campaigns and training of retailers
11 Travel costs will cover in-country travel of national consultants.

Outcome 4:

12 Local consultants will assist the international consultant to design, construct and commission refrigeration appliance test facility
13 International expert will, with assistance of local consultants, design, construct and commission refrigeration appliance test facility
14 The travel costs include the DSA and travels of international and local consultants
15 Equipment costs cover GEF contribution towards for refrigerating appliance test facilities

Outcome 5:

16 Local consultants will conduct training and capacity-building sessions for refrigeration technicians on the collection, dismantling and disposal of appliances and ODSs
17 International consultants will guide local consultants to conduct training and capacity-building sessions for refrigeration technicians on the collection, dismantling and disposal of appliances and ODSs
18 A local firm will assist to install and commission the used refrigeration appliance and ODS collection, dismantling and disposal facility
19 Equipment costs cover GEF contribution towards the used refrigeration appliance and ODS collection, dismantling and disposal

Outcome 6:

20 Local consultants will train program evaluators
21 International Consultants will perform training and capacity building activities for Ghanaian rigorous program evaluators
22 Equipment costs cover evaluation samples of metering and monitoring equipment

Outcome 7:

23 Local consultants will, among others, develop an inventory of baseline data for estimating carbon emissions reduction from domestic refrigerators on energy gains
24 International consultants will provide guidance to select appropriate carbon finance options for the Pilot Rebate and Exchange Program
25 The travel costs include the DSA and travels of international and local consultants
26 Equipment costs cover GEF contribution towards Pilot Refrigerator Rebate and Exchange Program

Outcome 8:

27 Local consultants will prepare market transformation business plan for national scale-up of Pilot Refrigerator Rebate and Exchange Program
28 Equipment includes computer hardware and software to facilitate preparation of market transformation business plan
29 International Consultants will assist local consultants with their knowledge and expertise from program scale-up designs in other countries and experiences
30 The travel costs include the DSA and travels of international consultants

Outcome 9:

31 Local professional will be hired as Project Coordinator to co-ordinate and manage the project, with assistance from an Administrative and Finance Assistant
32 Travel costs include the DSA and travels of Project Coordinator and Administrative and Finance Assistant
33 Equipment includes computer hardware and software, stationery, premises.
34 Supplies includes office equipment replacement cartridges, stationery and miscellaneous office materials
35 Communication costs include courier postal services, telephone and fax charges and tele-conferencing costs

Regarding the issue of Co-financing from MLF, the total and final considered MLF contribution is **US$ 1,198,338**; the first part approved since July 2010, and the second part regarding the ODS-facility (US$ 198,000) approved on April 6th 2011 during the latest MLF ExCom meeting (Montreal Protocol Board).

Points bellow recall budget changes from MLF over the GEF prodoc submissions:

1) On the ODS-waste Disposal centre Demo. At the ExCom meeting of the MLF held in Dec 2010, some delegates had concerns about the longer-term sustainability of the high-tech small-scale Plasma-Arc technology that was to be installed in Accra. UNDP was requested to reformulate the proposal using the "transport-option" of the ODS-waste to Europe or elsewhere. The project is currently being re-written but UNDP anticipate that the MLF resources needed to (a) ensure transportation of the ODS-waste from the GEF dismantling centres to Port Tema (b) transportation abroad (c) transportation from the foreign port to the destruction facility (d) gate price to destroy and (e) consultancies, training and other incidentals would only amount to approximately US$ 300,000 of MLF-resources.

2) On the already approved HPMP. The ExCom already approved the HPMP for Ghana at their July 2010 meeting. Its budget amounts to US$ 1.356 million which can be broken down as in the table below (page 2). All activities are directly related to the GEF-effort except for:

- activity-5 which will "provide new refrigeration systems to some end-users" which is unrelated.
- about 50% of activity 4 (recovery/recycling) which is only partly related to the GEF effort.

All other activities clearly contribute to Ghana's EE efforts as they include legislation, training and recovery/recycling operations related to its refrigeration sector. As such, the MLF-funded HPMP budget that is linked to the GEF efforts is US$ 970,388.

As mentioned, the above two projects which amount to US$ 1,270,388 (of which US$ 970,388 has already been approved) are all complementary to the GEF-funded activities. While the GEF-funded activities would focus on the end-of-life equipment, the MLF-funded activities focus on equipment still in service, but the target groups are clearly the same and interlinked.

3) The budget for the ODS-waste demonstration is reduced from $270,000 to US$ 198,000 out of which a significant part is to function the ODS-facility. The facility role will only be to collect ODS, identify which refrigerant is received, test its purity, determine if it is fit for re-use, or else accumulate it in larger cylinders for export to a destruction facility abroad. The total considered MLF cofinancing is US$ 1,198,338.

Outcome	Sub-components	GEF (US$)	Multi-lateral Fund (US$)	UNDP-Ghana (US$)	Ghana Gov't (US$)	Total (US$)
1. Structures and mechanisms for implementation of appliance energy efficiency standards and labels (S&L) strengthened	1.1 – S&L implementation regulations reviewed through stakeholder consultations	0	0	0	10,000	10,000
	1.2 – Consulting and advising provided to enforcement authority staff and government ministries, departments and agencies, involved in S&L program *	15,000	63,869	0	75,000	153,869
	1.3 – Monitoring and data collection studies performed for end-use sales and appliance energy and ODS use*	35,000	0	5,000	105,000	145,000
	Sub-Total	**50,000**	**63,869**	**5,000**	**190,000**	**308,869**
2. National testing, certification, labeling and enforcement mechanisms adopted	2.1 – National testing and certification procedures defined	10,000	0	0	35,000	45,000
	2.2 – Verification and enforcement procedures developed and state inspectors trained*	50,000	202,758	5,000	120,000	377,758
	Sub-Total	**60,000**	**202,758**	**5,000**	**155,000**	**422,758**
3. Increased consumer's and retailer's awareness and improved marketing of appliance EE standards and labels	3.1 – Enhanced awareness and knowledge of retailers' management and retail staff trained in appliance energy efficiency issues and sales rationales*	30,000	0	0	100,000	130,000
	3.2 – Enhanced consumers' awareness of appliance energy efficiency characteristics, standards and labels, and of costs and benefits of more efficient products	120,000	0	10,000	360,000	490,000
	Sub-Total	**150,000**	**0**	**10,000**	**460,000**	**620,000**
4. Establishment of refrigerating appliance test facilities	4.1 – Refrigeration appliance test facility designed and budgeted	40,000	0	5,000	5,000	50,000
	4.2 – Refrigeration appliance test facility built and commissioned	260,000	0	5,000	235,000	500,000
	Sub-Total	**300,000**	**0**	**10,000**	**240,000**	**550,000**

