



**REQUEST FOR MSP APPROVAL<sup>1</sup>**  
**(1-STEP PROCEDURE)**  
**TYPE OF TRUST FUND: GEF Trust Fund**

**PART I: PROJECT INFORMATION**

<b>Project Title:</b> Reducing greenhouse gases and ODS emissions through technology transfer in the industrial RAC (refrigeration and air conditioning) sector			
<b>Country(ies):</b>	The Gambia	<b>GEF Project ID:<sup>2</sup></b>	5466
<b>GEF Agency(ies):</b>	UNIDO	<b>GEF Agency Project ID:</b>	120623
<b>Other Executing Partner(s):</b>	NEA, GTTI	<b>Submission Date:</b>	06-18-2013
		<b>Re-submission Date:</b>	09-11-2013
<b>GEF Focal Area (s):</b>	Climate Change	<b>Project Duration (Months)</b>	36
<b>Name of Parent Program (if applicable):</b>	N/A	<b>Agency Fee (\$):</b>	47,025
<b>For SFM/REDD+ <input type="checkbox"/></b>			

**A. FOCAL AREA STRATEGY FRAMEWORK<sup>3</sup>**

<b>Focal Area Objectives</b>	<b>Expected FA Outcomes</b>	<b>Expected FA Outputs</b>	<b>Trust Fund</b>	<b>Grant Amount (\$)</b>	<b>Cofinancing (\$)</b>
CCM-1	1.1 Technologies successfully demonstrated, deployed and transferred <i>Indicator: percentage of technology demonstrations reaching its planned goals</i>	1.1 Innovative low-carbon technologies demonstrated and deployed on the ground	GEF TF	337,000	1,675,000
CCM-1	1.2 Enabling policy environment and mechanisms created for technology transfer <i>Indicator: extent to which policies and mechanisms are adopted for technology transfer (score of 1 to 5)</i>	1.2 National strategies for the deployment and commercialization of innovative low-carbon technologies adopted	GEF TF	158,000	800,000
Total project costs				495,000	2,475,000

<sup>1</sup> This document follows the GEF "Request for MSP Approval" (1-Step Procedure) Template (last updated January 16, 2013) but, for ease of use (e.g., to allow for track changes), has been converted to a fully editable, unprotected format. Before submission to the GEF, the contents will be converted into the form-protected format.

<sup>2</sup> Project ID number will be assigned by GEFSec.

<sup>3</sup> Refer to focal area/LDCF/SCCF Results Framework when filling up the table in item A.  
<http://www.thegef.org/gef/node/3624>

## B. PROJECT FRAMEWORK

**Project Objectives:** To reduce greenhouse gas emissions associated with industrial RAC (refrigeration and air conditioning) facilities in The Gambia.

Project Component	Grant Type	Expected Outcomes	Expected Outputs	Trust Fund	Grant Amount	Confirmed Cofinancing
					(\$)	(\$)
1. Policy and regulatory support	TA	Outcome 1: Policy, legal and regulatory measures are adopted by the government to support the adoption of low global-warming potential and energy efficient technology	Output 1.1: Gap analysis carried out in the national policy, legal and regulatory frameworks Output 1.2 Relevant recommendations drafted into the national laws/regulations/ guidance	GEF TF	75,000	889,000
2. Technology transfer support	TA	Outcome 2: Technical and financial support on replacement refrigerants, and reducing greenhouse gas emissions and operational costs, is ensured	Output 2.1: Refrigeration and air conditioning support mechanisms established and piloted	GEF TF	220,000	638,000
	INV		Output 2.2: Incentive mechanism piloted	GEF TF	100,000	0
3. Awareness raising	TA	Outcome 3: Demand is increased for refrigerant systems with low global-warming potential that are more energy efficient than existing technologies	Output 3.1: Lessons learnt and information on technology solutions is disseminated to policy makers, companies and technicians	GEF TF	75,000	848,000
Sub-total					470,000	2,375,000
Project Management Cost <sup>4</sup>					25,000	100,000
<b>Total project cost</b>					<b>495,000</b>	<b>2,475,000</b>

## C. COFINANCING FOR THE PROJECT BY SOURCE AND BY NAME IF AVAILABLE (\$)

Sources of Co-financing	Name of Co-financier	Type of Cofinancing	Amount (\$)
National Government	Government of The Gambia	Grant	1,081,000
	Government of The Gambia	In-kind	551,000
GEF Agency	UNIDO	Grant	228,000
	UNIDO	In-kind	35,000
Private Sector	Technology suppliers	In-kind	120,000
Others	Shecco (industrial association)	In-kind	310,000
	GTTI	In-kind	150,000
<b>Total Co-financing</b>			<b>2,475,000</b>

## D. GEF/LDCF/SCCF RESOURCES REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY

Not applicable as this section applies only to multi-agency projects.

## E. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS:

Component	GEF Amount (\$)	Cofinancing (\$)	Project total (\$)
Local consultants *	193,000	186,240	379,240
International consultants*	102,000	116,400	218,400
<b>Total</b>	<b>295,000</b>	<b>302,640</b>	<b>597,640</b>

<sup>4</sup> Same as footnote #4.

## **F. DOES THE PROJECT INCLUDE A “NON-GRANT” INSTRUMENT? (SELECT: YES/NO)**

(If non-grant instruments are used, provide in Annex E an indicative calendar of expected reflows to your Agency and to the GEF/LDCF/SCCF Trust Fund).

No.

## **PART II: PROJECT JUSTIFICATION**

### **A. PROJECT OVERVIEW:**

#### **A.1. Project Description**

##### ***1) The global environmental problems, root causes and barriers that need to be addressed***

**Project context** - The Gambia is one of the smallest African countries with an area of 11,300 km<sup>2</sup> (land ~ 10,000 km<sup>2</sup>) and a population of approximately 1.7 million. It is an agriculturally rich country and the Government of The Gambia's medium to long-term objectives in the agriculture and natural resources sectors – which are the dominant sectors in the economy – include: increasing output of both domestic and export produce to ensure food security and generate earnings of foreign exchange to finance other aspects of the development process; and producing a more diverse range of food and export produce to reduce the fluctuations and uncertainties associated with rural household incomes and export earnings.

The Gambia's Energy Strategy and Action Plan, 2010, covering the period of 2010 – 2014, identifies nine key objectives, including most relevant to this project: promote the use of renewable energy and energy efficiency. Regarding industrial development, "The Gambia Incorporated: Vision 2020" adopted in 1996 is the Government's overall guiding development policy document with a call to transform The Gambia into "a dynamic middle income country" by 2020.<sup>5</sup> The primary objective of the National Industrial Policy is to establish conditions required by the private sector to maximize gainful employment at ever increasing levels of productivity within the framework of a sustainable environment, social justice and equity. However, The Gambia's manufacturing sector remains small and is severely constrained by the lack of human, financial and technical resources.

Regarding environmental safeguarding, the Government of The Gambia is supportive with a major achievement of the Gambia Environmental Action Plan's (GEAP) implementation process been the development of Environmental Quality Strategy and Guidelines, which aim to safeguard the health of the population as well as sustainability of environmental quality. As noted in the Gambia's National Environment Agency's (NEA) "National Portfolio Formulation Document" (NPFDP), many agreements have been adopted by The Gambia at the global and regional levels to specifically address aspects of environmental management, with national environment laws, policies and initiatives including:

- Enforcement of National and International Environmental Quality Standards Regulations with the Gambia being a signatory/party to the establishment of the environmental quality standards board;
- Enforcement of the National Environment Management Act of 1994 as a strong regulatory tool for pollution control of activities of both public and private sector;
- NEA collaboration with United Nations Environment Programme (UNEP) on Clean Production (CP) and other environmentally related programmes e.g. UNEP Chemical and all those integrated preventive environmental strategies so as to increase efficiency and reduce risk on human and the environment.
- Ratification of the Vienna Convention for the Protection of the Ozone Layer in July 1990 and the Montreal Protocol on Substances that Deplete the Ozone Layer in July 1990. The Gambia has also ratified the London Amendments to the Montreal Protocol in March 1995.
- A number of measures have been adopted to mitigate air pollution problems, particularly those caused by the transport sector and improper waste management.

<sup>5</sup> [http://www.wto.org/english/tratop\\_e/tpr\\_e/s233\\_sum\\_e.pdf](http://www.wto.org/english/tratop_e/tpr_e/s233_sum_e.pdf)

**Global environmental problems** - The global environmental problem addressed by this project is the greenhouse gas emissions associated with industrial refrigeration facilities in The Gambia. Worldwide, the IPCC has estimated the global potential for mitigating GHG emissions in the refrigeration sector through 2030 through ODS substitutes as 80 MtCO<sub>2</sub>e, and the potential for mitigating GHG emissions in industrial facilities through more-efficient equipment is high (IPCC AR4, Working Group III, Chapter 7). In The Gambia, mainly due to the establishment of fish processing and handling plants funded by Government and the private sector, The Gambia's industrial refrigeration sector has increased significantly over the last few years.

Refrigeration is widely used in the food and agro sectors to enhance product shelf life; to ease packaging and shipping; or to enhance quality, encapsulate original flavour and maintain nutritional value of food and agro products. The Gambian fisheries are predominantly artisanal, with fishing operations relying on ice for preservation of catches from the resource to market.

The key considerations and benefits of refrigeration are summarised as follows:

- *Economic*: to reduce operating costs and improve capacity per unit of refrigeration equipment; to develop simple cold chain technology applications and processes using equipment that is reliable and requires minimal operational costs; to minimize off-specification product; and to develop a stable process that is capable of continuous operation.
- *Environmental*: to minimize energy consumption during the cold chain (e.g., freezing or ice production operation) and to reduce environmental impact by reducing product loss in waste streams (e.g., to incorporate the possibility of waste heat recovery systems).
- *Product quality*: to control product quality at the end of the preservation process such as by chilling or freezing; to minimize chemical degradation reactions; to reduce change in product structure and texture; to obtain the desired product colour; to control the product density; and to develop a versatile drying process that can produce products of different physical structures for various end-users.

As refrigeration equipment is vital to many manufacturing processes, other economic activities such as the growth of the hotel industry, expansion of breweries and increase in commercial agricultural farms are also actively consuming refrigerants. The use of refrigeration equipment will only increase as the Gambian economy grows, as more industries will require refrigeration to support manufacturing and distribution. Overall, this growth has led to a general increase in the quantity of refrigeration units, and consumption of all classes of refrigerants (including HCFCs, as second hand equipment that is no longer allowed in developed countries is often imported).

The increased use of refrigeration will lead to routine equipment upgrades, or new installations, and owners are currently likely to favour the use of HFCs that have very high global warming potentials thereby locking themselves into these technologies for many years. The Gambia looks to minimize the use of chemicals damaging to the ozone layer, and also operate with greater energy efficiency and use chemicals with lower GWP.

The GHG emissions from the refrigeration sector are due to: the particular problems of the industrial refrigeration and air conditioning operators in The Gambia in terms of maintenance expertise; energy and operating costs; and refrigerant quality. Indeed, the problem of procuring a small- or medium-sized plant or air conditioning equipment that are affordable to run - while not emitting ODS or GHGs - is common worldwide. As The Gambia anticipates the adoption and use of alternative low-ODS, low-GWP refrigerants, the interim focus needs to be on establishing and testing the mechanisms for technology transfer.

The proposed project, therefore, aims to reduce greenhouse gas emissions associated with industrial refrigeration facilities in The Gambia by removing barriers to increased energy efficiency and establishing the enabling environment for the introduction of low global warming potential (GWP) alternatives to HCFC-22. The project will use a synergistic combination of technical assistance on policy and regulation, capacity building and awareness-raising. The project will design and implement incentives to support the adoption of energy efficiency measures; and pilot innovative technical assistance delivery mechanisms.

It is expected that the policy and regulatory support, local energy service providers mechanism, and awareness and capacity development initiatives put in place under this project will help to prepare the market for the future selection and adoption of low GWP alternatives that operate both more efficiently and use chemicals with lower GWP, while minimizing the use of chemicals damaging to the ozone layer and ultimately improving productivity of the fisheries.

