



**REQUEST FOR MSP APPROVAL
(1-STEP PROCEDURE)
TYPE OF TRUST FUND: THE GEF TRUST FUND**

PART I: PROJECT IDENTIFICATION

Project Title: Reducing greenhouse gas and ODS Emissions through technology transfer in industrial refrigeration			
Country(ies):	Viet Nam	GEF Project ID:	5464
GEF Agency(ies):	UNIDO	GEF Agency Project ID:	120621
Other Executing Partner(s):	MONRE, MARD, Cleaner Production Centre	Submission Date: Re-submission Date:	09/11/2013 10/17/2013 11/01/2013
GEF Focal Area (s):	Climate Change	Project Duration (Months)	36
Name of Parent Program (if applicable):	N/A	Agency Fee (\$):	27,550

A. FOCAL AREA STRATEGY FRAMEWORK

Focal Area Objectives	Expected FA Outcomes	Expected FA Outputs	Trust Fund	Grant Amount (\$)	Cofinancing (\$)
CCM-1	1.1 Technologies successfully demonstrated, deployed, and transferred <i>Indicator: Percentage of technology transfer demonstrations reaching its planned goals</i>	1.1 Innovative low-carbon technologies demonstrated and deployed on the ground.	GEF TF	232,000	1,712,000
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 0 to 4)</i>	1.2 National strategies for the deployment and commercialization of low-carbon technologies proposed.	GEF TF	58,000	143,000
Subtotal				290,000	1,855,000

B. PROJECT FRAMEWORK

Project Objectives: To reduce greenhouse gas emissions by creating an enabling environment for the use of hydrocarbon refrigerants (with a very low GWP) in cold storage facilities in Viet Nam that currently use HCFC-22 for servicing and maintenance purposes.

Project Component	Grant Type	Expected Outcomes	Expected Outputs	Trust Fund	Grant Amount	Cofinancing
					(\$)	(\$)
Policy and Regulatory Support	TA	Policy, regulatory and legal measures are adopted by the government to support the adoption of low global-warming potential and energy efficient technology.	1.1 Gap analysis carried out in the national policy, legal and regulatory frameworks. 1.2 Relevant recommendations drafted into the national laws/regulations/guidance	GEF TF	54,000	130,000
Technology Transfer and	TA	Technology with low global-	2.1: Two pilot demonstration conversions are carried out:	GEF TF	67,000	240,000

Technical Assistance – TA		warming potential (hydrocarbon system) is demonstrated, replicated and deployed	two cold storage facilities converted from HCFC-22 use to hydrocarbon systems 2.2: The demonstration conversions are replicated in up to 10 facilities				
Technology Transfer and Technical Assistance - Investment	INV	Technology with low global-warming potential (hydrocarbon system) is demonstrated, replicated and deployed	2.1: Two pilot demonstration conversions are carried out: two cold storage facilities converted from HCFC-22 use to hydrocarbon systems 2.2: The demonstration conversions are replicated in up to 10 facilities	GEF TF	85,000	950,000	
Awareness Raising	TA	Demand for low-GWP refrigerant systems that are more energy efficient than existing technologies is increased	3.1 Lessons learnt and information on technology solutions is disseminated to policy makers, companies and technicians	GEF TF	69,000	360,000	
Sub-total						275,000	1,620,000
Project Management Cost						15,000	175,000
Total project cost						290,000	1,855,000

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

Sources of Co-financing	Name of Co-financier (source)	Type of Cofinancing	Cofinancing Amount (\$)
National Government	Government of Viet Nam	In-kind	120,000
		Cash	80,000
GEF Agency	UNIDO	Grant	210,000
	UNIDO	In-kind	35,000
Private Sector	Shecco (Marketing & Communication experts)	In-kind	310,000
	Zanotti (Technology supplier)	Cash	50,000
	Technology suppliers (TA)	Cash	150,000
Others	Vietnam Environmental Protection Fund	Soft loan	900,000
Total Co-financing			1,855,000

D. GEF/LDCF/SCCF/NPIF RESOURCES REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY¹

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

GEF Agency	Type of Trust Fund	Focal Area	Country Name/ Global			
				Grant Amount (a)	Agency Fee (b) ²	Total c=a+b

Total Grant Resources			

E. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS:

<i>Component</i>	Grant Amount (\$)	Cofinancing (\$)	Project total (\$)
International consultants	78,000	174,000	252,000
National/Local consultants	113,000	203,000	316,000

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

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

No – while a non-grant instrument is proposed it is funded from local Viet Nam sources. All GEF funds will be used as grants.

PART II: PROJECT JUSTIFICATION

A. PROJECT OVERVIEW:

A.1. Project Description. Briefly describe the project, including; 1) the global environmental problems, root causes and barriers that need to be addressed; 2) the baseline scenario and any associated baseline projects, 3) the proposed alternative scenario, with a brief description of expected outcomes and components of the project, 4) [incremental](#) cost reasoning and expected contributions from the baseline, the GEFTF, LDCF/SCCF and co-financing; 5) [global environmental benefits](#) (GEFTF, NPIF) and adaptation benefits (LDCF/SCCF); 6) innovativeness, sustainability and potential for scaling up.

A.1.1) the global environmental problems, root causes and barriers that need to be addressed;

The objective of the proposed project is to reduce greenhouse gas emissions by creating an enabling environment for the use of hydrocarbons, which have a very low global warming potential (GWP), in cold storage facilities in Viet Nam that currently consume HCFC-22 for servicing and maintenance purposes. The project as a whole will focus on synergies between the UNFCCC and the Montreal Protocol and will also reduce ODS emissions. To reach this objective, the project will use a synergistic combination of technical assistance on policy and regulation, technology transfer, capacity building and awareness-raising.

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. Instilling knowledge of new technologies through this proposed project will prepare the cold storage industry in Viet Nam to select the best technologies in the conversion away from HCFC-22.

Equipment upgrades will greatly reduce the emission of ozone depleting substances (ODS) and greenhouse gases by replacing HCFC-22 with non-ODS refrigerants with very low global warming potentials. The proposed demonstration projects will serve as a pilot for the conversion of other cold storage facilities in Viet Nam and elsewhere in both the choice of technology and project parameters. Hence, from the point of view of the GEF and the implementing agency, the project as a whole can be seen as an initial step that can be used to inform the possible development of large scale-up projects for Stage II of the HPMP (period 2015-2020) and the upcoming GEF 6.

The project will include three components in order to promote the development of a market for hydrocarbon refrigerants (which have a very low GWP) in the cold storage sector:

- 1) Policy and regulatory support;
- 2) Technology transfer; and
- 3) Awareness raising.

Key Barriers

The key barriers to promoting energy efficiency in the cold storage sector in Viet Nam, 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	Currently, there is an overall lack of policy and regulatory incentives to move away from HCFC-22 prior to 2040. There is also a lack of policies and measures for refrigeration emission control that would encourage cold storage facilities to consider lower-carbon, low-GWP alternatives in refrigeration. Demonstrating increased energy efficiency is complicated due to the lack of standard libraries for the determination of energy efficiency.
Awareness and information barriers	<p>Despite initiatives for energy efficiency from both the government and donor side, significant barriers remain such that many energy-saving opportunities remain unexploited. Achieving the government's aim under the VNEEP for key industries to improve, upgrade and optimize technologies aimed at energy saving and efficiency remains a challenge. Many industrial enterprises do not consider energy efficiency a priority due to lack of awareness of the potential savings as well as of the available technologies. They tend to carry out minimal or low cost energy efficiency measures while focusing on capacity expansion. To the extent that they are aware of opportunities for larger energy savings, they tend to shy away from risks associated with these due to insufficient in-depth knowledge and expertise.</p> <p>In most cases, owners' purchasing decisions are based only on initial costs instead of on the lifetime performance of the system. According to MONRE, the use of outdated equipment and the lack of good servicing and maintenance practices results in significant refrigerant losses of up to 20 – 25% of the total refrigerant charge contained in the units. In most cases, enterprises are forced to recharge every 3 to 6 months because of these leaks. Furthermore, owners and operators are reluctant to try new technologies -- and to invest to update or upgrade their facilities more generally -- due to the absence of planning and priority setting at the enterprise level. In the fishery sector, cold storage facilities are operated 24 hours per day, 365 days a year and only stop for maintenance and repair. The above reasons all lead to unpopularity of the regulations and policy enacted in order to comply with the Montreal protocol.</p> <p>Finally, awareness on the handling and best practice for alternative refrigerants in refrigeration and their advantages are still lacking among facility owners and operators.</p>
Capacity barriers	Although most enterprises have technical staff responsible for equipment operation and maintenance, they can only handle ordinary failure or refrigerant recharge. Tools for repair and maintenance are often poor quality and only few enterprises have tools for recuperating refrigerants. For major breakdowns, the enterprises have to hire specialists from the manufacturer or from electro-mechanical companies.
Technical barriers	Low-temperature cold stores and freezing units currently rely on HCFC-22. Drop-in replacements exist, yet they have very high GWPs. Other refrigerants require new systems that are comparatively costly, in addition to toxicity and flammability risks.
Financial barriers	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

<i>Barrier</i>	<i>Description</i>
	<p>Protocol phase-out targets, the price of HCFC-22 will rise.</p> <p>Another deterrent for end-users is the high cost of conversions to new equipment using low GWP refrigerants, particularly when compared to the cost of conversion to the extremely high GWP HFCs which are the standard HCFC-22 replacement . The conversion of cold storage facilities using HCFC-22 is taking place at a very slow speed because the Multilateral Fund of the Montreal Protocol generally does not finance such conversion where energy efficiency gains could offset the capital costs of conversion. Financial barriers are also closely related to policy and awareness barriers: alternative financing options have not been identified because Montreal Protocol activities have not been explicitly linked to national industrial development programs in the cold storage sector, and enterprises are not aware of other financing alternatives.</p>

A.1.2) the baseline scenario and any associated baseline projects,

Fisheries sector in Viet Nam - Viet Nam is one of the leading countries for aquaculture, aquatic product processing and export in the world. According to the Ministry of Natural Resources and Environment (MONRE), there are close to 400 cold storage facilities in the country used for fisheries, each with an average of 10 refrigeration machines running on HCFC-22, for a total of around 4,000 units with capacities between 10 and 200 HP.

Information on the industrial refrigeration sector was collected for the Viet Nam HCFC Phase-out Management Plan (HPMP). The majority of cold storage equipment is domestically manufactured using second-hand or locally produced compressors and unit coolers. There are about 30 contractors who assemble ice making and cold storage equipment in Viet Nam. These contractors have limited engineering capacity and basically reassemble refrigeration equipment using second-hand compressors imported from abroad. Due to the age and the particular design of the cold storage systems, the overall efficiency is generally low and there is great room for improvement, and, when it becomes necessary for equipment to be upgraded, owners are currently likely to favour the use of HFCs that have very high global warming potentials. HFC technology, specifically that using the refrigerant designated as R-404A (GWP 3922), is currently the standard alternative to HCFC-22 in these types of applications. The technology is well known, relatively affordable and energy efficiency can be good.

In order 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 USD 200,000 for UNIDO to prepare two 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."

Globally, the IPCC has estimated the global potential for mitigating GHG emissions in the refrigeration sector through 2030 through ODS substitutes as 80 MtCO₂e, and the potential for mitigating GHG emissions in industrial facilities through more-efficient equipment is high (IPCC AR4, Working Group III, Chapter 7).