5. Establishment of used appliance and ODS collection and disposal facilities	5.1 – Ghana refrigeration appliance industry understands environmentally friendly technologies and procedures for the collection and disposal of appliances and ODSs **	5,000	0	0	5,000	10,000
	5.2 – Bid documents formulated for Used Appliances Collection and Disposal Facilities (UACDFs)	5,000	0	0	5,000	10,000
	5.3- Contract signed for UACDFs	290,000	0	0	690,000	980,000
	5.4 - Transport of ODS cylinders to Destruction Centre		50,000			50,000
	5.5 – ODS Destruction Centre designed and implemented **	0	148,000	0	10,000	158,000
	Sub-Total	**300,000**	**198,000**	**0**	**710,000**	**1,208,000**
6. Development of efficiency program evaluation and monitoring capacity	6.1 – Professionals are trained in energy efficiency program monitoring and evaluation study design, methods, technologies and procedures	60,000	302,920	0	40,000	402,920
	6.2 - Promising monitoring technologies and metering equipment are tested and well-known in Ghana	50,000	0	0	150,000	200,000
	6.3 - Pilot rebate and turn-in program evaluation and monitoring services are bid and contracted to qualified local professionals	40,000	0	0	10,000	50,000
	Sub-Total	**150,000**	**302,920**	**0**	**200,000**	**652,920**
7. Conduct of refrigeration appliance rebate and exchange program throughout Ghana that distribute at least 50,000 efficient appliances	7.1 Carbon finance options for Pilot Rebate and Exchange Program are accurately estimated and well known **	30,000	30,000	15,000	30,000	105,000
	7.2 - Designs for loan guarantee and capital financing programs that can facilitate implementation of Pilot Rebate and Exchange Program are known and available.	20,000	0	5,000	15,000	40,000
	7.3 - The refrigeration appliance rebate and turn-in program is documented and available	35,000	0	0	10,000	45,000
	7.4 - The organizational and logistical feasibility of the appliance rebate and turn-in program is demonstrated.	310,000	370,841	100,000	487,080	1,267,921

	7.5 - Rigorous estimates of the impact of the rebate and turn-in program is well-documented and widely known	65,000	0	0	75,000	140,000
	Sub-Total	**460,000**	**400,841**	**120,000**	**617,080**	**1,597,921**
8. Development of various feasible finance models for national scale follow-up of pilot rebate and exchange program	8.1 - Business plans are available for several program follow-up scenarios	90,000	30,000	50,000	85,000	255,000
	Sub-Total	**90,000**	**30,000**	**50,000**	**85,000**	**255,000**
9. Project Management	**Project Management, Consultants ***	**162,727**	**0**	**0**	**342,920**	**505,647**
Project Total		**1,722,727**	**1,198,388**	**200,000**	**3,000,000**	**6,121,115**

United Nations Development Programme
Country: GHANA
PROJECT DOCUMENT[4]

Project Title: Promoting of Appliance of Energy Efficiency and Transformation of the Refrigerating Appliances Market in Ghana

UNDAF Outcome(s): Increased productive capacity for sustainable livelihoods, especially in the most deprived districts

UNDP Strategic Plan Environment and Sustainable Development Primary Outcome: Increased productive capacity for sustainable livelihoods, especially in the most deprived districts

UNDP Strategic Plan Secondary Outcome: Sustainable use of natural resources and good environmental management promoted

Expected CP Outcome(s): Establishment of regulatory framework for ensuring sustainable use of natural resources, water and energy for improved livelihood

Expected CPAP Output (s) Sectoral policies and legislations harmonized to ensure integration of environmental concerns in the development agenda
Executing Entity/Implementing Partner: The Energy Commission
Implementing Entity/Responsible Partners: Ministry of Energy, Environmental Protection Agency

Agreed by (Government):

Date/Month/Year

Agreed by (Executing Entity/Implementing Partner):

Date/Month/Year

Agreed by (UNDP):

Date/Month/Year

Programme Period:	2006-2011
Atlas Award ID:	**00059667**
Project ID:	**00074729**
PIMS #	4003
Start date:	July 2011
End Date	June 2014
Management Arrangements	NEX
PAC Meeting Date	June 15th 2010

Total resources required	6 121 115 $
Total allocated resources:	6 121 115 $
✓ Regular (GEF)	1 722 727 $
Other:	
✓ Government (cash)	2 200 000 $
✓ Government (In-kind)	800 000 $
✓ UNDP	200 000 $
MLF	1 198 388$

ANNEX A: BASELINE DATA ON REFRIGERATORS

Energy consumption of Domestic Refrigerators and Freezers

In 2006, the Energy Commission initiated a national survey that involved the measurement and evaluation of the energy consumption and efficiencies of refrigerators in 1000 households throughout Ghana. The annual energy consumption of the refrigerators and freezers was from about 150 to over 2000 kWh/per appliance depending on the size of the appliance, and the average annual energy consumption was 1140 kWh/per appliance. The data gathered in the national survey is presented in Figure A1.