According to The Gambia NAPA (National Adaptation Programme of Action), most coping strategies employed in the fisheries sector are unsustainable in the long run, in that they fail to address the issues of sustainable fisheries and livelihood security in the context of increasing fishing pressure and ecological disturbances. Climate change induced changes in seasonality of fish stocks and catches could result in a significant impact on the livelihoods of fisheries-dependent communities. The use of cold storage facilities to augment the supply capabilities of industrial and artisanal producers in the fisheries and other perishable food sectors is a strategic and business investment that contributes to the availability of fresh produce or catch across seasons and in diverse markets, thereby mitigating the negative effects of the seasonality of catches.

Moreover, most of the post-harvest preservation of fish catches, perishables and derived products - whether in artisanal or industrial applications - is widely undertaken using energy intensive applications such as refrigeration, drying or smoking. The latter process use forest cover and deplete mangrove and associated ecosystems. Process improvements in the efficiency and cost reduction of cold storage applications, including the production of ice, would minimise the application of more resource demanding preservation techniques, notably the impacts on biodiversity loss due to fish smoking.

The growing use of ODS in refrigeration and cold storage poses the threat of reversing the potential gains on mitigation of climate change. Most technologies used in ice-making and cold stores are high carbon emitting and have low energy efficiency. The use of cold storage and refrigeration applications in the fisheries sector helps to preserve the catches and are measures that could contribute to addressing the effects of climate-induced or climate-amplified changes in aquatic ecosystems.

The proposed initiatives developed under this project will help inform companies worldwide who face the common problem of having to procure future-proof plants that are affordable to run, especially for small or medium-scale industrial applications. Instilling better practices and knowledge through this proposed project will serve as the foundation for the growing refrigeration demand in The Gambia in the future and prepare this industry to select the best technologies for this market.

**Barriers that need to be addressed** - The key barriers to promoting energy efficiency in the industrial refrigeration sector in The Gambia, while using chemicals with lower GWP and minimizing the use of chemicals damaging to the ozone layer, are outlined below.

<i>Barrier</i>	<i>Description</i>
Policy barriers	<p>Despite the planned HCFC phase-out targets, there is an overall lack of policy and regulatory incentives to support the industrial refrigeration sector in moving toward greater energy efficiency and away from HCFC-22 prior to 2030 in The Gambia. In particular, there is a lack of measures that would encourage refrigeration facilities to consider lower-carbon, low-GWP alternatives in refrigeration.</p> <p>In addition, since other refrigerants – including CO<sub>2</sub> and hydrocarbons – are new to The Gambia, there are no policies in place to support the safe use and maintenance of equipment using these refrigerants.</p>
Capacity barriers	<p>Many refrigeration technicians lack maintenance expertise, specific training in improving energy efficiency of refrigeration systems. Most lack the knowledge, basic tools and equipment required to prevent refrigerant leakages while charging refrigeration systems in plants, and better methods of purging non-condensable gases. Furthermore, refrigeration technicians generally lack capacity to advise on HCFC-22 alternatives including associated energy efficiency gains and related operating costs from replacement systems that could offset the capital costs of conversion.</p>
Technical barriers	<p>Low-temperature cold stores and freezing units in The Gambia currently rely on HCFC-22. Drop-in replacements exist, yet they have very high GWPs. Ammonia and other refrigerants require new systems that are comparatively costly and may have higher energy usage in The Gambia, in addition to toxicity</p>

<i>Barrier</i>	<i>Description</i>
	<p>and flammability risks. CO2 cannot be used alone as a refrigerant, because the high ambient temperatures in The Gambia would mean that the equipment would run at a transcritical state at all times, greatly reducing the efficiency compared to HCFC-22. Thus, until a viable technical alternative is successfully identified and deployed in the market no viable low GHG options exist, and the market may be forced to move to – and lock into – higher GHG emitting options as HCFC-22 is phased out.</p> <p>Currently most of the HCFC-22 being imported by The Gambia is of a poor quality, containing other refrigerants such as HFCs as impurities, which causes loss of efficiency. Mineral oils commonly used for HCFC-22 are not compatible with HFC refrigerants such as R-134a, and using them in systems with a mixture of HCFC-22 and HFCs results in the oil breaking down followed by frequent replacement of filters and driers and even loss of compressors. While The Gambia is addressing this issue in part through capacity building of customs agents, there is a lack of testing services or quality assurance especially when buying from in-country resellers.</p>
Financial barriers	<p>One of the main barriers to the introduction of alternatives to HCFC-22 with low GWP is the low cost of HCFC-22 at present in the market compared to its alternatives. As HCFCs become less available on the market due to the Montreal Protocol phase-out targets, the price of HCFC-22 would rise, causing economical hardship for owners and operators of HCFC-22 based equipment.</p> <p>Further, the high cost of conversions to new equipment using low GWP refrigerants is a deterrent for end-users in The Gambia who already have to deal with tight market prices of their products. The high electricity costs mean that whatever replacement is chosen would have to have similar or less energy consumption as compared to an HCFC-22 system.</p>
Awareness and information barriers	<p>Due to a lack of good servicing and maintenance practices, and the use of outdated equipment, the industrial refrigeration sector experiences inefficient energy use and significant refrigerant losses (ranging from 200 kg to 300 kg per year per site). There is a lack of awareness about the potential energy savings possible from better maintenance and servicing.</p> <p>The Gambian industrial refrigeration sector also lacks mechanisms to access and disseminate up-to-date information on alternatives to HCFC-22 as they develop. There is also low awareness concerning the use of other refrigerants, such as CO2 and HFOs, including their technical performance and the attendant maintenance and safety issues. There is a need for capacity building for those involved in awareness creation.</p>

## 2) The baseline scenario and any associated baseline projects

Through the recent approval of its HCFC Phase-out Management Plan (HPMP) by the Multilateral Fund of the Montreal Protocol, The Gambia has committed itself to completely phase out HCFCs by 2030. The first control is the freeze on consumption of HCFCs, beginning on 1 January 2013, at the baseline levels (an average of 2009 and 2010). The second control step is the reduction of 10% from the baseline levels in 2015. To reach these targets, The Gambia will apply quotas to the imports of both bulk HCFC-22 and HCFC-containing equipment to ensure that they follow the reduction schedule of the Montreal Protocol. HCFC-22 is currently the least expensive refrigerant available in The Gambia, costing almost half the price of some non-HCFC refrigerants available in the market. The industrial refrigeration sector – which consumes the largest amount of HCFC-22 in The Gambia and is mainly divided between the fish processing and tourism industries (e.g. hotels) – includes fish processing plants, cold rooms, central air conditioning, ice-making systems and blast freezers. In addition, the Government will strengthen the enforcement of the licensing system in order to closely monitor imports of HCFCs.

To expand the consideration of linkages among HCFC phase-out under the Montreal Protocol and other environmental issues, such as climate change and energy efficiency, the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol recently provided funding to identify potential sources of co-financing to cover costs that are non-eligible under the Multilateral Fund but that could generate climate benefits under HCFC phase-out. This support from the Multilateral Fund allowed UNIDO with the participation of the National Environment Agency (NEA) of The Gambia to examine potential opportunities for energy efficiency gains and ODS emissions.

The Gambia's HPMP's stage I activities include, under UNIDO, strengthening of the three regional retrofitting centres through provision of technical assistance, equipment and an incentive programme for access to tool kits, spare parts, alternative fluid and conversion and development of a

comprehensive programme strategy for the reduction of HCFC and carbon emissions in the refrigeration and air conditioning sector. Under UNEP, the HPMP stage I will train customs and law enforcement officers, and strengthen the customs schools, including dissemination of the amended ODS regulations and strengthening of technical colleges and training of refrigeration technicians in good refrigeration practices. The conversion of end-users (with the exception of chillers) is not eligible under the Multilateral Fund, despite the fact that this conversion would accelerate considerably the phase-out of HCFCs.

The Gambia's Project will also build upon UNIDO's portfolio of climate change and energy efficiency, including the following:

- UNIDO's Industrial Energy Efficiency (IEE) programme that builds on more than three decades of experience and unique expertise in the field of sustainable industrial development;
- The UNIDO-led Strategic Program for West Africa (SPWA): Energy Component, of which The Gambia is a participating country. Coordination will be maintained, and duplication avoided, by coordination between the NEA and the SPWA Committee chaired by the Economic Community of West African States (ECOWAS), with support from UNIDO;
- The UNIDO-led "Regional Approach to Support UNIDO's Implementation of Montreal Protocol Projects in Sub-Saharan Africa", which includes interventions in the Gambia (project was approved by UNIDO in November 2012). Currently in its Inception Phase, this project seeks to develop customized approaches (at regional and country level) to support 22 countries to phase out HCFCs. The Gambia may be a beneficiary of a mission to check the possibility of undertaking a needs assessment. Taking into account the lessons learned from this experience, missions to The Gambia may be organized at a later stage.

The baseline for The Gambian fisheries sector includes the already introduced and adapted renewable energy applications such as the wind mini-grids introduced in select pilot fishing communities that have been implemented through complementary initiatives under the GEF as well as private and public investments in renewable energy use in The Gambian fisheries sector.

### **3) The proposed alternative scenario, with a brief description of expected outcomes and components of the project**

The proposed project addresses barriers to increased energy efficiency in the industrial refrigeration sector and the adoption of low GWP refrigerants. The project focuses on technology transfer<sup>6</sup> of low-GHG, low-GWP refrigeration technologies. In order to offer a complete solution to owners/operators of industrial refrigerators and to maximize the advantage of engagement with the project, leakage reduction will also be included in the technology transfer component. Hence, emission reductions due to prevention of leakage will be a co-benefit of this project. The project design recognizes that to ensure the effectiveness of technology transfer the following dimensions are necessary to address: enabling environments, mechanisms for technology transfer and capacity building.

A synergistic approach is therefore proposed to create a policy and regulatory environment conducive to the adoption of new technologies; develop mechanisms for technology transfer through the provision of targeted technical support mechanisms to identify energy efficiency measures and refrigerant options - including their economic viability - and incentive mechanisms for owners/operators to carry out improvements; and implement targeted capacity building and awareness initiatives.

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<sup>6</sup> The GEF makes use of the Intergovernmental Panel on Climate Change's (IPCC) definition as: "...a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change amongst different stakeholders such as governments, private sector entities, financial institutions, non-governmental organizations (NGOs) and research/education institutions..." *Methodological and Technological Issues in Technology Transfer*, IPCC 2000. <http://www.ipcc.ch/ipccreports/sres/tectran/index.htm>

The project has three Expected Outcomes associated with three Components to improve energy efficiency and reduce ozone depleting substances (ODS) emissions in the industrial refrigeration sector in The Gambia:

### **Component 1: Policy and regulatory support**

*Expected Outcome 1: Policy, regulatory and legal measures are adopted by the government to support the adoption of low global-warming potential and energy efficient technology*

Component 1 focuses on developing the national policy, regulatory and legal frameworks necessary to support increased energy efficiency and the introduction of refrigerant alternatives to HCFC. The development of legislation and regulation depends in part on the awareness of legislators and regulators of the need for new regulations (therefore, Output 3.1 is an important precondition for this Component.)

### **Component 2 - Technology transfer support**

*Expected Outcome 2: Technical and financial support on replacement refrigerants, and reducing greenhouse gas emissions and operational costs, is ensured*

As The Gambia anticipates the adoption and use of alternative low-ODS, low-GWP refrigerants, the interim focus needs to be on establishing and testing the mechanisms for technology transfer. The immediate focus of technology transfer in the proposed project will be on facilitating energy efficiency improvements in this sector, while creating a proven technology transfer mechanism to support the transfer of alternative refrigerant technologies as they become available in The Gambia.