Support from the Multilateral Fund allowed UNIDO to appoint national and international consultants to visit cold storage facilities in Viet Nam to collect information on the HCFC-22 technology used, leakage rate, size, age of refrigeration plant, and accessibility, as well as the willingness of the owners and operators to convert to a different refrigerant. Based on this information, two sites were selected for pilot conversion and a full assessment on the best alternative technology was done. Furthermore, the pilot projects would boost GHG reductions by introducing more energy-efficient equipment such as variable speed drives, highly-efficient compressor systems, and highly-efficient evaporator and condenser fan motors, among others.

Legal and regulatory context – A national environmental policy as well as the relevant legislation has been developed in recent years. There are various types of legislation such as strategies (for instance the “Strategy for Cleaner production in Industry up to 2020”), laws, National Target Programmes, Action Plans (such as for responding to climate change) and others. A list of Viet Nam Government decisions on environmental issues, energy and climate change is given in Annex F. Policy and legislation are, however, highly fragmented and need to be improved in order to be effective.

To implement the Prime Minister’s Decision approving the National Target Programme to Respond to Climate Change, the Ministry of Industry and Trade (MOIT) has taken the initiative in coordinating bodies in and outside the ministry. An Action Plan on responding to climate change is developed for MOIT. The National Science and Technology Framework on Climate change is broken down into a number of activities, one of which is strengthening international cooperation in science and technology activities; implementing and transferring eco-friendly and climate-friendly technologies in an effective manner.

To lessen dependency on oil imports and to ensure energy security, Vietnam is implementing policies to improve EE, reduce energy losses, and implement extensive measures for the conservation of energy. The Decree on Energy Saving and the Efficient Use of Energy (102/2003/ND-CP) of 2003 institutes a number of measures to improve efficiency, particularly that of large consumers of energy. These measures include, among other things, improved energy efficiency incentives. MOIT has been assigned by the government the task of taking the lead in implementing the National Target Programme on the Economical and Efficient Use of Energy.

The Government of Viet Nam has launched the Viet Nam National Energy Efficiency Program (VNEEP) for the period 2006 – 2015, which was prepared by MOIT. The VNEEP is the first comprehensive plan for improving energy efficiency and conservation in all sectors of the economy in Viet Nam. Project 8 of Component 4 of VNEEP aims to support industrial enterprises to improve, upgrade, and optimize technology aiming at energy saving and efficiency. Among its activities is the development and implementation of selected projects on energy using technology, and among the types of equipment to which priority will be given are air conditioners and ventilation systems, and aqua cultural product processing. MOIT leads the executing agencies for this project. The project management will take special efforts to ensure that the activities are coordinated, and that existing incentives are used so as to maximize benefits and avoid overlaps.

The Directorate for Standards, Metrology and Quality (STAMEQ) is an agency attached to the Ministry of Science and Technology that is responsible for standardization as well as quality control in Viet Nam. National standards are developed, based on various international standards such as ISO standards. A set of standards exists for various types of refrigerators. Standard TCXD-232:1999 “Ventilation, air conditioning and cooling system- Manufacture, installation and acceptance” contains specific rules for different refrigerants.

Refrigeration technologies – When replacing refrigeration systems using ozone depleting substances with non-ozone depleting substances, there are two possibilities - a retrofit or replacement of the condensing unit system. For older units with significant refrigerant leakage retrofitting is not recommended. Since most, if not all, cold storage facilities in Viet Nam are older and have serious leakage problems, in this project retrofits were not considered. For new systems there is a choice of

refrigerant substances, depending on the application. The present market trend has been moving away from hydro fluorocarbons (HFC) into what are termed natural refrigerants with low or zero global warming potential (GWP), such as hydrocarbons, ammonia and carbon dioxide, due to the unavailability of HFCs that are efficient and have a low GWP for low temperature applications.

Advantages and disadvantages of the various types of refrigerants available:

- *Hydrocarbons*: The dominant characteristic of the hydrocarbon refrigerants is their high flammability. Provided precautions are taken to mitigate the consequences of their flammability, hydrocarbons make excellent refrigerants in practice. Propane and propylene are suitable for general refrigeration applications.
- *Hydro fluorocarbons (HFC)*: Existing HFCs all have very high GWPs
- *Ammonia*: by far the most common refrigerant used in industrial systems. Ammonia systems can be designed for very high efficiency. The major hazard presented is its acute toxicity, although its pungent odor ensures that low, relatively harmless concentrations are obvious and provide an early warning of danger. Many freezers operate at sub-atmospheric pressure, so air and moisture are drawn into the system if it is not pressure-tight, thus preventing refrigerant leakage.
- *Carbon dioxide*: cannot be used in exactly the same way as other industrial refrigerants. It needs to be coupled with a higher temperature refrigerant in a cascade system or else used in a trans-critical system. Trans-critical systems have been used in commercial and small systems, but there are no compressors on the market to provide the necessary high operating pressures to run an industrial system in this way. In addition, the high operating pressure requires skilled labor for installation and maintenance.

In addition to the choice of refrigerant, a choice needs to be made between direct expansion and indirect or secondary systems, in which a secondary substance is introduced into the cold store instead of the primary refrigerant. Indirect systems are less efficient due to the extra heat exchanger required between the primary refrigerant and the secondary substance.

An innovative technology based on the hydrocarbon refrigerants propane and propylene, specially designed to reduce greenhouse gas emissions, uses refrigeration units that are uniblocks designed for wall or ceiling mounting, with water or air condensing systems. When compressors are used that are specifically designed for these refrigerants a high cooling capacity can be guaranteed along with low power consumption. Due to the flammability of these refrigerants, the charge allowed in a unit is limited, leading to units with a relatively small capacity. Hence multiple units are needed to meet the refrigeration load typical of cold storage facilities.

Baseline Project

The objective of the National HCFC Phase out Management Plan (HPMP) is to assist the Government of Vietnam to comply with its Montreal Protocol phase-out obligations for HCFCs. Stage I, focusing on the foam sector, was approved by the Executive Committee of the Montreal Protocol at its 63rd Meeting in April 2011. The HPMP states that the phasing out of HCFC's presents an opportunity for synergies between the ozone and climate protection.

This stage of the HPMP proposes a combination of financial incentives mainly for the procurement of equipment in the foam industries at the sector level, along with supporting Policies and Regulations, Technical Assistance Activities and Project Management, including an import quota system to curb the supply of HCFCs and policies specifically addressing the foam sector. Technical assistance activities to support implementation of investment interventions, awareness campaigns on the need to phase out HCFCs and on future regulatory measures to eliminate HCFC use will also be carried out along with capacity building of customs officers to ensure effective control of import of HCFCs and products containing HCFCs. In addition to the foam sector, HCFC-22 consumption in the residential AC manufacturing sector is addressed. The decision to focus on these sectors was made since the cold storage sector (fisheries) would be better addressed subsequently, in stage II, as an entire sector.

The HPMP therefore sets a valuable institutional and technical framework in which GEF market creation activities will take place. Under HPMP activities the price of HCFC-22 is expected to increase in the years to come due to the reductions on the HCFC-22 market availability, making the return to HCFC-22 unlikely.

Among the technical assistance activities described in the HPMP stage I is the promotion of energy efficiency awareness in the cold storage sector. This is to be done in conjunction with the TA activities for air-conditioning equipment, without Multilateral Fund finance. The activities planned include:

- Developing an inventory of cold storage facilities
- Conducting an energy performance audit of the baseline equipment
- Developing and distributing a code of good practice for designing, maintenance and servicing of industrial refrigeration system

There are, however, no direct phase-out investment activities to be financed by the MLF in the cold store sector under the HPMP.

The Government of Viet Nam proposes to submit stage II of the HPMP in 2016. One of the activities proposed for stage II is conversion of cold-storage facilities plus a policy to prevent any new HCFC installations in the fishery and fish processing industry. The World Bank has estimated that the phase-out of 670 tonnes of HCFC-22 in the industrial refrigeration sector will cost US \$10,190,700.

The project described in this proposal will be implemented parallel to stage I of the HPMP and thus prior to stage II of the HPMP. Hence, this project will be incremental to the limited number of activities affecting the cold storage sector that are included in the HPMP stage I and will set the baseline for the HPMP stage II. Although stage II is foreseen to cover the conversion of cold-storage facilities, the aim of the HPMP is only the reduction of ODS emissions, and it does not deal with greenhouse gas emissions. This project will establish a low GWP development path for cold storage facilities as opposed to the high GWP development path that might result if the HPMP were not accompanied by projects focusing on greenhouse gas emissions such as this one.

Baseline efforts already ongoing on the ground also include the UNIDO-GEF project in Viet Nam, “Promoting Industrial Energy Efficiency through System Optimization and Energy Management Standards”. This project includes work on industrial energy efficiency standards and legislature.

A.1.3) the proposed alternative scenario, with a brief description of expected outcomes and components of the project

The proposed project addresses barriers to the use of very low GWP alternatives to HCFC-22 in industrial refrigeration. The project focuses on technology transfer¹ of hydrocarbon refrigeration technologies, recognizing that to ensure the effectiveness of technology transfer the following key dimensions are necessary: enabling environments; mechanisms for technology transfer; and capacity building.

A synergistic approach is therefore proposed that creates a policy and regulatory environment conducive to the adoption of new technologies; develops technical capacity through the provision of targeted technical support to identify energy efficiency measures and refrigerant options, including implementation of pilot projects; and incentivizes owners/operators to carry out improvements. The proposed project targets industrial cold storage owners and operators in the fish processing sector.

¹ 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 reduce ozone depleting substances (ODS) emissions and to improve energy efficiency, thus reducing greenhouse gas emissions, in the cold storage sector in Viet Nam:

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 the adoption of low-GWP, higher-efficiency equipment that does not use HCFC. The development of legislation and regulation depends in part on the awareness of legislators and regulators of the need for improved regulations. Hence Activity 3.1.2 makes an important contribution to this Component.

Component 2: Technology transfer and technical assistance

Expected Outcome 2: Technology with low global-warming potential (hydrocarbon system) is demonstrated, replicated and deployed.

Component 2 is designed to introduce hydrocarbon refrigerant systems to the Vietnamese market and to demonstrate their effectiveness in reducing ODS and GHG emissions to both policy-makers and to facility owners and operators. The technology transfer and technical assistance mechanisms that will be put in place include (i) pilot facility conversions; (ii) a financial scheme for facility owners to convert their facilities to the new technology; and (iii) creation of a local knowledge base on alternative refrigerants, including training and capacity building.

Component 3: Awareness-raising

Expected Outcome 3: Demand for low-GWP refrigerant systems that are more energy efficient than existing technologies is increased

Component 3 is designed to improve the awareness of stakeholders regarding potential new refrigeration 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. Follow-up support is also required for the implementation.

A.1.4) incremental cost reasoning and expected contributions from the baseline, the GEFTE, LDCF/SCCF and co-financing;

Incremental reasoning:

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

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

- The owners of cold storage facilities will have to cover the costs of conversion of HCFC-22 based systems by 2040 or by the end of operating lifetimes of the current systems if sooner.
- Owners are likely to favor the use of HFC-404A, which has a global warming potential (GWP) of 3922, as an alternative technology, because initial replacement is simpler and initial costs would be lower than those for natural refrigerants with very low or zero GWP such as hydrocarbons, ammonia or CO₂.
- As an example, in preparation for this project an estimate was made for two facilities of the cost of replacing existing equipment with a conventional system running on HFC-404A: Seaprodex Hai Phong cold store, where replacement would cost around USD 140,000, and Tran Cong Thanh, where it would cost about USD 114,000 (see below for a description of these facilities). This may be compared with the costs for the innovative technology being considered for this project: at Tran

Cong Thanh, 14 small units and 14 larger units will be needed. Since these are compact units installation is straightforward, and total purchase and installation costs come to USD 169,000. To this must be added the cost of engineering and training for the use of a new type of technology, which in this project will be provided as in-kind contributions by the equipment supplier. In addition, the soft loans being made available will encourage facility owners to replace their old, leaky and inefficient equipment at an earlier date than they would otherwise have done, increasing the savings which may be attributed to the project.