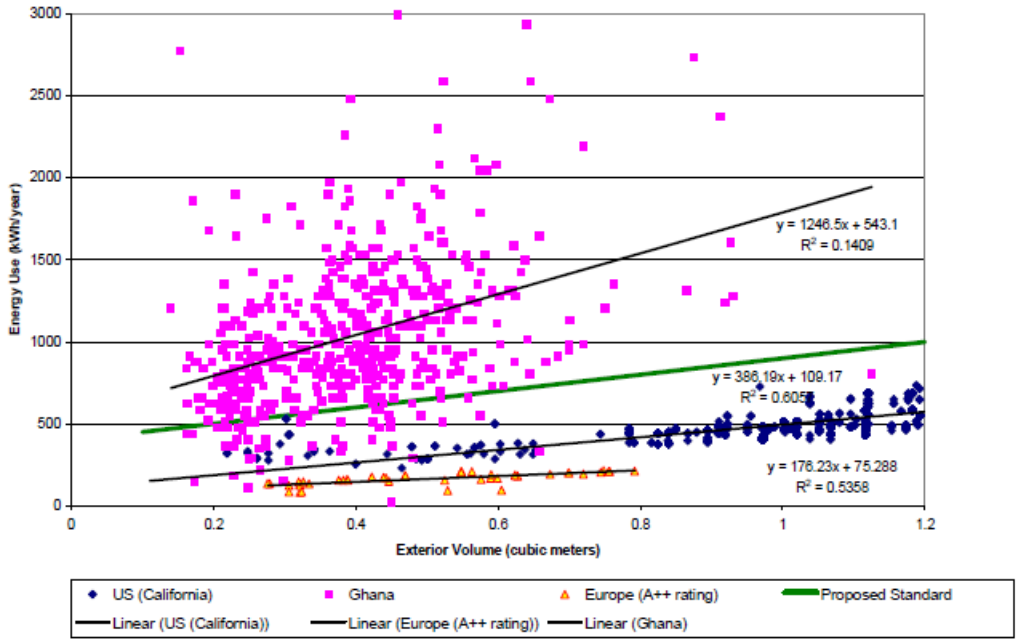

Figure A1: Energy Consumption of Refrigerators in Ghana, compared with USA and Europe

Population of Domestic Refrigerators and Freezers

According to Ghana's Ministry of Energy, there has been a steady upward trend in electricity access rates from 28 percent in 1988 to 43.7 percent in 2000 and about 55 percent in 2008, making Ghana the third highest in sub-Saharan Africa, after Mauritius and South Africa .

The Ghana Statistical Service estimates that there are 5.5 million households in Ghana, and at 55 percent access to electricity, approximately 3 million households are currently connected to the national electricity grid. With the assumption that 70 percent of the households with access to electricity use refrigerators in the home, there are currently about 2 million refrigerators in use in Ghana. Ghana's annual population growth rate stands at an average of 2.6 percent, and with modest improvement of standard of living of households, the increase in the number of refrigerators use in Ghana may be assumed to be approximately 3.0 percent.

Importation of New and Used Domestic Refrigerators and Freezers

The data compiled by the Customs, Excise and Preventive Service for the years 2005-2008 on the importation of domestic refrigerators and freezers is summarized as follows:

Nearly 389,200 used refrigerators and freezers were imported to Ghana from January 2005 to December 2008, while at the same time less than 25,000 new refrigerators were imported

On the average only about 5% of domestic refrigerators and freezers imported to Ghana from 2005 to 2008 were new, the rest were used.

The average price (CIF) of used domestic refrigerators cleared at the ports in Ghana was only about 15% that of new domestic refrigerators at GH¢29.49 (Ghana Cedis) equivalent to US$20.33 and GH¢185.20 or US$127.83 respectively (at current rate of exchange).

The largest volume of used refrigerators (over 172,000) was imported in 2005.

The main source of imported used refrigerators is the countries of the European Union.

Fig. A2 shows a comparison of the volumes of imports of domestic refrigeration units in the period 2005-2008.

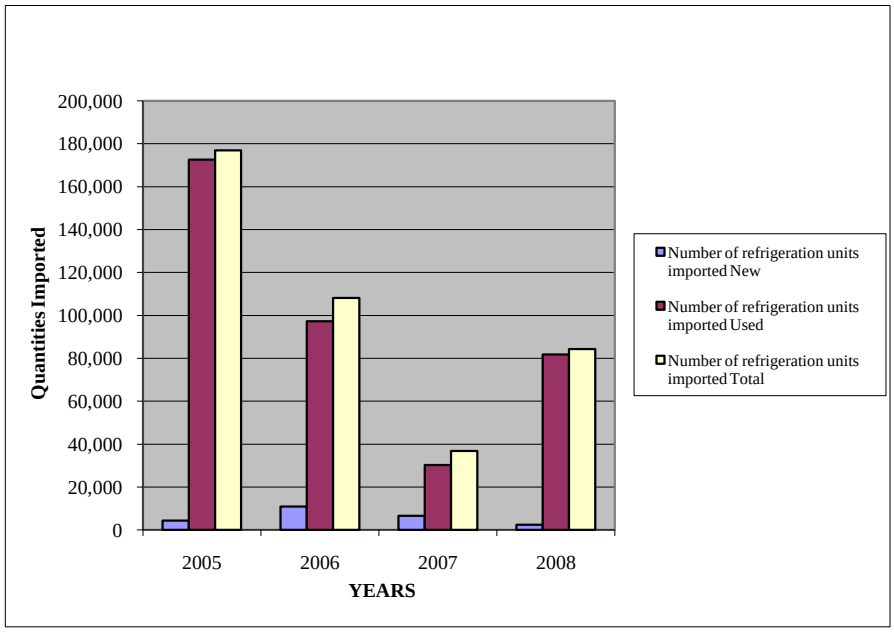

Fig. A2: Import of New and Used Refrigerators and Freezers 2005-2008

Table A1 also provides the summary of quantities of domestic refrigerators and freezers imported by year as well as the corresponding costs in Ghana Cedis. The CIF cost of imported goods which is a determinant of market prices of the goods shows a very wide gap between the

costs of imported new and used refrigerators and freezers. The very low costs of used refrigerators would make them much more affordable than the new refrigerators and consequently appear more attractive as a household appliance for such an essential item of equipment in the home.