Component 2 is therefore designed to create the enabling environment for cost effective mitigation and preparation for technology transfer by developing and implementing mechanisms to support technology transfer through technical assistance (i) a targeted technical support mechanism to enable the identification of energy efficiency measures and new refrigerant options, including their economic viability; (ii) a quality assurance mechanism for refrigerants, focused on empowering the end users, with the intent of promoting equipment efficiency; and investment in (iii) a financial incentive mechanism for those owners/operators to carry out the recommended improvements. The technology transfer technical support, financial incentive mechanism and the quality assurance mechanism will work together with the following key features:

- Targeted directly at supporting industry;
- Making use of existing refrigeration and air conditioning service providers working in the market that become advocates of energy efficiency and promoters of new refrigerant options;
- Ensuring that individualized technical assistance and financing support options are available to transform knowledge into real improvements.

Overall, this project seeks to pilot a technology transfer mechanism through the establishment and operation of the technical support mechanism (Gambian Refrigeration and Air-Conditioning Support Service) detailed below, while introducing innovative technologies to this sector. The technology focus will be on energy efficiency improvements and reduction of contaminated refrigerants (with leak reduction as a co-benefit); and introduction of two types of demonstration systems – one using hydrocarbon refrigerant for retrofits and a second full-scale CO2 industrial or commercial unit with cascade – to be piloted in a training environment. Importantly, use of these systems brings in opportunities to train on safety in plant rooms and refrigerant handling. The deployment of the pilot systems in a training context will, therefore, provide a valuable opportunity for training on safety considering while managing safety risks. In short, the project intends to pilot an environmentally friendly system that will reduce GHG emissions while managing safety risks to employees and industrial facilities.

### **Component 3: Awareness-raising**

*Expected Outcome 3: Demand is increased for refrigerant systems with low global warming potential that are more energy efficient than existing technologies*



Component 3 is designed to improve the awareness of stakeholders regarding energy efficiency measures, potential new refrigeration and air conditioning technologies and their benefits, and relevant regulatory frameworks. This Component is designed to increase demand for low-GWP refrigerant systems that are more energy efficient than existing technologies by increasing the awareness of enterprises and policy-makers of the potential benefits of these technologies. Outreach must be carried out to develop interest and understanding, and to build up the credibility and trust in new refrigeration technologies.

#### **4) Incremental cost reasoning and expected contributions from the baseline, the GEFTF, LDCF/SCCF and co-financing**

The incremental reasoning for this project is based on the following:

Under the baseline, in the absence of the proposed GEF project:

- The industrial refrigeration and air conditioning sector would continue to produce high GHG emissions as refrigeration equipment continues to age, with the amount of these emissions increasing due to reduced operating efficiency and use of contaminated refrigerants. With this sector continuing to grow as anticipated, these emissions would likely continue to accelerate; and
- Owners of industrial refrigeration facilities would be unlikely to make informed decisions about lower-GWP alternatives. End-users would lack information enabling them to convert voluntarily to lower-GWP alternatives when they become viable in The Gambia, perhaps converting to HFCs as alternatives to HCFC-22 based refrigeration systems and thereby continuing to have adverse effects on the climate.

Under the alternative scenario innovative low-carbon technology for low-GHG, low-ODS upgrades and conversions of industrial refrigeration and air conditioning, and the adoption of national strategies for the deployment and commercialization of these technologies will be possible. Under the alternative scenario:

- The industrial refrigeration and air conditioning sector would improve the condition of refrigeration equipment, with alternatives that are informed by both lower-ODS and lower-GWP refrigerants. Conversions to HFCs as alternatives to HCFC-22 based refrigeration systems will be reduced.

The incremental cost is determined based on the fact that the project activities will *substitute* the baseline technology choices of industries, while *complimenting* reforms in policy and national strategies informed by the Montreal Protocol with GHG emissions considerations.

Detailed descriptions of the incremental and baseline activities, identifying the incremental costs to be financed by GEF and in some cases by activities of co-funders is described below:

#### ***COMPONENT 1 – POLICY AND REGULATORY SUPPORT***

In Component 1, GEF funds will support incremental costs of a gap analysis of Gambian policy and the drafting of improved policies and regulations. Co-financing in the form of cash and in-kind contributions from the Government of The Gambia will support stakeholder consultations.

***Output 1.1:*** Gap analysis carried out in the national policy, legal and regulatory frameworks

**Activity 1.1 Identify the shortcomings of the national policy, the legal and regulatory framework, including the safety regulations for the conversion of HCFC-22 industrial refrigeration and air conditioning facilities to higher efficiency systems with low GWP refrigerants**

- *Sub-Activity 1.1.1 – Conduct a gap analysis of Gambian policy and legislation relevant to refrigeration in cold storage facilities and industrial air conditioning.* Survey existing policy

and regulation in The Gambia. Review international best practice, including for enforcement and inspections of refrigeration and air conditioning systems, and energy performance labels for refrigeration and AC systems, e.g. partly modeled on the requirements of the Energy Performance of Buildings Directive (EPBD) in the EU, or F-Gas legislation. The gap analysis will assess international best practices in light of the Gambian context and will be used to confirm barriers preventing the adoption of said best practices in The Gambia.

- *Sub-Activity 1.1.2 – Conduct a gap analysis of Gambian safety regulations concerning alternative refrigerants.* Survey existing safety regulations in the field of industrial refrigeration and cold storage, and industrial air conditioning; assess international best practices in safety regulations and the standards underlying them, including best practice for enforcement. Barriers preventing the adoption of said best practices in The Gambia will be confirmed. In particular, safety regulations regarding the handling of hydrocarbon refrigerants will be reviewed.

**Output 1.2:** Relevant recommendations drafted into the national laws/regulations/guidance

**Activity 1.2 Develop appropriate national policies, legal and regulatory framework, including safety regulations to support the use of alternative refrigerants**

- *Sub-Activity 1.2.1 – Facilitate discussion with relevant stakeholders, including officials and professional associations, to identify key policy, regulatory and safety regulations needs for The Gambia.* The gap analysis (activity 1.1.1 and 1.1.2) will be used as an input to this stakeholder consultation.
- *Sub-Activity 1.2.2 – Draft proposed policy(ies) and/or safety regulation(s) for The Gambia.* The concrete regulatory mechanisms proposed and then developed under the project is to ensure future replication of the demonstrated approach.
- *Sub-Activity 1.2.3 – Support key stakeholders on the adoption and enforcement of the proposed policy(ies) and/or regulation(s).*

**COMPONENT 2 – TECHNOLOGY TRANSFER SUPPORT**

In Component 2, GEF funds will support the incremental costs of employment of consultants for the design and provision of training, as well as the development, monitoring and implementation of the incentive mechanism and the quality assurance approach. Co-financing in the form of in-kind contribution from technology suppliers will support sourcing and installation of the pilot training equipment. Co-financing in the form of in-kind from GTTI, UNIDO and the Government of The Gambia will support the training and capacity building activities.

**Output 2.1 Refrigeration and air conditioning support mechanisms established and piloted**

**Activity 2.1: Establish and pilot the refrigeration and air conditioning technical support mechanisms**

A local technical support mechanism will be established to enable the transfer of refrigeration and air-conditioning technologies that maximize energy savings (and subsequent GHG emission reductions) while supporting information transfer on new and upcoming refrigeration and air conditioning options. This mechanism – tentatively named the “Gambian Refrigeration and Air-Conditioning Support Service” – will address comprehensive energy and refrigeration solutions with the following mandate:

- Promote energy efficiency associated with industrial refrigeration and air conditioning;
- Promote how to use refrigeration and air conditioning equipment more sustainably through improved maintenance (leak reduction will also be dealt with since it is an integral element of good maintenance);

- Support information transfer on new and upcoming refrigeration and air conditioning options; and
- Identify associated cost savings to help the sector save money.

The overall intent of the Support Service is to reduce energy use and provide timely inputs on new industrial refrigeration and air conditioning technologies as they become available, thereby reducing the effect of climate change and lessening the costs associated with refrigeration and air-conditioning usage.

- *Sub-Activity 2.1.1 – Design the pilot Gambian Refrigeration and Air-Conditioning Support Service.* One of the reasons for the slow spread of energy efficiency improvements, even when they are cost-effective, is the lack of awareness about energy consumption, the benefits of energy efficiency improvements, and how to implement such measures. Studies have also shown that once a general awareness level has been achieved there is often the need for individualized technical assistance<sup>7</sup>. For example, there is a need to know what technical solutions are available, what products and brands exist, what technical specifications are most suitable, and what financial help is available. To meet this need, countries are increasingly establishing local sources of information that offer information on energy conservation. The quality of the information and service providers are key, and one way to increase confidence in the provision of service is through certification<sup>8</sup> schemes.

The local refrigeration and air conditioning services mechanism will be provided through the tentatively named “Gambian Refrigeration and Air-Conditioning Support Service”. This Support Service will be provided through technicians that have been trained and certified in energy efficiency measures and improvements for industrial refrigeration and air conditioning, and new refrigerants and refrigeration technologies that are becoming available in this sector. The intent of certification is to enable consumers to distinguish between qualified workers and those with less-than-quality credentials<sup>9</sup>. This activity will require working closely with stakeholder from the Gambian industrial refrigeration and air conditioning services sector to maximize synergies and avoid overlap with existing initiatives. The certification process will require some professional experience, some additional training provided through the proposed project, and will be based on an assessment process also established through the proposed project.

Once having successfully passed through the certification process, the certified technical support service providers will promote energy efficiency associated with refrigeration and air conditioning, promote how to use refrigeration and air conditioning equipment more sustainably, and how to help the sector save money and energy. They will recommend improvement measures to be adopted by their clients, which would be eligible for partial financial support through the Incentive Mechanism (see Output 2.2).

It is proposed that the Support Service will be designed and operated under the oversight of the National Environment Agency (NEA) – National Ozone Unit (NOU). The intent is to leverage the work carried out under the ODS Phase-out Programme, which includes training of refrigeration technicians, users and repairers on refrigerant handling, recovery recycling as well as retrofit techniques. These technicians are trained and certified in retrofit, recovery and recycling technologies on domestic refrigerators and freezers by the National Environment Agency. The NOU in collaboration with the United Nations Environment Programme has

<sup>7</sup> Promoting Energy Efficiency in Buildings: Lessons Learned from International Experience, available at: [http://www.thegef.org/gef/sites/thegef.org/files/publication/EEBuilding\\_WEB.pdf](http://www.thegef.org/gef/sites/thegef.org/files/publication/EEBuilding_WEB.pdf)

<sup>8</sup> Note: the terms “certification” and “certificate” are similar, yet very different in terms of criteria, requirements and achievements that are met. A certificate usually results from an educational process and indicates completion of a course or series of courses. Certification goes beyond that and indicates competency for a specific job, requires some professional experience and is based on an assessment process. Certifications may also have ongoing requirements for maintaining proficiency/competency and can be revoked if those ongoing requirements are not met.