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

- The industrial refrigeration sector would switch to hydrocarbon refrigeration technologies, with both lower-ODS and lower-GWP. Conversions to HFCs which have high GWPs 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 *complementing* 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

Summary of financing: In Component 1, GEF funds will fund incremental activities to support a gap analysis of Vietnamese policy and the drafting of improved policies and regulations. Co-financing in the form of in-kind contributions from the Government of Vietnam will support stakeholder meetings.

Description of the activities: At the start of the project the consultative strategy given below will be reviewed and, if necessary, adapted in light of new developments and new knowledge.

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

Activity 1.1.1 Carry out a gap analysis of Vietnamese policy, legislation and safety regulations relevant to refrigeration in cold storage facilities and alternative refrigerants. In combination with an assessment of international best practices, including best practice for enforcement, this will be used to identify barriers preventing the adoption of best practices. To inform the next activities, examples representing international best practice, including best practice in safety standards, may be translated to Vietnamese.

Part of this analysis will be an examination of the possibilities to apply to cold storage facilities the incentives that are already in place as part of programs such as the Vietnam National Energy Efficiency Program (VNEEP) and the National Target Program on Energy Efficiency and Conservation.

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

Activity 1.2.1 Facilitate discussion with relevant stakeholders, such as officials and professional associations, to address policy, regulatory and enforcement needs for Viet Nam. Representatives of Viet Nam's Directorate for Standards, Quality and Metrology (STAMEQ) will be invited for the discussions on standards, to address needs regarding standards and safety regulations. Stakeholders will meet in a Consultative Round Table, which will also

function as the inception workshop for the project, and a continual bi-lateral dialogue with the project staff will take place.

Activity 1.2.2 Taking into account the result of Activity 1.1.1 and 1.1.2, proposed policy(ies), regulations and standards for Viet Nam will be drafted.

Activity 1.2.3 Stakeholders will be supported on the adoption and enforcement of the proposed policy(ies) and/or regulation(s) through the publication of a short review of recommended improvements to enforcement practices.



Component 2 – Technology Transfer

Summary of financing: In Component 2, GEF funds will fund incremental activities to support part of the costs of equipment for the pilot projects (34 units will be provided at cost price, 22 small units and 12 larger units. The full price of the units being provided is USD 192,610), as well as the development of a financing scheme. Co-financing in the form of in-kind contributions from technology suppliers will support pilot conversions of two facilities by providing the equipment at cost price. Technology suppliers will support both the pilot conversions and subsequent conversions by providing consultants for technical support and training. Co-financing in the form of soft loans from VEPF will support the additional conversions subsequent to the two pilot projects.

Description of the activities: As preparation for these activities, two sites were visited that are typical for the sector, Seaprodex cold store in Hai Phong and Tran Cong Thanh cold store in Hanoi, both in North Viet Nam. Initial discussions have been held with the facility owners to confirm their interest in exploring the possibility of facility upgrades and to collect basic information on the sites.

The two facilities were chosen to represent different types of companies and thus as illustrative cases for a large part of the cold storage sector in Viet Nam. As stated below (key stakeholders section), Tran Cong Thanh is privately owned, while Seaprodex is a large company with multiple branches.

Basic data on the example facilities visited:

	Seaprodex Hai Phong	Tran Cong Thanh
Temperature of cold store	-22 to -25°C	-22 to -25°C
Function	Long term storage	Temporary storage for retail outlet
Age of equipment	~25 years	~25 years (purchased second hand)
Staff of cold storage	4 technicians	One employee, maintenance and service outsourced
Storage area volume	2282 m ³	1440 m ³
HCFC-22 charge	200 kg	200 kg
HCFC-22 consumption	100 kg/yr	95 kg/yr
Electricity consumption in 2011	402,000 kWh/yr	~100,000 kWh/yr
Photo		

Output 2.1: Two pilot demonstration conversions are carried out: two cold storage facilities converted from HCFC-22 to hydrocarbon systems using in-kind contributions from technology suppliers and GEF funds.

Activity 2.1.1: Selection of pilot project sites. The pilot project will consist of the conversion of two cold storage facilities from HCFC-22 to a low GHG system. The indicative sub-activities listed below give an outline of the envisioned participatory process to identify the sites.

Sub-Activity 2.1.1.1 Determine the membership of the selection committee and agree with the project board the draft evaluation and selection procedures for the request for proposals (RFP) (alternatively, if so desired by the board, a pre-qualification request could be issued before the RFP).

Sub-Activity 2.1.1.2 Request Letters of Interest (LOI): Publishing/issuing a global brief Request for LOI will facilitate the selection process by:

- Announcing and generating interest in a project among a wide spectrum of potential project participants;
- Initiating and providing for efficient future communication between the project management and potential project participants;
- The contents of the request for LOI will include a brief project description, name and address of the contact, and due date and other early schedule information.

Sub-Activity 2.1.1.3 A performance based Request for Proposals (RFP) will be developed along with evaluation and selection procedures.

Pilot project sites will be selected based on criteria including the following factors:

- Prospects for long-term viability of the enterprise or entity
- Visibility and accessibility of the site (demonstration value)
- Replication potential
- GHG and ODS benefits of the conversion
- Technical feasibility of the proposed project
- Financial feasibility of the proposed project
- Willingness of owners and staff to participate in the project as a demonstration site
- Contribution to addressing analysed barriers
- Availability of co-funding (cash or in-kind)

One of the preconditions for facilities to receive assistance will be their commitment to properly recover and store any displaced HCFC-22, and inform the Project Management Unit accordingly. Through activities developed under the HPMP stage II, these stored cylinders should be sent to their respective recovery centers in the country.

Sub-Activity 2.1.1.4 The first RFP will be issued. During the bidding period technical concepts can be reviewed by project management for compliance only.

Sub-Activity 2.1.1.5 Proposals will be evaluated according to the agreed evaluation procedures and criteria. It is proposed that the contract for system conversion at the selected sites is signed by UNIDO. Once commissioned, ownership will be transferred to the beneficiary.

Sub-Activity 2.1.1.6 The contract will define risks and responsibilities with the contractor responsible for, amongst other things:

- Execution of the contract in agreed time frame
- Securing of design approvals as required by national legislation

- Coordinating with facility owners to ensure that the design meets their needs
- Quality and quantity of works, materials and equipment in compliance with performance specifications of the RFP
- Filling in and maintaining project site documentation (certificates etc.)
- Engineering setup, service testing and putting in operation of the refrigeration system, according to project design and national norms and standards
- Training of technicians in the new refrigeration technology
- Participation in preliminary and final commissioning of completed project
- Labour security during execution of works, compliance with fire protection, environmental protection standards

Facility owners of the selected sites together with the Project Management Unit will do overall management of project implementation and will be responsible for:

- Timely delivery of access to the project construction site to the contractor
- Monitoring and supervising contract execution
- Commissioning of completed works, after they are accepted by a local Engineer – Supervisor
- Authorize Contractor’s Statements of Accomplished Works and sign requests for payment
- Organize training and certification of refrigeration technicians on the new refrigeration technology, according to local standards
- Provide mains electricity connection for testing and putting in operation the new installation
- Organize and participate in testing and putting in operation of new refrigeration systems

Overall, the project engineering staff will monitor quality and supervision of the works.

Activity 2.1.2: Facility upgrades design for two pilot facilities in order to maximize energy savings (and subsequent GHG emission reductions) and learning opportunities

A typical cold room needs approximately 2 units of the compact uniblock hydrocarbon refrigerators, depending on the size and the load. For the two pilot projects, a total of 34 units will be provided at cost, with each of the two facilities thus being able to convert about half of its storage areas to the new technology. 12 larger units and 22 smaller units will be provided. This partial conversion will make possible a direct comparison between old and new technologies, illustrating to facility owners the advantages of the conversion. The monitoring program will also make use of this parallel operation of the different technologies.

Sub-Activity 2.1.2.1 Pre-feasibility assessment: pilot conversion of two cold stores in the fisheries industry in Vietnam from HCFC-22 into an alternative hydrocarbon (non-ODS, low GHG emissions) technology (co-financing by the GEF). To include a comparative study of the available technologies and their application to the actual situation in Viet Nam.

Sub-Activity 2.1.2.2 Detailed technical and feasibility study of the conversion

Sub-Activity 2.1.2.3 An engineer representing Project Management and technicians representing the beneficiary will supervise the technical design and construction work and monitor actual performance of the new technology. To this end they will use the indicators, monitoring forms and protocols and system for reporting the results of the monitoring developed as part of the monitoring and evaluation framework of the project.

Recovery of old refrigerants will be performed according to the international guidelines on good practices on recovery and recycling of ODS². In order to assure that the proper procedure is followed this will be done by technicians that were trained and equipped for ODS recovery, either during implementation of CFC phase-out or in the trainings that will be part of this Project. Recovered HCFCs will be temporarily stored in cylinders and if possible cleaned and reused.

It is foreseen that in stage II of Vietnam's HPMP (2015-2020) HCFC containment and reuse measures will be developed for the country as supplies of HCFC-22 are gradually reduced. Project management will stay informed concerning the progress of this initiative and will make sure that used refrigerant will be handled in accordance with these measures.

Output 2.2: The demonstration conversions are replicated in up to 10 other facilities.

Activity 2.2.1: Development of a pipeline of projects using very low GWP refrigerants

Due to the barriers to the conversion of facilities to use very low GWP refrigerants in Viet Nam, some form of incentive will be necessary in order to increase uptake of these technologies, complementing policies, awareness, and technical assistance. This activity will promote activities aimed at developing a sustainable pipeline of low GWP refrigeration projects and creating a critical mass of facilities using this technology. Even though it is not the only barrier, higher upfront costs of low GWP refrigeration technologies, coupled with the difficulties in mobilizing additional financing to cover these costs, can deter facility owners from investing. Financial incentives can make such investments more attractive, while also attracting attention and demonstrating the government's commitment to moving towards low GWP refrigerants in Viet Nam.

Soft loans from the Vietnam Environmental Protection Fund (VEPF) have been identified as a suitable source of financing for these projects. Targeted customers of VEPF are, among others, organizations who request and apply for soft-loans to implement projects, programs or activities that combat and overcome environmental pollution. Among the priority areas in financial assistance from the Fund are:

- Prevention and overcome environmental problem
- R&D of environmental technology

Part of the responsibilities of VEPF is co-sponsoring and soft-loans for environmental projects conforming with criteria and functions of VEPF with financial organizations at home and abroad such as the GEF. By the end of December 2012, VEPF approved soft loans for 157 projects with a total amount of over VND 950 billion (equivalent to USD 47.5 million).

The soft loans available will be used to purchase cooling units at the market price. For the available sum of USD 900,000, 10 facilities will be able to purchase roughly 18 small units each, to which will be added minor costs of civil works, installation and commissioning (beyond the in-kind contribution of engineering by the supplier). If some of the funds are used to buy larger units, the total number of units financed will be lower.