Table A1: Summary of Importation of New And Used Refrigerators to Ghana for the Four-Year Period 2005-2008

Year	Number of refrigeration units imported				Cost CIF (GH ¢) of imported units			(Average) Unit Cost CIF (GH ¢)		
	New	Used	Total	% New	New	Used	Total	New	Used	% New
2005	4,317	172,541	176,858	2	696,897	4,726,497	5,423,394	161.43	27.45	17
2006	10,944	97,240	108,184	10	2,256,527	2,751,055	5,007,582	206.19	28.29	14
2007	6,607	30,277	36,884	18	983,102	887,898	1,871,000	148.80	29.33	20
2008	2,401	81,854	84,255	3	557,992	2,886,685	3,444,677	232.40	35.27	15
Total	**24,269**	**381,912**	**406,181**	**6**	**4,494,518**	**11,252,135**	**15,746,653**	**185.20**	**29.46**	
Average	**6,067**	**95,478**	**101,545**	**6**	**1,123,630**	**2,813,034**	**3,936,663**	**183.56**	**29.46**	**16**

Sources of Importation of Domestic Refrigerators and Freezers

Used Refrigerators and Freezers

Used refrigerators were imported from all regions of the world including Europe, North America and Asia by Ghanaian commercial importers, shop owners, traders, and individuals. Large consignments in commercial quantities originated mainly from Europe while imports from North America tended to be predominantly in small consignments and single units. Europe, in particular some countries of the European Union, accounted for the bulk of the import of used refrigerators. Out of the total of 381, 550 used refrigerators imported in the period 2005 to 2008 346,400 (about 91%) were imported from five European countries, namely Belgium (59,200), Germany (32,000), Italy (48,000), Netherlands (46,600) and United Kingdom (160,500).

New Refrigerators and Freezers

New refrigerators were imported from about 27 countries in all the regions. Unlike the old used refrigerators the main source of import was Asian countries, as indicated in Table A2. China, India, Thailand and Turkey accounted for 62% of the new refrigerators imported during the period January 2005 to June 2009. China was the predominant source of the imports accounting for nearly 50% of the number of new refrigerators imported. Italy was the main source of import in Europe accounting for about 10% of the total import.

Table A2: Main Sources of Import of New Refrigerators in Ghana (Jan. 2005-June 2009)		
Country	**Number of New Refrigerators Imported**	**% of Total Import**
China	11,992	47.7
Italy	2,410	9.6
India	1,328	5.3
Turkey	1,271	5.1
USA	1,184	6.2
Thailand	997	4.0
Sub-total	**19,182**	**76.3**
Total Import for Period	**25,156**	

ANNEX B: TERMS OF REFERENCE OF KEY PROJECT PERSONNEL

1. Project Coordinator

Under the direct supervision of the UNDP CO Head of Environment & Energy Unit, and in close cooperation with the Climate Change Programme Coordinator and National Project Coordinator (NPC), the Project Coordinator is responsible for the day-to-day management and implementation of the UNDP-GEF project, including all project administrative matters. All work of the Coordinator will be carried out in line with the Country Programme Action Plan and in full compliance with the UNDP Rules and Regulations. The management and coordination process will be pursued through undertaking appropriate actions in programme formulation, implementation and evaluation. Strong emphasis will be made on ensuring cohesion with other UNDP programmes.

Job content

Manage the project implementation in accordance with objectives, schedule and planned budget;
Manage all project activity, staff, consultants and etc., for timely implementation of requirements on Monitoring and Evaluation;
Coordinate awareness creation on all project activities;
Coordinate the project activities with relevant activity and initiative of the Government;
Ensure cooperation between the participating institutions of the project;
Ensure timely preparation of annual project reports, working plans and other relevant project documents.

Qualifications

At least 5 years work experience in project management. Previous work in international project management is an advantage

University education in Engineering, Energy, Physics, Business Management or relevant field. A post-graduate degree (MSc, MPhil, PhD etc) is an advantage

Strong interpersonal and communication skills
Ability to take decisions
Strong computer skills (Microsoft Office, Internet, e-mail)

2. Administrative and Finance Assistant

The Administrative and Finance Assistant will work under the direct supervision of the Project Coordinator and provide assistance to project implementation in the mobilization of inputs, the organization of training activities and financial management and reporting.

Job content

Prepare all payment requests, financial record-keeping and preparation of financial reports required in line with NEX financial rules and procedures

Assist in the recruitment and procurement processes, checking the conformity with UNDP and the Government rules and procedures

Assist in the organization of in-country training activities, ensuring logistical arrangements

Prepare internal and external travel arrangements for project personnel

Maintain equipment ledgers and other data base for the project

Take record of projects meetings and draft correspondence as required

Maintain project filing

Other duties which may be required

Qualifications

At least five years administrative experience,

University degree in Business Administration (Finance or Accounting)

Good organizational skills

Good computer skills, including spread-sheets and database

Local Consultants

3. Communication Specialist

Job content

i. Coordinate inputs from stakeholders related to refrigeration appliances to plan and design internal and external strategies for the annual communications and outreach programs;
ii. Train staff of the Consumer Association of Ghana, environmental community-based organizations and the mass media to have sufficient knowledge to provide specific information on energy efficient refrigeration appliances to consumers
iii. Assist the Consumer Association of Ghana, environmental community-based organizations and the mass media to regularly organize media events and information campaigns at national and local level on the benefits of energy efficient refrigeration appliances
iv. Organize national events, press-conferences and other events devoted to the benefits of energy efficiency of household appliances

Qualifications

At least three years of relevant experience in public relations, communications or advocacy.