<sup>9</sup> <http://www.astm.org/Standards/E2659.htm>

- trained and certified 200 refrigeration technicians in the country. These technicians are responsible of servicing equipment running on refrigerants. The Gambia Technical Training Institute (GTTI) will house the training facilities and training programme required by the Support Service, and possibly administer the assessment required for official certification. More details are provided under section “Project Implementation Arrangements”. Key tasks will include:
- Develop the draft Support Service Plan, including certification approach and requirements, the anticipated delivery model, governance and oversight arrangements;
  - Conduct stakeholder discussions and facilitate comments on the draft Support Service Plan;
  - Refine and finalize the Support Service Plan.
- *Sub-Activity 2.1.2 – Prioritize the range of services to be provided by the Support Service.* The Support Service is anticipated to provide technical support on energy conservation, maintaining systems, recommending specifications for new systems (e.g., chill, freezer and ice-making), recommending replacement refrigerants, encouraging better methods of purging non-condensable gases and identifying and reducing leaks. This sub-activity will take gender mainstreaming into consideration including collecting gender disaggregated data to inform the prioritization of services. Key tasks include:
    - Design and conduct a survey of stakeholders in the industrial refrigeration and air conditioning sectors to determine the range of services required;
    - Review survey results to determine prioritization of services needed and to establish the initial list of services that will be provided under the Support Service.
  - *Sub-Activity 2.1.3 – Design and implement the certified training program for Refrigeration and Air-Conditioning Support Service Representatives.* Training and certification will be designed and offered on industrial refrigeration and air conditioning. These trainees would be certified to subsequently assume roles as certified Support Service providers, giving cutting edge advice concerning refrigeration and air conditioning in The Gambia, recommending investments that are eligible for the Incentive Mechanism, and serve as multipliers for project impacts. The NEA and GTTI, among other stakeholders, will be closely involved in this activity to ensure continued relevance and sustainability of the training programme. The Gambia Association of Refrigeration and Air Conditioning Practitioners has been an essential partner to the NEA and the NOU, including collaboration with training institutions and other stakeholders in the process of reviewing refrigeration training curricula to incorporate new technologies including, recovery and recycling, and retrofitting. This Association will be requested to nominate the beneficiary training participants (i.e. partaking in the pilot training initiative) who will subsequently act as Support Service providers. Everything done under this sub-activity will take gender mainstreaming into consideration, from collecting gender-disaggregated data when assessing training needs to ensuring that the impact of technician training is equal. Key tasks include:
    - Conduct training needs assessment – This will leverage the training experience established to date by GTTI, including a survey of potential trainees, conducting focus groups and administering an electronic survey; and is intended to ensure that training under this project is focused and complementary to the existing training initiatives.
    - Design the training course and curriculum – The perspective to be taken is that of creating a sustainable knowledge base within the country. The course will consist of both theoretical and practical modules and have a certification element. Modules will contain information on: natural refrigerants, their environmental impacts and how they differ from HCFCs and HFCs; detailed treatment of those technologies most relevant to The Gambian market; design and installation of refrigeration plants of the types selected; best refrigeration practices and safe handling of natural refrigerants. The curriculum will ensure that the range of services to be provided by the Support Service, identified through Sub-Activity 2.1.2, will be fully addressed.

- A group of up to 20 professionals will be trained through a classroom, pilot plant and mentoring by the international expert team and equipped with the expertise and the tools required for providing the support services. In designing this course, UNIDO will ensure that the project draws on the experience of the “Promoting renewable energy based mini-grids for productive uses in rural areas of The Gambia”, which has designed and implemented professional training through a train-the-trainers approach.
  - Develop and install training materials and tools (if needed also software) – The training equipment will introduce innovative technology to The Gambia, implemented for advanced training purposes and installed at the GTTI. Two types of systems are anticipated to be piloted, which may include establishing up to two (2) sets of refrigeration training equipment per system (4 in total) to ensure hands-on knowledge of new refrigeration systems. In particular, it is anticipated that the project will install and operate a cascade system using CO<sub>2</sub> as the refrigerant for the low temperature cycle. To provide sufficient heat rejection capacity for the low temperature cascade cycle, the high temperature compressors operate at an evaporating temperature of 10C, while the low stage would use a subcritical CO<sub>2</sub> compressor discharging into an intermediate heat exchanger. The second type of system involved hydrocarbon refrigerant, and will focus on converting units from R22. Part of the training on the hydrocarbon system will involve safe handling of material. During installation of the pilot systems local staff will be extensively briefed by the manufacturers on safe operation of these systems. Training will include instruction in the requirements of European Standard BS EN 378:2000 (Refrigeration systems and heat pumps – safety and environmental requirements), according to which the installations will be operated.
  - Deliver the course to trainees (i.e., Support Service providers) – using a phased approach (e.g., offering several rounds of training) consistent with the Support Service Plan (Sub-Activity 2.1.1). The GTTI may be considered as a natural location to house the training course.
  - Run the certification process – to certify Support Service providers. Those successful will be provided with documentation indicated that they are certified Support Service providers. As certified Support Service providers they will carry out activities noted under Sub-Activity 2.1.4.
  - Assess the benefits of the course – Evaluation forms will be distributed at the beginning and end of the training to allow for measurement of capacity gains.
- *Sub-Activity 2.1.4 – Operate and monitor the Gambian Refrigeration and Air-Conditioning Support Service.* In response to requests from the refrigeration and air-conditioning sector, certified Support Service providers will visit facilities at the request of owners/operators, providing technical recommendations and advice. This information will be provided consistent with the training and instruction provided during the certification training process. This may include a focus on providing information to stakeholders on life-cycle cost savings from more efficient systems and on financing options for adopting these systems. The certified Support Service providers also can recommend applications for funding under the Incentive Mechanism (Output 2.2). This activity will be reliant on awareness raised within the targeted sector, as conducted through the activities of Output 3.1. Key tasks include:
    - Certified Support Service providers consult with their customers, and record their recommendations for technical improvements, including recommending applications for funding under the Incentive Mechanism, in advisory reports;
    - Copies or summaries of these advisory reports are provided to the NEA;
    - Analysis of the services being provided under the project is undertaken on an ongoing basis, with recommendations made for refinement of the training, certification, or delivery of services.

## **Activity 2.2: Design and implement a quality assurance approach for refrigerants**

The proposed project will design and implement a quality assurance approach for refrigerants that is focused on empowering the end users - especially targeting HCFC-22 from in-country resellers - with the intent of promoting equipment efficiency. The use of poor quality refrigerant, containing other refrigerants such as HFCs as impurities, causes loss of efficiency. While The Gambia is addressing the import of contaminated refrigerants, in part through capacity building of customs agents, there is a lack of testing services or quality assurance especially when buying from in-country re-sellers.

- *Sub-Activity 2.2.1 – Design the labeling system that will be used by the mobile testing service.* This labeling will be used as an indication of quality and a record of inspections carried out by the service. The labels for tested refrigerants should be designed with some clear pictograms to ensure clear communication with all stakeholders.
- *Sub-Activity 2.2.2 – Design and establish a mobile testing service to ensure purity of refrigerant supply.* This service, housed within the NEA's NOU, will be composed of environmental inspectors equipped with mobile testing devices and will be focused on the end user (buyer). These inspectors will test refrigerants and administer the quality labeling system. The inspectors will also provide information on the benefits of using un-contaminated refrigerants including maintaining efficiency, and may also provide information on related initiatives underway under the proposed project.
- *Sub-Activity 2.2.3 – Monitor performance of the mobile testing service and labeling scheme.*

### **Activity 2.3: Design the Incentive Mechanism to support the owners/operators that carry out improvements**

Financial incentives are necessary to complement policies, awareness and technical assistance. Even though it is not the only barrier, higher upfront costs of energy-efficient improvements and associated investments coupled with the difficulties in mobilizing additional financing to cover these costs, can deter consumers from investing. Financial incentives can make such investments more attractive, while also attracting the consumer's attention and demonstrating the government's commitment to improving energy efficiency and moving towards low-GWP refrigerants in The Gambia.

- *Sub-Activity 2.3.1 – Design and advertise the Incentive Mechanism.* An Incentive Mechanism will be established under the proposed project to provide grants to the owners/operators that carry out improvements (maintenance, recovery, etc.), based on recommendations from the local certified Support Service providers. The intent is to support the implementation of their technical recommendations and thereby create local case studies while encouraging the local service provider market to grow.

Previously, the ODS phase-out programme in The Gambia has made use of an incentive program for end-users to retrofit their equipment running on CFCs. Administered by UNDP for the commercial and industrial refrigeration end-user sector, this program facilitated the process of replacing these substances with ozone-friendly refrigerants. This incentive scheme covered 15% of the total cost of equipment replacement, retrofit or 'drop-in' refrigerant solutions. For this project, the incentive scheme will reflect the size of the grants necessary to implement the technical recommendations provided by the Support Service providers. The following are key requirements and features of the Incentive Mechanism:

- Access to the Incentive Mechanism will be based primarily on technical recommendations from certified Support Service providers.
- The certified Support Service providers will make use of standardized savings measurements and verification protocols, established under the proposed project.
- A range of improvements will be funded (see Tiers in the Table below)
- Payment will be made directly to the technical service providers once the recommended improvements or installations have been carried out and verified.

- The incentive will tentatively cover between 25 to 75% of the total cost of the proposed improvements, with the customer/consumer/owner responsible for the remainder. A tentative allocation is as follows:

<b>Incentive Mechanism Parameters</b>	<b>Tier I</b>	<b>Tier II</b>	<b>Tier III</b>	<b>Tier IV</b>	<b>TOTAL</b>
Individual incentive grant (USD)	1 000	2 000	4 000	10 000	
% covered by Incentive Mechanism	75	75	40	25	
Number of grants	20	10	5	4	39
<b>Total grant available under Incentive Mechanism (USD)</b>	<b>20 000</b>	<b>20 000</b>	<b>20 000</b>	<b>40 000</b>	<b>100 000</b>
Consumer investment leveraged (USD)	6 667	6 667	30 000	120 000	163 333
Total Investments (USD)	26 667	26 667	50 000	160 000	263 333

Key tasks include:

- Design the standardized savings measurements and verification protocols to be used by the certified Support Service providers (consistent with training provided under Output 2.1);
  - Develop the Incentive Mechanism Recommendation Report format (form) to be used by the certified Support Service providers when recommending a project to the Incentive Mechanism;
  - Establish the administration and financial supervision of the Incentive Mechanism, including disbursement protocols. A review of UNIDO's and UNDP's experience with its incentive scheme will be conducted to inform best practice. The tentative allocation of grants (Tier I to IV) noted above will be reviewed by stakeholders and adjusted to ensure maximum uptake and generation of a range of improvements funded. A secondary option to be considered is using an external financial management service provider (e.g., <http://www.sahelgroup.gm>) or other local financial intermediary capable of administering the fund and disbursing the incentive grants;
  - Raise awareness of the Incentive Mechanism, primarily through the activities of the Support Service providers and also through the awareness activities under Component 3.
- *Sub-Activity 2.3.2 – Monitor actual performance of new technology or improvements made, and the resulting energy savings.* The intent is to monitor the actual performance of the improvements, and evaluate their effectiveness in reducing ODS and GHG emissions.

## ***Output 2.2: Incentive Mechanism piloted***

### **Activity 2.2.1 – Implement the Incentive Mechanism**

The Incentive Mechanism will be implemented according to the administration and financial supervision requirements established under Activity 2.3.

Key tasks include:

- Process/review grant requests;
- Verify implementation of requested improvements;
- Arrange for payments directly to the refrigeration and air-conditioning service providers, with the recipient paying the remaining percentage;
- Analyze the services being provided under the project on an ongoing basis, making recommendations for refinement of the training, certification, or delivery of services.

## ***COMPONENT 3 – AWARENESS-RAISING***

In Component 3, GEF funds will support the incremental costs for the development of materials for the information and awareness campaigns and the lessons learned analysis. Co-financing in the form

of in-kind contributions from shecco will support setting up a dedicated section of the shecco website as well as general input to the information and awareness campaigns, including at the ATMOSphere conference with a dedicated Gambia event. Under this component, all collected data will be disaggregated by gender in order to monitor the project's impact on both men and women.

***Output 3.1: Lessons learnt and information on technology solutions is disseminated to policy makers, companies, and technicians***

**Activity 3.1 Conduct awareness campaign targeted at owners and managers of industrial air conditioning and refrigeration facilities**

Using a range of media tools, targeted awareness-raising will be directed at owners and operators of industrial refrigeration and air conditioning facilities concerning potential energy savings from better maintenance and servicing. The intent is to increase awareness concerning the potential for energy savings from better maintenance and servicing, new refrigeration options, and environmental and phase-out legislation. The Support Service (Component 2) will form part of the delivery platform.