It is expected that in the coming years, in addition to natural growth of the sector as the Vietnamese economy expands, new cold storage facilities will be constructed as part of the national master plan for developing the seafood processing industry by 2020 and the World Bank-MARD Coastal Resources for Sustainable Development (CRSD) project. The incentive model will focus on this new construction as well as on renovation of existing installations.

² An example of such guidelines is GIZ's publication: http://www.giz.de/Themen/en/dokumente/2010-Good_practices_in_refrigeration-giz.pdf

Sub-Activity 2.2.1.1 Development and refining of a financial scheme providing soft loans from the Vietnam Environmental Protection Fund (VEPF), in discussion with VEPF and other stakeholders.

As a follow up on the two pilot conversions described in Activities 2.1 and 2.2, financing will be made available under favorable terms for a limited number of additional projects. The intent is to create local case studies while encouraging the local market for these technologies to grow. This activity will prepare the ground by engagement with VEPF, the technology supplier and other stakeholders to deliver the loan product.

Administration and financial supervision of the funds will be established, including disbursement protocols.

Loan criteria for VEPF are³:

Criteria 1: Project rationale and justification.

Criteria 2: Project effectiveness (environment, economy and society)

Criteria 3: Project relevance to regulations of VEPF

Criteria 4: Project's replication

Criteria 5: Refundability

Duration of VEPF loans depends on the capital capacity of VEPF, conditions of the project and refundability of project owner but will not exceed ten years.

In addition to standard VEPF criteria, a commitment to proper recovery and recycling of the used HCFC-22 from the facilities' old refrigeration equipment will be required. Facility owners should inform the Project Management Unit of all quantities of R-22 recovered. Through activities developed under the HPMP stage II, these stored cylinders should be sent to their respective recovery centers in the country.

SubActivity 2.2.1.2 Prefeasibility studies of good prospects carried out (supported by local experts trained under Activity 2.2.2 below), and financial facilitation.

A competitive application process for the VEPF loans will be established and supported under this activity.

Activity 2.2.2: Private sector involved in design of plants using non-ODS, very low GWP refrigerants and in project pipeline development, in order to engage local industry and develop engineering expertise. Everything done under this activity will take gender mainstreaming into consideration, from collecting gender disaggregated data to ensuring impact of training of technicians is equal.

The pilot conversion projects under Output 2.1 above provide an opportunity to familiarize the Vietnamese private sector with energy efficient refrigeration systems using an alternative refrigerant (in this case, hydrocarbon). One of the criteria used to evaluate possible technology suppliers with which cooperation will be sought for this project will be their willingness and ability to cooperate with the local private sector. Subsequently, conversions in the pipeline developed under Activity 2.2.1 will be partly executed by the local companies.

Sub-Activity 2.2.2.1 Assess the existing local knowledge on the technologies covered by this project and on the design of industrial refrigeration facilities using alternative refrigerants. Part of this process will be identifying the organizations with the relevant knowledge and skills that will then be offered a chance to participate in the project.

³ As described on the VEPF website: <http://www.vepf.vn/FormOfOperation-LoanWithOfferedRate>

Sub-Activity 2.2.2.2 The companies identified will be involved in the project application, design and construction activities. This will build their capacity to manage competitive tendering, include supply of standard tender documents, and provide training to refrigeration engineering firms on the approaches to supplier management and quality control.

Sub-Activity 2.2.2.3 Local companies given a role in the development of a pipeline of viable projects interested in using the financial scheme for industrial refrigeration facilities using very low GWP refrigerants.

The knowledge gained by Vietnamese refrigeration engineers during the pilot projects will be further deepened by their involvement in the creation of a pipeline of projects. The perspective to be taken in this activity is that of creating a knowledge base within the country that will become sustainable of the design and installation of refrigeration plants of the types selected.

Activity 2.2.3: Introduce Business Support Centres

The approach of Technical Cooperation projects supported by UNIDO in the agro sector largely includes establishment of Business Support Centres that provide services, including technology demonstration and training to businesses and operators along a select value chain and location. These services can be established at one of the pilot facilities selected to participate in the project grant or those that will qualify to benefit from the soft loan. Business support centres serve as pilot demonstrations of the improved technologies and processes for transfer and models for replication by enterprises. In such a case, during the selection of pilot projects, institutions that could serve as business support centres will be invited to participate in the submission of expressions of interest.

The information and awareness campaign in Output 3.1 will spread information about the new technology and the loan scheme to the target audience. This outreach will develop interest and understanding, and build up the credibility and trust in the new technology and the offered loans.

Follow-up support is required for design and implementation of the new facilities. In order to attract facility owners to invest in the new technology and as an encouragement to first movers, the technology suppliers involved in the pilot conversions, together with local companies, will perform a pre-feasibility study and provide initial plans for 10 sites that express interest in converting to the new technology. They will also evaluate the financial investment required for implementation. These documents will then be used in initial contacts with VEPP to confirm eligibility of the interested companies for the offered loans.

Component 3 Awareness raising

Summary of financing: In Component 3, GEF incremental cost funds will support 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 website and a side event at one of shecco's events as well as general input to the information and awareness campaigns. Co-financing in the form of cash from UNIDO and the Government of Vietnam will support training and capacity building activities. Under this component, all collected data will be disaggregated by gender in order to monitor the impact of the project on men and women,

Description of the activities:

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

Activity 3.1.1: Information and awareness campaign targeted at cold storage facility management conducted to improve knowledge of alternative refrigerant systems (with a focus on hydrocarbon refrigerants) and to improve perception of the effectiveness and safety of these systems.

Using a range of media tools, targeted awareness-raising will be provided among owners and operators of cold storage facilities and among policy makers. This will include information on life-cycle cost savings from more efficient systems and on financing options for adopting these systems, as well as on environmental policies and associated HCFC phase-out legislation.

Specific measures to increase demand that will be publicized by the campaign are the soft loans to be provided by the Vietnam Environmental Protection Fund for conversions and the free pre-feasibility studies that will be offered as per Output 2.4 to the first 10 qualified companies to apply for these loans.

Sub-Activity 3.1.1.1 Develop a media plan based on a needs assessment through a survey of the target audience. This will identify the best types of materials and the settings for communicating them in the local context. The media plan will include an overview of key project messages and target audiences, and the planned outputs tailored to the identified messages and audiences.

Sub-Activity 3.1.1.2 Prioritize, prepare and deliver elements of the information and awareness plan. Possible activities foreseen are subject to the results of the needs assessment. At this stage, we propose the following set of main elements:

- Study tours to newly converted locations
- Participation in exhibition of refrigeration association through stand, and if the possibility is offered by giving presentations. A relevant venue is Refrigeration Vietnam, an exhibition held concurrently with HVAC Vietnam, once every two years.
- Web site (to which all printed material such as advertisements, brochure etc. will refer) containing information on technologies based on alternative, low GWP refrigerants and information on the funding possibilities for converting to these technologies. When the training programs in Activity 3.1.3 have been set up the web site can serve both as a recruiting tool for the trainings and possibly as a platform for a peer-to-peer network created for the people who have completed the trainings. Website development will be coordinated between all three related projects UNIDO is developing as described below under Activity 3.1.4.
- A brochure highlighting the advantages of alternative, low GWP refrigerants, the energy saving options when converting to a new system and the possibilities for finance. The brochure could include a postcard which could be sent to the PMC for further information.
- Press releases and articles in publications aimed at the target group describing the issue, highlighting the possible solutions and particularly the pilot conversions after success has been obtained with those
- Case studies: key information and photos, possibly audiovisuals (e.g. interviews with stakeholders), of the pilot conversions, once these have been completed. These can be used in all other communication channels to serve as illustration. This could also be linked to the proposed award in Activity 3.1.1.3.
- Presentation at meetings of professional groups and associations
- Advertisements in specialist publications and on the internet, ideally on commercial websites dealing with industrial refrigeration and cold storage in Viet Nam.

Sub-Activity 3.1.1.3 Design and implement an annual competition to recognize the implementation of alternative refrigerants.

The competition could be linked to an existing or already planned award such as the Green Industry Award Scheme that is to be launched in 2014 as part of UNIDO's Green Industry Initiative. These awards would recognize enterprises that have achieved extraordinary progress in implementing Green Industry and are aimed at SMEs. They consider improvement in productive use of materials, energy and water and reductions in GHG emissions, waste and effluents.

Possible categories are in the proposed award are: best refrigeration supplier, best cold storage facility.

To design the award, criteria will be developed for selection, and applicants will be sought on an annual basis.

Sub-Activity 3.1.1.4 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.

Activity 3.1.2: Targeted outreach provided to policy-makers on the benefits of alternative refrigerants and on linking improvements in energy efficiency in the cold storage sector with national industrial development priorities

One of the challenges to reducing greenhouse gas emissions from industrial refrigeration in Viet Nam is the fragmentation of legislation and regulation relevant to alternative refrigeration technologies. The existence of comprehensive, best practice legislation and regulation setting standards for these technologies is necessary to expanding the market. The experience gained in the pilot conversions planned for this project can provide valuable inputs into the policy-making process. The following activities will create awareness among policy-makers of the need for such legislation.

Sub-Activity 3.1.2.1 Develop a media plan based on a needs assessment through a survey of the target audience. This will identify the best types of materials and the settings for communicating them in the local context. The media plan will include an overview of key project messages and the planned outputs tailored to the identified messages and target audience.

Sub-Activity 3.1.2.2 Prioritize, prepare and deliver elements of the information and awareness plan for policy makers, subject to the results of the survey. Initially, written materials concisely presenting the subject will be prepared. These will describe the issue, highlight the advantages of alternative technologies and describe the need for improved legislation and standards. Once available, the case studies presented by the pilot conversions will be used as illustration.

Sub-Activity 3.1.2.3 One of the functions of this Output will be to act as a platform for dialogue on integrating improvements in refrigeration technology in the cold storage sector with national industrial development priorities. Initially a number of bi-lateral meetings will be carried out to promote the alternative technologies (with a focus on hydrocarbon refrigerants) and their benefits. This will help prepare the ground for consideration of the options to enact the official policy and legislation enabling wider use of these technologies.

As a next step, potentially coinciding with and complementing the national exhibition or an initial award ceremony, a workshop/meeting/round table will be held at which the different actors will meet. At this event the information collected in the initial activities for Output 1.1

will be presented. Such a meeting will stimulate synergistic activity among the different stakeholders.

Activity 3.1.3: Technicians trained on best refrigeration practices and safe handling of alternative refrigerants: Short course for refrigeration technicians at cold-storage facilities to be coordinated by the Cleaner Production Centre under INEST.

Training and certification will be designed and offered on low GWP industrial refrigeration. Trainees will be certified to operate and maintain facilities using the alternative technologies covered in the course.

A prerequisite to the successful introduction of new technology is the availability of personnel trained to operate and maintain the new facilities. In order to ensure this availability for the technology to be introduced by this project, a course will be developed to enable the transfer of information on new and upcoming refrigeration options. A certification scheme will serve to increase confidence in the services provided by the technicians completing the course.

Vietnam has a number of technical institutions, which provide formal vocational education at different levels in refrigeration. Most of the technicians responsible for operating and servicing refrigeration equipment have received formal training at those institutions. Further training is often based on experience or training on the job. In addition, some of the technicians are trained while working with senior technicians, combined with self-learning. The educational institutions, via the Vietnam Society of Refrigeration and Air Conditioning (VISRAE), will be closely involved in this activity to ensure continued relevance and sustainability of the training programme.