• A university bachelor's degree in Corporate Communications, Public Relations, Mass Communications, Media Communications, Journalism or Publishing;

• Demonstrable excellent verbal and written communications skills.

• Excellent working knowledge of English;

Experience in the use of computers and office software packages

4. Socio-economist

Job content

Plan and carry out a socio-economic baseline study of the project areas;

Train a pool of professionals in rigorous program impact evaluation design and methods, in collaboration with international consultant;

Produce presentation and training materials based on evaluation which will be included in other components of capacity building and pilot testing activities.

Qualifications

At least 5 years of experience in Project Management and Project Evaluation, with expertise in baseline socio-economic studies, project cycle management, the logical framework and participatory approach
- University Degree in Economics, International Cooperation or related field.
- Experience as a Team Leader in evaluating national projects is a distinctive asset
- Strong communication, personal and interpersonal skills
- Computer literacy

5. Refrigeration Engineer

Job Content

Conduct training and capacity-building sessions for refrigeration technicians on environmentally friendly technologies and procedures for the collection, dismantling and disposal of appliances and ODSs;

Train staff on operation of refrigeration appliance test facility;

Lead the commissioning of refrigeration appliance test facility;

Assist in planning, preparation and organization of awareness and information dissemination activities (e.g. workshops, meetings, technical assistance activities, etc);

Qualification

5 years experience in refrigeration and air-conditioning project with knowledge of various international environmental conventions

• University Degree in Mechanical / Chemical Engineering. Master's Degree in Engineering with specialization in Thermal Engineering or Refrigeration and Air-conditioning Engineering is preferable.

Knowledge of computer applications is essential.

6. Finance Specialist

Job content

Evaluate various finance options for Pilot Rebate and Exchange Program;

Prepare designs for loan guarantee and capital financing programs that can facilitate implementation of Pilot Rebate and Exchange Program;

provide support in developing business plan for financing the refrigerator turn-in and rebate program;

Lead the demonstration of the organizational and logistical feasibility of the appliance rebate and turn-in program;

Participate in the rigorous estimation of the impact of the rebate and turn-in program.

Qualification

At least 5 years of working experience as Finance Specialist in a national project.

University degree in Finance, Business or related field

Knowledge of computer applications is essential

7. Monitoring and Evaluation Specialist

Job content

Assess training needs relevant to monitoring, evaluation and provide training to professionals in energy efficiency program monitoring and evaluation study design, methods, technologies and procedures;

Develop the monitoring and evaluation strategy of the project;

Identify information requirements of project components concerning planning, monitoring and evaluation;

Implement the monitoring and evaluation strategy of the project;

Qualification

Minimum 5 years of relevant professional experience in project management, project monitoring and evaluation or relevant connected fields

University degree in Human Resources, Social Science, Statistics, Economics, or Public Policy;

Good communication and social skills;

Computer skills (Word, Excel, Access) and MIS systems

International Consultants

8. Technical Advisor – Project Management

Job content

Provide overall technical guidance, advice and support to Project Coordinator and project team

Assist the Project Coordinator and project team to prepare a detailed Annual Work Plan of all project activities in line with the programming and approved budget, and start and conclude them accordingly;

Advise the Project Coordinator and project team on the project strategy and implementation methodology;

Assist in the recruitment, supervision and management of local staff;

Participate in the recruitment of local consultants and international experts:

Qualification

At least 5 years work experience in project management. Previous work in international project management is an advantage

University education in engineering, energy, physics, business management or relevant field. A post-graduate degree (MSc, MPhil, PhD etc) is an advantage

Strong interpersonal and communication skills

Ability to take decisions

Strong computer skills (Microsoft Office, Internet, e-mail)

9. Technical Advisor – Technical Assistance

Job content

Provide technical support to refrigeration appliance turn-in program;

Guide the designing of the refrigeration appliance market transformation strategy

Work with local consultants to design the impact study on the project

Qualification

At least 5 years work experience in appliance market transformation project. Previous work in international project management is an advantage

University education in engineering, energy, physics, business management or relevant field. A post-graduate degree (MSc, MPhil, PhD etc) is an advantage

Strong interpersonal and communication skills

Ability to take decisions

Strong computer skills (Microsoft Office, Internet, e-mail)

10. Carbon Finance Specialist

Job content

Develop an inventory of baseline data for estimating carbon emissions reduction from domestic refrigerators on energy gains;

Review availability of approved methodologies and protocols for project registration;

Review of procedures and protocols of voluntary and compliance carbon credit markets;

Identify carbon financing options and potential, as well as potential carbon credit buyers.

Qualification

At least 5 years of professional experience in formulation and implementation of renewable energy and/or energy efficiency activities. Previous experience with projects with carbon finance mechanisms will be highly desirable

University degree in Environmental Sciences, Environmental Economics, Environmental Management, or Engineering or Finance related to energy and climate change or a closely-related field;

Knowledge of computer applications is essential.

ANNEX C: COMBINING AND SEQUENCING GEF AND MLF FUNDING FOR CLIMATE AND OZONE BENEFITS

The Multilateral Fund for the Implementation of the Montreal Protocol (MLF) has been set up to support developing countries in their efforts to phase out the use of Ozone Depleting Substances well before the protocol deadline of 2010 and in this way to maximize the related environmental benefits for the global community. The Fund has for over fifteen years supported ODS phase out projects. By and large this support has been restricted to the so-called Annex-A substances from which CFCs constitute the main group. A Terminal Phase out Management Plan (TPMP) is ongoing in Ghana to address the CFC phase-out. The conversion of HCFCs, which have Ozone Depleting Potentials (ODPs) of only 5-10% of those of CFCs, is now recently being supported as well and the formulation of an HCFC Phase out Management Plan (HPMP) are being developed.