- *Sub-Activity 3.1.1 – Develop a media plan based on a survey (needs assessment) of owners and managers* to identify the best types of materials, formats, and channels of communication, etc. for the local context. Determine the key messages and target audiences, and the planned outputs tailored to the identified messages and audiences.
- *Sub-Activity 3.1.2 – Prioritize, prepare and deliver elements of the information and awareness plan* for owners and managers, subject to the results of the survey. Tasks include the development of:
  - Web site (to which all printed material such as advertisements, brochure etc. will refer) containing information on technologies (including new technologies as they emerge) and information on the Incentive System (Output 2.2) for adopting recommendations provided through the Support Service. (When the certification program in Output 2 has been established, the website can serve both as a recruiting tool for the program and possibly as a platform for a peer-to-peer network created for the people who have completed the certification);
  - Written materials highlighting the advantages of energy efficiency improvements, energy saving options when converting to a new system, new refrigerant options, and the Incentive System. The delivery and communication methods chosen will depend on the recommendations derived from the survey, and may range from the conventional (e.g., a brochure could include a postcard, which could be sent to the PMU for further information) to use of mobile technologies (e.g., use of SMS to deliver, support and enhance learning and awareness);
  - Presentation on the Support Service to refrigeration and air conditioning professional groups and associations;
  - Press releases and articles in publications aimed at the target group describing the issues, highlighting the possible solutions and particularly the pilot improvements after success has been verified (under 2.3.2);
  - Case studies compiled from the pilot improvements, noting key information and photos, possibly audiovisuals (e.g. interviews with stakeholders);
  - Advertisements in specialist publications and on the Internet, ideally on commercial websites dealing with industrial refrigeration and air conditioning in The Gambia.
- *Sub-Activity 3.1.3 – Monitor results of information and awareness interventions and adjust the plan accordingly.* Surveys may be used to establish baseline awareness and then post-interventions to determine the effectiveness of the interventions. For the website – as a key information platform – users may be randomly solicited for their inputs. Other mechanisms to



monitor the effectiveness of interventions will be determined at the beginning of project implementation. All awareness information will be collected disaggregated by gender.

**Activity 3.2: Provide targeted outreach to policy-makers on the benefits of low GWP refrigerants and linking improvements in energy efficiency in industrial refrigeration with national industrial development**

One of the challenges to reducing greenhouse gas emissions from industrial refrigeration and air conditioning is the lack of legislation and regulation. The introduction of legislation and regulation setting standards for these technologies is necessary to expanding the market, and is addressed in Component 1. However, an initial level of awareness among policy-makers is essential to clarify the need for such legislation. Further, the case studies established through the proposed project can provide valuable inputs into the policy-making process.

- *Sub-Activity 3.2.1 – Develop a media plan for policy makers based on a survey* (needs assessment) of the target audience. This survey will identify the best types of materials, formats, and channels of communication for communicating in the local context. The media plan will establish the key messages and the planned outputs required to reach this target audience.
- *Sub-Activity 3.2.2 – Prioritize, prepare and deliver the information and awareness plan* for policymakers, subject to the results of the survey. Initially, written materials concisely presenting the subject will be prepared. These will highlight the advantages of energy efficiency improvements, natural refrigerants, the energy saving options when converting to a new system. Once available, case studies developed under the proposed project will be used as illustrations. Presentations or roundtables initiated by the Support Service representatives may also be used to inform policymakers on legal and regulatory aspects of energy efficiency improvements and refrigerant options.
- *Sub-Activity 3.2.3 – Monitor results of information and awareness interventions* and adjust the plan accordingly. Baseline and post-intervention awareness will be surveyed to determine the effectiveness of the proposed project's interventions. All awareness information will be collected disaggregated by gender.

**Activity 3.3: Document lessons learned analysis from the project for scale-up and replication in other countries worldwide conducted**

Once the project is underway, the results and lessons learnt will be documented and communicated through various awareness raising channels.

- *Sub-Activity 3.3.1 – Prepare and publish project materials, including case studies, on an ongoing basis.* Reports on the proposed project's achievement, case studies and results achieved will be produced and will be made available both within The Gambia as physical copies, and more widely available on the project's website.
- *Sub-Activity 3.3.2 – Prepare and publish annual reports* for a general, external audience. Annual reports focused on the project outcomes will be produced and will be made available both within The Gambia as physical copies, and more widely available on the project's website. As inputs to a high level meeting to be held with the representatives of the Multilateral Fund for the Implementation of the Montreal Protocol and the GEF, the project team may provide an interim status report.
- *Sub-Activity 3.3.3 – Prepare a final report and website content* (detailing project outcomes and results achieved) for further coordination by UNIDO. The results of the project may also be combined by UNIDO in a summary report with the results of the related projects in Viet

Nam and other countries. A common website may be set up providing information on the three related projects, with separate entry points in the national languages of each country hosting a project. This website will be able to grow and add more projects as the pilot projects lead to other countries embarking on similar efforts.

#### **5) Global environmental benefits (GEFTE, NPIF) and adaptation benefits (LDCF/SCCF)**

This project will bring about global environmental benefits as a result of reductions in emissions of ozone depleting substances and reductions in emissions of Greenhouse Gases. There are also interesting connections, that could be explored in more detail, to impacts on biodiversity through the focus on the fishing sector.

Under the Montreal Protocol, HCFCs are being phased out and will be no longer available for purchase after 2030. Until conversion is mandated, the participating facilities in the industrial refrigeration and air conditioning sector would produce both through direct and indirect emissions. With ageing systems leading to dropping efficiency and increased refrigerant leaks, emissions of GHGs per year will also increase considerably.

#### **Global Environmental Benefits:**

*Direct GHG reductions* - Direct GHG reductions will come from energy efficiency improvements.

- Assuming 30% efficiency gains with initiatives in up to ~40 industrial refrigeration interventions (several per facility are anticipated) in the industrial refrigeration and air conditioning sectors (including fish processing and tourism sectors), the total direct GHG emissions reductions attributable to the project are estimated to be nearly 600 tCO<sub>2</sub>e per year.
- As a result of these activities during the project implementation period of three years, direct greenhouse gas emission reductions totaling 5,800 tonnes of CO<sub>2</sub> equivalent will be achieved over the lifetime of the investments of 10 years.

*Direct Post-project Emission Reductions*- The project does not include activities that would result in direct post-project greenhouse gas emission reductions.

*Indirect GHG reductions* – The indirect reductions will also come from improved policy, and increased awareness of the benefits of industrial refrigeration and air-conditioning facility upgrades through training and the initiatives supported through the incentive scheme:

- Using the GEF top-down methodology, assuming a causality factor of 20%, then over a 10-year lifetime the top-down indirect GHG emissions are estimated at 47,000 tCO<sub>2</sub>e.
- Using the GEF bottom-up methodology, with a replication factor of 4, the bottom-up indirect emission reductions are estimated at 23,000 tCO<sub>2</sub>e.

**Co-benefits** from the reduction of leakage of ozone depleting substances will include:

#### *Direct GHG reductions*

- A co-benefit of the project is that leakage of ODS will also be reduced: assuming 75% leak reduction (due to both maintenance and use of uncontaminated refrigerant), the co-benefit of the project is of 5,100 tCO<sub>2</sub> per year.
- As a result of the activities during the project implementation period of three years, the co-benefits due to ODS leakage reduction will be 51,000 tCO<sub>2</sub> eq over the lifetime of the investments of 10 years.

*Direct Post-project Emission Reductions*- The project does not include activities that would result in direct post-project greenhouse gas emission reductions.

### *Indirect GHG reductions*

- Using the GEF top-down methodology, assuming a causality factor of 20%, then over a 10-year lifetime the co-benefits due to ODS leakage reduction are 416,000 tCO<sub>2</sub>e; and
- Using the GEF bottom-up methodology, with a replication factor of 4, the co-benefits due to ODS leakage reduction are 204,000 tCO<sub>2</sub>e.

### **6) Innovativeness, sustainability and potential for scaling up**

The project's core outputs will be the support to innovative low-carbon technology, and the adoption of national strategies for the deployment and commercialization of innovative technologies and approaches. In doing so, the project will develop and deploy a novel mechanism of technology co-operation and transfer for low-GHG, low-ODS upgrades and conversions of industrial refrigeration and air conditioning. An innovative financial incentive mechanism will be developed and implemented. Further, a full-scale CO<sub>2</sub> industrial or commercial unit with cascade – which is new to The Gambia – will be installed and used for training purposes.

The project's sustainability lies in creating the enabling policy environment and mechanisms for this technology transfer. The perspective to be taken is that of creating a sustainable knowledge base within the country, as the curriculum developed and tested under the project will remain beyond the project's lifetime. The technical training will lead the industrial refrigeration and air conditioning sector into competence with new use and safety/materials handling issues that will remain valuable after the project ends.

The HCFC Phase-out Management Plan (HPMP) will operate until 2040 in the Gambia, with the final goal being to eliminate HCFCs in the country. Since the project proposal is fully integrated into the HPMP, this ensures its sustainability on the medium-term. In addition, the project proposal can also contribute to exploring further innovative possibilities in the future (e.g. HFC replacement).

### **A.2. Stakeholders. Identify key stakeholders (including civil society organizations, indigenous people, gender groups, and others as relevant) and describe how they will be engaged in project and/or its preparation:**

**National Environment Agency (NEA):** The Office of the President has overall mandate for the environment portfolio with activities coordinated by the National Environment Agency. The ultimate goal of the NEA is to achieve the essential policy objectives of the Gambia Environmental Action Plan: (i) To ensure an environmentally sustainable economic and social development in the Gambia; (ii) To have a Legal recognition of the fundamental right to a sound environment, ensuring the health and well-being of all those living in the Gambia; (iii) To develop and maintain a National Environmental Planning Framework for the Gambia; (iv) To educate about the environment, increasing environmental awareness and empowering communities to take action to identify and solve environmental problems; (v) To provide reliable and relevant information for sound environmental management; and (vi) To conserve and promote the sound and rational use of Natural resources. The programme areas at NEA include: Environmental Education & Communication, Environmental Quality Programme, Environmental Impact Assessment and Elimination of Ozone Depleting Substances, among others, making it the suitable agency to lead the project. The NEA houses the National Ozone Unit.

**Department of Agriculture:** It has been identified as the implementing agency for the Nationally Appropriate Mitigation Action project "Improve storage facilities and promote the use of post-harvest technologies", while the **Ministry of Agriculture** will serve as the Executing Agency. Since cooling and freezing have been identified as important post harvest

technologies in the NAMA document, these bodies will be involved as stakeholders in order to exploit possible synergies between the NAMA and our project.

**National Ozone Unit (NOU):** The National Ozone Office within the Technical Services Network of the National Environment Agency was established in 1997. The National Ozone Unit (NOU) acts as the Country's main coordinating body for ODS phase-out. In order to meet the reduction schedules the NOU has actively pursued a strategy that aims to secure the constant involvement of other stakeholders including importers, the clearing agency at the port of entry and customs departments.

The Executive Director of the NOU is the Focal Person for the Montreal Protocol and the Director of Technical Services Network (TSN) is the immediate supervisor of the National Ozone Unit. A national Working Group comprises representatives from various Ministries, whose inputs are crucial to the realization of the ODS phase-out schedule. The NOU has succeeded in sensitization and creating awareness on matters relevant to Ozone and Ozone depletion, trainings of custom officers and on good refrigeration practices, recovery and recycling scheme, implementation of retrofit activities, has undoubtedly helped a great deal in the reduction and importation of ODS and its usage. As part of its strategies, the NOU has established a Network and created Association's of refrigeration personnel and technicians in all the Regions. These Associations facilitate Regional meetings, trainings/workshops and other Ozone related activities. An advisory sub committee also comprised of experts in various fields. These committees also provide specialized technical and other advice for implementation of various activities of the under the HPMP. The NOU in collaboration with the UNEP has been responsible for organizing the training, liaising and coordinating with the training institutions and supervising and monitoring the training activities.

The NOU specifically is a key stakeholder in this project given that the project focuses on synergies between the UNFCCC and the Montreal Protocol. The involvement of the NOU will also support an incremental relationship between the present project and the baseline project, the HPMP, which is implemented by the NOU.

**The Gambia Technical Training Institute (GTTI):** The GTTI was established by an Act of Parliament in 1980 and began operations in 1983 providing instruction on a variety of technical and commercial disciplines. It has been a key player in other capacity building initiatives within The Gambia, most notably in the "SPWA-CC Promoting Renewable Energy Based Mini Grids for Productive Uses in Rural Areas in The Gambia" as part of the train-the-trainers initiatives. The GTTI also works closely with the NOU on provision of technical training related to the ODS initiatives.