Technicians will be trained from 50% of the total number of close to 400 cold stores in the fisheries sector. To ensure national coverage courses will be given in Hanoi, Danang, and Ho Chi Minh (locations and numbers to be confirmed at project inception). At the end of the training the technicians will be certified to work with these technologies.

Sub-Activity 3.1.3.1 Conduct a training needs assessment. This will be done through a survey of potential trainees and focus groups, as appropriate. The assessment is intended to ensure that training under this project is focused and complementary to the existing training initiatives.

Sub-Activity 3.1.3.2 Design the course curriculum and develop training materials and tools (such as software): the perspective to be taken is that of creating a knowledge base within the country that will become sustainable. The course will consist of both theoretical and practical modules and have a certification element, based on an assessment process to be established along with the course curriculum. The intent of certification is to enable employers to distinguish between qualified workers and those with less-than-quality credentials

Modules will contain information on:

- Alternative, low GWP refrigerants, their environmental impacts and how they differ from HCFCs and HFCs
- Detailed treatment of those technologies most relevant to the Vietnamese market
- Good practice in operation and maintenance of refrigeration plants of the types selected, with particular attention paid to issues specific to alternative refrigerants such as, for instance, dealing with leaks and flammable substances.
- Recovery and recycling of HCFCs (the attention given to this module will depend on whether the technicians attending the training have been previously trained and equipped for recovery and recycling in the context of the CFC phase-out).

A prerequisite to satisfactory practical modules is the presence of on-site training equipment to ensure the hands-on knowledge which is necessary for technician training.

Sub-Activity 3.1.3.3 Ensure local ownership. All materials developed will be translated into the Vietnamese and made publicly available using those methods determined as most appropriate during the training needs assessment, for instance web-based access for participants. The Ministry of Industry and Trade, MONRE and other stakeholders will be closely involved in this activity to ensure the sustainability of the training programme.

Sub-Activity 3.1.3.4 Initial course: train the trainers. Target audience of this course is teachers in vocational schools that have a course on refrigeration. The NOU has provided training to this target audience as part of the measures taken to comply with the Montreal Protocol. A group of up to 20 professional will be trained by the international expert team and will subsequently assume roles as national experts on industrial refrigeration with alternative refrigerants. Trainees will thus become a source of expertise on these technologies, and serve as multipliers for project impacts.

Sub-Activity 3.1.3.5 Subsequent courses will be delivered by the teachers trained in the initial 'train the trainers' course. They will receive support and feedback, as required, from the initial instructors. Successfully certified trainees will be provided with documentation indicating that they are certified.

Sub-Activity 3.1.3.6 Assess the benefits of the course through evaluation forms distributed at the end of the training, to allow for measurement of capacity gains.

Sub-Activity 3.1.3.7 Dissemination activities: development of a peer-to-peer network between cold-storage facilities.

Activity 3.1.4: 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 3.1.4.1 Prepare and publish project materials, including case studies, on an ongoing basis. Aggregate the monitoring information from the pilot conversions in Component 2 of the project and analyse the results, producing regular reports (every 3 months). This will include an anecdotal record of any events that relate directly or indirectly to the indicators that are being tracked. This includes press releases, photos, email inquiries etc. Reports about project outcomes, case studies and results achieved will be produced and will be made available both within Viet Nam as physical copies, and more widely available on the internet.

Sub-Activity 3.1.4.2 Prepare and publish annual reports for a general, external audience Reports about project outcomes, case studies and results achieved will be produced and will be made available both within Viet Nam as physical copies, and more widely available on the internet.

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, an interim status report may be provided by the project team.

Sub-Activity 3.1.4.3 Prepare a final report 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 the Gambia and one other country. A common website will 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 these three pilot projects lead to other countries embarking on similar efforts.

This component will make use of the co-financing provided by shecco, in the form of shecco's dedicated industry platforms for natural refrigerants on the internet. A special section on the project will be integrated into these platforms to communicate about progress made. In June 2013, shecco and UNIDO are planning the event "UNIDO ATMOSphere Technology Summit", which will focus on natural solutions for developing countries. The two pilot companies will be called in to present the project. In addition to this, a side event is planned at one of shecco's ATMOSphere workshops on natural refrigerants in Asia. In September 2013, for instance, shecco is holding its first-ever Asian ATMOSphere Conference on Natural Refrigerants in Tokyo. The focus will be on Natural Refrigerant technology and innovation from leading end-users, suppliers, academia and government representatives.

Deployment schedules for project components are as follows:

	Year 1	Year 2	Year 3
Component 1: Policy and regulatory support			
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.			
Component 2 – Technology Transfer			
Output 2.1: Two pilot demonstration conversions are carried out: two cold storage facilities converted from HCFC-22 to hydrocarbon systems.			
Output 2.2: The demonstration conversions are replicated in up to 10 other facilities.			
Component 3 Awareness raising			
Output 3.1: Lessons learnt and information on technology solutions is disseminated to policy makers, companies and technicians.			

A.1.5) global environmental benefits (GEFTF, NPIF) and adaptation benefits (LDCF/SCCF);

This project will bring about global environmental benefits as a result of reductions in emissions of Greenhouse Gases.

Under the Montreal Protocol, HCFCs will be no longer available for purchase after 2030. During the period 2030-2040 only 2.5% of the baseline will be allowed annually for servicing and maintenance purposes of existing installations (Decision XIX/6). Until conversion is mandated, HCFC-22 based

cold storage facilities will emit GHGs through both direct and indirect means. With aging systems leading to dropping efficiency and increasing leaks, emissions of GHGs per year will also increase considerably.

Direct Emission Reductions

- (1) Part of the outputs of the project will be the conversion of two cold storage facilities from HCFC-22 use to a hydrocarbon refrigerant system. In addition, USD 900,000 in soft loans will be provided for the conversion of additional facilities. These activities will result in direct greenhouse gas emission reductions during the projects’ implementation phase.
- (2) Direct CO₂e emission reductions as a result of the activities during the project implementation period of 3 years are due to the benefits of the proposed low GWP technology as compared to systems using HFC-404a.

To calculate this, we first find that with the proposed technology, greenhouse gas emission reductions totaling 25,000 tonnes of CO₂ equivalent will be achieved over the lifetime of the investments of 20 years when compared to continuing the current situation. This lifetime was chosen taking into account the fact that the equipment currently being used in typical cold storage facilities in Vietnam is commonly around 25 years old. The reduction is the sum of the reductions due to the pilot conversion in two cold storage facilities (34 units, 230 tons CO₂ eq./yr) and of the estimated reductions due to the conversion of additional facilities using the VEPF loans (0.001 tCO₂ eq./USD/yr, calculated from the impact of the pilot projects).

Second, we find that replacement by HFC-404a instead would result in reductions of almost 16,000 tonnes of CO₂ equivalent over the same period. For a similar sized facility replacement by hydrocarbon results in GHG reductions that are more than double the reductions due to replacement by HFC-404. Since HFC-404 systems are cheaper, the reduction per dollar invested is only 50% higher for the hydrocarbon systems than for HFC. Without replacement, 100 kg of HCFC-22 would be emitted as leakage from each of the two facilities already selected for conversion every year.

Finally, the difference between the two cases is **9,000 tonnes** of CO₂ equivalent, which is the lifetime **direct GHG emissions** avoided due to this project. The facilities that will be converted through the use of the soft loans would not otherwise implement a low-GHG emissions technology.

For all three types of systems air-cooling was assumed to be used.

The numbers given above are based on modeling the replacement of the present system with hydrocarbon and replacement with HFC-404a for a sample facility (Tran Cong Thanh, see description of Component 2 for details of the facility):

	Replacement of HCFC-22 with HFC-404A	Replacement of HCFC-22 with hydrocarbon
Lifecycle cost (equipment, installation, and maintenance over 20 years) (USD)	157,340	182,630
Energy use (kWh/yr)	105,611	77,493
Reduction in energy use compared to existing system (%)	3%	28%

GHG emissions reduction when new compared to existing system¹ (tCO₂/yr)	-132	-192
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¹Lifetime emissions reductions were calculated assuming that refrigerant leakage increases by 10% a year, starting from a level of 5% in the first year.

Direct Post-project Emission Reductions

- (1) The project does not include activities that would result in direct post-project greenhouse gas emission reductions.

Indirect Emission Reductions

- (1) Using the GEF bottom-up methodology, indirect emission reductions attributable to the project are 38,000 tonnes CO₂ eq when compared to replacement by R404 (or 100,000 tonnes of CO₂ equivalent when compared to the current situation). This figure assumes a replication factor of 4.
- (2) Using the GEF top-down methodology, indirect emission reductions attributable to the project are 64,000 tonnes CO₂ eq. when compared to replacement by R404 (or 115,000 tonnes of CO₂ equivalent when compared to the current situation). This figure assumes that the total technological and economic potential for GHG emission reductions in this area over 10 years is 129,000 tonnes of CO₂ equivalent if R404 technology is used, whereas the use of the proposed technology results in a potential of 288,000 tonnes of CO₂ equivalent compared to the current situation. The project causality factor is 40%.

Other Benefits:

UNIDO has experience in cold storage applications in food and agro industry value chains as a means of minimising post harvest losses, for value addition and trade competitiveness by allowing perishable commodities and products to reach end markets with the required quality and safety standards. This project will take advantage of such complementary services and synergies in applications promoted through technical assistance support services within UNIDO. Inputs may include:

- Good practices (GPs) for compliance to product quality standards

While the deployment of low-carbon technologies is expected to improve the efficiency of refrigeration and cold storage applications, GPs in the cooling process would generate complementary efficiency gains in terms of assurance of quality and compliance to safety standards.

The adoption of Good Practices (GPs) is not that much investment intensive in terms of capital requirements, for instance as compared to requirements to compliance with quality management systems such as ISO 9001/22000 (HACCP). Many fishing communities and businesses are already faced with growing challenges associated with climate change that are worsened by poverty in coastal communities, and these are resulting in a decrease of fish catches and high costs on operation; and therefore low productivity.

Enterprises that introduce Good Practices for assurance of product quality and safety in their processes can achieve market access gains, including competitiveness export markets. Such practices may include the introduction and training of operators along the value chain on HACCP, ice quality and improvements in cooling efficiency through contact surface, insulation or insulation for cooling lines or handling of ice. HACCP guidelines could also help to introduce and promote easy to operate controls on critical points, such as temperature monitoring systems.

Moreover, improvements in the cooling efficiency and optimized cooling capacity reduce operating costs, thereby improving profitability. Additionally, wider application of processing by refrigeration and cold storage helps to reduce the levels of post harvest losses (which are up to 40% in some

fisheries), therefore helping to reduce the pressure on fisheries resources and contributing to conservation of fisheries biodiversity.

- **Optimisation of resources throughout the value chain**

Refrigeration is widely applied in the food and agro sectors to enhance product shelflife; for easy of packaging and shipping, or to enhance quality, encapsulate original flavour and maintain nutritional value of the food and agro product. The key considerations and benefits of refrigeration can be summarised as follows:

- **Economic considerations:** to reduce operating costs and improve capacity per unit amount 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 concerns:** to minimize energy consumption during the cold chain/ for instance freezing or ice production operation and to reduce environmental impact by reducing product loss in waste streams, i.e. to incorporate the possibility of waste heat recovery systems.
- **Product quality aspects:** to have precise control of the 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.

A.1.6) 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 financing mechanism to support technology transfer for low-GHG, low-ODS upgrades and conversions of industrial refrigeration and air conditioning. This financial mechanism will be developed and implemented by the Vietnam Environmental Protection Fund (VEPF), which will ensure that it is effectively mainstreamed to ensure that it functions after the end of the project. As a revolving fund it has built-in post project impacts.