UNDP Ghana in collaboration with EPA, Energy Commission and the Center for Rural Industrial Research (CRIR) has developed on an overarching strategy to provide climate and ozone benefits through the Integrated Plan for Energy Efficiency, Climate Mitigation and ODS Reductions for the Refrigeration Sector as shown in Figure C1.

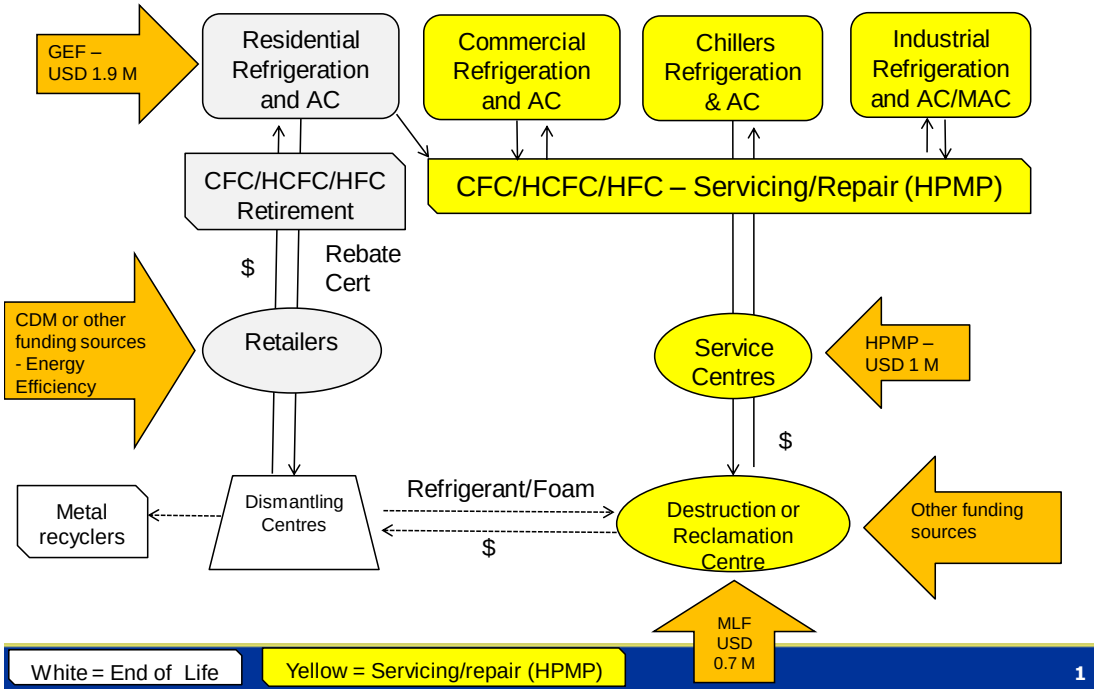

Figure C1: Integrated Plan for Energy Efficiency, Climate Mitigation and ODS Destruction Management

This integrated plan brings about the convergence of 3 synergistic interventions: (i) the phasing out of HCFC based appliances (MLF); (ii) the promotion of energy efficient refrigerators through Market Transformation (GEF) and (iii) the complimentary pilot project for the recovery and disposal of ODS (MLF). Opportunities to convert the environmental services into carbon

credits and assets offered by these programs will be explored. The ultimate objective of this plan is to bring economic, social and environmental benefits to the people in Ghana through the scaling up of energy efficient appliances with low global warming potential (GWP).

While it would be cost-effective to address only one refrigeration subsector (e.g. residential fridges) in larger countries, due to the large volume of equipment units, this would not be the case for a smaller country like Ghana, which is an example of a Low-Volume Consuming Country (LVC) as it only uses HCFCs in the refrigeration servicing sector. The proposed Integrated Plan would therefore address all subsectors (residential, commercial, industrial refrigeration, AC, MAC, chillers) and all types of refrigerants (CFCs, HCFCs and HFCs).

The HCFC phase out project only targeted the service sector where broken refrigerators are sent for repair. Whilst the HPMP program is targeted at the accelerated phase out of HCFC in the servicing sector, the ODS destruction project seeks to reduce potential ODS and carbon emissions from the ODS bank. This ODS destruction pilot project with a MLF funding of US$700,000 seeks to address both early refrigerator retirement program through rebate and turn in as well as End-of-Life program when old refrigerator reach the end of their life and are beyond repair. It is evident that some of the actions undertaken would address the objectives of both the Montreal Protocol and the Kyoto Protocol.

Figure C1 provides an overview of how the proposed Integrated Plan would work. Boxes in white represent the GEF-funded End-of-Life "Market Transformation for Energy Efficiency" programme, while the yellow boxes represent ODS management projects for the servicing sector financed by the MLF. Through the End-of-Life Scheme, equipment would be collected and dismantled by retailers. The recovered refrigerants would be sent to a central ODS Collection and Disposal Centre. Alternatively, a facility could recycle some of the refrigerants, while unusable ODS would be exported for destruction abroad. The HPMP activities would involve servicing operations on existing equipment, which would be supported by the MLF.

The brown arrows relate to the expected influx of funding from the GEF/MLF and other potential sources. Downward arrows in the diagram represent the process by which refrigeration equipment/refrigerant is delivered to the Collection and Disposal Centre. Upward arrows represent resources required to make the programmes operational and MLF and GEF funding (or funding from other grants) is needed to help developing countries and enterprises (especially Small-Medium Sized Enterprises) cover the necessary upfront investments. Without these funds they would not be able to cover these costs. As such GEF and MLF funding would play a critical role in kick-starting the above-mentioned scheme in Ghana during the first couple of years.