**The Gambian Association of Refrigeration and Air Conditioning Practitioners:** Refrigeration associations have been established covering all seven regions of the Gambia with networking bringing all refrigeration technicians under one umbrella. This Association has been strengthened through the initial training and certification of 200 refrigeration technicians, beginning in 2001, with technicians trained on recovery and recycling technology. The Association has received additional trained by the NOU on differentiating CFCs, HCFCs and HFCs as well as recovery and retrofitting of gases. The Association members have been equipped with the necessary equipment and tools to retrofit and recover gases. All members were acquainted with the management of refrigeration sector phase-out projects, having been involved in the phase-out of CFC-12 in the refrigeration-servicing sector. The refrigeration Technicians Association members have been involved with services in the country providing refrigeration engineering, servicing and consulting services to enterprises and end-users in the refrigeration sector.

The Gambia Association of Refrigeration and Air Conditioning Practitioners has been an essential partner in the bottom-up surveys conducted for the NOU and assisted in the collection of relevant data on HCFC use in the different sub-sectors. Since becoming operational, this Association has been collaborating with training institutions and other stakeholders in the process of reviewing refrigeration training curricula to incorporate new technologies including, recovery and recycling, and retrofitting.

The Association of Refrigeration Technicians will be responsible for the selection of beneficiary training participants (i.e. partaking in the train-the-trainers initiative).

For a discussion of how gender issues will be addressed in this project see Section A.3 below. Gender perspective may be incorporated in policy discussions by having representatives of women's organizations and NGOs involved in policy dialogue. The Gambia Technical Training Institute (GTTI) is particularly experienced with including gender dimensions in technical training.

**A.3. Describe the socioeconomic benefits to be delivered by the Project at the national and local levels, including consideration of gender dimensions, and how these will support the achievement of global environment benefits (GEF Trust Fund/NPIF) or adaptation benefits (LDCF/SCCF):**

This project is expected to deliver both national and local benefits. The implementation of energy efficiency measures will provide cost savings benefits to the local project beneficiaries as well as enhanced educational opportunities through targeted training with the refrigeration and air conditioning service provider sector. Improved awareness will be realized among policy-makers and facility owners of the phase-out requirements and options.

In particular, energy cost savings will be achieved, as maintained and updated systems will use less energy, bringing savings in terms of lower energy costs for installation owners. In addition, refrigerant recharge costs will be lower as leakage rates for better maintained systems will be reduced, whereas with the current systems it is estimated that up to 200-300 kg of HCFC-22 may be lost per year per system. Funds will be saved from the purchase of refrigerants for recharge. Owners/operators will also have lower maintenance costs as efforts to minimize contaminated refrigerants will ensure that efficiency losses from mixed refrigerants will be dramatically reduced.

The project has been designed using the GEF's guidance on gender mainstreaming<sup>10</sup>, which is the primary methodology for integrating a gender approach into environment and development efforts. In particular, the project's design reflects the GEF's experience that it is often difficult to encourage women's participation in projects that are technology intense. However, it is recognized that providing support (GEF funded and cofinanced) for educational activities on largely technical topics such as industrial refrigeration and air conditioning can help women access both the knowledge and skills needed to be active participants in the project and in the sector. The project's training and awareness raising activities will improve educational opportunities for women in The Gambia and is anticipated to have a positive impact on those working with the businesses that participate in the project. Gender perspective may be incorporated in national policy discussions by having representatives of women's organizations and NGOs involved in policy dialogue. All other project activities will be conducted to ensure gender balance in project activities, in particular in training and outreach initiatives, which will be reported through the GEF's tracking tools.

UNIDO also recognizes that "gender equality and the empowerment of women have a significant positive impact on sustained economic growth and sustainable industrial development, which are drivers of poverty reduction and social integration."<sup>11</sup> In particular, UNIDO seeks to reflect a gender perspective in its work at all times, including through awareness-raising campaigns and training, to enable UNIDO to become fully capable of delivering gender equality results. UNIDO's results-based management also defines and uses indicators and measurement protocols for gender equality.

As noted in '*The Gender Empowerment Strategy Paper (2007-2011) for The Gambia*',<sup>12</sup> the gender and women's empowerment paradigm "is a pivotal and basic instrument in development praxis for national poverty reduction". This Strategy intends to further for the empowerment of Gambian women

<sup>10</sup> Mainstreaming gender at the GEF (2010). Available at:

<http://www.thegef.org/gef/sites/thegef.org/files/publication/mainstreaming-gender-at-the-GEF.pdf>

<sup>11</sup> [http://www.un.org/womenwatch/ianwge/repository/UNIDO\\_Policy\\_on\\_Gender\\_Equality.pdf](http://www.un.org/womenwatch/ianwge/repository/UNIDO_Policy_on_Gender_Equality.pdf)

<sup>12</sup> [http://www.gm.undp.org/rtable/gender\\_empow\\_rtc.pdf](http://www.gm.undp.org/rtable/gender_empow_rtc.pdf)

to achieve the following, among others: design plans to ensure hands-on inserting of gender focused elements in all national policies and plans, in both the public and private sectors or create them, in sectors which do not have internal policies; ensure the identification of gender mainstreaming and budgeting personnel in all sectors; and collaborate with the education line sectors to promote increase in girls' access to, performance and retention in secondary, science and technical education, to better prepare them for the world of work.

The Gambia Technical Training Institute (GTTI) is already working to mobilize literacy and vocational training skills training for out-of-school girls and rural women, so is particularly experienced with including gender dimensions in technical training.

Further, the Project Results Framework includes a quantitative indicator for capacity development (capacity perception index), to assessed through a survey at the end of the project, disaggregated by gender.

**A.4 Indicate risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and if possible, propose measures that address these risks:**

Risks can be a result of many reasons including: environmental (including climate change related), technical, policy and regulatory, economic and market and, finance. In this project, no significant environmental/climate change risks have been identified. Project risks, their rating and proposed mitigation measures are presented in the table below.

**Table 1: Risk Overview**

<b>Risk Type</b>	<b>Description</b>	<b>Risk Level (low, medium, high)</b>	<b>Potential Impact (low, medium, high)</b>	<b>Proposed Mitigation Measure</b>
Technical risks	Availability of technical resources for the proper application of new technologies	Low	Low: the energy efficiency initiatives are considered low technical risk. The Gambia has not used the demonstration technologies, however, these will be implemented through the training initiatives so the impact of the overall project will be less significant that if it were to be installed directly in an industrial application.	To deliver the required capacity building, UNIDO will employ the services of highly skilled experts
Climate change risks	HCFC-22 release into the atmosphere when working with old systems	Medium: most contractors should be able to handle the recuperation of HCFC-22	High: Existing equipment contains HCFC-22 which will all go into the atmosphere with ozone depletion and global warming damage	Training to ensure expertise of HCFC handling
Economic/ market risks	Inability to scale up outcomes after successful delivery of outputs  Failure to achieve sustainable market transformation  Availability of funding or co-funding. The cost effectiveness of projects replacing refrigerators is low and complementary funding is needed.	Medium: The Gambia is committed to the HPMP, but financing may be difficult to mobilize among individual facility owners	High: Some owners of facilities may not implement energy efficiency improvements as without sufficient funding. The owners may not commit any funds of their own even if it means power savings in the future. Future conversion out of the present system may not be considered viable earlier than the deadline under the Montreal Protocol if units are running well and have been well maintained.	Ensure complementary funding by other donors, including on financing future retrofits. Ensure that the benefits of energy efficiency improvements and future conversions are well understood through awareness of pilot initiatives.
Policy/ regulatory	Change in priorities leading to reduced	Low: the project is fully consistent	Medium: Since the project addresses the needs of many	Close communication with the government will

<b>Risk Type</b>	<b>Description</b>	<b>Risk Level (low, medium, high)</b>	<b>Potential Impact (low, medium, high)</b>	<b>Proposed Mitigation Measure</b>
risks	support to the project, implementation delays and reductions in the effectiveness of delivery of the capacity building programs.	with The Gambia's priorities and international commitments and it is unlikely that this will change	stakeholders, changes of government priorities will likely not have far-reaching consequences on project implementation.	ensure open channels of information flow, so the project team will be able to address concerns of the government (if any)
Safety risks	Safety risk due to improper serviceability of new technology or after-sales service knowledge	Medium: Depending on which new technologies	Medium: Most of the innovative technologies have a potential safety risk, however, they will be introduced in the training institute	Intensive training and the certification of all service operators on safety procedures The demonstration installations will operate in accordance with the requirements of European Standard BS EN 378:2000 (Refrigeration systems and heat pumps – safety and environmental requirements).

#### **A.5. Explain how cost-effectiveness is reflected in the project design:**

Direct CO<sub>2</sub>e emission reductions from the project are expected to be 5,800 tonnes over the course of the 10-year investment lifetime, resulting from energy efficiency improvements and excluding leakage reduction. With a budget of USD 495,000, the cost per tonne of GHG reduced for the GEF is thus USD 86. While the direct emission reductions are comparatively small, the importance of the project is in its indirect effects. The bottom-up estimate for indirect emission reductions as a result of this project is 23,000 tonnes, and the top-down estimates are 47,000 tonnes. The cost per tonne of GHG reduced for the GEF for the indirect emission reductions thus ranges between 11 USD and 21 USD.

#### **A.6. Outline the coordination with other relevant GEF financed initiatives [not mentioned in A.1]:**

To expand linkages between HCFC phase-out under the Montreal Protocol and other environmental issues, such as climate change and energy efficiency, the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol decided at its 63rd meeting to approve funding for UNIDO to prepare project proposals to identify potential sources of co-financing to cover costs that are not eligible under the Multilateral Fund but that could generate climate benefits as the result of HCFC phase-out. The Executive Committee is interested in establishing a platform to explore and promote synergies between the UNFCCC and the Montreal Protocol. This is consistent with the GEF's CCM-2 that seeks to "build synergy across global environmental conventions", which may "extend to supporting the phase-out of hydrochlorofluorocarbons (HCFCs) used in industry and buildings such as chillers, air-conditioners, and refrigerators, even before the required phase-out dates under the Montreal Protocol."

Recent support from the Multilateral Fund of USD 200,000 allowed UNIDO to appoint national and international consultants to visit three countries to explore possibilities for projects minimizing the discharge of chemicals damaging to the ozone layer and greenhouse gas emissions thereby building synergies across global environmental conventions. One of the countries selected for review was The Gambia, specifically its fish-processing sector, as this sector is a significant source of GHG emissions and user of Ozone Depleting Substances (ODS). Globally, the IPCC has estimated the global potential for mitigating GHG emissions in the refrigeration sector through 2030 through ODS substitutes as 80 MtCO<sub>2</sub>e, and the potential for mitigating GHG emissions in industrial facilities through more-efficient equipment is high (IPCC AR4, Working Group III, Chapter 7).

In addition, UNIDO is developing Projects in other countries – including Viet Nam – to be presented for GEF funding. These projects explore a range of alternative (“natural”) refrigerants such as hydrocarbons, along with reduction of leaks of ozone depleting substances and implementation of energy efficiency solutions. These refrigerants have virtually zero Global Warming Potentials, which are substantially below that of the currently used HCFC-22 (GWP of 1700), or the baseline alternatives like HFC-404A (GWP 3922). Each project will include the preparation of lessons learned analysis for scale-up and replication in other countries worldwide. As part of its commitment to exploring synergies between the Montreal Protocol and the GEF, UNIDO will take leadership on synthesizing and disseminating lessons from these projects.

It is proposed that during the implementation of this Project a high level meeting be held with the representatives of the Multilateral Fund for the Implementation of the Montreal Protocol and the GEF in order to explore possibilities to invest in large scale-up projects for Stage II of the HPMP (period 2015-2020 and the upcoming GEF 6. As inputs to this meeting, interim status reports will be provided by both The Gambia’s and Viet Nam’s project teams.

The development and validation of the HPMP in The Gambia has already brought together stakeholders that are relevant to the proposed GEF projects, including representatives of key Government agencies, refrigeration and air conditioning technicians, customs officials, refrigeration and air conditioning importers and dealers, and both an International and National Consultants. Refrigeration technicians have been trained on good refrigeration practices, recovery and recycling methods, as well as implementation of retrofitting activities throughout the Gambia. Coordinating with the HPMP will allow the GEF project to both build-upon the work in the refrigeration and air conditioning conducted to date, but also leverage training mechanisms that have already been tested.