The project's sustainability is further enhanced by the work to create 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 creation of framework conditions encouraging the deployment of alternative, very low GWP refrigeration technologies will encourage development of these technologies, resulting in an improvement of their energy efficiency with time. Currently, the stage of development of HFC technologies, which use mature technology, is much more advanced than that of "natural refrigerants", which is part of the reason for the difference in price and in efficiencies of the equipment, resulting in higher life-cycle costs of the innovative hydrocarbon technology proposed for this project. As technology for natural refrigerants in general, and hydrocarbon in particular, develops, it will become both cheaper and more energy efficient. This project aims to contribute to this development by encouraging the deployment of a specific hydrocarbon technology.

As described in Section A.1.2, there are close to 400 cold storage facilities in Viet Nam used for fisheries, and the sector is growing. Other countries in South East Asia also have large industrial fisheries, with the associated cold storage sector (the members of the Association of Southeast Asian

Nations, ASEAN, are responsible for one-quarter of global fish production). Since HCFC-22 will be phased out globally by 2030, the potential for scaling up of alternative technologies such as the one transferred in this project is very large. The financing mechanism that will be developed in this project is designed to initiate the process of scaling-up the use of this technology beyond the initial pilot projects.

In addition to the above, looking further into the future, technologies using very low GWP refrigerants such as hydrocarbon can potentially be carbon neutral if a clean source of electricity is used. When refrigerants such as HFC-404 are used, on the other hand, the extremely high GWP of the refrigerant itself means that the technology has an inherent level of emissions that will remain even if the electricity supply is decarbonised.

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:

- Ministry of Natural Resources and Environment (MONRE): National Focal Point for the UNFCCC and the Kyoto Protocol. Also, through the National Ozone Unit (NOU), oversee the national programme to control ozone-depleting substances (ODS), enforce national policies and raises public awareness of Viet Nam's international obligations under the Montreal Protocol. MONRE plays a key role in research and development in environmental protection and energy. The NOU specifically is a stakeholder in this project in view of the focus of this project 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.
- Participating enterprises in which pilot conversions of cold storage facilities are planned:
 - Seaprodex Hai Phong (HaiPhong Factory for Transfer Aquatic for Export), No. 43, Le Lai Street, Ngo Quyen District – HaiPhong City. Seaprodex Hai Phong specializes in producing and processing agricultural and aquatic products and food for export and for domestic consumption. It has 22 employees and about 5,2 billion VND gross annual revenue. Seaprodex (Vietnam National Seaproducts Corporation) is majority owned by the Vietnamese government. The cold store in Hai Phong is run as an independent entity; however, major decisions have to be made at the headquarters in Hanoi.
 - Tran Cong Thanh cold storage, Thach Bich Village – Bich Hoa Commune – Thanh Oai Dist. - Hanoi. Privately owned. Five employees, about 4,5 billion VND annual gross revenue.
- Ministry of Industry and Trade (MOIT): runs the National Energy Efficiency Programme (VNEEP). The MOIT was formed after the merger of the Ministry of Industry and the Ministry of Trade. MOIT is in charge of activities related to the energy sector and other industries, in accordance with Decree 189/2007/ND-CP issued by the Prime Minister on 27 December 2007. MOIT is in charge of the formulation of law, policies, development strategies, master plans and annual plans for the sectors under its remit, and submits them to the Prime Minister for approval.
- The Department of Processing and Trade for Agro-Forestry-Fisheries Products and Salt Production, Ministry of Agriculture and Rural Development (MARD) is a project implementing partner due to its role in the fish processing sector
- Viet Nam HPMP PMU (set up by the NOU)
- STAMEQ as advisor on standards on industrial refrigeration.
- Vietnam Community of Heating, Ventilating, Air Conditioning & Refrigeration Engineers
- Vietnam Society of Refrigeration and Air Conditioning (VSRAE) (landhkk.com.vn):
- Vietnam Association of Seafood Processing and Export: This association, together with the Vietnam Fisheries Association, cooperated with MARD to propose policy mechanisms and measures to encourage organizations and individuals to reorganize their production to ensure

production efficiency, particularly of better design of commercial cold storage facilities to increase efficiency. These proposals were developed in the context of the Prime Minister's *Decision on the approval of the Strategy of Vietnam's Fisheries Development for the Period 2011 – 2020* (No. 1690/QĐ-TTg)

- Cleaner Production Centre: located at the Hanoi University of Technology, under its host organization: Institute for Environmental Science and Technology, INEST.

Since indigenous people in Vietnam mostly inhabit the interior mountains and highlands, while the majority Kinh people tend to be concentrated in coastal areas, indigenous people are not expected to be key stakeholders in this project. However, involving minority people will be explored where possible.

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 focal point for gender issues within MONRE will also be consulted for all three components of the project.

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):

Accelerated HCFC phase-out due to the introduction of alternative, low GWP refrigerants (specifically, hydrocarbons) on the market through the two pilot projects and soft loans (in Component 2), through increased policy and regulatory frameworks (in Component 1), and through improved awareness among policy-makers and facility owners of the phase-out requirements and options (in Component 3).

The increased energy efficiency of the new equipment will reduce energy use. This will bring savings for installation owners in terms of lower energy costs. Since in electricity production not only greenhouse gases but also air pollutants are emitted, reducing the energy use will also reduce other environmental impacts.

Reduced energy use will also increase the competitiveness of the companies.

The project has been designed using the GEF's guidance on gender mainstreaming, 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 co-financed) 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 education and outreach activities will improve educational opportunities for women in Viet Nam and is anticipated to have a positive impact on those working with the businesses that participate in the project. Since many women work in the fish processing sector in Viet Nam, this project - which will improve the refrigeration quality and working conditions - is anticipated to bring positive impacts on employment conditions for women. Gender perspective may be also incorporated in policy discussions by having representatives of women's organizations and NGOs involved in policy dialogue. The focal point for gender issues within MONRE will also be consulted for all three components of the project in order to better address gender equality issues. 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. Whenever possible, collected data will be disaggregated by gender in order to monitor the impact of the project on gender mainstreaming.

UNIDO also recognizes that “gender equality and the empowerment of women has a significant positive impact on sustained economic growth and sustainable industrial development, which are drivers of poverty reduction and social integration.” 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.

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, economic, policy, the market, and finance. Internal risks could pertain to the enterprises targeted for the pilot conversion in Component 2. 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

<i>Risk Type</i>	<i>Description</i>	<i>Risk Level (low, med, high)</i>	<i>Potential Impact</i>	<i>Proposed Mitigation Measure</i>
Technical risks	Availability of technical resources for the proper application of new technologies	High: The market for hydrocarbon technology may be immature and under-funded in the country. Some of the new technologies have not been applied in developing countries.	Medium: Vietnam has been introducing new technologies; however, Hydrocarbon has not been used in industrial refrigeration although used in commercial and residential on small scale	Some technologies will be excluded from the solutions suggested. This shows a limitation on the scope of the proposed solutions. 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 decommissioning and removing 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	Select the proper contractor with expertise of HCFC handling
Economic/market risks	<ul style="list-style-type: none"> Inability to scale up outcomes after successful delivery of outputs Failure to achieve sustainable market transformation Availability of 	Medium: Vietnam is committed to the HPMP; however, HCFC-22 Service sector was not a high priority for Stage one.	High: Some owners of facilities have no intention to convert out of the present system earlier than the deadline under the Montreal Protocol if units are running well and have been well maintained. Without considerable funding, the owners will not commit any funds of	<ul style="list-style-type: none"> The whole project is designed to mitigate this risk, which is at the heart of the problem that it seeks to address. Technology transfer, capacity building and policy dialogue are all measures taken as part of the project to promote the scaling up of project

	<p>funding or co-funding. The cost effectiveness of projects replacing refrigerators is low and complementary funding is needed. Owners of cold storage facilities also need to co-fund some of the items like civil works for example</p>		<p>their own even if it means power savings in the future</p>	<p>outcomes and to achieve sustainable market transformation.</p> <ul style="list-style-type: none"> As a first step to the development of a market, in this project funding has been ensured for a limited number of projects
<p>Policy/regulatory risks</p>	<p>Change in priorities leading to reduced support to the project, implementation delays and reductions in the effectiveness of delivery of the capacity building programs.</p>	<p>Low: the project is fully consistent with Viet Nam's priorities and international commitments and it is highly unlikely that this will change</p>	<p>Medium: Since the project addresses the needs of many stakeholders, a remote chance of changes in government priorities will not have very far-reaching consequences of project implementation.</p>	<p>Close communication with the government will ensure open channels of information flow, so the project team will have early warning and will be able to address concerns of the government early (if there were to be any)</p>
	<p>The high level of bureaucracy in Viet Nam might cause delays in the implementation of the policy component</p>	<p>Medium</p>	<p>Low</p>	<p>The relevant ministries are represented in the Project Steering Committee, and their representatives should be able to minimize any delays.</p>
<p>Internal risks</p>	<p>Acceptance of solution by owner of facility to be converted. Owners contributed to the choice of the existing system and would want to approve the new technology</p>	<p>Medium: Operators openness to new technologies is unknown</p>	<p>Medium: Owners are asked to co-fund and their acceptance of the solution is primary</p>	<p>Pre-meeting with owners/operators to explain new technology proposed and impact on their operations</p>
<p>Safety risks</p>	<p>Safety risk due to improper serviceability of new technology or after-sales service knowledge</p>	<p>High: Depending on which service resources have been trained on which new technologies</p>	<p>High: Most of the technologies have a potential safety risk</p>	<p>After sales Service expertise has to be developed through intensive training and the certification of all service operators on safety procedures</p>

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

Direct CO₂e emission reductions from the project are due to the benefits of the proposed low GWP technology as compared to systems using HFC-404a. To calculate this, we first find the emission reductions due to the proposed technology when compared to continuing the current situation, which are expected to be 25,000 tonnes over the course of the 20-year investment lifetime. Second, using the same funds as are being proposed for this project to purchase R404a systems would result in emission reductions of almost 16,000 tonnes. The **direct greenhouse gas benefits** of this project are the difference between these two scenarios, which is **9,000 tonnes** of CO₂ equivalent.

With a budget of USD 290,000, the cost per tonne of GHG reduced for the GEF is thus USD 31 when replacement by an R404a system is used as baseline (or USD 12 when continuation of the current situation is used as baseline). While the direct emission reductions are comparatively small, the importance of the project is in its indirect effects. When compared to replacement with R404a systems, the bottom-up estimate for indirect emission reductions as a result of this project is 38,000 tonnes and the top-down estimate is 64,000 tonnes. The cost per tonne in this case ranges between USD 4.5 and USD 7.6 (when compared to continuing the current situation, the bottom-up estimate is 100,000 tonnes and the top-down estimate is 115,000 tonnes. The cost per tonne of GHG reduced for the GEF would then be USD 2.9).

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

The development and validation of the HPMP in Viet Nam, which is implemented by the World Bank, has already brought together stakeholders that are relevant to the proposed GEF project, including representatives of key Government agencies, refrigeration technicians, refrigeration importers and dealers, and consultants. Trainings on good practices in refrigeration will be conducted. Coordinating with the HPMP through the PMU set up by MONRE which manages the HPMP will allow the GEF project to both build-upon the work conducted to date, and to leverage training and other delivery mechanisms that have already been tested.