GEF-funds would initiate the Early Retirement as well as End-of-Life scheme for the domestic refrigeration sector. The MLF's HPMP funds would help establish a refrigerant recovery scheme and collection centre, while the MLF's ODS waste pilot project would help fund ODS destruction operations, or transhipment ODS waste for destruction abroad. The legislative framework required to help sustain the operations will be established.

Once the model has been tested and proven, it is hoped that other sources of finance, including carbon finance, would generate the necessary funding that would allow the cycle to continue and

to become self-sustainable. The Collection and Disposal Centre would contribute to the provision of reliable information regarding the reclaimed/disposed ODS amounts, which in turn would facilitate obtaining approval for these alternative funding sources.

ANNEX D: GUIDELINES FOR TURN-IN AND REDEMPTION OF COUPONS

The refrigerating efficiency project will involve three classes of appliances; new refrigerators, old non-working and old functioning. The major stakeholders are; Energy Commission, Zoomlion Ghana Limited (a waste management company), NARWOA, participating retail shops, participating banks and volunteers/purchasers. Figure D1 shows the flow diagram of the Refrigerator Collection Process.

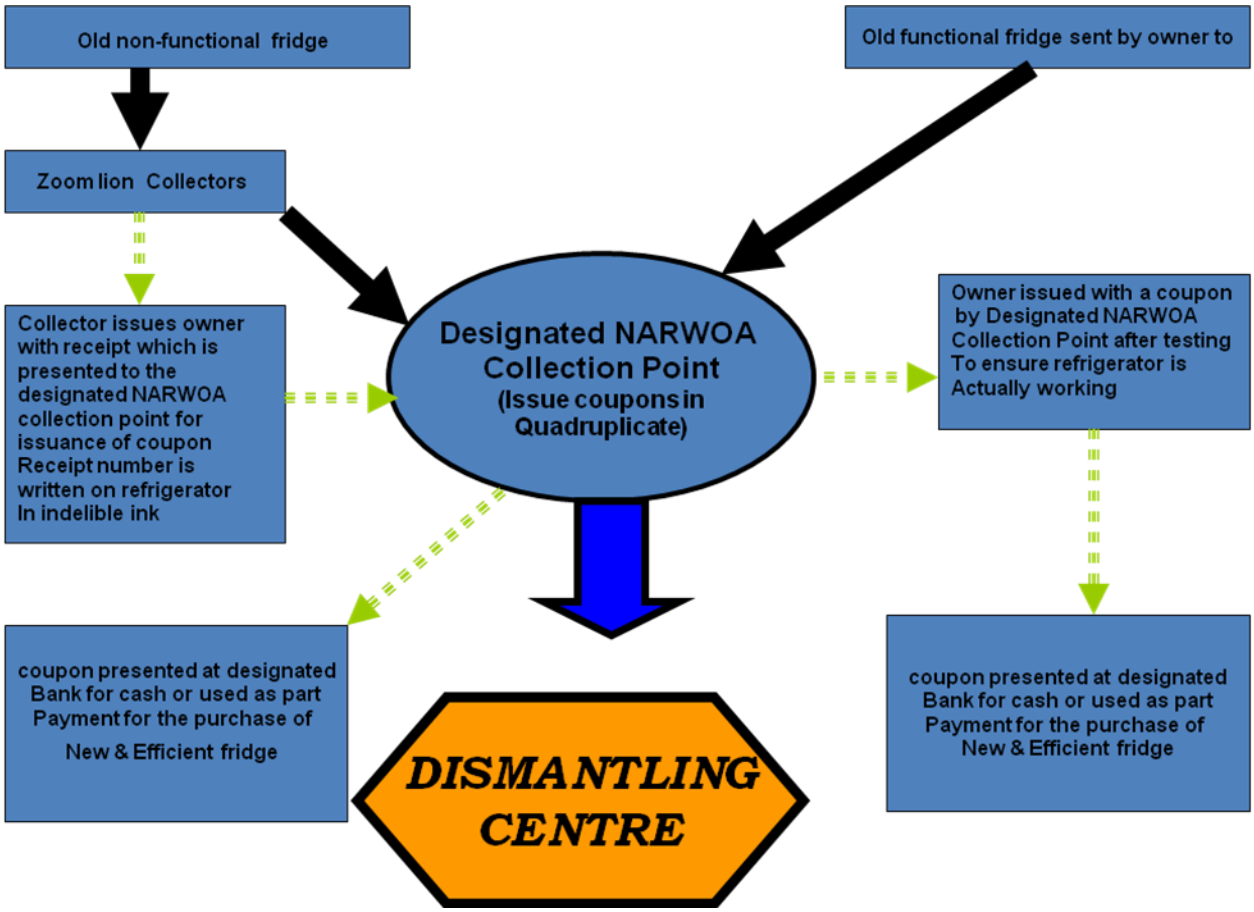

Figure D1: Flow Diagram of Refrigerator Collection Process

Registration

The process starts with the registration of importers of refrigerating appliances by the Energy Commission. All importers and future manufacturers of refrigerating appliances will have to comply with the minimum energy efficiency requirements (one star classification); this is mandatory. However, compliance with higher energy efficiency standards (two star and above) is voluntary. The Commission will, however, encourage consumers to patronize equipment with higher energy performance characteristics.

For the purposes of clarification, an importer is the person or company that imports the appliances. The dealer is the retailer. It is worthy of note that in Ghana, most importers have retailer outlets as well. The importers will be needed to submit test reports to assure the Commission that the appliances meet the required minimum standards. It is the importer who the Commission will deal with in the release of coupons.

Certification and labeling regime

To ensure compliance with existing standards, the Ghana Standards Board, which has the mandate to inspect all Hazardous Goods (which includes all electrical appliances), will ensure that all imported refrigerators are properly labeled and accompanied by manufacturers' test certificates before they are released at the port of entry. Appliances without labels will be detained until the technical details have been provided and the efficiency levels are determined. Importers who do not label the appliances will have to pay for a printing firm that has been pre-qualified by the Commission, to print the labels which will be affixed to the appliances that meet the minimum requirements. Those that do not meet the requirements will be re-exported.