The Gambia’s Project will also coordinate appropriately with the number of other initiatives underway or planned in the country including:

- Most recently approved is the ‘Strengthening climate services and early warning systems in the Gambia for climate resilient development and adaptation to climate change – 2nd Phase of the GOTG/GEF/UNEP LDCF NAPA Early Warning Project’ under the UNEP and UNDP GEF Agencies; and
- The UNDP-led ‘Enhancing Resilience of Vulnerable Coastal Areas and Communities to Climate Change in the Republic of Gambia’ under the LDCF, which aims to reduce Gambia’s vulnerability to sea-level rise and associated impacts of climate change by improving coastal defenses and enhancing adaptive capacities of coastal communities.

#### **A.7 Describe the institutional arrangement for project implementation:**

The GEF Implementing Agency UNIDO holds the ultimate responsibility for the implementation of the project, the delivery of the planned outputs and the achievement of the expected outcomes.

The project will be carried out as a collaborative effort between UNIDO, the National Ozone Unit (NOU) under the NEA. A Project Steering Committee (PSC) will be formed with UNIDO and NEA. Other local stakeholders will also be invited as needed to bring synergies between the public bodies, as described below. Within the project management structure these organizations will, through technical transfer activities, accelerate and leverage the baseline project to deliver the incremental impact of this GEF project.

UNIDO will be responsible for the general management and monitoring of the project, and reporting on the project performance to the GEF. UNIDO will be in charge of procuring the international and national expertise needed to deliver the outputs planned under the three project components. It will supervise and monitor the work of the international and national teams and ensure that deliverables are technically sound and consistent with the requirements of the project.

UNIDO will also bring synergies for this project by collaborating as in-kind with related UNIDO GEF projects in Viet Nam and in one other country.



The project will be coordinated through a two-tiered system, consisting of a Project Steering Committee (PSC) and a Project Execution Body (PEB).

### **Project Steering Committee**

The representatives of the main Government stakeholders and UNIDO will compose a Project Steering Committee (PSC). The PSC will perform as the apex body for the project. It will be responsible for overall guidance and making policy decisions for the project. It will review project plans, provide advice on strategic approaches and solutions to ensure that project objectives are achieved. It will ensure that required resources are committed, arbitrate any conflicts within the project and negotiate a solution to any problems with external bodies.

The PSC will be chaired by the NEA and will meet annually. At its meetings it will consider the Annual Work Plan presented by the Project Manager, give guidance and suggestions for its improvement and approve the final version.

The PSC will include a representative from the NOU, GTTI and the Gambian Association of Refrigeration and Air Conditioning Practitioners as well as the Project Coordinator (PC). The PSC, on a need basis, can decide to invite other stakeholders (e.g. regulators, industry actors, research institutes, etc.) while taking care that the PSC remains operational by its size. Coordination with other initiatives in The Gambia will be facilitated by involvement of stakeholders from those initiatives in the PSC. The UNIDO Project Coordinator, representing the NEA, will be the Convener Secretary of the PSC.

### **Project Execution Body**

The PEB will consist of a Project Manager (PM), supported by a Project Assistant and an Administrative Assistant, and at least two Program Officers from the NOU. The PM will be the field extension of the UNIDO-PM and will lead the PEB. The PM will be responsible for executing the quarterly WP and the day-to-day management, monitoring and evaluation of project activities as per the approved AWP.

The project will have two local executing agencies: the NEA's NOU and the GTTI. The NOU will be responsible for execution of the policy and incentive initiatives. The GTTI will lead the training activities (including training equipment), and provide technical support for standards.

All field staff will be hired as per UNIDO procurement rules. The PEB will be hosted at the National Ozone Unit, The Gambia. During the entire implementation period of the project, UNIDO will provide the PEB with the necessary management and monitoring support.

The PM will prepare the Annual Work Plan (AWP), as per UNIDO rules and regulations, and present it for consideration to the PSC one month before the end of every calendar year. Based on the approved AWP, quarterly plans will be prepared by the PM and accordingly executed by the PEB.

The PEB will be responsible for the overall operational and financial management in accordance with rules and regulations imposed by UNIDO/GEF for directly executed projects. It will prepare progress reports, financial reports etc., which are to be submitted to UNIDO-HQ and the PSC. It will also produce annual progress reports, at least two weeks before the annual meetings. At the end of the project, the PEB produces the terminal report, which is to be submitted to the Project Steering Committee at least two weeks before the Terminal meeting.

## **B. DESCRIPTION OF THE CONSISTENCY OF THE PROJECT WITH:**

### ***B.1. National strategies and plans or reports and assessments under relevant conventions, if applicable, i.e. NAPAS, NAPs, NBSAPs, national communications, TNAs, NCSA, NIPs, PRSPs, NPFE, etc.:***

The Gambia signed the UNFCCC in June 1992, which entered into force in 1994. The Gambia's First National Communication to the UNFCCC (2003), under priority actions in the energy sector, includes promoting energy efficiency and reducing energy use by applying basic house keeping and retrofitting. The Gambia's Second National Communication to the UNFCCC (2012) identifies priority mitigation technologies for technology transfer. In the category of industrial energy efficient technologies, food cooling technologies are assessed as having a lot of potential in terms of increasing competitiveness and growth. The SNC also states that per capita fish consumption in the Gambia can increase with improved access to fish products country-wide, one of the conditions for which is improvements in cold storage facilities.

The Gambia's MDG Needs Assessment: 2007-2011 (2006) notes that the goal of the national Gambia Environmental Action Plan (GEAP) is to ensure sustainable development, which includes a strengthened regulatory framework and enforcement of the regulatory codes, and environmental regulations fully enforceable and respected by all sectors. The GEAP takes a broad approach to environmental management in accordance with existing environmental legislation and international conventions. Coordination and implementation of the GEAP is through the national Environment Management Council (NEMC) and the National Environment Agency (NEA) that coordinates multi- and cross-sectoral environmental and natural resource management issues through a framework of networks and technical working groups.

In 2011, The Gambia's National Environment Agency (NEA) issued its "National Portfolio Formulation Document" (NPF) on GEF-5 focal area strategies<sup>13</sup> to guide the implementation of the GEF programs and projects. The NPF targets climate change mitigation projects that include mitigation of GHG emissions by strengthening the enforcement of legislation related to GHG emissions, with proposed activities including training of enforcement personnel; sensitization/awareness creation; decentralization of environmental laws; and regular monitoring and evaluation; among others. The NPF also notes that bilateral and multilateral development assistance to The Gambia is reflected in a number of agreements including the UN Country Cooperation Framework (CCF), the UN Development Assistance Framework (UNDAF), the World Bank Group Country Assistance Strategy (CAS I and II), EDF, DFID, which have in addition targeted various sectoral programmes.

The National Environment Agency of The Gambia also implemented the National Capacity needs Self Assessment for Global Environment Management (NCSA) project<sup>14</sup>, undertaken over a two year period and finalized in 2005. The report identified both the energy and the fishery sectors as priorities and suggested to 'Promote energy efficiency and reduce energy use by applying basic housing keeping and retrofitting' in order to facilitate the implementation of the UNFCCC.

The Gambia NAMA (Nationally Appropriate Mitigation Actions) team has agreed on a list of priority projects for a supported NAMA for The Gambia<sup>15</sup> and requests capacity building, technological transfer and financial support towards their successful implementation. Full proposals are currently being developed. The list includes improving storage facilities and promoting the use of post-harvest technologies. Among the technology needs identified is the freezing of food.

The Gambia also ratified the Vienna Convention for the Protection of the Ozone Layer in July 1990, the Montreal Protocol on Substances that Deplete the Ozone Layer in July 1990 and the London

<sup>13</sup> Available at: <http://www.thegef.org/gef/sites/thegef.org/files/documents/document/Gambia%20NPF%20Final.pdf>

<sup>14</sup> Available at: <http://www.thegef.org/gef/sites/thegef.org/files/documents/document/351.pdf>

<sup>15</sup> Available at: [http://unfccc.int/files/focus/application/pdf/nama\\_foc\\_prop\\_gambia.pdf](http://unfccc.int/files/focus/application/pdf/nama_foc_prop_gambia.pdf)

Amendments to the Montreal Protocol in March 1995. The Gambia has committed itself to the phase-out HCFCs through its Hydrochlorofluorocarbon Phase-Out Management Plan (HPMP). The Gambia is categorized as a Low Volume Country (LVC) and, historically, ODS and specifically HCFC consumption has occurred almost entirely in the refrigeration servicing sector and has been almost exclusively HCFC-22. The HPMP's staged approach has both the immediate targets of a 2013 freeze at the baseline and 2015 10% reduction of the baseline, with a high level long term strategy directed to meeting the 2020 (35% baseline reduction) and 2025 (67.5% baseline reduction) phase out targets and ultimately complete elimination of HCFC consumption in 2030. The Government of the Gambia requested UNEP and UNIDO to be the implementing agencies for the program, with UNEP being the Lead Agency and UNIDO the Cooperating Agency.

## ***B.2. GEF focal area and/or fund(s) strategies, eligibility criteria and priorities***

The project is consistent with the CCM-1 focal area objective of promoting the demonstration, deployment, and transfer of innovative low-carbon technologies. The project will focus on increasing energy efficiency of refrigeration systems, while minimizing the discharge of chemicals damaging to the ozone layer and building synergies across global environmental conventions. The project will: (1) develop and deploy a mechanism of technology co-operation and transfer for low-GHG, low-ODS upgrades and conversions of industrial refrigeration and air conditioning; (2) create the enabling policy environment and mechanisms for this technology transfer; and (3) reduce greenhouse gas emissions through the project's initiatives; and 4) demonstrate innovative business modules to enhance private-public acceptance of the low-carbon refrigeration and cold-storage technologies, and investments for value addition and reduced pressure on fisheries resources. The core outputs will be the support to innovative low-carbon technology, and the adoption of national strategies for the deployment and commercialization of innovative technologies and approaches.

The main barriers to adoption of low GWP refrigeration technology in the Gambia are identified in Section A.1.1 of this document. In addition to this, Sub-Activities 1.1.1 and 1.1.2 include the identification of barriers preventing the adoption of best practices for refrigeration in cold storage facilities in the Gambia. In this activity barrier identification will take place through interviews with key stakeholders, and supported by learning that takes place via the pilot activities. The project as a whole and its components and activities were designed with the aim of overcoming these barriers. In particular, as stated in Activity 2.3, the Incentive Mechanism is intended to assist in overcoming the financial barriers.

## ***B.3. The GEF Agency's program (reflected in documents such as UNDAF, CAS, etc.) and Agencies comparative advantage for implementing this project:***

UNIDO's overarching development objective is industrial development for poverty reduction, inclusive globalization and environmental sustainability. To that end, UNIDO is a leading provider of services for improved industrial energy efficiency, enhanced use of renewable sources of energy and promotion of cleaner technologies. UNIDO's activities focus on three thematic areas: poverty reduction - fostering the engagement of men and women into productive industrial activities; trade capacity-building - enabling industries in developing countries to produce and trade goods and services that meet national and international industrial standards; and energy and environment - encouraging the adoption by industries of cleaner, resource-efficient and low-carbon patterns of production and investment.

UNIDO has actively supported the Climate Convention and Kyoto Protocol negotiation process since 1998. UNIDO plays a leading role within UN-Energy, the interagency mechanism aimed at coordinating actions and policies on energy within the United Nations system. UNIDO also has a significant body of projects in the field of industrial energy efficiency and energy management standards. UNIDO's energy-related activities promote cleaner and efficient use of energy in industry, facilitate productive activities in rural areas by providing modern and renewable forms of energy, and

enhance the use of renewable energy for industrial applications. UNIDO's Industrial Energy Efficiency (IEE) programme builds on more than three decades of experience and unique expertise in the field of sustainable industrial development, with the GEF currently providing the main funding for the IEE Programme. As part of the IEE's Industrial Energy System Optimization, the UNIDO's training-the-trainers programme aims at equipping local industry and energy efficiency experts with the expertise, methodologies and tools required to develop and implement energy system optimization projects and practices. The IEE assists developing countries and emerging economies by providing policymaking technical assistance, institutional capacity-building and market transformation support instrumental to the adoption and implementation in industry of energy management standards.