Stage I of Vietnam's HCFC phase-out management plan, as submitted to the Executive Committee of the Multilateral Fund by the World Bank, includes technical assistance and capacity building activities for energy efficiency promotion in the refrigeration sector. These aim to control growth in HCFC consumption and to lay the groundwork for subsequent investment activities in 2015 and beyond. In the cold storage sector, the activities will include:

- Development of an inventory of cold storage facilities
- Conducting an energy performance audit of the baseline equipment/industrial refrigeration sector
- Developing and distributing a manual of good practice for designing, maintenance and servicing of industrial refrigeration system

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).

The project 'Implementation of eco-industrial park initiative for sustainable industrial zones in Vietnam' is being implemented by UNIDO with GEF funding. The project management team for that project consists of the Ministry of Planning and Investment, MONRE and MOIT. Three industrial zones have been selected as pilot projects for eco-industrial parks, one of which (IZ Tra Noc 1+2 in Can Tho, South Vietnam) has food & seafood processing activities.

UNIDO has launched the programme on “Green Industry for a Low-Carbon Future”, a strategy to support green industrial growth in the developing world. Based on European experience, the programme encompasses the development of policy instruments aimed at raising resource efficiency on the level of companies and products that foster economic growth and international competitiveness.

UNIDO is also implementing a project on promoting industrial energy efficiency through system optimization and energy management standards in Vietnam. That project is being implemented in close cooperation and coordination with MOIT and its Energy Efficiency and Conservation Office. It is complementary to several initiatives that have been developed by international cooperation (ADB, WB, UNDP) in Vietnam in the field of energy efficiency. Trainings are being given in collaboration with the International Finance Corporation.

Other current relevant programmes are (1) Action Plan on Response to Climate Change hosted by MOIT (2) National programme on Technology Transfer (TT) on Energy Conservation and Renewable Energy managed by the Ministry of Science and Technology (3) The Vietnam Clean Production and Energy Efficiency Project supported by GEF and WB and hosted by MOIT (4) Technology Needs Assessment for GHG Abatement in the Industry Sector in Vietnam. A draft has already been published. The document states that in the industrial sector, due to time limitations only the most highly energy intensive sectors have been examined up to now. As a result, the TNA has not dealt with the food processing industry.

A number of projects in related areas have been completed in recent years, such as the Promoting Energy Conservation in Small and Medium Scale Enterprises (PECSME) project funded by the GEF through UNDP, and the Promotion on Energy Efficiency and Conservation Project, fund by Japan. The results of these projects will feed into the project described in this document.

In addition, UNIDO is developing Projects in other countries – including The Gambia and one other country – to be presented for GEF funding. These projects explore a range of alternative (“natural”) refrigerants, 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.

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 and the National Ozone Unit (NOU) under MONRE, with the Cleaner Production Centre involved in the training component if deemed appropriate. A Project Steering Committee (PSC) will be formed with UNIDO, Cleaner Production Centre, the three ministries most directly involved: MONRE, MOIT, and the Department of Processing and Trade for Agro-Forestry-Fisheries Products and Salt Production of MARD and the Ministry of Science and Technology. 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 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 the Gambia and in one other country.

Project Implementation

The project will be coordinated through a two tiered system, consisting of a Project Steering Committee (PSC) and a Project Management Unit (PMU)

Project Steering Committee

A Project Steering Committee (PSC) will be formed and composed by the representatives of the main Government stakeholders and UNIDO. It 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 MONRE, and it will meet annually. At its meetings it will consider the Annual Work Plan presented by the Project Director, give guidance and suggestions for its improvement and approve the final version.

The PSC will include representatives from the Cleaner Production Centre, MONRE, MOIT, MARD and the Ministry of Science and Technology. 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 Viet Nam will be facilitated by involvement of stakeholders from those initiatives in the PSC.

The Project Co-ordinator, representing MONRE, will be the Convenor Secretary of the PSC.

Project Management Unit

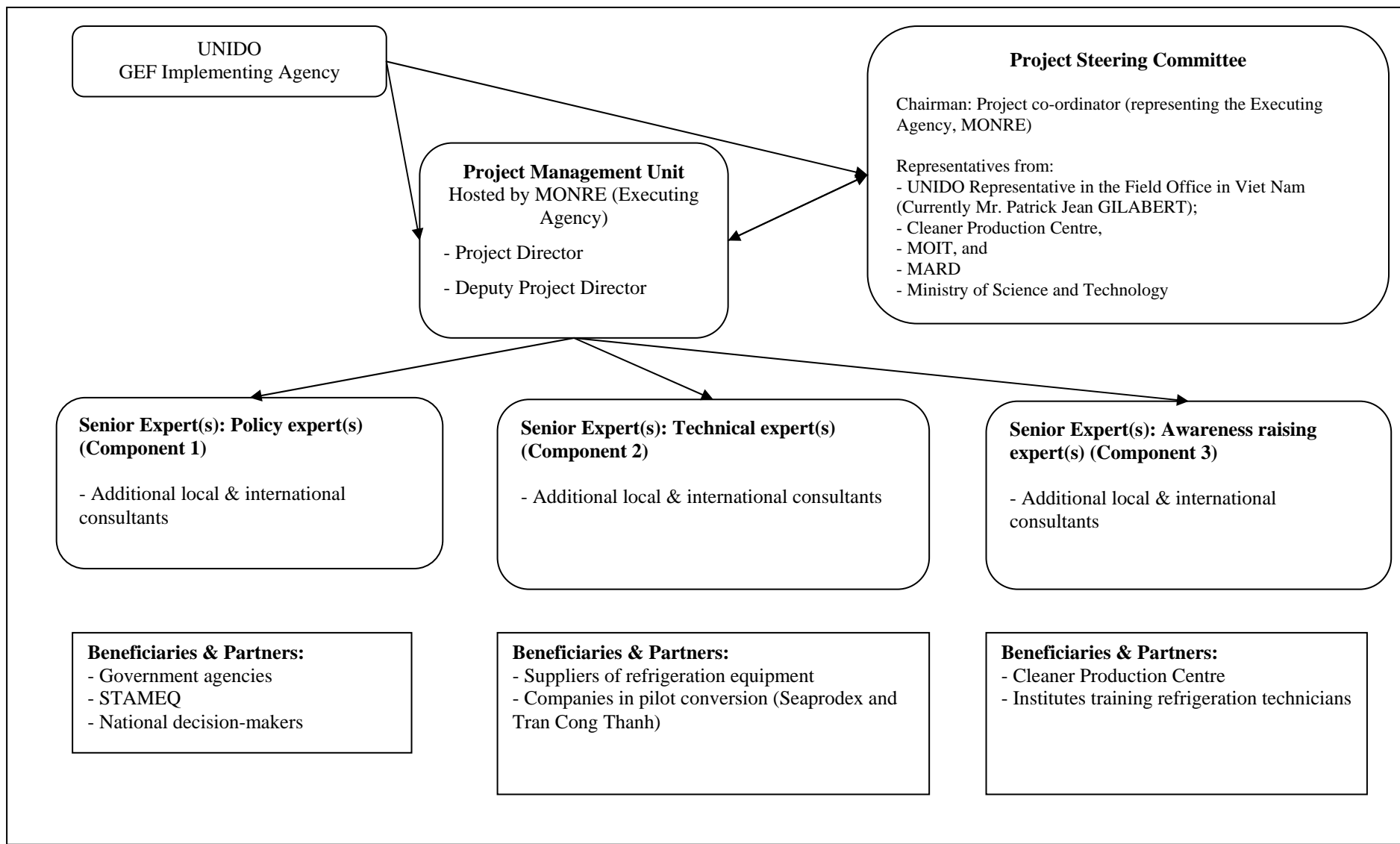
The PMU will consist of a Project Director (PD), supported by a Deputy Project Director and an Administrative Assistant. The Project Director will be the field extension of the Management Unit and will lead the PMU. The Director will be responsible for executing the WP and the day-to-day management, monitoring and evaluation of project activities as per the approved AWP.

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

The PD 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 PD and accordingly executed by the Project Management Unit (PMU).

The PMU 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 PMU produces the terminal report, which is to be submitted to the Project Steering Committee at least two weeks before the Terminal meeting.

The overall project management structure is outlined in the diagram below.



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 Vietnamese Government is in favor of adopting and enforcing standards and regulations that are essential for the project to have an impact through replication. Viet Nam signed the UNFCCC in June 1992, ratified it in November 1994 and it entered into force in February 1995. Viet Nam also ratified the Vienna Convention for the Protection of the Ozone Layer, the Montreal Protocol and its Amendments on 26 January 1994.

Vietnam's National Communication to the UNFCCC (2010) notes the need to deploy environmentally sound technologies to develop its low-carbon economy, including the application of advanced, high efficiency air-conditioning and refrigeration technologies in the civil area to reduce energy use. The National Communication also states that the present inefficient use of energy in fish processing leads to high GHG emissions.

The Synthesis Report of the Technology Needs Assessment for Climate Change Mitigation for Vietnam was published in June 2012. It states that industrial air conditioning, cooling and freezing technologies in Vietnam are mostly old and obsolete. Energy use technologies in general are outdated, with old equipment and energy consumption 1.2 – 1.5 times higher than the regional standards. Transfer and application of advanced technologies are demanded to meet the social and economic development needs in the future.

Vietnam's National Capacity Needs Self-Assessment for Global Environmental Management was published in 2006. Concerning capacity constraints and capacity needs for the implementation of the UNFCCC, the Assessment states that development of the portfolio of potential projects is restricted. The capacity to develop and implement projects on climate change is limited, and there are few consultants competent in the development and implementation of such projects. International consultants have not been actively involved.

In 2011, the GEF Vietnam Operational Focal Point issued the 'Proposed National GEF Portfolio of Viet Nam 2010 – 2014' on GEF-5 focal area strategies to guide the implementation of the GEF programs and projects. The document lists the national strategic priorities of Viet Nam in GEF-5 and selection criteria to establish these priorities. A sector specific criterion in the area of climate change is that sectors with high GHG emission should be given more consideration compared with other areas. Under the GEF-5 strategic objective of promoting the demonstration, deployment and transfer of innovative low-carbon technologies, the priority for use of funds is to demonstrate, develop policies and mechanisms for the promotion, application, transfer and market development of innovative low carbon technologies. The national policy guiding priorities is the 'National Strategy for environmental protection until 2010 and vision toward 2020'. This strategy promotes the adoption of clean technology and cleaner production lines and the use of environmentally friendly and less polluting raw materials and fuels.

Viet Nam has committed itself to the phase-out of HCFCs through the approval of its HCFC Phase-out Management Plan (HPMP) by the Multilateral Fund of the Montreal Protocol in 2011. The Vietnam HPMP addresses the conversion of facilities using ODSs in their manufacturing processes and customs control, with stage I focusing on the foam sector, technical assistance and project management. However, the conversion of end-users and existing installations is not eligible under the Multilateral Fund. GEF support for market development for alternative refrigerants for end users with very low global warming potentials such as hydrocarbons, would therefore accelerate the phase-out of HCFCs considerably, in addition to achieving GHG mitigation benefits.