Participation in the rebate scheme

Participation in the refrigerator rebate scheme is voluntary. Importers that opt to deal in higher efficiency appliances (efficiency levels that exceed the minimum requirements) will register with the Commission and they will be given certificates and special stickers to be displayed in front of their shops. The major firms who have offered to import and retail high efficiency refrigeration appliances in Ghana are Somotex Ghana Limited, Ghana and Bosch-Siemens Household Appliances Group, Germany. The importers of higher efficiency appliances will submit test reports from accredited test laboratories to the Energy Commission who will in conjunction with Ghana Standards Board, determine the efficiency level. Coupons will then be issued corresponding to determined efficiency levels with predetermined rebate values to the importer. Table D1 gives an estimated average annual energy consumption and saving for each star rating.

Table D1: Average Annual Energy Consumption and Saving for Each Star Rating

Star Rating	Annual Energy Consumption of Refrigerator, kWh	Annual Energy Savings of Refrigerator, kWh
5 star	250	950
4 star	350	850
3 star	400	800
2 star	500	700
1 star	600	600

Administration of the Rebate

The Energy Commission will appoint a participating bank where the rebate funds will be lodged. Security-enhanced coupons will be issued in quadruplicate by the Energy Commission and entered into a data base; one copy each of the coupon will be put on the records of the Commission and that of the participating bank. The remaining two copies of the coupon will be issued to the participating importer. The coupons will be completed at the time of purchase by the buyer, and then signed and stamped by the dealer. Details of the buyer - name, address etc - shall be recorded on the coupon. The buyer will pay for the refrigerator, less the value of the coupon. The dealer will retain one of the coupons, which he/she shall submit to the Energy Commission for endorsement. The endorsed coupons shall be submitted to the participating bank which shall pay the value of the coupon to the dealer. The bank will honour the coupon after having satisfied itself of the authenticity of the coupon (i.e. serial number, security features, endorsement by the Energy Commission etc). The bank will also be encouraged to provide loans or credits for consumers to purchase refrigerating appliances.

Table D2 below gives an indication of coupon values for various star ratings.

Table D2: Refrigerator Rebate Arrangement

Star Rating	Coupon Value	
	Ghana cedis (GH¢)	US$
5 star	120	80
4 star	100	67
3 star	80	53
2 star	60	40
1 star**	40	27

**1 star coupons will be phased out after 24 months

Information on Coupon

The following information will be legible on the coupon;

coupon serial number;
coupon value (to correspond with star rating)
Name of Company, rebate scheme participation number, issue date;
Energy Commission stamp
Name of purchaser, signature, residential address, telephone number etc.
Name of salesman;
Date of Purchase;
Shop address and stamp.

Old non-functioning refrigerators

The owner of an old non-functioning refrigerator (Volunteer) will hand it over to an accredited Zoomlion agent in his/her community and take a receipt for it. The receipt will contain vital information of the client (name, address and telephone number) who will take it to a designated NARWOA collection point shown him/her by the Zoomlion agent after 24 hours. At the tender of the receipt, the NARWOA representative will verify from the duplicate submitted by the Zoomlion agent and issue the client with a coupon which can be redeemed for cash in a Participatory Bank. The coupon value is proposed to be GH¢20 as against GH¢10 which scrap dealers currently pay for the same unit. The objective here is to cut off the scrap dealers whose activities are detrimental to the environment because they release the refrigerant to the atmosphere.

Zoomlion will carry a receipt that is in triplicate: the original for the client; the duplicate for the NARWOA representative; and the triplicate for Zoomlion records. Zoomlion should not keep records of transaction for more than 24 hours to ensure that clients can take their coupons the following day from the NARWOA representative for onward submission at the Participating Bank for redemption.

Old functioning refrigerators

The owner of an old but functioning inefficient refrigerator will hand it to the NARWOA representative in person and collect his/her coupon for redemption. The proposed coupon value is GH¢100. The justification is that, it will take a lot of monetary compensation for a volunteer to turn-in a working refrigerator for scrapping.

The NARWOA representative will issue the client with a coupon for onward submission at the Participating Bank for redemption. A duplicate of the coupon will be sent to the Energy Commission, the triplicate will accompany the appliances to the dismantling yard including a way bill which will also serve as a summary sheet and the quadruplicate will be for NARWOA records.

Checks against fraud

In order to ensure the scheme against fraud, the participating bank will redeem coupons from only registered importers after it is satisfied that the serial numbers are correct and that the Energy Commission has duly endorsed the coupon. Buyers may be visited at random to certify that the refrigeration appliances are indeed at the buyer's premises.

Dismantling Centre

Old inefficient refrigerators collected at the various NARWOA collection points will finally be transported to the Dismantling Centre by the Dismantling Centre Manager. The refrigerators will be accompanied by the triplicate coupon and the summary sheet from the NARWOA representative.

ANNEX E: LIST OF ORGANIZATIONS CONSULTED DURING THE PREPARATORY PHASE

The following organizations were consulted during the project preparatory phase:

Public Sector:

Ministry of Energy
Ministry of Environment, Science and Technology
Ministry of Trade and Industry
Energy Commission
Ghana Energy Foundation
CSIR-Institute of Industrial Research
Ghana Standards Board
Customs, Excise and Preventive Services
Electricity Company of Ghana
Environmental Protection Agency

Professional and Trade Associations:

Institution of Incorporated Engineers
National Refrigeration and Association Air–conditioning Workshop Owners Association
Consumer Association of Ghana

Private Sector:

ANADD Engineering
CREDG, Nigeria

Bilateral/Multilateral Agencies:

UNDP (Ghana Office)