The proposed project is consistent with the Gambia's UN Development Assistance Framework (UNDAF 2012-2016)<sup>16</sup>, which is a key element of the UN Reform and the joint response of the UN Country Team (UNCT). UNIDO is a participating UN Agency in Outcome 1, which involves "capacities, institutions strengthened and policies in place for pro-poor and equitable distribution of economic growth, employment, planning and budgeting; incorporating functional donor coordination and National Statistical Systems for effective planning, monitoring, reporting and harmonization". In particular, this project will contribute to Output 1.3, where UNIDO provides support for industrial development. Further, the initiatives under this project are aligned with Output 1.1, including private sector development, and national and local development planning capacities strengthening.

The UNIDO Country Office in Senegal covers initiatives in The Gambia. UNIDO headquarters-based project managers implement most projects.

Among the GEF Agencies, UNIDO's comparative advantage is that it can involve the industrial sector in GEF projects in the following areas: industrial energy efficiency, renewable energy services, water management, chemicals management (including POP and ODS), and biotechnology. UNIDO has extensive knowledge of small and medium enterprises (SME's) in developing and transition economy countries. For the proposed project, UNIDO's expertise in ODS is of particular relevance.

### **C. DESCRIBE THE BUDGETED M&E PLAN:**

The Monitoring and Evaluation (M&E) framework will assess the Project's impact based on the Project Results Framework (Annex A), which includes indicators, targets and timelines. Monitoring and evaluation of the Project will take place at two levels: the general project level and activity level:

- At the project level: the Project Steering Committee (PSC) will be formed and composed by the representatives of the NEA and UNIDO. It will be responsible for overall guidance and making policy decisions for the project. It will review project plans, provide advice on strategic approaches and solutions to ensure that project objectives are achieved. It will ensure that required resources are committed, arbitrate any conflicts within the project and negotiate a solution to any problems with external bodies.
- At the activity level, the Project Execution Body (PEB) under the Project Manager will be responsible for executing the WP and the day-to-day management, including monitoring and evaluation of project activities as per the approved annual work plan. The PEB will be responsible for the overall operational and financial management in accordance with rules and regulations imposed by UNIDO/GEF for directly executed projects. It will prepare progress reports, financial reports etc., which are to be submitted to UNIDO-HQ and the PSC. It will also produce annual progress reports, at least two weeks before the annual meetings. At the end of the project, the PEB produces the terminal report, which is to be submitted to the Project Steering Committee at least two weeks before the Terminal meeting.

<sup>16</sup> July 2011, <http://www.gm.undp.org/UNDAF%20Final%20Oct.2011.pdf>. See also Gambia's coordination profile at: <http://staging.undg.org/unct.cfm?module=CoordinationProfile&page=Country&CountryID=GAM&fuseaction=UN%20Country%20Coordination%20Profile%20for%20Gambia>

Monitoring and verification of the results is critical to determining the success of the programme. Participating companies will need to agree to provide required information on any materials use and other aspects of their participation in the project as part of an agreement that will be signed prior to the start of the capacity building program and participation with the incentive mechanism. In addition, the usual confidentiality arrangements must be agreed upon.

The Project Manager (PM) is responsible for regular progress reports (every 6 months) with the full support of, and in agreement with, the participating companies and any Government programmes.

External M&E will include official reporting summarizing the overall project's progress, including responses to in any additional or *ad hoc* reporting requested, to the GEF and to other donors. The Terminal Evaluation will comply with both the GEF's and UNIDO's<sup>17</sup> evaluation policies. UNIDO aims to determine the relevance, impact, effectiveness, efficiency and sustainability of the interventions of UNIDO. It assures accountability, supports management and drives learning and innovation. The evaluation focuses on the analysis of expected and achieved accomplishments, examining the results chain, processes, contextual factors and causality, in order to ascertain the degree of achievement or the lack thereof.

The project's indicative M&E work plan is provided in Table 2 below.

**Table 2: Project's Indicative Monitoring and Evaluation Workplan**

Type of M&E activity	Responsible Parties	Budget USD*	Time frame
Inception Workshop (IW)	Project Manager (PM)	3,000 (workshop costs only)	Within first two months of project start up
Inception Report	Project Execution Body (PEB) PM	0	Immediately following IW
Measurement of Means of Verification for Project Purpose Indicators	PM will oversee the hiring of specific institutions and delegate responsibilities to relevant team members	1,000	Start, mid and end of project
Measurement of Means of Verification for Project Progress and Performance ( <i>measured on an annual basis</i> )	Oversight by PM and UNIDO HQ	0	Annually prior to APR/PIR and to the definition of annual work plans
Annual Progress Reports (APRs) and Project Implementation Reviews (PIRs)	PM UNIDO	0	Annually
Steering Committee Meetings	PC UNIDO HQ	2,000	Following Project IW and subsequently at least once a year
Quarterly progress reports	PM	0	Every three months
Terminal Project Evaluation and Terminal Project Report	PEB, PC, independent evaluators, external consultants UNIDO HQ	12,000 (external evaluator only)	Evaluation at least one month before the end of the project; report at the end of project implementation
Lessons learned	PEB	0	By the end of project implementation; annual as part of PIR
Visits to field sites ( <i>UNIDO staff travel costs to be charged to agency fees not to project</i> )	PM UNIDO HQ	0 0	Annually
<b>TOTAL indicative cost</b> * Excludes project team staff time and UNIDO staff and travel expenses		18,000	

<sup>17</sup> [http://www.unido.org/fileadmin/import/64064\\_UNIDO\\_Evaluation\\_Policy\\_FINAL.pdf](http://www.unido.org/fileadmin/import/64064_UNIDO_Evaluation_Policy_FINAL.pdf)





**PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)**

**A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT(S) ON BEHALF OF THE GOVERNMENT(S):** (Please attach the Operational Focal Point endorsement letter(s) with this template.)

NAME	POSITION	MINISTRY	DATE (MM/dd/yyyy)
Ndey Sireng Bakurin	Executive Director & GEF Focal Point	National Environment Agency	June 11 2013

**B. GEF AGENCY(IES) CERTIFICATION**

This request has been prepared in accordance with GEF/LDCF/SCCF/NPIF policies and procedures and meets the GEF/LDCF/SCCF/NPIF criteria for project identification and preparation.

Agency Coordinator, Agency Name	Signature	Date (MM/dd/yyyy)	Project Contact Person	Telephone	Email Address
Philippe Scholtès, Officer-in-Charge, Programme Development and Technical Cooperation Division (PTC), UNIDO GEF Focal Point		09/11/2013	Riccardo Savigliano, Industrial Development Officer, Montreal Protocol Branch, Programme Development and Technical Cooperation Division (PTC), UNIDO	+431260265082 	R.Savigliano@unido.org

## ANNEX A: PROJECT RESULTS FRAMEWORK

Project Narrative	Indicator	Sources of Verification	
<b>Project Objective</b>  Reduction of greenhouse gas emission associated with industrial refrigeration and air-conditioning facilities in The Gambia	<i>Direct emission reduction:</i> Direct emissions reduction of 5,800 tonnes of CO <sub>2</sub> equivalent through improved energy efficiency, with co-benefits due to leakage reduction of 51,000 tCO2 eq.  <i>Indirect emission reduction:</i> - GEF bottom-up methodology Indirect emissions reduction of 23,000 tonnes of CO <sub>2</sub> equivalent through all the activities, with co-benefits due to ODS leakage reduction of 204,000 tCO2e - GEF top-down methodology 47,000 tonnes of CO <sub>2</sub> equivalent through all the activities, with co-benefits due to ODS leakage reduction of 416,000	Reports from the National Ozone Unit and The Gambia Technical Training Institute during and after project implementation.	
<b>Component 1: Policy and Regulatory Support</b>			
Outcome	Indicator	Sources of Verification	Assumptions/Risks (see section Part II A.4)
Policy, regulatory and legal measures are adopted by the government to support the adoption of low global-warming potential and energy efficient technology.	Number of national policies changed or adopted in favour of the use of alternative technologies with low global-warming potential.	Public records such as government websites and publications in the national gazette.	Assumes no radical shifts in Government priorities.
Outputs	Indicator	Sources of Verification	Assumptions/Risks (see section Part II A.4)
1.1 Gap analysis carried out in the national policy, legal and regulatory frameworks.	Availability of gap analysis report.	Project progress report	Continuous government support and participation.
1.2 Relevant recommendations drafted into the national laws/regulations/guidance.	Number of laws/regulations/guidance (new or amended) in favour of low global-warming technologies promulgated.	UNIDO project progress report.	



<b>Component 2: Technology Transfer</b>			
<b>Outcome</b>	<b>Indicator</b>	<b>Sources of Verification</b>	<b>Assumptions/Risks (see section Part II A.4)</b>
Technical and financial support on replacement refrigerants, and reducing greenhouse gas emissions and operational costs, is ensured.	Up to 5,800 tonnes of CO <sub>2</sub> equivalent emission reduced  Energy efficiency gain in percentage, by enterprise/facility  Up to 60 facilities involved in interventions of various scales	Records of each enterprise/facility to the National Ozone Unit and to The Gambia Technical Training Institute  Validation reports from The Gambia Technical Training Institute	The pilot demonstration systems with low global-warming potential refrigerants installed.  The companies want and can proceed with the conversion process.
<b>Outputs</b>	<b>Indicators</b>	<b>Sources of Verification</b>	<b>Assumptions/Risks (see section Part II A.4)</b>
2.1 Refrigeration and air-conditioning support mechanisms established and piloted	Up to 20 Support Service providers certified through course given at the training institute (disaggregated by gender)	Records of each enterprise/facility to the The Gambia Technical Training Institute	There is sufficient interest from private sector and trainee technicians.
2.2 Incentive Mechanism piloted	Over 30 interventions supported through the Incentive Mechanism  Monitoring of the results is continuous for minimum 12 months. Reduced emission of greenhouse gases and improved energy efficiency are verified.	Reports of The Gambia Technical Training Institute  UNIDO project report.	Certified trainees, as Support Service providers, are able to promote good practices regarding energy efficiency and sustainability in the refrigeration and air-conditioning sector.  The companies choose to proceed with improvement process and able to secure financing
<b>Component 3: Awareness raising</b>			
<b>Outcome</b>	<b>Indicators</b>	<b>Sources of Verification</b>	<b>Assumptions/Risks (see section Part II .4)</b>
Demand for refrigerant systems with low global-warming potential that are more energy efficient than	At least 20 firm inquiries indicating intent to use alternative refrigerants made to the Gambia Technical	Report from the Gambia Technical Training Institute and from the Support Service:	Continuous support and participation from national authorities and companies.

existing technologies is increased.	Training Institute and to the Support Service.	Companies indicate their interest towards the new technology.	
<b>Outputs</b>	<b>Indicators</b>	<b>Sources of Verification</b>	<b>Assumptions/Risks (see section Part II A. 4)</b>
3.1 Lessons learnt and information on technology solutions is disseminated to policy makers, companies, and technicians. <sup>1</sup>	Written materials delivered to 15 policy-makers (disaggregated by gender).  Capacity perception index of 5 reached by the end of the project for targeted trainees <sup>2</sup>	Market survey at the end of the project: demand for replicating the technology in other sectors.  Monitoring reports on events and activities.	Assumes the ability to gain media attraction on the issues.  Continuous government support and participation.  Trainees value the information provided and are able to use it in their day-to-day activities.

<sup>1</sup> All awareness and capacity indicators will be collected disaggregated by gender

<sup>2</sup> A capacity perception index score of between 1 and 5 will be used, to assessed through a survey at the end of the project, disaggregated by gender as follows: 1. No capacity built; 2. Initial Awareness raised (e.g., workshops, seminars); 3. Substantial training in practical application (e.g. vocational training); 4. Knowledge effectively transferred (e.g. passing examination, certification); 5. Ability to apply or disseminate knowledge demonstrated.