Other important documents at the national level:

- A national master plan for developing the seafood processing industry by 2020 was approved by the Ministry of Agriculture and Rural Development (MARD) in 2011. The master plan prioritizes a number of projects to upgrade or build industrial-scale factories for processing seafood, buy storage and preservation facilities for ships, and set up a research center. The master plan also states that investment is needed in the study and development of technology and equipment.
- Vietnam's Fisheries Development Strategy through 2020 approved by the Prime Minister on September 16, 2010 (Decision No. 1690/2100/QĐ-TTĐ) re-orientes the development of the fisheries sector to focus more on product quality and sustainable growth. This strategy includes initiatives to ensure production efficiency, specifically of better design of commercial cold storage facilities.
- The Coastal Resources for Sustainable Development (CRSD) project is a World Bank-MARD project that is the first major investment to implement the Government's strategy. This project was approved in May 2012 and will run until Jan. 2018. One activity of this project includes the upgrading of fishing ports, in the context of which cold storage facilities are expected to be provided at ports currently lacking them.
- The processing of aquatic products has been designated as a priority industry for the period up to 2020 by the Prime Minister of Viet Nam. The decision on priority industries promises that these industries will receive funds for R & D activities such as technology transfer.

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: (1) demonstrate, deploy and transfer technology for the conversion of HCFC-22 based facilities; (2) create the enabling policy environment and mechanisms for this technology transfer; and (3) offset greenhouse gas emissions through two pilot projects. The core outputs will be the demonstration and deployment of innovative low-carbon technology, and the adoption of national strategies for the deployment and commercialization of this innovative technology.

The project is also consistent with the Vietnam priority for use of GEF 5 funds for the CCM-1 focal area that is identified in the Proposed National GEF Portfolio of Viet Nam 2010-2014: to demonstrate, develop policies and mechanisms for the promotion, application, transfer, and market development of innovative low carbon technologies.

The main barriers to adoption of low GWP refrigeration technology in Vietnam are identified in Section A.1.1 of this document. In addition to this, Activity 1.1.1 includes the identification of barriers preventing the adoption of best practices for refrigeration in cold storage facilities in Vietnam. In this activity barrier identification will take place through interviews with key stakeholders, and supported by learning that takes place via the pilot projects. 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 2.2.1, the financing scheme 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 project will contribute to Outcome 1.3 of the One Plan 2012-2016 between Viet Nam and the UN. This outcome includes the establishment of mechanisms and resources to effectively address climate change mitigation. The rationale for this outcome states that Viet Nam is facing a rapid increase in greenhouse gas emissions and that the UN will provide support with developing enhanced mechanisms to promote energy efficient, greener production. One of the outcome indicators is national greenhouse gas emissions.

The UNIDO field office in Viet Nam is one of UNIDO's most longstanding Field Offices in Asia. The office is staffed by a UNIDO Representative and four national experts, who work mostly on GEF projects. Most projects are implemented by HQ based project managers.

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 Government of Viet Nam 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 Management Unit (PMU) under the Project Director 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 PMU 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 PMU produces the terminal report, which is to be submitted to the Project Steering Committee at least two weeks before the Terminal meeting.

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 director is responsible for regular progress reports (every 3 months) with the full support of and in agreement with the participating companies and Government programmes. The reports also will be discussed with the Project Steering Committee – which will include representatives from the Cleaner Production Centre, MONRE, the Ministry of Industry and Trade (MOIT), the Ministry of Agricultural and Rural Development (MARD) and the Ministry of Science and Technology.

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’s⁴ 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 shown in Table 1 below.

Table 2: Project’s Indicative Monitoring and Evaluation Workplan

Type of M&E activity	Responsible Parties	Budget US\$ (Excluding project team staff time)	Time frame
Inception Workshop (IW)	- Project Director (PD)	3,000	Within first two months of project start up
Inception Report	- Project Management Unit (PMU)	0	Immediately following IW
	- PD		
Measurement of Means of Verification for Project Purpose Indicators	- PD will oversee the hiring of specific institutions and delegate responsibilities to relevant team members	7,000	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 PD and UNIDO HQ	7,000	Annually prior to APR/PIR and to the definition of annual work plans
Annual Progress Report (APR) and Project Implementation Review (PIR)	- PD	0	Annually
Steering Committee Meetings	- PC	2,000	Following Project IW and subsequently at least once a year
	- UNIDO HQ		
Quarterly progress reports	- PD	0	Every three months
Terminal Project Evaluation and Report	- Project Management Unit	12,000	At the end of project implementation
	- PC		
	- External consultants		
	- UNIDO HQ		
Lessons learned	- PMU	0	Annually

⁴ http://www.unido.org/fileadmin/import/64064_UNIDO_Evaluation_Policy_FINAL.pdf

Type of M&E activity	Responsible Parties	Budget US\$ (Excluding project team staff time)	Time frame
Visits to field sites (UNIDO staff travel costs to be charged to agency fees)	- PD	0	Annually
	- UNIDO HQ		
TOTAL indicative cost		31,000	

UNIDO LEGAL CONTEXT

The Government of the Socialist Republic of Viet Nam agrees to apply to the present project, mutatis mutandis, the provisions of the Standard Basic Assistance Agreement between the United Nations Development Programme and the Government, signed and entered into force on 21 March 1978.



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. For SGP, use this OFFP endorsement letter).

NAME	POSITION	MINISTRY	DATE (MM/dd/yyyy)
Dr. Nguyen Van Tai	GEF Operational Focal Point, Director General, ISPONRE/MONRE	Ministry of Natural Resources and Environment (MONRE)	6 June 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		11/01/2013	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 (either copy and paste here the framework from the Agency document, or provide reference to the page in the project document where the framework could be found)

Project Narrative	Indicator	Sources of Verification	
<p>Project Objective</p> <p>Reduction of greenhouse gas emission in the cold storage sector in Viet Nam.</p>	<p><i>Direct emission reduction:</i>9,000 tonnes of CO₂ equivalent This is the result of emission reduction of 25,000 tonnes of CO₂ equivalent (with the elimination of HCFC-22, with global-warming potential of 1,810), minus the reduction of less than 16,000 tonnes CO₂eq. that would result from the use of HFC-404a.</p> <p><i>Indirect emission reduction:</i> GEF bottom-up methodology – Indirect emissions reduction of 100,000 tonnes of CO₂ equivalent through all the activities, or 38,000 tonnes when compared to replacement by R404. GEF top-down methodology – 115,000 tonnes of CO₂ equivalent through all the activities, or 64,000 tonnes when compared to replacement by R404.</p>	<p>Reports from MONRE during and after the duration of the project.</p>	
Component 1: Policy and Regulatory Support			
Outcome	Indicator	Sources of Verification	Assumptions/Risks (see section A.4)
<p>Policy, regulatory and legal measures are adopted by the government to support the adoption of low global-warming potential and energy efficient technology.</p>	<p>Number of national policies changed or adopted in favour of the use of alternative technologies with low global-warming potential.</p>	<p>Public records such as government websites and publications in the national gazette.</p>	<p>Assumes no radical shifts in Government priorities.</p>
Outputs	Indicator	Sources of Verification	Assumptions/Risks (see section 4)
<p>1.1 Gap analysis carried out in the national policy, legal and</p>	<p>Availability of gap analysis report.</p>	<p>Project progress report</p>	<p>Continuous government support and participation.</p>

regulatory frameworks. 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.	
Component 2: Technology Transfer			
Outcome	Indicator	Sources of Verification	Assumptions/Risks (see section 4)
Technology with low global-warming potential (hydrocarbon system) is demonstrated, replicated and deployed.	Up to 25,000 tonnes of CO2 emission reduced (vs. 16,000 if HFC-404a were used), by enterprise/facility Energy efficiency gain in percentage, by enterprise/facility Technicians of 12 enterprises/facilities reported that they can operate the new technology independently	Records of each enterprise/facility to the National Cleaner Production Centre Validation reports from MONRE Reports from the Viet Nam Environmental Protection Fund (VEPF).	The companies want and can proceed with the conversion process.
Outputs	Indicators	Sources of Verification	Assumptions/Risks (see section 4)
2.1 Two pilot demonstration conversions are carried out: 2 cold storage facilities converted from HCFC-22 use to hydrocarbon systems. 2.2 The demonstration conversions are replicated in up to 10 facilities.	Technology designs are available and demonstrated No of. technicians from each facility trained (disaggregated by gender) Monitoring of the results is continuous for minimum 12 months. Reduced emission of	Records of each enterprise/facility to MONRE Validation reports from MONRE Reports of the Viet Nam Environmental Protection Fund (VEPF).	The initial two pilot projects are successful. There is sufficient interest from private sector and trainee technicians. The companies are able to use and maintain the new technology. Trainees value the information provided

	greenhouse gases and improved energy efficiency are verified. Up to 900,000 USD from the Viet Nam Environmental Protection Fund will cover the costs from the new equipment in these 10 companies.	UNIDO project report.	and are able to use it in their day to day activities.
Component 3: Awareness raising			
Outcome	Indicators	Sources of Verification	Assumptions/Risks (see section 4)
Demand for low-GWP refrigerant systems that are more energy efficient than existing technologies is increased.	At least 20 firm inquiries indicating intent to use hydrocarbon refrigerants made to MONRE	Report from MONRE indicates their interest towards the technology.	Continuous support and participation from national authorities and companies.
Outputs	Indicators	Sources of Verification	Assumptions/Risks (see section 4)
3.1 Lessons learnt and information on technology solutions is disseminated to policy makers, companies, and technicians.	Written materials delivered to 50 policy-makers by month 18 (disaggregated by gender). Up to 10 bilateral meetings carried out by month 24. Up to 100 attendees at stakeholder meeting (disaggregated by gender) Training of technicians completed	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.

ANNEX F: Viet Nam Government decisions

The following table lists Viet Nam Government decisions on environmental issues, energy and climate change:

Name of docs	Type of docs	No.	Date of establishment	Person in charge
Approving the "Scheme on Development of the Environmental Industry in Vietnam up to 2015, with vision towards 2025"	DECISION	No. 1030/QĐ/TTg	July 20, 2009	Prime Minister
Approval of the National Target Program to respond to climate change	DECISION	No. 158/2008/QĐ-TTg	December 02, 2008	Prime Minister
Approving "the Strategy for Cleaner Production in Industry up to 2020"	DECISION	No. 1949 /QĐ-TTg/2009	September 07, 2009	Prime Minister
Law on Protection of the Environment	LAW	No. 52-2005-QH11	November 29, 2005	The Government
Law on Energy Efficiency	LAW	No.50/2010/QH12	June 28 2010	The Government
Approving the plan for thoroughly handling establishments which cause serious Environmental Pollution	DECISION	No. 64/2003/QĐ-TTg	April 22, 2003	Prime Minister
National Strategy for Environmental Protection until 2010 and vision toward 2020	STRATEGY		May, 2003	
Guiding framework for Formulation of Climate Change Response Action Plans of Ministries, Sectors and Localities	GUIDING FRAMEWORK	(Attached to Official Correspondence 3815/BTNMT-KTTVBDKH)	October 13, 2009	Ministry of Natural Resources and Environment - MONRE
Decision on promulgation of the Action Plan for Response to Climate Change of the Ministry of Industry and Trade	DECISION	/QĐ-BCT	July, 2010	Minister of Industry and Trade - MOIT
Approving the list of Priority Industries and Spearhead Industries for the 2007-2010 period, with a vision to 2020, and a number of Incentive Policies for these industries	DECISION	No. 55/2007/QĐ-TTg	April 23, 2007	Prime Minister

Approving the General Planning on Development of Vietnam's Industries by Territorial Region till 2010, with a vision to 2020	DECISION	No. 73/2006/QD-TTg	April 4, 2006	Prime Minister
Approving Vietnam's National Energy Development Strategy up to 2020, with 2050 vision	DECISION	No. 1855/QD-TTg	December 27, 2007	Prime Minister